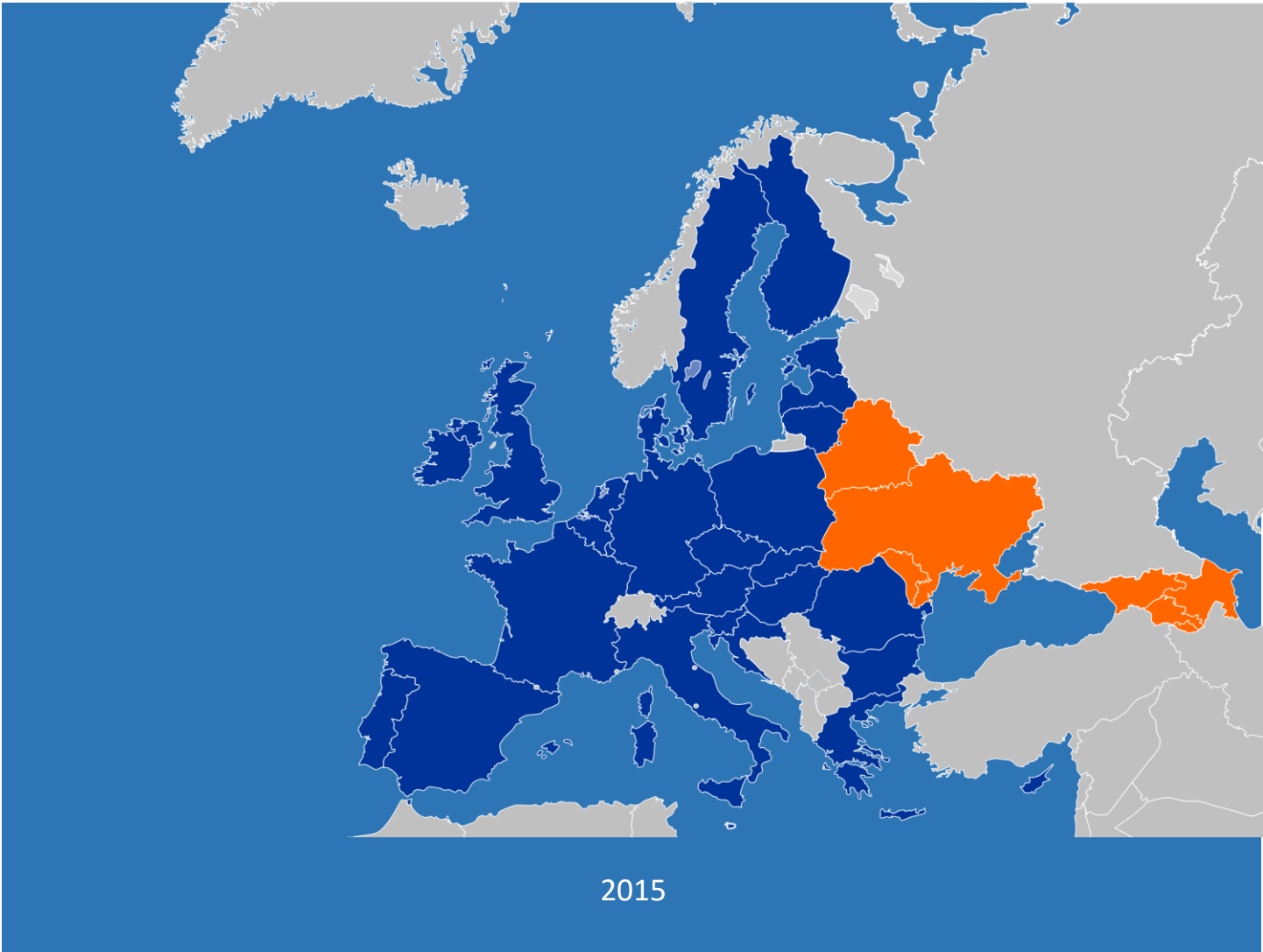




ENERGY UNION AND ENERGY SECURITY IN EaP COUNTRIES



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Project Funded by the
European Union



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This publication aims to increase awareness and capacity of EaP countries' CSOs in understanding of the EU new energy initiative-Energy Union and thus to enable synergies and cooperation between the EU and EaP countries for assuring the purpose oriented practical research in energy security.

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Abbreviations

EU – European Union

AA - Association Agreement

EaP – Eastern Partnership

WB - World Bank

DCFTA - Deep and Comprehensive Free Trade Area

PCIs - Project of Common Interest

R&D - Research and Development

RE - Renewable Energy

EE - Energy Efficiency

HPP - Hydro Power Plant

TPP - Thermal Power Plant

CC - Combined Cycle

CCGT - Combined Cycle Gas Turbine

BTC - the Baku-Tbilisi-Ceyhan oil pipeline

ANPP - Armenian Nuclear Power Plant

PSRC - Public Service Regulatory Commission

GNERC – Georgian National Energy and Water Supply Regulatory Commission

SCP - the South Caucasus gas Pipeline (Baku-Tbilisi-Erzurum main gas pipeline)

WREP - Western Route Export oil Pipeline (Baku-Supsa oil pipeline)

Energy Union Strategy and EaP countries (Policy Brief)

In February 2015 the EU launched a new framework strategy – Energy Union – with the aim to assure that Europe has secure, affordable and climate-friendly energy. There are a number of common interests between the Energy Union strategy and the national policy priorities of Eastern Partnership countries. The Energy Union is an ambitious project which lays out a long-term vision for European energy and climate policy. To achieve its aims of greater energy security, sustainability and competitiveness, the Energy Union strategy provides five interrelated and mutually reinforcing measures:

- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonizing the economy, and
- Research, Innovation and Competitiveness.

The Energy Union is based on the Energy Security Strategy, which was formulated in 2014. This document, among other things, supports deepening of the internal energy market, development and modernisation of energy and transport infrastructure, strengthening of the mechanisms for security of supply in the EU, strengthening of the negotiating position of the EU and its Member States towards external suppliers of energy commodities – “Energy Union that speaks with one voice in global affairs”, focus on the use of indigenous fuels and improving the energy security of neighbouring countries.

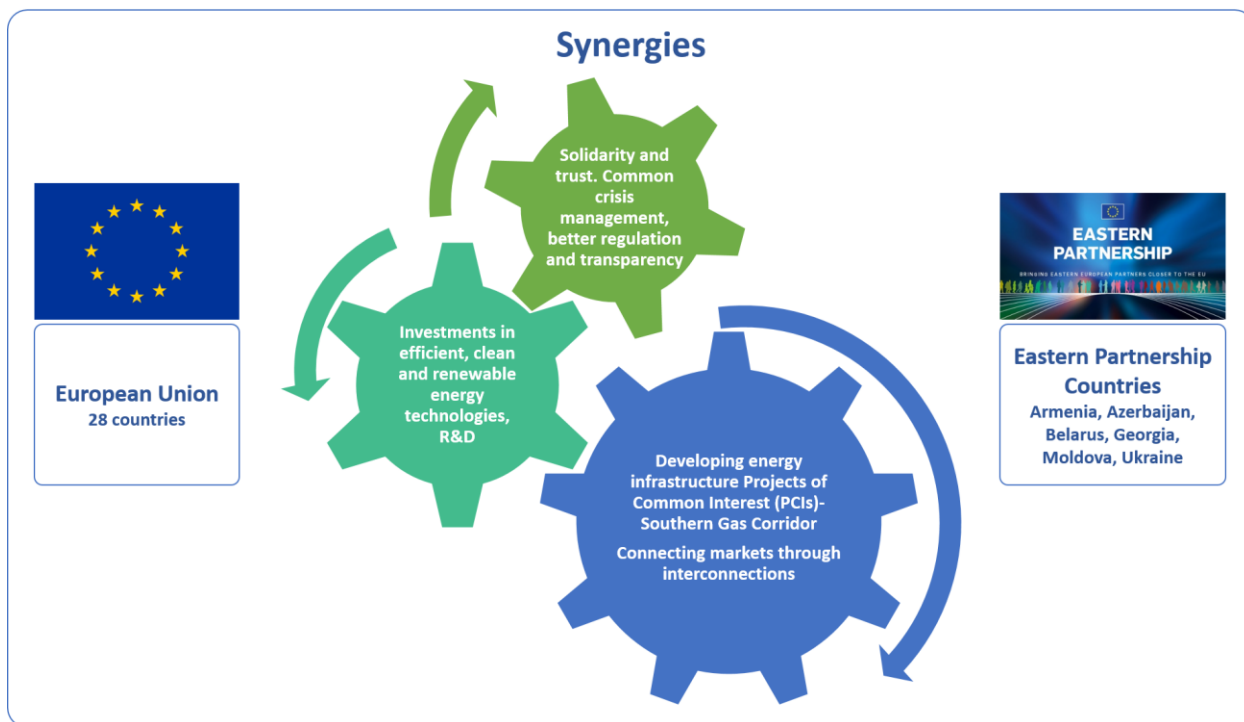
To address the challenges Energy Union will require countries to enforce existing EU energy legislation and pass new regulatory reforms aimed at increasing gas and electricity supply security, and reducing Europe’s reliance on dominant suppliers. It will encourage countries to develop a transparent, resilient and diversified energy network, and will set up an Energy Infrastructure Forum so that major infrastructure projects are delivered where and when needed.

It will also require countries to modernize their energy sector and promote transparent, secure and sustainable practices by:

- Passing legislation to modernize the European energy market and reinforce the regulatory framework at regional and European level;
- Passing legislation to ensure the 2030 climate and energy targets are reached;
- Making energy costs and prices more transparent;
- Making buildings more energy-efficient and decarbonizing the transport sector;
- Putting an initiative on global energy and climate technology and innovation leadership in place.

There are significant synergies between the Energy Union strategy and the national policy priorities of Eastern Partnership countries. The Eastern Partnership (EaP) countries will play a crucial role in the functioning of the Energy Union. Their strategic reserves and location along oil and gas supply corridors will be fundamental for the EU to diversify its energy supply sources and routes. Development of energy infrastructure under Project of Common Interest (PCIs) umbrella can benefit not only EU but EaP countries as well.

The Energy Union Strategy stipulates enhanced energy security in the partner countries along with the European Union, including through support to investment in infrastructure, better regulation, energy efficiency, clean and renewable energy technologies, research innovation and competitiveness and more efficient common crisis management to prevent disruption of energy supply. Adoption of the Energy Union could bring significant economic, political and social benefits to the EaP countries.



There is a wide spectrum of official positions toward EU approximation among the EaP countries. However a number of common interests especially in what concerns energy security should be utilized for mutual benefit of the EU and all EaP countries and requires closer cooperation. The role of civil society gets crucial in this respect especially in the situations where the external and internal factors may undermine the pro-western democratic aspirations on the official level. An attempt was made by the members of EaP CSF WG3 to reflect on the common interests in energy security and to formulate the country specific priorities and recommendations in relation to the new EU Energy Union strategy, as well as to formulate the common conclusions and recommendations for more effective cooperation under this new strategy.

Energy Security Risks and Interests in EaP Countries

All six EaP countries - Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine face important challenges regarding their energy security. National energy security risks and interests are specific to each country, but have many common aspects at the same time.

All countries see their role in providing the **transit for energy flows from Russia**. Azerbaijan and Georgia share the interest in development of the Southern Gas Corridor that should supply Europe with the gas from Caspian region. Armenia also considers the prospects of becoming a transit country for Southern Gas corridor by providing the gas flows to Europe from Iran through pipelines in Georgia. Ukraine, Belarus







and Moldova strive to remain the reliable transit countries for Russian gas and oil. All of these countries have their important role in the EU energy security but at the same time want to be free from political pressures.

Security of pipelines is the common concern emphasized by representatives of all three countries in the South Caucasus. Security of East-West transit pipelines are the major concern for Azerbaijan and Georgia especially in view of increased number of terrorist (and cyber-terrorism) attacks on energy infrastructure (August 5, 2008 cyber-attack on BTC pipeline in Turkey disrupted oil transportation for 14 days and caused 1 billion dollars loss). Armenia is more concerned with the security of North-South pipelines supplying it with gas from Russia (through Georgia) and Iran. Pipelines running through or in vicinity of conflict zones in Georgia and Azerbaijan cause additional concerns of their safe operation.

Another important problem and energy security risk is **increasing dependence on energy imports** from one particular supplier. Belarus is 85% dependent on imported oil and gas supplied mainly from the Russian Federation. This is especially important considering Russian-Belarusian gas disputes where "Gazprom" often threatened the Belarusian government to reduce or stop gas deliveries. This has allegedly resulted in a strong influence of the Russian political forces on the situation in Belarus. The same problem is also important for the republic of Moldova which depends almost completely on natural gas from one source - "Gazprom". Georgia has diversified from Russia and receives 90% of its natural gas from Azerbaijan. However the high dependence on one source is still not a comfortable position and Georgia should develop own sources of fossil fuels along with the gas storage for security and balancing the seasonal demand. Ukraine as well as majority of EaP countries needs to protect themselves from Russia's policy of "multidimensional utilization of energy dependence to gain political power and control over the states.

The major energy security risks and interests have been identified by the participants of the study:

Energy Security Risks and Interests

<div style="text-align: center;">  <p>Armenia</p> <ul style="list-style-type: none"> Disruptions in energy supply (oil, gas); Subversive and terrorist activities; Major deterioration of energy sector assets; Natural disasters, man-made accidents; Failure to construct the new nuclear power unit; Inadequate, below-the-cost tariff policy; </div>	<div style="text-align: center;">  <p>Georgia</p> <ul style="list-style-type: none"> Increasing dependence on energy imports; Threat to operation of strategic energy infrastructure due to Russian occupation; Threat of soft power through Russian ownership of energy assets; Need for new technologies including EE & RE Economic crisis and affordability of energy; Climate Change effects on energy sector; Physical and cyber threats to critical Energy Infrastructure. </div>	<div style="text-align: center;">  <p>Azerbaijan</p> <ul style="list-style-type: none"> Depletion of oil and gas reserves; Oil and gas pipeline security risks; Shortage of production of alternative energy resources; Energy Efficiency Development; Renewable Energy Development. </div>
<div style="text-align: center;">  <p>Belarus</p> <ul style="list-style-type: none"> Strong dependence on a single supplier – Russia; Inefficient use of energy; Deteriorated energy system due to the "socially-oriented" policy; </div>	<div style="text-align: center;">  <p>Ukraine</p> <ul style="list-style-type: none"> Russian aggression against Ukraine; Volatile gas prices and access to necessary volumes of imported gas at affordable prices; High dependence on credit resources and creditors for reforming energy sector; High penetration of Russian technologies, capital and owners in Ukraine's energy sector; High resistance of oligarchic groups to reforms in energy sector. </div>	<div style="text-align: center;">  <p>Moldova</p> <ul style="list-style-type: none"> Strong dependence on a single source of fuel supply (Gazprom); Outdated energy infrastructure; Low solvency of population to pay energy bills; Poor investment climate and lack of capacity of local energy authorities to finance the relevant energy projects; </div>

Russia represents a threat for Georgian and Ukrainian energy security more directly. It has occupied Georgian and Ukrainian territories. Kremlin continues aggression against Ukraine in the form of a hybrid warfare, hindering coal production and supply for electricity generation. In Georgia, Russia can easily manipulate with the main hydropower plant – Enguri, providing 40% of total electricity generation. In July, Russian military forces moved the border to the south, putting under threat one of main oil pipelines (Baku-Supsa). This has enhanced the critical risks for energy security of both countries.

Penetration of Russian capital to Georgian and Ukrainian energy sector is very high. This creates the interest groups that may be opposing the reforms toward EU approximation.

In Georgia the vertically integrated monopolies notably owned by Inter RAO UES and SOCAR may create the obstacles to market liberalization. Moreover the long term memoranda signed with the holding companies create a precedent of nontransparent governance in contrast to EU energy market principles. Russian businessmen also have big shares in Ukrainian energy production, including fossil fuels and electricity, technical equipment and maintenance.

Ukraine is a part of a former Soviet electricity network with simultaneous work mode and technical features with Russia and Belarus. Decision on switching off from Russian-led system require huge investments and time for modernization.

Corruption and non-transparency issues also cause certain problems in energy sector, corruption is still powerful in Ukraine, despite of changes in political structure of Ukrainian parliament and government. Lack of Energy security strategy and related capacity is an issues for Georgia, which raises the question on the qualification of managing and governing the energy sector which may be considered as a main energy security risk in the country. Corruption is seen as a high risk in Armenia and Ukraine. Relevant transparency safeguards should be established to protect against its negative impacts. All EaP countries highlighted the need for sectoral reforms.

Resistance to reforms of interest groups - This factor is especially noteworthy in Ukraine, Moldova and Georgia, who have signed the association agreement. In other countries, it is mostly a matter of political decision. In Associated countries there are various interest groups which prevent the reforms happening. The current grey areas in legislation and governance may be a feeding ground for strong interests to resist reforms. It can be also fed by insufficient capacity in government agencies who are used to the current status quo in their respective fields.

Obsolete energy infrastructure is also a major risk for most of the countries. Major deterioration of equipment and machinery, used in the Energy Sectors of Armenia, Moldova and Belarus often causes accidents and even human deaths. 70-75% of energy producing equipment is worn out in Moldova; as a result the system faces significant energy losses. Armenia has been trying to replace its nuclear power plant for years, but no progress has been made on this direction. Outdated energy infrastructure is a problem for Georgia, and Ukraine as well.

Energy Efficiency and development of Renewable Energy sources is the field of interest for all EaP countries who want to improve their security of supply and for example, significant energy inefficiency is a major challenge for Belarus where losses in heating plants goes up to 30%, all countries suggest development of Renewable Energy sources which requires investments in research and development and it's a topic where EU can share it's experience and contribute.

Innovation, Research and Development is perceived by all EaP countries as one of the most attractive directions of Energy Union, where the more realistic results can be achieved to the benefit of all parties involved. Participation in Horizon 2020 and other R&D programs could help the EaP countries to implement new efficient technologies, smart grids and smart cities, to increase their scientific potential and competitiveness.

Conclusions

There are significant synergies between the goals of Energy Union and the interests of EaP countries that provides the promising opportunities for increased cooperation between the EU and EaP countries. If realized in concrete policies and actions to the current high expectations, Energy Union can strengthen significantly the standing of the EU and thus make it more attractive for the EaP countries. In their turn they can be made more resilient and strongly contribute to improved energy security of the EU. To varying degree, all countries assess positively the prospects of cooperation within the Energy Union strategy; this can be more effectively strengthened especially within the Energy Community. The cooperation under the Energy Union seems to be beneficial to all parties; however, the concrete forms of interaction need to be developed further.

Energy security is closely related to other national security issues of the countries and mostly independence from external political influence. Therefore, stronger political support from the EU can have a crucial role for those countries that have signed the Association Agreements.

Difficult relations with Russia including open confrontation and attempts of political influence through different channels are commonly perceived as one of the main barriers in strengthening the cooperation between the EU and EaP countries under the Energy Union. A realistic policy approach needs to be developed in order overcome this barrier. Another related barrier is the opposition of interest groups benefitting from current non-transparent practices and substandard legislation providing the grounds for corruption and leverages for political influence.

In order to realize the promises of the Energy Union in relation to EaP countries it is necessary to fully realize the vision of Energy Union in combination of the EU energy security along with the security of neighbor – partner countries.

The situation in the world and in the region develops rapidly. Therefore there is a need of a more forward looking and dynamic approach that would enable prompt proactive actions rather than slow reactions to already happened events.

Due to current priorities, possible external and internal political pressures and changing current priorities the official structures may not be always in a position to follow the opportunities provided by the Energy Union. Therefore, the qualified participation of the civil society in policy process is becoming highly important. The governments may not be strong enough to ensure the sufficient progress and therefore the civil society needs to be involved more actively. Only providing adequate participation and involvement of civil actors one can expect that the interests of the societies in EU approximation and ultimately independence, will be fully defended and pursued. The involvement of CSOs in policy process should be strengthened both internationally and nationally. The case of Ukraine where the qualified CSOs are actively involved in formulating energy policies is exemplary for the CSOs from other countries.

Constructive engagement in Energy security discussion is a challenging task for the Civil Society as a combination of technical, economic and political factors should be duly addresses based on sufficient information. Therefore, increase in capacity for such an involvement shall be of the major concern for CSOs as well as a matter of attention from the EU. More focused efforts including e.g. creation of Energy-East forum for more in-depth discussion of energy security issues should be considered as having the major importance. Participation in energy security platform meetings could be a venue for informing and capacity building of civil society actors.

The discussion of the policy paper has shown that there is a need to align more closely the climate and energy agenda. In the period when the reduced oil prices can promote the increased use of fossil fuels and thus worsen climate change, state diplomacy and civil society should cooperate more effectively on promotion of energy efficiency and renewables in Europe and around the globe. In this regard, unification of Energy and Climate Change agenda under the same commissioner is considered as a positive step.

Recommendations:

- The EaP countries should closer participate at discussion on security, solidarity and trust, including development of preventive and emergency plans and talking in one voice with the monopoly suppliers to the extent possible.
- The EU and EaP countries should strengthen communication on safeguarding measures of key energy infrastructure, including common operations to protect important pipelines from terrorist attacks;
- Market integration and interconnection capacities should be strengthened on regional and EU level for guarantee diversification and secure supply of energy;
- EaP countries should develop domestic energy sources, especially renewable and support development of energy efficient technologies;
- EaP countries should harmonize their energy legislation to EU energy acquis, which will enhance transparency and investment environment for attracting strategic investors in the sector;
- The EU should strengthen cooperation with Ukraine and Georgia on creating prevention measures against Russian occupation of territories where strategic energy infrastructure is located;
- EaP countries should strengthen common principles of transparency, competition and independence of energy markets regulators by the implementation of European market principles in gas and electricity sectors;
- Synergies between EaP countries' energy policy priorities and the Energy Union strategy should be realized and supported by the parties in bilateral and multilateral formats.
- The potential for corruption and application of soft power multiplies in the conditions of substandard legislation and nontransparent unbalanced governance practices this leads to sliding away from the standards of the EU. Therefore, the countries who have chosen to reform energy sectors should maximize the pace of the reforms.
- Extend the role of civil society to be presented at the EaP platform meetings not only as representatives of EaP CSF but also to include the representatives from each country. Stronger interaction and common projects and experience exchange between the EaP and European NGOs can significantly strengthen the capacity of both sides;

- EaP CSF platform 3 on Energy Security and Environment and Platform 2 on climate change should improve coordination of activities;
- Strengthen the cooperation in research and development including Horizon 2020, creation of Research and Innovation Centers and provision of other technical assistance. This is the key development factor to help the countries acquire competitiveness and contribute to R&D goals of the EU;
- The effective schemes of meaningful CSO participation in formulating and implementing the energy strategies should be explored including through more qualified involvement but also regional cooperation with each other. Consider the possibility of creation of the Energy-East forum to supplement and expand the discussion going on the platform 3 of the EaP.

Energy Security and Energy Union Perspectives for Armenia

Artashes Sargsyan

NGO "EcoTeam-Energy and Environment"

Introduction

Armenia's energy relations with the EU are firstly supported through the Eastern Partnership (EaP) framework - a joint initiative of the EU and its Eastern European partners: Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine launched in 2009 at the EU Prague Summit. The EaP Riga summit (21-21/05/2015) confirmed energy as an important cooperation issue, as a result, within the European Neighborhood review process, energy is prioritized.

Armenia's accession on January 2nd, 2015 to the Eurasian Economic Union (EAEU, EEU, and sometimes referred to as Customs Union) could oblige the country to follow the Customs Union dominating Energy Policy and to some extent limit its opportunities to take advantages of the European Union Energy Policy.

Besides multilateral treaties, Armenia also has bilateral relations in the Energy sector. Significant support was provided by France, by the USA through USAID financed programs, and others.

A balanced energy policy strategy, taking into account Armenia's geopolitical issues, should be developed to maintain cooperation with its main partners in the Energy Sector.

The following three key security concerns dominate Armenia's energy debate:

1. Securing diversified energy sources, including nuclear;
2. Securing investments to ensure efficient, economical and environmentally sustainable renewable energy generation and usage;
3. Supporting the country's energy systems regional integration. (The National Energy Security Concept of RA was adopted by GoA in 2013) [8].

Armenia's Energy Sector depends on imported fossil fuel resources and securing their supply, as well as securing the operation of its nuclear power plant [6]. Armenia imports most of its fossil fuel resources, such as importing gas from Russia and Iran. In 2014, the Armenian Nuclear Power Plant (ANPP) in Metsamor met around 36.2% of Armenia's electricity demand while thermal power plants – around 32.8% (see Table 1) [27]. For now, the Armenian government does not see any alternative to nuclear power [30]. Originally they planned to close ANPP in 2016, however, in September 2013, Armenia announced that the operation of the ANPP would be extended until 2026. The government has not started designing a new Nuclear Power Plant, while the total cycle of an NPP construction requires at least 10 years.

Currently, the EU imports 53% of the energy it consumes, mainly crude oil (almost 90%), natural gas (66%), and solid fuels (42%) as well as nuclear fuel (40%) [23-24]. The most pressing energy supply security issue is its reliance on one single external supplier, especially with regards to gas and electricity: six Member States depend on Russia as single external supplier for their entire gas imports and three of them use natural gas for more than a quarter of their total energy needs.

The energy security concept, approved by presidential decree on October 23rd, 2013 [8], identifies the external and internal threats/risks of Armenia's Energy Security as the following:

External threats/risks:

1. Disruptions in supply of fuel/energy/oil resources; long-term damage to the North gas supply pipeline or simultaneous damage to the North and South gas supply pipelines.
2. Interceptions/failures in the parallel operations of Armenia and Iran's electric power systems, resulting in energy isolation of Armenia's power system.
3. Subversive and terrorist activities targeting fuel/energy systems.

Internal threats/risks:

1. Major deterioration of equipment and machinery used in the Energy Sector.
 2. Failure to construct the new nuclear power unit replacing the currently operating nuclear power unit at Armenia Nuclear power plant (ANNP) (*Example: in September 2013, Armenia announced that the operation of the Armenian nuclear power plant would be extended until 2026).
 3. Consequences of non-adequate tariff policy which fail to cover maintenance and operation expenses.
 4. Failure to implement large-scale projects due to unsuitable routes to transport heavy and large dimension equipment over (*Example: problems to bring heavy wind mill equipment).
 5. Natural disasters, man-made accidents, etc. (*Earthquakes like Spitak Earthquake in 1988*).
- *The examples are provided by the author

This chapter will further discuss the background of the Armenian Energy Sector, current energy policy, the legislative and institutional framework, key energy security issues and threats, relations and collaborations within the EU Energy Union strategy and Armenian energy policy, joint programs with the EU and opportunities to develop renewable energy sources, improving energy efficiency, nuclear energy security, regional cooperation, and state programs to develop the Armenia Energy Sector.

Key Energy Security Issues in Armenia

Background of Energy Strategy of Armenia

The four main directions of Armenia's Energy Strategy are: (i) developing of nuclear energy; (ii) developing renewable energy sources, improving energy efficiency and promoting energy saving programs; (iii) diversifying primary energy sources and supply routes; and (iv) regional integration [6].

Armenia has several official documents discussing energy strategy development [6-9]. The Energy Sector Development Strategy within the Context of the Republic of Armenia's Economy Development [14] was adopted by the Government of Armenia (GoA) in 2005, was updated in 2007, and has been the basis for the development of Armenia's long-term energy policy. Energy Sector development perspectives are also reflected in The Republic of Armenia's Long-term Development Strategy Program for 2014-2025, approved by the GoA on March 27th, 2014 [7], and the Energy Security Concept of the RoA approved by the President on October 29th, 2013 [8].

Developing renewable energy sources and improving energy efficiency, play an important role in Armenia's national policy as well. The law On Energy Saving and Renewable Energy was adopted on

November 9th, 2004 and The National Program on Energy Saving and Renewable Energy was developed and approved by a protocol decision by the GoA on June 23rd, 2007 [13].

The financing mechanisms have been based on foreign financial aid. In 2011, the Renewable Energy Roadmap for Armenia was developed with the help of foreign experts and focused mainly on the development of small HPPs and in 2014 [2] Scaling up Renewable Energy Program, (SREP) Investment plan for Armenia [14] became available to the public.

The Public Services Regulatory Commission of the Republic of Armenia supports renewable energy (RE) investments through feed-in tariffs. The Energy Law mandates that during the first 15 years of operations, 100% of electricity produced from new RE stations must be purchased at these tariff levels. According to a GoA decision, as of September 8th, 2011, a Small Hydropower Plant (SHHP) should have a 30MW capacity or less. Before, according to the law On Energy Saving and Renewable Energy, HPPs with capacities 10MW or less were considered a Small HPP.

Table 1. Feed-in-Tariffs for Renewable Energy Systems, 2013 (excluding VAT)

RE Technology	Feed-in Tariff	
	AMD/kWh	US\$/kWh
Wind	34.957	0.08
Biomass	38.856	0.09
Small hydropower plant built on “natural water systems”	20.287	0.05
Small hydropower plant built on irrigation systems	13.523	0.03
Small hydropower plant built on “drinking water supply systems”	9.017	0.02

Source: PSRC

Two documents focus on regional cooperation: Iran-Armenia Electricity-Gas Exchange Inter-State Agreements and Memorandum of Partnership between the Ministries of Energy of Armenia, Iran and Georgia September 29th, 2006.

ELECTRICITY GENERATION

The total installed capacity of Armenia’s power system is around 4336.6 MW and the available capacity is 2589.6 MW due to aging equipment. The installed capacity of thermal power plants (TPP) is 2347 MW. TPPs use natural gas imported from Russia and Iran. The installed capacity of the Hrazdan TPP is 1110 MW (available - 370), Yerevan TPP - 550 MW (currently not operational), Hrazdan 5 unit - 445 MW, and Yerevan CCGT - 242 MW. The total available capacity of all TPPS is 1380 MW. Additional TPPS with total capacity of 620 MW should be installed, as the Hrazdan TPP is calculated to be written off in 2018.

During 2012, Armenia imported 98 million kWh of power, of which the majority was from Georgia (67.9 million kWh), as well as from Iran and Artsakh. Armenia also exported 1696 million kWh, with 1578.1 million kWh to Iran and 118.1 million kWh to Artsakh. The maximum system load registered was 1520 MW on December 31st, 2012. The number of customers connected to the grid was 950,000.

The first unit (VVER-440/270 reactor) of the Armenian Nuclear Power Plant (ANPP) was put into operation in 1976, and the second unit (VVER-440/270 reactor) - in 1980. The total installed capacity of ANPP was 815 MW. In 1989, after the earthquake in Spitak on December 7th 1988, the ANPP was shut down due to safety concerns. In 1995, Unit No. 2 (with an installed capacity of 407.5 MW) was re-commissioned. Currently, the available capacity of ANPP is 385 MW.

Economically justified alternatives to life extension of the existing Nuclear Power Plant (ANPP) through 2026 do not exist [1]. Several options have been considered to replace the ANPP from 2026 onward. Three NPP technologies were identified to replace the old 2nd Unit of ANPP: VVER-1000 design AES-92 with a capacity of 1028MW (most suitable), the Enhanced CANDU 6 (EC 6) with a capacity of 670 MW, and several Small Modular Reactor (SMR) designs with a capacity of 385 MW, which offer the capability to add nuclear generation capacity in smaller increments, however, it has not been tested on a commercial scale.

The installed capacity of all HPPs is approximately 1182 MW, including 222 MW of Small HPPs, and one pilot wind farm with 2.64 MW installed capacity.

Table 2. Electricity delivered by energy companies of RA for internal consumption in RA in 2014¹

Name of the power plant	Power production	
	million kWh	%
Thermal power plants (TPP)	2076.2	32.8
Nuclear power plant	2290.4	36.2
Large and medium hydropower plants (HPPs)	1309.6	20.7
Small hydropower plants (small HPPs)	669.8	10.6
Lori 1 Wind Energy Plant	3.7	0.06
Lusakert Biogas Plant	0	
Total electricity production	6324.9	100

Table 3. Data on the existing power plants in Armenia [1]

Power Plant	Available Capacity (MW)	Efficiency, %	Annual Max. Generation (GWh/y)	VOM (€/MWh)	FOM (€/kW)	Last operation year
Armenian NPP	385	30.3	2124	0.44	84.09	2016
Yerevan CC	220 (200 In summer)	49	1888	-	42.41	2040
Hrazdan 5 Unit	440 (420 in summer)	45	3277	1.49	7.05	2040
Hrazdan TPP	370	34	2755	-	19.82	2019
Sevan-Hrazdan cascade of HPPs	550	88	472	0.44	15.18	2040
Vorotan cascade of HPPs	400	88	1120	9.41	25.01	2040
Small HPPs	222	90	558	39.29	-	2040
Lori Wind Farm	2.6		3	67.7	-	2040

* Based on water release limits from Lake Sevan for irrigation purposes

¹ based on PSRC data

Currently, 154 small hydropower plants produce electricity, with an aggregate design capacity of around 260 MW and an actual average annual energy supply of around 720 million kWh. In 2009, the Government of RA approved the development scheme for small hydropower plants, which envisages the construction of 90 additional small hydropower plants with an aggregate design capacity of around 110 MW (as of January 1st, 2012). As of January 1st, 2014, the construction of 71 small hydropower plants started with a total design capacity of around 145 megawatts and an expected annual average energy supply of around 515 million kWh [7].

The single wind plant operating in Armenia is the Lori-1 plant with a capacity of 2.64 MW and started operating December 2005 through a grant from Iran. The capacity factor of the plant is at approximately 11%. The annual electricity production of the wind plant was 3.7 GWh in 2014 and its share in net production of electricity was around 0.06%. The wind plant is grid connected.

The largest biogas plant in the region, Lusakert, started operating in 2008 (capacity - 0.85 MW, annual electricity production – 7 million kWh), however, it didn't produce electricity in 2014 due to a too low amount of waste. The biogas plant is grid connected as well.

In spite of some good examples of Photovoltaics (PV), solar energy station installation and operation in Armenia, the total capacity of all PV stations is less than 200kW. The development of PV stations is hindered by relatively high prices and insufficient high feed tariffs. According to expert estimates, 2000-3000m² solar water heaters have been installed in Armenia, most of them imported from China.

Armenia has no operational geothermal projects.

ELECTRIC NETWORKS AND INTERCONNECTIONS

The current transmission network of Armenia is comprised of a 220 kV electric network with a total length of 1323 km including 14 substations, and by a 110 kV network of 580 km including 18 substations [Appendices 3, 6]. The transmission networks are operated through High-Voltage Electric Networks CJSC, which also covers the 110 and 220 kV interstate lines on its balance sheet, including all corresponding parts of adjacent energy systems. The transmission network has a meshed topology, is capable of meeting the internal demand, and has excess capacity to exchange with and transit power to the regional market.

CJSC Electric Networks of Armenia (ENA CJSC) is a power distribution company, which supplies electricity to 980,000 consumers. Over the past nine years, the electric loss within the networks has decreased from 25.5% to 12.9%, and the average collection extended from 76.9% to 100%.

From July 2013 to July 2014, daytime residential tariffs were 38AMD/kWh. End-users tariffs for the residential sector in Armenia from August 1st, 2014 to July 31st, 2015 were 41.85 AMD/kWh (including VAT) for day time (from 07:00 to 23:00) and 31.85 AMD/kWh (including VAT) for night time (from 23:00 to 07:00). From August 1st, 2015, end-use daytime electricity tariffs for consumers (including population/residential sector) feeding from 0.38kV voltage networks turned into 48.78AMD/kWh and nighttime residential electricity tariffs – 38.78 AMD/kWh (approved by the PSRC). Protests in September 2015 led the GoA to subsidize electricity by reducing tariffs with 7 drams from daytime electricity tariffs of 48.78AMD/kWh and nighttime residential electricity tariff of 38.78 AMD/kWh for one year.

NATURAL GAS

The gas system in Armenia is operated by Gazprom Armenia CJSC. The total length of the main gas transmission pipelines is 1,863 km.

The construction of the Iran–Armenia gas pipeline has expanded the resource base of the natural gas supply and created a second technological entry to Armenia. Gazprom Armenia restored the Abovian Underground Gas Storage Facility’s (UGSF’s) design operating parameters with a capacity of 135 million m³. Armenia imported 2069.1, 2455.5 and 2361.1 million m³ natural gas in 2011, 2012 and 2013 correspondingly [20].

Daily and annual maximum capacities of pipelines transporting natural gas from Russia and Iran are presented below.

Gas pipeline	Daily maximum capacity, million m ³	Annual maximum capacity, billion m ³
North-South pipeline	10	3.65
Iran-Armenia pipeline	8	2.30
Total	18	5.95

Initially, the Russian-Armenian Intergovernmental Agreement stipulated the cost of natural gas imports from the North (from Russia) at 189 USD (143 EUR) for 1,000 m³ until 2018, after which it would grow [1]. However, on July 18th, 2015, the GoA announced an increase in natural gas import costs from the North (from Russia) at 165 USD for 1,000 m³ effective from January 1st, 2015 (1USD=480 AMD).

Armenia imports gas from the South in exchange for electricity exports at a rate of 1 m³ of gas = 3 kWh of electricity. Imports of 405 million m³ of natural gas through the South pipeline and exports of 1200 GWh electricity to Iran are forecasted for 2015.

For consumers in Armenia with a monthly consumption volume less than 10 thousand m³ of natural gas - the selling price (tariffs) is 156,000 drams (including VAT) for each consumed thousand m³ of natural gas (effective from July 7th 2013, Decision 190N of PSRC).

For consumers in Armenia with monthly consumption volumes of 10 thousand m³ and more, the selling price of a thousand m³ of natural gas with heat capacity of 7900 kcal equals to 276.98 USD (including VAT) expressed in AMD for each consumed cubic meter of consumed natural gas (effective from July 7th, 2013, Decision 190N of PSRC).

Cooperation with the EU

Armenia cooperates with the EU through the following EU Initiatives/programs [22-23]:

The Energy Flagship Initiative. Launched in 2010, the Energy Flagship Initiative has three main goals: to facilitate the trade of gas and electricity between the EU and the six Eastern European partner countries (Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova and Ukraine), to improve energy efficiency, and to expand the use of renewable energy sources. The INOGATE program supports the economic convergence of energy markets and the enhancement of energy security within the EaP region. At a municipal level, regional support is provided through the Covenant of Mayors and Sustainable Urban Demonstration Energy projects (SUDEP), as well as through the reinforcement of the Eastern Europe

Energy Efficiency and Environmental Partnership (E5P). Within the Covenant of Mayors initiative, whereby cities are committing themselves to reduce CO2 emissions by 20% through the implementation of Sustainable Energy Action Plans, ten Armenian cities (Aparan, Artik, Ashtarak, Dilijan, Gyumri, Hrazdan, Spitak, Tsakhkadzor, Vayk and Yerevan) have already signed up to this ambitious initiative.

Eastern Europe Energy Efficiency and Environment Partnership (E5P). Armenia recently joined E5P, a multi-donor fund managed by EBRD to improve energy efficiency and environmental protection in the Eastern Partnership region. Armenia plans to scale up ongoing energy efficiency program to invest an additional \$20 million (from E5P) in energy efficiency. The E5P funding is expected to become available to Armenia in 2016.

Multilateral and bilateral donors that are involved in investments and financing renewable energy and energy efficiency projects in Armenia.

- European Bank for Reconstruction and Development (EBRD)

-Rehabilitation of Sevan-Hrazdan HPP. EBRD is co-financing the rehabilitation of the Sevan-Hrazdan cascade with ADB's PSOD.

-Development of small hydropower plants (HPPs). Under the Renewable Energy Project, EBRD provided \$7 million to Cascade Bank (Ameriabank) for on-lending to Armenian companies involved in developing SHPPs. These funds, combined with a World Bank loan of \$ 5 million, \$ 3 million equity investment from a private investor, and \$ 13 million co-financing from project developers, which enabled to develop 25 SHPPs with total installed capacity of 45 MW. The Renewable Energy Project included also \$ 3 million GEF grant to help create a better enabling environment for development of renewable energy

- *Caucasus Energy Efficiency Program (CEEP).* EBRD extends loans to local commercial banks for sub-lending to industrial companies for energy efficiency and rational energy utilization investments, which include geothermal heat pumps and solar water heaters. Loans will be extended to residential customers on a demand-driven basis. The Project also includes grant funding to engage consultants in order to prepare energy audits, review investment proposals, support companies in securing funding from PBs and implementation support.
- *Regulatory support to promote renewable energy.* EBRD provided technical support to the PSRC on feed-in tariffs (FiT) and third party access (TPA) regulations.

KfW's focuses on developing and maintaining renewable energy resources and financing transmission investments to support regional cooperation

- *Construction and rehabilitation of SHPPs.* KfW provides financing and advisory support for the construction and rehabilitation of privately-owned SHPPs. Under Phase 1, KfW supported 14 SHPPs through several commercial banks. Under Phase 2, KfW supported 20 SHPPs with a total capacity of 45 MW. Phase 3, will include up to EUR 40 million in financing SHPPs.

Energy Union Strategy and National Energy Policy

On the 25th of February 2015, the European Commission adopted the Energy Union Strategy [22, 23]. The goal of Energy Union, with an ambitious climate policy, is to give EU consumers - households and businesses - secure, sustainable, competitive and affordable energy. Achieving this goal will require a fundamental transformation of Europe's energy system.

The Energy Union strategy has five mutually-reinforcing and closely interrelated dimensions designed to bring greater energy security, sustainability and competitiveness:

- Energy security, solidarity and trust;

- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonizing the economy, and
- Research, Innovation and Competitiveness

The Energy Union strategy envisages implementation of fifteen action points [22] which include: diversification of its supply of gas and making it more resilient to supply disruptions; bringing together information on EU-funded infrastructure projects and creation dedicated Energy Infrastructure Forum; creating a seamless internal energy market; ensuring security of supply; integrating renewables in the market; and regional approaches to market integration. They also include greater transparency on energy costs and prices.

Important is the EU's target of reaching at least 27% energy savings by 2030. Retrofitting existing buildings to make them energy efficient and making full use of sustainable space heating and cooling will reduce the EU's energy import bills, reinforce energy security and cut energy costs for households and businesses. The EU aims to speed up energy efficiency and decarbonization in the transport sector and has agreed to a target of at least 27% at the EU level for renewable energy by 2030. This will include a new policy for sustainable biomass and biofuels, as well as legislation to ensure that the 2030 EU target is met cost-effectively. The Commission will also develop an active agenda to strengthen EU energy cooperation with third countries, including on renewable energy and energy efficiency.

Energy Policy

According to Armenia's Law on Energy (2001), the government's main policy in the Energy sector is separating economic activity, state management and regulation. In May 2008, the Ministry of Energy of RA was renamed to the Ministry of Energy and Natural Resources of the Republic of Armenia (MOENR). The ministry is responsible for sustainably supplying electricity to the consumers, determine the economic potential of natural resources, and other tasks relevant to those areas. Moreover, it has the responsibility to define the policy for developing the energy sector.

The other main players in Armenia's Energy Sector are The Nuclear Safety Regulation State Committee, the Public Services Regulatory Commission, The Operator of the Electric Energy Network, and the Settlement Center. The management structure of Armenia's Energy Sector is brought in [6].

The Armenian government adopted the National Energy Security Concept in 2013 (in support of its Economic Development Strategy to 2025), outlining strategies for fuel diversification mainly through renewables, nuclear power, building up fuel reserves, and increasing its electricity generation capacity. Numerous strategies and action plans have been developed on the basis of the concept, supporting ambitious targets for replacing 1,000 MW nuclear capacity by 2026 and reaching a 26% renewable energy share in the country's energy mix by 2025 (up from 7% in 2012). Armenia has a well-elaborated renewable energy roadmap, adopted in 2011, largely focusing on small hydro plants [4]. In 2015, the Long-term (till 2036) Development Directions of the Energy Sector of the RA were presented by MOENR RA.

However, the country still needs to further develop energy efficiency policies, measures and governance to tap the potential for large energy savings in all sectors of the economy. Its Energy Savings and Renewable Energy law dates back to 2004 and the National Program on Energy Saving and Renewable

Energy of Armenia to 2007. Unfortunately, very little improvements have been observed in optimizing the country's assessed 40% energy saving potential.

Achievements in Improving Energy Security

CONSTRUCTION OF NEW GENERATING CAPACITIES: 220 MW Yerevan Combined Cycle Gas Power Plant (completed in 2013), and 440 MW Hrazdan-5 Combined Cycle Gas Turbine (commissioned in 2013).

REGIONAL INTEGRATION: Armenia and Georgia signed the Parallel Operation Agreement, Agreement on Power Supplies during Emergency Situations and Dispatch Instructions, on which trade between two states is founded. Armenia and Georgia approved a feasibility study of interconnection transmission lines with the installation of a substation with B2B converter at a total capacity of 1,050 MW, and signed Amendment #2 to the New Transmission Line Construction Agreement on April 16, 2014.

ACHIEVEMENTS IN RENEWABLE ENERGY AREA. Most achievements reached in the construction of Small HPPs are described on page 7. However, noteworthy are that some of the constructed SHPPs raise significant environmental concerns. Armenia's current observer status to the Energy Community opens the door to harmonizing with EU legislation. Research and technical capacity, studies, policies and plans for renewable energy development Armenia is on the list of pilot countries eligible for funding for investments in the RE area.

PROMOTION OF ENERGY EFFICIENCY IN ARMENIA (Implementation of the Action Plan on Energy Saving Renewable Energy and Roadmap on Energy Efficiency (EE)). In 2012, the GoA approved an EE project through World Bank financing, implemented by the R2E2 fund. To reduce the level of energy consumption by social and other public facilities, energy saving activities have been conducted in public facilities. The cost of the project is estimated at \$ 10.7 million. The Objective of the R2E2 Energy Efficiency Project, is to reduce energy consumption in public buildings. Financing, through a revolving fund: \$8 million from the GoA to R2E2 fund; \$1.8 million via the WB/GEF Grant. About 15 Energy Saving Agreements were signed totaling \$2.6 million.

GOA HAS SCHEDULED AN ACTION PLAN IN THE ENERGY SECTOR FOR 2014 – 2020. The roadmap includes the extension of Unit 2 of the ANPP Design's Lifetime for a period of 10 years and the construction of Armenia New Nuclear Unit (commissioned for 2026), the construction of Small HPPs with 260 MW capacity to produce an additional 300 million kWh of electricity, the construction of Lori-Berd HPP with 60 MW capacity (2023), the Shnogh HPP with 75-100 MW capacity (2023), the Meghri HPP with a capacity of 100-130 MW (2020), the construction of wind power plants (up to 200 MW total capacity), a geothermal power plant, and a PV station up to 30 MW. In addition, a competitive tariff setting is set to be introduced and plans to construct a second combined cycle unit at the Yerevan TPP with 250-450 MW capacity (2018). Among the government's priorities is the development of an electric transport system to connect Yerevan with neighboring cities to decrease the emissions. In addition, minimum requirements for energy efficiency and energy saving in the public sector procurement should be established. In the area of regional cooperation, the RA plans to construct the first 350 MW module of B2B substation and connect it to the 220 kV Alaverdi-Gardabani TL (2015 – 2018), the first circuit of the 400 kV Hrazdan-Ayrum line and the second 350 MW module (2017-2021). The RA schedules to install a third 350 MW module, to construct a second circuit of the 400 kV Hrazdan-Ayrum line, to construct the Iran-Armenia transmission third line and to construct the Meghri HPP with EDBI financing as well.

The mechanisms to integrate Armenia into regional energy projects are the Black Sea Economic Cooperation, European Energy Charter, Power Council of Commonwealth of Independent States (CIS), USAID, Interstate Oil and Gas Transportation to Europe (INOGATE), Horizon 2020, and Organization for

the Promotion of Energy Technologies (OPET), Green Growth Fund (GGF), and further development of economic relations on bilateral and multilateral basis.

Options and Suggestions

- As it is officially planned to construct a PV Station up to 30 MW till 2020 and increase the capacity of PV stations up to 80MW, we suggest *to enlarge the capacity up to 120 MW* taking into account a sharp decrease of prices on PV systems [18], and at the same time to limit the construction of remaining non economically feasible and/or are harmful to environment small HPPs by cutting feed-in tariffs.
- Armenia has a great renewable energy potential, as estimated in several reports and researches [2, 13, 19, 20]. Re-evaluating the renewable energy potential in biogas and biomass use is recommended. Data on biomass use are far from exact data, as no systematic research on volumes of biomass use exist. Major Illegal tree cuttings and data on its volumes are artificially reduced. Several attempts have been made at the NGO level to evaluate biomass use. Data should be reevaluated using modern techniques.
- More intensive cooperation with Energy Union's 5th direction: Research, Innovation and Competitiveness. The RA should facilitate for consumers participating in the energy transition through smart grids, smart home appliances, smart cities, and home automation systems to involve local population in similar programs.
- The *development of electrical transport for inter Yerevan communications* should be considered to decrease the emissions in Yerevan. The best choices to develop subsequent metro stations including underground and above ground options, especially above ground versions as they are less expensive.
- To improve energy efficiency and develop renewable energy sources *Research Centers and Laboratories should be formed and supported*, focusing their activities on bringing advanced technologies to Armenia and developing innovative products or components i.e. ready to sell the products in the area of renewable energy technologies. Although the Armenian market is relatively small for such products to be developed from start to end, international cooperation in these centers should counter for this and be organized with government support and resources. The Solar Center in Uzbekistan, organized with support of ADB and other donors, could serve as a good example (to be refined). More international funding should be reallocated from Ministries to similar centers and laboratories at which scientific knowledge should be prevalent over managerial experience and «copy paste» activities.
- *Corruption in the Energy Sector as well as in other areas in Armenia should be reduced*, as it deters potential foreign investors and the country's development overall. There is no official data on corruption, however, its existence in large volumes has been admitted by the government and an appropriate structure at the governmental level has been created to fight corruption. No significant examples on the fight against corruption have been demonstrated thus far. Environmental concerns regarding some of the constructed SHPPs, for example, are the result of inappropriate activities of officials from the Ministry of Nature Protection providing approval on projects which do not comply with environmental standards. In addition, a significant amount of loans for Small HPPs constructions are foreign.

Conclusion and Recommendations

Significant financial investments are required to implement developed plans with technical assistance from EU and USAID modernizing Armenia's energy sector and improving its energy security. Armenia relies on external funding. To avoid untargeted funding, Armenia should consider the EU's experience in solving energy supply security problems, as many common energy security problems exist in both Armenia and the EU. Similarities can be found in energy security, particularly, dependence on imported fossil fuels, dependence on Russian gas imports, secure operation of its nuclear power plants, and insufficient electricity and gas network connections between countries.

1. Economically justifiable alternatives for the life extension of the existing ANPP through 2026 do not exist. Three NPP technologies have been identified suitable to replace the old 2nd Unit of the ANPP. The VVER-1000 design AES-92 with a capacity of 1028 MW is seen as the most suitable.
2. Currently, Armenia's Energy Sector provides for its internal market with electricity and exports to neighboring countries around 10 to 16 times more than it imports. During 2012, Armenia imported 98 million kWh of power - mainly from Georgia (67.9 million kWh), as well as from Iran and Artsakh - and at the same time exported a total of 1696 million kWh to Iran (1578.1 million kWh) and Artsakh (118.1 million kWh). *A further upgrade of outdated equipment is required. A need for the installation of an additional 620 MW thermal capacity is needed starting in 2018, as several or all outdated units of TPPs (The Hrazdan Thermal Power Plant) will be decommissioned by that time. To provide reliable power flows with Georgia, and through it possibly with the EU, the construction of a 400 kV line and a Back-to-back converter (B2B) is required, as was approved by a GoA program, and feasibility studies are under way through funding from KfW.*
3. Commissioning the Armenia-Iran gas pipeline (South pipeline) in 2009 significantly reduced risks in the event of gas supply interruptions from Russia through the North pipeline and other possible issues with Armenia's energy system. Taking into the account the growing positive relations between the EU and Iran, as well as the US and Iran, and upon appropriate agreement with Russia, Armenia could develop and implement joint plans with the EU and Russia to enlarge Armenia and Iran's gas pipelines capacities and transit Iran gas to EU countries through Georgia's gas pipelines.
4. Provisions of soft loans from the EU to Armenia to develop and improve Armenia's Energy sector and its energy security, and to implement energy sector development plans (which were developed to a large extent through technical assistance from the EU and USAID) are necessary. As well as technical assistance to the RA in the form of program development, training of specialists, providing modern equipment at affordable prices. In addition, *training sessions of local specialists by EU experts could result in an increase of cooperation.* Moreover, intensifying collaboration within the Energy Union strategy's 5th direction - Research, Innovation and Competitiveness – as well. Facilitating the consumers' participation in the energy transition through smart grids, smart home appliances, smart cities, and home automation systems will improve Armenia's energy sector development and security as well.
5. *While establishing residential electricity tariffs, it is necessary to take into account current incomes of different segments of the population. In the case of Armenia this is especially pertinent, as it has high levels of poverty and needs to ensure differentiated social benefits related with electricity tariffs to population segments with low incomes.* The most recent social tensions in Armenia in the summer of 2015 were caused by a raise of end-use daytime electricity tariffs for consumers (including population

/residential sector) feeding from 0.38kV voltage networks from 41.85AMD/kWh (8.7 US cent/kWh) to 48.78AMD/kWh (10.1US cent/kWh) and nighttime residential electricity tariffs from 31.85 AMD/kWh to 38.78 AMD/kWh. The tariff changes were approved by the PSRC and effective from August 1st, 2015, a temporary halt by the GoA followed neglected discontent among the population. A raise in tariffs was requested by the ENA as a result of previously accumulated debts (according to some estimates around 300 million USD). Protests in September, 2015, resulted in subsidies on electricity for one year. As a result of these events, Russia-owned ENA was sold and its new owner has managed network improvements.

6. The GoA outlined plans to develop alternative energy sources (not only small HPPs). In order to reach successful *amendments in Energy saving and Renewable energy law are required as its current version does not reflect the demand in alternative energy sources and current EU legislation*. Historically, Energy saving and Renewable energy was designed merely as an energy saving law, already during its development the Ministry of Finance rejected to provide financial support. As a result, the law has a declarative nature in essence. Therefore, it is reasonable to have a separate law on renewable energy, and provide financial support through the Ministry of Finance together with bilateral donors and multilateral donors developing solar, wind, biogas and geothermal energy sources. The appropriate financial foundations should promote renewable resources, excluding small hydro, at no more than 6-7% long-term (10-15 years) loans to develop these sources. The law should operate under umbrella of UNDP, GEF, UNIDO, USAID, and the Energy Union's appropriate facility, and should additionally be introduced to the already existing R2E2 Foundation, as it will direct its activity on energy savings and small HPPs.
7. *The formation of Research and Innovation Centers and Laboratories which will focus their activity on adopting world advanced technologies to Armenia and which will be involved in the development of innovative products or components in its true meaning i.e. ready to sell product in the area of renewable energy technologies should be initiated*. The Armenian market is rather small for products to be developed from start to end, and, therefore, it is not suggested. International cooperation in these centers should be organized with support of the government and should involve their resources. A Solar Center in Uzbekistan established with support of the ADB and other donors could serve as an example. More international funding should be reallocated from Ministries to similar centers and laboratories at which scientific knowledge should be prevalent over managerial experience.
8. *Corruption in the Energy Sector, as well as in other areas, should be reduced significantly* as it deters investments in the energy sector and the country's development overall. There is no official data on corruption, however, it has been admitted to have taken place at the governmental level in large volumes. An appropriate structure at the governmental level has been created to fight against corruption; however, no significant examples of the fight against corruption have been demonstrated thus far.

The Eastern Partnership (EaP) framework could serve as a base for cooperation, solving urgent energy issues and improving energy security issues in Armenia. In turn, the EU could also benefit from that cooperation. The EaP Riga summit confirmed energy a priority issue in cooperation. The establishment of the EU's Energy Union is an ambitious, but doable task with huge potential. The EU could achieve major milestones in moderating energy demand and in renewable energy technologies development and could serve as a model to be replicated in Armenia. The involvement of Armenia in regional projects, with the help of the Energy Union, are urgent issues for Armenia. On-going and future cooperation on energy issues

between Armenia and EU should improve the energy security in Armenia and to some extent energy security in EU as well.

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Appendices 1

Renewable Energy Potential in Armenia by Technologies [6]

Technology	Capacity, MW	Generation, GWh
Wind	795	1,640
Solar PV	835-1,169 ^a	1,735-2,118 ^a
Concentrating Solar power	1,169	2,358
Distributed solar power	93	128
Geothermal power	31-54	244-436
Landfill gas	2.5	19
Small hydropower	91	334
Pumped storage hydropower	150	1,161-1,362 ^b
Biogas	3.3	26
Biomass	29	228
Total electricity	1,876-2,208	4,358-4,921
Solar thermal hot water	n/a	254
Geothermal heat pumps	n/a	4,423
Total (heat)		4,677

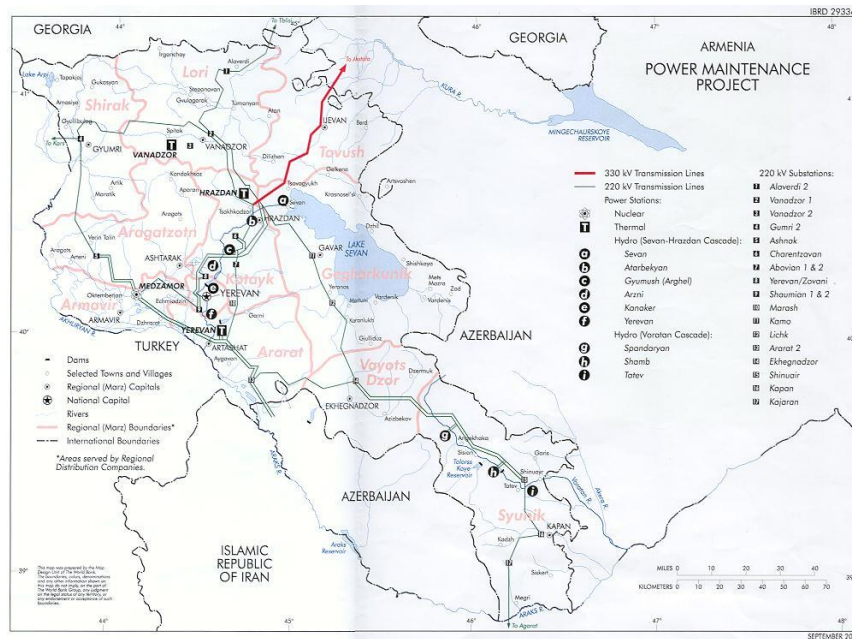
a - Depends on which solar PV technology is assumed to be deployed: fixed-tilt polycrystalline PV, single-axis tracking polycrystalline PV, dual-axis tracking mono-crystalline concentrating PV.

b – Pumped storage projects do not “generate” new renewable energy, but store energy that has been generated elsewhere. So, the pumped storage number is extracted from the total.

c - The total includes only the generating potential for one of these technologies, so as not to double count.

Appendices 2

Power System of Armenia Map



Source: Global Energy Network Institute

Energy Security and Energy Union Perspectives for Azerbaijan

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Introduction

Azerbaijan, one of the most energy-rich countries in the South Caucasus, has an advanced energy infrastructure, with fossil-fuel resources and energy systems, providing itself with the needed capacity. Establishing energy relations between Azerbaijan and the European Union started with the Baku-Tbilisi-Ceyhan pipeline preparation in July 2006. Europe is the main market for Azerbaijan's energy export. On November 7th 2006, Azerbaijan and the EU signed a memorandum on strategic relationships in the energy sector.

In 2005 the European Union decided to diversify its energy market. One of the common points shared by the EU and Azerbaijan in the energy security policy, are pipeline safety issues - considering that usually pipelines, including the Southern Gas Corridor pipeline, are passing through neighboring countries. Azerbaijan is also interested in safely exporting gas to Europe, and discovering new oil fields which will solve the issue of a continuous gas supply to Europe.

Energy security defines the base of economic and social stability. The importance of energy security sets the energy policy agenda, which includes increasing the natural gas export to the EU, managing the stabilization of the export of oil, and developing a partnership with the EU, in order to modernize the infrastructure of alternative and renewable energy resources.

The usage of alternative and renewable energy resources forms the energy policy agenda. Azerbaijan also has ample alternative energy resources in order to utilize and keep an energy balance. Therefore, the government is interested in investing in and modernizing the renewable energy infrastructure. These are all stimulating in order to diversify the usage of energy resources concerning economic and social stability.

The following chapter discusses issues of energy in Azerbaijan in two parts. Part one describes key energy security risks, partnerships with the EU and the Eastern Partnership (EaP) countries, and the country's overall experience. Part two comprehensively provides recommendations about the country's energy union strategy and national energy policy. The second section of the policy paper explains the opportunities and perspectives that an EU energy security strategy can provide for Azerbaijan. Moreover, it demonstrates the synergies between the country's national energy policy, the EU's energy security strategy, challenges and barriers, and recommendations for future actions.

Key Energy Security Risks, Their Causes and Effects

Azerbaijan is an energy-rich country, famous for its traditional energy resources such as oil and gas. As a result, energy security is fundamental to Azerbaijan's national security. Energy security, in this case, means to have sufficient fuel and energy supplies, ensuring the internal security of Azerbaijan. The development of the energy security strategy started in 1994, when Azerbaijan signed the Contract of the

Century, which undeniably influenced its economic development. According to the energy security principles, we are defining the energy security risks as following.

1) Reduction of oil and gas outputs

Azerbaijan has the potential to produce and use alternative energy sources; however, oil and gas represent the main part of its energy production (See Appendix 1). Oil and gas are exhaustible energy resources. As a result, this poses a huge risk from the energy security point of view.

The oil and gas reserves have an impact on the production process in Azerbaijan. According to an estimation of the United States Energy Information Administration² report, Azerbaijan's oil reserves are at 7 billion barrels and natural gas reserves at 35 trillion cubic feet (Tcf) as of January 2014. Oil production decreased from 50 thousand to 42 thousand tons from 2010 to 2014. The decreasing oil production is related to crude oil prices and oil reserves. Crude oil production also affects the revenue of the country. Appendix 1 shows the decrease of the production of crude oil from 76.6% to 70.8% between 2010 and 2014.

2) Oil and gas pipeline security

Security of oil and gas pipelines is one of the most important aspects of energy security. Pipelines run through conflict territories. Currently Azerbaijan has 4 pipelines (Baku-Novorossiysk, Baku-Supsa, Baku-Tbilisi-Ceyhan, South Caucasus Pipeline) and their security is of major importance to the country.

3) Stability and efficiency of energy resources

Stability and efficiency of energy resources is one of the main parts of the energy security strategy. The country should use energy resources effectively. The modernization of the oil and gas sector and petrochemical industry, the diversification and development of the non-oil industry, and the expansion of opportunities to use alternative and renewable energy sources impact the ability to use the energy resources effectively. In January 2013, Azerbaijan announced it would increase its alternative energy investments by 2020 with \$7 billion, growing the total renewable energy capacity to 2,000 MW - 20% of its overall power needs.³ The rise will help the country create an excellent energy industry and use the energy effectively.

4) Shortage of production of alternative energy resources

As mentioned earlier, Azerbaijan has the potential to utilize alternative energy sources. The period of sunlight reaches 2500 hours in the Absheron Peninsula and Caspian Sea coast, and reaches 2900 hours in the Nakhchivan Autonomous Republic. As for wind energy, the Absheron Peninsula and the Caspian Sea coastal areas, the western part of Azerbaijan (Ganja-Dashkesen) and the Nakhchivan Autonomous Republic (Nakhchivan-Julfa) have great potential as well. In addition, Azerbaijan has a high potential for wind energy, especially in the Absheron peninsula. The wind speed fluctuates between 3-7 m/sec year-round, which is considered perfect for wind generators (See Appendix 2). However, the usage

² <http://www.eia.gov/beta/international/analysis.cfm?iso=AZE>

³ <http://www.bloomberg.com/news/articles/2013-01-30/azerbaijan-plans-7-billion-boost-for-renewable-energy-by-2020>

of alternative energy sources are not as widespread as oil and gas. The share of electricity produced from renewable energy sources decreased from 18.4% to 6% (See Appendix 3).

Emerging energy security risks

Energy security contributes to economic stability when viewed from long-term perspectives. Considering all research and literature on this issue, we are defining the emerging energy security risks in Azerbaijan as the following:

1) Sustainable supply of domestic energy needs

Ensuring the domestic energy needs is one of the main energy security principles. The gasification process is one of the main parts of fulfilling domestic energy needs. Currently, based on the State Program on socio-economic development of regions of the Republic of Azerbaijan for 2014-2018 and the State Program on the development of socio-economic situation of Baku city and its towns, gasification is underway. However, a reasonable amount of investments in the oil and gas sector are needed to achieve full gasification of the country. According to SOCAR's reports⁴, gasification reached 89.8%, including Baku which was 99%.

2) Modernization of the energy infrastructure and the efficient usage of energy resources

The energy sector needs a major investment in terms of modernizing its infrastructure. The state program on the development of fuel and energy complex of the Republic of Azerbaijan has already resulted in several implemented projects to improve the situation. Following the Contract of the Century, investments into Azerbaijan's economy totaled more than \$100 billion, of which – mostly foreign – \$42 billion in the oil and gas industry. According to the Ministry of Industry and Energy's annual report, the indicators of oil production were perfect. As noted in the report, the country produced 42,160.7 tons of oil, instead of the predicted 41,184.6 tons.

Although Azerbaijan is investing in the development and production of renewable energy (RE) resources, the country needs to develop and modernize its renewable energy resources. According to the Renewable Energy Strategy for 2012-2020, it is targeting 20% of RE in electricity and 9.7% in total energy consumption.⁵

3) Oil and gas pipeline security

Pipeline security concerns not only Azerbaijan, but is an energy risk for the EU as well, as it is the most important in terms of delivering energy resources. The largest oil field in the Azerbaijan controlled area of the Caspian Sea is the Azeri-Chirag-Deepwater Guneshli oil field (ACG), where production started in 1997. The Shah Deniz gas field (SD), the largest gas field in Azerbaijan, was discovered in 1999. Another significant element of the energy infrastructure is the existing pipeline system that exports oil and gas

⁴ SOCAR (The State Oil Company of the Azerbaijan Republic) - <http://www.socar.az/socar/en/company/about-socar/discover-socar>

⁵http://eeas.europa.eu/delegations/azerbaijan/documents/page_content/2_-_jamil_malikov_-_re_strategy_in_azerbaijan.pdf

reserves from the Caspian Sea to international markets. The Baku-Tbilisi-Ceyhan⁶ (BTC) pipeline (1,768km) carries oil from ACG and condensate from SD across Azerbaijan, Georgia and Turkey.

In general, the researchers admit that the threat of a terrorist attack on the energy infrastructure is a reality. Large energy infrastructures are attract terrorists. A few groups have shown their aptitude to execute such attacks. Terrorist figures have clearly indicated their intentions to strike global energy markets. In August 2008, there was a burst at a pump station on the Turkish part of the BTC pipeline. Though suspicions about the Kurdistan Workers' Party's (PKK) involvement were high, the Turkish authorities have dismissed the terrorist nature of this incident. However, the potential risk of PKK terrorism cannot be completely excluded and raises the issue of the expansion and preservation of the BTC pipeline. BTC is the main export pipeline, which transports Azerbaijan's oil (and possibly part of Kazakhstan's oil in the foreseeable future) to the European market. The terror attacks are not the only potential threat to the critical energy infrastructure in Azerbaijan.

The security of pipelines, ensuring domestic needs and modernizing infrastructure in terms of the efficient use of energy resources, are all emerging security risks. The country has turned to solving these problems and managing them efficiently. Azerbaijan needs to improve its relations with other countries concerning pipeline security, and establish modern standards for its energy infrastructure. In order to efficiently use energy resources, the country should develop and invest in alternative energy resources. In the next subchapter we will describe Azerbaijan's relationship with EU and EaP countries regarding energy security.

According to the previous part, Azerbaijan's emerging energy security risks characterize common issues in the partnership with the EU and EaP. Azerbaijan has a good relationship with EU, EaP and other partner countries in terms of energy security and have potential from the energy strategy point of view. The 20/20/20 European directive has taken a new approach to energy strategies and highlighted the necessity to integrate EU and EaP countries into the European energy market. The directive's ultimate goal is strengthening energy security through the diversification of energy supplies, addressing global energy and environmental challenges, promoting an efficient exploitation of domestic resources, and developing energy sustainability.

Azerbaijan plays a major role in the EaP and EU countries' energy security. However, the security of energy is also an important issue for Azerbaijan. Azerbaijan has been working on its energy partnership since 2006 (the Memorandum of Understanding is aimed at strategic partnerships in the field on energy, and was signed by the EU and Azerbaijan on November 7th, 2006). Another document providing a platform for partnerships is the Eastern Partnership declaration, which was signed on May 17th, 2009. The Eastern Partnership Platform on Energy Security brings together representatives from the EU, Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine to discuss ways to promote energy security, renewable energy, energy efficiency, and nuclear safety. Moreover, it discusses the construction of missing infrastructure links and ways to bring partner countries' energy-related rules more in line with EU standards.

⁶ http://www.bp.com/en_az/caspian/operationsprojects/pipelines/BTC.html

We define the solutions and opportunities as following:

- a) Enhancing the security of Azerbaijan's transit and export pipeline network;
- b) Establishing an energy infrastructure, based on modern Euro standards;
- c) Increasing the volume of fossil-fuel energy from the Caspian Basin, and of Central Asia as a transit country;
- d) Developing a comprehensive energy demand management policy in Azerbaijan, in other words, reducing demand;
- e) Increasing the use of renewable energy resources;
- f) Gradually diversifying and securing energy resources;

In cooperation with EU and EaP countries, Azerbaijan's role is crucial for energy stability. The Trans Adriatic Pipeline (TAP) and the Southern Gas Corridor projects are significant oil and gas projects in the European continent, thereby, its security is one of the main issues regarding cooperation. This cooperation highly impacts the country's ability to solve energy security problems concerning modern standards and practices.

Overview of Azerbaijan's experience and good practices in addressing security problems

Azerbaijan's relations with the EU and EaP allow it to address security problems efficiently. In view of the fact that, the economy of Azerbaijan has prospered thanks to its energy sector, the country is interested in further developing this area. Western countries regard Azerbaijan as one of the key guarantors in the EU's energy security, which has helped raise the level of strategic relations. As a result, and as noted above, on November 7th 2006, the Republic of Azerbaijan and the European Union signed a Memorandum of Understanding on energy issues and a strategic partnership. In December 2013, the world's leading oil and gas companies, and many European countries, according to the Shah Deniz-2 project, began production, distribution and export of natural gas. Signing the final investment decision by not only Azerbaijan, but Europe as well, will play an important role in ensuring the world's energy security. The Shah Deniz-2 project and the South Caucasus pipeline, which crosses through Azerbaijan and Georgia, will expand the Trans-Asian and Trans-Adriatic gas pipeline. Shah Deniz-2 contributes to the construction of Europe, and opens a new gas corridor. These issues show the Azerbaijan experience in the context of managing the security problems.

Fortunately, Azerbaijan is gradually more interested in alternative energy investments. Azerbaijan has great potential for renewable energy resources. **Wind**, which blows more than 250 days per year and may generate 2.4 billion kWh of electricity annually, is the country's preferred option, because of its lower cost, environmental soundness and unlimited availability. Offering 2,400-3,200 hours of sunshine per year, Azerbaijan also has potential for **solar** electricity and heat generation. Traditional energy resources are not renewable and the current situation of oil and gas industry infrastructure are modern. Therefore, Azerbaijan is investing in renewable energy resources.

Several state programs and discounts for entrepreneurs willing to invest in this area exist in Azerbaijan. The strategic direction, which has already been set, is systemizing as follows. One of them, signed on April 21st, 2004, the state program on usage of alternative and renewable energy resources which helped to

develop and effectively use alternative energy resources. Another state program, signed in 2005, the State Program on the Use of Alternative and Renewable Energy Sources for 2005-2013, which led to the establishment of the State Agency on Alternative and Renewable Energy ([ABEMDA](#)) in 2009. One of the major investments in this sector was the launch of the Gobustan experimental polygon in 2011, including a 5.5 MW hybrid station and dispatcher center. The polygon helps to provide solar energy to the town of Gobustan.

Azerbaijan is developing and investing in the RE sector as its main energy strategy. Neighboring countries can learn from Azerbaijan's experiences. These directions have helped the country secure energy opportunities in the long-term perspective. The tactics will also increase employment, secure energy stability, diversify the economy and energy, and protect the environment.

Nowadays, reduction of oil and gas reserves, scarcity of alternative and renewable energy resources' production, security of oil and gas pipelines, decreasing investments on the energy and fuel complex, diversification of energy industry, efficient use of energy resources, and instability of the energy industry are the main energy security problems of the Azerbaijan Energy System.

By analyzing the European Energy Union Strategy and the security problems of Azerbaijan, we can clarify the opportunities and perspectives, which can be addressed to the energy security problems in Azerbaijan. One of the main aims of the Energy Union Strategy is a strong role of the EU on the global energy markets. According to the Strategy, the EU seeks to collaborate with countries, which are producers and transits.⁷

Azerbaijan has potential for establishing a renewable and alternative energy industry; however, the industry is not very developed. Most regions of the country use oil and gas. The creation of alternative energy resources will contribute to solving energy problems in the country. Therefore, Europe could be a good partner for developing a renewable and alternative energy resource industry for Azerbaijan. Europe is a leader in renewable and alternative energy and the European Energy Security aims to develop a renewable energy industry, to invest in other countries, and to create new partnerships.

Azerbaijan already has several partnerships in this field.

"A leader company of France, CNIM, has won the tender for €346 million for construction, establishment and operation of a waste to energy plant for 20 years in Baku, in 2008. The capacity will be 500,000 tons of the city's solid waste. The plant aims to be the biggest plant in Eastern Europe."⁸

Azerbaijan can benefit from the European Union's R&D strategy, innovation policy in terms of realizing innovative policies. Europe excels in innovation and Research and Development (R&D). If we take into account that Azerbaijan aims to develop its alternative energy sector, then the practical experience of the EU for researchers, competitiveness and innovation can help Azerbaijan to realize its national policies.

⁷ Energy Union Package, Brussels, 25.2.2015 COM (2015) 80 final, p. 6

⁸ Azerbaijan: Alternative and Renewable Energy – A Business Perspective, Caspian Information Service, p.7; May 2013.

Synergies in the Energy Union Strategy and Azerbaijan's National Energy Policy

The synergies in the European Energy Union Strategy and National Energy Policy of Azerbaijan are the security of oil and gas pipelines, which are very important in terms of oil and gas delivery to Europe, and the development of alternative and renewable energy resources.

If we observe the renewable energy policies of Europe and Azerbaijan, it will be clear that, Europe is more developed and the European countries aim to replace the current energy systems. The goal of the National Energy Policy of Azerbaijan is to develop alternative energy resources as well, completely meet the demand for electric power from internal resources, and satisfy the demand for the energy services of the population. Therefore, attracting new investments should be a priority for the country.

The main directions of the European Energy Union Strategy are mentioned below:

1. Solidarity and energy security;
2. Integrated energy market of the European Union;
3. Efficiency of energy, which contributes to the increasing demand;
4. Decarbonization of the economy;
5. Competitiveness, Research & Development (R&D) and Innovation.⁹

The National Energy Policy of Azerbaijan has some similarities with the union's strategy; however, there are differences. According to its own national energy strategy, Azerbaijan aims to export the country's surplus to the European gas market, to increase the production of energy resources, and increase the share of alternative energy resources in the whole energy industry.

The EU aims to provide their natural gas diversification, supply and sources. Azerbaijan is a good partner for the EU and can supply it with natural gas and carry out new gas projects, such as the Southern Gas Corridor project, TANAP and TAP.

An integrated energy market is important for the European Union. In the national energy strategy, Azerbaijan mentions the European energy market as the target market for selling its own natural gas resources. Nevertheless, there are some difficulties in this case, as Azerbaijan is not a member of the European Union.

The core of the relationship between Azerbaijan and EU is energy. The Caspian region and especially Azerbaijan is an important partner for the EU, because of their natural gas market.

Decarbonization of the economy and the development of the alternative energy sector is also a priority for Azerbaijan, according to the National Energy Strategy. This is close to the EU's strategy for decarbonization. The major tasks of the renewable energy security program of Azerbaijan are:

- to determine the potential of renewable and alternative energy sources for electric power generation;
- to enhance the efficiency of the utilization of energy sources of the country;

⁹ Energy Union Package, Brussels, 25.2.2015 COM (2015) 80 final, p. 4

- to enlarge the capacity of energy production by developing alternative energy sources.
- To create new jobs.

One of the key visions of the Energy Union Strategy is focusing on Research and Innovation (R&I), development, which can be the driving force of the new strategy.¹⁰ Today, Europe is very developed in this field. Azerbaijan's national energy strategy implements innovation and research as the core of the development of the energy sector in the country. However, many challenges continue to exist in this area.

Challenges and Possible Barriers

Today, Azerbaijan's role is becoming more and more important in the process of providing European countries with oil and gas, and ensuring the future development of European energy strategies. The political situation between the EU and Russia, and recent events in Ukraine, push Europe to search for other sources, and explore the possibility of Azerbaijan as an energy partner for European Energy Union. The potential integration of Azerbaijan to the Energy Security Union is top of the agenda. Possibilities and opportunities exist, as mentioned above, but there are challenges and barriers as well.

Challenges and barriers:

- Russian influence;
- Nagorno-Karabakh conflict;
- Passive participation of Azerbaijan in European Eastern Partnership Program;

Russian influence

After gaining its independence from the Soviet Union, Azerbaijan has insensibly rebalanced the political and economic situation in the region and has formed partnerships with its neighbors. When Azerbaijan became close to European countries, and attempted to form partnerships, it also endangered its relations with Russia. This is one of the main barriers for Azerbaijan in terms of partnership with European Energy Security Union.

Nagorno-Karabakh conflict

The conflict between Azerbaijan and Armenia over the Nagorno-Karabakh region is a major risk in terms of energy security and infrastructure. This can impede future projects with western partners and hampers foreign investments. This is a barrier for Azerbaijan in terms of energy union and energy infrastructure security.

Passive participation of Azerbaijan at European Eastern Partnership Program

Azerbaijan's passive participation in the Eastern Partnership Program also harms the possibility of integration. Active participation in the Eastern Partnership Program and good relationships with the EU can accelerate the integration of Azerbaijan into the Energy Union, and will help Azerbaijan develop its

¹⁰ Energy Union Package, Brussels, 25.2.2015 COM (2015) 80 final, p. 16

energy market. The 3rd platform of Eastern Partnership Program implements the importance of energy security and energy partnership.¹¹

Conclusion and Recommendations

Energy security is a highly investigated issue in the Energy Union. Energy security is also a necessary object in terms of rational usage of energy resources. Generally, Azerbaijan is known as an oil exporting country in the world. This is related to its abundance of traditional energy resources. In addition, the country has enough potential alternative and renewable energy resources for the efficient use of energy resources.

However, the country has many problems in terms of ensuring its security of energy resources. Reduction of oil and gas output, shortage of production of alternative energy resources, security of oil pipelines, and the stability and efficiency of energy resources, all define the key energy risks in Azerbaijan. Reduction of oil and gas output will affect the total production which, as a result, will decrease the income from oil and gas exports. Although having alternative energy resources, its insufficient use creates a misbalance between the efficient utilization of energy resources. The security of oil pipelines is the main issue from the energy security point of view. The geographical and neighboring position of the country, increases the likelihood of damage to the pipelines. In order to have stable and efficient energy resources, the country should diversify the use of energy resources. Additionally, it is necessary to invest in and modernize the energy sector's infrastructure to boost productivity.

Energy security influences the economic development and social stability inside the country. Highly improved energy policies give an opportunity to manage the economy efficiently in the long-term. However, there are some emerging risks in the country. A sustainable supply of energy needs the modernization of the energy infrastructure, the efficient use of energy resources and pipeline security. These factors determine the emerging risks of the country. Supplying the domestic energy needs is the main part of Azerbaijan's socioeconomic stability. A main issue with the domestic energy needs is the poorly managed gasification process. Until now, gasification reached 89.8% across the country. In addition, the modernization of the energy infrastructure is another emerging risk, which directly influences the efficient utilization of traditional and alternative energy resources. The country should try to invest in an alternative energy sector concerning its usage.

Partnerships with EU and EaP countries form the main principles of energy security. In terms of major oil and gas projects, international relationships are crucial. The Energy security policy of Azerbaijan has much in common with EU and EaP countries' energy security policies. Possible integration of Azerbaijan into the Energy Security Union creates a lot of opportunities and perspectives for the country. The Energy Security Union aims to develop relationships with EaP countries on energy security, to continue bilateral work with EaP countries, and the goal should be to diversify and explore new routes to other countries. Multilateral relations with the European Union include relations with institutions in the EU, other EaP countries, and EU member countries.

¹¹ Eastern partnership: Platform 3, Energy Security and Eastern Partnership; Angela Gramada, p. 100

Azerbaijan's integration into the Energy Union would contribute to solving energy security problems, such as security of oil pipelines, construction and development of alternative energy stations, and the diversification of energy sectors in the country. Pipeline security is a mutual problem for Azerbaijan and the European Union. The EU is interested in the security of oil pipelines in Azerbaijan and cooperation with our country in this case as well. Construction and development of renewable and alternative energy industry is a priority for Azerbaijan, the EU would make a fine partner as a world leader in this sector. Azerbaijan is already talking to several European companies about alternative energy; however, future cooperation can enforce the development. I recommend speeding up the partnership for energy security, and future integration.

Azerbaijan's National Energy Policy and the European Energy Union has differences and similarities. These common goals could strengthen the development of the partnership and solve urgent security problems. Nevertheless, several barriers and challenges in collaborating with the EU for energy security exist. Russian influence, the Nagorno-Karabakh conflict, the passive participation of Azerbaijan at European Eastern Partnership Program, are the main problems and barriers for Azerbaijan's potential membership of the Energy Union.

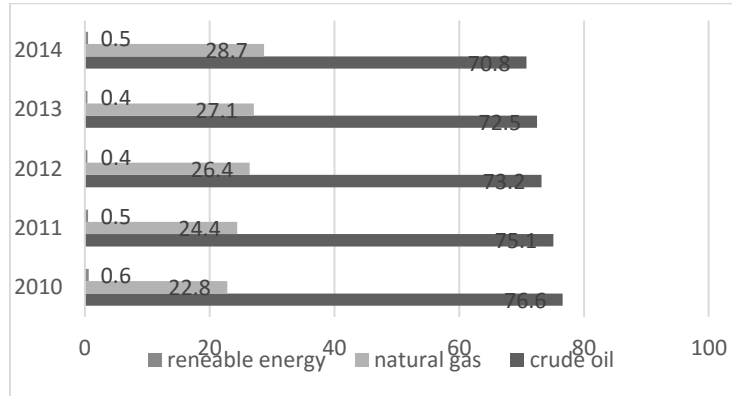
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APPENDICES

Appendix 1

Figure 1. Production of energy resources in Azerbaijan in the period of 2010-2014 (in percent)



Source: The State Statistical Committee of the Republic of Azerbaijan

Appendix 2

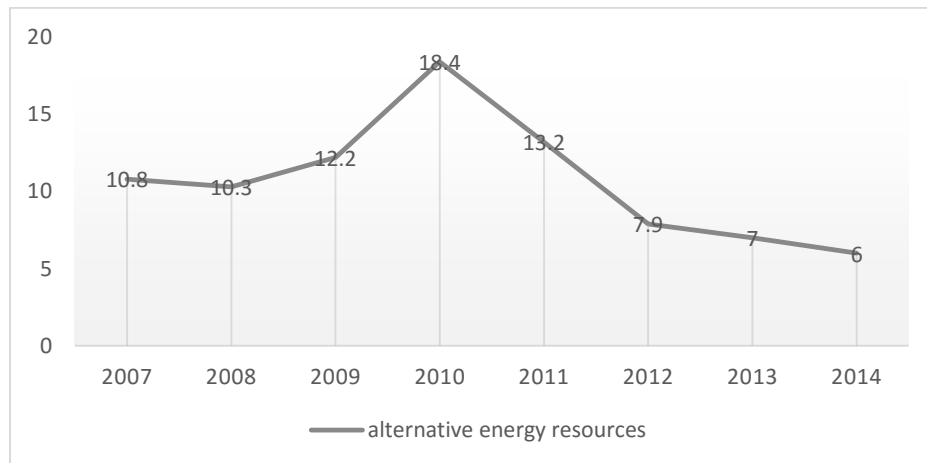
Table 1. The indicators of renewable energy of Azerbaijan

Types of energy	Power (Mvt)
Solar power	>5000
Wind power	>4500
Bioenergy	>1500
Geothermal	>800
Small hydro power plants	>350

Source: State Agency on Alternative and Renewable Energy Sources

Appendix 3

Figure 2. Share of electricity generated based on alternative sources in total production of electricity (in percent)



Source: The State Statistical Committee of the Republic of Azerbaijan

Energy Security and Energy Union Perspectives for Belarus

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Introduction

Belarus is a country through which natural gas transfers from Russia to EU. For example, in 2014 through the Belarusian section of the Yamal-Europe pipeline and "Gazprom Transgaz Belarus" the EU received 45.4 billion m³ of Russian gas, which accounts for about 31% of gas supply from Russia to Europe (146.6 billion m³).

Domestic consumption of gas in Belarus amounted at about 20.1 billion m³ in 2014. The quantity of gas obtained by its own oil production of associated gas was 222 million m³ (1.1% of consumption). Deliveries of Russian gas to the Europe via Belarus are not safe enough because of the Russian-Belarusian "gas wars." There were threats to stop or reduce the delivery during the conflicts between the Belarusian government and the leadership of "Gazprom" in 1995-1996, 1999-2000, 2003-2004, 2006-2007. In 2010, during a similar gas dispute about 6% of total EU gas consumption was at risk. Besides, Belarus is a transit country for crude oil to the EU countries via the pipeline "Druzhba".

Belarus has a powerful complex of refineries and produces fuel oil, diesel and gasoline by importing oil from Russia. In 2014, 8.244 million tons of oil and 0.559 million tons of liquefied natural gas were delivered to the foreign (non-CIS) markets. In 2014, 1.617 million tons of crude oil was delivered to Germany. It is almost the whole amount of oil produced in Belarus (oil extraction in its own territory is 1.645 million tons per year).

First energy projects of the EU in Belarus were implemented in 1991 under the Technical Assistance to the CIS countries (TACIS). In 2007, instead of the TACIS program, the European Neighbourhood and Partnership Instrument (ENPI), funded by the European Commission started to be implemented. In 2009, Belarus became a full-fledged member state of the EU initiative "Eastern Partnership" (EaP). Within the framework of the EP the Declaration on Cooperation between the Government of the Republic of Belarus and the Commission of the European Communities in the energy sector was signed (projects in the gas sector and transit for the period until the end of 2010). Since 2010, there has been a flagship initiative of the EP dealing with energy security in Belarus. It includes the program for multilateral cooperation in such issues as energy efficiency and renewable energy.

Most projects in which representatives of Belarus are currently participating are funded by the European Commission through the program of the Interstate Oil and Gas Transport to Europe (INOGATE). Belarus is also involved in the Covenant of Mayors initiative which is implemented by the program of the European Commission for technical support - EuropeAid.

Energy Security in Belarus and Current Energy Policy Agenda

One of the most important documents that define energy policy in Belarus is the Concept of Energy Security (adopted on 17.09.2007). This Concept underlines the priorities of the development of Belarusian fuel and energy complex as follows:

1. improving the efficiency of production, conversion and use of energy;
2. improving energy independence and ensure energy needs from its own sources of energy;
3. Improving the reliability of energy supply systems.

Since obtaining the country's independence, the energy sector in Belarus has remained in the state ownership as part of the strategy of cautious reforms undertaken by the Government of Belarus. They pay attention to the social protection and stability (referred to in the country as a "social market economy" or "market socialism"). Vertically integrated national energy companies support energy infrastructure in working order; according to the latest government regulations, power companies will soon be restructured.

The Republic of Belarus doesn't have enough of its own primary fuel and energy resources (FER). It is highly dependent on imported oil and gas supplied mainly from the Russian Federation. The share of imports in total consumption of primary FER is about 85%.

The country has a developed transport infrastructure of oil, oil products and electricity. In 2012 energy intensity of GDP in Belarus was 240 kg of oil equivalent per 1 thousand dollars. These realities define the key principle of the state energy policy: ensuring energy security by improving the structure of the fuel and energy balance (FEB) with the rational use of energy resources, maximum use of local fuels and renewable energy sources, the introduction of energy-efficient and environmentally-friendly technologies in all sectors of economy. So the main strategic directions of the government's energy policy are:

1. Improvement of energy security of the country;
2. Reliable supply of energy resources to the population;
3. Reduction of the cost price of production, transportation and consumption of energy resources;
4. Appropriate use of domestic energy resources;
5. Increase of financial stability, functioning and development of the fuel and energy sector.

Current policy and strategy of the Republic of Belarus in the field of energy and energy efficiency for the period up to 2020 and its implementation in the field of energy saving are aimed at structural changes in the national economy and its modernization based on energy-efficient technologies.

Set goals:

- to reduce GDP energy intensity by at least 60% in 2020 compared to the 2005 level;
- to achieve saving of fuel and energy resources in the amount of at least 5.2 million TCE for the period 2016-2020;
- to ensure the share of domestic energy resources in the balance of boiler and furnace fuels of 32% in 2020 compared to 20,6% in 2010;
- to ensure the share of natural gas in the balance of boiler and furnace fuels of 55% in 2020 compared to 83% in 2010;
- to reduce the depreciation of main production assets of the energy companies of 43% in 2020 compared to 56,3% in 2010;
- to reduce the share of the dominant energy supplier to the gross consumption of fuel and energy resources of 64% in 2020 compared to 77% in 2010;

- to increase provision of containers for gas and oil storage of 118 days in 2020 compared to 64 days in 2010.

In 2013, the Government approved the State program of energy development for the period until 2016. Numerous plans for the development of the sector were detailed on the basis of these documents, which laid the foundation for the country advance to self-sufficiency, including plans to assess additional potential of nuclear energy in order to improve the country's self-sufficiency in the long term.

Also Belarus widely supports the development of renewable energy sources and substantial improvement of investment legislation to support the development of local energy sources. To sum it all up, the main policy objectives of Belarusian energy strategy are:

1. modernization and development of generating facilities of electric and thermal energy;
2. reduction of the use of natural gas in the production of electricity and heat by increasing the use of local fuels, renewable energy and technologies producing energy by using waste;
3. modernization and improvement of grids;
4. development of the infrastructure of information technologies (IT) and the central management of the technologies;
5. Improvement of the financial recovery of energy suppliers;
6. improvement of tariff policy, including staged cancellation of cross-subsidies;
7. reduction of energy imports;
8. improvement of the structure of centralized energy system management;
9. creation of conditions for non-discriminatory access to the energy grids;
10. improvement of the legal and regulatory framework in the energy sector with the possibility of the formation of market conditions, as well as creation and development of nuclear energy;
11. reduction of greenhouse gases;
12. development of projects of cross-border energy grid in order to create opportunities for the electricity trade;
13. Increase of funding of scientific research and experimental projects.

Key documents in the area of energy policy and regulatory framework of the Republic of Belarus:

1. The law "On energy saving" (1998);
2. The law "On Gas Supply" (2003);
3. Development of the strategy of using the energy potential of the Republic of Belarus (2010)
4. The law "On renewable energy sources" (2010);
5. The rules of electricity (2011);
6. State Program of development of the energy system of Belarus for the period 2013-2016;
7. The law "On energy saving" (2015).

List of key energy security risks for Belarus

1. Low supply of its own energy resources;
2. High energy intensity of the economy;
3. High proportion of natural gas in the energy balance of the country;
4. High degree of depreciation of fixed assets in the energy sector;
5. Import of energy resources mostly from one country (Russian Federation);
6. High costs of imported energy resources.

Key Energy Security Issues in Belarus

The main threat to the energy security of Belarus is strong dependence on a single supplier of energy resources (Russian Federation). The result is a strong influence of the Russian political forces on the situation in Belarus.

None the less important problem of Belarusian energy sector is a significant energy inefficiency.

The main reasons for low energy efficiency in Belarus are:

1. Inefficient heating in large cities (losses in heating plants up to 30%);
2. energy-intensive industries with outdated equipment;
3. Inefficient generating capacity in CHP (for the same reasons);
4. State tariff policy that discourages saving.

The system reason for the low efficiency of the Belarusian economy and its energy sector is the lack of structural reforms that does not allow to restrict and to involve private investors, which ultimately leads to a shortage of funding of the sector.

One of the most serious obstacles for the Belarusian energy system on its way to sustainability and minimization of risks is the so-called "socially-oriented" policy of the Belarusian government, which is seen for ex. in cross-subsidies in the provision of energy services in the residential sector. For example, at the moment the citizens of Belarus pay about 6 eurocents per kWh of electricity and about 12 eurocents per m³ of natural gas. Paradoxically, formally aimed at improving the material welfare of the citizens of Belarus, state tariff policy leads to the deterioration of the energy system, which in the long term threatens with systemic complications. In the minds of citizens it strengthens paternalistic worldview that greatly devalues the idea of energy saving in the home and daily life.

Insight of emerging energy security risks

The government of the Republic of Belarus sets strategic objectives in the field of energy efficiency and energy saving to ensure energy security, increase the quality of life and competitiveness of the national economy.

To achieve these objectives the Government should:

- reform the energy sector which will make it possible to use market mechanisms and the capacity to attract investments in energy efficiency technologies and equipment;
- use and expand ongoing research related to energy losses and final consumption, and continue funding at the national and sectoral level;
- facilitate and encourage cooperation between national research institutions and international scientific and engineering community for further development of advanced technologies, the implementation of pilot projects in the field of energy efficiency and renewable energy;
- pay special attention to the development of renewable energy sources with the objective to develop energy systems towards sustainability. The use of renewable energy sources should always be taken into account and reflected apart from the use of non-renewable domestic energy resources, as well as individual targets set for renewable energy sources and other local energy sources;

- continue to organize active work in the Republic of Belarus on the harmonization of technical normative legal acts in the field of energy efficiency and renewable energy with international and European acts;
- persist in the policy of elimination of cross-subsidies in energy prices (tariffs);
- ensure the implementation of market-oriented principles and appropriate regulatory legal and regulatory framework, based on international experience, while developing the legislation in the energy sector;
- analyze and determine the system of measures to accelerate the improvement of the structure of financing energy efficiency and development of renewable energy sources in favor of increasing the share of enterprises' own funds, private equity, borrowed and external funds;
- encourage the creation and implementation of ESCO and other market mechanisms to attract investments in energy efficiency; initiate the implementation of the exchange of experiences, training, and implementation of pilot projects in this area in cooperation with international organizations;
- strengthen cooperation with commercial banks in order to create and promote financial and credit products in the field of energy-efficient technologies and energy saving equipment;
- Continue to promote the raise of awareness in the sphere of energy efficiency and training of civil servants and general public at the local, regional and national levels.

Possible solutions and opportunities

1. scientific, technological and innovation cooperation with a focus on energy issues, which could be integrated into existing and emerging programs and financing instruments by concerned organizations, international donors and national public authorities in the EU Member States associated with the EU countries and in the Republic of Belarus;
2. Experts' support in management and education:
 - a. seminars for senior officials of the energy sector of Belarus with the participation of foreign professionals who participated in the reform of the energy sector of countries with similar socio-economic characteristics ("post-Soviet" countries: Poland, the Czech Republic, the Baltic countries), as well as the officials from the EU who currently take management positions in the field of energy management systems;
 - b. Development and implementation of educational programs and training courses on the topic of modern energy management for students of specialties in the Belarusian universities;
3. The EU banks provision of credit lines for public and private organizations in Belarus on the implementation of energy-efficient measures. It's important to specify the credit support to small and medium business in the sphere of energy saving and renewable energy, because at this stage of development of this market segment they have to overcome not only the confidence of customers to innovative technologies, but also serious obstacles such as low prices for electricity and gas;
4. Enhancing cooperation (project work) with Belarusian NGOs working in the field of environment and education to provide educational programs on sustainable development to as many people as possible in Belarus. A good example of cooperation between NGOs and local authorities is the project «Engaging Citizens in Sustainable Energy to improve environment and local economy» implemented by the Center for Environmental Solutions (Minsk, Belarus) with the support of

"INFORSE-Europe" (Denmark) in 2013-2015. During the project, the Plans for sustainable development of energy systems of three regions in Belarus were prepared. As a result of this work, two of them decided to join the Covenant of Mayors (now there are 11 municipalities in Belarus, joined to the CoM).

Overview of the Belarusian experience and good practices

Construction of energy-efficient apartment buildings

The first of such houses was built in 2007 in Minsk. The quantity of the annual specific heat consumption for heating in some years reached 35 kilowatt-hours per 1 m² per year, but mostly remained at the level of 36-38% of this value. The costs of heating were three times lower compared to current standard. This effect was achieved by the use of windows with resistance to heat more than 1.0 m²·x °C/W, as well as individual system of controlled mechanical ventilation with heat recovery of ventilation emissions. For the heating of the house the tenants pay 2-4 times less than the owners of flats in conventional homes. Similar projects were implemented in 2009-2010 in Homel, Hrodno and Vitebsk.

In total, for the period 2007-2012, 18 energy-efficient buildings with forced ventilation with heat recovery of ventilation emissions were built. A comprehensive Program for design, construction and reconstruction of energy efficient residential buildings functions for 2009-2010 and until 2020. It provides staged expansion of energy-efficient construction in Belarus. In 2013, a huge step towards the development of energy-saving in the country was made: since April, only residential buildings of A+, A and B classes have been designed. Their heat demand should not exceed 40 kWh per square meter per year.

In addition, since 2013, the design and construction of 3 energy-efficient residential buildings has been carried out within the framework of the UNDP GEF "Improving the energy efficiency of residential buildings in the Republic of Belarus". Forced ventilation with heat recovery and heat recovery systems of domestic wastewater will be installed in all houses together with solar collectors for water heating, solar panels, ground heat pumps for heat recovery and automatic control of energy flows.

Additional measures will ensure the level of heat losses of up to 25 kWh/m² per year in the houses. Heat consumption for hot water supply will be reduced by at least 40%. The contribution of UNDP/GEF project to cover additional costs for the construction of houses will be 15% of the base cost of the investment projects.

Multi-Comfort House

In 2013, the construction of the first Multi-Comfort House in Belarus which is situated 30 km from Minsk was completed. The concept of **Multi-Comfort House** got its development in 2005 in ISOVER Company. It is based on "passive house" standards that were developed in 1988 by Wolfgang Feist. Today the concept is gaining ground in Europe. It represents an integrated system whose purpose is to achieve balance between energy efficiency, comfort living and respect for the environment.

The results of calculation of energy consumption, carried out by the architect Alexander Kucheriavy together with "Saint-Gobain Construction Products" as described in PHPP, show that the specific consumption of thermal energy for heating "Multi-Comfort House" during the heating period is 25 kW·h/m² per year. Total specific consumption of primary energy for all domestic needs is about 110

kWh/m² per year. Such indicators are 4-5 times lower than current standard and 7-9 times lower than average energy consumption.

Stimulation of the renewable energy

To encourage the development of renewable energy sources the Government has introduced raising factors to the tariffs for electricity produced from renewable energy sources by individual entrepreneurs and legal entities that are not part of state production association of electric power "Belenergo" on which electricity will be dispensed to energy supply companies of GTO "Belenergo".

For the first 10 years from the date of implementation of the equipment for using energy from water flows the multiplying coefficient is set at 1.1, previously 1.3. For the equipment using solar energy the coefficient is reduced to 2.7, previously 3.

Wind power

In 2011, National Programme for the development of local energy sources and renewables for 2011 – 2015 was adopted according to which it was planned to build up to 200 wind turbines with total installed capacity of nearly 450 MW.

The first megawatt-class wind power installation (1.5 MW) was earned in the spring of 2011 in the village of Hrabniki (Navahrudak district, Hrodno region). For four years of its work it has proved its efficiency. It was planned that the average annual power generation will be approximately 3.8 mln kWh. In practice, the wind turbine produces 10% more electricity. For example, in 2012 - 4.35 mln kWh, in 2013 - 4.0 mln kWh.

Mahiliou region is considered to be a leader in the number of wind turbines in Belarus. There are more than 15 wind turbines owned by different organizations. In 2013, new wind farms with total capacity of about 3.2 MW were put into operation.

Low-power wind farms also proved their viability. In 2012, near Kobrin 3 wind turbines began to generate electricity, each one with capacity of 7.5 kW. They provide electricity to the children's summer camp. In March 2014 within the framework of the "Green economy", the European Union has allocated 5 mln Euros for the construction of a wind farm with the capacity of 2 MW in Navahrudak which started in 2015. Nearly 1840 sites were revealed on the territory of Belarus on which more than 8000 wind turbines can be installed. All in all there are 26 wind turbines operating in Belarus now. Total capacity of all wind turbines installed on the territory of Belarus is 7.4 MW.

In the spring of 2015 in the reserve "Sporovsky" with the support of the Small Grants Program of the Global Environment Facility a solar power plant of 100 kW and cost of 150 000 dollars was installed. During an average summer day the plant produces 60 kWh, at the peak - up to 100 kWh.

In August 2015 in the Shchuchyn region the first solar power plant in Hrodna region was run at full capacity. Its electric power is 1.2 MW, it covers an area of 2.4 hectares. It can produce 8500 kWh of energy within a day.

Energy Union Strategy and National Energy Policy

Energy Union Strategy gives Belarus the following opportunities:

- To develop the regulatory and legal framework in the energy sector based on the achievements of the Energy Union for insuring the legislation acting in Belarus now,
- To begin to prepare for the convergence of the energy systems of the EU and Belarus in order to reduce dependence on energy supplies from Russian Federation
- To take part in the forums dedicated to the development of the energy structure of the EU, to discuss major joint infrastructure projects

Common topics for Energy Union Strategy and Belarusian national energy strategy are:

- Diversification of energy supplies
- Development and modernization of energy infrastructure
- Increase of the use of renewable energy sources and local fuels
- Reduction of greenhouse gas emissions
- Increase of energy efficiency of the housing sector

Challenges and possible barriers

The biggest obstacles to achieve a positive effect of participation of Belarus in the activities held within the framework of Energy Union Strategy may arise from the fact that the necessary reforms of the energy sector are in a sense a threat to the socio-economic model existing in Belarus. For example, the abolition of cross-subsidies (according to many experts, one of the most important steps to reform the energy system) will inevitably lead to a significant price rise of energy services for the population. That is an unpopular measure which current government does not dare to take in the crisis situation of the Belarusian economy.

Besides, difficulties in the process of Belarusian energy system development are in the close connection to electric power systems of the former Soviet republics. Obsolete equipment and energy grids require expensive upgrades and customization in order to be able, at least theoretically, to consider the convergence of Belarusian energy system with the European one.

Also, the construction of Belarusian nuclear power plant will lead to significant changes in the whole structure of energy sources consumption. Its capacity is 2400 (2x1200) MWt. In accordance with the general construction plan, the first power unit is to be put into operation in 2018, the second one - in 2020.

Conclusion and Recommendations

The main objectives of the Energy Union Strategy and Belarusian national energy strategy coincide in many key points. But it is obvious that there is a significant difference between the levels of development of energy systems and their management in Belarus and the EU. While the Energy Union is a kind of a new stage in the integration of the European energy system, Belarus is only going to step on its way to deep reformation and modernization of its energy sector.

Common interests in energy security must promote effective cooperation and exchange of experience in the field of energy between Belarus and the EU.

Recommendations for future cooperation and relations with the EU and other EaP countries

As the experience of working with representatives of the energy sector in Belarus shows, the level of competence of employees in the sphere is high enough. The problems are only in the management and financing of national and regional energy infrastructures. Taking into account current difficult situation of Belarusian economy, it can be argued that the situation in energy system will be changed without external support. Exchange of experience is necessary, but it is even more important to try to solve the problem of financing. A particular attention should be drawn to projects that can multiply the experience in other regions of Belarus or other EaP countries.

Concluding remarks

Ideally, the process of development of the Belarusian energy system should go taking into account the experience, goals and objectives of the EU member states, as some of them started a difficult path of reform more than 20 years ago. Cooperation between Belarus and the EU within the framework of the Energy Union Strategy can help to avoid mistakes on the way of reformation of Belarusian energy system to the finest contemporary standards that will allow to improve common energy security in the region.

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Energy Security and Energy Union Perspectives for Georgia

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Introduction

Energy security is of fundamental importance for a country to realize its economic potential and to fulfill its national security objectives. Ensuring sustainable economic and social development are intrinsically linked with the progress of any nation. Energy security is of particular importance to Georgia given its lack of domestic hydrocarbon reserves, increasing influence of Russia and etc. Partnership with the European Union can play a key role in addressing these issues, especially through the harmonization of its energy legislation to EU energy Acquis. Due to its preferable geopolitical location, Georgia can also play a significant role in assuring the energy security of Europe.

Georgia strives to be a strategic partner of the European Union and acts as a gateway to rich Caspian and Central Asia energy resources. It contributes to the diversification of the EU’s energy supplies through the implementation of important trans-national energy projects. These are the South Caucasus gas Pipeline (SCP), Baku-Tbilisi-Ceyhan (BTC) oil pipeline, and Western Route Export oil Pipeline (WREP) which have provided significant economic benefits to Georgia and helped in diversifying its energy supplies.

Georgia remains committed to its pursuit of democratic development and European integration. To enhance its relationship with the EU, Georgia signed the Association Agreement (AA) with a Deep and Comprehensive Free Trade Area in June 2014, including cooperation in energy related issues. In order to enhance European energy security in future, Georgia needs to preserve its independence and could play an important role as a Trans Caucasus energy hub with the development of new international pipelines to deliver oil and gas from the Caspian and Central Asia, and the creation of an integrated electricity grid to supply clean hydroelectric power to European consumers.

With realization of new energy transit projects Georgia can significantly benefit the implementation of EU’s new framework strategy – Energy Union which has been launched in February 2015, with the aim of improving its members’ energy security by diversifying energy suppliers and integrating the internal energy market. The Energy Union is an ambitious project which lays out a long-term vision for European energy and climate policy. It is based on the Energy Security Strategy, which was formulated in 2014.

On the other hand Georgia needs modernization and support to strengthen its position as an independent country.

Energy security is viewed as fundamental to Georgia’s national security interests¹². In June 2015 the parliament of Georgia adopted the new energy policy document¹³, which outlines main directions of state policy in energy sector, including: diversification of supply sources and optimal utilization of local energy resources, gradual approximation of Georgia’s legislative and regulatory framework with the EU’s Energy Acquis and effective implementation of EU energy market principles, strengthen Georgia’s role as a transit

¹² [National Security Concept of Georgia](#)

¹³ [“MAIN DIRECTIONS OF THE STATE POLICY IN ENERGY SECTOR OF GEORGIA”](#), adopted by the Parliament of Georgia on 24 June 2015

route in the region and etc. To realize the policy priorities Ministry of Energy of Georgia is still working on the development of energy strategy.

The main concerns in Georgia's energy security relate to 1) the increasing dependence on energy imports especially during winter months and lack of strategic reserves and security stocks of imported fuels; 2) Threat to operation of critical energy infrastructure due to Russian occupation; 3) Ownership of strategic energy assets by Russian state and non-state companies 4) Low reliability of outdated energy infrastructure - Need for new technologies; 5) Economic crises which has a significant effect on energy prices 6) Terrorism - emerging threat for critical energy infrastructure; 7) Climate change process which has a significant effect on hydro-dominated energy sector of Georgia 8) Lack of Energy security strategy and related capacity.

Georgia's difficult relations with Russia make it imperative for the country to leverage its energy sector for political and foreign policy goals. However its reliance on Russian state-owned companies to manage its strategic energy assets are largely unaffected. These risks present long-term challenges to Georgia's energy security but are often overlooked by the government.

Energy Union strategy includes energy security risk mitigation measures for its member and partner countries. These interrelated and mutually reinforcing measures comprise: solidarity and trust; fully integrated European energy market; development of renewable energy sources and energy efficient technologies; supporting to research, innovation and competitiveness.

This paper highlights the key energy security risks of Georgia, their causes and possible effects; it reviews the country's experience and good practices in addressing the energy security problems and analyzes Energy Union strategy from Georgia's perspective, what opportunities and perspectives does the strategy provide to address the energy security problems and what are the synergies in the strategy and in the national energy policy of Georgia. Finally, it will synthesize these findings into recommendations for policy-makers and CSOs in Georgia and the EU.

Key Energy Security Issues in the country

From the country perspective objective of energy security is to assure adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardize major national values and objectives.

The main energy security risks in Georgia are:

1) The increasing dependence on energy imports

Georgia does not have significant oil and gas reserves. As a result, about 65% of the country's primary energy supply is derived from external sources. Imported natural gas constitutes about 37% of total energy supply while imported oil products constitute about 26% of energy mix¹⁴.

¹⁴ GEOSTAT, Energy Balance 2013

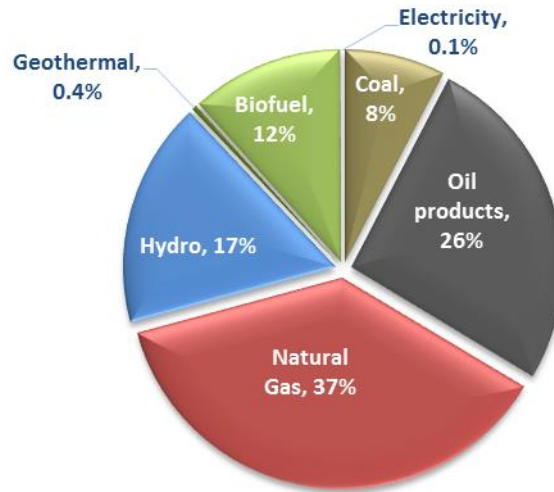


Figure 1 - Total Domestic Energy Supply - Georgia 2013 (GEOSTAT)

The scarcity of domestic fossil fuel reserves makes Georgia strongly dependent on energy imports and these leave the country exposed to fluctuations in global energy prices and also increases the risk of disruption to the fuel supply chain and the associated economic and political risks. Moreover, country does not have strategic gas reserves, as required by EU Energy Acquis and contrary to oil products natural gas supply needs the further diversification.

Until 2006 Russia was the only gas supplier for Georgia. Sabotage on Russian territory of the natural gas transmission pipeline and the main electricity transmission line, serving for energy export to Georgia, in severe winter of 2006, resulted in energy crisis for almost two weeks. This was preceded by almost quadruple increase in the price of imported gas over previous three years. These developments have indicated a serious need for strengthening Georgia's energy security and urged the actions for diversifying energy supply sources¹⁵.

There has been a significant improvement in Georgia's energy security standing over the last several years. In difference with the situation of 2006, together with development of Shahdeniz field in Azerbaijan more gas became available to Georgia both under transit arrangements over SCP, and also through direct purchase from Azerbaijan. Georgia has reoriented its gas purchases and has concluded a long term agreement with SOCAR to supply the gas at fixed price as well as to supply gas in emergencies. The portion of Russian gas in energy balance is now limited to in-kind fee for transit to Armenia. Currently, about 90% of imported gas comes from Azerbaijan and only 10% comes from Russia.

Georgia is heavily dependent on one supplier –Azerbaijan, for both oil and gas. This external dependence is especially aggravated in winter months when demand for imported gas increases. Georgia has no winter security reserve of gas or oil products, which significantly increases the risk of dependency. This also acts as a constraint to European integration, since the requirement of joining the Energy Union is for countries to have their own energy security reserves.

The danger of relying on gas imports during winter months has been witnessed over the past year in Ukraine, with Russia threatening to cut off gas supplies to further its political interests. Georgia has done

¹⁵ Energy Security Georgian Perspective, WEG 2011

a good job in weaning off its dependency on Russia but further diversification of suppliers is necessary to guarantee country's energy security.

Increasing gas consumption in Georgia will lead to more heavy dependence on natural gas import, especially from Azerbaijan. Despite of the strategic partnership between these two countries, existence of single dominated supplier is still a high risk for energy security of the country.

Georgia holds significant hydroelectric power potential, and if fully utilized this can allow the country to export significant quantities of clean electricity to neighboring countries and potentially to the European Union. However, due to the seasonality of hydropower output makes it dependent on Russia for electricity imports in winter months¹⁶. Georgia needs to develop gas-fired thermal power plants to offset its dependence on external sources of electricity in winter months.

The strong dependence on imported gas and oil products, pronounced seasonality of Georgia's vast hydro potential are the challenges to Georgia's energy security. In order to cope with these challenges Georgia needs to develop internal energy resources, create gas storage facility and oil security reserves, increase energy efficiency, diversify further energy supplies and seek the ways for more political stability in the region.

2) Threat to operation of critical energy infrastructure due to Russian occupation

Georgia has been subject to open confrontation, manipulation and serious pressure from Russia ever since its independence. One of the main reasons of Russia's attitude is the Georgia's course for independence, European and Euro-Atlantic integration. This has resulted for Georgia in occupation of its territories, Russia's military presence, economic and energy blockades, propaganda pressure and escalation of soft power etc. Russia currently occupies more than 20% of Georgian territory, including locations of key strategic energy infrastructure.

During the war in 2008 Russia targeted (bombed) territories very close to the major transit pipelines demonstrating their ability to destroy them.

A major energy security concern is related to Enguri hydro power plant. Being the key contributor to Georgia's power generation it provides about 40% of country's electricity needs. The location of the powerhouse and the switchyard of Enguri HPP is in Abkhazia occupied by Russia, while the dam and reservoir are on the territory controlled by Georgian state. Plant is operated and maintained by Georgian engineers, over 40% of output is consumed on Abkhazian side without any payment and participation in capital repairs or operation costs. In case of political escalation Russia has an easy means to cause the problems with power supply to the rest of Georgia. There is an undisclosed agreement with RAO UES supposedly on output sharing and joint operation however the status of this agreement is not known and there is a little hope that it can serve as a protection against potential disconnection. It is highly likely that the threat of Enguri power disconnection is being used as a leverage of political pressure on Georgian government. The latest event – inclusion of an arch dam of Enguri HPP into the list of cultural heritage is

¹⁶ Share of imported electricity from Russia constitutes about 15% in winter month consumption (ESCO 2014 Power Balance).

a positive event, however it cannot prevent the disputes between the Abkhazian and Georgian sides about operating of hydro plant.

Russia has been expanding its occupation of Georgian territories. On July 10, 2015, Russian occupying forces installed the banners to mark the so called 'border' in close vicinity to the Tbilisi-Gori central highway, cutting off about 1,4 kilometer of Baku-Supsa oil pipeline (WREP) from the Georgian government control. There are high voltage power transmission lines "Liakhvi" and "Kartli-2" nearby the region.

These factors create unbalanced vulnerabilities of energy security and need to be addressed through various means including development of emergency action plans, developing international support schemes and creating safeguards against potential realization of these threats.

3) Ownership of strategic energy assets by Russian state and non-state companies

Russian companies own major energy assets in Georgia and their influence is gradually increasing with the potential application of soft power. This can be considered as one of the risk factors for Georgia's energy security, especially combined with substandard legislation and nontransparent governance allowing "grey areas" where the subjective decisions can be taken without control.

Russian companies are most widely represented in the energy sector of Georgia¹⁷. The largest player on energy market is "Inter Rao UES" closely affiliated with Russian authorities. Inter Rao holds 75% of shares in JSC "Telasi" - the second largest power distribution company in Georgia, it owns thermal power plant – Mtkvari 9 with 300 MW installed capacity and the hydro power plants – "Khamhesi 1" and "Khamhesi 2", with 220 MW total installed capacity. The biggest HPP in Caucasus region – "Engurhesi" (1300 MW) is also under the management of Inter Rao.

70% shares of "Energy" LLC, which holds Dariali HPP, Larsi HPP, and Shilda HPP in total 134 MW installed capacity is owned by Russian citizen. Russian state company RAO UES is 50% shareholders in "SAKRUSENERGO", which manages the 500kV transmission network and interconnectors in Georgia. Tbilisi water supply company "Georgian water and power" which owns Zhinvali HPP (130 MW) is owned by offshore company "Georgian Global utilities" LLC governed by Russians, who have previously worked in different subsidiaries of Russian Inter Rao. Lukoil Georgia – a Georgian subsidiary of Russian Lukoil, owns 62 petrol stations in Georgia and is one of the largest importers of oil products in the country. Russian oil company – Rosneft, holds 49% in Petroca Energy LTD, which by itself owns oil terminals in Poti, and 140 petrol stations in Georgia under the brand name of "GULF". This presence creates the high risk of increasing the "soft power" that could affect the political realities in the country.

The largest power distribution company Energo-Pro Georgia, which operates throughout most of Georgia (except in Tbilisi and the Kakheti region)¹⁸ is currently on sale. If acquired by Russian capital this may result in almost full Russian control over Georgia's electricity sector.

Strong Russian influence over Georgia creates significant uncertainty for investors in terms of the country's business environment. Georgia's current approach to Russia is somewhat muddled, with the country keen to ensure energy independence and move towards convergence with Europe while at the same time attempting some type of rapprochement with Russia's business elites that can be hardly

¹⁷ [Russian Capital in Georgian Business](#), IDFI 2015

¹⁸ www.energo-pro.ge

separated with the Russian state. The official position of government is that there is no problem in privatizing strategic assets to Russian investors. However Russia will not be keen to give up its influence, and could use its political leverage and economic ties (remittances from Russia comprise a huge amount of the country's GDP) to oppose convergence with NATO and the EU, with a concomitant impact on energy transit and exports westwards from Georgia.

Although, no obvious negative effects have been demonstrated during Russian management of energy infrastructure, there has been a lack of investment and a failure to fulfill an obligation of building a new hydroelectric power plant as part of the agreement. There are also no guarantees that the legitimate commercial interests of the companies being privatized have taken precedence over the political interests of Russia or financial interests of the individuals involved. Grey areas also create a threat of collusion with Georgian officials and therefore exercising the influence over external and internal policy of the country.

An attentive eye can already notice some indications of this type. On top of this the Inter RAO's engagement in Georgia's energy sector through "Memorandums" with the government creates vertically integrated undertakings in energy sector, which goes against the EU's Energy Acquis thus posing a risk to European integration. Georgia will need to undertake significant reforms if it is going to adopt the energy Acquis in the Energy Community.

There is a need to prevent Russian controlled entities from acquiring more energy assets before sufficient transparency, good governance and proper independent regulation will be introduced.

4) Need for new technologies

Security of supply not only comprises the risk arising from commercial or political interests of pivotal suppliers but also the risk of technical faults of major infrastructure. Most of the energy infrastructure has been constructed in the Soviet time in Georgia. Considerable part of the infrastructure needs renovation. Energy losses in gas and power distribution networks are still high especially in the regions.

Modernization of energy infrastructure is vitally important for development of competitive regional energy markets and harmonization with EU energy Acquis. Modern and efficient technologies are needed to develop competition both in supply and demand.

Modern EE and RE technologies have long way to go in Georgia. The first wind turbine plant is under construction, the first combined cycle thermal power plant has been completed, but production of RE technologies, energy efficient construction, or other energy efficiency measures are still underdeveloped.

The energy intensity of the Georgian economy is high. The amount of energy needed to produce goods and services in Georgia is 2-2.5 times higher than in Western countries. Georgia has one of the most energy-intensive economies when compared with similar countries in the region. It is estimated that Energy efficiency measures can provide up to 20% of energy saving in the country in short term perspective and with minor expenses. This would allow Georgia to cut down its peak demand for electricity and gas, resulting strengthening its energy supply security.

To address these problems, in April 2015 Ministry of Energy approved the Ten Year Network Development Plan for the period 2015-2025¹⁹. The plan is focused on the electricity transmission sector and comprises

¹⁹ [Ten Year Network Development Plan of Georgia 2015-2025](#), GSE 2015.

11 large scale projects designed to strengthen the transmission network and enhance its interconnection with neighboring countries. On the other hand, in absence of clear strategy for power sector development the it is not clear to what extent is this aggressive development plan in interests of the country and whether it may spending the budget money on the projects that might be most beneficial to other states.

5) Economic crisis and devaluation of national currency

The economic crisis related to strengthening of US Dollar had its impact on our economy and finally the external and internal factors caused drop of Georgian Lari by 40% in relation USD. This fact had a huge impact on affordability of energy resources for Georgian consumers. With increasing demand on energy, import of electricity and gas were also increased in recent years especially in winter months. Transactions on imported energy are in USD, therefore the price of imported energy increased by 40% as well.

Gas supply tariff for commercial customers is deregulated in Georgia, therefore supplier companies have increased the tariff instantly by 20%. In this summer, power supplier companies applied to the regulator (GNERC) for increasing residential tariffs. As a result, tariffs have increased by 30% on average for the residential customers of Telasi and Ergo-Pro Georgia.

In case of full membership of Energy Community, Georgia would be less vulnerable for those shocks. EU energy Acquis provides some mitigation measures such as energy reserves, integrated, competitive energy market, coordinated actions to resolve short, mid and long term shocks.

6) Emerging threat for critical energy infrastructure

Terrorism is an emerging threat for the security of energy supply. It is widely documented that terrorist groups around the world often attack energy pipelines. Through acts of sabotage, bombing and cyber-attacks, terrorist or insurgent groups may seek to derail the construction of pipelines or the flow of oil or gas. Examples of such attacks have increased in recent years in our region as well.

The BTC came under attack on August 5, 2008, disrupting the oil transportation for 14 days. The pipeline had been pumping about 900,000 barrels per day before the explosion. The financial loss over 14 days came to over 1 billion dollars²⁰. At the beginning of December 2014, after seven years of investigation, Bloomberg, published the information that BTC pipeline was blown up not by the Kurdish terrorists with the hand-made bomb, but by hackers who used ultra-modern computer technologies and were supported by Russian Special Services²¹.

Again, in August 2015, the major gas pipeline, also known as Baku-Tbilisi-Erzurum pipeline, exploded unexpectedly. The explosion occurred in a section of the SCP in the Sarikamis region of Turkey's North-Eastern province of Kars. The speculation arose that the explosion was a result of a terrorist attack was reinforced in a statement by Turkey's Energy and Natural Resources minister²².

²⁰ U.S. Department of Energy, Energy Assurance Daily, August 8

²¹ [“Baku-Tbilisi-Ceyhan was blown up Not by Kurdish Bomb But by Russian Laptop”](#) Georgian Journal, 18 December 2014

²² [South Caucasus Pipeline explosion poses no threat to Georgia, says officials](#). Agenda. Ge, 4 August 2015

With the rise of terrorist groups in Syria and near Turkish borders the risks for the secure supply of energy increases further. In close cooperation with EU, United States and neighboring countries Georgia should improve the protection and safety of energy infrastructure against possible acts of terrorism.

7) Climate Change – challenge for energy security

Increasing demand on energy, unpredictable generation of energy from renewable energy sources and damaged energy infrastructure due to the growth in natural disasters are examples of climate change effects in Georgia.

Energy consumption for cooling as well as winter loads tend to increase. In the last few years, Georgia's energy consumption in summer has grown to winter levels due to cooling load.

Climate change represents one of the key energy security risks for hydro-dominated²³ Georgia. The amount of generated hydropower depends on annual precipitation and the surface area of glaciers, climate variations having a major impact on both. Glaciers have continued to shrink, moreover, according to the recent study²⁴ number of natural disasters has increased more than 50 times compared to 1900s in Georgia. In 2014 the catastrophic event on Devdoraki glacier, was provoked by heavy rain resulted in disastrous ice and land slide and brought huge damage and loss of lives in a hydro plant under construction. Mtskheta-Stepantsminda-Larsi road was ruined and the North-South transit gas pipeline supplying natural gas to Armenia from Russia was ruptured on a major section.

Climate change in the South Caucasus is a transnational challenge. Further regional cooperation would be beneficial in a number of areas, and future programs could include: the formulation of trans-boundary river management plans; the exchange of climate and hydro meteorological data, the development of Early Warning Systems for natural disasters and seasonal forecasting; and the sharing of lessons learned in climate change adaptation projects, such as water conservation and natural disaster management. These would be an important step for adaptation planning and building climate resilience in the Region.

Also, according to the Article 307 of EU-Georgia Association Agreement: "The Parties shall develop and strengthen their cooperation to combat climate change. Cooperation shall be conducted considering the interests of the Parties on the basis of equality and mutual benefit and taking into account the interdependence existing between bilateral and multilateral commitments in this area". Under the agreement Georgia should prepare national Adaptation Plan of Action (NAPA);

At the same time Georgia has a significant potential to offset the Greenhouse gas emissions in other countries by developing its renewable energy potential based predominantly on hydropower.

8) Lack of Energy security strategy and related capacity

Facing the above and other challenges, Georgia has not developed any sound analytical basis for energy security. There is no energy strategy that would lay out the existing threats and suggest the methodology for addressing them. The absence of document also means the lack of substantiated process of analysing weaknesses and threats as well as strengths and opportunities and consequently indicated the lack of capacity for proper policy making.

²³ 80% of total power generation in Georgia comes from hydro. (ESCO 2014)

²⁴ Atlas of Natural Hazards and Risks of Georgia, CENN 2012.

This fact also raises the question on the qualification of managing and governing the energy sector which may be considered as a main energy security risk in the country.

This risk especially aggravated by poor quality legislation, lack of effective regulations that might govern the decision making process in critical situations.

In 2015 the parliament of Georgia adopted new energy policy document “Main Directions of the State Policy in Energy Sector of Georgia”. The core national energy policy priorities complies:

1. Diversification of supply sources, optimal utilization of local resources and reserves;
2. Utilization of Georgia’s renewable energy resources;
3. Gradual approximation of Georgia’s legislative and regulatory framework with the EU’s Energy Acquis;
4. Energy market development and improvement of energy trading mechanism;
5. Strengthen Georgia’s role as a transit route in the region;
6. Georgia – regional platform for generation and trade of clean energy;
7. Develop and implement an integrated approach to energy efficiency in Georgia;
8. Taking into consideration environmental components in the implementation of the energy projects;
9. Improving service quality and protection of consumer interests.

The importance of Georgia-EU relationship is clearly stated in the energy policy document “With the aim of achieving deeper economic and political relations, one of the main directions of government policy in the energy sector is gradual harmonization of Georgian legislation with the EU legislation. The above process will facilitate: competitive, transparent and effective energy market model as well as creation of attractive and stable investment climate; development of energy trade between Georgia and EU countries; exploration of renewable energy resources and facilitation of energy efficiency oriented activities in the country through economically and ecologically feasible means.”

However, comprehensive energy strategy is needed to implement energy policy priorities.

Energy Union Strategy and Georgia’s National Energy Policy

The Energy Union strategy, initiated in February 2015 by the new team of European Commission clearly states that the EU's energy security is closely linked with its neighbors and the spirit of solidarity is at the heart of the strategy. The main aims of the Energy Union are largely align with Georgia’s energy policy priorities.

1) Diversification of energy sources, suppliers and routes.

The use of energy policy as a political bargaining tool by Russia over the past years has highlighted the need for energy diversification among European countries. The EU will look to other gas suppliers such as Turkmenistan and Azerbaijan in the East and LNG imports from the US in the west to wean itself off Russia. The Southern Gas Corridor is a priority project in the list of EU energy infrastructure Project of Common Interest (PCIs) which will guarantee the diversification of suppliers and routs and integration of regional gas markets.

Southern Gas Corridor is a major European project of common interest that can have a major benefit for Georgia as well. Georgia can benefit from EU's diversification its energy suppliers through the construction of new international pipelines for Caspian and Central Asia energy resources. According to the energy policy document, Georgia as an important transit country intends to strengthen its role in implementation of East-West and North-South transit corridors. Effective utilization of its geopolitical location, will contribute to country's energy security economic development and political stability by providing access to additional energy sources and attracting the political interest of international players. It will improve Georgia's resiliency to external and internal influences. Achieving of these goal will require from Georgia to introduce the principles of transparent and competitive market and transparent regulation compatible with the EU Energy Acquis, which is an effective step in improving energy security of the country.

2) Working together on security of supply.

By introducing common crisis management, the Commission proposes preventive and emergency plans at regional and EU level, including the Energy Community contracting parties. Strengthening solidarity among Member States, in particular in times of supply crisis is one of the main goals of the Energy Union strategy.

Georgia does not share a direct land border with members of the Energy Community and EU countries. However, Turkey is trying to integrate and harmonize its energy system with Europe's, which can also alleviate the security problems for Georgia.

Georgia is not connected to the EU energy markets directly, however establishing the new energy links between Georgia and the EU including the projects of Southern Gas corridor provides the opportunities that should be explored and utilized. E.g. in case of Energy Community membership there might be a possibility for Georgia to benefit from mutual support clause for emergency situations by having access to the transit flows on predefined and negotiated terms. This would also reduce the risks of intended cut-offs happening.

Security should be also addressed by developing the own fossil fuel production. Optimal utilization of estimated potential of local oil and gas bearing structures, especially on Georgia's offshore fields and coal deposits, by means of intensification of exploration activities and implementation modern, effective and environment friendly technologies, can significantly weaken import dependency of country. Construction of a strategic gas storage facility will allow the outside unaided management of the critical supply-distribution activities and make country thus more resilience subject to the negative external influences.

3) A fully-integrated internal energy market.

To strengthen cross-border connections EU has identified more than 200 energy infrastructure Projects of Common Interest (PCIs). The cross-border connections enable energy to flow freely across the EU without any technical or regulatory barriers. Only then can energy providers freely compete and provide the best energy prices. The European Investment Bank, the Connecting Europe Facility and financing under the European Structural and Investment Funds already provide the means for the development of PCIs.

Joining the internal electricity market of Europe across the EU will allow Georgia to export its excess renewable energy through Turkey to lucrative European markets. This can bring both energy and climate mitigation benefit. It will also increase investments in power generation and transmission networks. For gradual establishment of competitive energy market and development of trading relations, the following measures specified by the energy policy document: deepening legal and trading relations; establishment of strong and transparent institutions; improving regulatory legal basis; further development of gradual deregulation and technical synchronization of Georgia's energy system with the regional energy systems.

4) Enhanced regional cooperation within a common EU framework.

According to the Energy union Strategy member states must coordinate and cooperate with their neighbors when developing their energy policies. Dedicated cooperation arrangements, solidarity and trust in the Central and South-Eastern part of Europe would help to accelerate the better integration of these markets into the wider European energy market which would improve the liquidity and resilience of the energy system and would allow full use of the region's energy efficiency and renewable energy potential.

Introducing European legislation has remarkable own benefits. It envisages introducing market mechanisms based on the principles of transparency, which will encourage the development of open and transparent Georgian market. The need for a modern legislative environment which will require an overhaul of Georgia's inadequate legislative environment, strong and independent regulator, phasing-out the practice of non-transparent memorandums, de-monopolization of the market to promote healthy competition, unbundling, transparent tariff setting and eliminating the opportunities for corruption. All of these measures have a potential of attracting investment in the sector and thus supporting energy security and economic development.

5) Energy efficiency as a contribution to the moderation of energy demand.

The European Commission supports the work of the Smart Cities and Communities-initiatives as well as the Covenant of Mayors, which are primarily carried forward by mayors, civil society organizations, investors, financial institutions and service providers, this is important for achieving progress on energy efficiency in and outside the EU. "The role of cities is also very important in Georgia. Supported by the central government, eight cities in Georgia which represent more than half of the population have joined the Covenant of Mayors EU programme" said the Prime Minister the UN 2014 Climate Summit.

Enacting energy efficiency policies is a long standing problem in Georgia which is exceptional country that does not have energy efficiency law or any regulation for efficiency in building sector. Implementing of Energy Acquis under Association Agreement (Energy Community membership) will entail development of relevant legislation and institutions, which is a step forward in country's technological development. Signing the association agreement has already stimulated some activity in this direction and development of country's National Energy Efficiency Action Plan (NEEAP) is underway as well as a market study for energy efficiency in buildings (both EBRD funded projects). The emphasis on Energy Efficiency by Energy Union strategy may have a spill-over effect on Georgia as well.

6) An ambitious EU Climate policy.

The agreement on the 2030 climate and energy framework has defined the EU commitment of an at least 40% domestic reduction in greenhouse gas emissions compared to 1990. This makes an

ambitious contribution to the international climate negotiations with a view to achieving a binding climate agreement in 2015. The cornerstone of Europe's climate policy is a well-functioning EU Emissions Trading System. The EU Emissions Trading System will deliver a meaningful price on carbon emissions and stimulate cost-efficient greenhouse gas emission reductions²⁵.

Georgia has a vast potential of hydropower resources that can be further multiplied by easy integration of solar and wind power. This large potential far exceeds country's internal needs and can replace the emissions in other countries, including the European Union. In the times of obvious aggravation of climate problems this opportunity should not be overlooked. There have been the cases when Georgia through swaps involving Turkey managed to export the electricity to Europe. Now the adequate mechanisms for green certification need to be developed that will allow Georgia to develop its vast potential of renewable energy and will help Europe to meet its climate goals.

7) Becoming the number one in renewables.

The European Union is committed to becoming the world leader in renewable energy, the global hub for developing the next generation of technically advanced and competitive renewable energies. The EU has also set an EU target of at least 27% for the share of renewable energy consumed in the EU in 2030. The hydro-energy rich Georgia can significantly benefit to the EU's goals.

Attracting European investment in developing the renewable energy potential in Georgia as well as benefiting from technological development in renewable energy are the obvious synergies that Georgia has with the new initiative of Energy Union.

8) An Energy Union for Research, Innovation and Competitiveness.

In order to be the world number one in renewable energy, the EU should work together with its partners to coordinate efforts and deliver results, ensure more effective links between research and industry and thereby bringing new technologies to the market in the EU. The Horizon 2020, which is the biggest EU Research and Innovation program with nearly €80 billion of funding available over 7 years (2014 to 2020) create opportunities for EaP countries to be involved in the research programs with its EU partners.

Innovative technological development is the imperative necessity for the countries willing to advance their national systems of economy, policy and achieve sustainable development. Cooperation in research and development activities with European partners can bring an invaluable benefit of innovation and development to Georgia's economy and science.

Georgia remains committed in its pursuit of democratic development and European integration. To enhance the relationship with the EU, Georgia signed the Association Agreement (AA) and a Deep and Comprehensive Free Trade Agreement (DCFTA) in June 2014. This agreement provides a framework for a new relationship based on political association and economic integration. Under the Association Agreement, energy co-operation between EU and Georgia should be based on the principles of

²⁵ http://www.eumayors.eu/news_en.html?id_news=594 25 September, 2014

partnership, mutual interest, transparency and predictability and shall aim at market integration and regulatory convergence in the energy sector, taking into account the need to ensure access to secure, environmentally friendly and affordable energy²⁶.

According to the article-218 of the Association Agreement, preference in implementing energy chapter shall be given to the adoption of legislation or acts which are consistent with the Energy Community Treaty or are based on legislation applicable in the Union. Key energy directives and regulations should be implemented in accordance with the timeline agreed by Georgia in the framework of negotiations on membership in Energy Community Treaty.

The Energy Community is considered to be a mechanism to ensure the introduction of a single transparent energy market and stable investment environment in the EU neighborhood. The European Union considers Georgia's membership of the EU Energy Community as one of the important preconditions to implement strategic transit projects. Georgia has been negotiating officially with European Commission on its Energy Community membership since early 2014. According to the government officials, Georgia will become full member of the Community before the September 2016.

Conclusions

Georgia's aspiration of democratic development and Euro-Atlantic integration has been justified by the decision of Georgian people and the EU-Georgia Association Agreement, signed in 2014. It is a strategic partner of the European Union in the region and can act as a gateway to rich energy resources in the Caspian and Central Asia region. There are synergies in energy security interests of EU and Georgia. While Georgia's energy policy priorities relate to the diversification of supply sources and optimal utilization of local energy resources, gradual approximation of Georgia's legislative and regulatory framework with the EU's Energy Acquis and effective implementation of EU energy market principles, can strengthen Georgia's role as a transit route in the region and etc. the EU adopted new Energy Union Strategy which goals largely align with Georgia's energy policy priorities.

- Georgia faces significant energy security threats that if realized can undermine the country's ability to follow its aspirations to independent development as liberal market democracy and integration with EU and Euro-Atlantic community. Part of these threats are coming from continuing occupation of Georgian territories, including the location of part of key strategic energy infrastructure by Russia and part from the possibility of application of soft power strengthened by ownership of energy undertakings combined with internal weakness of legislative and institutional framework as well as policy making practices in the country.
- Georgia has difficulty in controlling all strategic energy infrastructure and thus can be subject to blackmailing and threat of disconnection – cannot guarantee the security over its whole territory. Threat of external interference in the operation of critical energy infrastructure as well as application of soft power can be used as a leverage over the politicians. The vulnerability to such threats has a fertile ground in poor quality legislation and governance allowing taking subjective decisions virtually without any control from parliament or civil society.

²⁶ Association Agreement, Title VI: Other Cooperation Policies - http://eeas.europa.eu/georgia/assoagreement/pdf/ge-aa-title-vi-other-cooperation-policies_en.pdf

- The concerns for Georgia's energy security are further aggravated by increasing dependence in winter months on energy imports from Azerbaijan (gas and oil products) and Russia (mainly electricity and gas);
- At the same time Georgia has a great potential for contributing to EU and own energy security through implementation of Southern Gas corridor and development of domestic renewable energy sources largely the renewable energy.
- Security should be also addressed by developing the own fossil fuel production and construction of a gas storage facility, which will make Georgia more independent and thus more reliable partner less subject to external influences.
- Active participation in Horizon2020 and other programs for innovation and technology development are vitally important for countries like Georgia.

Thus, there are a lot of synergies in Energy Union strategy goals and Georgia's energy policy priorities which should be captured and effectively used by decision makers on both sides.

Recommendations

1. Development of emergency action plans and safeguards against interruption and damage of critical energy infrastructure should become the major concern of the government. Various measures including creation of strategic reserves and information and experience exchange, emergency agreements etc. should be developed.
Enguri HPP should be brought up to the attention of international community attention, as interruption of power flow from this plant can constitute a major offence against Georgian political and economic stability threatening its independence and statehood.
2. Georgia should intensify information exchange and communication with Euro-Atlantic organizations on Russian occupation and its increasing influence in the region;
3. Georgia should accelerate the cooperation with EU, United States and neighboring countries to improve the protection and safety of energy infrastructure against possible acts of physical and cyber terrorism; intensifying the information and experience exchange including that in NATO format can be an important step in this direction.
4. The long protracted negotiations on Energy Community membership should be concluded in a short period with more engagement. Georgia should expedite the full membership of Energy Community to ensure effective harmonization process with EU energy Acquis; Accelerated implementation of the basic principles of EU legislation are essential for sector development and can remove major security threats coming from Grey Areas in Georgian Energy legislation and nontransparent governance practices.
5. Georgia needs to develop internal energy resources, create the gas storage facility and oil security reserves, as well as develop Energy Efficiency policies, diversify further energy supplies and seek the ways for more political stability in the region.
6. Safeguards should be created against further expansion of Russian control of of critical energy assets in Georgia. Government of Georgia should guarantee attracting strategic investors for largest power distribution company Energo-Pro Georgia, which is currently being sold;

7. Promote further development of internal energy infrastructure and strategic cross border connections; Strengthen the activities in support of regional energy market development;
8. Georgia should prepare mitigation and adaptation plans and measures for climate change. Further regional cooperation would also be beneficial in a number of areas, including development of Early Warning Systems for natural disasters and forecasting. These would be an important step for adaptation planning and building climate resilience in the Region.
9. The role of civil society should be strengthened in transformation process. CSOs should increase their awareness, engage meaningfully in the process and take more responsibility by monitoring the EC accession process, advocating and informing society about the benefits of the reforms to be facilitated by EC membership of Georgia;
- 10.
11. CSOs, analytical and educational centers should get actively involved in Horizon 2020 and other R&D project activities;

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Energy Security and Energy Union Perspectives for Moldova

Dumitru Drumea

ECOSTRATEGII

Introduction

Moldova has signed and ratified Association Agreement (2) with the EU on 27 June 2014. This document covers practically all domains of social and economic development of the country including energetic ones. The Moldova–European Union Association Agreement is a treaty between the European Union (EU) , Euratom, their 28 Member States and Moldova. It establishes a political and economic association framework for cooperation with the EU. The parties committed to co-operate and converge economic policy, legislation, and regulation across a broad range of areas, including the modernization of Moldova's energy infrastructure, and access to the European Investment Bank.

According to the provisions of this document Moldova has developed its national energy strategy, which was approved by Governmental Decision Nr. 102 in 5 February 2013. The target year for implementation of this document is 2030 with an intermediate year 2020.

Moldova has also signed an Energy Community Accession Protocol on 17 March 2010. It facilitated development of relevant legislation like Law # 107 of 17.12.2009 on energy bills, law 123 of 23.12.2009 on natural gas, law 117-XVIII of 23 December 2009 on accession to the Energy treaty and the law #320 of 16.01.2009 on regulations in the activity of National Agency for Regulation of Energy Market (ANRE).

One of the main objectives of Moldavian energy authorities is readiness of the country to join European Network of Transmission System Operators in Electricity (ENTSO-E) by 2020. Strategy contains prioritization of main problems of Moldova in the field of energy in line with EU and Energy Community objectives, sets national targets, international obligations like participation in different Energy related Conventions, Treaties etc,

Main priorities for the implementation of the National Strategy are:

- Strengthening of the status of Moldova as a transit country for power and natural gas on the base of bidirectional transmission connections
- Building new energy generation capacities as well as modernizing of the existing ones aimed at full commercial strengthening and exploitation of the power generation local capacities

Moldova has very limited local energy resources, which can cover only 1% of total needs and thus improving efficiency of energy installations is one of the priorities as well as attracting best practices for energy saving, educational, research and other activities, which could lead to energy saving on all stages of production, transport and use of energy resources in the country.

As a foundation for energy sector development Moldova has established a clear vector of integration with the European Union and its energy market, putting request on accession and identifying the steps needed for this. Moldavian authorities also recognize necessity of harmonization of actual legislative norms, acts etc. with the EU legislation and relevant activities are actually under way.

The Republic of Moldova is a net importer of energy. Natural gas comes mainly from one source “Gazprom” which makes the country very sensitive and dependent on this source. The use of coal is very

limited and thus Moldova has a good precondition for the implementation of the low-carbon provisions of relevant EU policy.

Main problems associated with generation, transportation and use of electricity and heat production are associated mainly with the:

- Lack of connection to the ENTSO-E,
 - Insufficient capacities of the existing lines to connect to the European internal market
 - Amortized energy facilities (mainly installed and used from the soviet period).
- Overcoming these issues is the main energy security political agenda in Moldova and relevant activities are also aimed at the saving of used energy.

Based on above mentioned problems, energy agenda of the country includes:

- Implementation of the provisions of the Association Agreement between Moldova and EU in the field of energy: usage of alternative energy resources (biomass, wind energy, small hydropower stations etc), effective energy saving, green economy, etc
- Further integration with the EU energy market
- Use of internal energy resources – oil, gas fields in the southern parts of the country for local energy supply
- Establishing of real tariffs for the energy use, which will cover operational and incremental costs for the energy production
- Reconstruction of existing facilities, especially in the capital (constructed in 1964-1982)
- Reduction of losses in distribution system (actually 5,5% from gas system, 13-15% from electricity, 20-21% in heating system)
- Research and innovation activities in the field of energy equipment modernizing, use of alternative sources etc, development of relevant curriculums at the Universities
- Public involvement in energy management

These issues are also mentioned in the political agenda of the National Development Strategy of the Republic of Moldova (Moldova 2020) and for its implementation activities as follows are presumed:

- Construction of 139 km power lines and 40 km gas pipelines
- 20% of renewable sources of energy in overall consumption and 10% of biofuel
- Assure total 800 MW production
- Reduce greenhouse emission by 10% in comparison with existing level of emissions
- Energy saving measures for gas system 39%, energy distribution by 11%, thermal energy for 5% (for distribution networks)
- To reduce energy consumption in buildings by 20%. In comparison with actual consumption

Key energy security risks

Based on the analysis of existing statistical (4) and political documents (1, 3, 5) main risks in energy security in Moldova could be identified as follows:

- Strong dependence on single source of fuel supply (Gazprom)
- 70-75% of energy producing equipment is worn out and significant energy losses occur especially in heating system. High risk of potential accidents on power stations and distribution networks.
- Insufficient capacity of population to pay energy bills (actually social subsidies cover 30% of relevant expenses)

- Poor attractiveness of Moldavian energy markets for foreign investors and poor capacities of local energy authorities to finance relevant energy projects

Key Energy Security Issues in the country

A. Current key energy security risks, their causes and effects.

One of the main risk for energy security in Moldova is the lack of own energy resources and strong dependence on one source supply – Russian Federation (Gazprom).

Risk 1. - Existing transport and distribution networks were built during the Soviet era and actually it is oriented (technically, raw material etc) on eastern (one source) supply. Diversification of the energy sources is complicated issue due to limited financial resources of Moldavian authorities and poor capacity of local population to pay the debts. In addition, Transnistrian authorities do not transfer financial resources for the consumed gas on the accounts of Moldovagaz and national debt to Gazprom has achieved a sum of around 1,8 bln \$ from which around 90% comes from Transnistria region. No progress on payment of this debt during negotiations with Transnistrian authorities has been achieved.

The effect can be the gas prices rising further, growth of poverty and increased social tension in the country. Gas pipeline from Romania (Yasi-Ungheni) is under construction and functions partially. This could be at least an emergency alternative in case of Force Majeur with Gazprom. It is also expected that energy supply network in Moldova will be extended based on the use of diverse sources including those located in the EU ⁽³⁾

Risk 2- Tariffs. Actually tariffs are established by national Agency for regulation in Energy (ANRE). Insufficient transparency of this institution causes social tensions and compromises the credibility of pro-European authorities (political pro-European parties actually predominate in the Parliament and form the Government).

Risk 3- Accidents. This risk is coming from old equipment and pipes. Actually personnel is trained on maintenance of the distribution networks, but equipment is old and can cause shortages in energy supply. Emergency plans for relevant situations exist, but additional trainings is needed. Cooperation with the EU is one of the key issues in that and relevant assistance is coming to the department for Emergency, which prepares population for emergencies in cooperation with local authorities.

The effect of this risk could be people deaths, economic losses, environmental pollution etc. last accident took place in the southern part of Moldova in 2009, when gas pipeline has exploded and authorities had to evacuate several hundreds of people from adjacent localities.

B. Possible solutions and opportunities, including potential role of EU, EaP and other partner countries. Measures to prevent key energy security risks

Moldova has signed and ratified Association Agreement with the EU (also ratified by Parliaments of the 26 EU member states). It gave an opportunity to Moldavian authorities to be involved in different EU programs, which cover energy security issues. Thus Government of Moldova in cooperation with EU experts is developing further actions for joining the EU Energy Union (activity suspended in 2012 due to the functioning of Moldova Gas – branch of the Gasprom). In addition, in cooperation with Romanian authorities, further extension of the gas pipelines is in progress and part of the pipeline Ungeheni-Yasi is completed. This construction is supported by the EU through the grant to Romanian and Moldavian

authorities. Exploitation of this facility will help to overcome energy crisis in case of emergency and reduce dependence on external supply.

EU institutions are also involved in the political agenda with Transnistria region facilitating negotiation process on Moldavian integrity, access of Transnistrian goods to the EU market and thus supporting living standard in this region. Actually around 60% of economy in Transnistria depends on relations with the EU. This could facilitate more effective political dialog between Moldavian and Transnistrian authorities in different domains including energetic sector.

Prevention of the energy security risks in Moldova could be based on:

- Construction of new pipelines and energy facilities in cooperation with the EU, development of emergency plans for protection of population, environment and economic enterprises in case of energy shortages as well as accidents.
- Monitoring and reporting on the state of pipelines, and extension of the existing network with the EU member states. Further integration to the European Energy market.
- Diversification of energy resources and use of available sources in Moldova (biomass, wind, small hydropower, local oil and gas fields, introduction of energy saving techniques etc)
- Further involvement of the civil society institutions in promotion of the EU experience in energy savings in private households, strengthening of the fundraising capacities on different level of authorities as well as participation of the civil society representatives and public authorities in decision making process on tariffs, local taxes associated with energy use and consumption, etc.
- Political dialogs on energy security, including Transnistrian authorities on energy issues assuring normal functioning of the energy enterprises located in this region and attraction of investments from local and international donors.

EaP could contribute through development of joint projects aimed at evaluation of relevant EU experience in this domain, organizing of trainings, seminars etc for representatives of the civil society organizations, local public and sectoral authorities, development of training materials on this issue etc (Energy Forum East).

C. Overview the country's experience and good practices in addressing the energy security problems.

Energy security issues present a great concern for different level of authorities. After gas supply crisis in the February 2000 and shortages in energy supply in 2009, Moldovan government in cooperation with the EU and relevant authorities from Romania decided to construct a gas pipeline in order to reduce negative consequences in case of emergencies. In this context EU Commission, Romanian and Moldovan Governments allocated resources for the construction of this gas pipeline branch.

Energy market was liberalized in 2000, when around 70% of the distribution sector was privatized and merged to the Union Fenosa Joint Stock Company (Spain). Actually this company provides services in three development regions of Moldova (northern, central and southern parts of the country), including capital town.

Moldova reports increasing of the investments in the gas sector from 15 mln euro in 2008 to 28 mln euro in 2010. Actual investment plan presume construction of the 500 km of the gas pipelines in the period 2013-2015. At the same time, according to the ANRE decision from 6 April 2011, Moldavian gas market was recognized as uncompetitive, because of a single import source. Local gas fields are insignificant and only one of them is used for rural bread factory in the southern part of the country (Baimaclia district).

Production of the biogas is very limited due to strong decreasing of the animal breeding. Anyway this sector is recovering now, especially in private households and one could expect growing of interest to this source of energy in the nearest future. In this context the sector is going to be developed together with preparing of the environmental guidance on the use of the biogas as well as development of local pipes for it (inside house) (8).

Biomass use is one of the priorities for assuring energy supply (speech of Moldavian foreign minister during UN General Assembly, September, 2015). Biomass production is a priority for local energy production and this sector should be developed in local communities. According to estimations around 5-7% of local energy consumption could be covered from this source.

“District heating improvement project” (8) supported by the World Bank stated in 2015 with the objective of contribute to improved operational efficiency and financial viability of the District heating company and to improve quality and reliability of heating service delivered to the inhabitants of the capital town (Chisinau). As an outcome of the project it is expected that 80% of town population will have better heating conditions through reduction losses in the distribution network.

Each of the described projects had a public participation compartment and relevant trainings were provided with invitation of the representatives of the civil society institutions. This was also reflected in the Climate Forum East project implemented in Moldova in 2013-2014 aimed at strengthening the civil society involvement in the decision making process as a tool of adaptation to climate change.

Seven best sustainable energy projects under the Moldovan Sustainable Energy Financing Facility (MoSEFF) were honored during the “EU-EBRD Sustainable Excellence Awards 2012” (10)

Launched in 2010 by the EBRD, MoSEFF is a €20 million special credit program designed to finance energy efficiency and renewable energy projects in corporate sector in Moldova through local partner banks – Moldova-Agroindbank, Moldindconbank and BCR Chisinau.

Main results of these projects were energy savings and reduction of costs of final products, less bills for energy payments etc. In addition to it good energy saving practices were presented in different parts of the country with presentation of the best practices in different training courses on energy saving for different level of public and sectoral authorities. EU grants also promote further development of the energy saving activities, use of alternative energy resources etc. These issues were also presented in the projects developed in different national and regional contests with involvement of students and pupils of lyceum classes.

Thus main challenges for energy security practices in Moldova are based on:

- Use of alternative energy supply sources like biomass, wind, hydro etc
- Use of local energy resources like local oil and gas fields in the southern part of the country. According to the estimations these sources could cover around 1-2% of total energy consumption in the country
- Energy saving technologies and use of modern materials in order to reduce energy losses in distribution networks and final recipients (buildings, pipelines, transportation etc)
- Further development of training programs and practices for different target groups of population and public campaigns on introduction of the best energy saving measures.

Energy Union Strategy and National Energy Policy

Energy Union strategy (2) from the country's perspective presents a base for the implementation of the national Energy document in cooperation with the EU and other international institutions working in Moldova. The government of Moldova is going to make a commitment to increase the share of renewable energy up to 20 percent in national consumption by 2020. As a result of implementing this strategy, Moldova will benefit from a modernized and competitive energy market, ready for integration into the European market based on: security of energy supply, creating competitive markets and regional and European integration and environmental sustainability and combating climate change.

The main goals for Moldavian authorities, which are relevant to implementation of the EU Energy Strategy look like the following:

- To assure sustainable energy supply of Moldavian customers by using opportunities arising from the EU cooperation. Main issue is connection to the EU distribution energy supply network (joint projects with Romania), use of practices for energy savings through introduction of new materials and technologies, attraction of EU financial resources for modernizing of the existing networks as well as participation in the development of common energy market. In this context national strategy presumes development of the tariffs on the basis of the EU practices and expertise. Transparency issues are also one of the key issues could be improved through participation in the Eastern Partnership EU project
- Integration in the EU market is proposed through privatizing national companies and this is one of the key concerns in energy management issues in Moldova. It presumes modification of the status of Moldovagas (Gazprom branch) and its papers (as well as other companies) should be available for the free circulation on the market. Moldavian strategy also presumes diversification of energy suppliers and sources on the basis of joining the EU distribution networks (Romania) and creation of the joint-stock companies with EU member states, especially in the Danube river basin (receiving the electricity from Iron Gate hydropower plant, Cernovoda in Romania and also procurement of electricity in Ukraine)
- One of the key issues in national and EU strategies is energy saving issues. Actually this is essential part of energy related activities in Moldova. By the year of 2020 school buildings in the country will have autonomous heating supply based on the use of renewable energy sources and buildings will be equipped with insulation materials to reduce energy losses. Moldavian authorities also will encourage private households to install local heating systems and introduce relevant tax promotions for institutions and enterprises with reduced energy use.
- Development of green economy is also a priority for Moldavian authorities in cooperation with the EU in energy sector. It presumes achieving of the 20% carbon emission reduction target by 2020 through implementation of green farming, introduction of technologies with reduced energy consumption (irrigation, food processing, etc). According to estimations it could lead to reduction of energy consumption for 20-25% by the period 2020-2030. At the same time growing of economy is presumed on the level of 3-5% (according to actual trends) and thus this target is a great challenge and could be achieved mainly in cooperation with the EU. In this context cooperation in the field of research and implementation of its results is a priority for different level of authorities. One of key concerns in this domain is development of the preparedness of

national infrastructure to adapt new technologies, develop relevant normative, standards and legislation according to EU ones.

Through the attainment of these targets, the EU can contribute to adaptation to climate change and air pollution, decrease dependence of national consumers on foreign fossil fuels, and keep energy use more affordable for households and businesses.

Main opportunity for further development of the energy sector in the country arises from entering into force of the Association Agreement, which is a basic document for further cooperation with the EU. It covers practically all domains of country development and gives opportunities for energy sector modernization according to the EU energy union standards. Based on that Moldova could have an opportunity:

- To have access to the EU energy market and use new technologies for energy production, transportation, saving etc.
- To increase technical level of Moldavian energy enterprises and thus reduce losses, create new jobs in this sector and establish more balanced tariffs on energy services.
- To be involved in new energy programs, which are available for countries with Accession agreement status
- To facilitate public involvement in energy management issues and efficient monitor of National Agency for Energy Regulation activities as well as other institutions dealing with energy services.

As a perspective Moldova could expect:

- Establishment of realistic tariffs on energy services
- Attraction of new resources for renovation of energy supply system
- More efficient use of energy resources and less dependence on single source of energy supply
- Sectoral development

Main synergies in the strategy and the country's national energy policy

In order to meet the targets of the EU Energy Strategy a number of issues should also be implemented in Moldova. According to this document five priorities could be identified:

- Making Europe more energy efficient by accelerating investment into efficient buildings, products, and transport. This includes measures such as energy labelling schemes, renovation of public buildings, and Eco-design requirements for energy intensive products. Moldavian strategy also presumes increasing of investments in energy sector, protect buildings from energy losses and promote green economy, especially in agricultural sector to reduce energy and raw material use.
- Building a pan-European energy market by constructing the necessary transmission lines, pipelines, LNG terminals, and other infrastructure. Financial schemes may be provided to projects which have trouble obtaining public funding. By 2015, no EU country should be isolated from the internal market. Moldavian energy strategy also presumes liberalization of the energy market, its further decentralization and appearance of financial schemes, which will be more transparent in establishment of the tariffs on energy bills. Essential place in the strategy is preparedness of Moldova to join EU energy union and be presented on the energy EU market.
- Protecting consumer rights and achieving high safety standards in the energy sector. This includes allowing consumers to easily switch energy suppliers, monitor energy usage, and speedily resolve complaints. Consumer rights is a concern in implementation of the Moldavian energy strategy and

also refers to diversification of energy suppliers, opportunities to shift from supplier to another and create a relevant opportunities for development of new companies dealing with energy services. Public participation is also mentioned, but it is not clear what mechanisms should be developed on national level in order to assure active public involvement. In this context further cooperation with EU should be much appreciated and valuable in the frame of the EaP.

- Implementing the Strategic Energy Technology Plan – the EU's strategy to accelerate the development and deployment of low carbon technologies such as solar power, smart grids, and carbon capture and storage. Carbon low emissions are presented in national energy strategy as well as in other sectoral strategies like environmental protection, agricultural development, water and sanitation strategy. As an objective around 20% of energy consumption in Moldova should come from renewable sources. At the same time it is not clear (from national documents) what is real potential for such activities and there were no estimations on how new technologies could contribute to the sectors development.
- Pursuing good relations with the EU external energy suppliers and energy transit countries. Through the Energy Community, the EU also works on integration of neighboring countries into its internal energy market. National energy strategy as well as other sectoral strategies are aimed at integration of the national market with EU one. It is reflected in a number of measures like construction of pipelines from EU to Moldova. Anyway cooperation with Eastern partners also remains a priority for Moldavian authorities.

Challenges and possible barriers

Main challenges are:

- Old equipment used for energy production, transportation, distribution etc. possible barrier: Poor capacities of local customers to pay the bills and as a consequence insufficient investments in energy sector.
- Overcoming of the dependence on one source of energy supply and sustainable political dialog with Transnistrian authorities on tariffs for energy produced in the region.

Possible barriers:

Controversial opinions of different authorities and institutions on resolution of many problems including energy:

- Creation of transparent tariffs establishment procedure and active involvement of the civil society in decision making process. Possible barrier: civil society experts are poor trained in EU relevant practices, insufficient knowledge on this issue
- Further extension of energy supply network and construction of new pipelines joint with EU
- Adoption and implementation of the provisions of the EU energy acquis, its application to national legislation. Possible barriers: insufficient number of qualified staff, especially on local sectoral level, poor institutional capacities, lack of relevant training programs etc

Conclusion and Recommendations

1. Moldovan authorities are concerned on the development of the energy sector in the country and analysis of political documents as well as sectoral strategies confirm commitment of relevant

authorities to integrate national energy sector with EU one. Cooperation with the EU remains main political priority in social and economic development of the country

2. Civil society organizations in Moldova are poorly involved in decision making process on energy sector development and priority areas for this should be identified. Training programs on relevant process in EU is much welcome and cooperation with EU as well as EaP countries is needed.
3. National energy strategy is a relevant document for further sector development and was elaborated according to the EU energy strategy and its implementation will facilitate further integration of Moldova with the EU and its energy union. Identified challenges and barriers could be overcome only in cooperation with the EU institutions and through development of joint actions (projects). EU experience in this domain is highly needed for further extension of networking and partnerships capacities of EaP civil society institutions in Moldova to be involved in energy sector development
4. Energy issues should become an integrated part of sectoral development based on green economy, introduction of energy saving technologies on all stages of energy production, transportation, distribution and use by final customers. Civil society organizations could contribute to that through organizing of public awareness campaigns, training on energy save practices for private households, school pupils etc.

Recommendations:

- Create an Energy Forum East with objectives, which could be discussed during meeting of the WG 3 under Civil Society EaP Forum.
- Prepare a project file(s) for efficient involvement of the civil society organization to be involved in development of the energy sector in Moldova and EaP countries.
- Elaborate a strategy for involvement of the civil society organizations for energy sector development on national level and for EaP region.
- To create mechanisms and tools to assure active public participation and awareness on the development of the energy sector and to contribute to the establishment of the Energy Forum East for cooperation between EU and EaP countries on this issue

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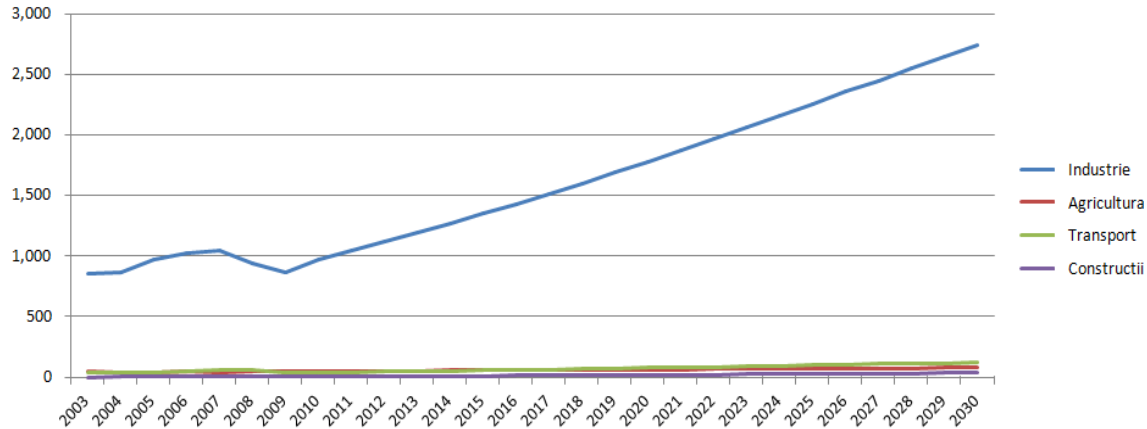
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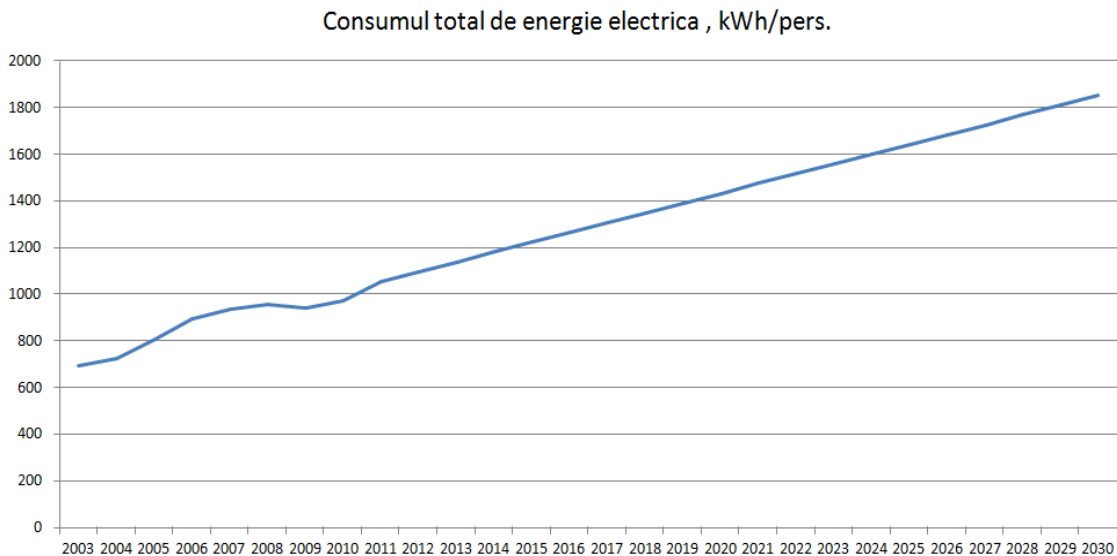
Appendices

Annex 1 – Consumption of the electric energy in basic sector of national economy till 2030, mil. kWh



Sursa: AF-Mercados; Biroul Național de Statistică al Republicii Moldova, Balanța Energetică a Republicii Moldova. Culegere Statistică, 2010; Programul Națiunilor Unite pentru Mediu, Ministerul Mediului. Proiectul: „Activități pentru pregătirea Comunicării Naționale a treia în conformitate cu Convenția-cadru a ONU privind schimbările climatice”, 1 aprilie - 31 iunie 2011.

Annex 2. – Consumption of electricity per capita in the Republic of Moldova (forecast 2030) in kWh/pers



Sursa: AF-Mercados; Biroul Național de Statistică al Republicii Moldova, Balanța Energetică a Republicii Moldova. Culegere Statistică, 2010

Annex 3. - To the Energy strategy of the Republic of Moldova till 2030

Main economic indicators in Republic of Moldova

Indicatori	2015	2020	2025	2030
PIB (in actual costs) mlrd lei	118,3	173,331	238,958	320,705
Industry ((in actual costs) mlrd lei	49,5	67,9	92,5	121,3
Agriculture ((in actual costs) mlrd lei	27,1	32,9	40,1	48,9
Population, mln	3,532	3,437	3,357	3,327
Energy consume, TWh	4,241	5,556	6,996	8,491

Sursa: In ternational Monetary Fund (FMI), WEO, april 2012; forecast actualized by the Ministry of Economy, 2015.

Annex 4, MoSEFF a technical cooperation programme and an attractive grant component, both funded by European Union. The winners of the EU-EBRD Sustainable Energy Excellence Award 2012 are:

1. Award for Industrial Energy Efficiency

Winner: MACON SA, Chisinau

The company used a MoSEFF loan from MAIB to invest €48,000 the implementation of frequency converters for its fan drives and a power factor correction unit for reactive power compensation. The investment produces a 26 per cent energy saving and 208 tonnes Carbon Emission Reduction per year.

2. Award for Energy Efficiency in the Food Sector

Winner: ORHEI-VIT SA, Orhei.

The company saves 24 per cent natural gas consumption per year with the installation of new steam boilers, financed through a €520,000 MoSEFF loan from MAIB.

3. Award for Agricultural Energy Efficiency

Winner: MAGT VEST SRL, Dondusheni.

The company used a €2.3 million MoSEFF loan from BCR to replace its outdated sugar beet harvesters and loaders. With this investment the company achieves a reduction in annual fuel consumption of almost 42 per cent and at the same time significantly reduces its harvesting losses.

4. Award for Energy Efficiency in Small Enterprises

Winner: COLOTEIA SRL, Chisinau.

The company used a €135,000 MoSEFF loan from MICB to invest in a new meat grinder, vacuum bowl cutter and sausage filling machine, an investment that allows the company to save 38 per cent of electricity per year in the production process.

5. Award for Best Building Rehabilitation

Winner: Restaurant BUTOIAS SA, Chisinau.

The restaurant saves 51 per cent energy yearly by insulating its building, installing new windows, solar collectors and heat pumps, financed by a MoSEFF loan of €200,000 from MICB. The project is a good example for smart combination of renewable heating sources.

6. Award for Best Solar Project

Winner: VILA VERDE HOTEL UNGHENI, Ungheni.

The hotel installed one of the largest solar systems in Moldova and at the same time improved the building insulation and the heat distribution system with a €280,000 MoSEFF loan. The project allows the company to save 80 per cent of final energy every year.

7. Award for Best Biomass Energy Project

Winner: AGROMAXER SRL, Straseni.

The company operates greenhouses and has signed a €250,000 MoSEFF loan with MICB to construct a new boiler house, install new pellet boilers and a new near-soil heating system. The project enabled the company to reduce its carbon emissions by 100 per cent and achieve an annual primary energy saving of 91 per cent.

Energy Security and Energy Union Perspectives for Ukraine

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Introduction

Since independence, Ukraine used to be one of the most important transit route from the East to the West, providing opportunities for uninterrupted supply of oil and gas due to well-interconnected multi-pipeline system, inherited from Soviet times.

After the Soviet Union collapse, most of the European countries agreed on the procedure of cooperation in gas sector, considering new borders and national interests. However, Ukrainian state authorities failed to change transit contracts according to new gas market rules, thus they were removed from the supplier-transmitter-consumer technological chain from legal point of view.

Changing European legislation has deepened the difference between transmission operators in the EU and Ukraine, while corruption with opaque oligarchic business schemes in gas sector has frizzed reforms and even creation of technological metering facilities for incoming gas volumes.

Since early 2000th Russia intensively started to use energy supplies as an advantage for gaining political concessions. Ukrainian attempts to change the civilizational path from Eastern to the Western direction in 2004 resulted in winter gas crisis, significantly increased gas prices and short-term annual contracts, ensuring deepened political crisis and conflicts between Ukrainian top-politicians.

Ukraine and the EU signed a Memorandum of Understanding on co-operation in the field of energy between the European Union and Ukraine²⁷ in 2005, which provided general framework of cooperation in the energy sector for upcoming period. In 2009, a Joint Declaration on modernization of Ukraine's gas transit system²⁸ was signed but not followed by sustainable development of bilateral relations.

2006 and 2009 Gas crises showed the EU, that Russia was able and would use energy and especially gas supply to put pressure on neighbors. It resulted in the "third energy package" and intensified cooperation to integrate internal gas transportation networks. However the EU was not able to act with a "single voice" in energy disputes, therefore achieved quite moderate success in energy market integration. Neighboring partner states gained more attention only given their membership perspectives, as it is the case for Balkan countries. Ukraine has joined the Energy Charter and the Energy Community, but has not achieved any clear signals of future integration within the European energy market in the Energy Union framework so far. Ongoing consultations in the EU have internal impact only and do not give much opportunity to non-EU-members for participation.

²⁷ https://ec.europa.eu/energy/sites/ener/files/documents/2010_ukraine_mou.pdf

²⁸ <http://www.enpi-info.eu/library/content/joint-eu-ukrainian-declaration-investment-conference-modernisation-ukraine%E2%80%99s-gas-transit-sys>

For the last decade, Energy security of Ukraine has been considered as secure, affordable and sustainable supply of energy resources. However, in order to gain political support of population, energy prices for private consumers were quite moderate during many years, which increased financial pressure on state budget and provided background for several significant political concessions like Russian fleet extension in Crimea in 1997 and 2010. Only after becoming under pressure of high gas price, in the end of 2012 Ukrainian government started diversification of gas supply from Western countries via reverse connections. They were immediately lifted after agreement of December 2013, but then renewed after Revolution of Dignity with ongoing operation mode of up to 15 bcm annual reverse gas supply potential.

Since 2014, energy security is second priority after national security because of Russian aggression against Ukraine. Due to active cooperation with the European Commission and national governments in the EU neighbor countries, significant gas supplies come to Ukraine from Western energy companies, breaking dependency on Russian gas under 50%. The Government of Ukraine has the goal to achieve less than 25% dependence on energy supplies from a single source in coming years. Since October 1, 2015 Ukraine introduced liberalized gas market rules thus creating conditions for free gas trade, based on “third energy package” requirements. Military operations in the East of Ukraine challenged sustainable production and supply of anthracite to thermal power plants, thus turning Ukraine to the coal importer. Opaque privation of generation assets in the past without binding modernization obligations lowered flexibility of the network; different tariffs created tensions between electricity producers and thus complicated functioning of the United Energy System of Ukraine.

Ukraine’s government is facing serious challenges in terms of providing end users with uninterrupted energy supply

Energy security of Ukraine depends on numerous internal and external factors. The main external factors are:

- 1) Continued aggression of Russia against Ukraine in form of hybrid warfare, including multidimensional utilization of energy dependence.
- 2) Volatile gas prices and access to necessary volumes of imported gas for affordable prices.
- 3) High dependence on credit resources and creditors for reforming energy sector.
- 4) High penetration of Russian technologies, capital and owners into Ukrainian energy sector.

Among the internal factors following issues play decisive role:

1. High resistance of oligarchic groups to reform energy sector.
2. Corruption.
3. Cross-subsidies for consumed energy.
4. Short-term governmental policies to fill state budget on the expense of sustainable development of domestic energy production.

Key Energy Security Issues in the country

Continued aggression of Russia against Ukraine in form of hybrid warfare, including multidimensional utilization of energy dependence.

Russia has used its oil and gas supplies in Ukraine to gain political power and preserve control over Ukraine. After Revolution of Dignity nearly successful plan of Ukraine joining Russian-led Eurasian Economic Union collapsed and caused massive utilization of measures to bring Ukraine back by “hard power” means.

Hard line with unilaterally determined high gas prices and following cut off gas supply for 180 days in 2014 have revealed the necessity of immediate emergency actions for securing appropriate gas volumes at the beginning of heating period.

Despite numerous negotiations with involvement of European Commission, Russia succeeded in its delay and so called “winter package” was signed only in the last night before resignation of former EC President and Energy Commissioner. Ukraine got cancelled “take or pay” clauses and option to buy prepaid as much Russian gas as needed. Warm weather and continued reverse supplies from the EU made it possible to limit purchases of Russian gas, thus restricting options for launching total gas blockade by Kremlin.

In 2015, Russia repeated its “hard approach” toward gas supplies to Ukraine by changing low and high prices in order to reduce reverse flows from the EU. However, due to several factors, Ukraine is still very attractive market for European gas companies with ongoing daily deliveries of 20-40 mcm of gas, enabling coverage of consumption and storage for the winter.

Energy dimension of Russian aggression made it possible to diversify gas imports to Ukraine by using existing infrastructure and to create preconditions for domestic gas market liberalization.

Volatile gas prices and access to necessary volumes of imported gas for affordable prices.

NAK “Naftogas of Ukraine” still plays a decisive role in providing gas to Ukrainian end users, being a guaranteed supplier despite occurring late payments and debts. Purchase of gas on European trade hubs requires free financial resources. Company usually pays in advance, gas might be consumed during winter period, but should be bought earlier. It causes cash gap in Naftogas corporate finances. Higher purchase prices for gas in Europe become a sensitive political issue in Ukraine and a matter of propaganda for pro-Russian forces.

Despite obligations to provide free access to transportation infrastructure, often there are problems in sustainable gas import from Hungary, for instance. The issue of so-called “big reverse” through Slovakia is still unresolved.

This situation stimulates Ukrainian top-officials and top-managers of Naftogas to proactive deals in order to preserve reverse gas supplies and conduct reforms.

High dependence on credit resources and creditors for reforming energy sector.

Utilization of energy assets during recent 20 years with little attention to renovation and modernization leads to their enormous deterioration. With its own financial sources Ukraine is not able to make reforms and modernization, and because of internal risks, external investments and credits flow very slowly into the country.

High penetration of Russian technologies, capital and owners into Ukrainian energy sector.

Russia used to implement long-term strategy of gaining control over Ukrainian strategic industry, science and technological assets, bank sector and even culture. The highest dependency in energy sector is in nuclear generation, where Ukraine has to implement costly and timely program of getting rid from Russian reactors and fuel.

Gas transportation system, designed and constructed during the Soviet period, is also under challenge of radical change in operation mode because of reduced gas transit. Being a comprehensive system, it will require significant reduction of pipeline network and personnel in case of further limitations.

Ukraine is a part of a Soviet electricity network with simultaneous work mode and technical features with Russia and Belarus. Decision on switching off from Russian-led system require huge investments and time for modernization, but is inevitable in the years to come.

Russian businessmen still have big shares in Ukrainian energy production, including fossil fuels and electricity, technical equipment and maintenance.

High resistance of oligarchic groups to reformation of energy sector.

Energy sector of Ukraine is among the most opaque branches of national economy with the strong interests from oligarch groups and ties with politicians and state officials on the highest level. During the recent time they constructed vertically integrated holdings, technological, financial and management chains under the general principle “revenues in own pockets, debts for the state”. In particular, changes on the gas market made impact on the business of DF Group, including regional gas distribution companies and chemistry. Behind DF Group stands Gazprom with its own interests of preserving Ukrainian market loyal businessmen and politicians.

So-called Privat Group has been controlling oil and oil product sector through minor shares at state owned companies and loyal management. They are strongly against changes on oil stock and oil exchange, refinery and oil transportation.

Electricity sector consists of different generation assets, including state owned nuclear and hydro power plants, private thermal and renewable plants with different tariffs and pricing, depreciation level and access to fuel reserves. Damages on confrontation line, difficulties to access coal producing mines on occupied territories and oligarchic sabotages in order to preserve privilege conditions made it difficult to operate the United Energy System of Ukraine in regular mode.

Coal industry is heavily damaged by ongoing armed conflict with Russia in the Eastern part of Ukraine and become a primary challenge for national energy security. Having had surplus of coal in previous years, Ukraine failed to establish reliable chains of its import and distribution among thermal power stations. The latter are mostly controlled or owned by private companies, in particular DTEK with little interest to

national problems but struggling for preservation of own monopolistic position and preferable pricing by all means, including sabotage, artificial emergency and termless repairs.

Interlinked structure of business and state authorities makes difficult to introduce necessary changes to the legislation and its implementation. Reforms are implemented under external pressure.

Corruption

Corruption is a derived result and precondition at the same time for difficult situation in the Ukraine's energy sector. Huge financial flows make it possible for oligarchs to fund establishment and work of political groups and parties, including parliamentary fractions, development of draft laws and implementation of decisions on governmental level, protection of interests in courts and state prosecution bodies etc.

This phenomenon is still very powerful, despite of changes in political structure of Ukrainian parliament and government. Numerous cases of court decisions in favor of particular oligarchic groups make it difficult to manage energy sector and create basis for its sustainable development in the future.

Cross-subsidies for consumed energy

Since the Soviet time Ukrainian top-politicians used to protect low prices for private consumers in order to gain additional support during elections, access to subsidies and donations from the state budget to cover difference in pricing for domestic and imported energy as well as control decisions how to distribute state funds for regions and energy sector branches.

Ongoing price equalization for different energy consumers in Ukraine is widely used by political populists and pro-Russian forces to accuse acting government and parliamentary coalition in illegitimate increase and mismanagement and promotion of advantages for consumers of Russian energy in Belarus and Armenia.

Despite painful and slow introduction, market based pricing already initiated energy efficiency measures on the level of private households and condominiums. It will result in changed attitude towards energy consumption, where end consumer should lead the process of modernization according to own needs but not in order to rescue obsolete public utilities.

Short-term governmental policies to fill state budget on the expense of sustainable development of domestic production

In 2014 Ukrainian government introduced emergency measures to find financial sources for security and defense purposes by significantly increasing taxation on hydrocarbon production, rent payments in particular. Announced as a temporary measure, this mechanism continued to operate in 2015, thus limiting incentives for domestic production and investments.

General approach instead of directed actions against certain violators first of all hampered plans of private and state owned companies on further geological exploration of prospective deposits and drilling. Stagnation of gas and oil production would be the lightest result of governmental policy toward energy production in 2015.

A. Give an insight of emerging energy security risks.

We described result of mismanagement and wrong privatization of energy assets during last 20 years of independence. The biggest challenge is to reform privately owned or controlled strategic assets according to European standards and ensure division of business and politic interests.

External risks are mostly caused by internal challenges and risks, which indeed could be solved only by common efforts of international partners and Ukrainian civil society organizations, pressuring and supervising government and parliament activities in executive and legislative fields respectively.

Ukraine, most of the Eastern partnership countries and the EU might face a large-scale destabilization of energy supplies, if further aggressive Russian foreign policy provokes counter reactions of radical Islamic groupings similar to Kurds pipeline subversions in Turkey.

B. Provide possible solutions and opportunities, including potential role of EU, EaP and other partner countries. What can be done to prevent key energy security risks?

The EU is right when requests visible reforms in exchange for financial support for Ukrainian authorities. However, it should be noted, that several steps could be made in order to secure progress of reforms and comprehensive introduction of European legislation.

While keeping strong overview of what is being done on the adoption of national legislation on electricity market, national energy regulator and other draft laws, developed under support and participation of international experts, it is strongly needed to officially indicate in international dialog framework of cooperation and area, covered by the EU standards for third parties, in particular Russia.

In this regard, the EU should clearly state that Ukraine as a member of Energy Community is considered to be an internal part of European energy market with ongoing process of acquis adaptation. It includes full-scale implementation of the “third energy package”, but also introduction of European approach toward operation of energy transportation infrastructure and transmission system operators.

For Ukraine is should be noted, that Energy Community means possibilities to participate in the EU-funded projects of common interest and apply for such funding, request change of delivery point from western to eastern border of Ukraine, withdrawal of Russian Gazprom from gas transit to the EU and free access to any European trading hub as well as transit route to own territory.

Given the fact, that the EU failed to introduce single trading point for Russian gas purchases so far, ongoing relations with Gazprom should remain the matter of trilateral negotiations, while decisions correspond to the European energy acquis.

Ukraine is ready to support solidarity among the European countries in terms of cooperation by gas shortages and contribute to creation of the united European energy market.

The EU and other partner countries should support Ukraine in preserving existing transit statute as the shortest and the safest route for Russian gas to Europe and block Gazprom attempts to build bypass pipelines via Baltic or Black sea. Even existing pipeline capacities enable the Gazprom to manipulate with gas volumes, supplied to the European gas market, but it is not able to switch off completely Ukrainian direction.

C. Overview the country's experience and good practices in addressing the security problems.

Since 2012, Ukraine has been introducing European requirement to diversification of energy supply. Currently Ukraine imports gas from Russia, Poland, Slovakia and Hungary, thus is becoming a leader among Central European countries. Numerous negotiations helped to proof results of the European gas stress tests of 2014 regarding requirements to cooperation between neighboring countries, volumes of stored gas and transparency of gas reserves and transportation.

Despite the fact, that Ukraine has no legal obligation before the EU to ensure gas transit similar to European TSOs, every year Naftogas is concerned with storage of gas for heating period, including necessarily volumes for Russian supplies to the West.

Energy Union Strategy and National Energy Policy

By withholding Polish initiatives on Energy Union, the EU has significantly reduces attractiveness of this strategy both for member states and partners, including Ukraine. Remaining goals and proposals in fact mean reset of the “third energy package” with additional options for research and innovations and medium to long-term period implementation.

However, Energy Union will be a common framework of cooperation between the EU Member States for coming years, thus inevitable to partner states agenda of relations with this community. Ongoing discussion on the Energy Union are limited to the EU that potentially leaves neighbors aside. Ukraine has the highest level of integration in terms of transportation interconnectivity and domestic obligations to reform the energy sector. Therefore, a logical perspective for Ukraine should be involvement into the process of Energy Union creation. Hereby the Energy Union should implicitly cover both the EU and the Energy Community member state area.

The main goal of national energy policy is integration into the European energy market through implementation of EU acquires, liberalization of the domestic energy market and coherence with technical standards of TSOs in electricity and gas. All this should ensure consumer friendly market functioning, affordable pricing and sustainable supply of energy.

The EU aims to ensure market based pricing for member states and non-discrimination by strategic importance for supplier or political, economic, cultural attitude etc.

By preserving ongoing status of transit and consumer partners, Ukraine and the EU could ensure shortest route for gas deliveries, significant storage reserves and uninterrupted supply for market based prices.

On the other hand, declining cooperation in energy sector due to falling gas, oil and electricity transportation would reduce incentives for both parties to expand relations and enhance at least

economic expenses. Staying along with monopolistic energy supplier, both the EU and the Ukraine would face more dangerous challenges for energy security with the risks of splitting the EU on Western and Central European block of countries and provoking large energy crisis in Europe.

Ukraine and the EU already lost nearly a year of negotiations with regard to Energy Union and common energy policy. European top-politicians are tired from regular energy crisis and want to return to comfort energy supply conditions of the past. Even the evidence of changes on American gas market, which brought significant disadvantages for European industries, have made little impact on politicians to improve the performance.

The EU still prefers to provide nationally oriented energy policy, staying vulnerable to any energy crises and manipulations from external suppliers. Motivated by bilateral agreements with some preferences, European energy companies fail to undergo serious changes and to offer new solutions for the energy market in Europe.

The biggest barrier to the united external energy policy of the EU still is nationally oriented energy mix, absence of obligatory measures to coordinate national energy policy with neighbors and lack of political will on common strong response to external challenges because several countries are afraid to lose national preferences in energy supply.

In one year Ukraine made more progress in gas market liberalization than many of EU Member States in recent five years according to the “third energy package” obligations. However, Euro-optimistic course will remain very unstable without strong bilateral obligations and visible advantages for Ukrainian energy consumers. Here we have to point out, that market based pricing is still not considered as advantage for Ukrainians. A visible success means change of gas delivery point, agreements with Ukrainian TSO on energy transportation according to EU procedures, several European energy suppliers for every consumer. Those arguments will make irreversible integration of Ukrainian energy market into European one and strengthen common energy position toward external suppliers.

Conclusion and Recommendations

Ukraine and the EU are facing important challenges in terms of ensuring appropriate level of energy security. Repeated gas crises should serve as a clear evidence of weak European influence toward aggressive energy suppliers. Proposed idea of the new mechanism to strengthen European position through a set of solidarity measures against Russia have already failed to find support among some top-politicians and governments, thus re-building the Energy Union from rapid reaction into medium-to-long term mechanism for implementation of the “third energy package” is needed.

Despite limited importance, Energy Union might still stay attractive for Ukraine, if expanded to EU plus Energy Community area and enforced by implementation of projects of common interest.

Under certain conditions, it might also be considered as one of dimensions to expand and strengthen cooperation between the EU and Eastern Partnership countries. Cooperation in energy efficiency and research and innovation sectors might become especially important

Bilateral EU-Ukraine level

Ukraine has to insist on more tight relations in energy sector with the EU, given own energy market, transit potential and direction of development. The very first step should be creation of a special energy committee under the auspice of one vice-prime-minister, staffed by state and independent experts on energy market issues, including most challenging gas, electricity and nuclear fuel. This committee should become a coordinator for governmental energy policy in the country and outside, ensuring cooperation with most strategic partners – the European Commission, DG Energy and Environment, DG for Neighborhood and Enlargement etc.

According to Art. 235 of the Association Agreement, Ukraine and the EU should coordinate efforts in development of their energy markets. Therefore, the EU should conduct negotiations with Ukraine to on Energy Union and propose cooperation agenda for the next period.

First of all it is in the interest of the EU to gain access to the wide range of options for delivering Russian gas on the territory, where European acquis are applied.

Multilateral EU-Ukraine-EaP level

Introduction of a multilateral early warning mechanism with telemetric online data control would become important mechanism for gaining solidarity among Member States and partner countries.

Multilateral EaP level

EaP countries have different level of energy market development, as well as different goals and perspectives. However, all countries are facing the challenges of energy overconsumption. Belarus is a leader in reducing energy losses by low-cost measures, while Georgia might share experience on renewables. Meetings on official level with business-forums side events might create multilateral basis for cooperation at least in energy efficiency sector, which would benefit from the EU funded opportunities and technical experience.

Concluding remarks

Ukraine and other Eastern partnership countries are facing now the option for strengthening energy cooperation with the EU by using natural process of changes due to introduction of Energy Union. Each country will try to achieve its own goals and go own pass, considering internal and external factors.

Ukraine has been one of the most consistent partners of the EU in energy sector so far, being a signatory to the European Energy Charter and Energy Community and one of biggest transit route for energy sources from the East.

Ignorance of cooperation in energy sector during previous years resulted in opaque gas schemes, lack of transparency in terms of volumes and pricing, heavy political losses and ongoing military conflict.

Timely coordination of efforts and establishment of cooperation under single regulatory umbrella would significantly strengthen Eastern part of the EU and create transparent energy market in Europe.

Here some comparative outcomes:

Failed cooperation EU/EaP within Energy Union	Successful cooperation EU/EaP within Energy Union
Reduction of energy market, ruled by common rules	Enlargement of energy market, ruled by common rules
Less stability of energy supply to certain EU Member States	Higher stability of energy supply to all EU Member States
Strengthened dominance of monopolistic suppliers vs. consumers	Strengthened position of consumers vs. suppliers, enforcement to commonly acceptable rules
Enhanced applicability of “divide and rule” approach by suppliers	Less space for bilateral negotiations, wider applicability of single market instruments
Segmentation of the EU Member States by privileged and non-privileged relations with Russia	Acceleration of united gas market
Weakening of the EU institutional bodies leading role in energy sector	Enhancement of the EU role in global energy market

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