

Energy Security of Georgia towards Integration in the European Union

A Master's Thesis submitted for the degree of
"Master of Science"

supervised by
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Affidavit

I, **Nino Akhvlediani**, hereby declare

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Abstract

Energy Security is usually defined as “reliable supplies at reasonable price”. Energy security is the milestone of the whole energy system of the country. The problem is that, achieving energy security is a hard task for the government. For such country as Georgia, which is a transit country, it is highly important to have a precisely defined energy security strategy, in order to overcome the political and economic problems related to energy. Moreover, Georgia has a strategic goal to integrate into the European Union. Therefore, Georgia has to fulfill the obligations taken during the past years. Based on literature review, case studies and interviews carried out with the government officials, the problems were set, solutions found and the conclusions drawn. In conclusion, it turned out that some areas should be more prioritized, the Directives/Regulations of the European Union should be implemented in the Georgian legislation and practically applied in order to secure the energy sector in the future. However, overcoming the problems which nowadays exist in the Georgian energy sector and integrating in the European internal energy market, means being close to the integration into the European Union.

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List of Abbreviations

EU: European Union

SOCAR: State Oil Company of Azerbaijan Republic

GDP: Gross Domestic Product

SCP: South Caucasus Pipeline

BTC: Baku-Tbilisi-Ceyhan

BTE: Baku-Tbilisi-Erzurum

OCGT: Open Cycle Gas Turbine

GWh: Gigawatt Hour

ESCO: Electricity System Commercial Operator

TFC: Total Final Consumption

TAP: Trans Adriatic Pipeline

AGRI: Azerbaijan-Georgian-Romanian Interconnector

MW: Megawatt

Km: Kilometres

ENP AP: European Neighbourhood Policy Action Plan

EEC: European Energy Community

NATO: North Atlantic Treaty Organization

GHG: Greenhouse Gas

INC: Initial National Communication

IPCC: Intergovernmental Panel on Climate Change

SNC: Second National Communication

UNFCCC: United Nations Framework Convention on Climate Change

Gg: Gigagram

GNERC: Georgian National Energy and Water Supply Regulatory Commission

VAT: Value-added Tax

Kv: Kilovolt

KWh: Kilowatt Hour

USSR: Union of Soviet Socialist Republics

OSCE: Organization for Security and Cooperation of Europe

AIOC: Azerbaijan International Operating Company

TRACECA: Transport Corridor Europe-Caucasus-Asia

TANAP: Trans Anatolian Pipeline

U.S: United States of America

HVDC: High-voltage Direct Current

ENTSO-E: European Network Transmission System Operators for Electricity

PKK: Kurdistan Workers' Party

BP: British Petroleum

ACG: Azeri-Chirag-Guneshli

TCP: Trans Caspian Project

IEA: International Energy Agency

HPP: Hydro Power Plant

UNESCO: United Nations Educational, Scientific and Cultural Organization

CENN: Caucasus Environmental NGO Network

ESIA: Environmental and Social Impact Assessment

UNDP: United Nations Development Program

USAID: United States Agency for International Development

GEF: Global Environment Facility

LNG: Liquefied Natural Gas

NGO: Non-governmental Organization

WEG: World Experience for Georgia

EBRD: European Bank for Reconstruction and Development

CDM: Clean Development Mechanisms

CFL: Compact Fluorescent Lights

LED: Light Emitting Diode

EC: European Commission

PCA: Partnership and Cooperation

ENP: European Neighbourhood Policy

INOGATE: Interstate Oil and Gas Transportation to Europe

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Introduction

It is not a secret that, in its content and designation energy complex represents a large and difficult complex of production and economical systems encompassing the enterprises, which provide various types of energy and technological raw materials to all sectors of economy and population. Energy is a basic sector of every country's economy, which makes determinative impact on society development, plays crucial role in creating material and technical bases and accelerating scientific-technical progress, establishing economic infrastructure and improving effectiveness of social production. Therefore, it is obvious that energy potential development and, particularly, the level of energy generation and consumption per capita, is recognized as one of the most credible indicators of economic development of the country. The problems such as growing dependence on energy imports, low prices and high demand result in insecurity of the energy sector. To overcome these problems the priorities, such as, diversification of energy supply and resources, energy efficiency, expansion of border trade in electric power, environmental safety and increasing country's transit potential, Georgia has to set. The long-term and short-term perspectives should also be differentiated and precise goals should be displayed in the strategy document, which will serve as the guideline for Georgia's future energy market. Whilst having achieved energy security and fulfilled all the obligations in order to integrate into European Union's internal market, Georgia as a country will acquire a status and a function of reliable transit country on the international arena. This process will make Georgia closer to the integration in the European Union.

1.1 Motivation

The main reason for choosing the topic of energy security linked to the Georgia's integration in the European Union is the absence of an official strategic document of a country, which will focus only on energy security and its aspects. For Georgia energy security is of high importance, because it has a strategic location in the Eastern Europe and it is has a bridge function between Caspian Sea and Europe. This makes Georgia an interesting transit country for Europe, which can be an alternative way for Europe's energy imports, thus decreasing the high dependency on Russia, Norway and Algeria. Georgia is already taking serious steps towards integration into

European Union, thus taking obligations which need to be implemented. To fulfill the goals which Georgia has set, it needs an accurate and precise energy strategy document. My goal was to unite all the problems existing in the energy sector of Georgia and to find solutions which would have been in compliance with the goals of the European Union. My hopes are that this thesis will have a practical application in Georgia.

1.2 Research Question

The aim of the paper was to show the present problems of the Georgian energy sector, the ways how to solve them and achieve energy security and by thus get closer to the integration in the European Union. Focus was done on the problems such as hydropower potential, which is the major source of electricity of Georgia, also on transit potential and energy efficiency. The solutions to the problems are laid down in the Directives and Regulations of the European Union, which Georgia should implement into its legislation and practically apply. By signing the EU-Georgia Association Agreement on June 27, 2014, and by applying for full membership in the Energy Community, Georgia is starting a new stage, takes new obligations and has the obligations to fulfill. The question is what Georgia should set as a priority and by what means should it achieve the final goal-energy security.

1.3 Methodology

In this thesis three different methodical approaches were applied: literature review, case study and interviews with government officials.

Literature review were done by reading existing literature, governmental documents, legal articles, also by asking data the State Oil Company of Azerbaijan Republic (SOCAR). Moreover, the data was included from several websites, which carry out the statistical analysis. Also, the documents from international organizations were helpful while writing. The major part of the thesis was done by literature review.

The case study was done to compare Georgia's specific part of energy system to other European countries, in order to have a full picture on the situation which is now in Georgia. Calculations were also done to find out how much electricity can be bought by one household with the average monthly salary. Afterwards the final result

was compared to the other developed European countries and the conclusions were drawn.

The interviews were carried out with the Deputy Minister of Energy, Ms. Mariam Valishvili, in order to have full insight into the energy sector and with the State Minister for Euro-Atlantic integration of Georgia, Mr. Alex Petriashvili, in order to get acquainted with the goals and obligations Georgia face nowadays, especially after signing the Association Agreement with the European Union.

1.4 Structure

Part 1 (Chapter 2) describes the overall picture of Georgia's energy sector, to be more precise the energy supply system, energy demand, the energy policy and its goals, the neighbourhood policy and the impact of the 2008 war on Georgia's transit infrastructure, including implications of the war for Europe as well.

Part2 (Chapter 3) deals with the energy security aspects, describing the concept of energy security and how to measure energy security in generally. Moreover, it deals with the goals and the solutions in the priority areas, such as: diversification of energy supply and resources, diversification of supply routes and increasing country's energy transit potential and energy efficiency, with a detailed description of the methods and technologies for achieving it.

Part 3 (Chapter 4) focuses on integration in the European Union. More precisely it covers the recent events taking place between Georgia and EU, such as signing the Association Agreement, also conducting the negotiations with the Energy Community in order to join it. Moreover, it is described in details the obligations which Georgia has taken as a result of signing the Association Agreement, which Directives and Regulations should be implemented in the energy sector and how is it connected to Energy Community.

2 Background

2.1 Geographical

Georgia is located in the South Caucasus, neighbouring with four countries: northern border with Russia, which runs along the crest of the Caucasus Mountains, the western border with Black Sea, to the south with Armenia and Turkey and the eastern neighbour Azerbaijan. Georgia covers a territory of 69.700 km² and the territory is located on the “Silk Route” between Europe and Asia, which has always been north-south and east-west transit route. Georgia is a multicultural country, in which ethnic Georgian are the majority (83.8%), Azeris (6.5%), Armenians (5.7%) and Russians (1.5%). In the early 1990’s, after the fall of Soviet Union, separatist conflicts broke out the autonomous regions Abkhazia and South Ossetia. (Energy Charter Secretariat, 2012)

2.2 Political

In 1991 Georgia declared independence after the break-up of the Soviet Union. Civil war led to creating autonomous regions Abkhazia and South Ossetia and 300.000 refugees. It also affected the trade routes and had major negative effect on energy sector, since one of the main hydro-electric capacities is situated in disputed territory. After the break-up of the Soviet Union, Georgia was one of the poorest countries in Europe and Central Asia by its economy. In 2003, the real GDP was 40% of its 1989 level and thus Georgia a weak state with accumulating unpaid pensions and wages, where the electricity service was limited to several hours a day and corruption rate being at its highest level. In 2003, the Rose Revolution established a new political system in Georgia. The aims achieved by the government were wide-ranging reform programs, which aimed at reviving national economy, reducing poverty and improving living standards. Since then, the government managed to combat

corruption, improve governance and alleviate poverty. (Energy Charter Secretariat, 2012)

2.3 *Economic*

Georgia has achieved progress in reforms during the past years, especially in the macroeconomic performance. Foreign investments have broadened the economic base in different sectors. Reforms included the regulatory framework for free industrial zones and businesses, also reduced corruption and simpler tax system and large scale privatization. But the Russian-Georgian war and the international financial crisis greatly affected Georgia's economy in 2008. The problem was the confidence of the investors who doubted whether it was stable to invest into Georgia, also it affected the consumer's confidence and damaged the infrastructure. The international crisis also played a big role in Georgia's financial crisis, because it put pressure on Georgia's currency and foreign investments, as well as on loan portfolios and recovery of bank deposits. Since the break-up of the Soviet Union, Georgia has undergone a lot of problems linked to political, economic and financial stability. It was a country which was struggling to move from an economy that was mostly dependent on exports and large-scale energy imports from Russia, to the country which was independent from its largest neighbour in both, exports and energy imports and made it possible to stabilize the energy sector and overcome the seasonal energy deficit problems. (Energy Charter Secretariat, 2012)

2.4 *Energy Supply*

2.4.1 *Overview*

Georgia is net importer of natural gas and together with the country's own hydropower and biomass resources for residential heating, makes the main energy sources. Before the collapse of the Soviet Union, Georgia was part of the integrated regional system, which balanced the deficit of hydropower in winter with power imports and made exports possible in summer and spring, when there was surplus of energy due to seasonal nature of production from hydropower plants. After

independence, Georgia had serious problems due to deficits in management, timely rehabilitation, financial control and maintenance, which soon played a major role in collapse of the power and gas systems. Nowadays, reforms and rehabilitation efforts are made in energy sector and renewal of critical infrastructure is a priority for the government. (Energy Charter Secretariat, 2012)

2.4.2 Oil and Gas

Georgia imports 98% of its primary requirements of natural gas and oil, which is two thirds of the whole energy supply. Because of high intensity of GDP, Georgia's competitiveness is affected at times of high prices on energy. Georgia has minor reserves of oil and gas. Nowadays, 15 oilfields confirmed reserves of only 8.3 million tons, but it is said that bigger oil reserves should exist. Although Georgia does not have its own oil and gas resources, but it generates revenues from oil and gas transit, because of its geo-strategic location. Despite of its strategic location, Georgia has undergone problematic times, when it struggled to secure basic energy supply for its citizens since independence. Nowadays, there are two gas pipelines going through Georgia, from Azerbaijan, known as South Caucasian Pipeline (SCP) and one from Russia to Armenia, known as North-South pipeline, which supplies Armenia. Moreover, through Georgia lie two oil pipelines from Azerbaijan, Baku-Tbilisi-Ceyhan (BTC) and Baku-Tbilisi-Erzurum (BTE) pipelines. (Energy Charter Secretariat, 2012)

2.4.3 Renewable Energy

Georgia has a lot of resources to develop the renewable energy sector. It has types of renewable resources, such as wind, solar, geothermal, hydro and biomass. From the listed renewable energy sources, geothermal waters are already used in Georgia for district heating, agricultural drying, industrial applications and greenhouse gas heating. The geothermal water reserves exceed 160.000 m³ per day. Geothermal water resources are available in 44 deposits across the whole country, and being generated by 206 well and four springs. The geothermal water is of the highest

quality, because it contains minimal amount of dissolved salts, which reduces scaling during utilization.

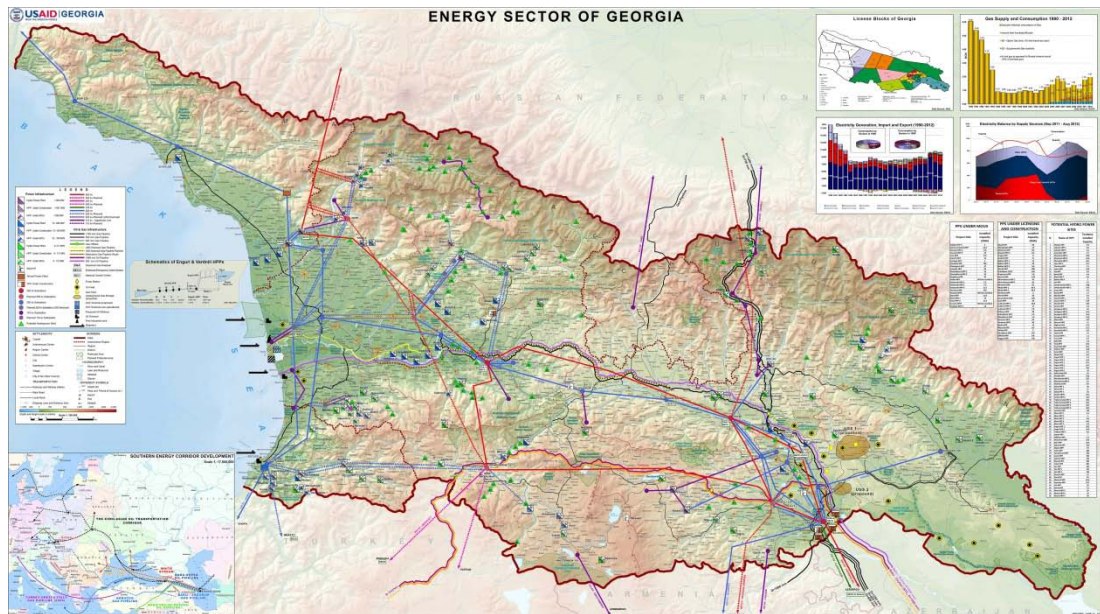
The geographical location of Georgia and its climate favourable to forest and agricultural development, makes the ideal environment for biomass power plants. Biomass is considered as one of the major power supply in rural areas, taking into account that country's total territory's 40% is covered with forests.

Wind power plants are not developed in Georgia, but the infrastructure is being investigated. According to researches done, the most suitable areas are the Caucasus high mountain zone, the highlands of southern Georgia (Javakheti region) and the southern part of the Black Sea coast.

The high sun radiation also makes Georgia suitable country for solar power plants. It is a reliable source, because annual hours of total sunshine counts 250-280 days, which will enable 108 MW of power generation. A number of projects have been implemented in the protected regions of Georgia to provide both population and tourism facilities with solar-powered electricity. (Econ, 2010)

2.4.4 Electricity

Map 1: Energy Sector of Georgia



Source: (Ministry of Energy of Georgia, 2014)

The power sector has been deregulated over the past years, to be more precise, the state electricity system has been unbundled into generation, transmission and distribution, from which generation and distribution is partly owned by private companies. Generation of electricity is dominated by hydro power and in 2009 the electricity constituted 88% of total generation, 92% in 2011 and still rising. Due to combined seasonality of hydropower production and electricity demand, Georgia is a net exporter in summer and an importer in winter. Nowadays, there are approximately 30 medium and small hydro power plants of 2370 MW operational capacity. As Georgia is in the top-five countries in per-capita water resources, it has a high potential for future development, yet only 18% of water resources for high electrical-generating capacity have been developed. Hundreds of 26.000 rivers across Georgia remain undeveloped. Limited storage capacity and surplus river flow in spring and summer negatively affects the annual generation profile and causes water spill in wet years. In 2009, the total spill of water constituted 20% of the annual hydro generation. In winter time, three OCGT power plants work, whose efficiency amounts to 20-36%. (Econ, 2010)

Table 1: Electricity Balance of Georgia in 2013

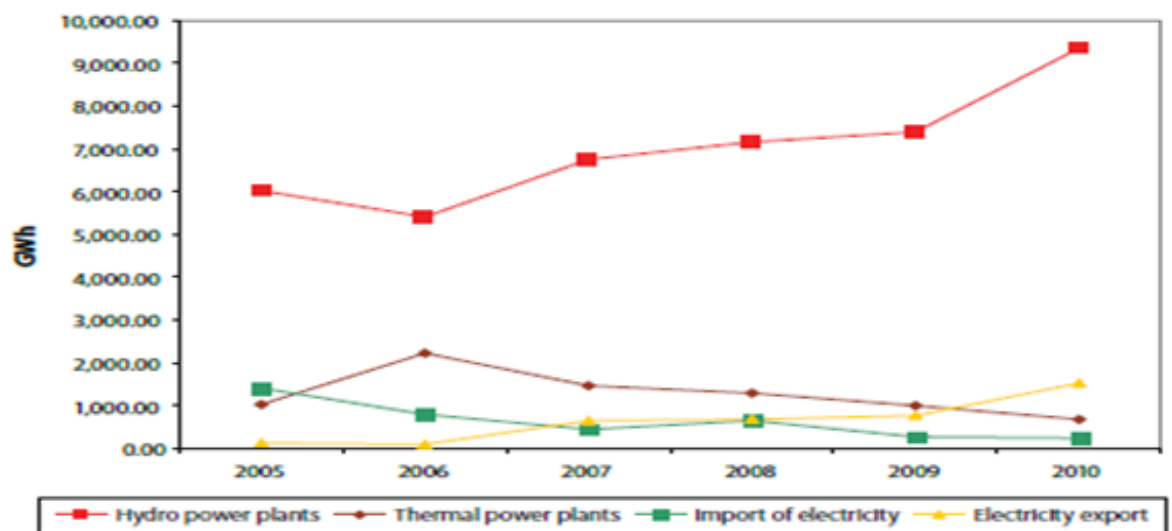
Name	2013 (GWh)
Total Generation	10058.752
Total Thermal Plants	1787.711
Total Hydro Plants	8271.041
Total Import	484.108
Total Resource	10542.860
Plant losses and Self-consumption	198.146
Delivery to the Network	10344.71
Supplied to the Consumers	9690.213
Total Export	450.386
Total Consumption	10140.600
Transportation Expenses	204.114
Total Demand including the losses	10344.71

Source: (ESCO, 2013)

Nowadays, the power system of Georgia, especially, the hydropower plants, undergoes serious rehabilitation processes. The reason is that rehabilitation and upgrading of already existing hydropower plants could bring additional 2.200-2.500 GWh of hydroelectricity. The government has given priority to expanding the generation capacity, due to its cost-effectiveness and lowest capital-cost route. Specialists estimated, that the excessive energy will be approximately 700-800 GWh, it is 10% of in-country generation. The reason of such a big amount of surplus

energy is the power plants being constructed in the times of Soviet Union for peak operation in united energy system. (GIZ, 2009) After the breakdown of the Soviet Union, some of the power plants were unused in summer and as a result it hindered the development of the energy generation of Georgia. Until now, the problem remained, the country suffers from surplus of hydropower, compared to system demand, especially after the spring melt, when the water discharges in rivers and water levels strongly increase and electricity usage decreases considerably.

Figure 1: Electricity Balances 2005-2010



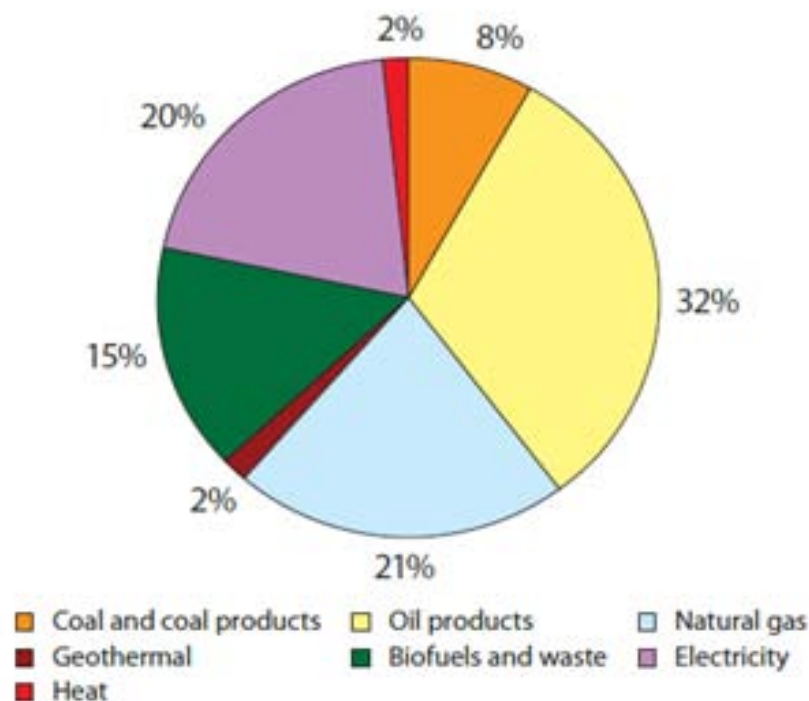
Source: (Ministry of Energy of Georgia, 2014)

This situation changed in 2007 when Electricity System Commercial Operator (ESCO) a newly created market maker, managed to develop a seasonal policy with Georgia's neighbouring countries, which meant seasonal energy swaps. This solution made possible to sell surplus hydroelectricity and positively influences the development of small hydropower.

2.5 Energy Demand

2.5.1 Total Final Energy Consumption

Figure 2: Total Final Energy Consumption



Source: (IEA, 2011)

After the collapse in 1991/1992, the structure of the total final consumption (TFC) of energy did not change very much until 2004. The total final energy consumption grew by 22% between 2004-2008 gas consumption increased by 64% and oil consumption by 59%. (Energy Charter Secretariat, 2012)

2.6 Energy Policy

The energy policy of Georgia is market-oriented and aims at promoting its economic development and trade regulation between the four neighbouring countries. Regional trade of electricity is nowadays the priority for the country as it will secure the future generations and infrastructure to access the market of Turkey and thus earn revenue

from sales. Georgia is striving to integrate into the wider regional and EU economy, which will make easier for Georgia to become an EU member state. Georgia's location has regional and national implications in terms of trading routes and oil and gas transit. As already mentioned above, Georgia nowadays hosts three new oil and gas pipelines from the Caspian base to western markets. The current priorities are also made on power system rehabilitation and attraction of foreign investments for new and existing electricity generation plants, transmission lines, inter-connection and the distribution infrastructure. In the past, Georgia was closely integrated into planned regional energy system, which collapsed and even until now, the country is making efforts to deal with technical, infrastructural and market deficits and legacy issues. The reforms implemented had won international recognition. First of all, the government made strong commitment to create business-friendly environment, simplified tax code, measurable results were made by reducing electricity losses and in fully accounting for electricity sales and deliveries. Georgia's striving towards EU energy market resulted in a number of important energy strategies and framework agreements. (Energy Charter Secretariat, 2012)

2.6.1 Energy Policy Goals

"Main Priorities of State Policy in Georgia's Energy Sector" was adopted by the Parliament of Georgia in 2006, where the priorities of the Georgian sector are prescribed. The main goal of the abovementioned document is to meet the growing demand for electricity of the citizens of Georgia through the use of local water resources. The main priorities of co-operation are as follows:

- **"Energy security of the country through diversification of energy resources and energy supply sources"** - The problem which was Georgia facing in 2006 was dependency on only one supplier of natural gas. Nowadays Russia and Azerbaijan are suppliers of natural gas in Georgia through South-Caucasus pipeline and North-South pipeline. But still the situation has not changed completely, as the amount of natural gas supplied from Russia is very minor and the main supplier still remains Azerbaijan, to be more precise the State Oil Company of Azerbaijan Republic (SOCAR).

- **“Development of infrastructure of transporting energy resources towards East-West and North-South in order to increase country’s transit potential”** – Georgia has proved that it is a reliable transit country and nowadays several oil and gas pipelines are working. It is crucial for Georgia to increase its transit potential that is why Georgia provides manufacturers and customers with reliable, transparent and stable transit conditions. It is very important the Shah Deniz Consortium’s decision about the Trans Adriatic Pipeline (TAP) and additional natural gas source, which will be delivered to EU market, through Georgia’s transit corridor. Moreover, the Azerbaijan-Georgian-Romanian Interconnector (AGRI) project is put on the agenda of the Georgian government.
- **“Decrease of thermal generation of electric power through development of energy sources”** – The Georgia’s hydro potential makes it possible to decrease the thermal generation of electric power through increasing hydropower. As already mentioned above, Georgia is among the world leaders in terms of water resources. The annual stock of fresh water is 95.6 cubic kilometers and the total length of the rivers is 600.000 km, this makes possible for generation of annual volume of electric power-15.000 MW. Nowadays, Georgia use only 20% of its total potential of hydropower, as a result, it is set as a priority by the government of Georgia to develop hydropower potential, rather than sun, wind and geothermal potential, as it is commercially not practicable.
- **“Attraction of foreign investments into the energy sector with a view to developing country’s energy infrastructure”** – in 2008, resolution was adopted by the Georgian government to promote the development of hydropower stations, as a result, 15 station projects are implemented, in which Georgian, Turkish, Austrian, Czech and Norwegian companies are involved. The resolution aimed at providing every party with an opportunity to build, manage and own a hydropower station. In 2013, construction of five new hydropower stations began and the completion is planned for 2014-2025.

- **“Expansion of border trade in electric power with neighbouring countries”** – Georgia has transmission lines with all four neighbouring countries and thus Georgia is completely integrated into the regional electrical power infrastructure.
- **“Expansion of co-operation with international organizations with a view to speeding up Georgia’s European and Euro-Atlantic integration”** – Georgia is striving to integrate into the EU’s single energy market, as a result, Georgia made steps to harmonize country’s domestic legislation with the legislation of the EU, which began in the frames of European Neighbourhood Policy EU-Georgia Action Plan (ENP AP). Moreover, the negotiations were being held between Georgia and EU in terms of Association Agreement about the part of energy, which have been completed. Furthermore, Georgia’s will to become a member of the European Energy Community (EEC), became reality when Georgia officially applied for the full membership in January 2013, which will promote liberalization of country’s energy market and serve as introduction of significant regulatory mechanisms. (Parliament of Georgia and Ministry of Energy of Georgia, 2006)

2.6.2 *Legal Basis*

The electric power sector’s primary legislation is the “Law on Electricity and Natural Gas” (1997), which incorporates the elements of energy regulation and market rules, which are in line with EU principles, but the legislation is not completely in line with them. The Law regulating the energy market of Georgia was amended many times for bringing it in line with the EU model. The “Law on Electricity and Natural Gas” prescribes the roles and functions of the two main institutions, which are responsible for the Georgia’s energy sector: Ministry of Energy and National Energy Regulatory Commission. The oil and gas sector is regulated by the “Law of Oil and Gas” (1999), which was later amended and is the primary law for developing the oil and gas resources of Georgia. The main objectives written down in the law are as follows:

- “support and promote investments in the oil and gas sector of Georgia”
- “protect the legal interests of the investors engaged in oil and gas operations (exploration and production) in Georgia”
- “create an effective legal basis for the state supervision and control of oil and gas operations in Georgia (Georgian Oil and Gas Regulatory Agency) with the inter alia establishment of a relevant state body and the determination of functions of National Oil Company of Georgia”. (Energy Charter Secretariat, 2012)

The Energy Policy of Georgia states the goal to develop legal and institutional framework for improving energy efficiency, but the absence of legal and regulatory base of energy savings and energy efficiency has yet to be developed in Georgia. The evidence of lacking legal base of energy efficiency is the “Law on Electricity and Natural Gas”, the basic legal act regulating energy sector, where the word efficiency is used seldom. Moreover, energy efficiency is only discussed in Paragraph 3 of Article 1, which states that “to promote improvement of effectiveness of energy generation, transmission, dispatching, distribution, import, export and consumption, also, natural gas delivery, import, export, transportation, distribution and consumption”. (Law on electricity and natural gas, 2006 source) and energy saving is not mentioned at all. Also, there are no other legislative documents regulating energy efficiency in Georgia. (Econ, 2010)

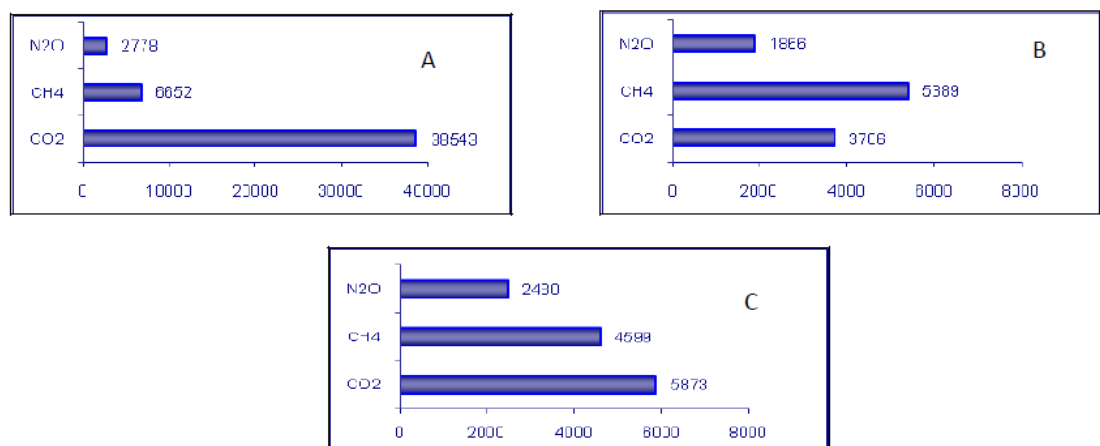
2.7 Environmental Policy related to Energy

After break down of the Soviet Union, Georgia set a goal towards integration into European structures and actively started to do so, moreover Georgia started its process towards integration in NATO. The years 1987-1997, were the years when Georgia undertook the first steps to first national inventory of greenhouse gas emission (GHG), which was followed by preparation of Initial National Communication (INC). The Second National Communication was followed soon afterwards to assess the GHG inventory for the period of 1998-2006. The calculations were done based on the IPCC 1996 Guidelines. The need of two

National Communications, the Initial and the Second, was the base year. The INC took the year 1990 as the base year, whereas SNC took 2000. Preparing the INC in 1997-1999 was the first step made to implement the obligations under the UNFCCC.

During the last two decades, Georgia underwent significant environmental changes in terms of CO₂ emissions. First of all, the first stage of changes in emission levels started in the first decade during 1990-2000, when CO₂ emissions fell drastically, CH₄ emission only by 23% and NO₂ emissions by 49%. The calculations done in 2006, showed significant difference compared to the calculations done one decade ago: CO₂ and NO₂ emissions increased by 58%, but on the other hand CH₄ emissions declined by 17% compared to 2000.

Figure 3: GHG (Gg CO₂-eq) emission in Georgia in 1990 (A), 2000 (B), 2006 (C).



Source: (Ministry of Environment of Georgia and United Nation Development Programme, 2009)

The reason for the sharp decrease in the emission levels was the fall in energy and industry sectors, after the collapse of the Soviet Union's "planned economy". But soon after 1990, Georgia started to revive its economy and thus causing CO₂ emissions rise mostly from significant rise in transportation subsectors. In 2000-2006 the definite decrease in CH₄ can be attributed to decline in leakages from the gas transmission and distribution system, due to restored and rehabilitated gas pipelines.

According to national GHG inventory for the years of 2000-2006 in Georgia's SNC to UNFCCC states that the biggest emitter is the energy sector including transportation. In 2000, the emission from the energy sector accounted for 5.925 Gg CO₂, which made 53.9 % of the total national emissions. (Ministry of Environment of Georgia and United Nation Development Programme, 2009)

2.8 *Energy Pricing*

The GNERC is an independent regulator, which sets tariffs for the generation, transmission, distribution, import and consumption of electricity and also for transportation, distribution and consumption of natural gas. (Energy Charter Secretariat, 2012)

Electricity tariffs, as mentioned above, are set by the regulator GNERC, but unlike other countries Georgia's tariff system is completely different. First of all, there is no capacity tariff, but only a tariff per kWh transferred. It is known as "postage stamp" principle, when the tariffs are set regardless of electricity transmission distance within the country. The tariff policy is based on full cost recovery principle for production and supply, which is regulated by the law and tariff methodology. The tariff methodology includes: seasonal tariffs, peak-load tariffs (day and night), step tariffs, long-term pre-set tariffs and marginal tariffs. The tariffs for distribution companies and direct customers differ from each other. The cost of electricity losses are reflected in customer tariffs by estimating the losses for a particular period of time and assessing the future expected losses. Comparing generation, transmission and distribution, the highest percentage of revenues are allocated in the distribution, which accounted for 60% of total share in the tariff in 2009 in Tbilisi. The reason for such a big percentage goes even further in the history, when the distribution losses in the system were very high. (Econ, 2010)

The tariffs are set out in the Georgian National Energy and Water Supply Regulatory Commission Decree No 33, December 4, 2008, on "Electricity Tariffs". The information about tariffs is not secret and everyone can get it without any permission in the internet. The Article 10 of the Decree No 33 sets out the electricity consumption marginal tariffs-upper limit. This Article makes a distinction between

the electricity consumption marginal tariffs according to the voltage and according to the amount of electricity consumed on 220/380 voltage. To the tariffs stated in the Decree No 33 should be added 18 percent VAT. (GNERC, 2008)

Table 2: Electricity consumption marginal tariffs according to voltage

Voltage level	Tariff from January 1, 2013 to March 31, 2013.
220-380 kV (non-household users)	13.56 Tetri/kWh
6-10 kV	12.618 Tetri/kWh
35-110 kV	7.28 Tetri/kWh

Source: (GNERC, 2008)

Table 3: Electricity consumption marginal tariffs according to electricity consumed on 220/380 voltage

Consumption level	Tariff from January 1, 2013 to March 31, 2013
101 kWh and less	8.424 Tetri/kWh +18% = 9.94 Tetri/kWh
101-301 kWh	10.56 Tetri/kWh + 18% = 12.46 Tetri/kWh
More than 301 kWh	14.998 Tetri/kWh +18% = 17.7 Tetri/kWh

Source: (GNERC, 2008)

2.9 Neighbourhood Policy

Georgia has four neighbours: Russia, Armenia, Azerbaijan and Turkey and with each of them it has its own relationship.

2.9.1 Russia

Russian-Georgian relationship counts back to 1989, when Soviet Union collapsed and Georgia and Russia had to start to deal with their relationships as independent countries. In 1989, USSR started to collapse and Georgia was one of the first countries who wanted to be an independent country. Meanwhile, South Ossetia also made clear that they wanted independence as well, which gave rise to 1991-1992 South Ossetian War in which South Ossetian militia, supported by individual Russian troops, fought against Georgian militia. This was followed by the War in Abkhazia in 1992-1993, where Abkhaz separatists together with Russian troops fought against Georgian troops for independence from Georgia. Although, Russia claimed its neutrality during the war in Abkhazia, its role in this conflict is obvious. First of all, Russia's warfare market was the source of weapons for both conflicting sides. Russian's unofficially supported the Abkhaz and Georgian sides. Many years later, in August 2008 the conflict arose again, which turned into a Russo-Georgian War, fighting Georgians on one side and Russian and separatists from Abkhazia and South Ossetia on the other. The war lasted 5 days. It was a short war with long aftermath. (Gonca, n.d.)

After the 2008 war, new strategic realities emerged in the Black Sea and Caspian regions. Right after the war, the Western ambitions towards these regions have weakened in favour to Russia and less favourably to other nations in the region, such as Georgia, Turkey, Azerbaijan, Armenia and Ukraine. The August war demonstrated some risks regarding functioning of the transit energy corridor in the Southern Caucasus. These events showed the need of broader security guarantees for a region, as it is vital for European and global energy security. Georgia has a tremendous potential and transit capabilities of new pipelines, railroads, marine and air ports. The physical damage that Georgia had to face after war was tangible but not large. The Georgia's transportation system was repaired shortly after the war. The problem emerged with the malfunctioning with the largest hydro power plant

generating electricity in the country- Enguri. The reservoir of the power plant is located on the Georgian controlled territory, while the electricity generation plant is located in Abkhazia, which is controlled by Russians. Moreover, Georgian leadership had to make a difficult decision in accepting the offer from Russia state-owned company Inter RAO, which proposed to the Georgian side the joint operation of the power plant. Nowadays, The Enguri Dam is completely under control of the Georgian Government. (Tsereteli, 2009)

2.9.2 Azerbaijan

Azerbaijan and Georgia have a very strong and long relations starting from very past, but the important period in the history of both countries started in 1991, when they declared independence and started establishing diplomatic ties as independent countries in November 18, 1992. Since then, Azerbaijan and Georgia cooperate in many different aspects, are engaged in active diplomatic alliance in multilateral and bilateral frameworks and as a result developed a very strong strategic partnership. These both countries share the same problems in terms of ethno-political conflicts, which started in the early years of their independence and had bad economic and social consequences. It is very obvious that the major drive for both countries were the energy potential of Azerbaijan and Georgia's transit corridor potential. The most important reason why these two countries needed each was to fulfill regional and international functions. In January 1993, president Shevardnadze made the reason of cooperation clear with his statement: "our interests complement each other. We need their railroads...they need our Black Sea ports if they want to export anything to West". (Karagiannis, 2002) Furthermore, Azerbaijan and Georgia cooperated during multilateral framework of the Organization for Security and Cooperation of Europe (OSCE) on issues such as security and independence of both countries. Shortly after, the strategic partnership of Georgia and Azerbaijan was supported by United States of America and Turkey. To be more precise about the bilateral relations of these two countries, some energy events were driving force for determining the direction of the strategic development. These events are as follows:

- The first steps made towards Western oil companies were made in September 20, 1994, when the “Contract of the Century” was signed between Azerbaijan and consortium of Western oil companies, what created the Azerbaijan International Operating Company (AIOC).
- Moreover, Azerbaijan made a decision to export oil and as a result opportunities opened for pipeline development via Georgia and thus the Early Oil pipeline was constructed named Baku-Supsa pipeline.
- In September 1998, the TRACECA meeting was held in Baku, which was a culminating point for boosting the development of East-West transportation corridor connecting Central Asia with Europe. That’s why Europe and regional effort was made to achieve the final outcome.
- The next big step forward was made in 1999 on the OSCE Istanbul Summit, when the final decision on Major Oil Pipeline, later named as Baku-Tbilisi-Ceyhan (BTC) pipeline, was announced.
- The further development of the transit corridor and energy export from Azerbaijan took place in 2001, when it was decided to construct the natural gas export pipeline. It was of big significance for both Georgia and Azerbaijan carrying out natural gas to the final destination Turkey. The cooperation went much further, to Turkey. The pipeline is connecting Baku via Tbilisi to Erzurum in Turkey.

Nowadays, Azerbaijan is planning a new project called Trans-Anatolian Pipeline (TANAP), which is scheduled to be funded by the Azerbaijan state oil company SOCAR. TANAP is planned to cross from Georgia to Turkey’s western border with the EU. In case this project will be fulfilled, the source of natural gas will be the Shah-Deniz field situated in the Caspian Sea, in the Azerbaijani section. TANAP is the opportunity for Azerbaijan to export natural gas to Turkey and to Europe markets. (Tsereteli, 2013)

During the hardest periods in Georgia Azerbaijan was always helpful. Since the time of independence, Georgia was always dependent on Russian energy supplies, to be

more precise on natural gas and electricity. Due to the tense relationships between Russia and Georgia, the electricity and gas supplies from Russia was often cut off, while Azerbaijan proved to be the main support for Georgia. One of such situations emerged in January 2006, when the electricity line and natural gas pipeline were stuffed, both at the same time. (Chivers, 2006) The situation happened before the Baku-Tbilisi-Erzurum pipeline was constructed, so this meant that Azerbaijan had to use existing pipelines to supply Georgia with natural gas and the most important was that Azerbaijan had shortage of natural gas at the moment and had to import substantial volumes from Russia. Nevertheless, the will to help the neighboring country overcome the crisis was very valuable from the side of Azerbaijan. (Dzhindzhikhashvili, 2006)

There are several reasons why Russia had Georgia as a target for more pressure than Azerbaijan. Svante Cornell once noted: “First, Putin and Heydar Aliyev both had a past in the KGB and could connect on a personal level; second, Azerbaijan was a stronger state with fewer minority problems, making Georgia the weak link that Russia focused on; third, a focus of Russian policy was to split the Georgian-Azerbaijani strategic partnership by pressuring Georgia and wooing Azerbaijan; fourth, Russian leaders generally applied an emotional streak to relations with Georgia, feeling that its pro-western policy was much more of betrayal, being culturally closer to Russia; and fifth, the more aggressive and outspoken Georgian policy style mattered much in angering Moscow, whereas Azerbaijan’s policies were more discre[et], in spite of being very similar to Georgia’s.” (Cornell, 2007)

In future, Georgia and Azerbaijan are destined to be strategic partners, but this will still depend on multiple factors affecting the South Caucasus region, moreover, EU’s Eastern Partnership initiative may help both countries to reach the ultimate goal: to access to European economic space.

2.9.3 Turkey

The recent years have shown that the relations between Georgia and Turkey have been improving. After the collapse of the Soviet Union, Turkey was one of the first countries supporting the independence of Georgia. Turkey has also supported

Georgia in the political development and restructuring and was a close ally, considering the importance of the regional stability. Turkey's strategy towards Georgia always had to be cautious, because of Russia. However, Turkey did not stop helping Georgia in modernizing the Batumi Airport, which resulted in the decision to make this airport available to both countries. As a result, Turkey has been using the airport for its domestic flights and both countries abolished visa requirements as well. The relations became deeper in 2010, when the Kars-Tbilisi-Baku railway line was initiated. The annual trade exceeded 1.5 billion dollars. Furthermore, Turkey became Georgia's biggest trade partner with the volume of 496 million dollars. Nowadays, there are many commercial projects taking place between Turkey and Georgia. These two countries are also strategic partners not only in the sphere of commerce but in energy, defence and security. For Turkey it is of a big interest to continue positive relations with Georgia, because of border security and energy resources. Three projects should be mentioned, which are of big importance for both countries: the Baku-Tbilisi-Ceyhan crude oil pipeline; the Baku-Tbilisi-Erzurum natural gas pipeline; and the Kars-Akhalkalaki-Tbilisi-Baku railway line. It was very difficult to make EU, U.S, Georgia, Russia, Azerbaijan, Turkey and other private companies approve the agreements. It was crucial in terms of competition over energy resources, called "New Big Game" in 19th century, referring to the rivalry between Russia and Britain.

The ethnic conflicts and especially the 2008 war in Georgia affected Turkey as well. First of all, the Russian military intervention into Georgia brought anxiety and violence into this region, which caused trouble for Turkey as well. Turkey took immediate actions during the 2008 crisis between Georgia and Russia and sent food aid and built 100 houses for the refugees in Gori. The reason of Russia's anxiety was that Georgia was gaining independence through the Baku-Tbilisi-Ceyhan crude oil pipeline (BTC). But on the other hand, there was Turkey, which is depending on Georgia in terms of energy, because the only alternative route for Turkey's natural resources is through Armenia. During the crisis, Turkey being a member of NATO had to balance its relationships with Georgia, U.S and Russian Federation at the same time. The crisis put Turkey in a very serious dilemma, because Russia is the

Turkey's biggest source of natural gas, moreover, Turkey is Russia's seventh biggest partner and Russia is on the top of the Turkey's trade list. (Aras and Akpinar, 2011)

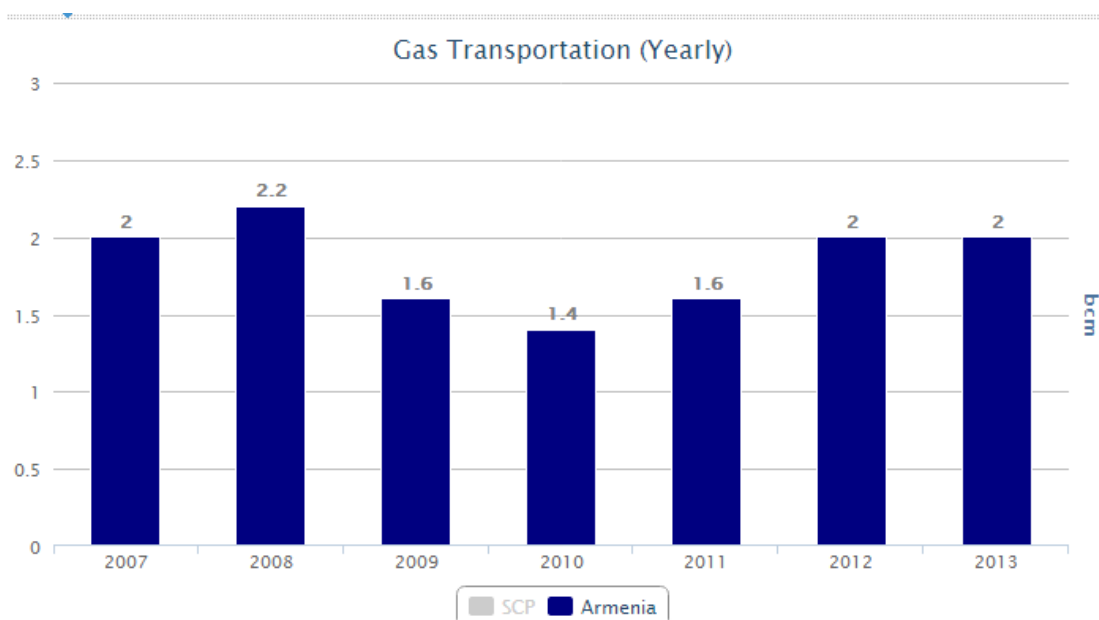
The most important event happening nowadays between Turkey and Georgia is the green energy that Georgia exports to Turkey starting from December 11, 2013. Georgia was the first country in the Caucasus using HVDC links to export eco-friendly electric power to the neighbouring country. The growing demand of Turkey for power and on the other hand the abundance of hydro power in Georgia made it possible to export the surplus electricity to Turkey. Moreover, the Georgia's grid network, which was constructed in the Soviet Union and was not designed for the independent state, but rather was a part of the Caucasus power system was linked to other Soviet Union republics, and thus made the task of exporting energy to Turkey harder. To achieve the task it was important to break down the existing barriers, connect different power supply networks of different technical parameters, stabilize the power supply in order to export excessive electricity. The so called Black Sea Transmission Network project began in 2010, supported by the European Investment Bank, the European Bank for Reconstruction and Development, the German KfW Group, and the Development Bank of Austria. Siemens was the company who completed the back-to-back high-voltage direct current (HVDC) links at Akhaltsikhe in the southern part of Georgia near to the Turkish border. The new HVDC links feed a 400-kv transmission lines connecting to the Turkish 400-kv transmission line. Moreover, each link transmits 350 MW of eco-friendly electric power, which is crucial for Turkey's growing power demand. Since the Georgia's electricity system is based on the 500-kv system, it converts power from 500 to 400-kv and back. "The HVDC back-to-back links provide protection against cascading grid disturbances because it acts like an automatic firewall, which can control stops and restarts of the transport of electric power." The line to Turkey is 151 kilometres long and ends at Borchkha substation in Turkey. The benefit from this project for Georgia is the opportunity to trade electricity to EU countries. Nowadays, Georgia is working on establishing the European Network Transmission System operators for Electricity (ENTSO-E), due to export the electricity to other European countries, which is now already available with this new transmission lines. On the conference on trans-border trade in electricity in May 2013, where the new transmission line to Turkey was

discussed, the U.S Ambassador to Georgia Bridget Brink stated that: “Georgia is rich in water resources,” she said. “It is important for buyers and sellers to have good relations existed and the market to be fully developed to take full advantage of them.” Moreover she added that this project was of big importance not only for ensuring energy security and economic development of Georgia but throughout the region. (Siemens, 2013)

2.9.4 Armenia

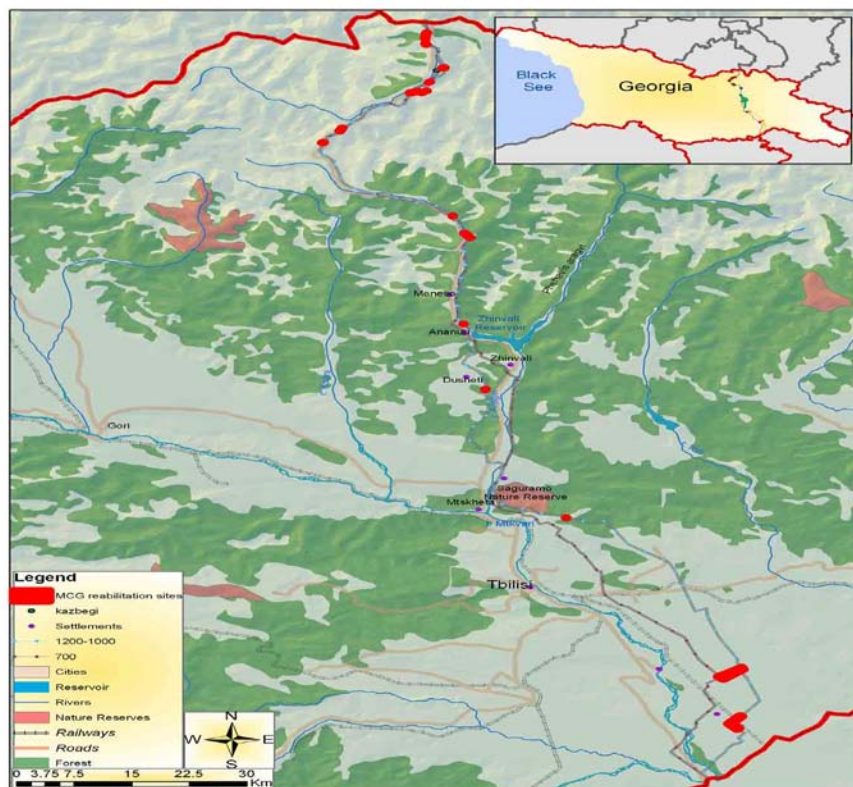
Armenia was a strategic partner of Georgia for many years, but after the ethnic conflicts in Abkhazia and the conflicts in Nagorno-Karabakh, between Armenians and Azerbaijanis the relations did take a different turnover. After the 2008 war, when the tension was reduced between Russia and Georgia, Armenia and Georgia have improved their relations. Economic cooperation between these two countries is based on energy transit and trade. Armenia is depending on Georgia, because it gets the natural gas from Russia through Georgia with the North-South pipeline.

Figure 4: Gas Transportation



Source: (Georgian Oil and Gas Corporation, 2014)

Map 2: North-South Pipeline



Source: (Georgian Oil and Gas Corporation, 2014)

On security issues, Armenia and Georgia have different approach. This has been obvious during the 2008 war, because Armenia is the military-political partner of Russia. The negative perceptions shaped from the Georgian side towards Armenia were caused by the ongoing alliance between Moscow and Yerevan. Such a negative attitude from the Georgian side, made Armenia very cautious. First of all, Armenia closely monitors Georgia's close relationships with Turkey and Azerbaijan, which makes them fear of further deepening of the existing transport and which is more

important the communications blockade of Armenia by these two states. Moreover, the difference between Georgia and Armenia is also conditioned by the ethnic conflicts in the regions. First of all, Armenia advocates the principal of self-determination, which is its position for the conflict in Nagorno-Karabakh, on the other hand, Georgia supports territorial integrity, because of the conflicts in Abkhazia and South Ossetia. One of the most important roles in the relations of these two countries plays the Armenian-populated Javakheti region which is situated in Georgia. Javakheti is situated near the border of Armenia and is settled by 100.000 Armenians and this region has created mutual concerns and phobias. Despite the mutual contradictions between Armenia and Georgia, they still strive to maintain good relations and collegiality. This means that, Georgia is maintaining neutrality in the Karabakh conflict, while Armenia is not recognizing independence of Abkhazia and South Ossetia.

Both Armenia and Georgia are having western policy and strive to integrate in the EU. They both were striving to sign the Association Agreement. In July 2013, during the visit of the European Commissioner for Enlargement, Štefan Füle, in Armenia and Georgia, he positively assessed the domestic political developments and announced the readiness for signing the Association Agreement. Both Armenia and Georgia completed the negotiations with the EU on Association Agreement and were ready to sign it, but the pressure from the Russian Federation towards Armenia was too strong, because of Russia's concern about Ukraine's determined resistance to join the Custom Union. As a result, Armenia was forced to disassociate himself from any future plans of signing the Association Agreement, but still he made a statement about readiness to join the Customs Union. Armenia realizes the importance of Association Agreement that Georgia will sign in the nearest future. This will mean the gradual establishment of European political and economic space directly at their borders. As a result, the simplification process of the border crossing between Georgia and Armenia will encourage more active and flexible trade regime between the two neighbours. (Minasyan, 2013)

2.10 Impact of the War on Georgia's Transit Infrastructure

The impact of the war on Georgian side, in terms of damage to physical infrastructure and pipelines were not critical and the total damage estimated at \$38 million. The damage was fixed soon after the war and the main problem for the country still remained the Enguri hydro power plant, which is the major supplier of electricity in the country. Despite, the undergoing processes in the country in terms of rehabilitation and building new hydro power plants in 2009 the main hydro power plant was Enguri, located in the conflict zone, on which the whole countries electricity was substantially depending. The offer, made from the Russian side about the joint operation of the Enguri power plant, concerned the Georgian side. As a result, the Georgian Minister of Energy cites three major reasons, why Georgia had to agree to this proposal. First of all, the financial interest, second-security of the Enguri HPP, and lastly-the security of the energy system of Georgia. (Civil Georgia, 2012) In fact, the decision made by the Georgian government regarding the shared management of the Enguri hydro power plant was a pragmatic decision dictated by the de facto realities as a result of war. Moreover, it is not the only weakness that Georgia faced after the war, the dependence on imported natural gas was a big problem for the energy system of Georgia. The risks of interruptions of supplies from Russia were big thus demonstrating the necessity to construct underground natural gas storage. At the difficult times, despite of increased imports of natural gas from Azerbaijan, Georgia still needed more than 1 billion cubic meters of natural gas annually from Russia for meeting its internal demands. The impact of the war on pipelines was more limited than on country's energy sector and security, because the operations of the suspended pipelines were soon resumed. The biggest impact on Georgian pipelines started on the first day of war, August 5th, when the PKK attacked the BTC pipeline and disabled it, also Russian bombardments cause problems. After the explosion on the evening of August 5th which happened on the Turkish section of the pipeline, transporting 850.000 b/d oil and Shah-Deniz condensate. British Petroleum (BP) started to re-route the oil by rail to Georgian ports, also additional volumes were directed to another pipeline Baku-Supsa. After the explosion, production of oil from the Azeri-Chirag-Guneshli (ACG) field was decreased from 850.000 bpd to 250.000 bpd, moreover, the production from the Shah-Deniz pipeline was also reduced compared to its normal production 40.000 bpd. These affected not only Georgia but Azerbaijan and its international partners as a result the closure of

the routes was a loss for them in approximately 1 billion bpd of oil and 500 million cubic feet per day of gas exports. In the end, the experts estimated, that the total loss of oil revenue through the month of August accounted for \$1.9 billion. “The Caucasian Energy Corridor Suffers a Reality Check,” Upstream Insight, Wood Mackenzie, August 2008. (Tsereteli, 2009)

2.10.1 Oil Refinery

On September 24, after the war was over Kazakhstan dropped the oil refinery plans in Georgia and while asked the representative of KazMunaiGas, he made it clear that the decision was not made because of political reasons, but was strictly based on commercial merits. (Nurshayeva, 2008) The oil refinery project was planned to be located in Batumi port, which was already controlled by KazMunaiGas, which is subsidiary of KazTransOil. The conflict in this region gave rise to other transit alternatives. The party concerned in that moment was Iran, which came up with the statements suggesting its territory as a transit alternative for Kazakh and Azeri oil. Moreover, Russia’s Transneft also suggested Azerbaijan to use the Northern route for transportation of oil and Gasprom offered the Azerbaijani government to purchase all the natural gas that the country produces. (Tsereteli, 2009)

2.10.2 Oil Exports

The most important thing in terms of oil exports happened after the war, on November 14, 2008, when the State Oil Company of Azerbaijan (SOCAR) and the Kazakh company KazMunaiGas signed an agreement and thus implemented the basic principles of the Trans Caspian project (TCP). This project was not only of big importance for Georgia, but also for Kazakhstan, because Kazakhstan fully relies on Russian routes for oil exports and Russia has been reluctant to expand the pipelines. (Tsereteli, 2009)

2.10.3 Natural Gas

On November 14, Georgia and Azerbaijan signed an agreement on the supply of Azeri natural gas to Georgia, which would have been available for 5 years period. This made clear the decision of Azerbaijani government to decline the offer from the Russian side about purchasing the whole amount of Azerbaijan's natural gas. Despite the attractiveness of the proposal and obvious commercial profit for Azerbaijan, the political factor appeared to be more important and significant for Azerbaijan. Moreover, Azerbaijan thought more globally about current developments of the region and the future Caspian natural gas supplies to the European region. (Tsereteli, 2009)

2.10.4 Implications of the War for Europe

Europe's overdependence on Russian gas makes them think of other potential countries for supplying gas in Europe. The natural resources of Central Asia is of big interest for Europe as it offers new markets for its goods and cheap and educated labor force, which will help Europe maintain their competitiveness in the world economy. Ukraine, South Caucasus and Central Asia, makes together 130 million people, which is not a small number in terms of labor force taking into consideration the aging population in Europe. The other reason is the Caspian energy resources, which have a potential to diversify the Europe's energy supplies away from the dependence on Russia. Nowadays, the Europe's energy supply situation is much depending on Russia, from whom quarter of the total gas need and more than a half of natural gas imports come from Russian and what is more important that 80% of the imports transits Ukraine. (Tsereteli, 2009)

After the war, EU responded to the crisis in Georgia proactively. Being the President of France in that period, Nicolas Sarkozy, acted as a broker during the six-point ceasefire agreement between Russia and Georgia. EU has been moderate in its political demand towards Russia, to fulfill the commitments to the agreed points of the ceasefire agreement and thus altering the recognition of independence of Abkhazia and South Ossetia. As a result, EU has been very generous when promising to increase the economic assistance to Georgia. The total pledge of \$4,5 billion dollars were made in November on donor conference for the reconstruction of

Georgia after the war. In addition, EU offered a new Eastern Partnership initiative, which aims at widening the ties with six eastern European countries including Georgia. The Eastern Partnership's goal is to upgrade EU's political engagement with Armenia, Azerbaijan, Georgia, Moldova, Ukraine and Belarus. Moreover, its target is to engage these countries into association agreements, which aims at integration into the EU economy and will make it easier to travel to the EU. (European Commission, 2008)

"Building on the progress of the last years we have prepared an ambitious and at the same time well-balanced offer. The security and stability of the EU is affected by events taking place in Eastern Europe and in the Southern Caucasus. Our policy towards these countries should be strong, proactive and unequivocal. The EU will continue with the successful approach of tailor-made programmes on a new scale and add a strong multilateral dimension. It remains our principle though that progress must go hand in hand with reform efforts by our partners, but this new package also offers more intensive assistance to help them meet their goals," the President of the European Commission, Jose Manuel Barroso said. (European Commission, 2008)

Moreover, the European Commission said in the statement that the European Neighborhood policy is the backbone of EU-Georgia relations: "however, the conflict in Georgia in August 2008 has shown the need for a deeper and more intensive EU involvement in the South Caucasus region, with a need of stronger regional cooperation". (Civil Georgia, 2008) The 2008 war had good impact on positive policy decisions regarding energy, which were also included in the EU's Second Strategic Energy Review, which stated that: "With respect to the EU, this is of most concern with respect to gas, where a number of Member States are overwhelmingly dependent on one single supplier. Political incidents in supplier or transit countries, accidents or natural disasters, the impacts of climate change, all remind the EU of the vulnerability of its immediate energy supply." (Commission of the European Communities, 2008) As a result, the core of the document was the EU Energy and Security Action Plan, which was intended to help Europe achieve its three main goals: reducing GHG by 20%; increasing the renewable source's share in the energy consumption by 20% and improving the energy efficiency by 20%. Obviously, the policy initiatives are the steps to right direction, but the problem is

how to implement them to ensure the real progress in terms of negotiations. Finally, the decision about implementation and managing of the infrastructure projects should be made by the individual countries, which are interested in assisting Europe in gaining secure and reliable energy resources. (Tsereteli, 2009)

3 Energy Security Aspects

3.1 The Concept of Energy Security

Before starting discussing the concept of energy security and how it should be measured, one must define the term “energy security”. “IEA defines energy security as the uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance.” (International Energy Agency, 2014) The definition of the International Energy Agency makes a difference between long-term energy security and short-term energy security. First of all, it should be mentioned that the concept energy security is an umbrella term, because it covers energy, economic growth and political power as well. There are some traditional elements, that can be listed, such as energy supply sources, demand centers, geopolitics and market structures. But how we measure energy security also depends on the country, whether its energy importing country or energy exporting. (World Economic Forum, 2006)

Still, debates about energy security are ongoing process and is one of the most controversial topics for the whole world. One aspect of energy security is the capacity of the country to have the possibility to switch freely from one source of energy to another. The reason to switch from one to another source is the environmental concern, because the energy reserves are depleting very fast according to different scientists. Moreover, there is a necessity to draft energy security strategy to ensure the availability of energy and economic development of a society. One of

the simplest definitions of energy security is “the uninterrupted availability of energy resources at an affordable price” according to International Energy Agency. This means that the energy should be physically available and at the same time the price should be reasonable. Every society is depending on energy, starting from households ending up with industries, therefore effective functioning of a society is much depending on affordability of availability of energy. However, the multi-faced nature of energy security makes it difficult to define energy security so, to be accepted by all. (Haghighi, 2007)

3.2 Measuring Energy Security

The most important aspect while measuring energy security is to figure out how to evaluate energy security. The assessment of energy security in the 21st century can be done through analyzing the situation and the problems that the world is facing now. The three main factors in evaluating energy security concept are balancing sustainable development, competitiveness and security of supply. To be more precise, the Commission of the European Communities created a Green Paper, A European Strategy for Sustainable, Competitive and Secure Energy, describing the situation nowadays in Europe and the priorities which need actions to be taken to address the challenges Europe faces. First of all, the problems seen according to the abovementioned paper are as follows:

- First of all, the problem which could be mentioned is the urgent need in investments. The reason is that, countries need to meet the expected energy demand and to reconstruct the ageing infrastructure.
- The next problem which Europe faces and Georgia as well is the dependency on energy imports. There is an immediate need of developing country's own resources and making domestic energy market more competitive. Otherwise, the insecurity will rise in these regions.
- The one of the biggest concerns is the energy reserves that are concentrated in few countries. Nowadays, roughly half of EU's gas imports are coming only from three countries, Russia, Norway and Algeria. The situation is similar in

Georgia, where gas and oil imports come only from two countries, from Azerbaijan and Russia.

- As the population is increasing from year to year, it is logically to say that the energy demand is also increasing. By 2030, the energy demand together with CO₂ emissions is expected to rise by 60%. Moreover, global oil consumption has already increased since 1994 by 20% and it is expected to continue increasing by 1.6% every year.
- The energy price affordability is under serious threat, because the oil and gas prices are rising. This affects the consumers directly. The situation which is occurring nowadays is the growing demand on fossil fuels, high dependency on imports and the growing price for oil and gas is not a minor problem.
- The other problem, rather than those listed above is the climate change. According to Intergovernmental Panel on Climate Change (IPCC), the climate is getting warmer because of greenhouse gas emissions which made the climate warmer by 0.6 degrees.
- The need of developed, competitive internal energy market is crucial for Europe. The problems such as high prices on energy and security of supply can be achieved through implementation of effective legal frameworks and regulations, which must be fully applied in practice.

“This is the new energy landscape of the 21st century. It is one in which the world’s economic regions are dependent on each other for ensuring energy security and stable economic conditions, and for ensuring effective action against climate change.” (European Commission, 2006)

To summarize, the key areas which should be addressed in terms of energy security in case of Georgia are:

- **Diversification of energy resources and energy supply sources**

- **Development of infrastructure of transporting energy resources towards East-West and North-South in order to increase country's transit potential**
- **Energy Efficiency**
- **Environmental Safety**
- **Attraction of foreign investments into the energy sector with a view to developing country's energy infrastructure**
- **Expansion of border trade in electric power with neighbouring countries**
- **Expansion of co-operation with international organizations with a view to speeding up Georgia's European and Euro-Atlantic integration**

3.3 Diversification of energy supply and resources

It is no secret that Georgia is vulnerable to political manipulation by foreign energy suppliers and for the reason to reduce the vulnerability two essential components should be fulfilled: diversification of supply and an effective internal regulation system. The government, which came after the Rose Revolution in 2003, had the strategy to create the system which would have been independent. The goal of the independence strategy was to increase the domestic energy potential, develop the reserve capacity, and to improve the existing transmission infrastructure. However, energy independence should not be understood as isolation from the international energy system, because it is obvious that no country can be isolated and completely self-sufficient in terms of securing energy supply. As a result, the important means of diversification and security of supply and transmission failures can be ensured through continuous regional connection due to energy import, export and transit stability. During the past years the Georgian government's goal in the energy sector was to improve the transmission infrastructure and energy system in general. To achieve this goal the previous government planned to do was constructing the

underground gas storage facility, improving Georgia's hydro power potential by rehabilitating existing hydro power stations and constructed new ones. The domestic oil and gas field development was also on the list of their goals, which is the least prior for Georgia due to its own minor oil and gas reserves. (Transparency International Georgia, n.d.)

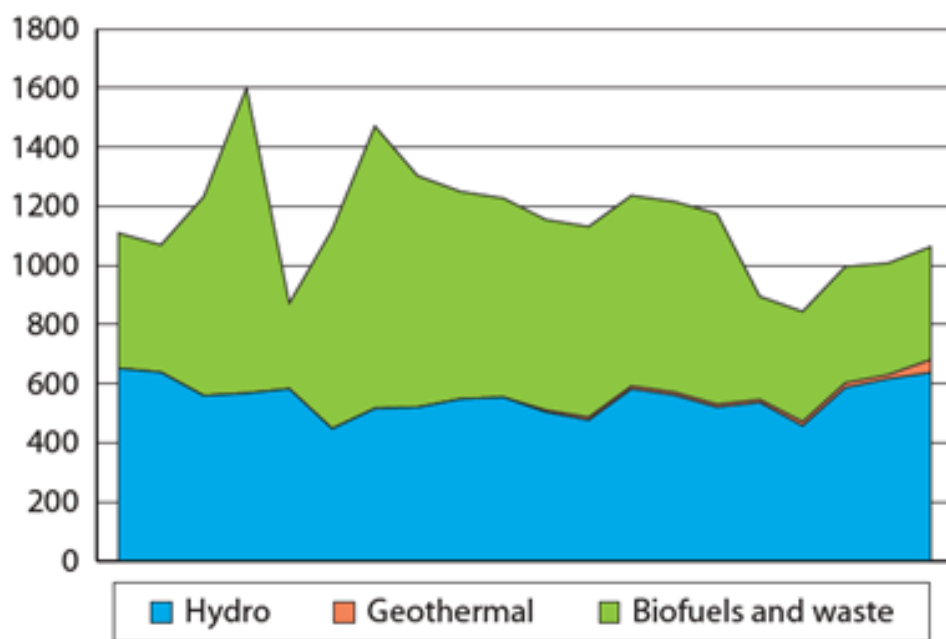
3.3.1 Georgia's underground gas storage facility

The absence of the underground gas storage facility in Georgia is a major risk for the country's energy supply security. In case of building the underground gas storage, it would maintain the Azeri gas, supplied from the South Caucasus Pipeline (SCP), however it will not only serve as the storage for Azeri gas, but it will store any gas received from diverse source. The biggest concern is how the underground gas storage facility in Georgia will function. The abovementioned facility will store gas in return to a payment for Georgia's energy host country status. The summer period is the most convenient period to store gas, because of the low demand of gas in summer. The gas storage will make it possible to overcome the problems linked to the deficit of hydropower in winter, making possible to use gas in winter and Georgia's own resources in summer. Furthermore, the benefits of underground gas storage can be seen from more technical sides as well. Georgia, which is mostly depending on one supplier, Azerbaijan, is potentially under risk if any accidents or leakages occur from the pipelines. In this case, because of lack of gas and oil imports, Georgia will not be able to meet the needs of the society. Moreover, one of such accidents happened in January 2006, when both electricity line and natural gas pipeline, supplied from Russia, were stuffed. This meant that Azerbaijan had to supply Georgia with the existing pipelines. These were times when Azerbaijan did also have problems with shortage of natural gas and the Baku-Tbilisi-Erzurum pipeline was not constructed yet. This is the ideal example to see the benefits of the underground gas storage. Unfortunately, the Deputy Energy Minister of Georgia, Ms. Mariam Valishvili, made it clear in the personal interview, held in April, 2014, that due to big costs the underground gas storage is the perspective of the future and cannot be set as a priority nowadays. (Transparency International Georgia, n.d.)

3.3.2 Georgia's Hydropower Potential

Georgia's geographical location, rainfalls, forest cover and climate gives high potential for renewable energy development in Georgia. Among all renewable energy sources known in the world, hydropower is mostly developed in Georgia. Hydropower is the main source related to energy supply in Georgia and it counts for the major part of the electricity generation.

Figure 5: Renewable Sources in Primary Energy Supply



Source: (IEA, 2011)

As we can see on figure 2, hydro resources occupy the biggest part of energy supply. Out of 26.000 rivers 300 are significant for electricity generation, whose total amount of electricity capacity is 15.000 MW. Georgia is a net exporter of electricity since 2007, and provides electricity to all four neighbouring countries. The long-term policy of the country is to fully develop and exploit the hydro resources, thus satisfying the overall demand for electricity with its own hydro resources, which will decrease the energy import. Nowadays, the capacity of the largest Hydro power

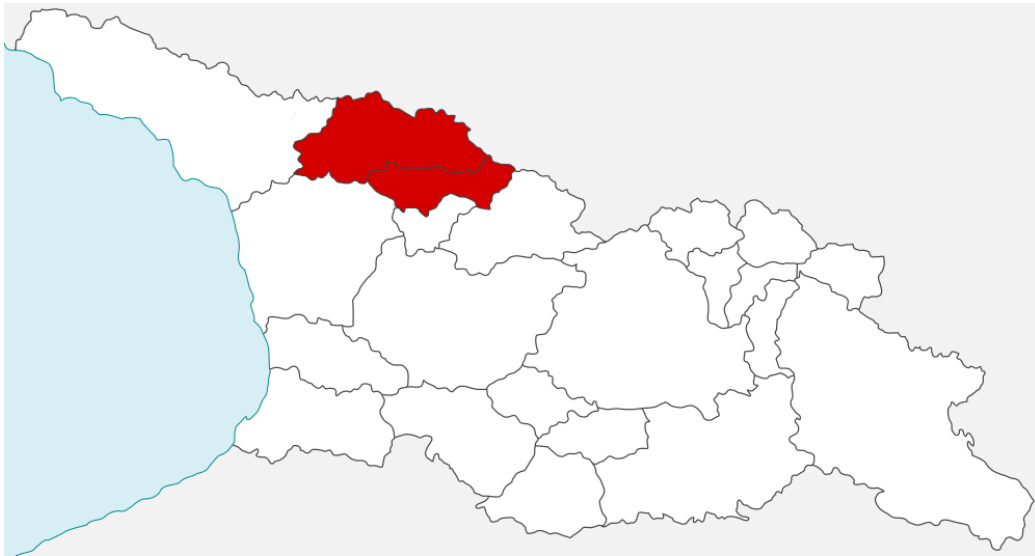
station in Georgia, Enguri, is 1.300 MW, which is the backbone of the Georgia's electricity generation system. The medium and small hydro power stations generate in totally 1.540 MW, which are also providing power domestically, either regularly or seasonally. In the document adopted by the Parliament of Georgia in 2006 "Main Directions of State Policy in the Power Sector" the first goal in terms of energy security is to rehabilitate the already existing hydro power stations. In terms of constructing, the first goal stated in the document is to build the medium and small hydro power stations with capacity up to 10 MW. Moreover, besides several dams with hydropower plants, one of them Enguri hydro power plant, the building of 702 MW capacity hydropower plant and dam was planned in the Soviet Union. Until now this project was not accomplished because of several reasons. But speaking about Georgia's energy security and development of the hydro potential of this country the already existing project should not be left without attention. (Transparency International Georgia, n.d.)

3.3.3 *Khudoni Dam*

Almost three decades the question whether the Khudoni Dam should be constructed or not is asked. During the Soviet Union, the project of the Cascade Master Plan of the Enguri River was planned, during which the Enguri dam and hydro power plant together with Vardnili Cascade were developed and constructed. In 1978, the first proposal of Khudoni hydro power plant was approved by the United Ministry of Energy of Soviet Union. Later, the project was also approved in 1984 by Tbilisi branch of "Hydro Project". The project was planned to be a 200m high concrete arch dam with an underground power house. The project could not be finished because of the collapse of the Soviet Union in 1989, but the process of constructing was started before suspension of the project. The construction of buildings, cofferdams, underground powerhouse, river diversion tunnel and other tunnels, and left abutment were already started, however, the constructions collapsed or are in bad state nowadays. The idea of revitalizing the Khudoni dam project started in 1992, when the new version was introduced. This is a never ending process of deciding whether Khudoni dam and hydro power plant should be constructed or not. (Netherland Commission for Environmental Assessment, 2013)

First of all, Khudoni dam is planned to be built in Svaneti, which is the alpine region of Georgia, situated on the southern slope of the main Caucasus range. The Khudoni dam will be located inside the Khaishi village, which is on the gateway of Upper Svaneti.

Map 3: Upper Svaneti, Georgia



Source: (Wikipedia, n.d.)

“To the natural beauties, the snowy peaks, the flowers and forests of the Svanetian landscape, man has added something. It is a land where every man’s house is his castle. The meadows and the cultivated valleys are strewn with high white towers. In one spot a single tower stands isolated, in another they cluster in groups of fifty to eighty.” (Freshfield, 1896) Svaneti is a unique place with its old traditions and cultural heritage. Upper Svaneti is the highest inhabited area in Europe. Moreover, since 1996, the monuments of Upper Svaneti are included in the list of UNESCO World Heritage Sites. The project of Khudoni HPP, which is the final version nowadays, envisages 200,5 m high arch dam, with a flooded reservoir 528 ha, with electricity capacity of 702 MW, and the annual generation of 1,500 million kW. (CEE Bankwatch Network and Green Alternative, 2007)

The main concern is whether Georgia will benefit from this project or not. Speaking generally about the hydropower reservoirs, which are widely spread in the whole world and in Georgia as well, it can be said that it can store significant quantities of water and act as a very effective electricity storage system. The positive side of the hydropower reservoir is that the generation of electricity can be decoupled during rainfalls or glacial melting periods. For example, in countries like Georgia, where the snow melt provides the bulk of inflows, the amount of water can be stored in the reservoir during spring and summer to meet the high electricity demand in winter. The alternative to this can be using electricity in summer, when there is peak demand for cooling. The hydropower reservoirs offer flexibility to energy system of the country. (International Renewable Energy Agency, 2012)

Moreover, electricity generation is directly linked to economic growth of the country. However, the economic growth in future affects electricity consumption increase, which is against energy efficiency concept. According to the forecasts of the Ministry of Energy of Georgia, the deficit of energy will increase due to price of imported electricity. It is estimated, that by 2018, the prices will rise by 8 to 10 cents, which will cause deficit of 1 billion kWh of electricity. On the other hand, electricity generated by Khudoni HPP, after becoming operative, will cost only 5.64 cents per kWh. In total, Khudoni together with Enguri and Varndili HPPs, will have increase of at least 450 million kWh of electricity at a price of 2.5 cents per kWh. This calculation done by the Ministry of Energy of Georgia, shows that the price of electricity generated within the country will be 10 times lower than its sales price.

In order to achieve the abovementioned results, the overall impact assessment of the situation should be done. First of all, the biggest problem of this project is the location and the local people. Up to 14 villages in Svaneti should be resettled in order to construct the dam, this is exactly the area of 0.17% of the entire territory of Svaneti, which is planned to cover in water. As a result, 184 families and 769 people must be resettled. Most of them do not want to leave their homes and they cite two reasons: first is the compensation and the second is the graves, churches and cultural monuments which may be submerged under the water. (Kvanchilashvili, 2013)

The other problem emerging from this project is the environmental impact. The Environmental and Social Impact Assessment (ESIA) was done by the Caucasus Environmental NGO Network (CENN) on behalf of Trans Electrica Ltd., which is responsible for building, owning and operating of the Khudoni HPP. The ESIA provided adequate information about the possible environmental impact listed as follows:

- “Impacts on aquatic and terrestrial flora and fauna, even though the information is of secondary nature and no local inventories have been carried out.
- Predictions of water quality and eutrophication processes in the Khudoni reservoir convincingly show that eutrophication processes are unlikely to develop.
- Climate change (macro): the contribution to greenhouse gas emissions by the reservoir has been well elaborated and the conclusion that this is not of a major concern is justified.
- The local climatic impacts of the Khudoni reservoir will only be noticeable at very short distance from the reservoir.”

(Netherland Commission for Environmental Assessment, 2013)

The possible problem, which is not listed in the abovementioned ESIA document, is the problem of deforestation. Until now, the forests of Upper Svaneti region was conserved pristine, which is known for rare native plants and animals. These mountain forests serve as a protective system for this region's ecosystem. The rural poverty has increased wood consumption for fuel and illegal wood export. Moreover, deforestation process is already taking place due to uncontrolled logging, which has caused soil erosion. As a result, the Khudoni HPP will intensify the deforestation process and promote loss of river species populations, degradation of upstream catchments and devastation of wildlife habitat due to flooding of the reservoir.

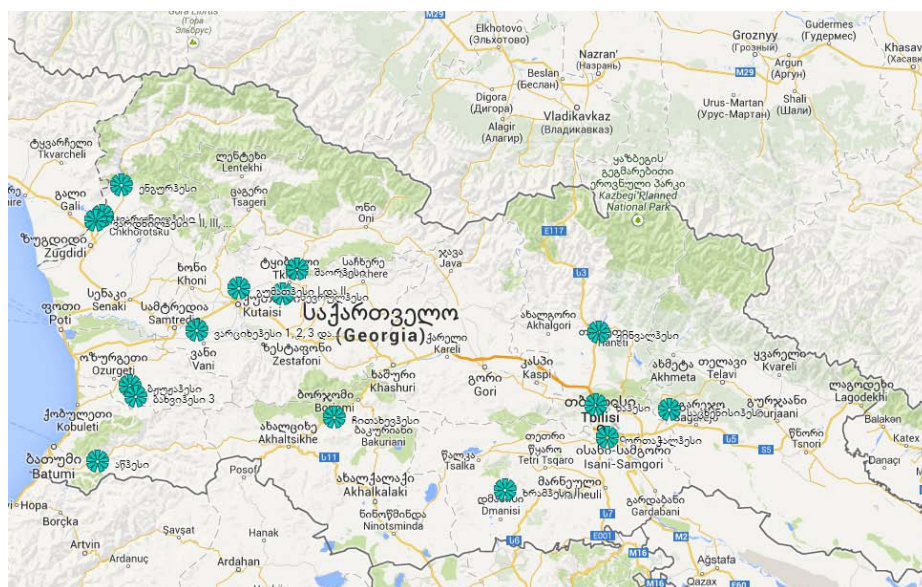
The Khudoni dam construction has also a big importance in terms of Georgia's energy security. The former Deputy Minister of Energy of Georgia underlined the problem Georgia is facing in winter time: “We have a deficiency in a system in winter time. To eliminate the deficiency there are two ways: to increase the

consumption and to decrease the demand. And the high tariffs and the step tariffs will somehow push the consumer to consume less.” Moreover, the topic was discussed by politicians as well stating that the Khudoni HPP will serve as the “export capability” and an inexpensive internal hydro at the same time. Also, the capital costs of the new HPP should be paid, which are comparable to the current average unit costs of imports. Thus, the reason for building a new hydro power station is increasing the Georgia’s internal capability and with that increasing supply security of the country. On the other hand, supply security cannot solve the problems emerging from building this station, such as environmental, social and economic. (CEE Bankwatch Network and Green Alternative, 2007)

3.3.4 Alternatives to the Khudoni dam

The first alternative to Khudoni dam, which can be more effective and less harmful for Georgia’s energy sector, is the rehabilitation of existing hydro power stations. By rehabilitation of all existing hydro power stations Georgia will add a considerable amount of generation capacity, which is a cost-effective way to restore Georgia’s energy sector capability.

Map 4: Hydro Power Stations in Georgia



Source: (Ministry of Energy of Georgia, 2014)

Nowadays, there are 26 hydro power stations all over the Georgia, but the majority were privatized over the years. The overall efficiency at which the country's hydro power stations work, varies between 40-45% of its installed capacity. This means that all hydro power stations need to be rehabilitated to achieve the maximum capacity. Moreover, during the privatisation processes the rehabilitation requirement was only included in several hydro power stations, but not in all of them.

The other alternative to the big hydro power stations are the construction of new medium and small hydro and wind farms. Several assessment were undertaken by UNDP, USAID and GEF, which concluded that 300 rivers have a potential for construction 1,200 derivation type small hydro power plants. Moreover, the total installed capacity of 1,200 small hydro power stations would be 3,000 MW, meaning that the annual generation will be 16,000 GWh. The construction of small hydro power plants will also be a benefit for the people living in rural areas, which mostly use wood for heating. Also, if the small HPPs were to operate in isolated networks, the losses in the transmission network can be avoided, which vary from 5-14% nowadays.

Table 4: Current Projects of Hydro Power Stations

Hydro-electric Power Station	Company	MW	Date of Explotation
„Paravani HPP“	Georgian Urban Energy (Turkey)	85	30.08.2015
„Dariali HPP“	Darial-Energy (Georgia-USA)	109	19.07.2014
„Nabeghlavi HPP“	Aliance Energy(Turkey)	1.9	28.03.2014
„Kirnati HPP“	Achar Energy 2007 ltd (Turkey)	36.644	30.02.2017
„Khelvachauri 1 HPP“	Achar Energy 2007 ltd	47.48	30.02.2017
„Okropilauri HPP“	Alter Energy (Georgia)	1.8	01.10.2014
„Goginauri HPP“	Alter Energy (Georgia)	1.8	01.10.2014
„Lukhuni 2 HPP“	Rusmetali Ltd (Georgia)	12	01.10.2015
„Aragvi HPP“	Energo Aragvi (Georgia)	8	15.02.2015
„Arakali HPP“	Optimum Enerji Üretim A.Ş (Turkey)	8.9	31.07.2015
„Abuli HPP“	Optimum Enerji Üretim A.Ş (Turkey)	22.2	31.07.2015
„Shuakhevi HPP“	Clean Energy Invest/Tata Group (Noway/India)	178	10.06.2015
„Skhaltal HPP“	Clean Energy Invest/Tata Group (Noway/India)	9.8	10.06.2020

Source: (Ministry of Energy of Georgia, 2014)

The 13 hydro power station projects are already under construction, which are supposed to be starting exploitation until 2020 with a total installed capacity of 522.544 MW. Besides the hydro power potential, Georgia has a potential of other

renewable energy, such as wind farms. Georgia's wind energy potential can be divided into four zones:

- High wind speed zones
- Low speed with partially high wind speed zones
- Low speed wind zones with the possibility of efficient exploitation of wind farms
- Low wind speed zones with a limited possibility of efficient exploitation of wind farms

Nowadays, the feasibility studies are carried out for future wind farms which can be constructed. Until now the feasibility studies showed that Georgia has a significant wind potential and can generate annual electricity at 4 billion KWh and installed-1.500 MW. (CEE Bankwatch Network and Green Alternative, 2007)

3.4 Diversifying of supply routes and increasing country's energy transit potential

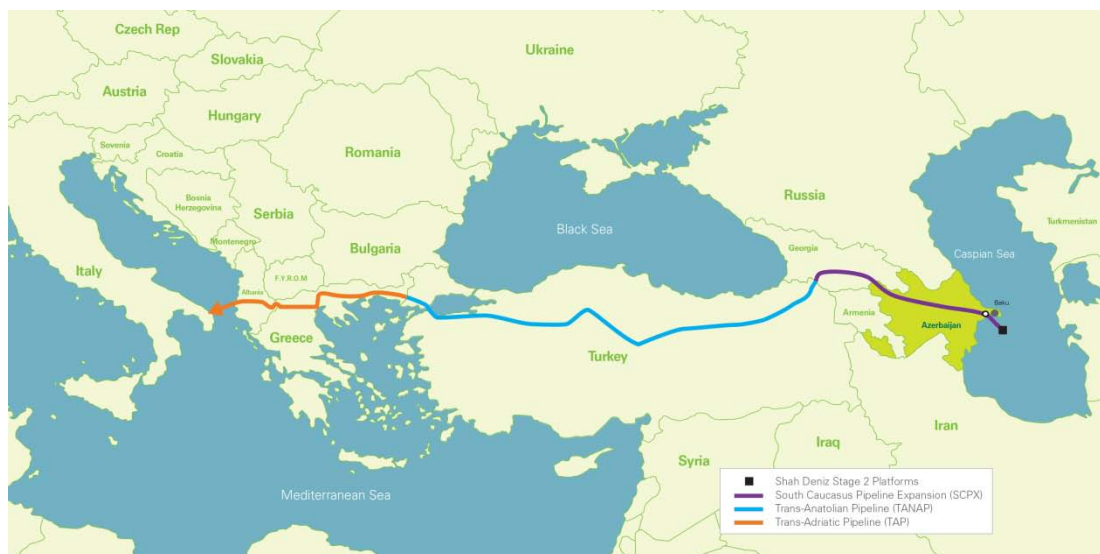
Georgia is the part of the Black Sea region, which is situated between energy consumer and energy provider countries. It has a special role in the functioning of the energy security guarantee on the Eurasian continent. Georgia has a big potential to become a major route of movement of gas and oil from the Caspian Sea, Middle East, and also Central Asia to Europe. South Caucasus, more precisely Georgia, has a potential to become a key country in terms of diversification of energy transit routes between energy consumer and energy provider countries. Moreover, EU has already become part of the Black Sea itself and Georgia's active cooperation and involvement in new pipeline projects to deliver gas and oil from the Caspian Sea to Europe, offers a chance to tighten relations and lead to the stable integration towards EU.

The need of delivering gas from the Caspian Sea to Europe and discussing new pipeline projects started after 2009, when the dispute between Russia and Ukraine

emerged. Russia accused Ukraine in siphoning gas, which was destined for Europe and cut off its gas to and through Ukraine. Europe, which is mostly dependent on imports of gas from Russia, had to close heavy industry facilities and lost hundreds of millions of Euros per day. After this crisis, EU felt the need to prevent it from ever happening again through diversifying the EU's sources of gas. There are already some new projects discussed to make EU more independent, while other countries involved in these projects will also benefit. (Sebo and Sipos-Kecskemethy, 2009)

Some of the proposed projects to deliver gas to Europe, from which Georgia will benefit, are the Trans Adriatic Pipeline (TAP), which will connect Greece, Albania and Italy, Trans Anatolian Pipeline (TANAP), which will connect Georgia and Greece through Turkey, Azerbaijan-Georgia-Romania-Hungary Interconnector (AGRI).

Map 5: TAP and TANAP



Source: (Arabian Oil and Gas, 2013)

3.4.1 Trans Adriatic Pipeline (TAP)

Trans Adriatic Pipeline is a project that aims to deliver Azeri gas to Europe. In case of the construction of TAP, the new gas infrastructure will connect Caspian Sea directly to Europe. The Azeri gas, which is exploited from the Shah Deniz II field,

amounting 16 bcm/year, will bring the gas from the Turkish border to Greece, then Albania and to its final destination Italy, through a new pipeline TANAP being built in Turkey. The European Commission welcomed the new pipeline selection. The President of the European Commission, Jose Manuel Barroso, said that: “I welcome today's decision by the Shah Deniz II Consortium selecting the Trans-Adriatic Pipeline (TAP) as the European route of the Southern Gas Corridor. This is a shared success for Europe and a milestone in strengthening the energy security of our Union. I am confident that today's decision, which builds on the strategic Joint Declaration I signed with President Aliyev of Azerbaijan in January 2011, will provide further momentum to the full and rapid realization of the entire Southern Gas Corridor as a direct and dedicated link from the Caspian Sea to the European Union, which should be expanded over time.”

Moreover, the European Commissioner for Energy, Guenther H. Oettinger, added that: “We have a definite commitment from Azerbaijan that gas will be directly delivered to Europe through a new dedicated gas pipeline system. Whether the system consists of two gas pipelines - TANAP and TAP - or one single pipeline as earlier projects had foreseen - does not make any difference in terms of energy security. We now have a new partner for gas, and I am confident that we will receive more gas in the future.” (European Commission, 2013)

Besides, energy supplier country Azerbaijan and energy consumer Europe also Georgia will benefit from these Projects. First of all, Georgia will benefit from the Shah Deniz Stage 2, but apart from that, also directly from the South Caucasus Pipeline expansion. Moreover, the project is believed to provide \$2 billion from foreign investments in the country. Secondly, 20% of the capital expenditure is planned to be transferred to the local Georgian suppliers providing goods and services. Lastly, the unemployment rate will decrease due to the 2.000 job places that will be created during the period of the construction.

The shareholder structure of the Trans Adriatic Pipeline project comprises of BP (20%), SOCAR (20%), STATOIL (20%), Fluxys (16%), Total S.A. (10%), E.ON (9%) and Axpo (5%). This project is expected to be finished by 2018. (British Petroleum, n.d.)

3.4.2 *Trans Anatolian Pipeline (TANAP)*

After many debates about Nabucco and South Stream projects, BP who is an important player in the Shah Deniz Consortium proposed a new project the South Eastern Europe Pipeline in late 2010. The project proposed by the BP is planned to go through Georgia and Turkey to Europe from Shah Deniz II, rather than building new pipelines.

Map 6: TANAP Road



Source: (TANAP, 2014)

In order to reduce the project investment costs, BP offered to use the already built pipelines BOTAS in Turkey, rather than building new ones. Because of the project being inexpensive, it became a competitor to Nabucco project. In October 25, 2011, Turkey and Azerbaijan decided to start the project in 2017-2018. The annual gas reserves capability in Azerbaijan, Shah Deniz II account for 16-24 bcm, from which 6 will be transferred to Turkey for his own needs and the rest to Europe. Finally, after many meeting between the Azerbaijani and Turkish companies, such as SOCAR, BOTAS and TPAO, they agreed that the right to sell gas to the European markets would be up to Azerbaijan and Turkey. It is assumed that the 16 bcm capacity of TANAP will be increased to 31 bcm until 2023. There is also the

possibility that Turkmenistan will join the project and deliver gas through trans-Caspian line, which will increase the gas volume capacity by 60 bcm. The Trans-Anatolian Pipeline will be split in two lines – Trans Adriatic Pipeline, which will deliver gas to Italy through Greece and the second line directed to Austria through Bulgaria. The expected costs of the pipelines will be \$7,0 billion, whose total length is 1750 km and the construction phase is planned to start in 2014 and finished in 2018. The official signing ceremony was already held on 26th of June, 2012 in Istanbul. (QANUN, 2012)

3.4.3 Azerbaijan-Georgia-Romania Interconnector (AGRI)

It is obvious that new pipelines are just one piece of puzzle and other alternatives for creating energy security should also be discussed. Additionally to the new pipelines new advanced technologies should implemented into the energy system. In this line, liquefied natural gas (LNG) can offer many advantages. Recently, the new intergovernmental agreement was signed between Georgia, Azerbaijan and Romania on the “AGRI” project. The advantages of the project are that it will deliver LNG from Azerbaijan to Romania through Georgia.

Map 7: AGRI Road



Source: (Novinite, 2014)

Moreover, LNG provides more price competition and the direct connection with the European markets, which will be guarantee for the long-term contracts and development of natural gas markets. Furthermore, the AGRI project will serve as the diversification of supply routes for the final consumers, thus increasing Georgia's energy security through diversifying routes, energy independence and security of demand for producers. Besides the rising role of Georgia as a transit country of oil and gas resources, the liquefied gas transit will set a precedent for the alternative route from the Caspian basin towards Europe through "non-territorial" Black Sea waters. This project will link the Caspian and Black Sea regions even closer to Europe. (QANUN, 2012)

3.5 *Energy Efficiency*

Energy efficiency can be defined in many different ways, as there is no global definition for this term. One of the definitions of "energy efficiency denotes to using less energy to provide the same level of energy service, related to more efficient technology and equipment". The energy prices continued to increase for the past years and Georgia's desire to become independent from external supplies, due to the risks connected to energy imports and the improvements, which were made in energy distribution collection levels, played a big role in for active development of energy efficiency in Georgia. Moreover, Georgia strives to become a member of EU and this aim encouraged country's government, especially Ministry of Energy, to advance initiatives in the fields of energy efficiency and renewable resources. The Georgia's present energy policy needs to be advanced to establish legal and institutional framework for improving energy efficiency and harmonization with EU's ascension targets. The EU ascension target regarding energy efficiency has a huge benefit for enhancing Georgia's economic, environmental and social development. To be precise, the first benefit for Georgia will be the reduced energy imports and thus increased country's energy security; it will positively impact energy tariffs, the country's external trade balance, economic and social development and; will reduce environmental impacts from energy consumption and trade. (Energy Charter Secretariat, 2012)

3.5.1 Background

More than 70% of Georgia's total energy consumed is imported. This is relatively high dependence on external energy imports, which makes it impossible for the country to secure energy on a high level. Moreover, the highest amount of energy imported to Georgia is mostly from one country, which makes the country more unsecure. Furthermore, according to the IEA (2008), International Energy Agency (IEA) (2011) *Energy Statistics*, share of energy efficiency in the GDP of Georgia is 0.7%, when the world average is 0.31%. (Energy Charter Secretariat, 2012)

3.5.2 Strategic and Legal Basis

Ministry of Energy is responsible for the development of energy efficiency policies and regulation, but nowadays, there is no State entity that is responsible for managing energy efficiency and energy saving policies, implementing plans and programs. The Department of Energy Policy and International Relations in the Ministry of Energy, is responsible for developing energy efficiency policies but until now there main priority was to increase energy supply. Drafting of an energy efficiency law was well advanced since 2008, which was abandoned by the government afterwards. In 2007, the government of Georgia has asked the Winrock International to assist them in developing energy efficiency law and policies. Winrock International is an USAID subcontractor, which has drafted energy efficiency law with the cooperation of Ministry of Energy and the NGO "World Experience for Georgia" (WEG). (Energy Charter Secretariat, 2012)

3.5.3 Energy Efficiency Initiatives

Many energy efficiency initiatives were implemented in the last decade by various international organizations. The first ones were the so-called Green Energy Brigades, which implemented many energy saving pilot projects in different regions of Georgia. The very first evaluation of the energy saving potential in the non-residential sector was carried by Least Cost Plan for Georgia's Energy Sector project,

which was supported by USAID. After 2000, the process of implementing energy efficiency initiatives, pilot projects, research and promotion started mainly by USAID and the European Commission through programmes and projects. The projects implemented by different international organizations play a big role in promoting energy efficiency in Georgia. In 2010, the Covenant of Mayors for Climate Change Mitigation was joined by the Tbilisi City Hall under which Tbilisi should become “low carbon city” by 2020. Under the initiative of the Tbilisi City Hall a Sustainable Energy Plan for Tbilisi was worked out, which was released in 2011 and included the main priorities such as CO₂ emission reduction by 25% by 2020. Another initiative taken by the European Bank for Reconstruction and Development (EBRD) was the energy credit amounting 35 million euros granted to Georgia. The credit line was meant to increase the business competitiveness of Georgia. The credit was expanded afterwards and loans became available for individuals as well. Major Georgian banks were participating in the credit line such as Bank of Georgia, TBC Bank, Bank Republic and Carty Bank. The credit line covered three main features: “(i) local banks use the credit line to provide commercial loans, at their own risk; (ii) every credit line is supported by a comprehensive, donor-funded, technical assistance package that helps potential borrowers to prepare loan applications and train local bank loan officers to process sustainable energy investment opportunities. This assistance is provided free of charge by a project implementation team consisting of international and local experts; and (iii) often a performance-related incentive fee is paid to the participating banks and to the end-borrowers.”

The main problem existing in Georgia regarding energy efficiency both in residential and industrial sector are the majority technologies and equipment which remain from the Soviet times and are obsolete in industry and energy sectors. As a result, the inefficient use of resources and significant emissions to the environment take place. Moreover, it has also negative impact on country’s economy, however economic and environmental problems coincide in industrial, residential and energy sectors. After energy efficiency potential assessments based on already assessed analysis and projects implemented, in case of implementing new energy efficiency measures such as energy efficient lightning, hot water supply, heating, air conditioning,

modification of low efficiency engines, use of residual heat and installation of new technologies the total energy saved by the country could amount 450 GWh. Moreover, the yearly energy saving potential in the capital of Georgia, Tbilisi, through street lightning and traffic light can be 3 million kWh, which is around Gel 250-300 thousand a year. On the other hand, the energy saving potential for Tbilisi industrial sector could be 71 million kWh electricity and 18 million cubic meters of gas.

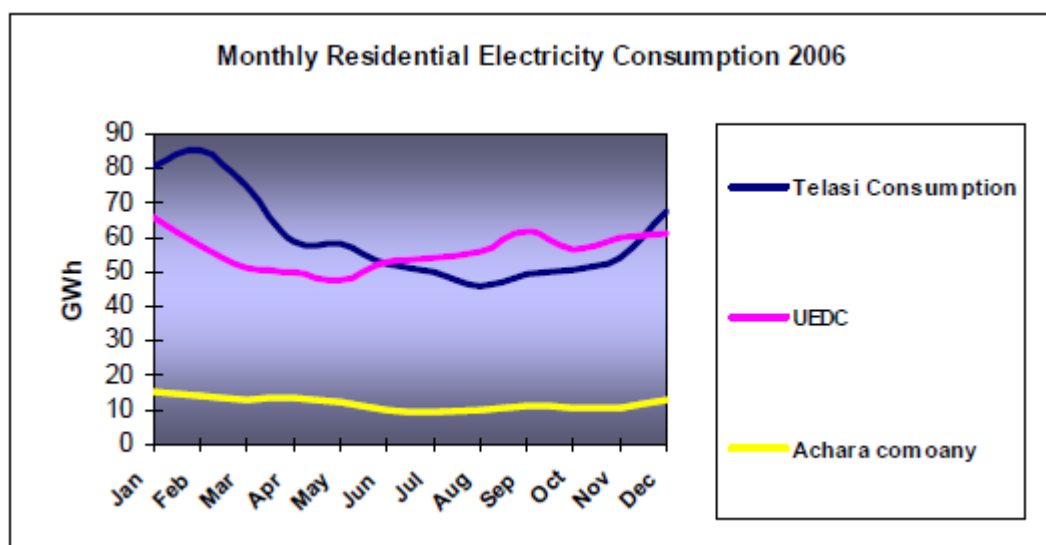
Distribution networks are still the main priority area in the energy sector which need rehabilitation. They are owned by private companies and are subject to losses of energy. In case of rehabilitation of distribution networks may result in energy saving of approximately 500 million kWh of electricity and 180 million cubic meters of gas. The amount of electricity saved is 7% of the total Georgia's electricity consumption and 10 % of gas consumption.

Moreover, there are still losses in the gas distribution sector. However, since 2000, the repair of gas pipelines resulted in significant decrease of losses. In 2000, before the rehabilitation processes of pipelines the losses amounted 6.78% and were decreased to 3.44% after the pipelines were repaired in 2006. Furthermore, Kaztransgas, which is the Tbilisi gas distribution company, launched the project in 2008 to reduce the leakage of methane in aboveground infrastructure in the Tbilisi gas distribution networks. The abovementioned project was implemented under the UNFCCC Clean Development Mechanism (CDM). In 2009, the total emissions reduction achieved 194,420 tones CO₂. The expectations are that in case of repair works the annual emission reduction will result in 339,197 tones CO₂ emissions. Another project which was implemented with the aim of emission reduction is the Leak Reduction in Aboveground Gas Distribution Equipment in SOCAR Georgia's gas distribution system. The project is under validation by CDM and UNFCCC and aims the reduction of 171,185 tones CO₂ emissions annually all over the Georgia. (Kochladze, 2012)

3.5.4 Energy Efficiency in Residential and Non-Residential Sector

Georgia's households consume approximately 30-35% of the total energy. The residential sector has the potential to facilitate benefits in case of energy savings. The one of the important things to mention is the seasonal variations of the energy supply. The seasonal coefficient (the ratio of Georgia's consumption in minimum in summer to maximum in winter) is 55%.

Figure 6: Monthly Energy Consumption of the Population of Georgia



Source: (World Experience for Georgia, 2008)

In Georgia more than 470.000 customers use natural gas for heating, cooking and hot water supply. However, 80-90% of natural gas is used by households for heating and hot water supply. These numbers make it clear that it is of great importance to reduce heat losses in dwellings and promote rational use of hot water. (World Experience for Georgia, 2008)

Moreover, Georgia has a significant energy saving potential in terms of lightning. In case of replacing incandescent bulbs with energy efficient bulbs, which constitutes 25-40% of general consumption of Tbilisi will save 145 GWh annually. If this initiative will be implemented throughout Georgia the total energy saved by country

will amount 340 GWh a year. One of the important facts worth mentioning is the wood consumption in rural areas for heating. Reducing fuel wood consumption has two positive sides, firstly, it will impact household expenditure positively and secondly, it will positively affect the environmental impacts and deforestation problems. According to World Experience for Georgia (WEG), which has done the assessment of energy saving potential in Georgia estimated that, the typical wood stoves used for heating has 35-40% efficiency, whereas the energy efficient stoves have up to 70-80% efficiency which will make it possible to save 1 million cubic meters of fuel wood. As a result, the CO₂ emissions and deforestation rate will significantly decrease. (Kochladze, 2012)

Georgia can be divided into three categories of consumers. The first category is the consumers of 5-100 kWh daily. The first category customers leaving in Tbilisi amount 144.849 which is 36%. The second category consumes approximately 100-300 kWh monthly and their number equals to 40.059, which is 10%. The third category is the passive consumers, which consume less than 5 kWh monthly. Their number in Tbilisi is 59.639, which is 14%.

The problem of the first category lies in lightning (40%) and electrical heating (30%). The majority of this category use natural gas for heating and hot water supply. Mostly, gas heaters are located in one room and only in extreme cold weather electric heaters are used in other rooms. The electrical heaters are not used more than 1-1.5 hours a day. The second category consumption lies in lightning (35%), refrigerators (20%) and electric heating (15%). The household in this category mainly use natural gas for heating purposes. The heaters used are mostly of 2-5 kW capacity and additional electric heating is not used. Small part of these households uses central heating using individual boilers and mostly electric water heater tanks are used. Third category, however, consumes water electric heaters mostly (30%), lightning (25%) and electric heating (15%). Consumers mostly use natural gas and electric energy as additional heating source in cold months. The energy saving potential in the residential area according to the abovementioned categories in lightning constitutes 25-40% of general consumption. That is why special attention is paid to lightning regarding energy saving potential.

The improvement of energy use efficiency is very important for Georgia through introduction of efficient technologies, implementation of energy saving measures and effective use of local fuel energy resources. The major part of energy resources, such as natural gas and most of the oil and oil products are imported for the needs of economy, but on the other hand, the efficiency of using these imported fuel energy resources does not exceed 45%. This means that more than a half of the imported energy cannot be used. Some investigations made on energy efficiency potential showed that energy can be saved in different non-residential sectors, such as in industry-about 70%, in utility service sector-15-25%, in transport-15-18% and in agriculture 10-14%. (World Experience for Georgia, 2008)

Moreover, the energy efficiency in electricity sector nowadays in Georgia can be compared to other European Countries. To calculate the level of energy efficiency first of all it should be found out how much electricity can be bought according to the tariff set out in the Georgian National Energy and Water Supply Regulatory Commission Decree No 33, December 4, 2008, on “Electricity Tariffs”. The medium tariff set out in the Decree is 12.46 Tetri/kWh. However, the average monthly income per household in 2013 was 887.2 GEL. (Shipilin, 2013)

This means that with 887.2 Gel households can buy 7120.4 kWh of electricity if the price is 12.46 Tetri/kWh. Furthermore, it is interesting which European countries have approximately the same results as Georgia, as it will be much easier to judge if Georgia is energy efficient country in terms of electricity or it has to raise prices on electricity to decrease the demand and increase energy efficiency. The statistics show that in Italy, Spain and Germany approximately the same amount of kWh electricity can be bought per household as in Georgia. In Italy, 7274 kWh electricity can be bought on average monthly salary per household, while in Spain 7277 kWh and 7687 kWh in Germany. The results show that Georgia’s energy efficiency, in terms of electricity, is close to the ones of developed European countries. Moreover, it shows that there is no need to raise prices on electricity in order to decrease energy demand. (National Statistics Office of Georgia, 2014)

3.5.5 Energy Efficient Technologies and Methods

In case to achieve energy efficiency, technologies should be taken into account. One of the most important ways to efficiency is to build energy efficient buildings, which function like people, as a system. Building is a system, because when one part goes wrong it will affect other parts of the building, which may seem having no direct connection. Many developed countries have developed their standards of energy efficiency buildings. It is obvious that green buildings increase the efficiency of the buildings and the use of energy, water, reduces impacts on human health and environment. There are different kinds of technologies to build energy efficient buildings or zero energy homes, such as:

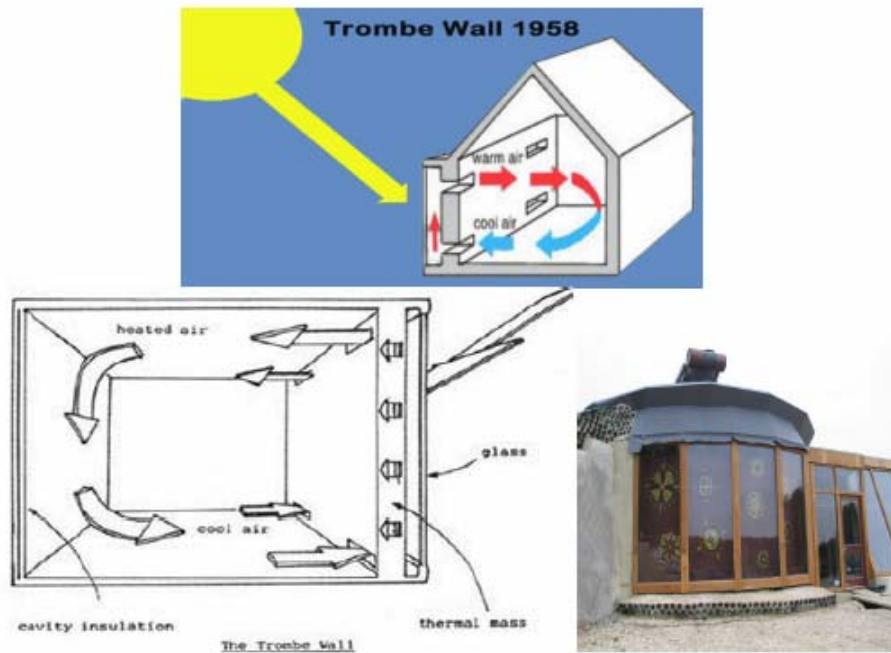
- Structural Insulated Panels
- Heat Recover Ventilation System
- Radiant Floor Heating
- Insulated Concrete Foundations
- Sealed Combustion Boilers
- Day-lightning
- Energy Efficient Windows
- Solar home design and orientation
- Trombe wall

Structural Insulated Panels are used to create air tight building. The Structural Insulated Panels consists of two skins of oriented strand board. It has an inner core which is made of solid foam insulation. As a result it is an incredible strong panel. These panels are used to replace the buildings framed wall system. It is known that these panels can reduce the buildings heating and cooling load by half.

The Heat Recover Ventilation System is designed to use for controlled ventilation in tight homes. These devices recover up to 80% of the energy. First of all the energy is recovered from the stale exhaust air and is then delivered to the fresh entering air

with the help of the heat exchanger inside the device. Sometimes these devices are attached to the central forced air system, but in some cases they have their own duct system.

The Trombe wall is a very interesting design which was invented by Felix Trombe in late 1950's. The way of how this system works is as follows, the incorporated thermal mass into the wall creates the large storage capacity for heat. The wall is slowly absorbing the heat of the sun during the day, but at the night time when the heating is needed the top and bottom vents of the wall are opened to make the air circulate around the wall. These walls can provide 20% of the heating needed at home. The walls may need up to 8-9 hours to heat up but at night when the walls are starting to cool it transfers heat into the leaving space. The Trombe walls can be built using different methods of thermal mass. Water is one that was used and has been proved to have a good thermal storage potential. The other material which can be incorporated into the walls can be phase change materials. Phase change materials are materials that can change from solid to liquid or from solid to another solid, when affected by heat. In the night time when the walls start to cool the material is changing to its original phase. The advantage of the phase change material is that large amount of heat can be absorbed in the material. The phase change materials are already used in the electronics industry, because it keeps away the electrical components from overheating.



Source: (World Experience for Georgia, 2008)

Another way to save energy is the technology known as energy-efficient windows. It is proved statistically that approximately 30% of the total heat and air-conditioning energy are lost in homes through windows. For the long term period the energy-efficient windows cost less than the normal windows, because of its low maintenance and replacement costs. Windows lose and gain heat in four ways through conduction, convection, radiation and air leakage. This heat transfer is expressed with U-values or U-factors. Conduction is the movement of heat through the solid material, however, with less conductive material the heat flow impedes. The solution to the problem is the multiple-glazed windows which reduce conduction.

There are also other energy efficient technologies such as:

- Energy efficient lightning
- Energy efficient appliances
- Efficient water heating
- Efficient wood stoves

The one of the most important energy efficient technologies is the efficient lightning. The reason is that the electric lightning burns up to 25% of the average home budget. There are different types of light bulbs which are very efficient and can reduce the electricity bills dramatically. Two of the most efficient light bulb types are compact fluorescent lights (CFL) and light emitting diode (LED) bulbs. CFLs are 3 to 4 times the wattage of the original incandescent bulbs and can save up to 75% of the initial lightning energy. CFLs cost 10 to 20 times more than the incandescent bulbs, but can last 10 to 15 times longer. The calculations were done by Amory Lovins from the Rocky Mountain Institute, who found out that by replacing the 75 watt incandescent bulb with the 18 watt compact fluorescent bulb, which gives the same amount of light, will reduce the carbon dioxide emissions by 1 ton and sulphur dioxide by 8 kilograms during the life span of the light bulb. Moreover, the huge savings of the electricity cost and 10 times more life time of the bulb is a benefit. The other type of energy efficient light bulb is the LEDs (Light Emitting Diodes), which are extremely efficient. The advantage of these bulbs is that as the amount of light needed gets larger the LEDs are marginally more efficient than the 100 watt incandescent, moreover, at night time the LED is three times more efficient. Furthermore, it is shock and cold resistant, which is perfect for portable and outdoor applications. Three LEDs running together consume only 0.22 watt, which proves to be extremely energy efficient.

Another problem which arises in the rural areas of Georgia is the heating problem. As already mentioned above, people use wood stoves in winter as a heating. However, the problem with the wood stoves in Georgia is that the typical efficiency of such stoves is 35-40%. This means that more than 60% of heat obtained by burning woods is lost. If the woods stoves used nowadays would be replaced by new efficient stoves the efficiency would be up to 70-80%. It is clear that replacing old technologies with the new ones cannot be done so fast and needs time but the process should definitely be started in case to become an energy efficient country in the future. (World Experience for Georgia, 2008)

4 Integration in the European Union

4.1 Introduction

The relationship between the European Union and Georgia dates back to 1992, when the Soviet Union collapsed and Georgia regained its sovereignty. EU was one of the first to help Georgia in the hard times and as a result the European Commission (EC) opened its Delegation to Georgia in Tbilisi in 1995. After the “Rose Revolution” in 2003 the relations between EU and Georgia intensified. However, the most important act that strengthened this bond took place in 1996 by signing the Partnership and Cooperation Agreement (PCA). The PCA entered into force for 10 years and is extended on yearly basis. The document is of a big importance as it covers areas such as: investment, trade, economic, legislative, political dialogue and cultural cooperation. Moreover, in December 2005, EU granted Georgia the General System of Preferences +. The next and one of the biggest step made by Georgia towards EU was the inclusion in the European Neighbourhood Policy (ENP) on June 14 2004, followed by the adoption of the EU-Georgia Action Plan after two years on the same

date. The Action Plan is a political document which lays down the strategic objectives of the cooperation between EU and Georgia. Implementation of this document will help fulfill the obligations of PCA and build stronger ties in cooperation and support Georgia on the pathway to integration into European social and economic structures. In 2009, European Union launched the Eastern Partnership aiming to support Georgia, Azerbaijan, Belarus, Moldova, Ukraine and Armenia in political and socio-economic reforms. (European Union, 2014)

On June 27, 2014 Georgia and the European Union signed the Association Agreement, which includes deep and comprehensive free trade area (DCFTA) during the European Council meeting in Brussels. The agreement was signed by the Prime Minister of Georgia Irakli Gharibashvili, President of the European Council Herman van Rompuy, President of the European Commission Jose Manuel Barroso and heads of the states and governments of the EU-member states. “Today Georgia is taking a big step towards free Europe, June 27 will be remembered as a historic and special day. There are dates in the history of each nation, which they are proud of. Today a new big date is being written in the history of my homeland, which gives me hope and which our future will be proud of. Many generations have spent their lives thinking about this day. And I am happy that it was honor of my generation to turn this dream of our ancestors into reality. It is difficult to express in words feelings I am experiencing now. I am sure that everyone has the emotion in my country. Today Georgia is given a historic chance to return to its natural environment, Europe, its political, economic, social and cultural space.” said Gharibashvili in his speech at the signing ceremony. (Civil Georgia, 2014)

Moreover, Georgia is making steps forward to integration into Europe’s energy market through applying for full Energy Community membership. Energy Community is an international organization dealing with energy policy. The permanent Vice-President of the organization is European Union represented by the European Commission. (Energy Community, 2014)

To be more precise, the words of the European Commission about the Energy Community are as follows: “The Energy Community is about investments, economic development, security of energy supply and social stability; but – more than this –

the Energy Community is also about solidarity, mutual trust and peace. The very existence of the Energy Community, only ten years after the end of the Balkan conflict, is a success in itself, as it stands as the first common institutional project undertaken by the non-European Union countries of South East Europe.” (European Commission, 2011) Nowadays, the leitmotiv behind the Energy Community Treaty, which is the establishing treaty of the Energy Community, is rather the import of the EU energy policy into non-EU countries. On February 20, 2014, negotiations were held between Georgia and Energy Community about Georgia’s accession. The areas such as electricity and gas networks, environment, renewable energy, energy efficiency, oil and energy statistics were discussed in order to agree upon the conditions of future implementation of the abovementioned key EU rules. (European Commission, 2014)

4.2 EU-Georgian Action Plan

First of all, while speaking about Georgia and its way to integration in the European Union, the EU-Georgia Action Plan should be mentioned. This document is important because it includes the objectives which should Georgia fulfill in case to be closer to the integration into the EU. As already mentioned above, the Action Plan is a political document, which will help Georgia implement the policies and measures to promote economic growth, also to advance the legislation, norms and standards those of the European Union. This document will contribute to the sustainable, long-term development of the country and thus promote further integration of Georgia into European economic and social structures. The Action Plan sets out eight priority areas, which are within and beyond the Partnership and Cooperation Agreement. Priority area 8 is related to transport and energy, which states that: “

- Continue cooperation on Caspian and Black Sea regional energy issues (oil, gas, electricity) in the context of the follow up to the EU-Black Sea-Caspian Basin energy Ministerial Conference of November 2004 as well as INOGATE.

- With a view to regional integration and progressive integration with the EU energy market and system and Georgia's role as energy transit country, encourage the development of diversified infrastructure connected to development of Caspian energy resources and facilitate transit." (European Union, 2014)

Taking into account that the EU-Georgian Action Plan very briefly describes what should be done in the sphere of energy, the Green Paper on the other hand, which was adopted by the Commission of European Communities, is a document stating the European strategy for sustainable, competitive and secure energy. By following and implementing the priorities and objectives laid down in this document, Georgia will be able to get much closer to the integration into EU. The six priorities which are described in the Green Paper are related to Europe's energy sector. The first problem highlighted in this document is the urgent need for investments, in order to meet energy demand and replace the old infrastructure. Import dependency is rising in Europe and the objective is to make the domestic energy market more competitive, because nowadays 50% is imported through the territories which are under threat of insecurity. Moreover, the gas reserves are concentrated in few countries and Europe gets gas only from three countries, these are Russia, Norway and Algeria. Global energy demand is also rising, which underlines the importance of undertaking energy efficiency measure in the region. Furthermore, the electricity and gas prices are rising, which is difficult for consumers as the energy demand is rising instead of decreasing. The last problem which Europe is facing in the 21st century is the competitive internal energy market which was not developed yet. As a consequence, European citizens are not able to benefit from security of supply and lower prices. The Green Paper aims to suggest options and solutions to the abovementioned problems. This document emphasizes the need to develop a pan-European energy community. In line with the European Neighbourhood Policy and its Action Plans, which also include the Association Agreements and Partnership and Cooperation Agreements, EU has undertaken actions for widening its energy market to include its neighbours, thus making them closer EU's internal market. As a result, creating a "common regulatory space" around Europe will help to develop the common trade, transit and environmental rules, market harmonization and integration. A great

example of the actions taken by the EU to involve neighbours into their internal market is through the Energy Community and establishing Treaty, which already has 9 contracting parties from South-East Europe and Black Sea region. In addition, Caspian and Mediterranean countries are of great importance for Europe, as they are important gas suppliers, thus bringing Black Sea region countries into EU's internal market and rules will guarantee safe and secure transit of gas from suppliers to Europe. (European Commission, 2006)

4.3 Association Agreement between Georgia and EU

The Association Agreement signed on June 27, 2014, between EU and Georgia was a very important document for Georgia, as it made it closer to the integration into EU. During the interview with the State Minister of Georgia on European and Euro-Atlantic Integration, Mr. Alex Petriashvili, he mentioned the importance of the Association Agreement between EU and Georgia and added that nowadays the goal is to implement the directives and regulations of the EU, also undergo reforms in the energy sector, moreover, to secure the pipelines going through Georgia and achieve national security. First of all, Association Agreement is a document, which includes Deep and Comprehensive Free Trade Area and stipulates further strengthening of political, economic and trade relations between EU and Georgia. By implementing the Association Agreement Georgia will benefit from it, as it will deepen economic and political relations with EU, moreover, Georgia will be supported in future core reforms, which should be implemented according to Association Agreement. Reforms should be undertaken in many areas such as: security policy, economic growth and recovery, industrial cooperation, environmental protection, energy and transport, social development, equal rights, youth and cultural cooperation and consumer protection education.

The area which is one of the most important areas for Georgia is energy. The Annex 25 to the Association Agreement is related to energy and focuses on the main goal to approximate the Georgia legislation to the EU legislation and international instruments. First of all, before starting fulfilling the obligations stated in this Agreement, serious analysis should be done of the obligations to understand the

concept of the final result. Annex 25 to the Association Agreement focuses on six main issues related to energy:

- Electricity
- Gas
- Renewable Energy
- Oil
- Energy Efficiency
- Prospection and Exploration of Hydrocarbons

The Association Agreement makes direct indication on the Directives and Regulations adopted by the different institutions of the European Union. It is important to figure out what Directives and Regulations related to energy should the Georgian government implement into the Georgian legislation. (EU Neighbourhood Info Centre, 2013)

4.3.1 Directives and Regulations of the EU

The first article listed in Annex 25 Energy is electricity. It is stated that Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity should be implemented by the Georgian government. The Directive stated the problem and solution to it. Even nowadays there are problems regarding the sale of electricity on equal terms and without discrimination. Moreover, security of supply is of vital importance for the European society: “In order to secure competition and the supply of electricity at the most competitive price, Member States and national regulatory authorities should facilitate cross-border access for new suppliers of electricity from different energy sources as well as for new providers of power generation.” Furthermore, the effective separation of networks from generation and supply, also known as effective unbundling is vital for non-discriminatory operation of the network. The second Directive regulation electricity system of EU is Regulation

(EC) No714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity stating that: “In particular, increased cooperation and coordination among transmission system operators is required to create network codes for providing and managing effective and transparent access to the transmission networks across borders, and to ensure coordinated and sufficiently forward-looking planning and sound technical evolution of the transmission system in the Community, including the creation of interconnection capacities, with due regard to the environment.” The next document mentioned in Annex 25 is the Directive related to measures to safeguard security of electricity supply and infrastructure investment. The next area is related to gas, which is very similar to those directives regulating the electricity market, as both have the same objectives. One of the biggest places in the Association agreement is devoted to energy efficiency area. The energy efficiency documents cover the areas such as: end-use efficiency and energy services, energy performance of buildings, indication by labeling and standard product information of the consumption of energy and other resources by energy-related products, the promotion of clean and energy-efficient road transport vehicles, eco-design requirements on ultraviolet radiation of non-directional household lamps, eco-design requirements for televisions. But the most important document laying down the whole aspect of the energy efficiency objectives is the Directive No2011/27/EU on energy efficiency. Energy efficiency problems cause many other problems. The Union nowadays is facing serious problems such as high dependency on imported energy and scarce energy resources, as a result, there is a need to limit climate change and to overcome the economic crisis. To overcome the problems energy efficiency should be addressed. Overcoming these problems will have significant advantage for the energy sector of the European Union. First of all, it will improve the Union’s security of supply and decrease energy imports. As a result, energy-efficient economy would help to spread innovative technological solutions and will increase employment due to sectors related to energy efficiency. The Union has set a timeframe and an objective to save 20% of Union’s primary energy consumption by 2020 compared to projections. The implementation of this Directives and Regulations will make Georgia closer to EU’s energy market and to the integration into EU, will benefit from free trade area and single internal market, but to be able to implement them into

Georgia's legislation and fulfill it in the practical way a controlling mechanism should exist. Therefore, the Association Agreement provides the information about the implementation of the Directive's, which are in the framework of the Energy Community Treaty. This automatically means that the implementation of the abovementioned documents should be done under the supervision of the Energy Community. (European Union, 2014)

4.4 Energy Community

Energy Community is an international organization as already mentioned above which aims at creating open and transparent national energy markets, also in medium term, an integrated energy market should be formed, which will allow cross-border trade in energy. The goal of the Energy Community, which was established for 10 years, until 2016, is to widen the energy borders to South East Europe. The long term perspective of the Community is to integrate fully the regional market into European Union's internal energy market. By joining the Energy Community, the Contracting Parties have committed themselves to implement the EU rules on energy, competition and environment. It should be mentioned, that the Energy Community Treaty -acquis communautaire is a legally binding document and to make it more effective it was extended in 2007 to the EU directives on security of electricity and gas supply. As a result, since 2010, "Energy Community acquis" covers the main EU legislation on energy efficiency, more precisely the Directives and Regulations that were mentioned above in the Association Agreement in Annex 25. (European Commission, 2011)

If Georgia will successfully become a full member of the Energy Community, the border will be shifted further to the East. The Energy Community is until now promoting and supporting Contracting Parties in implementing and fulfilling the obligations taken by signing the Treaty. The first area is electricity, where the third energy package should be implemented by the Contracting Parties. The special attention should be put on unbundling process of transmission and distribution networks. Also the list of priorities, include creation of regional market and security

of supply. The gas sector of acquis has the same objectives as listed in the electricity sector. Moreover, the Energy Community acquis lists the same priority areas as were listed in the Association Agreement Annex 25 and therefore the Directives and Regulations which should be implemented does not differ from each other. EU and Energy Community serve the same goal with a difference that Energy Community is more specific and works only on energy issues. (Energy Community Secretariat, 2013) The Director of the Energy Community Secretariat Janez Kopač said: “I am very happy that Georgia will become a full member of the Energy Community family. The Energy Community has proven to be an effective tool for supporting reforms in the energy sector and fostering investment. The opening of the negotiations sends an important signal that Georgia is on its way to develop its energy markets in a sustainable way”. (European Commission, 2014)

5 Conclusion

According to the abovementioned, a number of conclusions can be drawn, which concern energy security of Georgia, integration in the European Union and how to achieve these two goals together. First of all, taking into account the geopolitical state of Georgia, electricity and fuel supplies on the basis of domestic resources together with import and its integration into European energy market is one of the key factors of independent, safe and rapid social-economic development of the country. The basic aims of Georgian energy strategy differ considerably from the countries having domestic organic fuel resources. The first solution to the nowadays energy sector is the diversification of energy resources and energy supply resources. This includes many aspects, such as building an underground gas storage facility, which will be a guarantee of unstoppable gas during any unpredicted situation. Moreover, Georgia rich with hydro power potential, should develop its hydro power sector, by rehabilitation of old hydro power plants and building new small and medium hydro power plants. Building big hydro power plants will have adverse effect on Georgia's energy sector. Diversification of energy supply sources is the priority number two nowadays. Taking into consideration that Georgia's main gas and oil supplier is Azerbaijan and only, it should see to find other suppliers as well or be involved in new international or regional pipeline projects, such as TAP, TANAP

and AGRI. Georgia's strategic location makes it a benefit for developing a reliable transit country. Moreover, diversifying Georgia's own energy resources and by thus selling it to neighbouring countries will improve Georgia's economy and energy sector. Energy efficiency stands on the top priority list of Georgia. As energy efficiency is lower demand on energy, different means are used in different countries to achieve it. The problem which in Georgia nowadays exist, concerning energy efficiency is not high prices on electricity and gas, as it is in other neighbouring countries, but it's the problem in buildings and lightning and other technical issues. While finding out how much electricity can be bought in Georgia by one household with the average monthly salary, I compared it to other western countries, to find out how much is energy efficiency achieved in Georgia. The final results showed that Georgia was similar to the countries as Italy and Germany. From all said above, it is obvious that the problem mostly lies in diversification of supply resources and its own resources. The other aspect is Georgia's goal to integrate in the European Union. The way from which I looked on integration was from energy sector. It is very important to integrate into EU's institutions in order to achieve the final goal. Georgia should strive to enter into EU's internal energy market. On June 27, 2014, Georgia already signed an Association Agreement with EU which also includes Annex about energy sector with the precise list of Directives and Regulations that should be implemented in Georgia's legislation. Moreover, Georgia already applied for full membership in the Energy Community, which plays a crucial role in broadening the borders of EU's internal energy market. In conclusion, it is important to remember that energy sector is crucial for Georgia, its strategic location and transit possibility should be used in a good way. Georgia's vast hydropower potential makes Georgia a country who will strive to develop renewable energy. Energy is just one area, but one of the most important, that Georgia should use, to become a developed country, integrate in the European Union and acquire a status of a reliable transit country, on which Europe can always rely and by thus decrease independence. It is obvious that it is in interests of both EU and Georgia to cooperate and help each other to achieve their goals, which coincide with each other.

Bibliography

Arabian Oil and Gas (2013, December 22): Arabian Oil and Gas. www.arabianoilandgas.com. [Online] <http://www.arabianoilandgas.com/article-11597-shah-deniz-makes-final-investment-decision/> - accessed: July 20, 2014.

Aras B., and Akpınar P. (2011): The Relations between Turkey and the Caucasus. Centre for Strategic Research (SAM).

British Petroleum (n.d): Shah Deniz 2 and Opening of the Southern Corridor. BP Exploration, Baku.

CEE Bankwatch Network, and Green Alternative (2007): The Khudoni Dam: A necessary solution to the Georgian energy crisis?. [Online] http://bankwatch.org/documents/khudoni_dam_study.pdf - accessed: July 20, 2014.

Chivers (2006): Explosions in Southern Russia Sever Gas Lines to Georgia. New York Times.

Civil Georgia (2008, December 4): Civil Georgia. EU Offers Close Partnership to its Six Neighbors. [Online] <http://www.civil.ge/eng/article.php?id=20070> - accessed: July 20, 2014.

Civil Georgia (2012): Russia, Georgia to Jointly Manage Enguri Power Plant. Civil Georgia.

Civil Georgia (2014, June 27): Civil Georgia. Georgia, EU Sign Association Agreement. [Online] <http://civil.ge/eng/article.php?id=27417> - accessed: July 20, 2014.

Commission of the European Communities (2008): AN EU ENERGY SECURITY AND SOLIDARITY ACTION PLAN. [Online] http://news.bbc.co.uk/2/shared/bsp/hi/pdfs/14_11_08euenergy.pdf - accessed: July 20, 2014.

Cornell S. (2007): Georgia after the Rose Revolution: Geopolitical Predicament and Implilcations for U.S Policy. Army War College, Carlisle PA.

Dzhindzhikhashvili M. (2006): Azerbaijan Supplies Gas to Georgia. Associated Press.

Econ (2010): The Electricity Sector in Georgia-An Overview. Poyry AS, Oslo.

Energy Charter Secretariat (2012): In-Depth Review of Energy Efficiency Policies and Programmes: Georgia. Energy Charter Secretariat, Brussels. pp.23-26.

Energy Community (2014): Energy Community. www.energy-community.org. [Online] http://www.energy-community.org/portal/page/portal/ENC_HOME/NEWS/News_Details?p_new_id=6781 - accessed: July 20, 2014.

Energy Community Secretariat (2013): Energy Community Work Programme 2014-2015.

ESCO (2013): esco.ge. ESCO. [Online] http://esco.ge/files/energobalans_2013_eng.pdf - accessed: July 20, 2014.

EU Neighbourhood Info Centre (2013): EU Neighbourhood Info Centre. EU-Georgia Association Agreement: what impact will it have? [Online] http://www.enpi-info.eu/maineast.php?id=35360&id_type=1&lang_id=450 - accessed: July 20, 2014.

European Commission (2006): GREEN PAPER A European Strategy for Sustainable, Competitive and Secure Energy. [Online]

http://europa.eu/documents/comm/green_papers/pdf/com2006_105_en.pdf -
accessed: July 20, 2014.

European Commission (2008, December 3): The Eastern Partnership –an ambitious new chapter in the EU's relations with its Eastern neighbours. [Online] http://europa.eu/rapid/press-release_IP-08-1858_en.htm?locale=en - accessed: July 20, 2014.

European Commission (2011): REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL. Brussels.

European Commission (2013): EU Commission welcomes decision on gas pipeline: Door opener for direct link to Caspian Sea. Brussels.

European Commission (2014): Commission launches negotiations with Georgia to join the Energy Community. Tbilisi.

European Union (2014): European Union. [www.europe.eu](http://eeas.europa.eu/delegations/georgia/eu_georgia/political_relations/index_en.htm). [Online] http://eeas.europa.eu/delegations/georgia/eu_georgia/political_relations/index_en.htm - accessed: July 20, 2014.

European Union (2014): European Union. EU/GEORGIA ACTION PLAN. [Online] http://eeas.europa.eu/enp/pdf/pdf/action_plans/georgia_enp_ap_final_en.pdf -
accessed: July 20, 2014.

European Union (2014): European Union. Association Agreement between European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part - Annex 25 to this Agreement. [Online] http://eeas.europa.eu/georgia/assoagreement/pdf/ge-aa-annexes-part-iii-annexes-xxii-to-xxxiv_en.pdf - accessed: July 20, 2014.

Freshfield D. w. (1896): The Exploration of the Caucasus.

GIZ (2009): Renewable Energies in Georgia. GIZ, Eschborn.

GNERC (2008, December 4): Decree No33 on "Electricity tariffs". Kutaisi.

Gonca I.B. (n.d): International Relations Theory and Russia-Georgia Conflict of 2008.

Haghighi S. S. (2007): Energy Security-The External Legal Relations of the European Union with major Oil- and Gas-Supplying Countries. Hart Publishing, Portland. ISBN: ISBN-13: 978-1-84113-728-5.

IEA (2011): IEA statistics.

International Energy Agency (2014): International Energy Agency. [Online] <http://www.iea.org/topics/energysecurity/> - accessed: July 20, 2014.

International Renewable Energy Agency (2012, June): RENEWABLE ENERGY TECHNOLOGIES: COST ANALYSIS SERIES. [Online] http://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf - accessed: July 20, 2014.

Karagiannis E. (2002): Energy and Security in the Caucasus., London.

Kochladze M. (2012): Resource Efficiency Gains and Green Growth Perspectives in Georgia. Friedrich-Ebert-Stiftung, Berlin.

Kvanchilashvili E. (2013): The Khudoni Hydro Power Plant. Tabula.

Minasyan S. (2013): Armenia and Georgia: A New Pivotal Relationship in the South Caucasus? PONARS Eurasia.

Ministry of Energy of Georgia (2014): Energy Sector of Georgia.

Ministry of Environment of Georgia, and United Nation Development Programme (2009): Georgia's Second National Communication to the UNFCCC. Tbilisi.

National Statistics Office of Georgia (2014): GeoStat. www.geostat.ge. [Online] http://geostat.ge/index.php?action=page&p_id=182&lang=eng - accessed: July 20, 2014.

Netherland Commission for Environmental Assessment (2013, May 6): Advisory Review of the Environmental and Social Impact Assessment of the Khudoni Hydropower Project. [Online] http://moe.gov.ge/files/PDF%20Eng/News/Angarishi_ENG.pdf - accessed: July 20, 2014.

Novinite (2014): Novinite: Sofia News Agency. www.novinite.com. [Online] <http://www.novinite.com/articles/125268/Hungary+Lured+into+AGRI+Natural+Gas+Pipeline+Project> - accessed: July 20, 2014.

Nurshayeva R. (2008): Kazakhstan drops oil refinery plans in Georgia. Reuters.

Parliament of Georgia, and Ministry of Energy of Georgia (2006): Main Directions of State Policy in Georgian Power Sector. Parliament of Georgia, Tbilisi.

QANUN (2012): EU Commission welcomes decision on gas pipeline: Door opener for direct link to Caspian Sea, Istanbul.

Sebo L., and Sipos-Kecskemethy K. (2009): Energy security and the Caucasus region. Miklós Zrínyi National Defence University, Budapest.

Shipilin P. (2013, November 26): Live Journal. [Online] <http://pavel-shipilin.livejournal.com/175108.html> - accessed: July 20, 2014.

Siemens (2013, December 13): Georgia now exporting green energy to Turkey. [Online] <http://www.siemens.com/press/en/feature/2013/energy/2013-12-blacksea.php> - accessed: July 20, 2014.

TANAP (2014): TANAP. www.tanap.com. [Online] <http://www.tanap.com/en/#!/prettyPhoto> - accessed: July 20, 2014.

Transparency International Georgia (n.d): GEORGIA'S POWER SECTOR: ENERGY CROSSROADS IN UNCERTAIN TRANSITION. www.transparency.ge. [Online] <http://transparency.ge/sites/default/files/GEORGIA'S%20POWER%20SECTOR%20-%20ENG.pdf> - accessed: July 20, 2014.

Tsereteli M. (2009): The Impact of the Russia-Georgia War on the South Caucasus Transportation Corridor. Washington DC.

Tsereteli M. (2013): Azerbaijan and Georgia: Strategic Partnership for Stability in a Volatile Region. Central Asia-Caucasus Institute and Silk Road Studies Program, Washington DC.

World Economic Forum (2006): The New Energy Security Paradigm. [Online]
<http://www.weforum.org/pdf/Energy.pdf> - accessed: July 20, 2014.

World Experience for Georgia (2008): Energy Efficient Potential in Georgia and
Policy Options for its Utilization.

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