

THE STATE OF POWER INDUSTRY OF THE REPUBLIC OF ARMENIA AND THE MAIN DIRECTIONS OF REFORMS

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One of the key branches of the whole national economy of the Republic of Armenia is power energy generation. The constant increase in electricity generation is aimed at satisfaction of growing demands of both industry and consuming public in electricity. Therefore, in the program of the Government of the Republic of Armenia for the economic development for 2017 – 2022 a separate section is devoted to the main directions of power energy generation growth.

This paper studies data on total capacity of electric power stations of Armenia and their structure, sources and volumes of generated electrical power, energy balance of the country and its structure for the period of 2000 – 2015. The amount and value of exported from Armenia electrical power and that of imported to Armenia, electricity charges for 1000kW/h, as well as coefficients of foreign commodity turnover and comparative advantages of electrical power for 2000- 2016.

The authors highlighted the concepts of energy independence and energy security, giving them their own characteristics. Taking into consideration that the Republic of Armenia is a member of the EAEU, the principles of the union, the main problems and principles of the energy policy of the Member States, as well as the main directions of the energy policy have been presented. The authors also keep the latest developments in energy liberalization and legislation in Armenia at the centre of their attention.

Key words: *energy independence, energy security, electricity, export, import*

1. Current state of the Armenian power system development

In RA Government economic development program for 2017-2022 an important place is given to the energy and energy infrastructures. Particularly, as regards energy it was mentioned: "The energy policy of the Government of the Republic of Armenia is aimed at ensuring energy independence and rising security of the country, securing regional integration process, sustainable development of the energy sector, based on further development of nuclear energy, diversification of energy carriers supply and full, effective use of local primary (renewable) power resources, and on the implementation of current available measures and the introduction of new technologies." [1, pp. 62-63].

In addition, it was stated in the foregoing program in the program that the activities of the Government of Armenia for the coming five years will be mainly aimed at

- ensuring energy independence of Armenia through active policy of regional search for new energy markets, active import and export policies,
- formation of legislative incentives for introduction of new and high technologies, pursuing a policy aimed at the development of the energy sector and the introduction of energy efficiency measures,
- to extend the design life of the second block of the Armenian Nuclear Power Plant, with the aim of increasing the efficiency and safety of the nuclear power plant operation, setting up a schedule for the supply of additional equipment and additional research of equipment and systems of the power block,
- implementation of Armenia-Iran and Armenia-Georgia 400 kV high-voltage electricity transmission lines construction programs, as a consequence the Republic of Armenia will

become (after completion of construction and putting into service of power transmission lines) a hub of the regional powerful power grids connecting power systems of Iran, Georgia and Russia.

- implementation of solar energy systems construction projects, with the aim of implementation until the end of 2018 the construction of a peak-powered solar photovoltaic power plant of 55 MW at Masrik village,

- support the private wind power plant construction projects in the period of 2017-2022 by develop legislative incentives in that direction;

- construction of a geothermal power plant in a Karkar location involving a private investor in the project in case the final estimation of geothermal resources will enable economically sound generation of power [1, pp. 63-66].

Besides, RA Prime Minister Karen Karapetyan while presenting the economic development programm of the government at the National Assembly of the Republic of Armenia stated "We have great ambitions in the energy sector. Our object is not only the reequipment of the entire energy infrastructure, but also to become an active and key regional player. The government will implement energy market reform projects that will greatly contribute to the creation of renewable energy capacities, increase efficiency and security of the system, and dramatically increase cross-border electricity volumes.

As a result, we will have a modern, efficient, exporting and competitive energy system. At the same time, we planned to provide high quality energy services. One of the main goals of this sphere is liberalization of the energy market. "[2, p. 10].

Data on the output of power plants in Armenia and their structure for the period of 2000-2015 are given in Table 1.

Table 1

Power stations output in the Republic of Armenia in the period of 2000-2015

	2000	2003	2011	2012	2013	2014	2015
All electrical power stations, including	3231.1	3351.7	3508.7	4054.6	4094.4	4099.5	4086.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Thermal	1799.4	1774.4	1906.0	2394.0	2394.0	2390.0	2390.0
	55.7	52.9	54.3	59.0	58.5	58.3	58.5
hydroelectric	1024.2	1169.8	1191.2	1249.2	1289.0	1298.1	1286.7
	31.7	34.9	33.9	30.8	31.5	31.7	31.5
nuclear power	407.5	407.5	407.5	407.5	407.5	407.5	407.5
	12.6	12.2	11.6	10.1	10.0	9.9	10.0
other sources	-	-	4.0	3.9	3.9	3.9	2.6
	-	-	0.1	0.1	0.1	0.1	0.1

In numerator 1000 kW, in denominator with regard to output of all electrical power plants expressed in percentage.

The source was compiled and calculated [3, p. 283 and 4, p. 285].

It follows from the Table 1 that the total power output of all power plants was increased by 126.5% in the mentioned period. This growth was mainly achieved by growth of thermal power plants output (by 132.8%) and increase of hydroelectric power outputs (by 125.6%). The capacity of the nuclear power plant has remained unchanged over the years, and as for other sources (wind power plants) were insignificant. The power plant capacity structure of the Republic of Armenia proves that the thermal power stations have a dominant role (in 2000 - 55.7%, in 2015 - 58.5%, growth - by 2.8 percentage points), the share of hydroelectric power stations in 2000 was 31.7%, in 2015 - 31.5%, the decrease was 0.2%, the share of the Armenian nuclear power plant in 2000 was 12.6%, and in 2015 - 10.0%, the decrease was 2.6 percentage points.

Table 2 presents data on volumes and structure of electricity generation in Armenia.

Table 2

Volumes of electric power generation by source and structure in the Republic of Armenia

	2000	2003	2011	2012	2013	2014	2015
All electrical power stations, including	5958.6	5500.9	7432.7	8036.2	7710.0	7750.0	7798.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
thermal	2692.1	1521.5	2390.3	3399.1	3173.1	3288.6	2801.2
	45.2	27.7	32.2	42.3	41.2	42.4	35.9
hydroelectric	1261.1	1981.9	2488.7	2311.0	2173.4	1992.6	2205.6
	21.2	36.0	33.5	28.8	28.2	25.7	28.3
nuclear power	2005.4	1997.5	2548.1	2322.0	2359.7	2464.8	2787.7
	33.7	36.3	34.3	28.9	30.6	31.8	35.7
other sources	-	-	5.6	4.1	3.8	4.0	3.7
	-	-	0.1	0.1	0.0	0.1	0.0

In numerator million kW/h, in denominator with regard to output of all electrical power plants expressed in percentage.

The source was compiled and calculated [3, p. 283 and 4, p. 284].

It follows from the Table 2 that during the period under discussion the volumes of total electrical power generation all power plants of Armenia was increased by 130.8%. This growth was mainly achieved in hydropower plants (174.9%), in the nuclear power plant (139.0%) and in thermal power plants (104.1%) increase of hydroelectric power outputs (by 125.6%) at the expense of growth of power generation volumes.

The mentioned changes have made considerable shifts in the structure of electricity production volumes. If in 2000, the share of thermal power stations in Armenia amounted to 45.2%, then in 2015 - 35.9% (decrease was 9.3 percentage points), in hydropower stations 21.2% and 28.3%, respectively, (7.1% growth), in the nuclear power plant - 33.7% and 35.7%, respectively (increase was 2.0 percentage points). The resulting structural changes can be assessed as positive, for they have been achieved through the decrease of electricity generation in thermal power plants (which is particularly important from the ecological point of view), as well as due to development of such “clean” production of electric power generation facilities as hydroelectric power plants.

Table 3 shows the current energy balance of the Republic of Armenia and its structure for the period of 2000-2015.

Table 3

Electricity balance of the Republic of Armenia and its structure in the years of independence

	2000	2003	2011	2012	2013	2014	2015
Generated electrical power	5958.6	5500.9	7433.0	8036.0	7710.0	7750.0	7798.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Imported electrical power	352.0	306.7	301.0	98.0	198.0	206.0	174.0
	5.9	5.6	4.0	1.2	2.6	2.7	2.2
Exported electrical power	814.8	583.1	1383.0	1696.0	1226.0	1314.0	1424.0
	13.7	10.6	18.6	21.1	15.9	17.0	18.3

In numerator million kW/h, in denominator with regard to output of all electrical power plants expressed in percentage.

The source was compiled and calculated [3, p. 283 and 4, p. 283].

Data in Table 3 show that in the mentioned period the structure of the electricity balance of the Republic of Armenia has considerably been improved, as the volume of electricity produced increased by 130.8%, the volume of imported electricity decreased by 3.7 percentage points, or from the physical point of view - twice), and the volume of exports increased by 174.8%, or by 4.6 percentage points. In essence, the electricity has become one of the main products exported from Armenia.

Electricity is mainly exported to the Islamic Republic of Iran and Georgia.

Table 4 shows the amount of electricity exported from Armenia and imported to Armenia as well as the value of 1,000 kW/h in 2000-2016.

Table 4

Quantity of electricity exported from Armenia and imported to Armenia, and value per 1000 kW/h for 2000-2016

Years	Export			Import		
	Amount, thousand kW/h	Value, US dollars	Value of 1000 kW/h, US dollars	Amount, thousand kW/h	Value, US dollars	Value of 1000 kW/h, US dollars
2000	814853.5	20551593	25.2	352012.4	10253051	29.1
2003	279460.6	4590867	16.4	54226	779495	14.4
2011	1533066.1	87514495	57.1	204528.2	9463950	46.3
2012	1696152.9	95223952	56.1	98115.2	3344560	34.1
2013	1312942.9	77962320	59.4	147674.6	4309484	29.2
2014	1313610.5	81292080	61.9	205750.3	9512630	46.2
2015	1423699.3	81211936	57.0	173603.1	7685247	44.3
2016	1228772.1	60991134	49.6	275071.4	13998956	50.9

The source has been compiled and calculated [5, p. 27, 6 p. 31, 7, p. 52, 8, p. 52, 9, p. 54, 10, p. 54, 11, p. 59, 12, p. 59].

According to the data presented in Table 4, in 2012 the amount of electricity exported from Armenia for the mentioned period was the highest (increment in electricity generation was 208.2% as compared with that in 2000), after which a decrease in the export of electricity was observed (the export index in 2016 made up 72.4% of the 2012 export figure), and in general the volume of electricity exports from Armenia in 2016 was 150.8% as against that of 2000. The value of each exported 1000 kW/h was the highest in 2014 (61.9 USD), which in the following years had a downward trend (the index of 2016 was 80.2% in comparison with 2014). As regards the import of electricity into Armenia, in 2016 it was the largest one, and the import value was the (about 14 million US dollars) and the highest value paid for 1000 kW/h of electricity was 50.9 USD.

To make certain that electricity export from Armenia is a profitable trade, we have used the theory of comparative advantages. For this purpose Table 5 presents coefficients of comparative advantages (CCA) of the RA foreign trade turnover as well as electricity exports in the period of 2000-2016.

Table 5

Coefficients of comparative advantages of RA foreign trade turnover and electrical power from 2000 to 2016

Years	Foreign turnover of Armenia			Electrical power		
	Export, in thousand US dollars	Import, in thousand US dollars	Coefficients of comparative advantage	Export, in thousand US dollars	Import, in thousand US dollars	Coefficient of comparative advantage
2000	300487.4	884733.2	-0.493	20551.6	10253.1	0.334
2003	685599.2	12779485.7	-0.898	4590.9	779.5	0.710
2011	1334338.8	4145332.0	-0.513	87514.5	9463.9	0.805
2012	1380199.2	4261232.7	-0.511	95223.9	3344.6	0.932
2013	1478748.6	4385865.9	-0.496	77962.3	4309.5	0.895
2014	1547286.6	4424424.5	-0.482	81292.1	9512.6	0.790
2015	1485331.9	3239238.7	-0.371	81211.9	7685.2	0.827
2016	1782924.7	3292425.3	-0.297	60991.1	13998.9	0.627

The source was compiled and calculated [3 p. 460, 4 p. 446, 13 p. 445, 14 p. 118].

As it is known, the state of both the whole trade turnover and import and export of some individual products are characterized by the Comparative Advantage Coefficient (PPP) calculated by the following formula:

$$CCA = (E - I)/(E + I),$$

where E is the export, I is import.

In other words, the numerator of the above formula presents the pure export, and the denominator - the foreign trade turnover. The value of the said coefficient is in the range [+1, -1], at that CCA UMC receives the +1 value when the country is only exported and the -1 value when the country only imports [15, p. 26]. That is, the closer the CCA is near to + 1, the higher is efficiency of the country's exports, and v.v. The negative CCA increases the negative value of the country's balance of payments, due to which the country faces external debt burden, exchange rate change for the worse, and other problems, while exporting of electricity from Armenia and being the principal player in the regional electricity market can dramatically improve the country's balance of payment. And this means that the economic policy implemented and maintained in the electricity market in Armenia can significantly widen possibilities of electricity export and increase the state budget revenues.

2. The main directions of the RA Reforms in Power Industry

2.1. Concepts of energy independence and energy security

Many countries worldwide are striving for achieving "energy independence" and this idea is lays foundation for development of energy sector strategies or following up ongoing energy projects. Under conditions of geopolitical instability, unceasing fluctuations of energy carriers' prices, and in a situation when energy carriers (particularly oil) are becoming a source of political and economic power, and moreover, the cause of wars, energy independence can not be regarded as purely theoretical. On the contrary, it is necessary to make possible efforts to ensure energy independence of the country.

The former President of the United States Richard Nixon on November 7, 1973 announced **Project Independence** initiative in reaction to the OPEC oil embargo and the resulting oil crisis. He stated that the goal of **Project Independence** was to achieve energy self-sufficiency for the United States by 1980, through national commitment to energy saving and development of alternative sources of energy. Nixon declared that American science, technology and industry could free America from its

dependence on imported oil, and establish its energy independence [16]. Despite these initiative, **Project Independence** failed to prevent to increase in American oil consumption after the 1973-74 embargo; its dependence on foreign suppliers rose essentially. Time has showed that it was much easier to send man to the Moon than to get energy independence.

We can state that there is no prospect of achieving energy independence through international isolation (that is attaining energetic self-sufficiency of the country). When prices of energy carriers will pass through all their phases, the situation will be disappointing because for achieving a secure energy future usually sides enter into long-term agreements. The isolation from global energy markets is neaningless and unrealistic.

A long-expected technological progress in the extraction, recycling of energy carriers and their production also is very important. The use of renewable energy sources and alternative fuels is a very attractive idea, and large-scale scientific research is being carried out in the above-mentioned directions. But today it is impossible to say when revolutionary changes will take place in this sphere and what will be the result.

There is a much more effective way. Its meaning is that the objectives of achieving energy independence should be interpreted differently: energy independence must be based on the reliability of supply of energy carriers and the opportunity to minimize the risks to the importing country. This notion of independence does not jeopardize international trade. At the same time, it emphasizes the main purpose of diversification - to encourage investments in alternative and traditional sources of energy and research funding. This creates incentives for rising energy saving and energy efficiency.

Such energy independence can be identified with energy security. In reality it requires not isolation, but interdependency from different countries, including energy consumers and manufacturers. The country's inner energy well-being is directly dependent on our relationships set up with other countries and regions.

Energy is the key driving force behind global economic progress and directly affects the well-being of billions of people worldwide. There are many factors of energy security, but unified and accepted worldwide, definition of this term has not been given yet. At the same time, differences between different countries around this issue are deepening, for energy-producing and energy-consuming countries approach energy security problems from different viewpoints.

Very often energy security is identified with the energy independence of a particular country. Such an approach has led to such a situation where the competition for natural resources in the world is getting worse and causes many conflicts. Though many threats are emerging in the field of energy security (which have long been common to all mankind) should have compelled countries to acquire resources so that they can embark on the development of a global energy security concept.

It is obvious that it has become imperative to create such a global energy system that will minimize all potential dangers. One of those policies is energy conservation and environmentally responsible use. Another direction should be offer increase of the supply of economically efficient energy resources. There are still enough fuel and energy resources in the world to ensure the demand for humanity in the foreseeable future. The main problem is not the physical deficit of energy carriers, but the necessity of applying joint efforts to realize that potential.

Striving for overall energy security, the international community should first aim at developing the infrastructure of the international energy market. The ultimate goal of the development of energy markets should become the formation of a unified energy area where uniform rules are used. Presently, much of the energy resources are supplied crossing the borders of countries, in the future this tendency will grow. It can be said that the world oil market already exists. At present, for the creation of a unified energy infrastructure, it is necessary to gradually establish interstate, continental and intercontinental energy associations that will work under common technological standards and management rules.

The role of the authorities is to provide constant assistance in the implementation of international energy trade and investment activities through the creation of favorable technical, ecological, political and legal conditions for supplying consumers from energy production areas.

Experts worried about energy security issues should be able to reach consensus on joint actions, balanced approaches and elaboration of a joint program. It is undoubtedly not an easy process and requires a dialogue between countries and a mutual openness. However, the general nature of energy security threats does not allow energy issues to be solved efficiently only by the efforts of individual countries.

In this context, energy independence is viewed as a procurement of local energy of countries, which takes into account the market demand and the possibility of using and/or building up stock of alternative fuel and energy sources.

Energy security is the protection of a country (countries) energy sector from external and internal conditions, factors and processes that endanger the sustainable development of the sector and the country's energy independence.

2.2. Energy Policy Foundations in Member States of the Eurasian Economic Community

In the member states of the Eurasian Economic Community, the principles of energy policy have been established on February 23, 2003 [17]. Thus, the energy policy of the Eurasian Economic Community states that the joint activities of these countries are aimed at the efficient use of energy resources, the formation of mutually supplementing fuel-energy systems of the partner countries, the development of transit potential of the countries, as well as creating favorable conditions for the increase of interstate supplies of energy resources. This policy is aimed at ensuring the energy independence of the Member States through restoration and development of mutually beneficial economic relations in the energy sector and the formation of a common energy market.

The main issues of Energy policy of the Eurasian Economic Community countries are the following:

- Development of mutually beneficial cooperation in the field of energy and undertaking of joint actions to form a common energy market;
- Domestic market's saturation with energy resources and increase their export volumes to other countries;
- Formation of the wholesale market of electricity and energy potential,
- Efficient use of water and fuel-energy resources;
- Expansion of cooperation for the exploitation of new fields of hydrocarbon raw materials, its recycling and export,
- Development of transit potential of countries;
- Ensuring energy security and creating conditions for sustainable economic growth.

The principles of energy policy of the Member States

- Mutual respect for sovereignty and national interests,
- Comprehensive co-operation in the formation of a common, complementary fuel-energy system;
- Joint responsibility for the application of measures to ensure national interests during the development of the energy sector, taking into account the interests of the countries' energy security,
- Adoption of the principle of preference for joint decision-making on energy security issues of the Member States.

The main directions of the energy policy are:

1. Ensuring energy security of the Partner Countries, which foresees the following:

- Unification of the legislation regulating the energy sphere and the creation of legal conditions for the formation of the energy market;

- Ensuring the demand for energy resources on the domestic market and the development of energy resources export potential of the Member States;
- Formation of coordinated principles of customs, tax and tariff policies related to the energy sector.

2. Formation of the common energy market of the cooperating Member States, which presumes:

- Expansion of cooperation between the Member States' energy systems and the provision of possibilities for intergovernmental transfers of electric power under the conditions of a common market of electricity and power;
- Providing electricity transmission systems to transit electricity to other countries, in accordance with non-discriminatory (the same) conditions against those of energy transfers in their own country, taking into account the mutual benefit of power systems' parallel work,
- Creating favorable conditions for efficient use of water energy resources and electricity;
- mutual assistance in the elimination of the effects of natural disasters and the consequences of accidents at energy facilities;
- Increasing the efficiency of existing energy capacities and creating new ones in order to meet energy security needs and cheap electricity demand,
- Establishment of joint ventures in the field of electric power generation, transmission and transition, and joint ventures for manufacturing of electric power equipment;

3. Establishment of the common oil and gas market of the Eurasian Economic Community, which envisages:

- Creation of conditions for increased efficiency of joint geological prospecting activities;
- Joint operation of new oil and gas fields,
- Implementation of coordinated measures for the reconstruction and upgrading of gas supply systems;
- Establishing of extractive joint ventures;
- Development of mutually beneficial cooperation for the creation of new transport systems and restructuring of existing ones aimed at optimization of the ways of oil and gas import in the partner countries and growth of capacities;
- Definition of unified rules for access to main oil and gas pipelines and the provision of transit of energy carriers through the territories of EAEU Member States;
- Development of optimal oil and gas pipelines routes;
- Creation of conditions for rational use of oil and gas;
- Conducting coordinated policies to expand markets of oil and gas resources;
- Establishment of joint ventures specializing in the production of oil and gas equipment.

To implement the above mentioned exposition of principal propositions of energy policy it is necessary to form a common fuel and energy market for the EAEU Member countries [17].

2.3. Energy system functions and state regulation

The main responsibility and key function of the state is to ensure the stability, self-preservation and development of the society, and repulse all possible threats to the country's security. For this reason it is necessary to clearly define the system of indicators or indices of economic safety. The latter, having received a numerical expression, send signals to the predetermined danger and allow to take measures to prevent them.

The three main functions of the energy system are:

- **social – infrastructural:** designed to meet the most important demand for the country - electricity, gas, heating, fuel and other energy products and services;
- **economic:** the energy system provides a significant part of the budgetary (mainly tax) receipts, as well as essential part of investments in different branches of industry;

- **geopolitical:** through activity of organizational-and-engineering structures provides regional contacts and relations, the possibility of creating a unified energy system, which can boost the joint energy security of the countries of the region.

The problem of establishing new relationships between the energy system and the state is the key issue of economic security of any country and new policy on energy, based on the raw material (or production) potentialities and the issues set forth for the "sustainable development". The energy system as a combination of energy, economy and ecology is considered as the main direction of Armenia's further development.

In the future, Armenia's economic security, both from the point of view of economic growth and expanded reproduction, will also depend on the country's fuel-and-energy balance in terms of overcoming severe vulnerability to external influences. Therefore, it is necessary to incorporate and calculate the following energy indicators referred to energy component:

- The ratio of energy (energy carriers) export and import,
- Share of the energy system product in GDP, which is directed to domestic consumption,
- Depreciation of fixed assets of industry, including of energy sector,
- Annual GDP power intensity decline,
- Tax burden on energy sector.

It should be noted that the state strategy for economic security made up on the basis of a national and its components elements should be based on the ideology of development that takes into account the strategic priorities and the national interests of Armenia. Should these factors be taken into consideration, security threats would be minimized. Without providing an ideology of development and industrial and scientific-technical progress, it is impossible to solve neither the problems of economic security, nor a living standard acceptable by population, as well as the social protection of the population.

It is also clear that the problem of energy security should be viewed at two levels - national and regional. The state regional policy should be a link between these two levels of security. Under current conditions of the regional development, it is important to highlight the most important energy component of Armenia's economic security components and consider it as a part of other components of economic security.

In recent years radical changes have been made in Armenia's energy system that have had an impact on both economic and social life. The energy system incessantly being the basis for the modernization of the economy, acquires characteristics of special public infrastructure in the process of formation of present time conditions of human society's vital activity in the context of sustainable development in the future. Volumes and quality of energy production are largely predetermined by the security of the country, economic subjects and citizens, living standards and business activity.

Meanwhile, the issue of generation change and upgrading of production capacities has become imperative, as the character of RA power system's technical capacities is the following:

- 38% of installed production capacities have been operated for more than 40 years;
- The duration of operation of the main equipment of the thermal power plants has reached the limit indicators and their technical-economic and environmental indicators do not meet requirements of international standards;
- In 70% of hydroelectric power stations (Dzorak HPS, Sevan-Hrazdan cascade, the system of Vorotan HPS) have been operated for more than 40 years, and 50% for more than 50 years.

The goal of the RA Energy Security Concept is to define the main ways to reach the specified level of energy security, compensating for the lack of commercially available local mineral fossil fuel, providing economically affordable, acceptable quality and uninterrupted power supply in daily conditions, in emergencies and warfare [18].

The following documents are the basis of the RA energy security protection:

1. The **Rio Declaration on Environment and Development** was adopted at the United Nations Rio Conference known as the **Earth Summit** held on 3 – 4 June 1992 in Rio de Janeiro.
2. The **Johannesburg Declaration on Sustainable Development** was adopted at the World Summit on Sustainable Development, sometimes referred to as **Earth Summit 2002**, at which the **Plan of Implementation of the World Summit on Sustainable Development** was also agreed upon.
3. The **EU Energy Security Strategy** released by European Commission in May 2014 designed to secure Energy Supply Security, Competitiveness and Sustainability, reflected in the Green Paper of the European Commission;
4. The **Obligations** assumed by a number of other environmental conventions ratified by the Republic of Armenia.

Efficient use of renewable energy resources and energy conservation are crucial in ensuring energy security.

Promoting the use of own renewable energy sources (hydro, wind, biomass, solar, geothermal, etc.) is of great importance in ensuring energy independence of the country. The promotion of demanded investments for development of new renewable energy technologies, such as solar and bio technologies, geothermal and hydrogen energy, is of great concern not only for energy sector development and energy independence, but also enables to develop other related sectors of the economy. In particular, the development of various technologies for biofuels will contribute to the development of agriculture and the improvement of living standards of rural communities, development of processing and recycling industries in rural areas. Development of solar photovoltaic technology will create opportunities for the development of non-metallic mining and chemical industries, semiconductor technologies and semiconductor thermogenerators, which have wide range of applications.

One of the preconditions for the transition to knowledge-based economy is the large-scale introduction of energy conservation and energy-efficient technologies.

One of the most effective ways to promote energy supply with minimal costs is the reduction of energy waste, and, where possible, prevention by implementing energy efficiency measures, in particular, on the review of construction norms and introduction of energy saving standards, which will contribute to promoting the use in building industry non-metallic minerals that are a significant part of Armenia's national wealth.

The aim of the energy saving investment is to reduce energy dependence on imported energy resources, reduce greenhouse gas emissions through improvement of energy efficiency, increase public and private investment to provide energy saving in buildings, reduction of losses and raising energy efficiency and reliability level, as well as making the energy efficiency in other sectors of national economy an integral part of the government programs under implementation, and through the state support to ensure private capital involvement in energy efficiency sphere.

The concept outlines the measures necessary for energy efficiency:

- Follow the methodologies widely used in EU countries, develop a methodology for building up the energy balance of the Republic of Armenia and prepare annual energy balance of all types of energy - imported into the country, generated in the country and transferred to consumption sphere.
- Overcome the risky obstacles existing in the financial market that hamper the participation of commercial banks in the energy saving sector;
- Show that reasonable investments in increasing energy efficiency of buildings is profitable business,
- Promote energy saving demand in buildings, increase the awareness of commercial banks and skills of bank lending in energy saving,
- Carry out generation change of heat-and-power engineering capacities by introducing gas-turbine and combined thermal and electric power cogeneration systems that will operate in

competitive conditions without cross-subsidization and will be the best energy-saving solution.

2.4. The main directions of the reforms in energy sector undertaken by the Government of the Republic of Armenia:

The recent reforms in the energy sector undertaken by the RA government refer to the transition to a new, up-to-date power industry market in Armenia, the need of which is conditioned by the needs of the domestic market and is also important in terms of using cross-border trade opportunities [19].

The problem is that the current model of the Armenian energy market has been put into operation in 2004 and is based on the "single buyer (seller)" model, in which the electrical energy distribution license holder is entitled to buy electricity from the wholesale electricity market and sell it to consumers. In addition, the electricity market is fully regulated both in wholesale and retail sectors, electricity imports and exports are also regulated. In many developed and developing countries, energy markets have already been liberalized and have guidelines for a fully competitive market structure.

In order to liberalize the electricity market it is necessary to move to a new model of the market, which will increase the effectiveness of wholesale and retail markets and promote interstate trade will have some competitive elements in the domestic market.

The current electricity market is based solely on the annual electricity production and consumption forecasts and does not define responsibility for market participants in case of deviations from these volumes. As a result, the risks arising from the difference between the designed and actual volumes of electricity generation are balanced by electricity tariffs supplied to consumers, including the value of the balance risk of a person holding an electricity distribution license. Such a combination of legal relationships also does not enable to increase the efficiency of economic regulation of the power system. The new model of the market should be based on modern electricity trade rules, acting through demand and supply requests from business market participants and aim to incorporate accountability mechanisms for a market participant.

Tariff regulation is mostly implemented on the "profit rate regulation" principle, by annual complete recalculation of tariffs of system companies and service providers every year. This principle does not create enough incentives for regulators to increase the cost and effectiveness of investment. Electricity tariffs for consumers are differentiated by voltage levels, as well as overnight and daytime rates, insufficiently ensure the targeted distribution of electricity produced and system costs. For power generating stations have separate electricity and power rates are set, but they are not used in case of any consumer group and vice versa, night and day tariffs for consumers do not reflect the price of electricity production during that period. Such a tariff system can lead to an essential disbalance of financial flows in electricity production and consumption markets because of being different from the technological process. Therefore, there are addressed gaps in the tariff regulation system and application of new approaches is a necessity.

Conclusion

Taking into account the above, the transition from a fully regulated model of the electricity market to a new, liberal model, introduction of modern trade rules, further improvement of the tariff system and the promotion of interstate commerce are the main priorities of the RA electricity market liberalization (hereinafter - the Program) as priorities for domestic market consumer protection, including the distribution of responsibilities between market participants.

The main goals of the project are:

- Implementation of economic regulation in the electricity power system based on demand and supply requests from market participants.
- Introducing of individual responsibility for market participants and end-users in order to balance risks resulting from the difference of predicted and actual consumption volumes.
- Establishing new opportunities for interstate commerce.

- Introduction of new mechanisms for the protection of domestic consumers.
- Improvement of investment environment and creation of attractive conditions for investors; The main steps to achieve these objectives are as follows.
- Introduction of new tools and regulations in line with the best international practices in the RA Law on Energy, to clarify the scope of competences of state bodies and persons involved in the field.
- Develop concepts of new model of electricity market for Armenia and of new mechanisms of electricity trade.
- To develop new market rules based on the above mentioned concepts and fully transition to a new market model and new trade mechanisms by 2020,
- Review the tariff regulation system.
On resoluteness of The RA Government to implementing the program speak already implemented in a number of laws changes the main objectives of which are:
- To define (separate) the functions of the Ministry of Electric Power Infrastructures and Natural Resources of the Republic of Armenia, the Public Services Regulatory Commission and other state agencies.
- To make transition from the regulated model of the current single buyer-seller market to a new, liberal model, to introduce modern trade rules, to improve the tariff regulation system.
- To apply new tools to promote interstate trade having as a priority protection of consumers of the domestic market and the distribution of responsibilities among market participants.
- To separate distribution and supply functions as a result of which other suppliers may be able to act in the market, each as a licensed organization, which in turn will increase the collection of state dues. At the same time, the guaranteed supplier will operate in the market, which will provide services at regulated prices, enabling consumers to choose between both suppliers and buyers of electricity in the regulated and non-regulated market. At the same time, qualified consumers will have the right to buy electricity from electricity producers through direct contracts,
- To clarify functions of operators of the RA electrical power system and electrical power market.
- To define the concept of a new wholesale electricity trade license, under which the defined activities will not practically be regulated, which will promote interstate trade.
- To anticipate increase in the number of licensed persons engaged in business in a wholesale power market who can fulfill the function of importing and exporting electricity, which in its turn will lead to the increase in state revenues.
- For the purpose of planning the development of the power system, it is envisaged to clarify the requirements and tools for the development of power generation plants, transmission and distribution systems.
- To define new provisions guaranteeing non-discriminatory right of the third-party access to electrical power markets, in terms of infrastructure availability and guarantees for new connections [20].

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ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ ԷԼԵԿՏՐԱԷՆԵՐԳԵՏԻԿԱՅԻ ԱՐԴԻ ՎԻՃԱԿԸ ԵՎ ԲԱՐԵՓՈՒՆՈՒՄՆԵՐԻ ՀԻՄՆԱԿԱՆ ՈՒՂՂՈՒԹՅՈՒՆՆԵՐԸ

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²Շուշիի տեխնոլոգիական համալսարան

Հայաստանի Հանրապետության տնտեսության առանցքային ոլորտներից է էներգետիկան, որի զարգացմամբ է պայմանավորված ինչպես տնտեսության, այնպես էլ բնակչության կարիքների բավարարումը էլեկտրաէներգիայի նկատմամբ: Այդ պատճառով էլ Հայաստանի Հանրապետության կառավարության ծրագրում (2017-2022թթ.) առանձին բաժին է հատկացված էներգետիկայի զարգացման հիմնական ուղղություններին:

Հողվածում ուսումնասիրվել են ՀՀ էլեկտրակայանների հզորությունների և դրանց կառուցվածքի վերաբերյալ տվյալները 2000-2015թթ. ժամանակահատվածում, էլեկտրաէներգիայի արտադրության ծավալները ըստ ստացման աղբյուրների և կառուցվածքի, ՀՀ էլեկտրահաշվեկշիռը և դրա կառուցվածքը, ՀՀ-ից էլեկտրաէներգիայի արտահանման և ՀՀ էլեկտրաէներգիայի ներմուծման քանակը, արժեքը և 1000 կՎտ/ժ-ի արժեքը, ինչպես նաև ՀՀ արտաքին ապրանքաշրջանառության և էլեկտրաէներգիայի համեմատական առավելությունների գործակիցները 2000-2016 թվականներին:

Շեղիակները կարևորել են էներգետիկ անկախություն և էներգետիկ անվտանգություն հասկացությունները՝ տալով դրանց սեփական բնորոշումներ: Նկատի ունենալով, որ Հայաստանի Հանրապետությունը ԵԱՏՄ անդամ պետություն է, ներկայացվել են այդ միության գործունեության սկզբունքները, անդամ երկրների էներգետիկ քաղաքականության հիմնական խնդիրները, սկզբունքները, ինչպես նաև էներգետիկ քաղաքականության հիմնական ուղղությունները: Շեղիակների ուշադրության կենտրոնում են նաև ՀՀ-ում էներգետիկայի ոլորտի ազատականացման և օրենսդրական վերջին փոփոխությունները:

Բանալի բառեր. էներգետիկ անկախություն, էներգետիկ անվտանգություն, էլեկտրաէներգիա, արտահանում, ներմուծում

СОСТОЯНИЕ ЭЛЕКТРОЭНЕРГЕТИЧЕСКОЙ ОТРАСЛИ РЕСПУБЛИКИ АРМЕНИЯ И ОСНОВНЫЕ НАПРАВЛЕНИЯ РЕФОРМ

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Одной из важнейших отраслей экономики Республики Армения считается энергетическая отрасль, развитие которой позволяет обеспечивать потребность экономики и населения в электроэнергии. Не случайно в Программе Правительства РА, разработанной на 2017-2022гг. отдельный раздел посвящен основным направлениям развития отрасли энергетики в республике.

В статье исследованы показатели мощностей электростанций, источники получения электроэнергии в РА и структура производства электроэнергии за 2000-2015гг., показатели электроэнергетического баланса РА и его структура, а также показатели экспорта и импорта электроэнергии, цены за 1000 кВт/ч электроэнергии, а также стоимости экспортируемой и импортируемой электроэнергии. Авторами рассчитаны коэффициенты сравнительных преимуществ во внешней торговле и торговле электроэнергией за 2000-2016гг.

Особое внимание уделяется понятиям энергетической независимости и энергетической безопасности, основываясь на богатой теоретической литературе авторы представили собственное видение энергетической безопасности. Поскольку Республика Армения является страной-членом ЕАЭС, авторы проанализировали основные задачи и принципы энергетической политики, утвержденные

Решением Межгоссовета ЕАЭС, а также основные направления осуществления энергетической политики в странах союза. Авторы статьи акцентируют внимание на последние реформы Правительства РА и изменения в законодательстве, суть которых заключается в либерализации энергетической отрасли.

Ключевые слова: энергетическая независимость, энергетическая безопасность, электроэнергия, экспорт, импорт.