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**ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ ЭНЕРГЕТИКА САЛАСЫН
ЭНЕРГЕТИКАЛЫҚ ҮНЕМДІЛІГІ ЖӘНЕ ТИІМДІЛІГІ
МӘНМӘТІНІНДЕ РЕФОРМАЛАУ ҚАЖЕТТІЛІГІ**

Г.А. Рахимова, А.Б. Темирова, М. Д. Абикаева

Кілт сөздер: энергетика, электрэнергиясы, өндіріс, энергетикалық сала, тиімділік;

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**THE NEED FOR REFORM AT ENERGY SECTOR
REPUBLIC OF KAZAKHSTAN IN THE CONTEXT CONSERVATION
AND ENERGY EFFICIENCY**

G. Rakhimova, A. Temirova, M. Abikayeva

JSC "Financial Academy"
e-mail: m.abikaeva@mail.ru

Keywords: power, electric-power, production, power industry, efficiency.

Kazakhstan is rich in minerals and uses traditional energy sources, however, it is clear that alternative energy and conservation of natural resources is one of priority directions of development of the entire energy sector of the country. According to rating compiled by the world energy Congress (The World Energy Council) according to three criteria: energy security, affordability, environmental friendliness, Kazakhstan has achieved significant success in the field of energy security: under this criterion, the country ranks sixth among 129 countries of the world, ahead of Britain (11th place), the USA (12th place), China (18th place), Switzerland (19th place), Spain (22nd place), Sweden (24th place) and Germany (31st place). This result was achieved by reducing accidents, losses and through reduction in compliance of the standards of various indicators of electricity. [1]

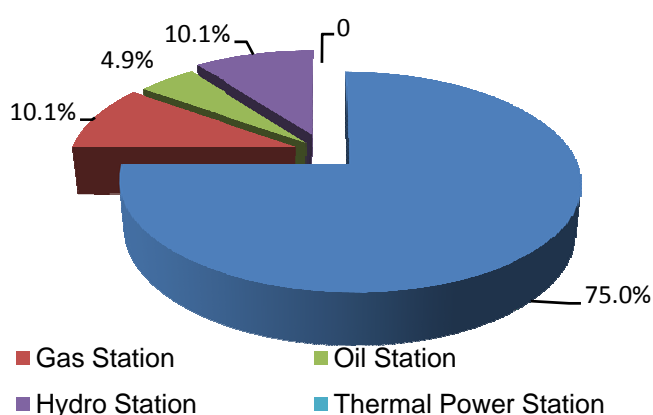
With the help of energy conservation and expansion of combined heat and power in a Central heating, Denmark has been able to keep the primary fuel for more than 30 years, despite an increase in GDP of about 70%. In addition, 14% of fossil fuels were replaced by renewable energy, at the same time significantly increased the electricity consumption, including increased consumption of transport and area of heated rooms. [2]

Dynamics of production of electricity in the three territorial zones of the Republic of Kazakhstan allows us to conclude that a significant portion of the electricity produced in the Northern region of Kazakhstan, i.e. at the end of 2014 is 79.2 per cent. This trend is primarily due to the vast reserves of coal in the North of the Republic of Kazakhstan, which is the main fuel in electricity generation for industrial enterprises of mining-metallurgical complex of the region. The availability of energy resources creates additional prospects for further development of energy-intensive enterprises. The Western region accounts for 10.8% of the total production of electricity in the country, respectively the South region – 10%.

Analysis of the structure of installed capacity of power stations of the Republic shows that the power system of Kazakhstan is characterized by prevailing share of thermal power plants that combust as its primary fuel coal (75%), gas (10.1 percent), oil (4.9 per cent), and insufficient share of hydropower in the electric power balance of the Republic of Kazakhstan.

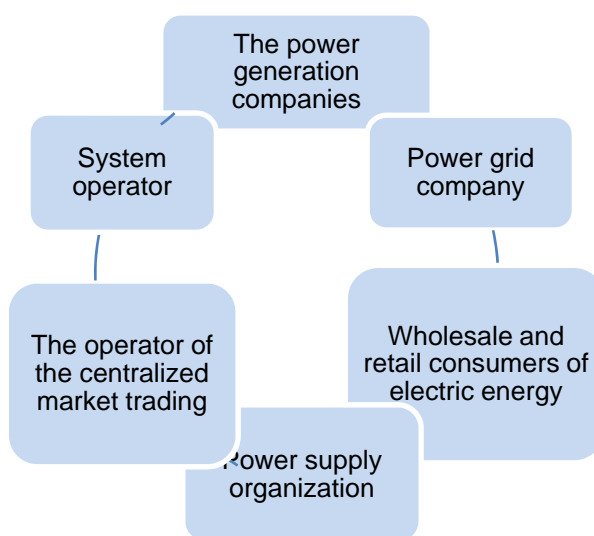
Given the large coal reserves in Kazakhstan, as well as the government's plans to increase electricity by 2020, in the medium term, apparently, will remain a high share of coal-fired power plants in total electricity production. In addition, it should be borne in mind that the use of "cheap" coal in electricity production allows to keep low tariffs for the population.

Analysis of electricity production in the Republic of Kazakhstan for the period from 2004 to 2014 allows to make a conclusion about the presence of positive dynamics in industry, electricity production is constantly increasing. So, in 2014, in comparison with 2004 the volume of electricity produced increase in 1.6 times GDP over the period - by 8.4 times. In 2009 compared to the previous 2008 there had been a decline of volume of electricity production (-2%), due primarily to the negative impact of the global financial and economic crisis on the economic development of the Republic of Kazakhstan – there was a decrease in industrial production and, consequently, of energy consumption, which once again proves the relationship between the level of energy production, industrial production and quality of energy supply to the economy.



Picture 1 - The structure of electricity producers in Kazakhstan

Currently, the Unified power system of Kazakhstan there are 40 energy-producing organizations of various forms of ownership, which includes 70 plants. The total installed capacity of power plants in Kazakhstan amounts to 19.4 GW, the available capacity of 15.3 GW. As a result of the market reforms in the electricity sector of the Republic has developed the following organizational-technological structure.



Picture 2 – Organizational and technological structure of the energy sector of the Republic of Kazakhstan.

The power generation companies are engaged in the manufacture and sale of electrical energy to wholesale consumers and power supply companies. In the Republic of Kazakhstan electric power stations are divided into stations of national, industrial, regional, and power plant heat supply companies.

Regional electric grid companies transmission and distribution of electric energy at the regional level through networks with a voltage of 220 kV and below.

Wholesale and retail customers are end-consumers of electricity generated by power generation companies. The power supplying organization shall purchase electric energy on the wholesale market and centralized market, and sell it to retail consumers, enterprises, public utilities and population. Only in Kazakhstan there are 45 power supply companies. The operator of the market of centralized trade, which carries out centralized trading of electric energy, including spot trading of electric energy in the Republic of Kazakhstan is JSC "DORAM".

The functions of the system operator on transmission of electric power through networks of interregional and interstate level with a voltage of 220 kV and above, as well as functions for organization of balancing of production-consumption of electric energy, operative dispatch management of the unified energy system of Kazakhstan performs JSC "KEGOC".

In the Republic of Kazakhstan market of electric energy consists of two levels: the wholesale and retail markets; thermal energy market consists of one level - the retail market. [3]

Wholesale electricity market of Kazakhstan is segmented within electricity networks the system operator on the zonal markets, within the boundaries of the electric networks of regional energy commissions - regional markets. In each segment of the wholesale market actually compete with each other from 2 to 5 power generation companies, and each segment of the wholesale market is an oligopoly of manufacturers.

The main drawback of the wholesale market is its concentration in one area – in the Northern and Central regions, which are the largest energy-producing power of the country.

According to the Kazakhstan operator of the market of electric power production of electricity for 2014 in the whole of Kazakhstan amounted to 86 203,0 million kWh. Electricity consumption for 2014 as a whole in Kazakhstan amounted to 88 million 136,0 kWh, compared to the same period in 2013 increased by 3907,4 million kWh, or 4.7%. [4]

In addition to domestic demand, consumers of electricity produced in the territory of the Republic of Kazakhstan, the Russian Federation, the countries of Central Asia (Uzbekistan, Tajikistan, Kyrgyzstan) and China. According to the Ministry of industry and new technologies of Kazakhstan, in 2014 the volume of export of electricity amounted to 1.5 billion kWh, with imports of 2.9 billion kWh. We are an importer of electricity, compensating for the power deficit of the southern zone through imports from neighboring States (mainly from the Republic of Kyrgyzstan).

Electricity demand is of seasonal nature: in autumn and winter, the load in the power system increases, which causes seasonal price increases, and decreases in spring and summer (the period of declining prices).

Unlike seasonal changes in demand, supply, i.e. the electricity generation in the power system, is of a permanent nature that is determined by the total amount of operating capacity of power equipment.

The supply of electric power on the market of Kazakhstan is ensured by the following power generating companies:

- Thermal power plants (TPP) – 79%;
- Gas turbine power plants (GTPP) – 11%;
- Hydroelectric power plants (HES) – 10%.

Hydropower potential of Kazakhstan is about 170 billion kWh per year. The main sources of hydroelectricity are the rivers Irtysh and Syr Darya rivers. Cost-effective water resources are concentrated mostly in the North (the Altai) and South (Tien Shan) energy regions of Kazakhstan.

As can be seen, the power industry of Kazakhstan is practically not represented by the use of alternative energy sources, as their share in the economy is quite small. In the electricity sector the main directions of energy saving are reducing the cost of fuel for production of electric and thermal energy, reduction of losses in electric and heat networks.

For the development of the energy sector need to be developed for industrial activities based on the following factors:

- the impact of substitute products;
- power customers;
- power suppliers.

Table 1 - The production of electricity by generators [5]

Name	Volume for 2013 (million kWh)	Volume for 2014 (million kWh)	Deviations	
			million kWh	in %
LLP "Ekibastuz GRES-1"	11703,3	13401,5	1698,2	14,5%
LLP "Ekibastuz GRES-2"	5438,5	5917,6	479,1	8,8%
JSC "EEC"	13711,5	13993,2	281,7	2,1%
JSC "Zhambyl GRES named after. Baturova"	457,5	868,0	410,5	89,7%
GRES-2 LLP "Kazakhmys Corporation"	4779,7	4698,0	-81,7	-1,7%
JSC "Bukhtarminskaya HPP"	2272,1	2541,2	269,1	11,8%
LLP "AES Ust-Kamenogorsk HPP"	1350,2	1496,7	146,5	10,9%
LLP "AES Shulbinsk HPP"	1545,7	1446,1	-99,6	-6,4%
JSC "Arcelor Mittal Temirtau"	2345,8	2058,7	-287,1	-12,2%
LLP "Karaganda Energocenter"	2371,9	2533,0	161,1	6,8%
JSC "Sevkat-Energy"	2409,8	2513,3	103,5	4,3%
JSC "Astana-Energy"	2304,2	2375,1	70,9	3,1%
LLP "MAEK-Kazatomprom"	4289,6	4506,3	216,7	5,1%
JSC "Almaty ES"	5441,7	5438,5	-3,2	-0,1%
ES "at Aksu Ferroalloy plant TNK Kazkhrom" (STU)	806,3	800,1	-6,5	99,2%
JSC "Z-Energoortalyk"	794,2	824,4	30,2	3,8%
JSC "Shardarinskaya HPP"	670,5	495,7	-174,8	-26,1%
Other sources	19603,1	20646,8	1043,7	5,3%
Total	82295,6	86203,0	3907,4	4,7%

Potential alternative sources of electrical energy given the fact that science today is exploring new technology in electric energy production by means of stationary power generating solar cells, wind turbines, fixed generators on fuel, which may in future allow yourself to ensure its own need for electrical energy. To date, the efficiency of such plants is very low both in capacity and unit cost of production. The

use of such sources are caused only by reason of lack of access to distribution networks or emergencies. In the near future the influence of this factor on the electricity generation market is insignificant.

Information about the electricity market today is open. Potential customers know the situation about the production, pricing and supply chain, which ultimately determines the value of the goods. This information allows the customer to compare and make a buying decision. However, the shortage of electricity on the market contributes to the decision making. The analysis of prices shows that electricity produced by hydropower is the cheapest, so customers primarily want to purchase the maximum amount, however, the limited production does not allow to provide all the needs.

The main consumption of external resources for exploitation: these are the materials for repair in the form of electrical products, steel products, building materials, insulation, etc. the Market for such materials is very developed and suppliers are ready to deliver the goods to the buyer's warehouse with the collateral replacement. With regard to capital repairs in this situation the picture opposite.

These types of activities are the specificity and high cost, so the market for such services is limited. These factors are the suppliers, setting high prices for these services. Tools used by energy companies to lower prices, are holding open tenders, comparative analysis of the similar of the works performed taking into account the inflation factor, the estimated verification of calculations on application rates and ratios. A relatively small reconstruction volume of the equipment does not allow to get an additional discount on the economies of scale. Therefore, the priority of energy companies in the market orders with suppliers in case of larger or bulk orders will always stand in the background.

On the basis of the factors mentioned above, it is obvious that energy companies of Kazakhstan subject to the influence of suppliers and it can be expressed in inflated cost of works and services. [6] Particularly relevant in the electricity sector at present and for the future issues of energy conservation and energy efficiency given the lack of number and capacity of electrical energy. Therefore, it is necessary to improve measures of the state to support those producers who use renewable energy in other States.

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ПОТРЕБНОСТЬ РЕФОРМИРОВАНИЯ ЭНЕРГЕТИЧЕСКОЙ ОТРАСЛИ РЕСПУБЛИКИ КАЗАХСТАН В КОНТЕКСТЕ ЭНЕРГОСБЕРЕЖЕНИЯ И ЭНЕРГОЭФФЕКТИВНОСТИ

Г.А. Рахимова, А.Б. Темирова, М. Д. Абикаева

Ключевые слова: энергетика, электроэнергия, производство, энергетическая отрасль, эффективность;

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