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CONCEPTUAL DEVELOPMENT OF ELECTRIC ENERGY OF THE REPUBLIC OF UZBEKISTAN: PROBLEMS AND PROSPECTS

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In the conditions of global competition, those countries that have been able to create a developed infrastructure and institutions for the development, commercialization and implementation of innovations have an advantage. Nowadays, at the time when all countries, even though in different degrees, are experiencing the consequences of the financial and economic crisis, it is clear that ones will outcome the current situation with the least losses who will timely take measures on re-equipment of production and develop new technologies, which ensures the production of competitive products with the lowest costs. One of the most important measures to overcome the consequences of the financial and economic crisis is the accelerated innovative development of the fuel and energy complex. This direction has been and remains a priority in the policy of the Republic of Uzbekistan. The energy sector of Uzbekistan is the basic branch of the national economy of the Republic and, having significant production and scientific potential, has a significant impact on the development of the entire national economic complex. Continuous electrification has created an opportunity for the development of industrial and social infrastructure of cities and rural areas of Uzbekistan, the formation of industry, construction industry. Currently, taking into account the self-sufficiency of the republic, measures are being taken to meet its needs in the medium and long term with the necessary high-quality energy resources on the basis of sustainable innovative development of the industry.

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The article touches upon the role of the energy sector in the development of the economy of the Republic of Uzbekistan. Data on the use and generation of electricity throughout the republic are presented. The detailed classification of the producing electricity is disclosed in full. There are announced the problems and ways to solve them in the near future.

Introduction

The electric power industry of Uzbekistan is the basic branch of the economy, has significant potential, and strongly influences the development of the market economy. In accordance with the decree of the President of the country, in order to radically improve the organizational and legal foundations of public administration in the electric power industry it should be based on advanced foreign experience, modern innovative ideas, developments and technologies. In addition to it, the strategy should be in accordance with the tasks defined by the action strategy for the five priority areas of development of the Republic of Uzbekistan in 2017-2021. Today, a consistent demonopolization of energy industries is being carried out; measures are being taken to accelerate the development and financial stability of the electric power industry. Because of development of industry and economic growth, an increase in population, industrialization, raising living standards, Uzbekistan needs to increase electricity generation, thereby ensuring energy security in the country.

Currently, the available generating capacity of the republic is 12,9 GW, of which:
TPP – 11 thousand. MW or 84,7%; HPP – 1,85 thousand. MW or 14,3 %;
Block stations and isolated stations – more than 133 MW or 1 %.

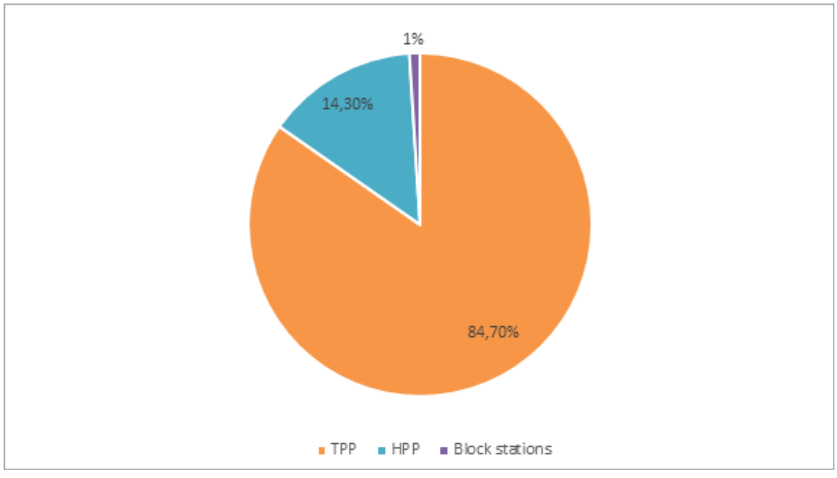

Fig. 1. Structure of electric energy generation

Source: Designed by the author based on the Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030

The main source of generation is 11 thermal power plants, including 3 thermal power plants. The capacity of modern energy-efficient power units is 2,825 MW, or 25,6 % of the total capacity of thermal power plants [The concept of providing the Republic of Uzbekistan].

In 2019, 89,6 % of the total electricity generated within the republic was generated by thermal power plants. At the same time, the total capacity of power units operating during the maximum load hours of the unified electric power system amounted to 8,6 thousand MW.

Hydropower includes 42 HPPs, including 12 large ones with a total capacity of 1,68 GW (90.8 % of the total capacity of HPPs), 28 MPPS with a total capacity of 0.25 GW (13.5 %) and 2 micro HPPs with a total capacity of 0,5 MW. 30 hydroelectric power plants with a capacity of 532 MW are operating along the watercourse (4 large ones – 317 MW and 26 MGES – 215 MW). There are 10 hydroelectric power stations with a total capacity of 1.4 GW at the reservoirs. The utilization rate of the republic's hydropotential is 27 %.

One of the main problems at present is that significant physical and moral deterioration of production capacities does not always allow us to compete with foreign manufacturers, even in the domestic market. This problem also exists for fuel and energy companies. Hence, there is a need to develop and implement an effective innovation policy at the enterprises of the fuel and energy complex of the Republic of Uzbekistan, the main task of which is to create such a system that will allow the intellectual and scientific and technical potential of this industry to be used in production in the nearest possible future [*Allayeva, 2014*].

At the same time, the economy of Uzbekistan is very energy-intensive by international standards. However, some countries as Western Europe, The USA, Japan and Korea are in average 4-5 times more energy– intensive compared to Uzbekistan. Among the group of CIS countries, Uzbekistan has the highest value of this indicator. The energy intensity of Uzbekistan's GDP exceeds the current value of this indicator in Russia – by 80%, Kazakhstan – by 70%, Ukraine – by 20%. This is due to the use of technologically outdated equipment, a high share of fuel and energy resources in the country's exports, relatively low prices for electricity and some types of fuel, an inadequate accounting system for the production and consumption of electricity and energy resources, etc. The country's leaders understand this problem and in order to reduce the energy intensity of the economy, ensure the rational and efficient use of non-reproducible hydrocarbon resources in Uzbekistan, the «Strategy for further Development and reform of the electric power industry of the Republic of Uzbekistan» was adopted, approved by the Decree of the President of the Republic of Uzbekistan dated March 27, 2019.

Reducing the energy intensity of the economy is the main task of Uzbekistan's energy policy, without which the energy sector will inevitably restrain the socio-economic development of the country [Priorities of industrial development..., 2010].

The key problem is a decrease in hydrocarbon fuel reserves, a large emission of greenhouse gases into the atmosphere, an increase in electricity consumption and its shortage in the near future.

The main factors contributing to the growth of electricity consumption:

– economic growth (GDP is expected to increase by 1.9 times by 2030);

– improving the standard of living of the population, leading to an increase in the use of electricity-consuming equipment;

– the growth of the country's population to 37.4 million people, according to the United Nations, with a simultaneous increase in the level of urbanization;

– elimination of unsatisfied demand, estimated at about 10 %.

In the period from 2012 to 2019, there was an increase in the percentage of electricity production at an average of 2,6 per year. However, the demand for electric energy was not fully met, the deficit amounted to 9,4 % of the demand [President resolution № 4249..., 2019].

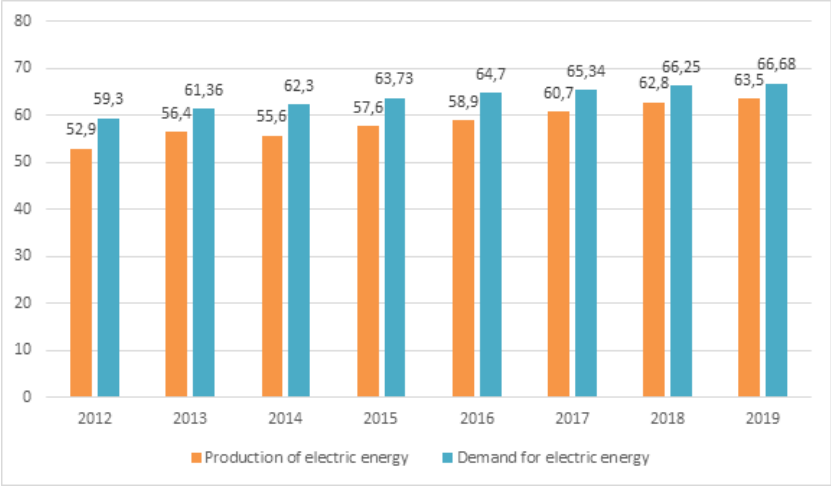

Fig. 2. Actual dynamics of production and demand for electric energy in the period 2012-2019, billion kWh

Source: Designed by the author based on the Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030

The main goal of the energy policy of the Republic of Uzbekistan is to meet the growing demand for electric energy at competitive prices and to ensure the dynamic development of the electric power industry of the Republic of Uzbekistan through modernization and reconstruction of existing power plants, construction of new generating capacities based on highly efficient energy production technologies, improvement of the electricity metering system, diversification of fuel and energy resources with the development of renewable energy sources [National goals and objectives].

The main ways to solve the tasks are the following steps:

1. Modernization and construction of new electric power facilities necessary to ensure the effective functioning of the domestic market, improvement of the electric energy accounting system and dispatch management through the introduction of advanced information and communication technologies.

The main objectives of the technical policy are:

– the introduction of new equipment and technologies to solve large-scale program tasks for the development of the electric power industry, ensuring reliable operation of the entire energy system of Uzbekistan, balanced by the regions of the republic, the structure of highly efficient, environmentally friendly generating capacities of thermal, hydraulic power and renewable energy sources:

– overcoming the trend of physical and moral aging of fixed assets and the complete withdrawal of obsolete equipment by the end of the period. It can be done by an increase in the commissioning of new generating capacities, the scale of work on the reconstruction and technical re-equipment of existing power plants based on the use of advanced technologies and technical solutions;

– reducing the specific consumption and increasing the efficiency of fuel use by increasing the generation of electricity on thermal consumption and, in this regard, creating the necessary regulatory framework that promotes combined generation of electricity and heat;

– improving the reliability and manageability of the unified energy system through the use of new highly efficient equipment and technologies in new construction, technical re-equipment and reconstruction of generation facilities, power grid facilities, the creation of peak capacities and highly maneuverable power units, the creation of an economically sound reserve of capacities;

– implementation in the development of new developed systems of decentralized and local electricity and heat supply based on the use of renewable energy sources, solar heaters, heat pumps, gasification technologies, including from local resources, industrial waste and household waste, followed by the use of synthesis gas and other promising breakthrough technologies;

– improving the technical level of the electric power industry based on the widespread use of superconducting equipment, advanced power semiconductor devices, microprocessor and computer technology in electrical networks and power plants;

– development of information and telecommunication infrastructure and centralized technological management;

– bringing the environmental characteristics of the electric power industry in line with progressive foreign requirements, including the tightening of national norms and standards of the environmental impact of energy.

2. Increasing the efficiency and rational use of electric energy at all stages of the technological process on the basis of energy-saving technologies and optimization of generating capacities.

The implementation of measures to optimize systems with an electric drive must be carried out in two stages. The first step is to optimize the entire system that uses the motor as a whole (e.g., cooling, utilization of thermal energy, heating, etc.). In the second stage – optimization of motor included in the system, based on newly defined power requirements using one or more methods in accordance with the terms of applicability.

Optimization of the power supply system can be carried out by the following methods: the use of transformers with increased efficiency or a reduced level of losses, the placement of equipment requiring high current as close as possible to power sources, ensuring sufficient cable diameter in order to reduce losses.

3. Ensuring diversification in the electric power and thermal power industry by increasing the share of renewable energy sources with the creation of mechanisms for investment projects of renewable energy sources on the terms of public-private partnership, improving state policy in the field of development of renewable energy sources and demonstration of investment projects for the development of renewable energy sources;

4. Formation of a comfortable, legal, administrative investment environment and a wholesale electricity market to attract long-term, primarily foreign direct investment.

To increase the investment potential of the energy complex, it is necessary:

– to create a system of state funds through which it will be possible to provide financial support to energy enterprises at early stages of development on a competitive basis;

– to implement foreign best practices in the field of investments in innovations of the energy complex;

– to attract foreign experts in the field of innovation and energy to Uzbekistan;

– to carry out legislative harmonization of relations between the federal center and the regions in the field of regulation of investment in innovative development of the energy sector;

– to create special economic zones for the development of innovations in the energy sector, which can become a catalyst for the process of investment attractiveness of innovative development of Uzbekistan's energy sector.

5. Increasing cross-border trade and strengthening regional cooperation through the restoration and modernization of power transmission lines connected to the energy systems of neighboring countries.

In order to succeed in the task of strengthening of the regional cooperation, it is necessary to ensure that the following steps are completed:

– harmonization of the national legislations of neighboring states in the field of pricing and state regulation of natural monopoly activities in the electric power industry;

– organization of management of the interstate electric grid infrastructure, taking into account the principles of ensuring non-discriminatory and free access to it;

– development of uniform pricing principles for natural monopoly services provided on the common electricity market, to implement mechanisms of tariff and antimonopoly regulation on the common electricity market.

At the initial stage, the creation of a common electric power market can be realized by organizing one or more joint trading platforms with a limited number of par-

ticipants from each country, where bilateral fixed-term contracts will be concluded, as well as exchange trading is carried out. At this stage, the volumes of electricity sold within the framework of the common market will be insignificant (cross-border trade in surplus electricity that has not found sale on national markets. Considering the supply of those markets to the territory of other countries participating in the common market, taking into account the cost of interstate transmission, will be economically feasible). As a long-term goal, it is necessary to consider the creation of a single electricity market in Central Asian countries, which will ensure a real increase in competition as a result of integration, optimization of equipment utilization and minimization of the cost of electricity for end users.

In the Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030, the directions of development of the country's electric power industry for the medium and long term are determined, **indicators of fluctuations in the power generation capacity in 2019-2030 are calculated.**

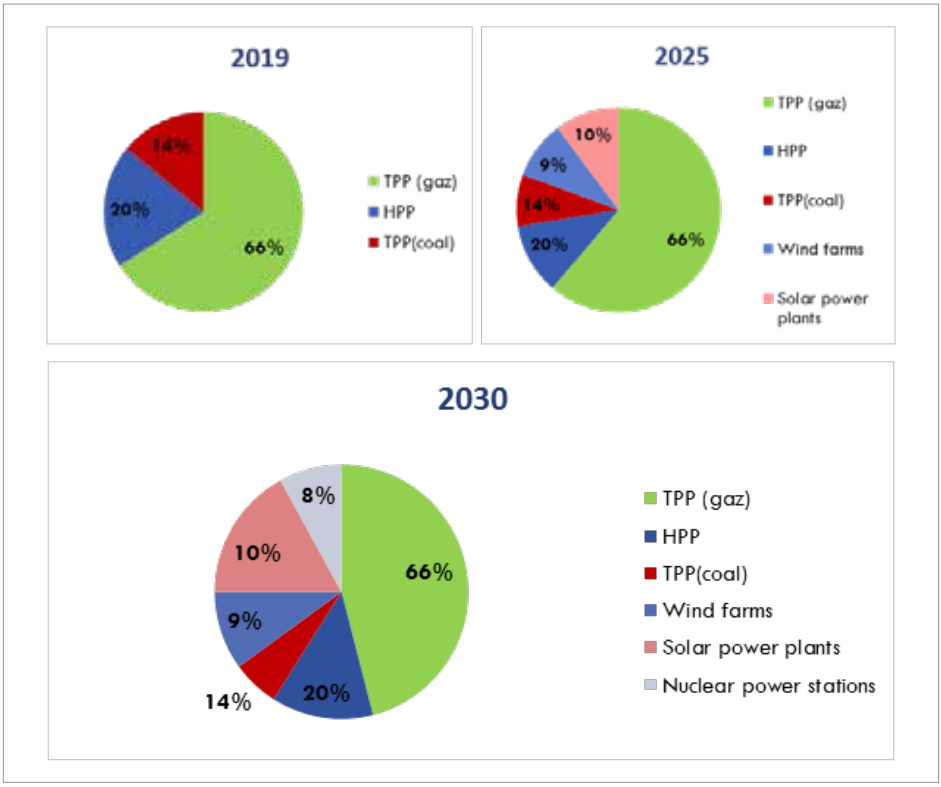

Fig. 3. Indicators of fluctuations in the power generation capacity in 2019-2030 years[1]

[1] Designed by the author, but based on the data of the «Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030»

Based on these diagrams, we can say that the diversification of the generation of the electric power industry will increase quite significantly in 2025-2030. As it can be seen the best world experience in the development of renewable and nuclear energy in countries such as Germany, Russia, the Netherlands, China and Spain is being studied.

Conclusion

The electric power industry of Uzbekistan is the basic branch of the national economy of the Republic and, having significant production and scientific and technical potential, has a significant impact on the development of the entire national economic complex.

Changing the traditional to new applications of electricity is becoming the main means of positive impact of the electric power industry on socio-economic development everywhere in the coming century. And this is of particular importance for Uzbekistan, where overcoming the low efficiency of electricity use in traditional areas will allow them to develop intensively with a moderate increase in electricity consumption, and its main increase should be due to the development of high technologies of the so-called new economy. Only with such a restructuring of the sphere of electricity use will the greatest positive contribution of the electric power industry to the revival of Uzbekistan be ensured.

The implementation of a complex of measures will stimulate the accelerated development of innovative energy in the Republic of Uzbekistan, which in turn will contribute to the sustainable development of not only the fuel and energy complex of the republic, but also the national economy of the country [Uvraimov, 2013]. By diversifying the generation of electric power by increasing the share of renewable energy sources and the development of nuclear energy, Uzbekistan will be able to ensure energy security in the future.

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КОНЦЕПТУАЛЬНОЕ РАЗВИТИЕ ЭЛЕКТРИЧЕСКОЙ ЭНЕРГИИ РЕСПУБЛИКИ УЗБЕКИСТАН: ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ

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Аннотация

В условиях глобальной мировой конкуренции преимущество имеют те страны, которые смогли создать развитую инфраструктуру и институты по разработке, коммерциализации и внедрению инноваций. В настоящее время, когда все страны, хотя и в разной мере, испытывают последствия финансово-экономического кризиса, понятно, что из сложившейся ситуации с наименьшими потерями выйдут те из них, в которых своевременно будут приняты меры по перевооружению производства и освоению новых технологий, обеспечению за счёт этого выпуска конкурентоспособной продукции с наименьшими издержками. Одной из важнейших мер по преодолению последствий финансово-экономического кризиса является ускоренное инновационное развитие топливно-энергетического комплекса. Это направление было и остаётся приоритетным в политике Республики Узбекистан. Энергетика Узбекистана является базовой отраслью народного хозяйства республики и, обладая значительным производственным и научно-техническим потенциалом, оказывает весомое воздействие на развитие всего народно-хозяйственного комплекса. Сплошная электрификация создала возможность развития производственной и социальной инфраструктуры городов и сельских районов Узбекистана, становления промышленности, стройиндустрии. В настоящее время, учитывая самообеспеченность республики, принимаются меры для среднесрочного и долгосрочного удовлетворения её потребностей необходимыми качественными энергоресурсами на основе устойчивого инновационного развития отрасли.

В статье затронута роль энергетического сектора в развитии экономики Республики Узбекистан. Представлены данные об использовании и генерировании электроэнергии по всей республике. Подробно раскрыта детальная классификация добываемой электроэнергии. Озвучены проблемы и пути их решения в ближайшей перспективе.

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