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IMPROVEMENT OF ECONOMIC MECHANISMS OF FUNCTIONING OF THE ELECTRIC POWER INDUSTRY OF UZBEKISTAN

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Abstract
The article evaluates the state of economic mechanisms such as state regulation, tariff policy, investment in infrastructure, stimulation of energy efficiency and ensuring energy security in the process of functioning of the electric power industry of Uzbekistan, identifies the main problems and proposes ways of their solution aimed at ensuring sustainable development of the energy industry.

Keywords: Economic mechanisms, electric power industry, Uzbekistan, regulatory system, tariff policy, investment, renewable energy sources, energy efficiency.

Introduction

Electric energy is one of the key factors that ensure the maintenance of society's vital activity. It is an integral part of the economy, contributing to the development of its various industries and spheres. In addition, the availability of electricity directly affects the quality of life of the population. In the context of population growth and further socio-economic development of the country, the demand for electricity continues to grow, which poses a challenge to the government and the energy sector to ensure a stable, efficient and environmentally safe energy supply.

In recent years, Uzbekistan has been undertaking significant reforms in the energy sector, one of the directions of which is the improvement of economic mechanisms in the electricity sector. This is an important step in realizing the strategy of energy security and sustainable economic growth, the achievement of which is also facilitated by integration into global energy networks, development of a green economy and increasing the share of renewable energy sources.

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II. RESEARCH METHODOLOGY

The purpose of this study is: a) to assess the state of economic mechanisms for the development of the electric power sector in Uzbekistan and identify problems related to their functioning; b) to develop proposals for improving these mechanisms in order to ensure sustainable and efficient functioning of the sector.

The study is based on a systematic approach to analyzing the mechanisms of development of the electric power industry, which implies a deep and comprehensive consideration of various factors interrelated within a single energy system. The methods of economic analysis, analysis of secondary data, including statistics on the electricity sector of Uzbekistan, as well as comparative analysis were used.

The empirical base consists of data on socio-economic development of the Republic of Uzbekistan collected from national and international sources, including reports from the Ministry of Energy and other government agencies, as well as data from government portals.

From the methodological point of view, the economic mechanisms of the electric power industry are a system of tools and methods aimed at the effective functioning of the industry. The main mechanisms include government regulation, tariff policy, investment in infrastructure, promotion of energy efficiency, ensuring energy security and development of renewable energy sources. All these elements should be interconnected and work in a single complex for sustainable and efficient development of the sector.

III.OBSERVATIONS

State regulation in the energy sector of Uzbekistan plays an important role in ensuring the stability and development of the sector. It includes setting electricity tariffs, regulating the balance of interests of business and households, attracting investment in infrastructure modernization and development of renewable energy sources. Energy security regulation ensures the reliability and sustainability of supply, while measures to support environmentally friendly technologies contribute to improving the environmental situation. As part of state regulation, regulatory acts are developed to govern the activities of energy companies and ensure compliance with standards. In general, regulatory measures are aimed at improving energy efficiency, sustainability and quality of energy supply in the country.

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The main problems of state regulation in the energy sector of Uzbekistan are: a) insufficient flexibility of tariff policy, which makes it difficult to quickly adapt to changes in resource prices, as well as insufficient attraction of investments in infrastructure modernization, including development of renewable energy sources; b) uneven development of energy infrastructure, which leads to interruptions in supply in remote regions; c) lack of a comprehensive approach and insufficient coordination between different governmental and non-governmental organizations; d) weak environmental regulation, which slows down the transition to more environmentally friendly technologies; and e) lack of a comprehensive approach to energy efficiency. d) weak environmental regulation, which slows down the transition to more environmentally friendly technologies.

The electricity tariff policy in Uzbekistan plays a key role in ensuring the stability of the energy sector and protecting the interests of consumers. Uzbekistan continues to reform its tariff policy. It should be emphasized that electricity tariffs in Uzbekistan have increased in recent years. Thus, in 2023 they were increased by 10-15%, and over the last 5 years tariffs for households have increased by 25-30%. Tariffs for legal entities have also increased by 15-20% over the last two years. The increase in tariffs is due to the increase in fuel prices and the need to modernize the energy infrastructure. In general, electricity tariffs in Uzbekistan remain at the average level in Central Asia. The main problems of tariff policy are as follows:

a) the constant increase in tariffs caused by rising fuel prices; b) the need to modernize outdated infrastructure. Uzbekistan continues to depend on fossil energy sources such as oil and gas, which makes the country vulnerable to fluctuations in world fuel prices. Thus, about 80-85% of all electricity in the country is generated on the basis of natural gas. Dependence on hydrocarbon resources makes the country sensitive to changes in oil and gas prices in the world markets. This directly affects the cost of electricity and forces the government to raise tariffs to compensate for rising costs.

Despite a significant reduction in the energy intensity of GDP over the past decades, Uzbekistan's economy remains one of the most energy-intensive in the world. Currently, the energy intensity of the national economy, according to expert data, is 2-2.5 times higher than in developed countries.[1] This indicates problems with low energy efficiency and high energy losses, which requires large investments in modernization of the sector. However, tariff increases do not always cover these costs.

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Uneven tariffs for households and legal entities are also a problem: high tariffs for businesses slow down economic development, while higher prices for households complicate their financial situation, despite subsidies. In addition, the lack of funds limits large-scale modernization of infrastructure, which hinders addressing problems with the quality and reliability of energy supply.

In recent years, Uzbekistan has been actively working to modernize its energy infrastructure, including the development of power plants, transmission lines and power distribution systems. One of the significant steps is the development of renewable energy sources, such as solar and wind power plants. Thus, between 2017 and 2022, $10.2 billion was invested in the development of the power sector, which significantly contributed to the improvement and modernization of the energy infrastructure. New power plants were put into operation, including: the first large solar photovoltaic plant in Navoi region in 2021, the second 100 MW solar photovoltaic plant in Samarkand region in 2022, as well as 6 new thermal power plants with a total capacity of 1,374 MW. Renewable energy projects (RES) have been actively developed in recent years. In particular, solar power plants were commissioned in 2021 and 2022. Since 2017, work has also started on wind energy development, which will give an impetus to expand the share of green energy in the future. Meanwhile, Uzbekistan's Strategy for 2022-2026 envisages a significant expansion of solar and wind power capacity up to 8,000 MW. [2]

The opening up of ample opportunities for the private sector has created 11.2 gigawatts of new capacity, bringing the private sector's share of generation to 24% and the share of green energy to 16%.

The process of modernization of the energy infrastructure is underway, in particular, the renewal of more than 46,000 km of power transmission lines and 14,000 transformer stations, which has improved power supply to more than 7,500 micro-districts. This achievement has significantly improved the quality and reliability of power supply, which is critical for economic growth and improved living conditions of the population. [3]

However, despite the efforts, Uzbekistan's electricity infrastructure faces several key challenges. First, much of the equipment, including transformers, transmission lines, substations and thermal power plants, has physical deterioration reaching 60-70%. This creates the need for large capital investments to modernize and rehabilitate infrastructure facilities. Secondly, distribution networks are characterized by high

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inefficiency. Energy losses at all stages of transmission and distribution remain at the level of 15-20%, which significantly exceeds global norms and requires improving the quality of network equipment and optimizing processes.

Another major challenge is the lack of investment in renewable energy sources (RES). Despite the country's desire to increase the share of RES in the energy balance, only about 10% of electricity is produced from such sources as of 2023. The development of the renewable energy sources (RES) market in Uzbekistan is at a nascent stage, with significant potential for growth. Solar and hydropower have been mainly developed, while wind and biomass remain underdeveloped. The main obstacles to RES development remain; a) high capital costs for construction of such facilities and insufficient infrastructure for grid connection; b) Uzbekistan continues to depend on traditional energy sources such as coal, gas and hydropower, which makes the country vulnerable to external risks such as fluctuations in fossil resource prices and water restrictions for hydropower plants. This leads to threats to the sustainability and security of energy supply in the long term. At the same time, bureaucratic barriers and insufficient flexibility in tariff policy hamper the introduction of new technologies and projects.

Promoting energy efficiency in the electricity sector of Uzbekistan is an important part of ensuring sustainable and efficient functioning of the sector. In recent years, the country has made some progress in this direction, but there are still many challenges that hinder the achievement of a high level of energy efficiency.

Uzbekistan faces important challenges in the field of energy efficiency. This task is especially important for Uzbekistan, which has mostly energy-intensive equipment introduced in the 50-70s of the last century. [4] The energy intensity of Uzbekistan's economy is 2.5 times higher than the world average. Electricity losses in the grid reach 14% and natural gas losses more than 7%.[5] This is due to outdated infrastructure, as well as a low degree of automation and integration of smart grids

Another problem is insufficient energy efficiency at the consumption level. Many enterprises and households do not use modern energy-saving technologies, which leads to excessive energy consumption. This in turn affects the cost and availability of electricity for the population.

Uzbekistan's energy security faces a number of challenges, including a high dependence on fossil energy sources such as gas and coal, which makes the economy vulnerable to fluctuations in world oil and gas prices. This can cause instability in

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electricity costs and threaten the stability of energy supply. Additionally, deteriorating energy infrastructure leads to high energy losses, while inefficient resource utilization, underdevelopment of renewable energy sources and limited energy storage capacity worsen the energy security situation.

IV. RESULTS

In order to address the problems related to state regulation in the energy sector of Uzbekistan, it is necessary to: a) introduce a more flexible tariff policy that will promptly respond to changes in resource prices; b) create attractive conditions for investors by improving the legal framework, providing tax incentives and reducing administrative barriers; c) to improve coordination between public and private entities, a single body should be created to coordinate projects in the energy sector; d) tightening environmental standards and encouraging the use of environmentally friendly technologies will accelerate the transition to sustainable energy sources.

To improve the electricity tariff policy in Uzbekistan, it is necessary to: a) introduce a flexible system that takes into account regional peculiarities and consumption volumes, which will allow differentiating tariffs for different categories of consumers; b) develop a plan for gradual tariff increases taking into account fuel price increases and infrastructure modernization needs, while protecting vulnerable groups of the population; c) introduce subsidy mechanisms for low-income citizens and key industries, as well as stimulate energy efficiency through discounts and rebates for relevant technologies, and develop flexible compensation mechanisms for businesses in the context of increased tariffs. At the same time, the transparency of tariff formation should be ensured through the publication of reports, which will increase the confidence of citizens.

To improve the state of Uzbekistan's electricity infrastructure, it is necessary to significantly increase investments in modernization of power plants and grid expansion. It is important to create conditions to attract private investment by offering state guarantees and tax incentives. The development of RES requires economic incentives, such as tax breaks and subsidies, as well as the creation of infrastructure for their connection and the formation of green energy markets. Tariff policy should encourage efficient use of energy and reduction of grid losses, and tariff modernization should take into account innovative solutions.

Improvement of energy efficiency is possible through improvement of power grid

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equipment and introduction of smart grids. Development of energy storage infrastructure, including batteries, will increase the stability of energy supply. It is also important to invest in training qualified specialists and create favorable conditions for attracting international investors and sharing experience with foreign partners.

To improve energy efficiency in the electricity sector of Uzbekistan, it is necessary to: a) modernize the infrastructure, including upgrading of electricity networks and introduction of smart grids, which will help to manage energy supply more efficiently, forecast consumption and reduce losses; b) to increase the share of renewable energy sources, it is necessary to develop incentives for investors, including tax breaks and subsidies, and to improve the infrastructure for their connection; c) to stimulate the introduction of energy saving technologies

d) educate the population and businesses in methods of efficient energy use.

It should be emphasized that public support for private investments in energy efficient technologies and RES, flexible tariff policies and investments in innovative projects are key for sector development. The development of green energy markets and improved interaction between public authorities and private investors will help accelerate the process. Lower capital costs for RES and the availability of technologies will also increase the competitiveness of these sources. In the long term, it is important to raise public and business awareness of the benefits of RES and to introduce technologies for optimal energy utilization.

V.CONCLUSION

The energy sector plays a vital role in shaping the structure and trajectory of Uzbekistan's economy. Going forward, the country's demand for electricity will continue to grow. In 2030, the demand will be 117 billion kilowatt-hours and in 2035 it will be 135 billion kilowatt-hours, which is 1.7 times more than now [2]. Despite the significant challenges faced by the electric power industry under current conditions, there are promising prospects for its development.

By addressing key challenges, capitalizing on opportunities and fostering cooperation, the industry can make the transition to a cleaner and more sustainable energy future. Moving forward, it is critical that Uzbekistan continues to prioritize the sustainable development of its energy sector, improving economic mechanisms, encouraging innovation and investing in cleaner and more efficient technologies.

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Analyzing and proposing improvements to economic mechanisms will ensure that Uzbekistan's energy sector can continue to develop towards sustainability and efficiency. By utilizing its abundant energy resources and developing alternative renewable energy sources, Uzbekistan can not only ensure energy security and economic prosperity, but also make a significant contribution to global efforts to achieve a more sustainable and stable future.

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