



DEVELOPMENT OF ENERGY INDUSTRY IN UZBEKISTAN

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ABSTRACT	KEYWORDS
<p>Along with the large-scale reforms carried out in Uzbekistan in recent years, the energy sector has entered a stage of institutional renewal, technological modernization and diversification of sources. The article analyzes the historical stages of electrification in Uzbekistan, the establishment and development of the national power system, the role of hydropower and thermal power plants, the transformation of “Uzbekenergo” and “Uzbekhydroenergo”, as well as recent trends related to solar, wind, hydropower and energy storage projects.</p>	<p>Electricity, energy, power system, hydropower, thermal power plant, station, photovoltaic, steam-gas technology, Bozsuv, Uzbekenergo, Uzbekhydroenergo, Tollimarjon, renewable energy, modernization.</p>

Introduction

РАЗВИТИЕ ЭНЕРГЕТИЧЕСКОЙ ПРОМЫШЛЕННОСТИ В УЗБЕКИСТАНЕ

Аннотация

Наряду с масштабными реформами, проводимыми в последние годы в Узбекистане, в энергетической отрасли последовательно осуществляются институциональные преобразования, техническая модернизация и переход к диверсифицированной структуре источников энергии. В статье на основе исторического анализа освещены этапы электрификации, деятельность отдельных электростанций, развитие гидро- и теплоэнергетики, создание “Узбекэнерго” и “Узбекгидроэнерго”, а также новые сведения о проектах солнечной, ветровой энергетики и систем накопления энергии в 2025–2026 годах.

Ключевые слова: электричество, энергия, энергосистема, гидроэнергетика, тепловая электростанция, фотоэлектрическая станция, парогазовая установка, Бозсу, Узбекэнерго, Узбекгидроэнерго, Толлимарджан, возобновляемая энергетика.

Introduction

In Uzbekistan, the efficient use of natural and energy resources, the introduction of modern management methods into the energy system, and the steady development of generating capacities have become urgent tasks dictated by the needs of economic and social development. In the current period, when scientific and technological progress is accelerating, industrial branches are expanding, and the living standards of the population are rising, the energy sector performs the function of a strategic infrastructure for all spheres of the national economy. The energy industry of Uzbekistan is one of the firm foundations of the republic's economic and technical development, and its formation is closely connected with almost a century of historical processes.

The history of energy is not limited only to the construction of power plants or the growth of production indicators. It is also closely related to the political and economic independence of the country, the development of urban and rural infrastructure, industrialization processes, the expansion of transport and communication networks, and the improvement of people's welfare. From this point of view, a historical analysis of the development of Uzbekistan's energy industry requires the interconnected consideration of the initial stage of electrification, large-scale construction projects of the former Soviet period, the policy of energy independence after national independence, and the new strategy of "green energy" in the present period.

In this article, while preserving the main statistical data and chronological consistency presented in the earlier study, additional information has been included on institutional changes in recent years, renewable energy sources, solar and wind power plants, energy storage systems, and modernization of electricity networks. Such an approach makes it possible to evaluate the energy sector as a continuous chain of historical development rather than as a set of isolated technical projects.

Research Methodology

The article was prepared on the basis of the principles of historicity, objectivity, accuracy, reliance on sources, systematic analysis, and comparative study. The principle of historicity made it possible to reveal the development of the energy sector from the first stage of electrification to the current stage of modernization. The comparative method served to demonstrate both the differences and continuity between the periods of the 1920s–1940s, the 1950s–1980s, the years of independence, and the reforms after 2017.

The study analyzes the attention paid to the electric power industry in Uzbekistan, the current state of electrification, the dynamics of electricity generation and consumption, as well as the specific features of hydropower, thermal energy, and renewable energy sources. The statistical information contained in earlier sources has been preserved, while figures relating to the new period have been added on the basis of official information resources and open sectoral data.

Analysis and Results

The development of electrification in Uzbekistan is historically connected with the development of the energy sector of the former Soviet Union. The rise of the energy industry in the Republic of Uzbekistan began with the construction of the Bozsuv Hydroelectric Power Plant near Tashkent. This plant, with a capacity of 2,000 kW, was commissioned in May 1926 [2, p. 3]. At the same time, a 34 km long 6 kV cable network was built to connect the Bozsuv HPP with the diesel power station that supplied

electricity to the Tashkent tram system. The network included 39 transformer substations, and these facilities laid the foundation for the formation of the energy system of Uzbekistan.

The Bozsuv HPP had historical significance not only as a technical facility, but also as a practical expression of the idea of electrification in Uzbekistan. Its commissioning expanded the possibility of supplying Tashkent's transport, municipal services, and small industrial enterprises with electricity. Thus, electricity gradually became an everyday necessity of urban life and created the technical and organizational experience needed for the construction of new hydroelectric power plants along the Chirchik-Bozsuv cascade in subsequent years.

Construction of power stations along the Chirchik-Bozsuv route continued rapidly. From 1926 to 1940, 67,000 kW of capacity was commissioned in this direction. In 1940, the installed capacity of power plants in Uzbekistan reached 170,500 kW, and electricity production amounted to 482 million kWh. Of this amount, 200 million kWh was generated by hydropower plants. These figures show that hydropower occupied a leading position in the republic's energy sector during the initial stage.

In 1940, electricity generation per capita in the republic amounted to 72.5 kWh, while by the 1990s this indicator had exceeded 220 kWh. During the 1950s–1980s, numerous thermal power plants were constructed, and the total capacity of Uzbekistan's energy sector reached 11.5 million kW. During this period, the energy network developed together with cotton production, the chemical industry, machine-building, mining, and urban infrastructure.

During the Second World War and the subsequent recovery period, demand for electricity increased sharply. The growth in the number of industrial enterprises, the launch of evacuated factories, and the mechanization of agriculture required the expansion of the energy system. Therefore, from the 1950s onward, special attention was paid to the construction of thermal power plants alongside hydropower. This process created the basis for diversification of the structure of energy sources.

In the years of independence, achieving energy independence was defined as an important factor in the socio-economic development of the country, and this result was achieved in 1995 [1, p. 17]. Many tasks were set before sector specialists, including reducing the costs of electricity generation, transmission, and distribution through the introduction of highly efficient and modern technologies, as well as ensuring uninterrupted electricity supply to consumers.

In the post-independence period, one of the main goals of the energy industry was to meet domestic demand on a stable basis and reduce external energy dependence. For this purpose, existing power plants were reconstructed, high-voltage networks were expanded, large substations were built, and generating capacities were gradually increased. At the same time, the introduction of market elements into the energy sector, the reorganization of enterprises into joint-stock companies, and strengthened cooperation with international financial institutions began.

In later years, the scale of projects aimed at increasing production volumes continued to expand. Promising programs for modernization, technical and technological renewal, and the development of renewable energy sources were implemented in the sector. In 2015, along with the construction of steam-gas units at the Tollimarjon, Tashkent, Takhiatash, and Navoi thermal power plants, work began in the Turakurgan district on the construction of two steam-gas power units with a total capacity of 900 MW.

Numerous projects were also implemented to save electricity generated at the cost of large financial and labor resources and to make wider use of alternative sources. In particular, enterprises specializing in solar water-heating equipment and energy-saving lamps were established in the "Jizzakh" Special

Industrial Zone [6, p. 1]. This contributed to the broader dissemination of energy-saving technologies throughout the republic.

Due to the special attention paid to the development of the sector by the First President of the country, the construction of new facilities and the reconstruction and modernization of existing ones increased electricity production by 1.5 billion kWh, while the total length of electricity networks increased by 38,200 km [6, p. 2]. The number of electricity consumers increased by 2.5 million, and consumption by economic sectors rose by 445.6 million kWh, which demonstrates the scale of changes in the sector [6, p. 2].

In December 2000, the Government of Uzbekistan adopted the “Program for the Development and Reconstruction of Power Capacity Creation in the Republic of Uzbekistan for 2001–2010” [3, p. 70]. Investor funds were attracted to implement the program. Two power units of the Syrdarya TPP were reconstructed with a loan from the European Bank for Reconstruction and Development. The modernization of the Tashkent TPP was carried out using a long-term preferential loan from the Government of Japan.

In 2005, one 800 MW power unit of the Tollimarjon TPP was commissioned. In addition, the 500 kV Sugdiyona substation with 1002 MW transformers was put into operation. These projects not only increased electricity generation capacity, but also played an important role in ensuring the stability of the republic’s power grids. High-voltage substations and main transmission lines expanded the possibilities for transmitting electricity between regions.

Beginning in 2001, Uzbekistan’s electric power industry, including coal industry enterprises, operated within the system of the state joint-stock company “Uzbekenergo”. The company included 53 enterprises and organizations, of which 39 were open joint-stock companies, 11 were unitary enterprises, and 2 were limited liability companies [8, p. 3]. The company performed the task of centralized electricity supply to the population and the national economy.

In 2005, the company’s power plants generated 46.2 billion kWh of electricity. Consumers received 9.9 million Gcal of heat energy, and electricity worth 16.9 million US dollars was exported. The installed capacity of Uzbekistan’s 42 power plants exceeded 12.3 million kW, which accounted for approximately 50 percent of the capacity produced by the United Energy System of Central Asia, indicating the regional significance of the republic’s energy sector [3, p. 66].

The Decree of the First President of Uzbekistan of 1 March 2013 “On Measures for Further Development of Alternative Energy Sources” and the holding of the Asian Solar Energy Forum in Tashkent in November 2013 [7, p. 2] opened a new stage in the development of renewable energy sources. During this period, issues such as the use of solar energy, localization of energy-saving technologies, and efficient utilization of natural gas were elevated to the level of state policy.

Large projects implemented in the energy system became an important factor in the rapid development of production and the improvement of the living standards of the population. The Turakurgan Thermal Power Plant, built on a 76-hectare area in the Shahidon village of Turakurgan district, is one such major project [9, p. 57]. It was designed to improve electricity supply in the provinces of the Fergana Valley. The necessary equipment for the Turakurgan TPP was supplied by Japan. Within the first stage of the project, with a total cost of 1 billion 195.9 million US dollars, a modern steam-gas turbine with a capacity of 450 MW was commissioned by 2017. In 2019, its second unit was put into operation [5, p. 3]. Thanks to advanced technologies, the project was expected to save 726.9 million cubic meters of natural gas annually [5, p. 3].

In 2016, the electricity demand of the Fergana Valley provinces amounted to 1,700 megawatt-hours. With the growth of population and production sectors, this indicator was expected to reach 1,900 megawatt-hours by 2030. The capacities generated at the Turakurgan Thermal Power Plant were aimed at covering this demand, and the project therefore played an important role in strengthening the energy security of the Fergana Valley.

In Namangan region, a number of measures were also implemented to use electricity efficiently and meet consumer demand. In 2001, electricity consumption in the region amounted to 7 million kWh; by 2016 it had exceeded 10 million kWh. Accordingly, special attention was paid to maintaining existing substations and transmission networks in proper condition and to building additional voltage and transmission facilities [4, p. 2].

Additional high-capacity substations were built and commissioned in Namangan city, in Hakkulobod town of Norin district, and in Jiydakapa village of Uychi district. In 2015, 19.3 km of transmission lines and transformers in 21 complexes were commissioned for the external electricity supply of residential areas built in rural locations on the basis of model designs. The second stage of the “GES-11A” substation in Namangan city was commissioned, and transmission networks were reconstructed in Chodak village of Pop district [5, p. 1].

A special program for the rapid development of the industrial potential and infrastructure of Namangan region for 2016–2019 was adopted. It included tasks such as increasing the capacity of the “Elektrqishloq Qurilish” research and production enterprise, modernizing electricity distribution networks in the region, electrifying the Angren-Pop railway, replacing existing substations at industrial enterprises, and building new ones.

The pilot work carried out at the photovoltaic station built in Pop district in 2015, capable of producing 130 kW of electricity per hour, proved successful. Specialists provided conclusions on the placement of the installed solar panels in different areas. On this basis, the construction of a 100 MW photovoltaic station was included in the program. An investment of 210 million US dollars was planned for the construction of this facility [5, p. 1].

An investment project was also implemented at Heating Center No. 4 in Tashkent. As part of the project, the facility was re-equipped with four gas-turbine units with a capacity of 27 MW, creating the possibility of combined production of electricity and heat energy. This process served to improve the efficiency of natural gas use and stabilize urban heat supply.

In accordance with the Decree of the President of the Republic of Uzbekistan No. PF-5044 of 18 May 2017 “On the Establishment of the Joint-Stock Company Uzbekhydroenergo”, Resolution No. PQ-2972, and the Resolution of the Cabinet of Ministers No. 407 of 22 June 2017, a unified system for the management of water and energy resources was formed in the country. All hydropower plants previously included in “Uzbekenergo” JSC, as well as those belonging to the “Uzsuvenergo” association of the Ministry of Agriculture and Water Resources, were consolidated into “Uzbekhydroenergo” JSC [10].

“Uzbekhydroenergo” JSC includes 4 joint-stock companies, 15 unitary enterprises, and 3 limited liability companies, and operates as the only specialized organization in the republic responsible for developing the country’s hydropower potential and using existing opportunities efficiently. Modernization in the hydropower sector is connected not only with increasing electricity generation, but also with the integrated management of water resources and the provision of regional stability.

After 2017, institutional reforms in Uzbekistan's energy sector deepened further. The separation of electricity generation, transmission, and distribution into distinct management systems, the attraction of private investment, and the construction of major solar and wind power plants on the basis of public-private partnership expanded. This process marked a new stage in the historical development of the energy industry: whereas previous periods were dominated mainly by state funding and centralized planning, the new period is characterized by the growing role of international investors, private producers, and elements of competition.

According to official information, in recent years Uzbekistan has attracted 35 billion US dollars of foreign investment into the energy sector and commissioned 9,000 MW of new capacity. As a result, electricity generation increased from 60 billion kWh in 2017 to around 85-86.7 billion kWh in 2025. At the same time, the capacity of operating solar and wind power plants is reported to be around 5,000 MW [11; 12].

The year 2025 represented a special stage in terms of commissioning new capacities in the energy sector. Official information indicates that 42 new energy facilities were put into operation in 2025, with a total capacity of 4,647 MW, including 5 solar power plants, 4 wind power plants, 10 energy storage systems, 1 thermal power plant, and 2 cogeneration units [13]. These figures show that the composition of energy sources in the sector is becoming increasingly diverse.

In 2025, electricity generation reached 86.7 billion kWh; production by solar and wind power plants exceeded 10.5 billion kWh for the first time; and, together with hydropower, "green" energy production amounted to 16.8 billion kWh [13]. The saving of 3.2 billion cubic meters of natural gas and the reduction of harmful emissions by 4.7 million tons due to renewable energy sources indicate the strengthening of environmental efficiency in the energy sector [13].

At the beginning of 2026, solar and wind energy continued to grow. According to available data, since the beginning of 2026, electricity generated by solar and wind power plants reached 1 billion kWh, which is 400 million kWh, or 40 percent, more than in the same period of the previous year. During this period, 15 solar photovoltaic plants and 5 wind power plants were operating in Uzbekistan with a total installed capacity of 5,582 MW [14].

Another important feature of the new stage is the introduction of energy storage systems. In earlier periods, electricity generation and transmission relied mainly on traditional sources; however, the growing share of solar and wind power plants requires battery storage systems and modern dispatch management to maintain grid stability. Therefore, the simultaneous commissioning of 10 energy storage systems in 2025 indicates the formation of a new energy architecture for the future.

From a historical point of view, three main stages can be distinguished in Uzbekistan's energy development. The first stage, covering the 1920s-1940s, was associated with the beginning of electrification on the basis of hydropower and the formation of the energy system around the Bozsuv HPP. The second stage, covering the 1950s-1980s, was characterized by the expansion of thermal power plants, high-voltage networks, and industrial centers. The third stage, during the years of independence, was marked by energy independence, modernization, and the formation of national management institutions. After 2017, this stage was enriched by "green energy", private investment, and elements of digital management.

In this sense, Uzbekistan's energy industry is not merely a mechanical increase in generating capacities, but a continuous process of institutional, technological, and ecological transformation. The history of electrification that began with the Bozsuv HPP has today become a complex energy system that

includes solar, wind, hydropower, steam-gas units, and energy storage technologies. This strengthens Uzbekistan's energy position in the region and serves economic growth, industrialization, and environmental sustainability.

Conclusion and Recommendations

In conclusion, electrification is a leading factor in the development of all sectors of the national economy, the implementation of modern progress, and the improvement of the welfare of the population. Uzbekistan's energy sector has evolved from the initial electrification experience associated with the Bozsuv HPP into a multi-branch energy system that is technologically diversified and developing with the participation of international investment.

The data presented in the article show that the path that began in 1926 with the 2,000 kW Bozsuv HPP reached 170,500 kW in 1940, 11.5 million kW during the 1950s-1980s, 46.2 billion kWh of electricity generation in 2005, and 86.7 billion kWh of electricity generation in 2025. Thus, the historical development of the energy sector has been closely connected with the industrialization of the national economy, the expansion of infrastructure, and the growth of public needs.

For the further development of Uzbekistan's energy industry, it is advisable, first, to modernize existing thermal power plants on the basis of highly efficient steam-gas and cogeneration technologies; second, to reconstruct hydropower facilities and use the potential of small hydropower plants; third, to develop solar and wind power plants in harmony with energy storage systems; and fourth, to reduce losses in electricity networks and widely introduce digital management systems.

At the same time, future scholarly research on the history of energy should study more deeply the regional characteristics of the sector, electricity supply by individual provinces, the impact of international investment, environmental efficiency, and the transition to a "green economy". Such studies are important for correctly assessing the past of the energy industry, scientifically substantiating current reforms, and developing future strategies.

References

1. Allaev K.R. *Electroenergetika Uzbekistana i mira* [Electric Power Industry of Uzbekistan and the World]. Tashkent: Fan va texnologiya, 2009. 461 p.
2. Alimboev A.U., Alimov Kh.O., Akhmedov K.Kh. *Issiqlik elektr stansiyalari* [Thermal Power Plants]. Tashkent: Cholpon Publishing and Printing Creative House, 2007. 161 p.
3. Jalilov R.B. *Yonalishga kirish* [Introduction to the Specialty]. Bukhara: Bukhara Engineering-Technological Institute, 2016. 216 p.
4. Isoqulov D. Energy independence is a guarantee of rapid economic development and improvement of people's welfare // *Xalq sozi*, 18 August 2016.
5. Najmiddinov Q. Prospects of the energy system // *Xalq sozi*, 7 April 2016.
6. Rahmonov S. A new approach in the energy system // *Xalq sozi*, 22 August 2015.
7. Sodiqov D. Prospects of alternative energy // *Xalq sozi*, 24 December 2014.
8. Taslimov A.D., Rasulov A.N., Usmanov E.G., Rafiqova G.R. *Elektr taminoti* [Electric Power Supply]. Tashkent: Ilm-ziyo, 2016. 174 p.
9. Resolution of the President of the Republic of Uzbekistan "On priority measures for the implementation of the project 'Construction of the Turakurgan Thermal Power Plant'" // *Collection of Legislation of the Republic of Uzbekistan*. 2014. No. 46. Article 550.

10. Collection of Legislation of the Republic of Uzbekistan, 2017, No. 21, Article 378.
11. Government Portal of the Republic of Uzbekistan. Energy activity page: information on investment in the energy sector, new capacities, and planned projects for 2025. gov.uz/en/activity_page/energy.
12. Invest Uzbekistan. Energy sector snapshot: electricity generation, solar-wind and hydropower indicators in 2025. invest.gov.uz/en/guide/explore/8.
13. Uzbekistan Energy Forum. Electricity production increased in Uzbekistan in 2025, and solar and wind energy production doubled - Ministry of Energy. energyforum.uz, 2026.
14. Uzbekistan Energy Forum. “Green” energy generation in Uzbekistan since the beginning of the year amounted to 1 billion kWh. energyforum.uz, 2026.