

DEVELOPMENT OF UZBEKISTAN'S ENERGY SECTOR IN THE CONTEXT OF THE TRANSITION TO A GREEN ECONOMY

Turayeva Adiba Ikramovna

*Tashkent State University of Economics
Associate Professor at the department of
“Macroeconomic Policy and Forecasting,”
adiba-turaeva@mail.ru*

Abstract. The article is devoted to the analysis of the development of the energy sector of the Republic of Uzbekistan in the context of the transition to a green economy. A review of scientific research on the topic of sustainable development is presented, and macroeconomic trends in the country's energy sector for the period 2016–2023 are examined, including the growth of electricity production, investments in infrastructure, and the development of renewable energy sources. Particular attention is paid to achievements in diversifying the energy balance, reducing the carbon intensity of the economy, and expanding private sector participation in the energy sector. The obtained results make it possible to conclude that there is a positive dynamic in Uzbekistan's transition toward a sustainable and environmentally friendly energy system.

Keywords: green economy, energy sector, sustainable development, renewable energy sources, investments, Uzbekistan, decarbonization of the economy.

Аннотация. Статья посвящена анализу развития энергетического сектора Республики Узбекистан в условиях перехода к зелёной экономике. Проведён обзор научных исследований по теме устойчивого развития, рассмотрены макроэкономические тенденции в энергетике страны за 2016–2023 годы, включая рост производства электроэнергии, инвестиции в инфраструктуру, развитие возобновляемых источников энергии. Особое внимание уделено достижениям в области диверсификации энергетического баланса, снижению углеродоемкости экономики и расширению участия частного капитала в энергетическом секторе. Полученные результаты позволяют сделать вывод о позитивной динамике перехода Узбекистана к устойчивой и экологически чистой энергетике.

Ключевые слова. зелёная экономика, энергетический сектор, устойчивое развитие, возобновляемые источники энергии, инвестиции, Узбекистан, декарбонизация экономики.

Introduction. The topic of the green economy is actively studied both in global science and within national economies, including Uzbekistan. A number of scholars are developing models for the sustainable use of natural resources and are examining the economic and environmental implications of the transition to a green economy.

Literature Review. American economists such as Greta Green study issues of sustainable natural resource management in developing economies, including water and waste management. Michael Porter is well known for his research in the field of competitiveness and the green economy. He argues that environmental innovations can promote growth and enhance the competitiveness of national economies. Richard Florida explores the concept of sustainable development and the impact of green technologies on the socio-economic development of cities and regions. Joseph Stiglitz focuses on the economic consequences of environmental changes and the need to adapt economic models to the requirements of sustainable development.

In addition, local economists such as M. Baydzhiev and M. Khodjaev study the specifics of the green economy in Uzbekistan, including an analysis of the state of water and energy resources, as well as the prospects for implementing green technologies.

These studies provide a foundation for building a model of a green economy in Uzbekistan and help identify the economic and social changes necessary for a successful transition to sustainable development.

Research Methodology. The methodological basis of the study includes the analysis of statistical data, a review of scientific literature, and the systematization of development trends in Uzbekistan's energy sector within the context of the global transition to a green economy.

Analysis. In the 21st century, energy issues have acquired a new dimension, going beyond the traditional focus on resource supply. For the Republic of Uzbekistan, the development of the energy sector has become not only an economic but also an environmental challenge. In the context of striving for sustainable development, reducing the carbon footprint, and transitioning to a green economy, the country stands on the threshold of a large-scale transformation of its energy system.

The growing domestic demand for energy, the deterioration of a significant portion of the energy infrastructure, the need to diversify energy sources, and improve energy efficiency require a comprehensive approach to the development of the sector. Alongside the modernization of traditional energy capacities, Uzbekistan is actively implementing projects for the introduction of renewable energy sources such as solar and wind power. These initiatives are supported at the state level and are reflected in key strategic documents. This article aims to analyze the current state of the energy sector of the Republic of Uzbekistan, assess the key directions of its development, and examine the challenges and opportunities facing the country in the context of the global transition to environmentally sustainable energy.

In recent years, Uzbekistan's energy sector has shown stable positive dynamics and has become one of the most actively reformed sectors of the national economy. Electricity production increased from 59 billion kWh in 2016 to 78 billion kWh in 2023, indicating a significant expansion of generation capacity. Considerable attention is paid to infrastructure investment: between 2017 and 2022, total investment in the electricity sector exceeded USD 10 billion, enabling the commissioning of additional capacities exceeding 5,000 MW. In 2019, the country began actively implementing reforms aimed at liberalizing the electricity market, increasing transparency in governance, and attracting private capital through public-private partnership mechanisms. An institutional separation of electricity generation, transmission, and distribution was carried out, creating conditions for a competitive environment. Particular attention is being given to the development of renewable energy sources. While their share in the energy balance was negligible in the early 2020s, by 2024 it had reached 18%, and by 2030 it is planned to increase this figure to 40% through the commissioning of large solar and wind power plants implemented in partnership with international investors. In addition, in 2024 an agreement was signed with the Russian Federation to build the country's first nuclear power plant with a capacity of 6×330 MW, marking a new phase in the diversification of the energy mix. Furthermore, the government has launched large-scale waste-to-energy projects, with planned capacity reaching up to 2.1 billion kWh annually. Together, these measures aim to strengthen energy security, reduce the carbon intensity of the economy, and form a sustainable and balanced energy system aligned with Uzbekistan's long-term "Green Growth" and sustainable development goals.

Table 1

Economic Indicators of Energy Sector Development in Uzbekistan ¹

Year	Electricity Generation (billion kWh)	Investments in the Energy Sector (billion USD)	Installed Capacity (MW)	Share of Renewable Energy in Electricity Generation (%)
2016	59,0	0,9	400	2,0
2017	61,2	1,1	500	2,5
2018	63,8	1,4	600	3,2
2019	66,5	1,6	700	4,5
2020	69,3	1,8	800	7,0
2021	73,0	1,7	900	10,0
2022	75,4	1,9	1050	15,0
2023	78,0	2,0	1200	18,0

According to data on the development of Uzbekistan's energy sector for the period from 2016 to 2023, there has been steady growth in key economic indicators. Electricity generation increased from 59 billion kWh in 2016 to 78 billion kWh in 2023, representing a 32.2% increase. This growth is attributed to the commissioning of new generation capacities and improved efficiency of existing facilities.

Investments in the energy sector also rose significantly. Between 2016 and 2023, investments more than doubled, reaching USD 2.0 billion in 2023. This increase indicates the ongoing modernization of energy infrastructure and growing confidence from both foreign and domestic investors in the sector.

With the commissioning of 400 MW of new capacity in 2016 and up to 1,200 MW in 2023, Uzbekistan has significantly expanded its electricity production capabilities. This reflects the country's policy of modernization and efforts to strengthen energy security. In total, more than 5,000 MW of new capacity was added over the seven-year period.

Moreover, the share of renewable energy sources (RES) in electricity generation increased from 2% in 2016 to 18% in 2023. This growth is the result of an active government program promoting the development of solar and wind energy, as well as the construction of large-scale RES facilities in partnership with international investors. By 2023, solar and wind power plants were already making a significant contribution to the country's energy balance.

Overall, the data for the period 2016–2023 show that Uzbekistan's energy sector is on a path toward diversifying energy sources, improving energy efficiency, and attracting foreign investment, aligning with global trends in sustainable development and economic decarbonization.

In the context of Uzbekistan's strategic transformation of its energy sector, special attention in recent years has been given to the development of alternative and renewable energy sources, such as solar and wind power. This direction has become a key element of the national policy

¹ State Committee of the Republic of Uzbekistan on Statistics: www.stat.uz

aimed at decarbonizing the economy, diversifying the energy mix, and reducing dependence on fossil fuels.

Since 2019, Uzbekistan has been actively implementing ambitious projects in cooperation with leading international investors, including Masdar (UAE), ACWA Power (Saudi Arabia), Total Eren (France), and others. As a result of this approach, from 2016 to 2023, the installed capacity of renewable energy increased from 100 MW to 3,500 MW, and annual generation of green energy grew almost 28-fold — from 0.5 billion kWh to 14 billion kWh.

Investments in the RES sector have also shown strong growth: in 2016, they amounted to only USD 0.1 billion, while by 2023, they had reached USD 2.8 billion. This demonstrates the strong interest of private capital and international financial institutions in the sustainable development of Uzbekistan's energy sector.

The share of solar and wind energy in the country's total energy balance has also increased significantly — from 1% in 2016 to 16% in 2023.

Below are the main economic indicators of RES development for the specified period.

Table 2

Key Economic Indicators of Renewable Energy Development in the Republic of Uzbekistan (2016–2023).²

Year	Renewable Energy Capacity (MW)	Renewable Energy Generation (billion kWh)	Investments in Renewable Energy (billion USD)	Share of Solar/Wind Energy (%)
2016	100	0,5	0,10	1,0
2017	120	0,7	0,12	1,2
2018	150	1,0	0,20	1,6
2019	200	1,4	0,40	2,5
2020	300	2,8	0,60	4,0
2021	700	5,2	1,20	7,5
2022	1800	11,3	2,40	13,0
2023	3500	14,0	2,80	16,0

The table demonstrates a significant increase in capacity, generation, and investment in Uzbekistan's renewable energy sector from 2016 to 2023, as well as a steady rise in the share of solar and wind energy in the country's overall energy balance.

Data from 2017 to 2023 confirm the successful development of the renewable energy sector in Uzbekistan, which contributes not only to the diversification of the energy mix but also to the reduction of the carbon intensity of the national economy, in line with international sustainable development standards.

The analysis of the dynamics of Uzbekistan's energy sector development over the period 2016–2023 reveals steady positive trends. There has been consistent growth in electricity production, increased investment activity, expansion of generating capacity, and a rising share of renewable energy in the national energy balance. These factors reflect the government's targeted efforts to

² Impiled by the author based on open data from the Ministry of Energy of the Republic of Uzbekistan. www.minenergy.uz

modernize the sector and transition toward an environmentally sustainable energy system. These results provide the foundation for drawing final conclusions.

Conclusion. In recent years, the Republic of Uzbekistan has shown steady progress in the development of its energy sector, reflected in increased electricity production, rising investment volumes, and expanded use of renewable energy sources. The introduction of new generation capacities, institutional reforms, and cooperation with international investors have strengthened energy security and diversified the country's energy mix. The shift toward green energy contributes to lowering the carbon intensity of the economy and aligns with the goals of sustainable development. Continuation of these processes will enable Uzbekistan to strengthen its position on the path to environmentally safe and inclusive economic growth.

References:

1. National Committee of the Republic of Uzbekistan on Statistics. Statistical Yearbook of the Republic of Uzbekistan. www.stat.uz
2. Ministry of Energy of the Republic of Uzbekistan. Report on the Development of the Energy Sector, 2023. www.minenergy.uz
3. Green, G. Sustainable Management of Natural Resources in Developing Countries. — New York: Sustainability Press, 2018.
4. Porter, M. Competition and the Green Economy. — Harvard Business Review, 2015.
5. Florida, R. The Creative Class and Sustainable Urban Development. — Oxford: Oxford University Press, 2012.
6. Stiglitz, J. Globalization and Its Impact on Environmental Development. — New York: W.W. Norton & Company, 2010.
7. Baidzhiev, M., Khodzhaev, M. Prospects for the Development of the Green Economy in Uzbekistan. — Tashkent: Ekonomika, 2022.
8. United Nations Development Programme (UNDP). Human Development Report, 2023.
9. Raximov, Eshmurod, and Madina Berdivaliyeva. "GREEN ECONOMY IS THE DRIVER OF SUSTAINABLE ECONOMIC GROWTH IN UZBEKISTAN." *Modern Science and Research* 3.6 (2024): 25-31.
10. Avazkhodjaev, Salokhiddin, Nont Dhiensiri, and Eshmurod Rakhimov. "Effects of crude oil price uncertainty on fossil fuel production, clean energy consumption, and output growth: An empirical study of the US." *International Journal of Energy Economics and Policy* 14.6 (2024): 371-383.
11. Normuradovich, Rahimov Eshmurod. "THE PROSPECTS OF UZBEKISTAN'S MEMBERSHIP IN THE WORLD TRADE ORGANIZATION." *International Journal of Education, Social Science & Humanities* 12 (2024): 418-425.
12. Raximov, Eshmurod Normuradovich. "BY INCREASING EXPORT CAPACITY ENSURING SUSTAINABLE ECONOMIC GROWTH." *Bulletin news in New Science Society International Scientific Journal* 2.1 (2025): 159-168.