

GREEN AND SUSTAINABLE ECONOMY IN UZBEKISTAN: CURRENT TRENDS, STATISTICAL EVIDENCE AND DEVELOPMENT PROSPECTS

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Annotatsiya

Yashil va barqaror iqtisodiyotga o'tish O'zbekistonning uzoq muddatli ijtimoiy-iqtisodiy rivojlanishining muhim ustuvor yo'nalishlaridan biridir. Mamlakatda aholining o'sishi, energiyaga bo'lgan talabning ortishi, suv resurslari tanqisligi, atrof-muhit degradatsiyasi hamda yuqori iqtisodiy o'sish sur'atlarini ta'minlash zarurati kabi o'zaro bog'liq muammolar mavjud. Mazkur maqolada O'zbekistonda yashil iqtisodiyotning rivojlanish tendensiyalari 2020-2025-yillardagi statistik ma'lumotlar hamda 2030-yilgacha belgilangan milliy strategik maqsadlar asosida tahlil qilinadi. Tadqiqotda qayta tiklanuvchi energiya manbalarini rivojlantirish, energiya samaradorligini oshirish, issiqxona gazlari emissiyasini kamaytirish, suv resurslaridan oqilona foydalanish, iqtisodiy o'sish va ekologik barqarorlik o'rtasidagi bog'liqlikka alohida e'tibor qaratilgan. Tahlil natijalari O'zbekistonda yashil iqtisodiyotga o'tish jarayoni energetika, investitsiyalar, texnologik modernizatsiya va ekologik siyosatni takomillashtirish bilan chambarchas bog'liqligini ko'rsatadi.

Kalit so'zlar: yashil iqtisodiyot, barqaror rivojlanish, O'zbekiston, qayta tiklanuvchi energiya, energiya samaradorligi, iqlim o'zgarishi, yashil o'sish, ekologik siyosat.

Аннотация

Переход к зеленой и устойчивой экономике является одним из важных приоритетов долгосрочного социально-экономического развития Узбекистана. В стране существуют взаимосвязанные вызовы, включая рост численности населения, увеличение спроса на энергию, дефицит водных ресурсов, деградацию окружающей среды и необходимость обеспечения высоких темпов экономического роста. В статье анализируются тенденции развития зеленой экономики в Узбекистане на основе статистических данных за 2020–2025 годы и национальных стратегических целей, установленных до 2030 года. Особое внимание уделено развитию возобновляемых источников энергии, повышению энергоэффективности, сокращению выбросов парниковых газов, рациональному использованию водных ресурсов, а также взаимосвязи между экономическим ростом и экологической устойчивостью. Результаты анализа показывают, что переход Узбекистана к зеленой экономике тесно связан с развитием энергетики, привлечением инвестиций, технологической модернизацией и совершенствованием экологической политики.

Ключевые слова: зеленая экономика, устойчивое развитие, Узбекистан, возобновляемая энергия, энергоэффективность, изменение климата, зеленый рост, экологическая политика.

Abstract

The transition towards a green and sustainable economy is one of the important priorities of Uzbekistan's long-term socio-economic development. The country faces interconnected challenges, including population growth, increasing energy demand, water scarcity, environmental degradation, and the need to maintain high rates of economic growth. This article analyzes the development trends of the green economy in Uzbekistan based on statistical data for 2020–2025 and national strategic targets set for 2030. Particular attention is given to the development of renewable energy sources, improving energy efficiency, reducing greenhouse gas emissions, rational use of water resources, and the relationship between economic growth and environmental sustainability. The findings indicate that Uzbekistan's transition towards a green economy is closely associated with the development of the energy sector, investment attraction, technological modernization, and the improvement of environmental policy.

Keywords: green economy, sustainable development, Uzbekistan, renewable energy, energy efficiency, climate change, green growth, environmental policy.

INTRODUCTION

The transition to a green economy has become an increasingly important component of global economic development. A green economy seeks to combine economic growth with efficient resource utilization, environmental protection, technological modernization and improved social well-being. For developing economies, the transition is particularly important because economic growth is often accompanied by increasing demand for energy, water, land and other natural resources [2]; [5].

Uzbekistan is undergoing a period of rapid economic and demographic transformation. According to the World Bank, the population of Uzbekistan exceeded 37 million people in 2025, while GDP reached approximately USD 147.0 billion and real GDP growth amounted to 7.7% [10]. Such economic expansion creates additional demand for electricity, transport, industrial production, housing and infrastructure.

At the same time, Uzbekistan faces significant environmental and climate-related challenges. The country is characterized by high dependence on energy resources, considerable water consumption and exposure to drought, heat and other climate risks. The World Bank estimates that the energy sector accounts for approximately 75% of Uzbekistan's greenhouse gas emissions [9].

Therefore, the development of a green economy is not only an environmental objective but also an important economic strategy aimed at improving energy security, reducing resource dependence, stimulating technological innovation and maintaining long-term economic growth.

LITERATURE REVIEW

The concept of a green economy has been discussed in the literature from several angles. Loiseau et al. [5] compared the green economy with related concepts such as the circular economy, the bioeconomy and green growth, and showed that these ideas overlap but place different weight on resource efficiency, ecosystem services and social well-being. Georgeson, Maslin and Poessinouw [2] reviewed definitions and measurement approaches of the global green economy and pointed to the lack of a single accepted set of indicators, which makes statistical monitoring at the national level especially important.

A separate line of research asks whether economic growth can be separated from resource use and emissions. Hickel and Kallis [3] argued that absolute decoupling of growth from resource use and carbon emissions is difficult to achieve at the speed required by climate goals. This debate shows why energy intensity and emissions per unit of GDP are central indicators for countries with fast economic growth. Apergis and Payne [1] studied the link between renewable energy consumption and economic growth in Eurasian countries and found evidence of a two-way relationship, which supports the view that renewable energy development and growth can reinforce each other.

Studies on Uzbekistan have become more numerous in recent years. Nuriddinova and Ahmad [7] tested the environmental Kuznets curve hypothesis for Uzbekistan and linked economic growth with environmental pressure. Tukumbetov and Tukumbetov [8] examined the statistical relationship between renewable energy development and economic growth in the country for 2021-2025. The World Bank [9] assessed the climate risks of the Uzbek economy and the growth opportunities that climate action can create. Earlier works by the author considered the integration of the digital and green economy in Uzbekistan [15] and compared country ratings by green economy indicators [11]. At the same time, the latest official statistics for 2020-2025 have not yet been brought together with the national 2030 targets in a single analysis. This article addresses that gap.

METHODOLOGY

The study uses a combination of statistical, comparative and analytical methods. Statistical information was obtained from the National Statistics Committee of the Republic of Uzbekistan, the World Bank and official national strategic documents.

The analysis covers the period from 2020 to 2025, while national targets for 2030 are used to evaluate the direction of Uzbekistan's green transformation.

The main indicators analyzed include:

- share of green energy in total energy production;
- renewable energy capacity;
- GDP and economic growth;
- CO₂ emissions per capita;
- energy intensity;
- freshwater withdrawals;

- renewable energy policy targets;
- greenhouse gas reduction targets.

Comparative analysis is used to identify changes in the country's green economy indicators over time.

ANALYSIS AND RESULTS

Economic growth and sustainability in Uzbekistan. Uzbekistan's economic growth has accelerated considerably in recent years. World Bank data show that GDP increased from approximately USD 70.2 billion in 2020 to USD 147.0 billion in 2025. Real GDP growth reached 7.7% in 2025 [10] (Table 1).

Table 1

Selected macroeconomic indicators of Uzbekistan¹

Indicator	2020	2025
GDP, current USD billion	70.2	147.0
GDP growth, %	1.6	7.7
Population, million	-	37.1
GDP per capita, USD	-	3,968
CO ₂ emissions per capital, CO ₂ e (2024)	-	4.1 t

The significant expansion of GDP demonstrates the country's economic potential. However, sustainable economic growth requires a gradual reduction in the amount of energy and natural resources required to produce one unit of economic output.

This is particularly relevant for Uzbekistan because the country's energy system has historically relied heavily on fossil fuels. Consequently, increasing renewable energy generation and improving energy efficiency can simultaneously support environmental objectives and strengthen energy security.

One of the most visible components of Uzbekistan's green transition is the rapid development of renewable energy. Official statistics from the National Statistics Committee show that the share of green energy in total energy production increased from 7.5% in 2020 to 21.4% in 2025 [6] (Table 2).

Table 2

Share of green energy in Uzbekistan's energy production²

Year	Share of green energy, %
2020	7.5
2021	7.0
2022	9.3
2023	9.6
2024	15.7
2025	21.4

The increase from 7.5% to 21.4% represents an increase of approximately 13.9 percentage points over five years. The most substantial acceleration occurred during 2024-2025.

¹ Source: World Bank, World Development Indicators.

² Source: National Statistics Committee of the Republic of Uzbekistan, <https://stat.uz/en/>.

Other recent estimates also demonstrate the rapid expansion of renewable generation capacity. A 2026 statistical study based on data from the National Statistics Committee, Ministry of Energy, IRENA, World Bank and other sources estimates that renewable power capacity increased from 2,056 MW in 2021 to 10,027 MW in 2025, representing an increase of almost 4.9 times [8].

This expansion is particularly significant for Uzbekistan because solar and wind energy can help diversify the country's electricity generation structure and reduce dependence on conventional energy sources.

Uzbekistan has established a national policy framework for the transition towards a green economy. The country's updated green economy program sets several quantitative objectives for 2030. These include reducing greenhouse gas emissions per unit of GDP by 35% compared with the 2010 level, increasing renewable energy production capacity to 15 GW and increasing the share of renewable energy in electricity generation to more than 30% [14] (Table 3).

Table 3
Major green economy targets for 2030¹

Indicator	2030 target
Reduction in greenhouse gas emissions per GDP unit	35% from 2010 level
Reduction in GDP energy intensity	30% from 2021 level
Renewable energy capacity, GW	15
Renewable energy share in electricity generation, %	More than 30
Industrial energy efficiency improvement, %	At least 20
Improved access to drinking water, %	90
Urban green areas, %	30
New waste collection points	600

These targets demonstrate that Uzbekistan's green economy policy extends beyond renewable electricity. It includes energy efficiency, water resources, urban development, forestry, waste management and industrial modernization.

Energy efficiency is one of the key conditions for sustainable economic development. If economic output increases while energy consumption per unit of GDP decreases, the economy can achieve higher resource productivity.

The national green economy program establishes a target of reducing energy intensity per unit of GDP by 30% by 2030 compared with 2021. The intermediate targets are a 14% reduction by 2024, 22% by 2026 and 27% by 2028 [14].

This objective is particularly important because international assessments have historically identified Uzbekistan as an energy-intensive economy. The International Energy Agency noted that Uzbekistan's GDP energy intensity had been considerably higher than the global average, despite a declining trend [4].

Improving energy efficiency can produce several economic effects:

- lower production costs;
- reduced pressure on the electricity system;

¹ Source: Resolution No. PP-436 of the President of the Republic of Uzbekistan and subsequent amendments.

- lower fuel consumption;
- reduced greenhouse gas emissions;
- improved industrial competitiveness;
- increased attractiveness of green investment.

Consequently, energy efficiency should be considered not only as an environmental policy but also as an instrument of industrial and economic modernization.

Reducing greenhouse gas emissions is another important component of Uzbekistan's green transition. World Bank data indicate that Uzbekistan's CO₂ emissions excluding land-use change and forestry were approximately 4.1 tonnes per capita in 2024 [10]. The structure of emissions is closely associated with the country's energy system. According to the World Bank's Country Climate and Development Report, the energy sector accounts for about 75% of national greenhouse gas emissions [9]. This means that decarbonization of electricity generation, industry, buildings and transport represents a central component of climate policy.

In 2025, Uzbekistan also adopted measures related to participation in the international carbon market [12]. The policy framework links carbon-market participation with the country's commitment to reduce greenhouse gas emissions per unit of GDP by 35% by 2030 relative to 2010. Carbon markets may therefore become an additional mechanism for attracting investment into renewable energy, energy efficiency and emissions-reduction projects.

Water management represents a particularly important dimension of sustainable development in Uzbekistan. The World Bank reports that annual freshwater withdrawals in Uzbekistan have historically been very high relative to the country's internal renewable water resources. The available indicator was equivalent to approximately 263% of internal resources in the latest reported series [10].

This indicator reflects the country's dependence on water resources that are under substantial pressure and highlights the importance of improving water-use efficiency.

Uzbekistan's green economy strategy therefore includes water-saving technologies as an important policy direction. The original national strategy established an objective to expand drip irrigation to up to 1 million hectares and increase crop productivity by approximately 20-40% in areas where appropriate technologies are introduced [13].

The transition towards sustainable agriculture can therefore simultaneously address:

- water scarcity;
- agricultural productivity;
- food security;
- rural incomes;
- climate adaptation.

The green transition requires significant investment in infrastructure and technology. Renewable power plants, energy-efficient buildings, modern electricity

grids, electric transport, water-saving irrigation and waste-recycling infrastructure require substantial financial resources.

At the same time, green transformation can create new economic opportunities. These include:

- renewable energy production;
- manufacturing of energy-efficient equipment;
- green construction;
- electric mobility;
- waste recycling;
- environmental services;
- sustainable agriculture;
- green finance;
- digital technologies for energy management.

Digitalization can further support the green transition. Smart electricity meters, automated energy management systems, satellite monitoring, artificial intelligence and Internet-of-Things technologies can improve the efficiency of energy and resource consumption.

Therefore, the green economy and digital economy should increasingly be viewed as interconnected development processes.

Despite considerable progress, Uzbekistan's green transition faces several challenges.

First, rapid economic and population growth increases demand for electricity and infrastructure.

Second, the country remains dependent on conventional energy sources, meaning that renewable energy expansion must occur alongside modernization of the existing energy system.

Third, water scarcity and climate change create additional risks for agriculture and regional development.

Fourth, green investment requires appropriate financial mechanisms, including green bonds, concessional financing, public-private partnerships and carbon-market instruments.

Fifth, technological modernization requires qualified human capital. The expansion of renewable energy, green construction, environmental monitoring and sustainable finance creates demand for specialists with interdisciplinary knowledge.

Finally, effective implementation requires reliable statistical monitoring. Quantitative indicators should be regularly measured so that progress toward 2030 targets can be evaluated transparently.

Discussion. The statistical evidence demonstrates that Uzbekistan has entered a period of accelerated green transformation. The share of green energy increased from 7.5% in 2020 to 21.4% in 2025, while renewable power capacity increased several times during 2021–2025. At the same time, Uzbekistan's economic growth remains strong. GDP approximately doubled in nominal US-dollar terms between 2020 and 2025, reaching around USD 147 billion in 2025.

This creates an important policy challenge: economic expansion should increasingly be separated from excessive growth in energy and resource consumption.

The 2030 targets provide a quantitative framework for this process. In particular, the planned 30% reduction in GDP energy intensity, expansion of renewable generation to more than 30% of electricity production and reduction of greenhouse gas emissions per unit of GDP by 35% from the 2010 level provide measurable benchmarks for evaluating progress.

The country's longer-term climate policy is also linked to the objective of carbon neutrality by 2060, according to the World Bank's climate and development assessment [9].

Thus, the green transition should not be interpreted as a separate environmental program. It represents a structural transformation of the national economy involving energy, industry, agriculture, transport, finance, urban development and digital technologies.

CONCLUSION AND SUGGESTIONS

Uzbekistan's transition towards a green and sustainable economy is becoming an increasingly important component of national economic policy. Statistical evidence indicates substantial progress in renewable energy development and green energy production. The share of green energy in total energy production increased from 7.5% in 2020 to 21.4% in 2025, while renewable power capacity expanded rapidly during 2021–2025. At the same time, Uzbekistan continues to experience rapid economic growth, with GDP reaching approximately USD 147 billion in 2025 and real GDP growth of 7.7%. This makes resource and energy efficiency increasingly important for maintaining sustainable economic development.

The national targets for 2030 establish a clear quantitative framework: a 30% reduction in GDP energy intensity from the 2021 level, renewable energy capacity of 15 GW, more than 30% renewable electricity generation and a 35% reduction in greenhouse gas emissions per unit of GDP compared with 2010.

The future success of Uzbekistan's green economy will depend on the integration of renewable energy, energy efficiency, water-saving technologies, circular economy principles, green finance, digital technologies and human capital development.

In this context, green transformation can become not only an instrument of environmental protection but also a mechanism for technological modernization, energy security, investment attraction, productivity growth and long-term economic resilience.

Based on the analysis, the following recommendations are proposed:

1. To expand renewable generation together with the modernization of power grids and the existing energy system, so that growing electricity demand is met with a lower share of fossil fuels.
2. To support the 2030 energy intensity target with sector-level energy efficiency programs in industry, buildings and transport.
3. To scale up drip irrigation and other water-saving technologies in agriculture as a joint measure for water security, productivity and climate adaptation.

4. To develop green finance instruments, including green bonds, concessional financing, public-private partnerships and carbon-market projects.

5. To train specialists for renewable energy, green construction, environmental monitoring and sustainable finance, and to publish regular statistical indicators on progress toward the 2030 targets.

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