GREEN ECONOMY IN UZBEKISTAN

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Abstract. This article examines the development of the green economy in Uzbekistan as a strategic direction of economic modernization, climate resilience and sustainable investment. The study focuses on renewable energy, energy efficiency, green finance, circular economy mechanisms and institutional reforms. The analysis shows that Uzbekistan has formed a policy and investment basis for green growth, although the effectiveness of the transition depends on stronger environmental governance, private-sector participation, technological upgrading and consistent integration of green principles into industrial and regional development.

Keywords: green economy, Uzbekistan, renewable energy, green finance, sustainable development, circular economy, energy efficiency, climate resilience.

Introduction

The development of the green economy has become one of the central directions of Uzbekistan's modern economic policy. The country is entering a stage in which economic growth can no longer be based only on resource-intensive production, extensive energy consumption and traditional infrastructure expansion. Demographic growth, industrial modernization, increasing electricity demand and climate-related risks require a development model that combines productivity with environmental responsibility.

For Uzbekistan, the green economy is not a narrow ecological agenda. It is connected with energy security, resource productivity, investment attractiveness and the long-term competitiveness of national industries. A resource-saving economy can reduce production costs, improve the quality of infrastructure and create new investment opportunities in renewable energy, green finance, efficient transport, water management and waste processing.

The strategic relevance of this issue is reinforced by Uzbekistan's climate vulnerability. The World Bank describes Uzbekistan as one of the most energy- and resource-intensive countries and emphasizes that water scarcity, droughts, extreme heat, dust storms and the consequences of the Aral Sea ecological crisis may seriously affect economic welfare. Without sufficient adaptation, climate change could make the economy significantly smaller by 2050, while the energy sector remains the main source of greenhouse gas emissions in the country (World Bank, 2023).

The research problem of this article is to determine how Uzbekistan can transform green economy policy from strategic declarations into an economically effective, institutionally stable and investment-attractive modernization model. The problem is important because green transition requires not only renewable energy projects, but also financial mechanisms, environmental regulation, technological renewal, circular economy infrastructure and measurable governance systems.

Literature Review

The theoretical foundation of the green economy is closely connected with environmental economics, sustainable development theory, ecological modernization and institutional economics. Environmental economics considers land, water, clean air, energy resources and biodiversity as forms of natural capital. Their degradation generates hidden economic costs in the form of lower productivity, higher public health expenditures, infrastructure damage and increasing social vulnerability.

Sustainable development theory broadens this approach by linking economic growth with social inclusion and ecological balance. In this view, the green economy is not limited to environmental protection. It covers industrial modernization, energy transition, transport infrastructure, water efficiency, waste management, public finance and responsible consumption. This interpretation is suitable for Uzbekistan because environmental problems are directly linked with the structure of production and the quality of infrastructure.

Ecological modernization theory argues that environmental policy can become a driver of innovation rather than a barrier to growth. Cleaner technologies, energy-saving equipment, digital monitoring systems, modern public transport and low-carbon infrastructure may improve productivity and reduce environmental pressure. In Uzbekistan, this argument is especially relevant because the green transition is taking place together with broader reforms in energy, public administration, investment policy and regional development.

The literature on renewable energy stresses the importance of solar, wind and hydropower in diversifying the energy mix and reducing dependence on fossil fuels. Uzbekistan has strong potential in this field due to favorable solar resources and increasing interest from foreign investors. However, academic research also shows that renewable energy expansion cannot be effective without modern electricity grids, storage capacity, transparent tariffs and stable regulation.

Green finance literature emphasizes that environmental transition requires long-term capital and credible reporting systems. Green bonds, climate funds, sustainability-linked loans and blended finance instruments can direct resources toward renewable energy, water-saving technologies, public transport and waste-management infrastructure. Uzbekistan's first sovereign green bond issuance demonstrates the emergence of this direction, but the domestic green finance market still needs stronger taxonomy rules, verification standards and banking-sector capacity.

Circular economy studies focus on the replacement of linear production and consumption with models based on reuse, recycling, resource recovery and waste minimization. For Uzbekistan, circular economy instruments are relevant for municipal waste, agriculture, construction and industrial materials. The research gap is that Uzbekistan's green economy is often discussed through separate sectors, while its economic effect depends on the integration of energy, finance, technology, institutions and resource management into one coherent system.

Research Methodology

The article uses a qualitative and analytical research methodology. Comparative analysis is applied to assess Uzbekistan's green economy priorities in relation to international sustainable development and green growth approaches. Statistical analysis is used to interpret selected indicators of renewable energy capacity, investment attraction and strategic targets. Logical analysis helps identify causal links between energy transition, resource efficiency, environmental policy and long-term competitiveness.

The system approach is central to the study because green economy development cannot be assessed through one isolated indicator. Renewable energy expansion, green finance, circular economy mechanisms, institutional coordination and resource-saving technologies affect one another. Document

analysis was also applied to official strategies, presidential materials, international organization reports and analytical publications of institutions such as the World Bank, International Energy Agency, United Nations Development Programme and Partnership for Action on Green Economy.

Analysis and Results

Uzbekistan's green economy development is currently shaped by the interaction of renewable energy expansion, energy-efficiency improvement, green finance formation, institutional reform and circular economy development. These directions are not separate policy blocks; together they define the country's ability to shift from a resource-intensive growth pattern toward a more sustainable and competitive economic structure.

The first major direction is the transformation of the energy sector. Uzbekistan's previous energy model relied heavily on fossil fuels, especially natural gas. This created a system in which industrial growth was closely tied to high energy consumption and greenhouse gas emissions. The Strategy for the Transition to a Green Economy for 2019–2030 sets priorities such as improving energy efficiency, rational use of natural resources, reducing greenhouse gas emissions, ensuring access to green energy, creating green jobs and strengthening climate resilience (IEA, 2025).

Official policy documents also show that green development has moved from general environmental discourse to a strategic economic agenda. The 2022 green economy reform package approved a program for transition to a green economy until 2030, a concept of energy efficiency in industries, an action plan and target parameters for saving fuel and energy resources. These targets included reducing the energy intensity of manufactured products by 20 percent compared with 2022 levels in 2022–2026 (Ministry of Economy and Finance of Uzbekistan, 2023).

Recent energy-sector data confirm that the green transition is becoming investment-driven. According to the official website of the President of Uzbekistan, almost 20 billion US dollars of foreign investment had been attracted to the energy sector over five years, while modern energy capacities of 9.6 GW had been commissioned. The same source reported that 14 solar and wind power plants with a capacity of 3.5 GW and two energy storage systems of 300 MW had been created. More than 50 large projects worth over 26 billion US dollars are being implemented with foreign partners to produce a total of 24 GW of electricity, and the share of renewable energy sources is planned to reach 54 percent by 2030 (President of the Republic of Uzbekistan, 2025).

Table 1.

Selected indicators of Uzbekistan's green economy and energy transition

Indicator / policy direction	Recent figure or target	Economic meaning
Foreign investment attracted to the energy sector over five years	About US$20 billion	Shows that green transition is increasingly linked with investment-driven modernization.
Modern energy capacity commissioned	9.6 GW	Indicates expansion of national energy infrastructure and production potential.
Solar and wind power plants commissioned	14 plants / 3.5 GW	Demonstrates the growing role of renewable sources in the energy mix.
Energy storage systems	2 systems / 300	Reflects the need to stabilize renewable

created	MW	energy integration.
Large projects implemented with foreign partners	More than 50 projects / over US$26 billion	Confirms the scale of international participation in Uzbekistan's green energy sector.
Planned electricity production capacity from joint projects	24 GW	Shows the strategic importance of renewables for future energy demand.
Planned share of renewable energy sources by 2030	54%	Indicates a structural shift away from fossil-fuel dependence.

Source: Compiled by the author based on official information on Uzbekistan's green energy development (President of the Republic of Uzbekistan, 2025).

The table shows that Uzbekistan's green transition is not limited to declarative policy statements. The scale of investment, the number of renewable projects and the planned share of renewable energy indicate a structural transformation of the national energy system. Economically, this transition can reduce dependence on natural gas, strengthen energy security, create demand for engineering and construction services and improve the country's attractiveness for international investors. At the same time, rapid expansion of renewable capacity requires parallel modernization of power grids, storage infrastructure and regulatory mechanisms. Without these complementary measures, generation capacity may grow faster than transmission and distribution capacity, which can reduce the efficiency of investment.

Conceptual Model of Uzbekistan's Green Economy Development

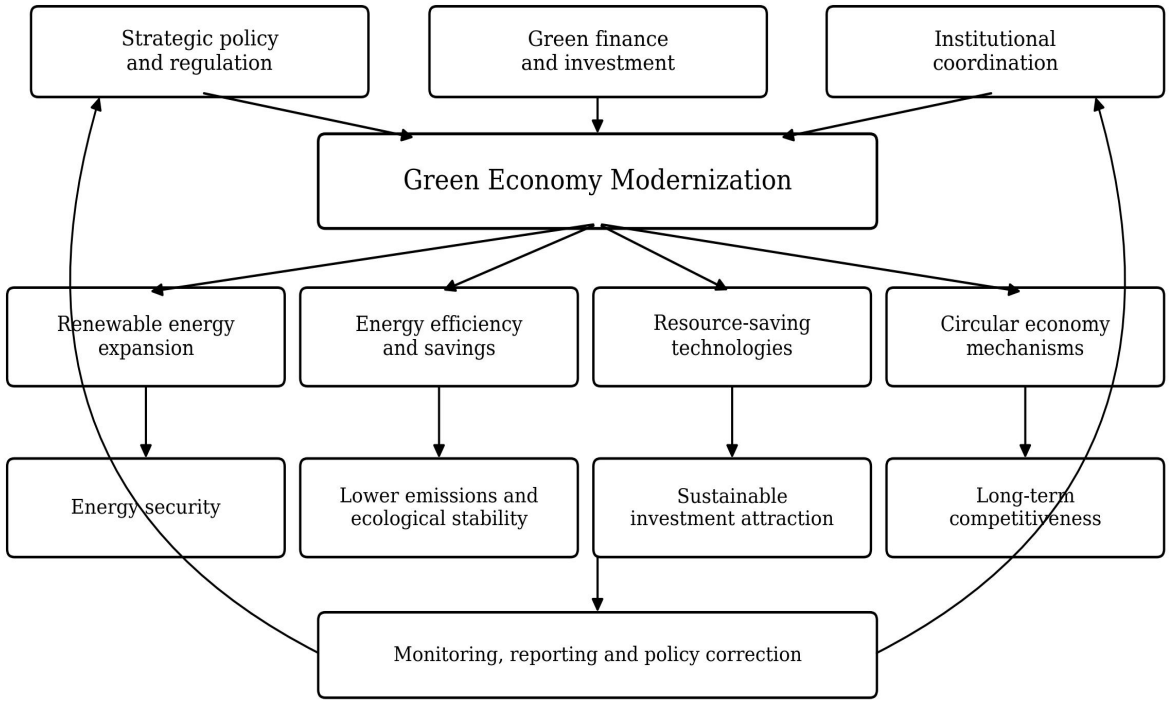


Figure 1. Conceptual model of Uzbekistan's green economy development

Source: Developed by the author based on Uzbekistan's green economy policy directions, energy transition priorities and sustainable development principles.

The conceptual model in Figure 1 illustrates that Uzbekistan's green economy development should be understood as an integrated modernization system. Strategic policy and regulation, green finance and investment, and institutional coordination create the upper-level framework. These elements support practical pillars such as renewable energy expansion, energy efficiency, resource-saving technologies and circular economy mechanisms. The expected outcomes include energy security, lower emissions, sustainable investment attraction and long-term competitiveness.

The figure also emphasizes feedback through monitoring, reporting and policy correction. This is essential because green economy policy cannot remain static. Investment projects, energy savings, emission reductions and circular economy outcomes must be measured continuously. Reliable monitoring makes it possible to correct inefficient measures, improve project selection and increase investor confidence.

Green finance is the second important direction of Uzbekistan's transition. In 2023, Uzbekistan successfully placed Eurobonds valued at US$660 million and issued its first sovereign green Eurobonds worth UZS 4.25 trillion on the London Stock Exchange. The United Nations Development Programme reported that the proceeds would finance environmentally focused projects such as water-saving technologies, railway and metro transport, sanitation initiatives and protective forests against wind erosion and water-body siltation (UNDP, 2023).

This development is economically significant because green finance connects environmental objectives with capital-market instruments. It allows the state to mobilize long-term resources for infrastructure projects and strengthens transparency through impact monitoring. However, the domestic green finance market remains at an early stage. Uzbekistan needs a stronger green taxonomy, independent verification, project-level reporting and banking-sector capacity to evaluate environmental risks and returns.

Circular economy development is another important but less mature area. Waste sorting, recycling markets, resource recovery and waste-to-energy projects can reduce environmental pressure while creating additional economic value. For Uzbekistan, circular economy mechanisms are particularly relevant in municipal waste management, agriculture, construction and industrial production. Yet this direction requires more than waste processing plants; it also requires separate collection systems, producer responsibility, green procurement and demand for secondary raw materials.

Institutional reform is the foundation of the entire transition. Partnership for Action on Green Economy states that Uzbekistan is advancing a green and sustainable economic model through strategic frameworks including the Uzbekistan 2030 Strategy and updated climate commitments. These strategies are intended to reduce fossil-fuel dependence, diversify the economy and channel resources toward renewable energy, green skills, climate adaptation and social programs (PAGE, 2025).

The main achievements of Uzbekistan's green economy development include the expansion of renewable energy, attraction of foreign investment, issuance of green bonds and strengthening of national strategic frameworks. The unresolved problems include high energy intensity, insufficient domestic green finance mechanisms, uneven regional environmental infrastructure, limited circular economy capacity and the need for stronger environmental monitoring. These problems show that the next stage of green development should focus less on formal targets and more on implementation quality.

From a long-term economic perspective, the green economy can become a source of competitiveness for Uzbekistan. Energy-efficient production reduces costs, renewable energy improves energy security, green finance attracts international capital and environmental modernization supports

access to markets where sustainability standards are becoming stricter. Thus, the green economy is not only a response to climate change; it is a strategic condition for future industrial and investment competitiveness.

Conclusion

The article has shown that the development of the green economy in Uzbekistan is becoming a major direction of national modernization. Renewable energy expansion, green finance instruments, institutional reforms and resource-efficiency measures indicate that the country is moving toward a more sustainable development model. The green economy is strategically important because it connects environmental protection with energy security, investment attraction, technological renewal and long-term competitiveness.

The main scientific conclusion is that Uzbekistan's green transition should be interpreted as a systemic economic transformation rather than as a separate environmental policy. Its effectiveness depends on the integration of renewable energy, finance, institutions, circular economy mechanisms and resource-saving technologies. If these elements are developed together, they can reduce environmental risks and create a stronger foundation for sustainable economic growth.

Practical policy priorities should include accelerating grid modernization, expanding energy storage, strengthening domestic green finance, improving environmental reporting, developing circular economy infrastructure and supporting private-sector participation. Uzbekistan has already created a strong strategic basis for green growth. The next stage should focus on implementation quality, institutional consistency and measurable economic results.

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