

## DIRECTIONS FOR ACCELERATING GREEN ECONOMY DEVELOPMENT IN NEW UZBEKISTAN

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**Abstract.** This article examines the institutional, energy, financial, and resource-efficiency pathways for accelerating the transition to a green economy in New Uzbekistan. Trend, structural, and comparative analysis methods were applied to electricity generation indicators for 2020–2024, official programme results for 2025–2026, and assessments by international financial institutions. The calculations show that total electricity generation increased by 24.4 percent in 2020–2024, while generation by solar power plants rose almost 81-fold, from 49.0 million kWh in 2021 to 3,965.2 million kWh in 2024. It was determined that additional solar generation accounted for 70.6 percent of the total increase in electricity generation in 2024. The article proposes implementing grid modernisation, improved energy efficiency, expanded green finance and carbon markets, water-efficient agriculture, the circular economy, green cities, and just-transition mechanisms as a single interconnected policy package.

**Keywords:** green economy, renewable energy, energy efficiency, green finance, carbon market, water efficiency, circular economy, sustainable economic growth.

**Abstract.** This article examines the institutional, energy, financial and resource-efficiency pathways for accelerating the green economy transition in New Uzbekistan. Trend, structural and comparative methods are applied to official data for 2020–2024 and policy outcomes reported for 2025–2026. The calculations show that total electricity generation increased by 24.4 percent between 2020 and 2024, while solar generation rose almost 81-fold, from 49.0 million kWh in 2021 to 3,965.2 million kWh in 2024. Additional solar output accounted for 70.6 percent of the overall increase in electricity generation in 2024. The paper proposes an integrated policy package covering grid modernization, energy efficiency, green finance and carbon markets, water-smart agriculture, the circular economy, green urban development, and a just transition.

**Keywords:** green economy, renewable energy, energy efficiency, green finance, carbon market, water efficiency, circular economy, sustainable growth.

### INTRODUCTION

In the global economy, climate change, energy security, water scarcity, and the degradation of natural capital require a reassessment of the traditional criteria of economic policy. The quality of economic growth is now evaluated not only by the volume of gross domestic product, but also by the amount of energy, water, and raw materials used per unit of output, atmospheric emissions, new “green” jobs, and the degree of ecosystem restoration. In this sense, a green economy is a development model that creates high value added under environmental constraints, uses resources efficiently, and ensures social inclusion.

In Uzbekistan, the green economy has become a distinct component of the national development strategy. The Strategy for the Transition to a Green Economy for 2019–2030, Resolution No. PQ-436 adopted in 2022, and subsequent sectoral programmes identify the efficient use of natural resources, low-carbon industrial development, the attraction of green investment, climate resilience, and stronger human capital as priorities. The designation of

2025 as the “Year of Environmental Protection and the Green Economy” placed this agenda at the centre of nationwide policy.<sup>12</sup>

The relevance of the topic is explained by three factors. First, population growth and the expansion of industry and services are rapidly increasing demand for electricity. Second, the economy’s high energy and water intensity raises production costs, weakens export competitiveness, and increases pressure on public finances. Third, the strengthening of the European Union’s Carbon Border Adjustment Mechanism, environmental certification, and ESG requirements is turning the “green” transformation into a market requirement for Uzbek exporters. The green economy is therefore not merely an environmental initiative, but also an instrument of industrial policy, export strategy, and macroeconomic stability.

The purpose of the study is to evaluate the current results of accelerated green economy development in New Uzbekistan, identify systemic constraints, and substantiate priority policy and economic directions through 2030. To achieve this purpose, the study analyses the institutional framework, calculates the dynamics of the energy transformation, evaluates opportunities for green finance, and develops a cross-sectoral “road map.”

### LITERATURE REVIEW

In green economy theory, the relationship between economic growth and environmental pressure is explained through the concept of “decoupling.” Under relative decoupling, resource and emissions intensity declines, although total environmental pressure may still rise because of economic growth; under absolute decoupling, resource consumption or emissions decline in real terms even as the economy grows. For Uzbekistan, it is advisable first to accelerate relative decoupling and then to move towards absolute decoupling in energy, industry, and transport.

The World Bank’s climate and development report on Uzbekistan emphasises the need for green growth through gradual reform of energy subsidies, wider adoption of energy-saving technologies, development of a competitive renewable energy market, investment in electricity infrastructure, modernisation of water management, and improvement of urban transport. This approach treats the green transformation not as a collection of separate projects, but as a combination of price signals, institutional reforms, and investment policy.<sup>3</sup>

International experience shows that rapidly expanding renewable capacity without simultaneously developing electricity grids, storage systems, flexible generation, and demand-management mechanisms raises system costs. Therefore, alongside the criterion of “building megawatts,” grid losses, reserve capacity, energy storage, outage duration, and end-user energy efficiency should also become key performance indicators.

Research on green finance shows that public funds should not “crowd out” private capital, but should attract it by sharing risk, providing guarantees, using blended finance, and covering project-preparation costs. Because state financial institutions account for a large share of lending in Uzbekistan’s economy, the introduction of green criteria into their loan portfolios directly affects the speed of the transformation. According to the World Bank, state financial

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1 Ministry of Energy of the Republic of Uzbekistan, “New Uzbekistan on the Path of Sustainable Development and Green Progress,” 15 January 2025: <https://gov.uz/uz/minenergy/news/view/32841> (accessed 27 July 2026).

2 Resolution No. PQ-436 of the President of the Republic of Uzbekistan dated 2 December 2022, Lex.uz: <https://lex.uz/uz/docs/-6303230> (accessed 27 July 2026).

3 World Bank, Uzbekistan Country Climate and Development Report, 2023: <https://www.worldbank.org/en/country/uzbekistan/publication/ccdr> (accessed 27 July 2026).

institutions provide nearly 70 percent of credit in the economy, while the projects of certain state investment funds in 2024 were equivalent to approximately 10 percent of GDP.<sup>4</sup>

Although the existing literature and policy documents report substantial progress in green energy, the issue of integrating energy, water, industry, finance, transport, and waste policies into a single economic mechanism has not been examined sufficiently. The scientific approach of this article is to substantiate the cross-sectoral interdependence of the green economy and the sequence of transformation.

### **RESEARCH METHODOLOGY**

The study uses official statistical data, regulatory and legal documents, official information from the President and Government of the Republic of Uzbekistan, and materials from the World Bank, the United Nations system, and international energy organisations. For the statistical analysis, the volumes of total electricity generation and electricity produced by solar power plants in Uzbekistan in 2020–2024 were used. Policy results were evaluated using official indicators published for the end of 2025 and through May 2026.

The principal methods are: 1) time-series analysis; 2) calculation of structural shares; 3) the compound annual growth rate (CAGR); 4) institutional and comparative analysis; and 5) a priority matrix based on a problem–instrument–result logic. The following formulas were used: growth rate —  $T = (Y_t/Y_0 - 1) \times 100$ ; structural share —  $S = (Y_i/Y) \times 100$ ; and compound annual growth rate —  $CAGR = (Y_t/Y_0)^{1/n} - 1$ .

A limitation of the study is that some renewable energy indicators are published in different forms: installed capacity, generation, and share in total generation. Therefore, the article interprets generation data from the statistical committee separately from installed capacity and the “green” share reported in official statements.

### **ANALYSIS AND RESULTS**

#### **1. Institutional and Strategic Changes**

Resolution No. PQ-436 defines six priority areas of green economic growth: sustainable use of natural resources; resilience to climate change and natural disasters; green and low-carbon industrial development; innovation and green investment; sustainable and inclusive urbanisation; and human capital and social protection during the green transition. This framework provides a methodological basis for applying the green economy at every level of economic governance rather than restricting it to the energy sector alone.

Uzbekistan has committed to reducing greenhouse-gas emissions per unit of GDP by 35 percent from the 2010 level by 2030. Subsequent policy statements have proposed an even sharper reduction in carbon intensity by 2035. These targets require industrial modernisation, decarbonisation of the power sector, and the gradual alignment of energy prices with economically justified levels.<sup>5</sup>

According to official information from early 2025, nearly USD 20 billion in foreign investment was attracted to the energy sector over the preceding five years, and 9.6 GW of modern capacity was commissioned. This included 14 solar and wind power plants with a combined capacity of 3.5 GW and 300 MW of storage systems. The result indicates that

<sup>4</sup> World Bank, Prime Picks for a Green Pivot: Uzbekistan State Funds for Climate Action, 2024/2025: <https://www.worldbank.org/en/country/uzbekistan/publication/state-funds-for-climate-action> (accessed 27 July 2026).

<sup>5</sup> Resolution No. PQ-436 and Uzbekistan’s updated Nationally Determined Contribution submitted to the UNFCCC: the target is to reduce emissions per unit of GDP by 35 percent from the 2010 level by 2030.

Uzbekistan’s energy sector has begun shifting from an investment model based on a state monopoly to one based on public-private partnerships, independent power producers, and international tenders.<sup>6</sup>

## 2. Dynamics of the Green Transformation in the Power Sector

According to the National Statistics Committee, electricity generation in Uzbekistan increased from 66.5 billion kWh in 2020 to 82.7 billion kWh in 2024, a rise of 24.4 percent over four years. The compound annual growth rate was 5.6 percent. Over the same period, generation by solar power plants increased from 49.0 million kWh in 2021 to 3,965.2 million kWh in 2024, rising approximately 80.9 times.<sup>7</sup>

**Table 1. Dynamics of Electricity and Solar Generation in Uzbekistan**

| Year | Total electricity,<br>million kWh | Solar energy,<br>million kWh | Solar share, % | Annual growth<br>of solar<br>generation, % |
|------|-----------------------------------|------------------------------|----------------|--------------------------------------------|
| 2020 | 66,500.7                          | 0.0                          | 0.000          | —                                          |
| 2021 | 71,364.6                          | 49.0                         | 0.069          | —                                          |
| 2022 | 74,269.3                          | 435.8                        | 0.587          | 789.4                                      |
| 2023 | 78,005.4                          | 622.4                        | 0.798          | 42.8                                       |
| 2024 | 82,739.7                          | 3,965.2                      | 4.792          | 537.1                                      |

*Source: Author’s calculations based on data from the National Statistics Committee of the Republic of Uzbekistan.*

According to the calculations, the share of solar energy in total electricity generation increased from 0.07 percent in 2021 to 4.79 percent in 2024. Most importantly, total electricity generation rose by 4,734.3 million kWh between 2023 and 2024, while the increase in solar generation amounted to 3,342.8 million kWh. Thus, solar energy accounted for 70.6 percent of the total annual increase. This shows that solar power is no longer an experimental project but has become the main source determining the marginal growth of electricity generation.

An official statement on the results of 2025 reported that nearly 5,000 MW of solar and wind capacity and 400 MW of hydropower capacity had been commissioned, that the share of green energy in generation had reached 30 percent, and that 2,000 MW of small-scale solar panels had been installed at private-sector and household facilities. Information released in May 2026 stated that large-scale solar and wind capacity had reached 5,600 MW and confirmed a plan to raise the share of green energy to 54 percent by 2030.<sup>8</sup>

However, the rapid expansion of generation capacity intensifies constraints in the electricity grid. The World Bank estimated technical losses in distribution networks at

<sup>6</sup> Ministry of Energy of the Republic of Uzbekistan, 15 January 2025: official information on nearly USD 20 billion in foreign investment, 9.6 GW of new capacity, 3.5 GW of solar and wind capacity, and 300 MW of storage systems over the previous five years.

<sup>7</sup> National Statistics Committee of the Republic of Uzbekistan, “Volume of Electricity Generated by Solar Power Plants,” SIAT, 2021–2024: [https://api.siat.stat.uz/media/uploads/sdmx/sdmx\\_data\\_446.pdf](https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_446.pdf) (updated: 3 September 2025).

<sup>8</sup> President of the Republic of Uzbekistan, speech at the 59th Annual Meeting of the Board of Governors of the Asian Development Bank, 4 May 2026: <https://president.uz/en/lists/view/9173> (accessed 27 July 2026).

approximately 13 percent in 2024 and indicated that more than half of grid facilities had been in operation for over 30 years. Therefore, the next stage of investment should shift towards a single package comprising “new plant + storage + grid + digital management.” Otherwise, part of the installed capacity will remain underutilised because of grid constraints.<sup>9</sup>

### **3. Development of Green Finance and the Carbon Market**

The speed of green economy development depends on the financing architecture. In renewable energy, international tenders and long-term power purchase agreements have created a clear revenue model for investors. This experience should now be extended to energy efficiency, green construction, public transport, waste recycling, and water-saving projects. A green taxonomy, project-selection criteria, verification of environmental results, and mandatory reporting are important in this process.

In 2024, under the World Bank’s iCRAFT programme, Uzbekistan received a USD 7.5 million carbon-credit payment for 500,000 tonnes of verified emissions reductions and became the first country in the world to receive carbon-finance payments based on policy reforms. This experience shows that access to the carbon market is possible by combining energy-subsidy reform, an MRV system, and social compensation.<sup>10</sup>

At the next stage, carbon credits should not be limited to energy reforms. Standard methodologies should be developed for reducing methane emissions, improving energy efficiency in industrial enterprises, afforestation, producing biogas from landfills, increasing the efficiency of water pumps, and electric transport. Directing part of carbon revenues towards targeted subsidies for energy-efficient appliances, thermal insulation, and solar panels for low-income households would strengthen the just transition.

### **4. Resource Efficiency: Water, Industry, and the Circular Economy**

Under Uzbekistan’s conditions, the second pillar of the green economy is water efficiency. Digital water metering, differentiated tariffs, water-saving technologies, reuse, and loss reduction in agriculture, energy, and industry can generate environmental and economic benefits simultaneously. Water saving does not end with installing drip-irrigation equipment; crop composition, water-related productivity, pumping costs, and farm income must be evaluated together.

The green transformation of industry should include energy audits, ISO 50001 energy management, the use of waste heat, electrification, renewable energy certificates, and calculation of product carbon footprints. For exporting enterprises, a “green electricity” certificate and a product carbon passport would provide an additional competitive advantage in international markets. For small and medium-sized enterprises, standardised energy audits, preferential loans, and results-based compensation mechanisms are more effective than complex reporting requirements.

The objective of the circular economy is not to collect more waste, but to reduce demand for primary resources. This requires the gradual introduction of extended producer

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<sup>9</sup> World Bank, “Uzbekistan to Invest in Modernizing Electricity Distribution Networks,” 15 May 2025: technical distribution losses were approximately 13 percent in 2024, and more than half of grid facilities had been in operation for over 30 years.

<sup>10</sup> World Bank, “Uzbekistan Receives \$7.5 Million in Carbon Credits for Enabling Half a Million Tons of Emissions Reduction,” 21 June 2024: <https://www.worldbank.org/en/news/press-release/2024/06/21/uzbekistan-receives-7-5-million-in-carbon-credits-for-enabling-half-a-million-tons-of-emissions-reduction>.

responsibility, standards for recycled raw materials, separate collection of electronic waste, recycling of construction waste, and criteria for the use of secondary materials in public procurement. A digital waste-tracking system would reduce illegal dumping and stabilise the raw-material base of recycling businesses.

### **5. Green Cities and Human Capital**

Green-city policy should combine urban greening with public transport, energy-efficient buildings, air quality, and measures to reduce the urban heat-island effect. According to official information from 2026, 200 million seedlings were planted each year over the previous five years under the “Green Space” programme, and 2 million hectares of protective forests were established on the dried bed of the Aral Sea; the target is to increase the level of green coverage across the country to 30 percent by 2030. These indicators should be monitored not by the number of seedlings planted, but by their survival over three to five years, irrigation costs, and air-cleaning effectiveness.<sup>11</sup>

The green economy requires new occupations and skills: energy auditors, solar and wind power plant technicians, battery-system engineers, ESG reporting specialists, carbon verifiers, agronomists specialising in water efficiency, and waste-logistics operators. Expanding higher-education modules that integrate engineering, economics, finance, and ecology, together with dual education programmes involving enterprises, would increase domestic value added in green projects.

### **CONCLUSION AND RECOMMENDATIONS**

The study results show that renewable energy is the fastest-growing segment of Uzbekistan’s transition to a green economy. Total electricity generation increased by 24.4 percent in 2020–2024, while solar generation rose almost 81-fold in 2021–2024. The fact that solar energy accounted for 70.6 percent of the additional growth in electricity generation in 2024 confirms that the energy transformation has become structural. At the same time, grid losses, ageing infrastructure, energy efficiency, water scarcity, and the insufficient development of financial standards for green projects remain the main constraints at the next stage.

The following practical recommendations are proposed to accelerate green economy development:

1. Approve every new solar and wind project as a single investment package incorporating energy storage, grid reinforcement, and digital dispatch.
2. Expand ESCO and results-based lending mechanisms in industry, budget-funded organisations, and the housing sector, with payments linked to actual energy savings.
3. Integrate the national green taxonomy mandatorily into banking supervision, public procurement, and public investment projects.
4. Create a unified digital MRV platform for measuring, reporting, and verifying carbon emissions, and direct part of carbon revenues to social protection.
5. Introduce product carbon passports, green-electricity certificates, and an energy-benchmarking system for exporting industrial enterprises.
6. Link water subsidies not to equipment purchases, but to actual water savings and value added created per cubic metre of water.

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<sup>11</sup> President of the Republic of Uzbekistan, 4 May 2026: under the “Green Space” programme, 200 million seedlings are planted annually, 2 million hectares of protective forests have been created on the dried bed of the Aral Sea, and a 30 percent green-coverage target has been set for 2030.

7. Gradually introduce extended producer responsibility for packaging, electronic waste, and construction waste.

8. Shift green-city indicators from the number of trees planted to their survival, PM2.5 levels, the share of public transport, and building energy consumption.

9. Develop green-specialisation maps based on the resource potential of regions and implement projects through regional clusters.

10. Create a national classification of green occupations, expand dual programmes in higher and vocational education, and provide targeted compensation to vulnerable groups for the effects of tariff reform.

Overall, the next stage of the green economy in New Uzbekistan should be characterised by a shift from merely expanding renewable capacity to improving resource efficiency and low-carbon competitiveness across the entire economy. Green growth will become a source of long-term economic prosperity only when institutional consistency, private-sector incentives, open data, and just social mechanisms are combined.

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