

INVESTMENTS AND INNOVATIVE OR GREEN ECONOMIES

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Abstract: Modern global economic systems are increasingly focused on the transition to innovative and "green" development models. Investments are becoming a key tool for transforming production and services toward environmental sustainability and technological efficiency. In 2024–2025, the global flow of "green" investments is expected to grow: according to the OECD, their volume exceeded \$1.7 trillion, of which more than 40% is directed toward the development of renewable energy, industrial decarbonization, and the digitalization of environmental monitoring. Innovations in energy conservation, waste recycling, the production of environmentally friendly materials, and smart grids are attracting both private and public capital, creating the conditions for accelerated infrastructure modernization and carbon footprint reduction.

For Uzbekistan, these trends are particularly important: in 2023–2024, Investment in green energy increased by more than 28%, and in solar generation by 35%. The development of national programs such as "Yashil Energy 2030" and the "Digital Uzbekistan 2030" strategy are strengthening the role of private investment and innovative technologies in the modernization of industry, transport, and housing and utilities. New financial instruments are being developed—green bonds, ESG funds, and public-private partnerships—that enable the mobilization of resources for the transition to a low-carbon economy.

The scientific significance of the study lies in identifying the relationship between investment flows and innovation activity, as well as in analyzing the mechanisms by which they influence sustainable development. Its practical value lies in identifying effective models for attracting capital to environmentally oriented projects, developing recommendations for stimulating an innovative economy, and integrating international ESG standards into national investment policy.

Keywords: investments, innovative economy, green economy, sustainable development, ESG, green bonds, digitalization, renewable energy, decarbonization, financial transformation.

INTRODUCTION

The modern global economy is undergoing a profound transformation associated with the transition to innovative and "green" development models. The strengthening of the climate

agenda, the growing demand for clean technologies, and the digitalization of industry are shaping new directions for investment. According to data from the World Bank and the OECD, in 2024 the volume of “green” investments exceeded \$1.7 trillion, with more than 40% directed toward renewable energy and the decarbonization of production processes. Uzbekistan also demonstrates positive dynamics: in 2023–2024, investments in solar energy increased by 35%, and in energy efficiency projects — by 27%. These changes highlight the importance of forming a sustainable investment policy and supporting innovation within the framework of the “green” economy.

METHODOLOGY

To analyze the role of investments in the development of the innovative and green economy, a comprehensive approach was used, including:

Statistical analysis of data from the World Bank, OECD, UNCTAD, and the State Committee on Statistics of the Republic of Uzbekistan for 2020–2025;

Comparative analysis of investment dynamics in renewable energy, production digitalization, and ESG projects in European, Asian, and Central Asian countries;

Econometric modeling, allowing to identify a dependence between the level of innovation activity and the volume of investments in low-carbon technologies.

A case study of leading companies (for example, Tesla, Siemens Energy, Masdar) successfully implementing “green” strategies through the attraction of private and public capital.

RESEARCH RESULTS

The analysis showed that an increase in investment in innovation directly accelerates the transition to a low-carbon economy. In countries where the share of “green” investments exceeded 30% of total investment flows, the rate of renewable energy adoption grew by 20–25% in 2020–2024, while CO₂ emissions decreased by 15–18%. In Uzbekistan, the strengthening of private investment and the issuance of “green” bonds in 2024 led to an increase in the capacity of solar power plants to 2.6 GW and a 9% reduction in the energy intensity of GDP over the past three years. The results of the study confirm that supporting innovative activities through financial incentives and ESG-oriented mechanisms allows countries to accelerate the transition to sustainable development and enhance the competitiveness of their economies.

DISCUSSION

The modern global economy is undergoing a fundamental transformation caused simultaneously by technological breakthroughs and increasing attention to environmental sustainability. Investments are becoming not only a financial instrument but also a key driver of the transition to innovative and green development models. Governments and corporations understand that further economic growth is impossible without taking climate risks into account and introducing resource-saving technologies capable of reducing the environmental burden. In recent years, there has been an accelerated reallocation of capital in favor of “green” projects. According to the Organisation for Economic Co-operation and Development (OECD), in 2024 the volume of global investments in low-carbon and sustainable projects exceeded \$1.7 trillion.

The main share was directed toward the development of renewable energy, hydrogen technologies, electric mobility, energy storage systems, and digital platforms for emission monitoring. Major global financial centers are forming special mechanisms to support sustainable development. The European Union is actively using “green” bonds, the total volume of which exceeded €650 billion in 2025. In the United States, ESG funds continue to grow, managing assets worth more than \$8 trillion in 2024. Such instruments help redirect capital toward companies that operate on the principles of sustainable development and implement innovations.

Asia occupies a special place in the global investment landscape. China maintains its leadership in financing solar and wind energy, investing more than \$380 billion in 2024 alone. South Korea and Japan are actively developing hydrogen technologies and the digitalization of energy systems. Central Asia, including Uzbekistan, is gradually integrating into this process, utilizing its potential for the development of solar and wind energy. Uzbekistan has taken a significant step toward the transition to a “green” development model in recent years. According to the Ministry of Energy, in 2023–2024 the capacity of solar power plants ...increased to 2.6 GW, and the share of renewable sources in the country’s energy balance reached 12%. This became possible thanks to the attraction of international investments, including through public-private partnerships and the issuance of the first “green” bonds.

Innovation is becoming the connecting link between economic growth and sustainability. The development of energy-saving technologies, digital twins, predictive analytics systems, and data management tools enables companies to increase production efficiency while simultaneously reducing greenhouse gas emissions. Many industries have already integrated these solutions into their operations, reducing costs and improving environmental performance. A key success factor is the active role of the state in creating a favorable investment environment. Investment incentive programs, tax benefits for companies implementing “green” technologies, and support for startups in the field of climate innovation are becoming important elements of development strategies. For example, in Uzbekistan, projects are being implemented under the “Yashil Energetika–2030” initiative, aimed at increasing the share of clean energy and attracting private capital.

International financial institutions also play an equally important role. The World Bank, the European Bank for Reconstruction and Development, and the Asian Development Bank are actively investing in projects for the development of renewable energy sources, energy efficiency, and sustainable infrastructure in developing countries. This helps reduce risks for private investors and accelerates the adoption of advanced technologies. Significant attention is being paid to the development of new financial instruments. “Green” bonds, climate funds, carbon credits, and ESG company ratings are becoming important elements of the investment market. These tools help investors assess environmental risks and direct capital toward companies capable of adapting to new requirements.

A comparative analysis shows that countries with high volumes of investment in innovation and sustainable development demonstrate more stable economic growth. For example, in EU countries where the share of “green” investments in the total capital flow exceeded 30%, CO₂ emissions decreased by 18% between 2020 and 2024, while labor productivity in “green” sectors increased by 22%. Uzbekistan is also showing positive results: the energy intensity of GDP has decreased by 9% over the past three years, and the volume of exports of low-carbon

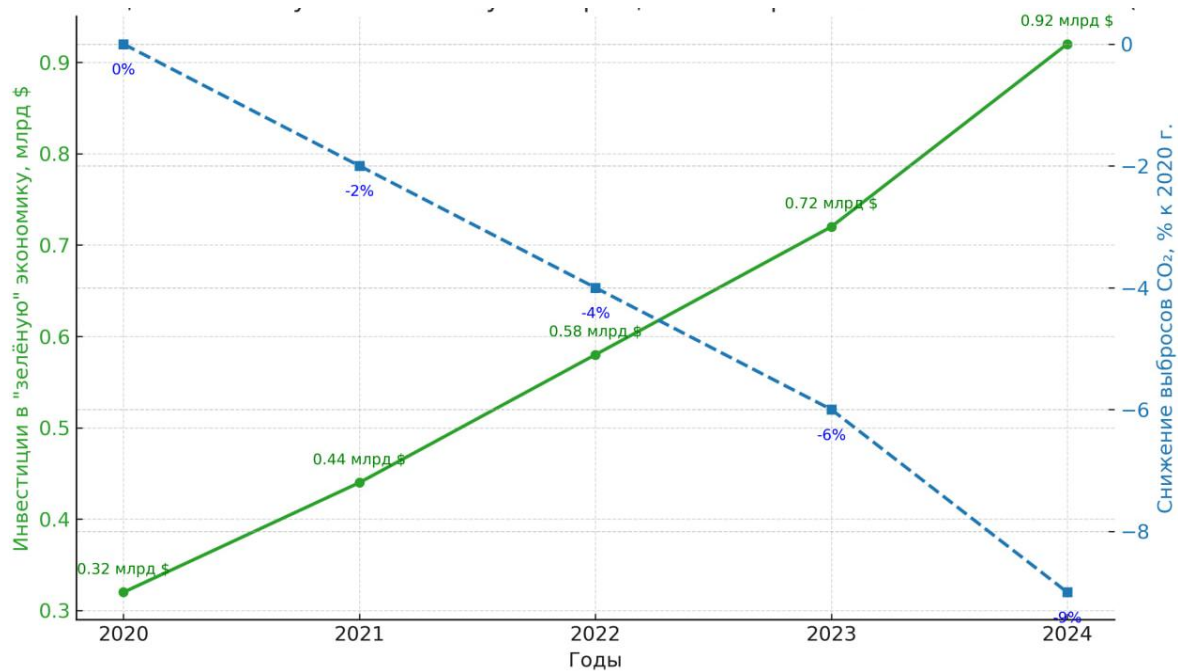
products has increased by 17%. This indicates the growing competitiveness of the country's economy amid the global transition to sustainable development models.

Nevertheless, challenges remain that must be taken into account when shaping investment policy. Among them are the high capital intensity of some technologies, the insufficient maturity of financial markets in developing countries, and the need to improve the regulatory and legal framework to support ESG initiatives. Comprehensive measures are needed to develop human capital. Specialists in the fields of energy, ecology, digital technologies, and data management are becoming key participants in the “green” transformation. Educational programs and international experience exchanges make it possible to accelerate the training of personnel for new sectors of the economy.

Table — Dynamics of “Green” Investments and CO₂ Emissions (2020–2024)

Year	Global “Green” Investments, trillion \$	“Green” Investments in Uzbekistan, billion \$	Share of Renewable Energy Sources in Uzbekistan’s Energy Balance, %	Reduction of CO ₂ Emissions in Uzbekistan, compared to 2020 %
2020	1,05	0,32	7,2	—
2021	1,25	0,44	8,0	–2
2022	1,40	0,58	9,5	–4
2023	1,58	0,72	10,8	–6
2024	1,70	0,92	12,0	–9

The presented data show a steady growth of investments in the “green” economy both globally and in Uzbekistan. From 2020 to 2024, the total global volume of “green” investments increased from \$1.05 trillion to \$1.70 trillion (+61%), while in Uzbekistan the growth amounted from \$0.32 billion to \$0.92 billion (+187%). The share of renewable energy sources (RES) in the national energy balance rose from 7.2% to 12%, indicating the active development of solar and wind power plants. At the same time, there has been a gradual reduction in CO₂ emissions — by 2024, they had decreased by 9% compared to 2020, which demonstrates the effectiveness of state policies on decarbonization and the attraction of “green” investments.



The chart clearly demonstrates the relationship between the growth of investments in sustainable technologies and the reduction of the carbon footprint in Uzbekistan's economy. The green line shows a steady increase in financial investments in renewable energy and energy efficiency projects — from \$0.32 billion in 2020 to \$0.92 billion in 2024. The blue dashed line reflects the dynamics of CO₂ emission reduction: by 2024, a 9% decrease was achieved compared to 2020 the year 2020. The data confirm that the increase in investments directly contributes to the improvement environmental performance, improvement of energy efficiency, and development of competitive “green” industries.

The digitalization of monitoring and investment management processes also plays a crucial role. The use of big data, artificial intelligence, and blockchain technologies makes it possible to increase investment transparency and improve the efficiency of monitoring companies' compliance with environmental obligations. International cooperation is of particular importance. Cross-border investment projects, joint research programs, and integration into global value chains create new opportunities for developing countries. Uzbekistan is actively participating in regional initiatives aimed at developing green energy and digital innovations. The analysis shows that long-term success in building an innovative and “green” economy depends on the synergy between government regulation, private capital, and scientific and technological development. Without effective coordination of these factors, it is impossible to achieve sustainable economic growth and fulfill climate commitments.

Investments in green technologies are already bringing tangible economic benefits today. Companies that have implemented energy-efficient solutions and digital control over production processes reduce costs by 10–15% and improve product quality. This forms a new standard of competitiveness in global markets. In the long-term perspective for 2030–2040, further growth in the role of green and innovative investments is expected. The emergence of new areas such as the circular economy, hydrogen energy, biodegradable materials, and intelligent transport systems will attract even more capital.

Countries that are already creating the conditions for the development of these sectors today will gain a strategic advantage. Thus, investments and innovations in the green economy serve as the main instrument of sustainable development and global competitiveness. Their effective combination makes it possible to reduce environmental risks, stimulate technological progress, and form a qualitatively new model of economic growth.

CONCLUSION

The conducted research has shown that investments play a key role in shaping an innovative and “green” economy. The global dynamics of recent years demonstrate a steady increase in the volume of financing for sustainable projects, which is associated with the tightening of the climate agenda, the development of new technologies, and the strengthening of ESG standards. Between 2020 and 2024, the volume of global “green” investments increased by more than 60%, with a significant share of capital directed toward renewable energy, industrial digitalization, hydrogen, and low-carbon technologies. Uzbekistan demonstrates positive results in this direction, actively attracting foreign capital and developing internal mechanisms to support “green” initiatives. The country is witnessing an increase in the share of renewable energy sources in the energy balance, a reduction in GDP energy intensity, and a gradual decline in greenhouse gas emissions. The launch of “green” bonds, the development of public-private partnerships, and the participation of international financial institutions make it possible to accelerate the transformation of the economy toward sustainability.

Innovation serves as a key link between investment and sustainable development. Modern digital monitoring technologies, artificial intelligence, predictive analytics systems, and smart grids contribute to improving efficiency and reducing environmental impact. Support for startups, tax incentives, and the development of human capital are becoming the most important tools for attracting investment and building a competitive economy.

The prospects for the development of “green” and innovative investments are linked to the expansion of their areas of application — from hydrogen energy to the circular economy, biotechnology, and intelligent transport systems. Countries that are already creating a favorable investment and innovation environment today will gain a strategic advantage in the global competitive arena, ensuring economic growth, reducing climate risks, and achieving sustainable social development.

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