



Abstract

The article studies the theoretical and practical issues of increasing the efficiency of investment in the process of transition to a green economy. On the basis of experience of other countries, a comparative analysis of the methods applied by Germany, Japan, South Korea, China, Singapore, Finland, Australia, and Canada to attract and efficiently use green investments is carried out. The comparative method, statistical method, and system approach were used in the study of the effectiveness of green investment models. It was found that the development of green financial tools, the increase in investment in the renewable energy industry, the optimization of the PPP mechanism, and the application of the ESG principles in investment policy are the most important approaches to increase the efficiency of investments in Uzbekistan. On the basis of the international best practices, recommendations for the adaptation of successful green investment mechanisms in national economic conditions of Uzbekistan are given.

Keywords: green economy, green investments, investment efficiency, Environmental, Social, and Governance (ESG), green finance, renewable energy, sustainable development, international experience.

Introduction

The increasing difficulties connected with climate change, the exhaustion of natural resources, and the growing number of greenhouse gas emissions have led to an increased need for a new approach to economic development, which would take into account the problems mentioned above. Therefore, the green economy is one of the main concepts in international economic policy, which represents the balance between economic growth and the preservation of the environment. The green economy implies an efficient use of natural resources, implementation of environmentally friendly and energy-efficient technologies, development of renewable energy, and decreasing of the environmental impact.

The development of the green economy requires huge financial costs, which makes investment one of the main tools for this concept. Proper investment policies can lead to the rapid development of renewable energy, to improvement of energy efficiency, to innovation and to a decrease of carbon emissions. At the same time, the efficiency of investments is as important as the volume of investments made, since it influences their results.

There are many other countries, including Germany, Japan, South Korea, China, Singapore, Finland, Australia, and Canada, which have made tremendous achievements in terms of fostering green investments. The efforts undertaken by those countries have been driven by the use of various policy instruments, including green bonds, fiscal incentives, subsidies from the government, carbon pricing schemes, PPPs, and ESG-based investment frameworks. All of these examples show that a well-designed investment strategy can bring benefits not only for

environmental sustainability but also for competitiveness and the wellbeing of society. They can be useful for developing countries seeking to achieve similar goals with their policies.

The Republic of Uzbekistan has recognized the importance of making its economy green. In recent years, there have been numerous attempts to increase the share of renewable energy sources in the economy, develop energy efficiency programs, cooperate with foreign financial institutions, and increase green investments. However, much work still needs to be done in order to increase the effectiveness of investments and green financing instruments and adapt international best practices to the country.

In this context, the current research analyzes opportunities for improving investment efficiency in the process of transition to the green economy on the basis of the world experience and its applicability to Uzbekistan. The objective of this research is to identify efficient policy instruments, assess world best practices, and formulate relevant recommendations.

Main Discussion

International Experience: Comparative Efficiency Analysis of Green Investments

During the last decade, a transition towards the green economy became a strategic goal for economic policy-making in most countries. As the international experience shows, the efficiency of green investments is influenced not only by the scale of financial resources involved but also by the institutional background, the role of state support, innovations, and development of financial market and instruments of investments.

The International Energy Agency (IEA) reports that the global energy investments have exceeded USD 3 trillion in 2024. Almost USD 2 trillion were spent on investments in clean energy, renewable energy, electrical grid, energy storage systems, electric cars, and other relevant infrastructure. The scale of such investments is about twice higher than investment into fossil fuels.¹

Germany Experience

Germany is considered one of the best examples in the world of successful transition towards the green economy. With the help of "Energiewende" (Energy Transition) concept, the country is increasing the share of renewable energy and improving energy efficiency.

The effectiveness of this transition has been facilitated through such factors as government subsidies, preferential financing, carbon pricing policies, and the involvement of the private sector.

Germany's experience shows that investment effectiveness depends not only on financial investments but also on innovations, institutional stability, and proper regulation. Stable long-term policy has helped create favorable conditions for green investments and speed up the process of commercialization of clean technologies.

The Experiences of Japan and South Korea

Despite the lack of energy sources in these countries, both Japan and South Korea have made huge investments in order to secure their energy and meet their environmental targets. According to the International Energy Agency, green energy investments in Japan and South Korea are nine times higher compared to those related to the usage of fossil energy. In the

¹ https://frends.com/insights/energy-sector-2026-how-automation-accelerates-decarbonization?hs_amp=true



period between 2021 and 2023, clean energy investment grew on average by 40% in Japan and 10% in South²

Korea.

Investments in hydrogen technologies, industrial production, and efficient energy consumption are the priorities of Japan in terms of decarbonization. At the same time, the Carbon Neutrality and Green Growth Strategy, introduced in South Korea, involves the development of renewable and nuclear energy, hydrogen, and green industries.

These policies illustrate how focused public policies and technological advancement can increase the effectiveness of green investments.

Experience of China

The experience of China shows that it is now the largest market for green investments in the world. The International Energy Agency reports that its investments into clean energy amounted to USD 680 billion in 2024 and accounted for one-third of global green investments.³ In 2023, the capacity of new solar power installations grew beyond the total capacity of solar power installations of the previous year in the whole world, whereas the capacity of new wind power installations grew by 66%.

The experience of China demonstrates how essential long-term industrial policy, huge public finance investments, and technological innovation are in order to increase investment effectiveness. Thanks to governmental planning, investments in infrastructure, and support for the development of domestic industries of clean energy, China managed to become a leader in the production of renewable energy and technologies.

Table 1.

Comparative Overview of Green Investment Promotion Mechanisms in Selected Countries⁴

Country	Primary Focus	Investment Mechanisms	Key Driver of Investment Efficiency
Germany	Wind and solar energy	Government subsidies, green banks, carbon pricing mechanisms	Technological innovation and stable long-term policies
Japan	Hydrogen energy and energy efficiency	Public-private partnerships (PPPs), research and development (R&D) funding	Technological modernization and innovation
South Korea	Green Growth and the hydrogen economy	Green funds, climate finance facilities	ESG integration and strong government financial support
China	Solar energy, wind power, and the	Government investment, green credit programs	Large-scale industrial policy and strategic state support

² International Energy Agency. (2024). *World Energy Investment 2024*. Paris: IEA. [World Energy Investment 2024](https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings?utm_source=chatgpt.com)

³ International Energy Agency. (2024). *World Energy Investment 2024*. Paris: IEA. [World Energy Investment 2024\(https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings?utm_source=chatgpt.com\)](https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings?utm_source=chatgpt.com)

⁴ Muallif tomonidan IEA *World Energy Investment 2024* ma'lumotlari asosida tuzildi.

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From the comparative analysis of the cases it can be seen that the countries which achieved the most successful results have a number of common features. Such features include development of long-term strategies regarding green investments, technological innovations and collaboration between government and business sectors. However, at the same time, each country developed its unique model of financing based on its natural resource endowment, economic specifics and institutional capacity. It means that there is no universal approach to promotion of green investment and it should be based on the adaptation of the policy to the peculiarities of each state but still include long-term strategy of sustainable development.

The Experiences of Singapore, Finland, Australia, and Canada

Although their economic structures and natural resource endowments are different, Singapore, Finland, Australia, and Canada have proved that proper management of investment can be an important component of the transition to green economy and sustainable development.

Despite the fact that Singapore has poor natural resource endowment, it has become a center of sustainable finance due to implementation of Singapore Green Plan 2030. Singapore has actively supported the development of the market of green bonds and innovative low-carbon technologies in order to attract foreign investors.

Finland is known for implementing successfully the circular economy. It has invested heavily in biomass, wind energy, energy efficiency, and waste recycling technologies. Therefore, it is known for having a highly resource efficient economy. Consequently, Finland was ranked among the leaders in the world in 2024 in the share of renewable energy in total primary energy consumption.

The country with abundant resources of renewable energy sources, especially solar and wind energy, is Australia. One of the main factors that contribute to the green transformation of the country is the Clean Energy Finance Corporation (CEFC). This institution finances renewable energy projects and clean infrastructure using the funding from both public and private investors. During the 2024-2025 fiscal year, CEFC invested the record amount of AUD 3.5 billion into clean energy generation and electricity transmission grid development.⁵

Canada has been successful in developing its green economy thanks to the investments in hydropower, wind energy and solar power. The country has managed to implement an extensive carbon price regime that fosters low carbon investment and innovations. Canada is known for its record share of renewable electricity generation in the world.

Table 2.

Selected Indicators of Green Economy Development in Selected Countries⁶

Country	Green Policy	Investment	Key Priority Area	Relevance for Uzbekistan
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⁵ Reuters. (2025, July 28). *Australia's green bank makes record clean energy investments.*
⁶ Muallif tomonidan IEA, World Bank va boshqa xalqaro tashkilotlarning 2023–2025-yillardagi rasmiy ma'lumotlari asosida tuzildi.

Germany	Government subsidies and carbon pricing mechanisms	Wind and solar energy	Experience in energy transition and renewable energy development
Japan	Hydrogen economy strategy	Energy efficiency and hydrogen technologies	Adoption of innovative technologies and energy-efficient solutions
South Korea	Green Growth Strategy	ESG integration and green industrial development	Development of a digital and sustainable green economy
China	Government investment and green credit programs	Solar energy and electric vehicles	Managing large-scale green investments and industrial transformation
Singapore	Green finance hub	Green bonds and sustainable finance	Strengthening green financial infrastructure and capital markets
Finland	Circular economy strategy	Biomass and resource efficiency	Development of waste management and circular economy practices
Australia	Green bank model	Solar and wind energy	Establishment of specialized green finance institutions
Canada	Carbon pricing policy	Hydropower and clean energy	Development of carbon markets and climate-related investment mechanisms

For Uzbekistan, the transition towards a green economy is one of the strategic priorities of the national development agenda. During the last years, a number of reform measures to increase renewable energy production and energy efficiency and to attract foreign investments to the green economy were implemented. Solar and wind power facilities have been developed in cooperation with foreign investors, which shows commitment to the diversification of the energy production and reduction of CO₂ emissions. Still, the country needs to implement more reforms to develop green finance instruments, ESG principles in the investment policy, local green bond market, and PPPs.

There are a number of policy models of other countries, which would be appropriate for Uzbekistan. First, there is a great experience in energy transition strategy in Germany and in renewable energy usage and long-term planning of policy measures. Singapore has developed a well-functioning green finance system, which attracts sustainable investments through financial infrastructure. There are some experiences in industrial policies and large-scale investments in China and in developing specific green financial institutions in Australia. Adaptation of these policies to the economic and institutional context of Uzbekistan could considerably improve the efficiency of investments and the level of energy security.

Through comparative analysis, it becomes clear that there are some similarities in the characteristics of countries that managed to progress their green transitions successfully. They develop their investment policies based on strategic long-term planning and are supported by the government and participation of the private sector. However, every country has designed its own policy that depends on its economic state, natural resources, and priorities.

Thus, Germany has used subsidies, renewable energy programs, and carbon prices for the transition to a new energy system. Japan and South Korea have concentrated on the use of technological innovation, energy efficiency, and hydrogen technology as the main pillars of sustainable development. In turn, China has made itself the world leader in solar, wind energy, and electric vehicles due to significant investments and industrial policy. Also, Singapore has become the hub for green finance in the region, as it attracts international capital through sustainable financial market. Finally, Finland has been working on its resource efficiency by using the principles of circular economy.

According to the International Energy Agency (IEA), investments in energy at the global level reached USD 3 trillion for the first time in 2024, while almost USD 2 trillion was invested in the sphere of clean energy technologies⁷ and corresponding infrastructure. Investment in solar PV technologies reached more than USD 500 billion, being the biggest item of investment in the power sector in the world.⁸

International experience shows a number of significant lessons for Uzbekistan. First of all, the volume of green investments is not enough by itself; the same efforts should be made to improve the efficiency of such investments from the economic, ecological, and social perspectives. Secondly, green investments can only be attracted through the establishment of reliable institutional base, transparent legislative base, and effective system of incentives. Thirdly, additional types of green financing, such as green bonds, sustainable financing, and PPPs can substantially increase investment in environmentally sustainable projects.

Uzbekistan can increase its investment efficiency and make a faster move towards a green economy by implementing the following policy recommendations:

- Make improvements in order to attract private financing into the projects involving renewable energy.
- Promote the development of the green bond market in the country.
- Gradually incorporate ESG criteria into corporate governance and investment processes.
- Provide financial support for innovative solutions improving energy efficiency.
- Broaden partnerships with international financial institutions in order to attract green financing and expertise.
- Set up a system of indicators to measure the effectiveness of green investments from an economic, environmental, and social perspective.

Conclusion

The results of this study prove that increasing investment efficiency is a crucial element of ensuring the transition to a green economy, sustainable economic growth, energy security, and environmental sustainability. As can be seen from the international experience, the success of green investments depends not only on the volume of capital allocated for this purpose but also on the consistency of government policies, application of new technologies, availability of green financing instruments, and involvement of the private sector.

⁷https://frends.com/insights/energy-sector-2026-how-automation-accelerates-decarbonization?hs_amp=true

⁸ International Energy Agency. (2024). *World Energy Investment 2024*. IEA. <https://www.iea.org/reports/world-energy-investment-2024>

The comparative analysis shows that the experience of Germany, Japan, South Korea, China, Singapore, Finland, Australia, and Canada can serve as examples for Uzbekistan. Specifically, such measures as an expansion of the range of green financing instruments, development of PPPs, improvements in energy efficiency, and ESG integration into investment policy can significantly improve the efficiency of green investments.

In the future, Uzbekistan has great opportunities to increase economic and environmental efficiency of investments through the development of institutions of a green economy, diversification of sustainable financial markets, and implementation of international best practices.

Policy Recommendations

In accordance with the results obtained during the course of this research, the following policy recommendations can be put forward for increasing investment efficiency of Uzbekistan in the process of transition to a green economy:

1. Improve the institutional environment for encouraging green investments. It is necessary to improve the coordination between the government bodies, develop criteria corresponding to the international practice for selection of green projects, and improve the monitoring and evaluation system in order to ensure successful implementation of investment programs.
2. Increase the variety of tools for financing green investments. More attention should be paid to issuance of green bonds, provision of preferential credits for environmentally sustainable projects, and introduction of green loan products in the commercial banks.
3. Improve the public-private partnership mechanisms. Attracting the private sector to renewable energy, energy efficiency, and waste management projects will contribute to more effective allocation of investment resources.
4. Include ESG factors in the investment policy. The encouragement of ESG reporting and use of internationally accepted standards of sustainable corporate governance will foster the investor's confidence, increase transparency in corporations, and bring long-term domestic and foreign investments.
5. Increase investment in R&D of innovative and energy-efficient technologies. Funding domestic innovations and advancing technology transfer would increase productivity in industry and minimize negative impacts on the environment and resources.
6. Enhance cooperation with international financial organizations. Cooperation can be expanded with such international financial organizations as the World Bank, Asian Development Bank, European Bank for Reconstruction and Development, and others.
7. Develop national standards for the evaluation of the impact of green investments. Besides conventional economic parameters, investment appraisal should involve factors such as decrease in carbon emissions, improvement in energy efficiency, productivity of resources, and others.

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