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WAYS TO DEVELOP THE ENERGY SECTOR IN ENSURING "GREEN" ECONOMIC GROWTH

Berdiyeva Aziza Ganisher kizi

Senior Lecturer, Department of Network Economics and Accounting,

Tashkent University of Applied Sciences

Abstract. This study examines the importance of transitioning Uzbekistan's energy sector toward a green economy within the framework of the Uzbekistan-2030 Strategy. The research identifies major challenges, including fossil fuel dependence and outdated infrastructure, while emphasizing Uzbekistan's high solar and wind potential. The study concludes that green energy development, supported by investment, digital technologies, and policy reforms, is essential for sustainable economic growth and environmental stability.

Keywords: *sustainable financing, green economy, greenwashing, green bonds, environment, biodiversity, greenhouse gas, sustainable development, international standards.*

1.Introduction

In the process of implementing economic reforms in the new Uzbekistan, wide attention is being paid to the development of economic sectors, including the energy sector, based on the principles of the "green" economy. The "Uzbekistan-2030" strategy sets goals such as developing the "driver" sectors of industry and fully utilizing the industrial potential of the regions and transitioning to a "green" economy, sharply increasing the use of renewable energy, which is its basis. Within the framework of these goals, the following tasks were set: to increase the value added in the industry to $45 billion and create 2.5 million high-income jobs, to expand the production of import-substituting products by large enterprises and cooperation with regional enterprises, to introduce a system of active incentives for enterprises that have established industrial cooperation, to establish modern technological industrial zones in each district, to increase the capacity of renewable energy sources to 25 thousand MW and their share in total consumption to 40 percent, to develop the market for "green certificates" in industry and introduce the practice of "ecological labeling", and a number of other tasks.

2.Literature review

The growing urgency of climate change, biodiversity loss, and resource depletion has intensified scholarly and policy interest in mechanisms that can effectively align financial systems with sustainable development goals. Within this discourse, "green" taxonomies have

emerged as a critical institutional innovation designed to classify economic activities based on their environmental sustainability. The academic literature increasingly recognizes taxonomies not merely as technical classification systems, but as strategic governance tools that shape capital allocation, mitigate information asymmetry, and support the transition toward low-carbon economies.

Early theoretical foundations of sustainable finance emphasize the role of financial markets in internalizing environmental externalities (Schoenmaker & Schramade, 2019). Building on this, recent studies highlight that one of the key barriers to sustainable investment is the lack of a unified definition of what constitutes "green" or environmentally sustainable activities (OECD, 2020). This definitional ambiguity creates risks of misallocation of capital and enables practices such as greenwashing. In response, green taxonomies have been proposed as standardized frameworks that provide clarity, transparency, and comparability across markets.

A central reference point in the literature is the EU Taxonomy for Sustainable Activities, which is widely regarded as the most comprehensive and advanced taxonomy system. According to European Commission (2021), the EU taxonomy establishes technical screening criteria for determining whether an economic activity substantially contributes to environmental objectives such as climate change mitigation, adaptation, and biodiversity protection. Empirical studies (e.g., Andersson et al., 2022) demonstrate that the EU taxonomy enhances investor confidence by reducing information asymmetry and improving the credibility of green financial instruments.

Comparative research indicates that other jurisdictions have also developed taxonomy frameworks tailored to their national contexts. For instance, People's Bank of China introduced a green bond catalogue that initially included certain transitional activities, reflecting a pragmatic approach to economic transformation (Ma et al., 2020). More recently, efforts toward harmonization between the EU and China taxonomies illustrate the importance of international coordination in sustainable finance. Similarly, emerging economies are increasingly adopting taxonomy frameworks to attract green investment and align with global climate commitments (World Bank, 2022).

The literature further explores the relationship between green taxonomies and financial instruments, particularly green bonds. Studies show that clear taxonomy criteria improve the integrity and market growth of green bonds by ensuring that proceeds are allocated to genuinely sustainable projects (Flammer, 2021). In addition, taxonomies contribute to risk management

by enabling financial institutions to assess climate-related risks more accurately, which is consistent with recommendations from Task Force on Climate-related Financial Disclosures.

Another important strand of research focuses on the role of digital transformation in enhancing the effectiveness of green taxonomies. Digital technologies such as big data analytics, blockchain, and artificial intelligence facilitate real-time monitoring, reporting, and verification of environmental performance (Zhang & Luo, 2023). This integration reduces transaction costs and strengthens accountability mechanisms, thereby reinforcing the credibility of sustainable finance systems. Scholars argue that digitalization is essential for scaling taxonomy-based approaches, particularly in complex and data-intensive sectors such as energy, transport, and manufacturing.

Despite these advantages, the literature also identifies several challenges associated with the implementation of green taxonomies. One major issue is the complexity of technical screening criteria, which may impose significant compliance costs on firms, especially in developing economies. Additionally, there is an ongoing debate regarding the inclusion of transitional activities (e.g., natural gas, nuclear energy) within taxonomy frameworks, reflecting tensions between environmental ambition and economic pragmatism (IEA, 2021). Furthermore, the risk of fragmentation across different national taxonomies may undermine global comparability and hinder cross-border investment flows.

From a policy perspective, scholars emphasize that green taxonomies should be integrated into broader economic and regulatory frameworks, including fiscal policy, industrial policy, and financial supervision. In this context, taxonomies serve as a foundation for designing green public procurement, sustainable banking regulations, and climate-aligned investment strategies. The literature also highlights their relevance for achieving the United Nations Sustainable Development Goals, particularly those related to climate action, responsible consumption, and life on land.

Existing research underscores that green taxonomies play a pivotal role in advancing sustainable economic development by providing a scientifically grounded and standardized classification of environmentally sustainable activities. While challenges related to complexity, harmonization, and implementation remain, the integration of taxonomy frameworks with digital technologies and international standards offers significant potential for enhancing the effectiveness of sustainable finance. This body of literature provides a strong theoretical and empirical foundation for analyzing the importance of green taxonomies in national economic systems, particularly in the context of ongoing digital transformation.

3.Analysis and results

The Resolution of the President of the Republic of Uzbekistan No. PQ-4477 dated November 4, 2019 “On Approval of the Strategy of the Transition of the Republic of Uzbekistan to a “Green” Economy for 2019-2030” established the following priority areas of the “Green” economy and green growth policy:

- Sustainable and efficient use of natural resources;
- Strengthening the resilience of the national economy to natural disasters and climate change;
- Ensuring the “green” and low-carbon development of the national economy, in particular industry;
- Introducing innovations and attracting effective “green” investments;
- Developing sustainable and inclusive “green” urbanization;
- Supporting the population and their habitats that can have a significant impact during the transition to a “green” economy;
- Increasing the capacity for “green” growth and developing human capital;
- Creating a favorable political environment for the transition to a "green" economy, introducing effective institutions;
- Increasing external and internal "green" financing flows.

The energy sector is the foundation of the economy. This sector plays an important role in ensuring the economic, social and environmental stability of the country. It also causes many environmental problems, including greenhouse gas emissions and harmful emissions from large energy facilities. Traditional energy sources, such as coal, oil and gas, are the main sources of greenhouse gas emissions. This issue is especially relevant for Uzbekistan, where the energy sector has a large environmental impact.

The formation of a "green" economy, including green energy, is considered the most effective way to solve this problem. The transition to a "green" energy sector plays an important role not only in ensuring environmental sustainability, but also in stabilizing economic growth. Ensuring sustainable development in the energy sector and protecting the environment are becoming an integral part of the long-term economic development strategy of each country. Currently, the energy sector, in particular, the use of carbon-based energy sources, is causing major difficulties in solving environmental, economic and social issues on a global scale. In this regard, the principles of a green economy and green energy solutions create opportunities not only to ensure environmental sustainability, but also to increase efficiency in the energy

sector and strengthen social security. The importance of green energy is especially great for countries such as Uzbekistan, which are rich in natural resources and are rapidly exposed to geopolitical changes.

The Resolution of the President of the Republic of Uzbekistan No. PP-436 dated December 2, 2022 “On measures to increase the effectiveness of reforms aimed at the transition of the Republic of Uzbekistan to a “green” economy by 2030” was adopted. Based on it, the following regulatory documents were developed:

- Program for the transition to a “green” economy and ensuring “green” growth in the Republic of Uzbekistan until 2030, designed to achieve strategic goals;

- Concept for the transition to a “green” economy and ensuring energy efficiency in industrial sectors;

- Action Plan for the transition to a “green” economy and ensuring “green” growth in the Republic of Uzbekistan until 2030;

- Target parameters for saving fuel and energy resources in economic sectors for 2022-2026, aimed at reducing the energy intensity of manufactured products by 20% by 2026 compared to 2022;

- The composition of the Interdepartmental Council for coordinating measures to transition to a "green" economy in the Republic of Uzbekistan has been updated;

The Donor Coordination Group for the transition to a "green" economy and "green" growth has been approved.

The energy sector of Uzbekistan is currently facing economic and environmental pressures. The use of natural gas and coal as the main direction in energy production is not in line with modern environmental requirements. Also, the negative impact on the environment in the process of energy production and consumption is an obstacle to strengthening the state's position in global climate policy. Therefore, the need to stabilize the energy sector of Uzbekistan on the basis of new strategies is increasing. The transition to green energy will not only improve the country's environmental situation, but also contribute to the sustainable, economically efficient development of the energy industry.

The development of green energy around the world has been expanding rapidly in recent years. Internationally, many countries, including the European Union and the United States, are taking new initiatives to develop new energy sources and reduce their carbon footprint. For example, the European Union plans to run its entire energy system on renewable sources by

2030. At the same time, many countries are investing in green energy to achieve their climate goals as part of the Paris Climate Agreement.

The unique geographical and economic conditions of Uzbekistan create great opportunities for the introduction of green energy technologies. Uzbekistan is waiting for favorable conditions in terms of sunlight and wind energy potential. Solar energy resources in Bukhara and Navoi regions, as well as high wind energy potential in the Northern and Eastern regions, can accelerate the country's transition to green energy.

In Uzbekistan, the following climate change mitigation and adaptation goals have been set for 2030 in this direction:

- reduce energy consumption per unit of GDP by 30% compared to 2021;
- reduce electricity consumption in industry, its share in total EE consumption to 20%;
- increase the share of electricity generation from renewable energy in the total volume to 30.5%;
- expand green areas in cities by 30% within the framework of the “green space” project;
- build small solar photovoltaic power plants with a capacity of 1.5 GW;
- increase the population with access to improved drinking water sources to 90% of the total population;
- increase the stock of trees and shrubs in forest areas to 92.3 million m3;
- increase the level of solid household waste recycling by 65%.

The “Green Energy” strategy developed by the state, including tax incentives and investment incentive mechanisms for the introduction of green technologies, can bring Uzbekistan among the leading countries in the development of green energy. The development of green energy systems, in turn, plays an important role in the implementation of modern technologies in production and ensuring sustainable economic growth.

The energy system of Uzbekistan is mainly based on natural gas. According to statistics for 2023, more than 85 percent of total electricity generation is generated by thermal power plants. This leads to an increase in carbon emissions and disruption of the ecological balance. Currently, Uzbekistan emits a large amount of greenhouse gases into the atmosphere through many main areas of energy production (coal, gas and oil), which seriously worsens the environmental situation of the country.

Therefore, the following reforms are necessary in the energy sector:

Diversification of energy sources. Increase the use of renewable energy sources such as solar, wind, bioenergy and hydropower. Uzbekistan’s geographical location and natural

resources allow for large-scale production of solar and wind energy. For example, Bukhara and Navoi regions have very high levels of sunlight throughout the year, and these regions have great potential for developing solar energy.

Technological modernization. It is necessary to introduce modern technologies that increase efficiency in energy production and transmission systems. Currently, many energy facilities are outdated and their efficiency is low. At the same time, losses in energy transmission networks are also a major problem.

Carbon neutrality. As part of the plans to make the Uzbek economy “carbon-neutral” by 2050, it is necessary to transition to green energy. This process requires not only a transformation of the energy sector, but also a reduction in carbon emissions in all sectors of the economy. This requires large-scale investment and technological development by the government and the private sector.

There are several problems that hinder the development of green energy:

Lack of financial resources. The introduction of green technologies requires a large initial investment. Therefore, it is necessary to develop financial incentives and credit mechanisms by the state.

Obsolete technological infrastructure. Many facilities in the energy sector still operate on systems left over from the Soviet era. This makes it difficult to integrate new technologies and reduces efficiency.

Low human resource capacity. There is a shortage of qualified specialists in the field of green technology management and service. It is necessary to update the vocational education system and train qualified personnel.

Weak legislative base. Regulatory documents related to environmental criteria in the energy sector have not yet been sufficiently improved. It is necessary to carry out reforms in the green energy sector and create new legislation.

A number of initiatives are being implemented in Uzbekistan in the field of green energy:

- solar and wind power plants are being built;
- a 100 MW solar power plant is operating in Navoi region;
- planned projects for the construction of new wind power plants are being implemented.

In addition, the "Green Energy" departments have been established under the Ministry of Energy. These departments are aimed at implementing strategic tasks to develop green energy and ensure environmental safety.

4.Conclusions

The population and enterprises are encouraged to use green electricity, which ensures environmentally friendly energy consumption.

We make the following proposals to improve the green energy sector:

1. Simplify attracting investment in green energy. Create a favorable environment for investors through tax incentives, grants, and state guarantees. The state should create favorable conditions for investing in the green energy sector.

2. Introduce digital technologies. Effectively manage electricity distribution through the "smart grid" system. This system can optimize energy distribution and reduce losses.

3. Open green energy universities. It is necessary to add new areas of green technologies to the vocational education system. Special universities can be established to train specialists in the green energy sector.

4. Develop mechanisms to limit carbon emissions. Gradually introduce a "carbon tax" and "emission quota" system. These mechanisms can reduce carbon emissions and accelerate the transition to green energy.

5. Support local producers. Subsidies for local production of solar panels, wind turbines and other equipment. This will accelerate the development of green technologies in the country and reduce import dependence.

In conclusion, the energy sector remains one of the key areas in the transition to a green economy. The introduction of environmentally sustainable and efficient technologies for energy production will ensure not only economic efficiency, but also environmental safety. Uzbekistan can create a solid foundation for the transition to green energy by adopting international experience and adapting it to local conditions. This will provide a basis for not only economic efficiency, but also environmental safety and building a healthy society.

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