

GREEN ECONOMY TRANSITION IN UZBEKISTAN: NATURAL RESOURCE SUSTAINABILITY, ENERGY SECURITY, AND RENEWABLE ENERGY DEVELOPMENT.

Abdurazzoqov Hojiakbar

Namangan State University

Department of Economics

Intern-lecturer at the Department of

Green Economy and Sustainable Business

e-mail: Hojiakbarabdurazzaqov8@gmail.com

<https://orcid.org/0009-0000-4849-8707>

ANNOTATION. The transition to a green economy has become a strategic priority for ensuring sustainable economic growth, environmental protection, and rational use of natural resources. This study examines the necessity and prospects of the green economy transition in the Republic of Uzbekistan, considering the country's dependence on non-renewable energy resources and increasing environmental challenges. The research analyzes the reserves, extraction volumes, and estimated depletion periods of major natural resources, including oil, natural gas, coal, and uranium. Particular attention is paid to the role of renewable energy sources in reducing pressure on finite natural resources and mitigating the effects of climate change. The findings indicate that continued reliance on fossil fuels may lead to resource depletion and environmental degradation, while the development of green energy technologies can contribute to long-term economic stability, energy security, and ecological sustainability. The study provides recommendations for accelerating the transition to a green economy through investment support, institutional reforms, and sustainable resource management policies.

Keywords: Green economy, sustainable development, renewable energy, natural resources, energy transition, climate change, Uzbekistan, environmental sustainability, energy security, green growth.

INTRODUCTION. The concept of a green economy has gained increasing importance in recent decades as countries seek to balance economic growth with environmental sustainability. Rapid industrialization, population growth, and rising

energy demand have intensified pressure on natural resources and ecosystems worldwide. As a result, governments and international organizations are promoting green economic development models aimed at reducing environmental risks while improving social welfare and economic efficiency.

For Uzbekistan, the transition to a green economy is particularly relevant due to the country's significant dependence on non-renewable energy resources, including oil, natural gas, coal, and uranium. Although these resources continue to play a crucial role in national economic development, their finite nature raises concerns regarding long-term energy security and sustainable growth. Furthermore, environmental challenges such as climate change, water scarcity, land degradation, and the consequences of the Aral Sea crisis necessitate the adoption of environmentally friendly economic policies.

Recent data indicate that the extraction rates of several key natural resources remain relatively high, which may shorten the lifespan of existing reserves. At the same time, Uzbekistan is experiencing a faster increase in average annual temperature compared to the global average, highlighting the urgency of implementing climate adaptation and mitigation measures. In this context, renewable energy sources such as solar, wind, and hydropower offer significant opportunities to diversify the energy mix and reduce dependence on fossil fuels.

The objective of this study is to assess the importance of green economy development in Uzbekistan, evaluate the sustainability of current natural resource utilization, and identify strategic directions for accelerating the transition toward a low-carbon and resource-efficient economy.

Methodology. This research is based on a combination of quantitative and qualitative analytical methods. The study utilizes statistical data obtained from the Ministry of Energy of the Republic of Uzbekistan, the Committee of Geology and Mineral Resources, and international energy reports. Comparative analysis was employed to evaluate the dynamics of natural resource extraction and reserve availability during the period 2020–2025.

The estimated depletion periods of major natural resources were calculated using the ratio of available reserves to annual extraction volumes. Trend analysis

was applied to assess changes in the production of oil, natural gas, coal, and uranium over time. In addition, a descriptive and analytical approach was used to examine the environmental and economic implications of resource depletion and climate change.

The research also incorporates a review of international literature and policy documents related to green economy development, renewable energy deployment, and sustainable resource management. This methodological framework allows for a comprehensive assessment of the current state and future prospects of Uzbekistan's transition to a green economy.

Main body. “Green economy” transition is of great importance for all countries and occurs in direct relation to natural capital, the level of the country's economic development, and human capital. Therefore, it is necessary to create enabling incentive factors, legal infrastructure and other conditions for the transition. If the nationally supported incentive factors, including investments and public procurement, are directed toward developing the “green economy”, the process of “greening” the economic system will accelerate further¹.

The necessity of transitioning to a “green economy” in the Republic of Uzbekistan is characterized by the fact that the majority of energy consumed in the national economy is produced using non-renewable natural resources, the limited nature of these resource sources, environmental pollution as a result of rapid industrial development, water shortages, and the increasingly acute problems related to the drying of the Aral Sea.

There are several ways to generate electricity in our country, and electricity is mainly produced from natural resources. The most widely used among them are: TPS (Thermal Power Station), HPS (Hydroelectric Power Station), and NPS (Nuclear Power Station). Currently, there is no NPS in the Republic of Uzbekistan, but several projects for the construction of an NPS in Jizzakh region are planned in cooperation between “Uzatom” and “Rosatom”.

¹Stern N. The Economics of Climate Change: The Stern Review. — Cambridge: Cambridge University Press, 2007. — P. 184.

Approximately 295 oil and gas fields, coal deposits, and uranium reserves existing in the Republic of Uzbekistan determine the natural resource potential of the country. However, the inevitable depletion of these resources is clearly visible from the following table (Table1).

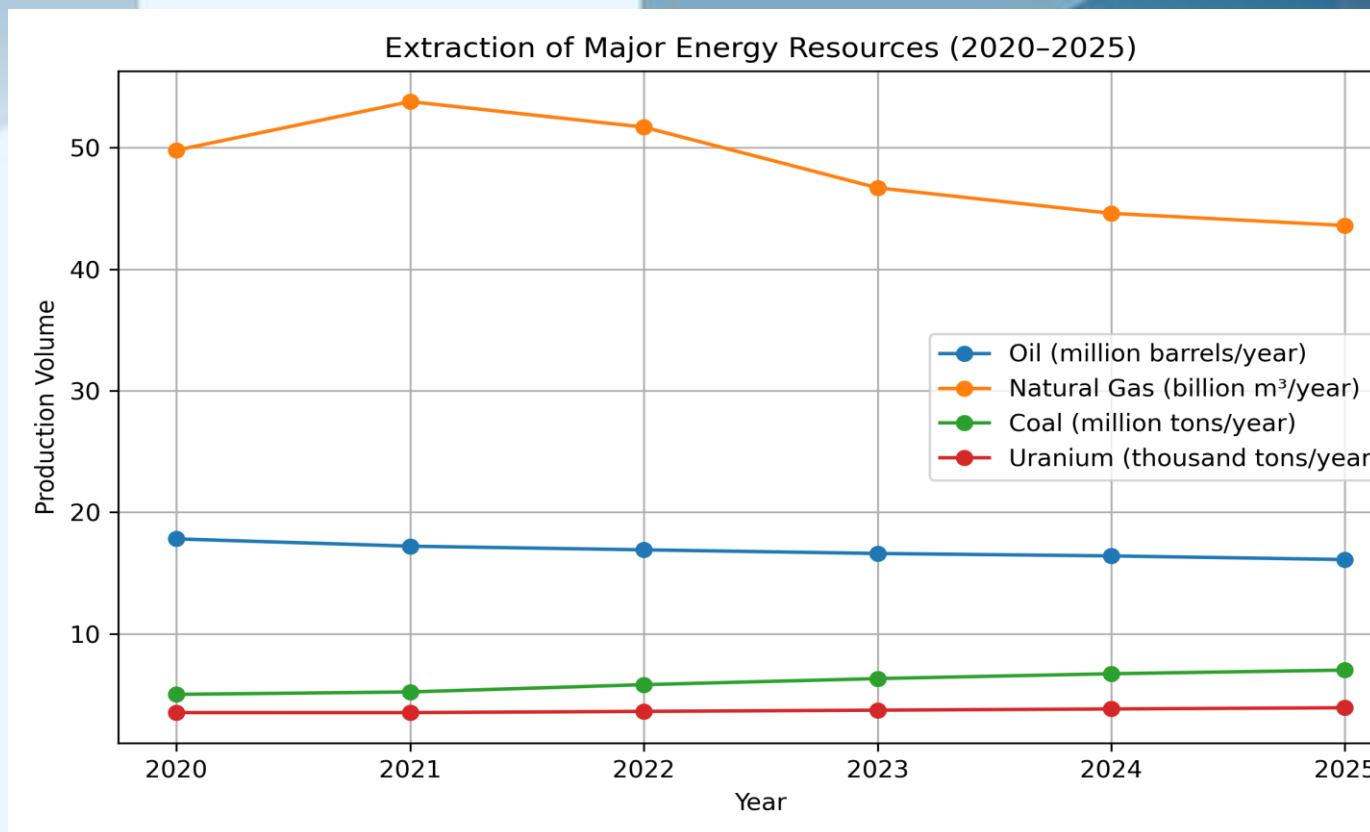
Table 1

Reserves, extraction indicators, and estimated depletion period of major natural resources of the Republic of Uzbekistan (2024–2025)

Natural Resource	2024 Reserves	2024 Extraction	Estimated Depletion Period	2025 Reserves*	2025 Extraction*	Estimated Depletion Period*
Oil	594 mln barrels	16.4 mln barrels/year	36.3 years	592 mln barrels	16.1 mln barrels/year	36.8 years
Natural gas	1.8 tln m ³	44.6 bln m ³ /year	40.4 years	1.79 tln m ³	43.5 bln m ³ /year	41.1 years
Coal	2.0 bln tonnes	6.7 mln tonnes/year	298 years	2.0 bln tonnes	7.0 mln tonnes/year	286 years
Uranium	132.3 thsd tonnes	3.8 thsd tonnes/year	34.8 years	131.0 thsd tonnes	3.8 thsd tonnes/year	34.5 years

Source: Compiled based on data from the Ministry of Energy of the Republic of Uzbekistan, the Committee of Geology and Mineral Resources, and the Energy Institute Statistical Review of World Energy, as well as the author's calculations.

Note: The estimated depletion period is calculated relative to the extraction volume in 2024 and 2025.



Dynamics of extraction of major energy resources in Uzbekistan (2020–2025)
— **Figure 1.**

The data presented in this table are constantly changing due to the discovery of new deposits and fluctuations in the volume of product consumption. The actual period may change as a result of changes in extraction volumes, the identification of new deposits, or geological re-evaluation. However, it is clearly evident from the table that, due to the high extraction rates for oil and uranium, the exploitation period of existing reserves is quite limited. In order to preserve natural resources of these types, a gradual transition from electricity generated from coal and gas to the green energy sector could significantly save natural resource reserves.

According to reports of the UN World Meteorological Organization, as of today, the global annual average temperature has risen by 1°C compared to the 1880 level. In our Republic, the annual average temperature has increased by 1.6°C (from 13.2°C to 14.8°C) during this period. The rate of warming in Uzbekistan exceeds the international average²³. This situation is causing further deterioration of the ecological condition in the Aral Sea region, including the Republic of

Karakalpakstan, Navoi, Kashkadarya, Khorezm, Bukhara, Surkhandarya, and Samarkand regions.

Conclusion

The study demonstrates that the transition to a green economy is a critical requirement for ensuring the sustainable development of Uzbekistan. The analysis of natural resource reserves and extraction dynamics reveals that continued dependence on non-renewable energy sources may create long-term economic and environmental risks. In particular, the relatively limited depletion periods of oil and uranium resources emphasize the need for more efficient resource utilization and diversification of the energy sector.

At the same time, climate change impacts, increasing temperatures, water scarcity, and environmental degradation associated with the Aral Sea crisis highlight the urgency of implementing environmentally sustainable development strategies. Expanding the use of renewable energy sources, improving energy efficiency, and encouraging green investments can significantly reduce pressure on natural resources while enhancing energy security.

Therefore, Uzbekistan's successful transition to a green economy requires coordinated government policies, institutional support, technological innovation, and increased investment in renewable energy infrastructure. The implementation of these measures will contribute to sustainable economic growth, environmental protection, and improved quality of life for future generations.

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