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SCIENTIFIC AND METHODOLOGICAL APPROACHES TO ASSESSING RESOURCE USE IN THE CONTEXT OF A GREEN ECONOMY

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Abstract. This article analyzes scientific and methodological approaches to assessing the efficient use of resources in the context of a green economy. The study examines the theoretical foundations of the rational use of natural, economic, and environmental resources, as well as the criteria for their evaluation. It also provides a scientific justification for the interrelationship between environmental sustainability, economic efficiency, and social benefit in determining the efficiency of resource use. The article develops proposals and recommendations for improving modern methods, indicators, and mechanisms for assessing resource use based on the principles of a green economy. The results of the study support the introduction of resource-saving approaches in economic sectors and the strengthening of environmental security.

Keywords: green economy, efficient resource use, environmental sustainability, economic efficiency, resource assessment, scientific and methodological approach, resource saving, sustainable development, environmental security, innovative mechanisms.

Аннотация. В данной статье проанализированы научно-методологические подходы к оценке эффективного использования ресурсов в условиях зелёной экономики. Исследованы теоретические основы рационального использования природных, экономических и экологических ресурсов, а также критерии их оценки. Обоснована взаимосвязь экологической устойчивости, экономической эффективности и социальной полезности при определении эффективности использования ресурсов. Разработаны предложения и рекомендации по совершенствованию современных методов, показателей и механизмов оценки использования ресурсов на основе принципов зелёной экономики. Результаты исследования способствуют внедрению ресурсосберегающих подходов в отраслях экономики и укреплению экологической безопасности.

Ключевые слова: зелёная экономика, эффективное использование ресурсов, экологическая устойчивость, экономическая эффективность, оценка ресурсов, научно-методологический подход, ресурсосбережение, устойчивое развитие, экологическая безопасность, инновационные механизмы.

INTRODUCTION

Today, the intensification of environmental problems in the global economy, the gradual depletion of natural resource reserves, and the growing risks associated with climate change are creating the need to form a new model of economic development. From this perspective, the concept of a green economy is emerging as an important factor in ensuring sustainable development, reducing negative environmental impacts, and establishing the rational use of resources. In the context of a green economy, maintaining ecological balance and introducing energy- and resource-saving technologies, alongside ensuring economic growth, are among the most urgent issues.

At present, assessing the efficient use of resources is regarded as one of the main directions for modernizing the economy and increasing production efficiency. This is because the improper use of resources not only exacerbates environmental problems but also leads to economic losses. In particular, it is important to determine the efficiency of using energy, water, land, and raw material resources in industrial sectors and to improve the scientific and methodological foundations of their management.

Large-scale reforms are also being carried out in the Republic of Uzbekistan to transition to a green economy. Particular attention is being paid to ensuring environmental security, expanding the use of renewable energy sources, improving energy efficiency, and introducing resource-saving technologies into production. This requires the development and practical implementation of modern scientific and methodological approaches to assessing resource use.

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The purpose of this article is to study scientific and methodological approaches to assessing resource use in the context of a green economy, analyze existing mechanisms, and develop scientifically grounded proposals and recommendations for their improvement. The study considers modern methods for assessing the efficient use of resources based on the interrelationship among economic, environmental, and social factors.

LITERATURE REVIEW

Issues related to the green economy and efficient resource use have been widely studied by foreign scholars. In particular, the English economist David Pearce, in his work *Blueprint for a Green Economy*, addressed the issue of ensuring a balance between economic development and environmental sustainability. Edward Barbier's study *Green Economy and Sustainable Development* also scientifically substantiates the role of the green economy in the rational use of resources. Scientific works by Joseph Stiglitz and Nicholas Stern analyze the importance of introducing resource-saving technologies in ensuring environmental security and increasing economic efficiency. These studies pay special attention to economic and environmental mechanisms for assessing the use of natural resources.

A number of studies on the green economy and efficient resource use have also been conducted by local scholars. In particular, Qobul Tashnazarov's research on the economic mechanisms of transition to a green economy analyzes directions for developing an environmentally sustainable economy in Uzbekistan. Shavkat Ayupov's scholarly works examine issues of increasing resource-use efficiency and ensuring environmental security. The studies of local economists have developed scientific recommendations on the rational use of energy and natural resources, the development of renewable energy sources, and the institutional foundations of the transition to a green economy.

RESEARCH METHODOLOGY

In this study, the methods of analysis, comparison, statistical observation, and generalization were used to examine scientific and methodological approaches to assessing resource use in the context of a green economy. During the research process, scientific literature, international experience, and economic and environmental indicators related to efficient resource use were analyzed. Scientific conclusions were developed based on the interrelationship among economic, environmental, and social factors in assessing resource-use efficiency.

ANALYSIS AND RESULTS

Today, the concept of the green economy is regarded as one of the key directions for ensuring the sustainable development of the global economy. According to data from the World Bank and the United Nations Environment Programme (UNEP), the excessive use of natural resources is increasing the risks associated with environmental degradation, climate change, and economic instability. Therefore, the rational use of energy and resources in economic sectors, the development of renewable energy sources, and the introduction of environmentally friendly technologies in production have become urgent priorities.

According to international analyses, in 2023, approximately 30.3 percent of global electricity generation was produced from renewable energy sources, representing a significant increase compared with previous years. Furthermore, according to BloombergNEF, more than 40 percent of global electricity generation in 2023 came from low-carbon energy sources. These trends demonstrate the growing importance of the green economy in promoting sustainable economic development worldwide.

Large-scale reforms are also being implemented in the Republic of Uzbekistan to support the transition to a green economy and ensure the efficient use of resources. In recent years, the share of renewable energy in the national energy mix has increased, and several state programs aimed at improving energy efficiency have been adopted. In particular, systematic measures are being undertaken to construct solar and wind power plants, introduce energy-saving technologies in industry, and promote the rational use of water resources.

Energy efficiency is an important criterion for assessing the efficient use of resources. It refers to reducing energy consumption relative to the volume of goods and services produced. The experience of developed countries demonstrates that the introduction of energy-saving technologies can reduce production costs, improve economic efficiency, and minimize environmental impacts. The table below presents the main criteria for assessing resource-use efficiency (Table 1).

Table 1
Criteria for Assessing Resource-Use Efficiency[1]

Criterion	Description	Impact on Outcomes
Energy Efficiency	Degree of reduction in energy consumption	Reduces production costs and improves efficiency
Environmental Efficiency	Volume of emissions released into the atmosphere	Enhances environmental safety and sustainability
Water-Resource Efficiency	Level of water consumption and conservation	Promotes efficient water use and conservation
Level of Innovation	Share of modern and resource-efficient technologies	Increases resource savings and productivity
Social Efficiency	Impact on population well-being and quality of life	Supports sustainable and inclusive development

As shown in the table, the assessment of resource use is not limited to economic indicators alone. Environmental and social factors also play an important role. In particular, environmental efficiency indicators are among the key criteria in the context of a green economy.

Today, the development of renewable energy sources in Uzbekistan is also having a positive impact on the level of efficient resource use. According to the Ministry of Energy, the total capacity of solar and wind power plants operating in the country has reached 5,582 MW. By the end of 2025, green energy production reached 10.5 billion kWh. This contributes to reducing natural gas consumption and decreasing harmful emissions released into the atmosphere.

The analysis shows that the following areas are priorities for increasing resource-use efficiency:

– expanding the use of renewable energy sources;
– introducing energy-saving technologies in industrial enterprises;
– expanding the use of water-saving technologies;
– developing the waste recycling system;
– improving digital monitoring and environmental control systems.

The study found that it is necessary to improve scientific and methodological approaches to assessing resource use in the context of a green economy. The comprehensive application of economic, environmental, and social indicators in assessing resource-use efficiency makes it possible to achieve greater effectiveness. At the same time, the introduction of resource-saving innovative technologies serves as an important factor in ensuring the sustainable development of the national economy.

The research results show that, in the context of a green economy, efficient resource use is one of the important factors in ensuring economic stability, strengthening environmental security, and improving the quality of life of the population. Under modern conditions of economic development, the rational use of natural resources, increased energy efficiency, and the preservation of ecological balance are becoming urgent tasks. Therefore, the need to improve scientific and methodological approaches to assessing resource use in economic sectors is increasing.

CONCLUSIONS AND RECOMMENDATIONS

The analysis found that positive results are being achieved in Uzbekistan in the implementation of green economy principles. In particular, the expansion of renewable energy use, the introduction of energy-saving technologies, and reforms aimed at the efficient use of water resources are contributing to increased resource-use efficiency.

At the same time, the study substantiated the importance of comprehensively taking economic, environmental, and social factors into account when assessing resource use. During the study, it was determined that criteria such as energy efficiency, environmental security, the use of innovative technologies, and social effectiveness play an important role in assessing resource-use efficiency.

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In particular, the development of digital monitoring systems, energy-saving technologies, and waste recycling mechanisms has a positive impact on the sustainable development of the green economy. Overall, improving the scientific and methodological foundations for assessing resource use in the context of a green economy is important for increasing resource efficiency in economic sectors, ensuring environmental security, and achieving the country's long-term sustainable development (Table 3).

Table 3
Proposals for Improving the Efficient Use of Resources in the Context of a Green Economy[2]

No.	Proposals	Expected Outcomes
1	Increase the share of renewable energy sources	Conservation of energy resources and reduction of environmental impacts
2	Promote the widespread adoption of energy-saving technologies in industrial enterprises	Reduction of production costs and improvement of energy efficiency
3	Expand the application of water-saving technologies in agriculture	More efficient use and conservation of water resources
4	Develop the waste recycling system	Expansion of opportunities for the use of secondary resources
5	Introduce digital monitoring systems for resource use	Improvement of control, monitoring, and management efficiency
6	Enhance environmental standards and the green certification system	Strengthening of environmental safety and sustainability
7	Support scientific research related to the green economy	Development of innovative and sustainable solutions
8	Strengthen awareness-raising activities aimed at improving environmental culture among the population	Promotion of rational resource-use practices
9	Develop environmental audit systems in enterprises	Reduction of resource consumption and enhancement of operational efficiency
10	Expand state financial incentive mechanisms for green projects	Increase in the volume of green investments and sustainable development initiatives

The table data show that a comprehensive approach is necessary to ensure the efficient use of resources in the context of a green economy. In particular, by expanding the use of renewable energy sources and introducing energy-saving technologies, it is possible to reduce the consumption of natural resources and increase production efficiency. At the same time, the use of water-saving technologies and the development of a waste recycling system are important for ensuring environmental security.

The analysis found that digital monitoring of resource use, improvement of the environmental audit system, and expansion of state support mechanisms for green projects contribute to the sustainable development of economic sectors. In addition, increasing the environmental culture of the population and encouraging scientific research are among the important factors in ensuring the rational use of resources.

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