

GREEN ECONOMY AND SUSTAINABLE DEVELOPMENT: MODERN CHALLENGES AND INNOVATIVE SOLUTIONS IN THE GLOBAL ECONOMY**N.A.Naimova**Senior Lecturer , Department of Economics,
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Abstract: This scientific article analyzes the role of the green economy concept in modern economic development, its importance in ensuring environmental sustainability, and its impact on the global economy. The research examines issues related to renewable energy sources, green technologies, carbon neutrality, efficient resource utilization, and ecological investments. Furthermore, the experiences of developed and developing countries in implementing green economy models are scientifically explored. The article also analyzes the prospects and challenges of implementing green transformation in the economy of Uzbekistan. The findings demonstrate that the green economy is an important strategic direction for ensuring environmental security, increasing economic efficiency, and achieving sustainable development.

Keywords: green economy, sustainable development, ecological innovations, renewable energy, carbon emissions, green investments, environmental policy, resource efficiency, climate change, digital transformation.

In the 21st century, the rapid development of the global economy has led to the intensification of environmental problems. Air pollution, depletion of natural resources, climate change, water scarcity, and the reduction of biodiversity are forcing the international community to search for a new economic model. In this context, the concept of the “green economy” has become one of the most relevant directions of modern economic policy.

A green economy is an economic system that harmonizes economic growth with environmental security and social welfare. This model focuses on energy efficiency, waste reduction, rational use of natural resources, and the development of renewable energy sources. The United Nations and international financial institutions recognize the green economy as one of the key mechanisms for global sustainable development.

Currently, many countries are striving to reduce carbon emissions through the “green transformation” of their economies. The European Union’s Green Deal program, China’s carbon neutrality strategy, and the United States’ ecological investment programs are clear examples of this process. At the same time, the transition to a green economy is becoming strategically important for developing countries as well.

The concept of the green economy first began to be widely used in scientific research on ecological economics in 1989. Later, this concept evolved into a model that integrates environmental safety with economic sustainability.

The main principles of the green economy include:

- rational use of natural resources;
- increasing energy efficiency;
- implementation of environmentally friendly technologies;
- reduction of carbon emissions;
- development of renewable energy sources;
- promotion of green investments.

Unlike the traditional economic system, the green economy is based not on the principle of “high production – high consumption,” but rather on “sustainable production – environmental balance.” As a result, economic growth can be achieved without harming the environment.

In recent years, countries around the world have been implementing large-scale green policies to reduce environmental problems. In particular, the European Union plans to transition to a carbon-neutral economy by 2050. This strategy includes industrial modernization, development of ecological transport, and expansion of renewable energy use.

China is currently one of the world’s largest investors in solar and wind energy. By developing exports of green technologies, the country is strengthening its competitive advantage in the global market. The United States is also among the leading countries in ecological innovations and electric vehicle production.

The following factors play an important role in the development of the green economy:

1. **Technological innovations** – energy-saving equipment and environmentally friendly production systems.
2. **Government policy** – ecological taxes, subsidies, and incentives.
3. **International cooperation** – international climate agreements and investment programs.
4. **Financial mechanisms** – green bonds and ecological funds.

Today, the green finance market is also developing rapidly. The World Bank and the Asian Development Bank are investing billions of dollars in financing ecological projects.

One of the main directions of the green economy is the development of renewable energy sources. Solar, wind, hydro, and bioenergy are widely used today as environmentally safe energy sources.

The relationship between energy consumption and economic development can be expressed by the following formula:

$$E=P \times t$$

Where:

- E — energy consumed;
- P — power;
- t — time.

This formula plays an important role in calculating energy efficiency. In a green economy, reducing energy consumption helps optimize production costs.

Advantages of renewable energy include:

- environmental cleanliness;
- long-term economic efficiency;
- ensuring energy security;
- reduction of carbon emissions.

In addition, the growing popularity of electric vehicles is also considered an important element of the green economy. Electric vehicles not only reduce harmful emissions into the atmosphere but also decrease fuel costs.

Uzbekistan is also implementing large-scale reforms aimed at transitioning to a green economy. The country is paying significant attention to solar energy, wind power plants, and water-saving technologies.

Uzbekistan’s geographical location creates favorable opportunities for the development of solar energy. The republic experiences more than 300 sunny days per year, which increases the efficiency of solar panels.

At the same time, several challenges remain:

- high initial investment requirements for ecological technologies;

- insufficiently developed infrastructure;
- shortage of environmental specialists;
- weak green financing system.

To solve these problems, it is necessary to:

- develop public-private partnerships;
- support ecological innovations;
- attract international investments;
- strengthen environmental education systems.

Uzbekistan's "Green Economy Strategy until 2030" identifies the reduction of carbon emissions and improvement of energy efficiency as one of the country's primary objectives.

Climate change is one of the greatest global challenges of our time. Rising global temperatures are causing droughts, water shortages, and an increase in natural disasters.

The relationship between carbon dioxide emissions and environmental risks can be expressed by the following formula:

$$CO_2 = \sum_{i=1}^n E_i \times F_i$$

Where:

- E_i — volume of energy consumption;
- F_i — emission coefficient.

This model is widely used in environmental monitoring and carbon footprint assessment. The green economy proposes economic mechanisms aimed at reducing these emissions.

The green economy ensures not only environmental sustainability but also social and economic efficiency. In particular:

- new jobs are created;
- environmental awareness among the population increases;
- healthcare costs decrease;
- innovative economies develop.

Research shows that companies implementing green technologies achieve higher long-term economic efficiency. Therefore, many international corporations apply business models based on ESG (Environmental, Social, Governance) standards.

In conclusion, the green economy is one of the most promising directions of development in the modern global economy. This model supports economic growth and social welfare while ensuring environmental security. The development of renewable energy sources, implementation of ecological innovations, and efficient use of resources are becoming the main factors of sustainable development.

For Uzbekistan, transitioning to a green economy is also of strategic importance. By expanding ecological investments, developing green technologies, and implementing international experiences, the country can improve economic efficiency. In the future, the green economy will remain one of the most important mechanisms for solving humanity's environmental and economic problems.

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