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The Need and Priority Directions of Transition to a "Green Economy" in Uzbekistan

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Abstract: *This article examines the necessity and strategic directions of transitioning to a green economy in Uzbekistan. It analyzes the environmental, economic, and social challenges associated with traditional growth models and highlights the urgency of adopting sustainable development principles. The study emphasizes the importance of modernizing production processes, promoting renewable energy sources, and implementing environmental policy reforms. Special attention is given to national programs and international cooperation aimed at fostering ecological sustainability and green innovation. The paper concludes that a gradual but determined shift to a green economy is essential for ensuring long-term economic resilience and environmental protection in Uzbekistan.*

Keywords: *green economy, sustainable development, environmental policy, renewable energy, ecological innovation, Uzbekistan, economic transformation, climate change adaptation*

Introduction. Global problems related to the limited natural resources and the need for processing have a significant impact on the economic development of the world economy. The study of this scientific problem began to acquire relevance in the 60-70s of the XX century. century. As a result of the implementation of the principles put forward on the basis of the development of environmental economics and ecology economics in economic policy, the concept of "green economy" began to form. Unlike environmental economics or ecological economics, "green economy" is more practical in nature. The formation and development of the concept of "green economy" will be decided by introducing these ideas into the practice of ensuring sustainable development. Sustainable development is understood as development based on not jeopardizing the ability to meet the needs of future generations, considering this as a complete satisfaction of the needs of the population. The economic approach to ensuring sustainable development assumes the rational use of limited resources. The social approach will be aimed at ensuring social stability and cultural diversity on a global scale. The ecological approach should contribute to ensuring the normal functioning of ecological systems.

There is no single, generally accepted approach in the economic literature. to the concept of "green economy". If in some sources "green economy" is described as new branches of economy, promoting improvement of environmental protection, in other scientific studies it is noted that "green economy" studies new technologies, ecosystems, which provide assistance and benefit to nature. The third group of researchers believes that "green economy" means transition to a new stage of development, aimed at creation of environmentally friendly products.

In economic literature, the concept of "green economy" developed by specialists from the United Nations Environment Programme (UNEP) is widely used - "green economy" promotes "improvement of well-being and social equality of people, significantly reduces environmental risks and environmental deficit" [1].

In our opinion, the term "green economy" cannot replace the concept of sustainable development and is an important condition for achieving sustainable development. The following features are characteristic of the "brown economy" operating in the world: environmental disruption (climate change, global warming, loss of biodiversity), limitation of natural capital, increasing poverty levels, shortage of fresh

water, food, energy, economic and social relations between people and countries. According to the above reasons, the world, including Uzbekistan, should move from the "brown economy" to the "green economy". The formation of a "green economy" will ensure "green growth" and will contribute to the implementation of the sustainable development strategy.

The need to transition to a “green economy” in Uzbekistan is explained by the fact that most of the energy consumed in the national economy is generated using non-renewable organic natural resources, depletion of limited resource reserves, aggravation of environmental problems associated with environmental pollution, water shortages, drying up of the Aral Sea due to accelerated industrial development. Sustainable development of the economy of Uzbekistan, development of a long-term strategy for structural transformations requires taking into account internal and global processes and problems.

According to the UN World Meteorological Organization, the average annual air temperature in the world has now exceeded the 1880 level by 1 degree Celsius. In Uzbekistan, the average annual air temperature for the same period increased by 1.6 degrees Celsius (from 13.2 to 14.8 degrees). The intensity of warming of average air temperatures in our country exceeds the average rates observed on a global scale. Climate warming has a negative impact on the state of ecosystems, which leads to an aggravation of the environmental situation in the Republic of Karakalpakstan, Khorezm, Bukhara, Navoi , Kashkadarya, Samarkand and Surkhandarya regions.

As a result of global warming, the area of glaciers in Central Asia has decreased by approximately 30% over the past 50-60 years. Analysis has shown that with a temperature increase of 2 ^{0}C, the volume of glaciers will decrease by 50%, and with warming of 4 ^{0}C - by 78%. According to scientists' calculations, a decrease in water resources in the Syr Darya basin by 5% is expected by 2050, and in the Amu Darya basin - by 15%. As calculations by specialists show, the total water deficit in Uzbekistan for the period up to 2015 amounted to more than 3 billion m3 , by 2030 it may amount to 7 billion m3 and by 2050 - 15 billion ^{m3} .

The economy of Uzbekistan is among the top ten countries in the world in terms of energy and carbon intensity of GDP. Energy consumption per unit of GDP in the world in 1990-2024 decreased from 0.170 kg oe to 0.110 kg OE, this indicator in Uzbekistan decreased accordingly from 0.689 kg OE to 0.150 kg OE. Consequently , the energy intensity of GDP in Uzbekistan still remains higher than the world average. This indicator is twice as high as the level in the UK, Italy, Turkey, Spain, Germany. Despite the fact that the carbon intensity of the economy has sharply decreased in Uzbekistan, it is 1.5 times higher than the world average.

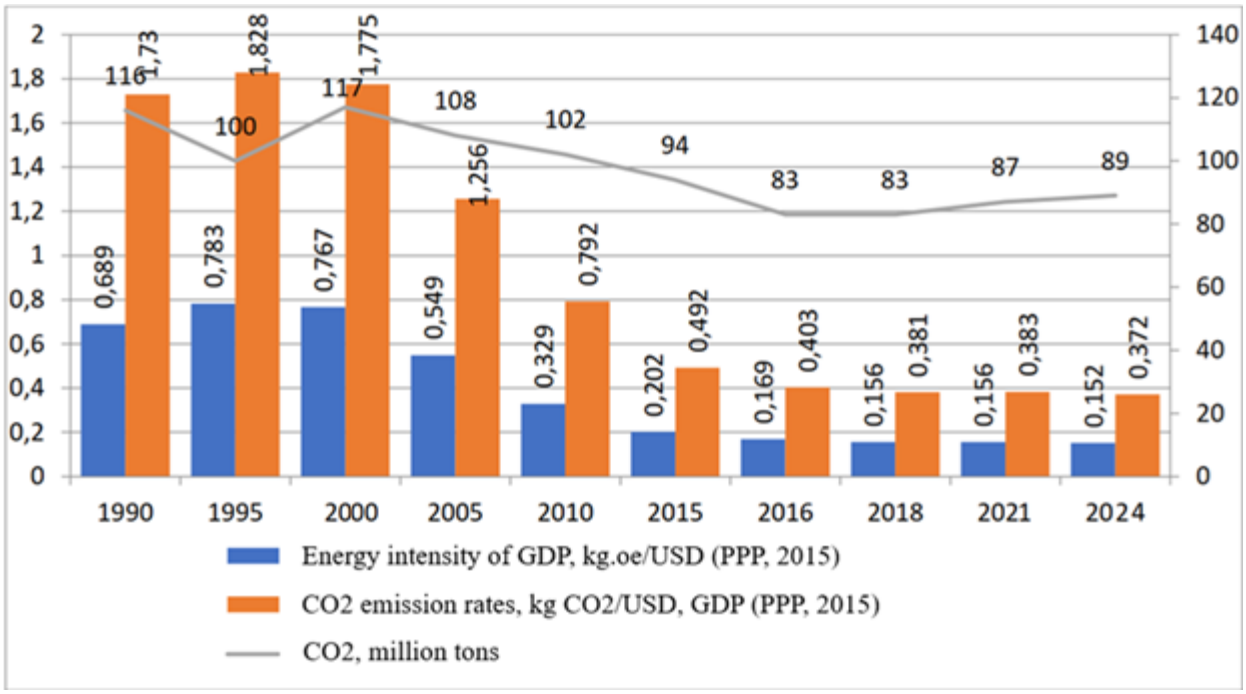

Fig. 1. Energy efficiency indicators of the economy of Uzbekistan [2]

As surveys show, most power grid facilities in the country have been in operation for more than 30 years, in particular, 66% of trunk and distribution networks, 74% of substations and more than 50% of transformer substations have been in operation for more than 30 years. This is one of the main factors leading to an increase in the level of technological losses in the distribution and supply of electricity. In 2012-2024, the demand for electricity was not fully satisfied, while electricity production during this period increased by an average of 2.6% per year. According to some estimates, in 2024, the deficit between electricity demand and supply was 9.4%.

Low energy efficiency of the national economy, low use of natural resources, slow pace of technological innovation, passive participation of small businesses in the implementation of innovative solutions for the development of the "green economy" hinder the achievement of sustainable development goals. In our opinion, the lack of a long-term strategy in this area did not allow for the implementation of "green technologies" and systemic measures for the transition to a "green economy".

In order to fulfill the obligations of the Paris Agreement of October 4, 2019, the President of the Republic of Uzbekistan adopted Resolution No. PP-4477 “On approval of the Transition Strategy

The Republic of Uzbekistan towards a “green” economy for 2019-2030”.

The objective of the Strategy is to achieve sustainable economic progress that promotes social development, reduction of greenhouse gas emissions, climate and environmental sustainability, through the integration of the principles of the “green economy” into the implemented structural reforms.

In Uzbekistan, in the long term, the transition to a “green economy” should be based on the following principles: compliance with the National Sustainable Development Goals and Objectives; rational use of resources, sustainable consumption and production; inclusion of environmental and social criteria in the economic accounting system; priority application of “green” instruments and approaches to achieve socio-economic development goals; achievement of existing macroeconomic goals by increasing competitiveness and growth rates of indicators in key sectors, creation of “green” jobs, improvement of the well-being of the population; ensuring investment the attractiveness of measures for the efficient use of economic resources.

The first priority area established by the Strategy is to increase energy efficiency in the basic sectors of the economy by 2 times by 2030. In particular, for this purpose it is planned to increase energy efficiency by modernizing the infrastructure of industrial enterprises, further using clean and environmentally friendly technologies and industrial processes by at least 20%, energy efficiency and environmental improvement of the production of motor fuel and vehicles, and the development of electric transport (Table 1).

Table 1 Target indicators for the implementation of the strategy for the transition of the Republic of Uzbekistan to a "green economy" for 2019-2030 [3]

Target indicators	Expected results
reduction of specific greenhouse gas emissions per unit of gross domestic product	A 10% decrease from 2010 levels
increasing energy efficiency and reducing the carbon intensity of the gross domestic product;	Double the amount
further development of renewable energy sources	increasing their share to 25% of the total volume of electric energy generation
ensuring access to modern, inexpensive and reliable energy supply for the population and economic sectors	up to 100%
modernization of the infrastructure of industrial enterprises, ensuring their sustainability through increased energy efficiency and wider use of clean, environmentally friendly technologies and industrial processes	not less than 20%
significant increase in water use efficiency in all sectors of the economy	implementation of drip irrigation technologies on an area of up to 1 million hectares and an increase in the yield of crops grown on them by 20-40%
production of basic types of agricultural food products.	increase in average productivity up to 20-25%

The second priority area is the diversification of energy consumption and the development of its use renewable energy sources in the transition to a "green" economy in the country.

The third priority area includes issues of adaptation and mitigation of climate change, increasing efficiency of use of natural resources and conservation of natural ecosystems.

The fourth direction of the strategy is aimed at developing economic mechanisms to support the "green economy", developing institutional foundations for the implementation of "green technologies", improving the regulatory framework in the field of the "green economy", and regulatory and control mechanisms.

Energy efficiency, integration of the principles of the "green economy" into education and science, increasing production potential and creating a favorable environment for the transition to a "green economy".

Uzbekistan has large reserves of renewable energy sources. In the structure of these sources, the predominant share is solar and wind energy. At the same time, one of the reasons hindering the development of this industry is the dependence of alternative energy sources on changing weather conditions. Wind generators are produced only at wind speeds above 5-6 m / s and provide energy for

an average of 3200-4300 hours per year in areas of Uzbekistan with high wind potential (the length of the year is 8760 hours). Solar photovoltaic The stations will operate only during daytime, cloudless and low-water periods, on average for 1500-2200 hours per year in areas of Uzbekistan with high solar potential.

The total potential of Uzbekistan in terms of renewable energy sources is 117,984 million toe , its technical potential is 179.3 million toe . A significant part of alternative energy comes from solar energy, the total potential of which is 51 billion toe , and the technical potential is equal to 177 million toe . The technical potential of solar energy is four times higher than the consumption of primary energy in the country. Favorable climatic and geographical conditions in Uzbekistan make it possible to use solar energy at the industrial level. The total potential of wind energy is 2.2 million toe . As calculations show, there is a possibility of its technical development by 19%. The total potential of geothermal energy is greater than the potential of solar energy and is 67 billion toe . Due to the underdevelopment of simple and cost-effective technologies, the possibility of technical development of this type of energy is about 0.3 million toe .

There are a number of factors in Uzbekistan that negatively affect the development of the green economy sector:

- High cost of production of renewable sources energy and their low capacity, compared to traditional energy sources, than in other countries. At the beginning of the 21st century, in countries with emerging market economies, the cost of generating electricity based on renewable energy sources remains high. Uzbekistan leads the group of countries in supplying cheap electricity to the population. According to Global Petrol Prices the cost of kWh of electricity in our country in 2020 averaged 2.8 cents, while in Kazakhstan it was 4.0 cents, Russia - 6.0 cents, Belarus - 7.2 cents; in developed countries: in Norway - 10 cents, in France - 21.6 cents,
- Great Britain - 26.1 cents, Germany - 36.6 cents [5].
- There are no economic mechanisms of financial support stimulating the use of renewable energy sources. Legal and institutional basis for the functioning
- Economic mechanisms, the use of renewable energy sources is insufficient.
- insufficient awareness of the population about the “green economy”, modern types of “green energy”, in particular about renewable energy sources;
- One of the factors hindering the impact on the scale of renewable energy use is the development of nuclear energy. According to research, the cost of producing environmentally friendly energy from renewable energy sources is approximately 20 times higher than at nuclear power plants. According to expert estimates, the world's coal reserves will last for 270 years, oil - for 50 years, gas - for 70 years. Uranium reserves used at nuclear power plants amount to 5,718,400 tons. It is calculated that it will last for 2,500 years. In some countries, the share of nuclear power plants in the total volume of electricity production is relatively high, in particular in France - 70.6%, in Slovakia and Ukraine - 53.9%, Hungary - 49.2%, Belgium - 47.6% of electricity is produced at nuclear power plants [4];

Organic agriculture exists in Uzbekistan. However, scientific criteria for classifying organic products produced in this way have not been developed . Despite the fact that organic farming products exist, there are no norms and standards confirming that they are truly environmentally friendly. Based on world practice, it is necessary to develop a legal basis for the introduction of standards for environmentally friendly products, their regulation and certification systems.

The priority areas for the development of financial and non-financial mechanisms for the development of a “green economy” in Uzbekistan in the long term are:

- Development of institutional bases for the implementation of "green technologies". In particular, it is necessary to assess technological needs, determine priority tasks and select the most advanced technologies that assist in their development. To develop an economic mechanism for the commercialization of "green technologies" and support innovative activities, it is necessary to create organizational structures - technology supply agencies, technology business incubators, technology parks, clusters;
- improvement of the regulatory framework for the development of the “green economy”, in particular, proposals should be developed for inventory, improvement of the regulatory framework covering the priority areas of the Strategy and the introduction into practice of a national system of indicators for assessing the “green economy”;
- Development of mechanisms for regulating and monitoring energy efficiency . In particular, a tariff should be introduced for guaranteed purchase of electric energy by enterprises of territorial electric networks from newly commissioned solar, wind and biogas power plants, micro and small hydroelectric power plants with an installed capacity of up to 1 MW. The identification of potential investors for the implementation of projects in the field of renewable energy sources (except hydroelectric power plants) on an industrial scale (1 MW and more) is carried out through transparent auction (competitive) bidding;
- integration of the principles of the “green economy” into education and science;

increasing the potential and creating a favorable environment for the transition to a "green economy", creating a system for monitoring, accounting and verification of greenhouse gas emissions taking into account national conditions for continuous tracking of the fulfillment of their quantitative commitments under the Paris Agreement, ensuring reporting on greenhouse gas emissions; developing the potential of public-private partnerships for the implementation of "green technologies"; assisting private investors in the implementation of "green innovations"; developing mechanisms to stimulate public "green procurement" with the introduction of a system for certification of energy efficiency of goods; taking into account the fundamentals of the "green economy" in the development of state educational programs for the training and retraining of personnel; developing research in areas related to mitigation and adaptation of the effects of climate change; strengthening cooperation between national and foreign scientific organizations in the field of creating “green technologies”.

- Support for "green investments": "green lending", introduction of a venture financing system; creation of "green" funds, special energy saving funds and other similar mechanisms; activation of the private sector in financing projects for the transition to a "green economy", support for sustainable growth of the "green economy" by the state on the basis of fiscal policy.
- The implementation of the proposed measures will increase the competitiveness of the national economy and facilitate the transition to a sustainable path of development based on the "green economy". "Greening" the national economy will contribute to the growth of the export potential of products with high added value through deep processing of natural resources, diversification of its structure and increasing the competitiveness of national companies in world markets.

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