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Transition to "green economy" in Uzbekistan: Opportunities and challenges

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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

«Green» economy has become a central theme in Uzbekistan's national agenda. President Shavkat Mirziyoyev has issued a number of decrees and initiatives that provide a clear «roadmap» for the transition to a green economy. These directives cover a wide range of measures, including:

- Promoting renewable energy sources such as solar and wind power to reduce dependence on fossil fuels.
- Implementing energy efficiency measures in all sectors of the economy.
- Creating a national waste management system with a focus on recycling and waste reduction.
- Preserving and restoring natural ecosystems, including forests, wetlands, and water resources.
- Investing in green technologies and infrastructure to support sustainable economic development.

Key Strategies and Programs to Stimulate «Green» Development. The Uzbek government is actively working to create a legal and institutional framework for the transition to a green economy. In 2019, Presidential Decree adopted the "Strategy for the Transition of the Republic of Uzbekistan to a Green Economy for the period 2019-2030," which is the main document aimed at integrating climate change issues into the sustainable development of the national economy.
The main goal of the Strategy is to achieve sustainable economic progress that contributes to social development, reduces greenhouse gas emissions, and improves climate and environmental sustainability through the integration of green economy principles into structural reforms.

To achieve these goals, the following tasks are envisaged:

1. Improving energy efficiency and rational use of natural resources through technological modernization and the development of financial mechanisms.
2. Integrating green criteria into state investments and expenditures based on international standards.
3. Supporting pilot projects for the transition to a green economy through state incentives, public-private partnerships, and cooperation with international financial institutions.
4. Developing a system for training personnel for a green economy through investments in education and cooperation with international educational and scientific institutions.

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5. Measures to mitigate the environmental crisis in the Aral Sea region.
6. Strengthening international cooperation in the field of green economy, including the conclusion of bilateral and multilateral agreements.

Presidential Decree of December 2, 2022, "On Measures to Increase the Efficiency of Reforms Aimed at the Transition of the Republic of Uzbekistan to a Green Economy by 2030", approved the following strategic documents and systems:

- Program for the transition to a green economy and ensuring green growth in the Republic of Uzbekistan until 2030, aimed at achieving strategic goals.
- Concept of the transition to a green economy and energy saving in industries.
- 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 sectors of the economy for 2022-2026, aimed at reducing the energy intensity of output by 20% by 2026 compared to 2022, etc.

International Cooperation and Investment in «Green» Economy. In recent years, the growing public awareness of environmental problems and the need for a rapid transition to a new type of green, low-carbon development in many countries has led to an increase in the number of various international and regional organizations, forums, and partnerships with a wide range of participants, contributing to the implementation of national programs and policies in the field of green economy.

Uzbekistan, as a country with a rapidly growing economy and significant environmental challenges, understands the importance of integrating green practices into its economy. Cooperation with international organizations such as the World Bank, the European Bank for Reconstruction and Development, the European Union, the French Development Agency, the Asian Development Bank, and the German Society for International Cooperation plays an important role in supporting the country's green economy, contributing to infrastructure modernization, job creation, and the development of local companies.

It is worth noting that in May 2022, Uzbekistan joined the Global Methane Pledge initiative. The initiative implies that its participants undertake to voluntarily take measures to reduce global methane emissions by at least 30% compared to the 2020 level by 2030.

In addition, in May 2023, the Ministry of Economy and Finance became a member of the Coalition of Finance Ministers for Climate Action. These principles include adapting policies to the commitments of the Paris Agreement, sharing experience in climate change, and mobilizing private investment to address climate challenges.

International cooperation and investment in the green economy are becoming key factors for countries striving for sustainable development. Uzbekistan, recognizing its environmental challenges and potential, is actively integrating green practices into its economy through partnerships with international organizations, creating opportunities for economic growth, infrastructure modernization, and improving the quality of life of its citizens.

Analysis and methods

As part of the "Innovative Application of Carbon Resources for Energy Transition – iCRAFT" project, the World Bank plans to allocate $46.2 million to Uzbekistan in 2024. This project aims to reduce greenhouse gas emissions through tariff reforms in the energy sector and establish trade in reduced greenhouse gas emissions.

In addition, as part of the "Assistance and Policy Advice to the Private Sector in Uzbekistan" project, implemented jointly with the German Society for International Cooperation (GIZ), €12.0 million is allocated to the Uzbek government to implement green industrialization projects.

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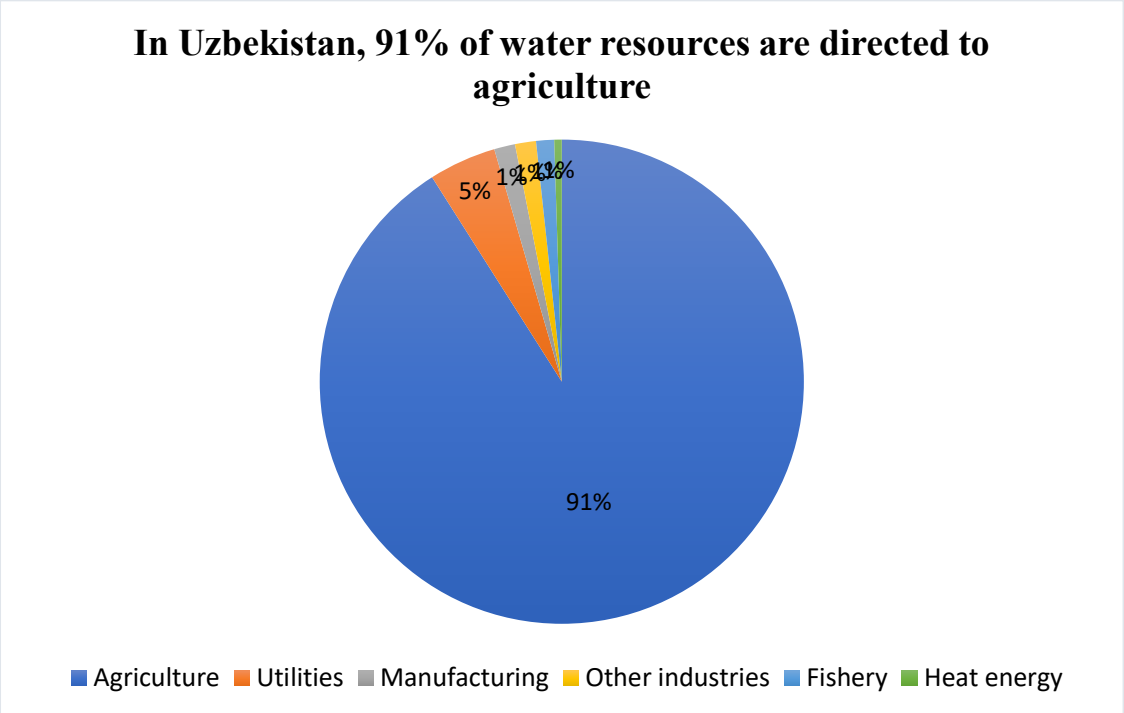
Thus, international partnerships and investments play a decisive role in Uzbekistan's transition to a green economy. The total inflow of investments and financing from international organizations allows the country not only to adapt to the challenges of climate change but also to create a sustainable economy capable of supporting social development and improving the quality of life of its citizens.

To date, Uzbekistan has achieved certain successes in the transition to a green economy. In particular, to develop and stimulate the use of renewable energy sources in the Uzbek energy system, a system of "green energy certificates" has been introduced. This system allows renewable energy producers to sell "green certificates" to end consumers, which confirms the "cleanliness" of energy and contributes to increased sales and exports, as well as attracting green investments and loans from international financial organizations.

At the same time, our country pays special attention to increasing sources of renewable energy: in recent years, 9 solar and wind power plants with a total capacity of 1.6 gigawatts have been connected to the network in Bukhara, Jizzakh, Kashkadarya, Navoi, Samarkand, and Surkhandarya. 6 hydroelectric power plants with a total capacity of 183 megawatts were launched in Andijan, Samarkand, Surkhandarya, and Tashkent region.

Uzbekistan is located in the heart of Central Asia, a region with a pressing problem of water scarcity. According to the World Resources Institute, Uzbekistan ranks 29th among the countries that will be exposed to high levels of water stress by 2040. The expected level of stress is projected to be more than 80% in the entire Central Asian region. These figures are depressing, especially considering the fact that Uzbekistan's population will exceed 42 million by 2040. According to projections, rapid population growth could lead to water shortages ranging from 44-46%. Given the growing demand for water resources and their rapid depletion, it is important to take appropriate measures to address the problem.

According to the forecasts given in the Presidential Decree dated 01.04.2023, by 2023, water resources are expected to decrease from the long-term norm by 10-15% in the Syrdarya river basin and by 15-20% in the Amudarya river basin. At the same time, the Concept of Water Sector Development of the Republic of Uzbekistan for 2020-2030 notes that the average annual volume of water resources used by Uzbekistan is 51-53 billion m3, of which 80% (about 41 km3/year) falls on transboundary rivers. Reduction of water volumes in the Amu Darya and Syr Darya rivers will have a significant impact on water availability in Uzbekistan, which will entail serious social and economic consequences.



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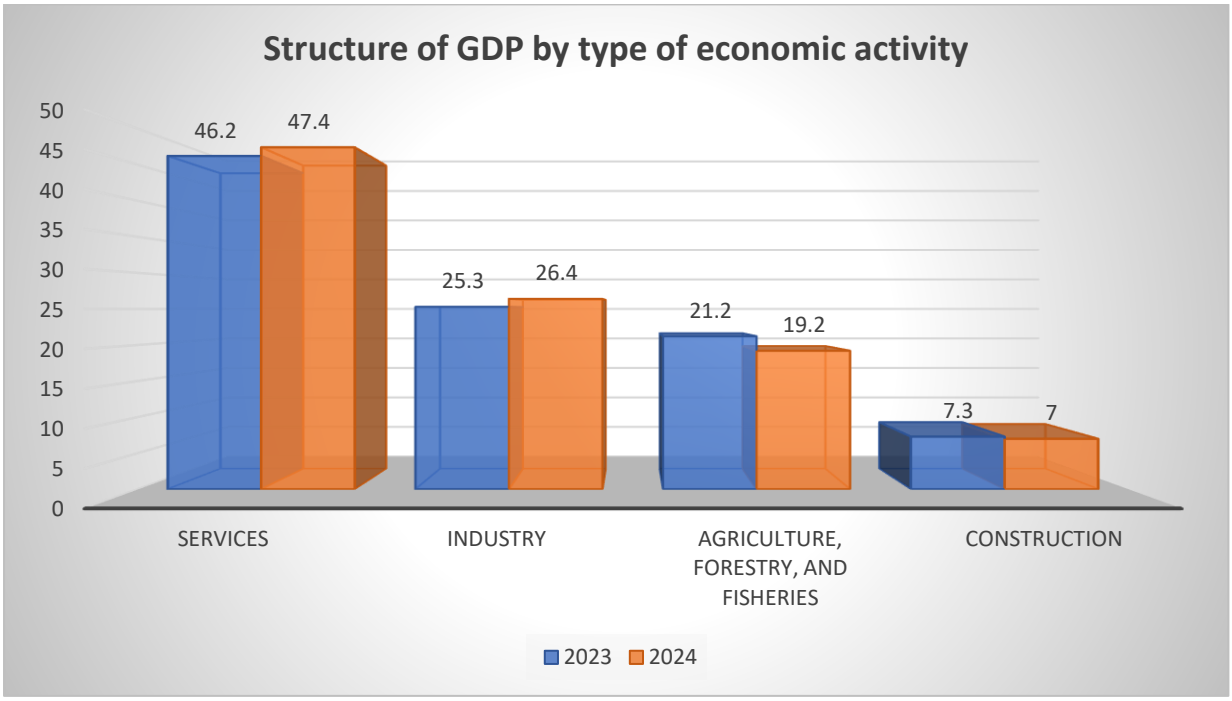
Source: Decree of the President of the Republic of Uzbekistan on Approval of the Concept of Water Sector Development of the Republic of Uzbekistan for 2020

In addition to the above-mentioned, it should be noted that in neighboring Afghanistan the Kosh-Tepa (Kushtepa) canal is under construction, 280 km long, 100 meters wide and 8.5 meters deep, which will allow Afghanistan to irrigate 550 thousand hectares of land. Currently, one third of the canal has been constructed. After completion of construction, Afghanistan's consumption of water from the Amu Darya may increase from 7 to 17 cubic meters.



Source: Agency of statistics under the President of the Republic of Uzbekistan

Gross value added created by all sectors of the economy amounted to 95.3 % of the total GDP and increased by 6.6 % (contribution to GDP growth - 6.2 percentage points). Net taxes on products in the structure of GDP amounted to 4.7 % and, compared to 2023, they increased by 6.0 % (contribution to GDP growth – 0.3 p.p.). According to the results of 2024, minor changes were noted in the sectoral structure of GDP. Thus, compared to 2023, the share of the service sector in the sectoral structure of GDP (GVA) increased from 46.2 % to 47.4 %, industry - from 25.3 % to 26.4 %, while the share of agriculture, forestry and fisheries decreased from 21.2 % to 19.2 %, construction - from 7.3 % to 7.0 %.

The decrease of water resources in the Amu Darya and Syr-Darya rivers will also affect the energy sector of Uzbekistan, as the country has more than 30 hydroelectric power plants, whose productivity depends, among other things, on the annual inflow of water from these rivers[1]. Already in 2021, according to the Ministry of Energy of Uzbekistan, the total volume of electricity production at hydroelectric power plants decreased by 23% due to low water levels. At the same time, in terms of shares of electricity sources in Uzbekistan, hydropower accounts for the largest share – 11.9%. Electricity deficit in the country, in turn, is equal to 10-15%, as a result of which there is a shortage of electricity not only for the population, but also for enterprises, and the reduction in the capacity of hydroelectric power plants will further exacerbate this problem.

Renewable energy: salvation or reversal? Unfortunately, alternative or renewable energy sources are not so sustainable and stable in terms of power generation. The operation of green energy sources depends on many different factors and has its positive and negative sides. Paradoxically, the increasing use of renewable energy sources, in particular solar energy, is increasing dependence on traditional forms of energy such as coal. For

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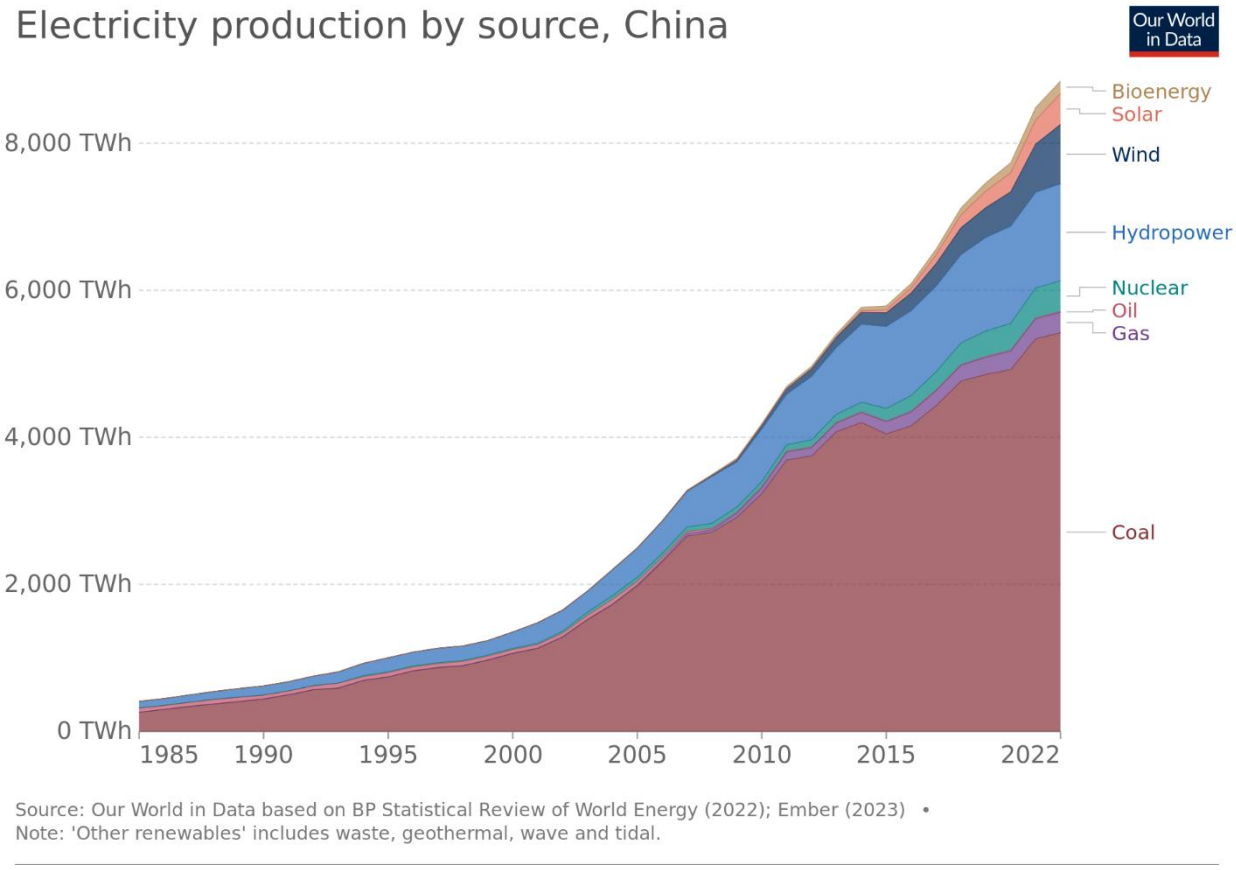
example, China, despite huge investments in solar energy and an increase in the number of solar power plants, continues to use coal to cover electricity outages caused by river shoaling caused by drought and heat, resulting in low power generation at hydropower plants, as well as instability of electricity supply during the day and due to climate change.



This is not the only problem associated with the use of RES. The issue of environmental pollution during their production and further disposal is becoming topical, leading to a number of discussions and protests by environmental organizations and activists.

Risks and threats of renewable energy. Solar renewable energy sources, including solar panels, wind turbines are considered by some to be one terrific piece of green technology. While others label the wind turbine, for example, as too noisy, overly bulky, or dangerous to biodiversity.

The potential amount of green energy waste is alarming. Bloomberg New Energy Finance estimates that by 2025, spent batteries recovered from electric vehicles will weigh 600,000 tons.

The International Renewable Energy Agency (IRENA) predicts that the same number of old solar panels will have accumulated by then. IRENA expects the number of used solar panels to reach 78 million tons by 2050. In Europe, up to 300,000 tons per year of decommissioned wind turbine blades could accumulate over the next two decades, according to trade association WindEurope.

The problem of disposing of turbine blades is one of the pressing problems associated with the operation of wind power plants (WPPs). Currently, up to 90% of everything in a wind turbine can be recycled. The problem lies in the blades. The blades are made of composite materials and are designed for long-term use, not recycling. One wind blade is about 40 meters long, weighs seven tons and makes up the 10% of a wind turbine that is difficult to recycle. This 10% has sparked a worldwide debate about the sustainability of this renewable energy source. Today, most of these blades are reused. However, the number of blades that will be retired in

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five or ten years will be so large that the entire system will have to be changed. Solar panels that use chemicals such as mercury, arsenic, chromium and other elements that are dangerous if not disposed of properly can also cause serious damage to the environment. There are also solar panels whose chemicals cannot be recycled, which can lead to soil contamination.

In addition to utilization, there is the issue of low capacity of solar panels at 220 W/m2 at their high prices. In particular, from the economic point of view, for consumers represented by citizens at the existing prices in the country it is more profitable to make a deposit in the bank than to install expensive RES. In Uzbekistan, the payback period for solar panels is about 8-9 years, which is due to low electricity tariffs. For comparison, in developed countries this period does not exceed 3 years. According to the Ministry of Energy, the purchase and installation of a 2 kW unit (2 TV sets, 1 refrigerator, lighting of several rooms) is estimated, depending on the brand, from 18 to 30 million soums. A 3 kW unit (+1 air conditioner) will cost 20-45 million soums, while the average annual income per person is approximately 46.68 million soums. From this we can conclude that the majority of the population cannot afford the purchase and installation of solar panels, which at the same time do not have sufficient capacity to fully cover their electricity needs. In addition, the production capacity of solar panels is significantly reduced if there is dust on its surface.

In order to maintain maximum power, the panels themselves need to be cleaned of dust and dirt on a regular basis, either with special equipment or with a certain amount of water. This again raises the issue of water scarcity. In addition, in cases of improper use of the panels, which will lead to their failure, repair of the equipment will be a difficult task, as the country does not yet have a sufficient number of service centers and specialists for technical maintenance.

The state initiative to install solar panels on at least 50% of the free part of the roof of commissioned multi-storey buildings, which is stipulated by the Decree of the President of the Republic of Uzbekistan № PP-57 from 16.02.2023 on acceleration of the introduction of RES and energy-saving technologies in 2023, makes the solution of these problems especially urgent. Realization of this requirement is possible provided that the following tasks are solved:

First, to solve the issue of panel surface contamination, you need to install a special system to clean the panels with air currents. This will save water.

Secondly, it is important to conduct an information policy to raise public awareness through an active mass information campaign, as low public awareness of the rules of solar panel operation can lead to a shorter panel lifetime or its rapid breakdown, which in turn can cause dissatisfaction among the population. Also important is the role of RES suppliers in informing and educating consumers on the rules of panel operation, and in expanding the maintenance network for the installed equipment.

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.

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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.

➢ 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 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.

Conclusion and suggestions

Thus, a solution to resource scarcity and the imminent energy crisis is possible if (in order of priority):

✓ improving energy efficiency;
✓ reducing losses in energy production and transit;
✓ modernization of existing facilities and construction of new ones;
✓ price liberalization;
✓ demonopolization of the electricity and heat energy market;
✓ diversification of energy sources and phased, rational introduction of alternative energy sources, in particular:
✓ ensuring maximum competitive environment in the RES equipment market and maintenance services market;
✓ ensuring regular monitoring and relevance of requirements to quality standards of imported, assembled and produced in the country equipment for RES and spare parts for them in accordance with international standards.

Given the rather high cost of alternative energy sources, the complexity of their proper operation and utilization, as well as relatively low electricity tariffs, it is not worth hoping that household and legal consumers will willingly switch to RES. Nor should we underestimate the probability of possible social unrest due to a sharp price increase as a result of tariff liberalization taking into account market realities.

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Therefore, it is vital to carry out these two processes step-by-step and in parallel, providing competent information support to consumers in the country – both legal entities and individuals.

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