REGIONAL DEVELOPMENT AND ENVIRONMENTAL PROBLEMS IN THE FORMATION OF A GREEN ECONOMY IN UZBEKISTAN

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Abstract. *The economic development of the Republic of Uzbekistan largely depends on traditional energy sources (gas, coal, water) with the help of which electrical energy is produced. Growing social tension in the world and the presence of deep-seated environmental problems are driving great interest in the use of new energy sources. One of the key issues for solving the country's economic development is the transition to a "green economy". Today, climate change is one of the main and real threats to our planet. One of the main problems is the lack of energy resources, as well as emissions from combustion products in the form of carbon into the atmosphere. The Republic of Uzbekistan is an energy efficient country. Providing electricity to the country's economy and population is especially critical. Taking into account the structure of the republic's economy as an industrial-agrarian one, the operation of power plants mainly through the use of gas and coal, objective prerequisites have emerged for improving the structure of the energy balance through renewable energy sources. The article outlines the current state of the energy industry, the need to introduce a green economy in the republic, problematic issues and ways to solve them.*

Keywords: *energy, green economy, water resources, power increase, electricity consumption.*

Introduction: The economic development of the Republic of Uzbekistan largely depends on traditional energy sources. Electricity generation is carried out by generation at thermal stations, accounting for 87.3% of the total installed capacity, and at hydroelectric stations (12.7%).

Growing social tension in the world and the presence of deep-seated environmental problems are driving great interest in the use of new energy sources. One of the key issues for solving the economic development of the Republic of Uzbekistan is the transition to a "green economy".

What is the essence of the "green economy"? Experts and scientists have proposed to define it as a trend in economic science, which involves the simultaneous preservation and development of the biosphere and civilization, and as a way of conducting economic activity that is aimed at improving the well-being of people without risks to the environment.

Today, climate change is one of the main and real threats to our planet. One of the main problems is the lack of energy resources, as well as emissions from combustion products in the form of carbon into the atmosphere. For several years now, countries around the world have been smoothly transitioning to a green economy.

In the modern world, several areas of the "green economy" can be distinguished.

The main ones are:

- introduction of renewable energy sources - solar and wind energy, wave energy, hydropower, tidal energy, hydrothermal energy, liquid diffusion energy, biofuel and others. Of these types of renewable energy sources in Uzbekistan, the main and applicable ones are solar and wind energy, as well as hydropower. According to the Ministry of Energy of the Republic of Uzbekistan, by 2030 it is planning to build 17 solar stations in the republic worth 4.8 billion dollars,

which will increase electricity production by 15.3 billion kW per year. 4.5 billion cubic meters of gas per year will be saved, hydrocarbon emissions will be reduced by 6.0 million tons per year.

Target indicators for the construction of solar power plants until 2030.

Table 1

Solar stations	17
Total project capacity	7000 MW
The total cost of projects	4.8 billion dollars
Annual production volume	15.3 billion kW
Annual natural gas savings	4.5 billion cubic meters.
Reduction of annual harmful emissions	6.0 million tons.

By 2030, it is also planned to build 11 wind farms. The total cost of the projects is 6.0 billion dollars, the annual energy production will be 17.5 billion kW per year. Gas savings in this case will amount to 5.2 billion cubic meters per year. Hydrocarbon emissions into the atmosphere will decrease by 6.7 million tons. These projects will be implemented through loans from the World Bank, the European Bank for Reconstruction and Development, the Asian Development Bank and other investments.

Target indicators for the construction of wind power plants until 2030.

Table 2

Number of projects	11
Total project capacity	5000 MW
Total cost of projects	6.0 billion dollars
Annual production volume	17.5 billion kW
Annual natural gas savings	5.2 billion cubic meters.
Reduction of annual harmful emissions	6.7 million tons.

By 2024, it is planned to introduce in the republic:

• 9- CCGT (steam-gas units) with a total installed capacity of 6010 MW;

• 5-GTU (gas turbine units) with a total capacity of 844 MW;

• coal blocks with a total capacity of 620 MW;

• HPP with a total capacity of 613 MW;

• RES with a total capacity of 4000 MW, incl. solar 2400 MW, wind – 1600 MW.

• By 2030, it is planned to increase the capacity of solar power plants to 5 GW and to 3 GW of wind power plants.

Is there really a need for such an aggressive expansion of renewable energy sources in the republic?

The energy industry of the republic faces large-scale tasks to increase the production of electrical energy using renewable energy sources. The specific, necessary task is related to the reduction of natural gas and coal reserves currently used in the production of electricity.

This problem faces the entire world community. Until recently, individual countries (especially European states) actively moved to a “green economy”, where the use of oil, gas, coal in the production of electricity was rejected, and the power of nature (wind, sun, water) was actively used).

However, against the background of the deepening global economic crisis, many countries began to reactivate coal mines and thermal power plants to generate electricity.

Among the world powers, Russia and China are moving in two directions of energy development. In our opinion, the Republic of Uzbekistan should also move in this direction.

According to the concept of development of the energy industry of Uzbekistan, the total demand for electricity by 2030 will increase to 120.8 billion kWh, or 1.86 times compared to 2019 (65.0 billion kWh), an average of 5.8% per year.

In recent years, Uzbekistan has faced a very serious problem of shortage of water resources. National goals and objectives in the field of sustainable development also include the proper management of water resources, ensuring universal access to safe drinking water, and providing the country's agriculture with water for irrigation. This problem has a more global level on the scale of Central Asia. In Uzbekistan, 90% of fresh water is used for agricultural needs, and 10% for municipal and industrial needs. To avoid the threat of drought, according to the UN, since 2019, Uzbekistan has been building 7 reservoirs in the Tashkent, Jizzakh, Kashkadarya and Samarkand regions with a total capacity of 45 million cubic meters. Thereby, 1 million 200 thousand hectares of agricultural land will be provided with stable irrigation.

One of the main priorities of the green economy is the development of clean transport. The less transport produces exhaust gases, the less nature will be polluted. In this regard, our country has a number of incentive preferences for the purchase and use of green transport.

At the same time, for the effective implementation of the “green economy” in the republic, certain recommendations can be offered, taking into account the experience of developed countries. The main ones:

- state management of the environment.
- resolving tax issues
- encouragement in the production of environmentally friendly products
- disclosure of information on the impact of business entities on the environment and others.

Over the past years, in the Republic of Uzbekistan, as in many neighboring regions, there has been an intensification of the struggle for energy resources, especially hydro resources, which ultimately implies the need for a transition to a “green economy.” The problem of energy saving, which is directly related to environmental issues, is becoming more acute. The use of traditional energy sources leads to environmental pollution, which in the modern world raises the issue of economic and environmental safety and is a global problem of our time. According to the Organization for Environmental Development (OECD), by the end of 2025, 33% of the world's population could suffer from a lack of drinking water, and 10% of biodiversity will be lost by 2030.

The development of a green economy as an alternative to the existing “brown” one, is intended to become a driver of sustainable development.

Forecast data show that in developed countries, the consumption of renewable energy sources (RES) will increase by approximately 130% until 2040, mainly due to new renewable sources (solar, wind, etc.). In developing countries, the growth in RES consumption is expected to be within 80%. Ultimately, the share of renewable energy sources in the energy consumption structure will increase to 21%.

The Republic of Uzbekistan is an energy efficient country. Providing electricity to the country's economy and population is especially critical. Taking into account the structure of the republic's economy as an industrial-agrarian one, the operation of power plants mainly through the use of gas and coal, objective prerequisites have emerged for improving the structure of the energy balance through renewable energy sources.

The development of renewable energy sources in the republic will provide additional new jobs and give impetus to the development of industry in the regions.

However, when constructing solar and wind stations, it is necessary to take into account environmental problems, which have been especially acute in the country in recent decades due to the drying up of the Aral Sea.

Basically, it is planned to build 100-250 MW stations in Uzbekistan, which will occupy large areas. Climate change will negatively affect the efficiency of such stations. The increase in "dust storms" in recent years and the settling of dust on panels will ultimately affect the amount of electricity generated.

The construction of solar and wind stations will increase the costs for energy companies for the construction of 500-220-110 kV power transmission lines through which the generated electricity will be transported. All this will affect the cost of electricity supplied to consumers. Based on the results of studying the wind potential of the republic by national and foreign experts, it was revealed that on the territory of Uzbekistan there are two regions out of eleven where it is possible to build wind stations and receive solar energy (Republic of Karakalpakstan, Navoi region).

The introduction of "green" technologies that save fuel (not to mention their role in reducing atmospheric emissions), as well as nuclear energy, is a necessity that the Uzbek energy system, the basic generation of which consists of thermal power plants, will inevitably face.
The transition to renewable energy sources will have certain problematic issues that energy industry specialists will need to work on.

RES is characterized by such properties as variability and intermittency, and it should be expected that they will significantly influence the regimes of the power system. Until recently, the main feature of the electric power industry was that at any given time, the generation and consumption of electricity should be equal to each other. In recent years, various energy storage technologies have emerged that make it possible to store excess energy and use the accumulated energy when there is a shortage of it in the system. These technologies have not yet received industrial application in large quantities, primarily due to their high cost and their share is negligible.

Therefore, energy system dispatchers operate based on the requirements of maintaining the balance of generation and consumption.

With the intensive development of renewable energy sources, in parallel, at an accelerated pace, it is necessary to develop the republic's electric grid economy. The construction of wind and solar power plants without the construction of transmission lines and substations will lead to inevitable problems throughout the energy system.

It should be noted that the construction of 1 km of 500 kV overhead line in Uzbekistan currently costs 400.0 thousand US dollars, 200 kV overhead line - 150-180.0 thousand dollars, 500 kV substation - 80.0 million, Substation -220 kV. - 45.0 million US dollars.

Over the past decade, the cost of construction of these facilities in the country has increased 1.5 times. The costs of installing wind farms in European countries also increased by 1.5 times.

When constructing renewable energy facilities, much attention should be paid to their service life; all of them last no more than 20-25 years. The installed power factor of the power system depends on this. This coefficient worldwide is:

NPP - 90%

TPP - 75%

Wind stations-24%

Solar stations - 22%.

Therefore, a new solar station with a capacity of 100 MW will actually have much less power.

It is also necessary to take into account the fact that new wind and solar stations in the republic are being built near 500-200 kV overhead lines, through which electricity will be subsequently transported, which has obvious disadvantages. Consequently, in order to deliver generated electricity to consumers, it is necessary to erect new wind and solar stations near the 110-35 kV overhead line and transmit the generated electricity through these networks directly to consumers.

Based on this, we can identify the main obstacles to large-scale integration of renewable energy sources in Uzbekistan:

1. Large mobile power reserves are needed to compensate for imbalances caused by the variability of renewable energy sources. (In China, where the share of renewable energy sources is 17%, problems arise with power regulation).

2. For the efficient use of water resources, the influence of renewable energy sources on the creation of peak capacities, it is necessary to make maximum use of all the hydro resources of the countries of Central Asia, for which purpose it is necessary to effectively use existing reservoirs, as well as build new ones. Accelerate the solution to the issue of joint development of the significant hydro potential that exists in Tajikistan and Kyrgyzstan, by participating in the construction of such large hydroelectric facilities as the Rogun hydroelectric power station (3600 MW) or the Kambarata hydroelectric power station-1 (1900 MW), as well as new pumped storage power plants.

3. Create and build storage devices for generated electrical energy from renewable energy sources, that have a high cost.

4. Develop uniform technical requirements for generation facilities operating on the basis of the use of renewable energy sources, operating as part of the energy systems of the countries of Central Asia.

5. Use a vertical layout of solar panels, oriented from East to West, which will allow creating two maximum solar power plants, bringing them closer to the peak hours of load in the system.

6. Transition to “summer” time (in Uzbekistan, the period of activity of the SES is from 05:00 to 19:00.) For information, in the state of California, summer time is from 7:00 to 21:00.

Conclusions and proposals: when transitioning to alternative energy sources, it is necessary to take into account all existing environmental problems, the economic development of the country, and relations with its closest neighbors. In our opinion, instead of large solar stations, it is necessary to build small 10-15 MW stations in the republic, the energy of which will supply consumers in nearby areas. It is also necessary to take into account when constructing solar and wind stations the issue of storing the generated energy (joint construction of battery stations).

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