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THE USE OF RENEWABLE ENERGY SOURCES IN UZBEKISTAN

Abstract: Uzbekistan is considered one of the richest countries in terms of renewable energy sources which exceed the current annual volumes of production of fossil fuels by a factor of three. Solar energy is the most promising renewable technology for Uzbekistan as it is accessible nationwide for many days of the year. Increasing use of solar energy in Uzbekistan can make more gas available for export while meeting the national demand for electricity and heating, especially at remote locations. [1] In this article we discuss the use of renewable energy resources in our country.

Key words: Renewable energy, Uzbekistan, solar radiation, solar power resources, wind power resources, solar plant, small hydro power resources.

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Introduction

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Today, the world economy is experiencing a great need for energy resources. Therefore, the problem of ensuring a balance between nature and man, saving natural resources in achieving sustainable development, and using renewable, environmentally friendly energy sources is becoming more and more urgent. Renewable energy sources (RES) play an important role in meeting energy needs in countries with growing economies. Biomass, geothermal and hydro energy, solar and wind energy are of great interest to various countries. Indeed, the energy balance can contribute to the most rapid solution of

such a social problem as ensuring public access to electricity and heat, even in remote areas

The singularly important role energy plays in human lives, and in society as a whole, has made it possible to increase many times over the possibilities for satisfying various human and social needs. The progress of human civilization has always been closely associated with the amount and types of energy utilized. Hydropower potential of rivers, reservoirs and irrigation canals; solar energy; wind energy; biomass energy (including energy from household wastes); tidal energy and energy from ocean waves; and geothermal energy constitute the range of alternative energy options. Renewable sources of energy are theoretically very desirable but

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the costs associated with them and the conditions in which they produce energy make their use less attractive. The world's progress in the field of technology to transform and application of various types of renewable energy sources (RES) and assess of the technical feasibility based on these sources electrical and thermal energy demonstrate possibility of satisfying current and future needs of Uzbekistan in power for the long term. This can be done through a phased use of renewable energy and the creation of environmentally safe sources of electricity and thermal energy for different purposes and different power levels for use in the electric power system of the country, in district heating systems, as well as decentralized sources in energy supply to various customers in various sectors of the economy of different regions of the country.

Materials and Methods

Uzbekistan is rich in hydrocarbon resources, and is now almost completely energy provided from its own resources, but the country's economy is highly dependent on the use of non-renewable hydrocarbon resources in the first place -natural gas, whose share in the total energy exceeds 90% [2]. As Uzbekistan is considered one of the richest countries in terms of renewable energy sources, it has the potential to produce 50 billion t.o.e. based on solar energy, with current technology it would be possible to generate 175 million t.o.e, more than triple the amount of fossil fuel the country produces annually [3]. Moreover, the studied hydropower potential of Uzbekistan is estimated at 27.5 billion kWh per year. Currently, the country uses only about 39% of the technical hydropower potential. The wind and biomass potential of Uzbekistan exceeds 520,000 MW of installed capacity [4] and 6.3 milliard m³ of natural gas respectively [5]. Energy sector priorities to 2027 include increasing generating capacity, improving energy efficiency in the energy, transport and agriculture sectors, and using renewable energy sources more widely.

To expand the use of renewable energy sources, reduce energy intensity of production and implement the Strategy of Actions on Five Priority Directions of Development of the Republic of Uzbekistan in 2017-2021, Presidential Decree No. PP-3012 of 26 May 2017 on the Program of Measures on the Further Development of Renewable Energy and Energy Efficiency in Sectors of the Economy and the Social Sphere for 2017-2021 was adopted.[6]

- As part of the plan, the government plans to spend 314.1 billion UZS (\$81 million) of its own money and raise 20.5 trillion UZS (\$5.3 billion) from foreign sources to develop hydro, solar and wind power through 2025.

- Hydro accounts for 12.7% of all Uzbekistani electricity now. Uzbekistan wants to raise it to 15.8% by 2025

- Uzbekistan will build 42 new hydro plants and modernise 32 more by 2021

- Solar and wind will account for 2.3% and 1.6% of the country's power by 2025

Action Program on renewable energy development for 2017-2021 adopted on May 2017 to promote private sector investments in renewable energy development, serve as key indicators in this regard. Moreover, Presidential Decree on 23.10.2018 about measures of development providing financial stability of energy sector outlines the following reforms for 2019-2021 [7]

Increase installed capacity of main TPPs and modernizing them;

- Improving metering infrastructure;
- Modernizing transmission lines of 7.1 thousand km;

- Increasing renewable energy share in production by attracting private sector via Public Private Partnership agreements.

The value of all reform projects that are intended to implement through 2019-2021 is almost \$ 5bln. The primary sources of these projects are from Uzbekistan Reconstruction and Development Fund, Government budget and other international donors.

The strategy for improving of energy independence of Uzbekistan: According to the concept of development of power of the country became:

- At the first stage- development gas and oil branches, with the purpose of maintenance of fuel self-sufficiency of republic and stable, reliable work of an electro power system of the country; maintenance with fuel, raw material and thermal energy of all branches of economy with expansion of export of hydrocarbon raw material;

- At the second stage - development of coal branch, with the purpose of maintenance of increase its share in fuel and energy balance with stage-by stage replacement of a part of the natural gas used for manufacture electric and thermal energy;

- At subsequent stages - large-scale use of renewable power resources, in process of development of technologies and creation energy effective means, transforming renewable energy sources in electric, thermal, chemical, mechanical and other kinds of energy.

Conclusion

To conclude, Uzbekistan with its immense renewable potential can meet the country's all energy demand using only renewable sources of energy. However, hitherto Uzbekistan cannot make use of its potential relying heavily on fossil fuels as a source of energy. The use of renewable energy in Uzbekistan in particular photovoltaic solar panels is considered prospectively. Measures that the Republic accepts have a positive impact on the use of RES in different

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scales. In close future in Uzbekistan a big rise in the use of renewable energy will be observed.

Uzbekistan has the highest potential for solar energy. by the number of Sunny days per year, the Republic surpasses Spain, where solar energy is very developed. At the same time, solar energy is available throughout the country, and its involvement in the energy balance can contribute to the fastest solution of such social problems as providing the population with electric and thermal energy, even in remote rural areas. However, despite the fact that Uzbekistan has a huge potential for solar energy and experiments in this direction have been conducted in the country for decades, the solar energy market has never been created on a full scale. Currently, the use of solar energy in Uzbekistan consists mainly of the use of solar water heaters.

Currently, of all renewable energy sources, only hydropower from natural and artificial watercourses accounts for a significant share in our country. Other sources are still used only slightly.

Petrothermal resources are considered to be the most promising for energy use in the Republic – huge arrays of granitoids lying at a depth of 4-6 km, heated from 70 to 3000C.

To estimate the gross potential, averaged thermograms were calculated up to a depth of 3,000 m, taking into account the average statistical values of the heat flux density and thermal conductivity of rocks. Calculations have shown that the gross potential of geothermal energy contained in dry heated rocks (petrothermal resources), in the volume limited by the depth of 3 km and the area of the Republic of Uzbekistan, is 6700,000 million tons of n.e. Technical

possibilities for using petrothermal resources are not determined due to the lack of technologies. It should be noted that geothermal water is available in almost all regions of the Republic. The average temperature of these waters in the Republic is 45.50 C.

It is proposed to stimulate the accelerated development of renewable energy sources in Uzbekistan in the following main directions:

- formation of the legal framework for the use of renewable energy sources;
- stimulating investment in alternative energy, both external and internal;
- increasing access of the population and other consumers of electric and thermal energy to information about the implementation of alternative energy systems;
- introduction of a system of tariff incentives for alternative energy;
- implementation of the strategy for reducing the use of non-renewable energy resources in the Republic.

Thus, despite the evidence of an increasing shortage of non-renewable energy sources in the medium and long term, the development of renewable energy sources is a prerequisite for preserving the country's energy resources (oil, gas, coal) for the future generation, improving the environmental situation, given the significant potential of RES in Uzbekistan. Therefore, there is an urgent need for interest in the introduction of alternative energy sources at all levels of decision-making: the government, business entities and the population.

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