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RENEWABLE ENERGY RESEARCH IN UZBEKISTAN: PROSPECTS AND CHALLENGES

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Annotation

In the world practice, the use of non-traditional energy sources is expanding, but in Uzbekistan this process is developing very slowly. The country's economy is built on the use of mainly hydrocarbon raw materials, which are mostly used for domestic needs. At the same time, natural gas is exported in ever-increasing volumes. At the same time, Uzbekistan has a great potential for alternative energy sources, which, according to experts, are three times higher than the resources of organic non-renewable fuel. The country has more than 300 Sunny days a year, windswept territories, and mountain rivers that can be used to generate electricity. Such a rich natural potential must be used for its intended purpose, and highly efficient renewable energy sources, whose popularity is growing all over the world, must be widely applied in practice. The article discusses the possibilities of efficient use of alternative energy in Uzbekistan.

Keywords: Wind Generator, Alternative Energy, Wind Power, Solar Energy, Energy Efficiency.

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Introduction

In The use of non-traditional and renewable energy sources in the fuel and energy industry is an urgent task of the world energy industry. One of their main types, which is environmentally friendly and affordable, is the energy of solar radiation. The use of non-traditional and renewable energy sources in the fuel and energy industry is an urgent task of the world energy industry [1].

One of their main types, which is environmentally friendly and affordable, is the energy of solar radiation. Uzbekistan has favorable climatic conditions for the use of solar energy, the energy potential of which is 98.5 percent of all renewable energy sources combined, so its use is relevant both for the purpose of ensuring energy security and improving the social and living conditions of the population. At the same time, the possibility of preserving hydrocarbon fuel reserves for future generations and mitigating the environmental situation in the country is of no small importance [2-4].

The main components of renewable energy sources in Uzbekistan are solar, hydraulic, wind and geothermal energy, as well as biomass energy. According to the results of the conducted assessments, the technical potential of renewable energy sources in the Republic of Uzbekistan is 180 million tons of oil equivalent, which is more than three times higher than its annual demand
for energy resources [5].

The most prepared area of large-scale use of solar energy in the country's economy, as well as in the whole world, is its conversion to low-potential heat using flat solar collectors for heating water and its use in hot water supply systems for residential, municipal and social facilities. It should be noted that in low-rise residential buildings, which make up 76 percent of the total housing stock, out of the total natural gas consumption (15,100 million cubic meters), only about 3,000 million cubic meters are spent on hot water supply. Analysis and generalization of world experience in this area show that the actual scale of solar energy use in hot water systems, all other things being equal, depends on the technical and economic indicators of their main element-a flat solar water heating collector, the scale of production and use of which is constantly growing worldwide. It should be noted that considerable experience has been accumulated in the field of thermal conversion and solar energy use in Uzbekistan, and a sufficient scientific and technical reserve has been created. In particular, small – scale production of the main element of solar hot water systems-a flat solar collector-was organized; experimental individual and collective doublecircuit solar hot water systems were created and their main operational characteristics were determined; solar-fuel boilers have been developed for hot water

supply of a group of single-and multi-store buildings and industrial enterprises, as well as small towns and micro districts, which allow saving traditional fuel and energy resources. [6-9].

Materials and Methods

The The extensive use of alternative energy sources is in line with the priority objectives of each country and the tasks of energy security and is one of the rapidly developing directions of the energy sector.

Certain works are being carried out on the development of renewable energy sources in the Republic, first of all on the use of the potential of hydropower. Energy is currently the highest priority area of engineering science, which deals with the transformation, transmission, storage and use of energy. The history of the civilization of all mankind is connected with the consumption of energy of various types. The main feature of the modern world is an increase in energy consumption in all spheres of public life[10-12].

In the field of development and use of non-traditional renewable energy sources in Uzbekistan, the decree of the First President of the Republic of Uzbekistan "on measures for the further development of alternative energy sources" dated March 1, 2013, which became a program document in the planning and implementation of fundamental and applied research aimed at expanding the use of alternative energy sources, primarily solar[13].

In accordance with the Program of measures to reduce energy intensity and introduce energysaving technologies in the economy and social sectors for 2015-2019, approved by the decree of the President of the Republic of Uzbekistan dated May 5, 2015, our country is implementing a wide range of measures to ensure energy conservation in the economy and social sectors.

Construction of residential and social facilities using solar and energy-saving technologies continues[14-15].

In this work a powerful impetus was given the decree of the President of our country Shavkat Mirziyoyev, "About the program of development of heat supply system for the period 2018-2022 years," April 20, 2017, to speed up measures to increase quality and ensure uninterrupted supply of thermal energy to consumers, updating and modernization of fixed assets of heat supply

systems through the introduction of modern efficient and energy saving technologies, effective and rational use of energy resources[16-17].

In the roadmap "development of solar energy use in the Republic of Uzbekistan" for the period 2014-2031, it is noted that the share of solar energy use in the total energy

balance of the country by 2030 should be 6 percent. In 2016-2017, solar heating systems using solar water heating collectors were installed on a number of multi-store buildings in Tashkent. For example, a residential building on Navoi street has a hot water supply system with an area of 159.72 square meters of high-efficiency flat solar water heating collectors, and a residential building on Oybek street in Mirabad district has 40 vacuum-tube collectors for hot water supply with a total volume of 8 tons. Over the next half century, an increasing number of environmental risks on the planet have been causing serious concern to scientists. The increasing use of energy for economic development purposes is recognized as the main cause of the problem. [18-19].

The environment is polluted because of the harmful gases coming out of the power and heat stations and internal combustion engines that use organic types of fuel. Over the years, it has been undermining the ozone layer as a result of the massive release of the remains of harmful substances into the atmosphere, while on earth there is a global energy deficit. As a result, the change in the world's climate, the decrease in energy resources are closely connected with the problem of food scarcity, which puts enormous problems before humanity[20].

Production of electric energy using traditional energy sources in the form of minerals (coal, gas, oil) leads to environmental pollution due to carbon dioxide emissions into the atmosphere.

An increase in the concentration of CO2 in the atmosphere leads to global climate change and the formation of a greenhouse effect, and as a result, to possible environmental disasters. In this regard, the use of environmentally friendly renewable energy sources in the energy sector is an urgent and priority task. Renewable energy sources are solar, wind, hydro, biogas, geothermal, wave and current energy of the seas and oceans. Most types of renewable energy sources (RES) are derived from solar exposure. Such as the appearance of winds due to changes in temperature and atmospheric pressure, the formation of water resources due to evaporation from the seas and oceans[21].

As the above analysis shows, the production of electricity using traditional energy sources has a significant impact on the environment. All this in General creates the necessary prerequisites for the introduction of energy-saving and efficient technologies, the development of environmentally friendly and harmless types of energy. In this regard, the current urgent task of energy is to switch and increase the share of renewable energy sources that are environmentally friendly and harmless to the environment.

According to world energy data, the ratio of energy sources in global electricity production in 2018 was as follows: renewable energy sources(RES) 26%, including

the share of solar energy 3%, the share of wind energy 6%, other types of RES 17%, traditional energy sources (TES) – 74% (Figure 1). . [1-3].

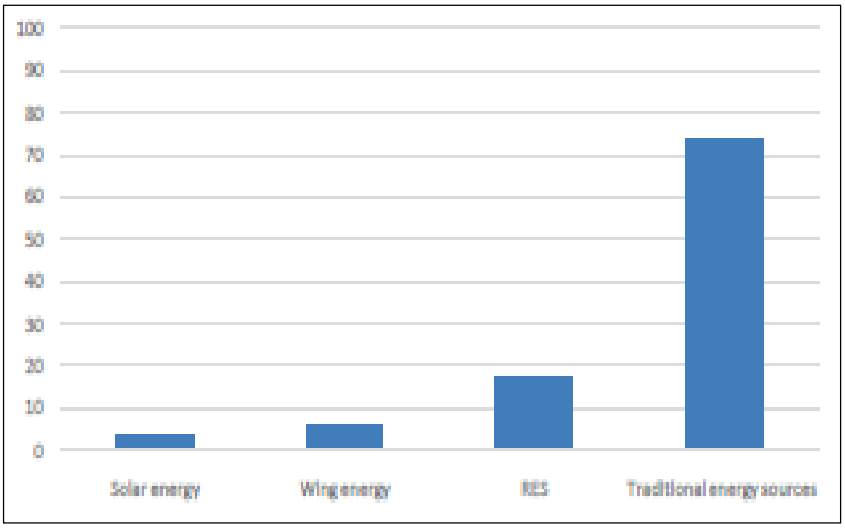

Figure 1. The ratio of sources of RES and TES in the global production of electricity.

Consumption and demand for electricity both around the world and in the Republic of Uzbekistan is growing every year. The reason for this is the intensive development of industry, manufacturing, construction and other sectors of the country, the growth of settlements and infrastructure facilities that consume electricity. The specific share of renewable energy sources (RES) in the total volume of electricity generation in Uzbekistan is currently 10%.

The remaining 90% of electricity comes from traditional energy sources (TES) (Figure 2). [1-3].

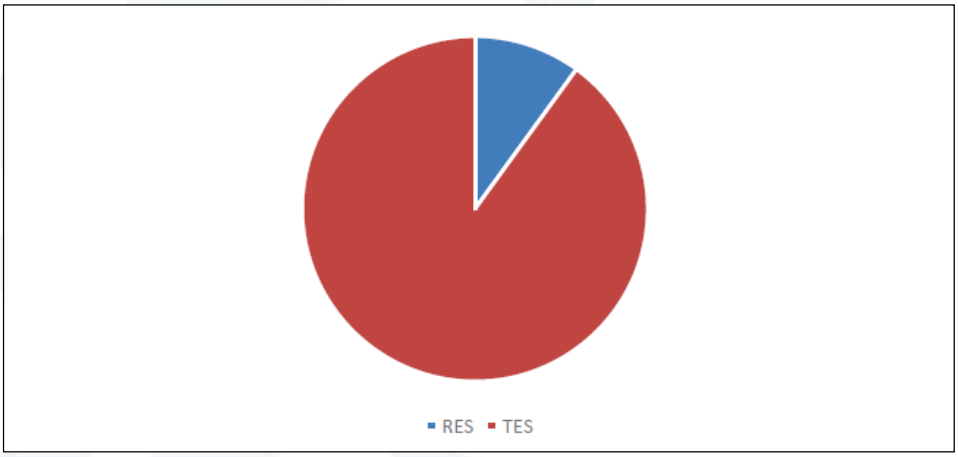

Figure 2.The ratio of RES and TES in electricity production in Uzbekistan

In this regard, the development and widespread use of solar energy in Uzbekistan are more relevant and promising.

There are various technological methods for using and converting solar energy, the use of which can produce a sufficiently large amount of heat and electricity.
The use of solar energy can be carried out by the following main installations and methods:
- Solar water heating installations (collectors) in which the heat carrier, water, air is heated. Such installations are widely used for heating and hot water supply.
- Solar power plants, in which solar energy is sent by various types of concentrators to the receiving surface to form steam, which rotates turbines that generate electricity.
- Direct conversion of solar radiation into electricity by means of photovoltaic converters (PVS) built on the basis of semiconductor materials.
All these technologies, power plants for the use and conversion of solar energy can be successfully applied in the climatic conditions of Uzbekistan. [10-12].

Conclusions

For the large-scale implementation of solar-based technologies, it is advisable to develop a regulatory framework, as well as state standards and all necessary documentation in the field of renewable energy sources, widely promote the experience of using solar-based technologies in the media, use economic mechanisms to encourage solar energy producers and consumers, select
the most promising investment projects and technologies for generating and using renewable energy sources, expand the production of equipment, components and materials used in technologies related to the use of alternative energy sources in the country.
In addition, it is necessary to organize experimental and applied research related to the use of alternative energy sources at the International Institute of solar energy and other scientific institutions of Uzbekistan on the basis of the existing scientific potential of the country and in cooperation with foreign research centers[13-15].
In General, as the First President of the Republic of Uzbekistan Islam Karimov noted at the 6th Asian solar energy forum, we have every reason to say that the problem of using solar energy at the present stage of development is steadily moving from the field of scientific research and experimental development to the field of practical application, and solar energy, like other types
of renewable energy, is becoming competitive, one of the cleanest ways to generate energy[22-24].

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