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Wind Mill and Solar Energy

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Key words: Nanoscale structures, laser irradiation, defect formation, traditional heat treatment, windmill and solar energy.

Renewable energy sources (RES) - energy from sources that are inexhaustible. Renewable energy is obtained from natural resources such as sunlight, wind, rain, etc. — which are renewable, i.e. replenished naturally. The basic principle of the use of renewable energy is to extract it from processes constantly occurring in the environment and provide them for use. In this direction, work is currently underway in the republic at the TSTU, at the FTI of the Academy of Sciences of the Republic of Uzbekistan, at the Institute of Chemical Physics of the Academy of Sciences of the Republic of Uzbekistan, etc. Solar panels are mainly considered in this direction, which ranks third in terms of renewable energy production in the world. Alternative energy not only provides the population with energy, but reduces the cost of energy supply, and also reduces the risk of environmental pollution. Provides the ability to provide remote populations with electricity offline. For such cases, developed universal autonomous solar power plants for individual use for electrification of farms and water lifting, academician M. Bakhadyrkhanov (TSTU). Our group collected scientific literature on RES. Among all the RES, our attention was drawn to the windmill and solar energy.

In 2006, about 18% of the world's energy consumption was met from renewable energy sources, with 13% from traditional biomass such as wood burning. The use of wind energy is growing by about 30 percent per year. Brazil has one of the largest renewable energy programs in the world related to the production of fuel ethanol from sugar cane. Ethyl alcohol currently covers 18 percent of the country's need for automotive fuel. Fuel ethanol is also widely available in the US.

A wind energy industry that specializes in converting the kinetic energy of air masses in the atmosphere into electrical, thermal and any other form of energy for use in the national economy. The transformation takes place with the help of a wind generator (to produce electricity), windmills (to produce mechanical energy) and many other types of units. Wind energy is a result of the activity of the sun, so it belongs to renewable types of energy.

The power of the wind generator depends on the area swept by the generator blades. For example, the 3 MW (V90) turbines manufactured by the Danish company Vestas have a total height of 115 meters, a tower height of 70 meters and a blade diameter of 90 meters.

Wind generators practically do not consume fossil fuels. The operation of a wind turbine with a capacity of 1 MW over 20 years of operation saves approximately 29 thousand tons of coal or 92 thousand barrels of oil.

Windmills that produce electricity were invented in the 19th century in Denmark. In 1890, the first wind farm was built, and by 1908, there were already 72 stations with a capacity of 5 to 25 kW. The largest of them had a tower height of 24 meters and four-blade rotors with a diameter of 23 meters. The predecessor of modern horizontal axis wind farms had a capacity of 100 kW and was built in 1931 in Yalta. It had a

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tower 30 meters high. By 1941, the unit capacity of wind farms reached 1.25 MW. Between the 1940s and 1970s, wind energy experienced a period of decline due to the intensive development of transmission and distribution networks, which provided energy independent of the weather at moderate prices. A resurgence of interest in wind power began in the 1980s when California began offering tax credits to wind power producers. The cost of electricity produced by wind turbines depends on the wind speed. If the wind speed does not exceed 5 m / s, and therefore the usual wind turbines with a horizontal axis of rotation are practically not applicable - their starting speed starts from 3-6 m / s, and it will not be possible to obtain a significant amount of energy from their work. However, today more and more manufacturers of wind turbines offer the so-called. rotary installations, or wind turbines with a vertical axis of rotation. The fundamental difference is that 1 m/s is enough for a vertical generator to start generating electricity. The development of this direction removes restrictions on the use of wind energy for electricity supply. The most advanced technology is a combination of two types of generators in one device - a vertical wind generator and FEM (photovoltaic modules) - solar panels. Complementing each other, together they guarantee the production of a sufficient amount of electricity in any territory and in any climatic conditions. Wind power is an unregulated source of energy. The output of a wind farm depends on the strength of the wind, a factor that is highly variable. Accordingly, the output of electricity from the wind turbine to the power system is highly uneven both in daily and weekly, monthly, annual and long-term sections. Considering that the energy system itself has load inhomogeneities (peaks and dips in energy consumption), which, of course, cannot be regulated by wind energy, the introduction of a significant share of wind energy into the energy system contributes to its destabilization. It is clear that wind energy requires a reserve of power in the energy system, as well as mechanisms to smooth out the heterogeneity of their generation. This feature of wind energy significantly increases the cost of electricity received from them.

Basic Research

Due to theoretical limitations in converting the spectrum into useful energy (about 30%), first and second generation photovoltaic cells require the use of large areas of land for power plants. For example, for a power plant with a capacity of 1 GW, this can be several tens of square kilometers (for comparison, hydropower, with the same capacity, takes noticeably large areas of land out of use), but the construction of solar power plants of such a capacity can lead to a change in the microclimate in the surrounding area and therefore, photovoltaic stations with a capacity of 1 - 2 MW are mainly installed near the consumer, or even individual and mobile installations. Photovoltaic cells at large solar power plants are installed at a height of 1.8-2.5 meters, which allows the land under the power plant to be used for agricultural purposes, for example, for grazing. The problem of finding large areas of land for solar power plants is solved in the case of the use of solar balloon power plants, suitable for both ground and sea and high-altitude basing.

The flux of solar energy falling on a photocell installed at an optimal angle depends on latitude, season and climate and can vary by a factor of two for a populated part of the land (up to three, taking into account the Sahara desert). Atmospheric phenomena (clouds, fog, dust, etc.) not only change the spectrum and intensity of solar radiation incident on the Earth's surface, but also change the ratio between direct and scattered radiation, which has a significant impact on some types of solar power plants, for example, with concentrators or on elements of a wide range of transformations.

Applied Research

Photovoltaic converters work during the day and work less efficiently in the morning and evening twilight. At the same time, the peak of power consumption falls on the evening hours. In addition, the electricity they produce can fluctuate dramatically and unexpectedly due to changes in the weather. To overcome these shortcomings, solar power plants use efficient electric batteries (today this is an insufficiently solved problem), or convert to other forms of energy, for example, building pumped storage plants, which occupy a large area, or the concept of hydrogen energy, which is not economically efficient enough. Today, this problem is simply solved by creating unified energy systems that redistribute the generated and consumed power. The problem of a certain dependence of the power of a solar power plant on the time of day and weather conditions is also solved with the help of solar balloon power plants.

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Relatively high price of solar cells. With advances in technology and rising prices for fossil fuels, this shortcoming is being overcome.

The surface of photopanels and mirrors (for thermal power plants) must be cleaned from dust and other contaminants. In the case of large photovoltaic plants, with their area of several square kilometers, this can be difficult, but the use of polished glass on modern solar panels solves this problem.

The efficiency of photovoltaic cells decreases when they are heated (mainly for systems with concentrators), so it becomes necessary to install cooling systems, usually water. Also, in photovoltaic converters of the third and fourth generations, for cooling, the conversion of thermal radiation into radiation is most consistent with the absorbing material of the photovoltaic cell (the so-called up-conversion), which simultaneously increases the efficiency.

After 30 years of operation, the efficiency of photovoltaic cells begins to decline. Used photocells, although a small part of them, mainly for special purposes, contain a component (cadmium), which is unacceptable to be thrown into a landfill. Additional expansion of the industry for their utilization is needed.

Bibliography

1. Zemskov, V. I. Renewable energy sources in the agro-industrial complex: study guide / V. I. Zemskov. - St. Petersburg: Lan, 2014. - 368 p. - ISBN 978-5-8114-1647-9. — Text: electronic //Lan: electronic library system.—URL: https://e.lanbook.com/book/47409.
2. Moskalenko, A. P. Environmental management. Mechanisms and methods: textbook / A. P. Moskalenko, S. A. Moskalenko, R. V. Revunov. - St. Petersburg: Lan, 2019. - 392 p. - ISBN 978-5-8114-3563-0. — Text: electronic // Doe: electronic library system. - URL: https://e.lanbook.com/book/122160
3. Nikitenko, G. V. Autonomous power supply of consumers using wind energy: monograph / G. V. Nikitenko, P. V. Konoplev. - Stavropol: SSAU, 2015. - 152 p. - ISBN 978-5-9596-1092-0. — Text: electronic // Doe: electronic library system. - URL: https://e.lanbook.com/book/82183
4. Yudaev, I. V. Renewable energy sources: textbook / I. V. Yudaev, Yu. V. Daus, V. V. Gamaga. - St. Petersburg Lan, 2020. - 328 p. - ISBN 978-5-8114-4680-3. — Text: electronic // Doe: electronic library system. - URL: https://e.lanbook.com/book/140747.