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Scientific and Economic Basis of Use of Wind Energies in Uzbekistan

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Abstract *- This article analyzes the scientific and economic foundations of the use of wind power plants in Uzbekistan and draws conclusions from the data obtained.*

Keywords: wind energy, wind speed, wind generator , wind flow power.

1. Introduction

Currently, the Republic of Uzbekistan is conducting effective research on the use of wind energy. An example is the construction of 6 large wind farms, the total capacity of which is 100 MW, together with German companies. It is assumed that the project will be launched before 2025. The total investment value is $ 250 million. Wind power stations are planned to be installed on the territory of Bukhara, Navoi , Kashkad, Arya, Tashkent regions , as well as the Republic of Karakalpakstan. Currently, the only project that receives energy through wind in Uzbekistan is the construction of 750 kW capacity near the Charvak reservoir in the Tashkent region [1] .

Measuring the instantaneous speed of wind equipment is also an important factor in determining its technical parameters. The average wind speed depends on the selected time interval T = (t_1-t_2) and the instantaneous value of v and the number of measurements n .

$$v_{cpeð} = \frac{\sum_{i=1}^{n} v_i}{n} \quad (1)$$

In order, to find a weight hourly space velocity, the sum of the velocity increases up to day 24 due to its weight hourly space velocity on average 1 per hour. The average wind speed will be different depending on the state of the day, months of the year, and seasons. Therefore, we consider the wind speed as daily, monthly, seasonal air currents. Long-term operation of wind generators and its reliability depend on the maximum wind speed in a given area. It is used in constructive calculations of wind power units, obtaining normal sizes when determining the drying strength, and aerodynamic characteristics of the blade unit are determined [2].

Options for maximum use of wind speed are determined by the formula:

$$F(x) = e^{\frac{-x^y}{\beta}}, \quad (2)$$

Here F (x) is the probability of preference for a given sum. x, y , β are the parameters of the equation. E ti parameters depend on the conditions. In metrological practice, when determining the relative wind speed, the following formula is used [1].

$$k = \frac{v_i - v}{v_{\max} - v_{\min}} * 100\% \quad , (3)$$

Here v_i is the instantaneous wind speed that we find during the measurement. *v is the* average wind speed over the selected time . v_{max} , $v_{min\ are\ the}$ maximum and minimum wind speeds during the time during which the calculations are carried out .

If we find the energy of the air flow, then it is in a state

$$E = mv^2 / 2, \quad (4)$$

From this

$$E = pv^3 F / 2, \quad (5)$$

p is the density of air. Under normal conditions, 1.23 kg / m3

From this it follows that wind energy varies in proportion to its speed . Modern wind generators are able to convert 35-40% of wind energy into electricity.

By putting various wind speeds in the formula for finding energy, we get the following table [3] .

Table 1. Dependence of wind speed on power.

Wind speed (m / s)	4	6	8	10	14	eighteen	22
Power flow (kW / m ^{2})	0.04	0.13	0.31	0.61	1.67	3.6	6.25

We can turn wind energy into electrical, mechanical or thermal energy using various mechanisms (generator, engine, compressor, electrolyzer, etc.). (5) using that

$$mv^2 / 2 = \frac{pv^3 F}{2} = pv^3 \pi R^2 / 2, \quad (6)$$

We find the wind energy utilization factor; we divide the output power from the wind generator by the total wind power [4] .

$$\xi = \frac{N_{gen}}{N_{wind}}, \quad (7)$$

Accordingly, the power of the wind generator

$$P = \rho v^3 F \xi / 2, \quad (8)$$

Wind energy is several hundred times greater than all the marine and river energy of the Earth. At first glance, wind energy seems to be the most convenient renewable energy source. Unlike solar energy, day is night, winter is summer.

For a more complete use of wind energy, wind farms are used, occupying a large area. There are basically 2 problems using wind power. Firstly, the inability to fully utilize their kinetic energy due to the fact that the wind is strongly dissipated. The second is that there is no constant airflow. It also causes a number of disadvantages when using wind power. Currently, the number of blades of the most commonly used wind pipes is 1-3 pieces. For the effective operation of such wind generators, the average wind speed should not exceed 6 m / s [5].

When we build wind generators in regions where the annual specific wind power is 500 W / m 2 , we can turn it 175 W into electricity. This means that its efficiency

$$\eta = \frac{P_{ген}}{P_{вет}} * 100\% = \frac{175}{500} * 100 = 35\%$$

This is approximately 35%.

Small mines are built mainly for battery life. Wind generators are able to provide the necessary power only in the presence of wind. This means that a second source is also necessary (for example, a diesel generator), since the wind does not blow or the wind speed is low so that the consumer does not disconnect from electricity. At this time, it cannot be connected directly to the electrical system.

And wind power plants of high power (with a capacity of more than 100 kW) can be used when connected to an electric system, taking into account the relative stability of energy. Typically, at large wind farm capacities, energy is accumulated through numerous wind turbines that are installed in a specific area. They cannot be placed so tightly, otherwise they can interfere with each other's work. Such syllables occupy a very large area. Giant power of the wind farm can be found in many countries, such as the USA , France , Denmark, England.

Wind farms are environmentally friendly.

Wind blows strongly from wind generators , separate power lines do not reach, in power centers use in remote areas gives more advantages. As an example of such places, we can give addresses with a small number of mountain residents. In areas where wind power is not constant, the energy supplied by the generator first accumulates in the batteries. Then, the frequency and voltage are regulated through the inverter and supplied to electrical consumers.

Conclusion

Every day, the cost of energy received from a wind farm is getting cheaper. The reason for this was the use of modern technologies, which arose as a result of the demand for wind devices, competition between manufacturers, and a drop in prices for wind equipment. A striking example is the fact that in the world today 1 kWh wind energy is 10 times cheaper e (from 40 cents to 4 cents) than in the 1994 years [1] .

There are also negative sides to syllables. Large wind farms impede the transmission of radio signals and adversely affect their quality. Prevents seasonal migration and (migration) of birds. In addition, infrared emitters of wind generators with a power of more than 20 kW have a negative effect on the auditory system and nervous system of surrounding people and animals. Therefore, it is advisable to build large wind farms outside the city.

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