Academicia Globe: Inderscience Research

ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

THE USE OF NON-CONVENTIONAL POWER SOURCES IS A REQUIREMENT OF THE PERIOD

Dehkanov Ulugbek Gafurovich
Associate Professor Namangan Engineering Construction Institute
Namangan, Uzbekistan.

Zokirjon Mahmudov Sotivoldievich
Associate Professor Namangan Engineering Construction Institute
Namangan, Uzbekistan. zokirjon.1956@mail.ru

Annotation

This article deals with the problem of obtaining electricity from wind, which is one of the unconventional methods of obtaining energy. In it, the energy potential of the wind region is calculated relative to the annual wind speed. The data provided provide a summary of how the wind speed of the unit should be adjusted, and a preliminary indication of how well the planned amount of money will be spent to fully cover the wind speed range.

Keywords: Wind, speed, area, electric power, potential, repetition, period, aggregate, nominal, mode, rotor, wind speed, Havos wind.

The most important difference of the twenty-first century is that the economies of countries around the world have entered a phase of rapid development. New production facilities, plants and factories are being built and put into operation. This is especially true in Uzbekistan, which is experiencing the third Renaissance. The issue of power supply, which is the most necessary for the implementation of large-scale works, emerges as a serious issue. The agreement with the Russian government on the construction of a nuclear power plant, including the existing thermal power plants, hydroelectric power plants, the establishment of a separate institute for the production of electricity from solar energy, all this is part of the work to increase electricity consumption. enters. In addition to the traditional sources of electricity listed above, the use of wind energy is also important due to the geographical location of the territory of Uzbekistan. This article is based on the relevance of wind power generation in our country.

When using wind power units, first of all, it is necessary to study the wind characteristics. We all know that wind is a natural process that serves as a heat exchanger for two regions, and it has a local and global character. Uzbekistan is divided from local wind zones into mountain-valley and regional heat exchange winds. In contrast, winds with periodic changes in opposite directions occupy large areas. For example, the winds of the mountain valleys are morning and evening, while the winds in the Fergana Valley and the "Hungry Reserve" change their direction depending on the seasons. Therefore, there is a need to design structures whose operating mode is independent of wind direction. Figure 1 below provides an overview of the new design of such rotors designed by the authors [1].

ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

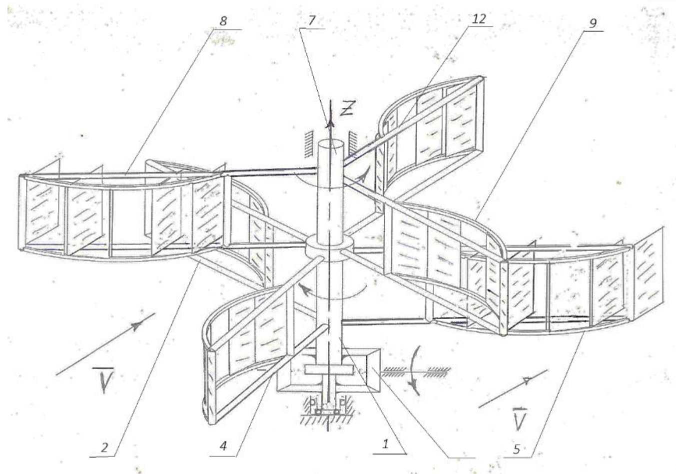

Figure 1. Rotor "Samarkand". LAP 20200106

This rotor consists of two tiers rotating in opposite directions and operates in a way that is absolutely independent of the direction of the wind vector.

Also, the repetition of the wind speed of each wind zone, the scale of the area is also important. Using the database of the Metrology Center of the Republic of Uzbekistan for the last 50 years, it was found that there are more than 25 economically viable areas. The authors studied the Air Wind region, which is part of these areas (Figure 2).

It is known that data on wind speed are determined based on the height at which the flyer is installed 10 m. The wind speed increases with altitude according to the following formula:

$$V = V_1 \frac{\ell g\left(\frac{H}{H_0}\right)}{\ell g\left(\frac{H_1}{H_0}\right)} \quad (1)$$

The value of the elemental kinetic energy of a wind

$$dE = d\left(\frac{1}{2}\cdot\rho\cdot\ell\cdot H\cdot V^3\right) \quad (2)$$

This value can be expressed by the following equation [2]:

$$E = \frac{1}{2}\cdot\rho\cdot L\cdot\left(\frac{V_1}{\ell g\left(\frac{H_1}{H_0}\right)}\right)^3\cdot\left(3\cdot\int_{H_2}^{H_3}\left(\ell g\left(\frac{H}{H_0}\right)\right)^2 dH + \int_{H_2}^{H_3}\left(\ell g\left(\frac{H}{H_0}\right)\right)^3 dH\right) \quad (3)$$

Here ρ=1,21 kg / m3 - air density; L – the width of the area, 10-15 km; H_1 -10 m is the height at which the flyer is mounted, H_0=0,2 m. altitude at which wind speed is zero; H_2 and H_3 height is used in the

Academicia Globe: Inderscience Research
ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

range of use of wind energy flow and in the world experience in the range of 30 meters to 600 meters [2].

Before determining the economic performance of a region, it is advisable to study the data required for Equation (3). Without clarifying them, mistakes can be made in the use of wind energy and the cost-effectiveness may not be appropriate.

Let's get acquainted with the characteristics of the Havos wind zone. It is a wind that starts in the Fergana Valley, passes through a narrow mountain range between the Koramin and Turkestan ridges, and blows towards the Mirzachul ("Golodnaya Step") latitudes (Figure 2) [3].

The wind occurs due to the pressure gradient generated between the Fergana Valley and the Mirzachul region, i.e. both cold flow and hot flow in the valley are maintained for a longer period of time than the reserve. The wind does not reach much speed between Kokand and Sogd (Leninabad) regions and has a north-easterly direction. This corresponds to the orientation of the valley.

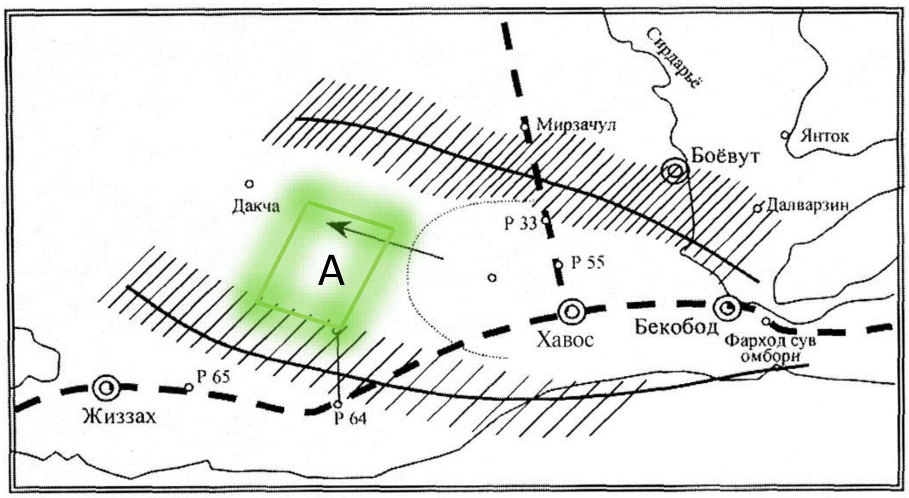

Figure 2. View of the regional direction of the Havasu wind: Zone A is the optimal area where aggregates can be installed

At the exit from the valley, the wind speed increases and the direction changes to the east. Wind speeds are typically 15-20 m / s, sometimes exceeding 30 m / s. The highest speed is at the exit to Mirzachul in Bekabad district. Here, the airflow turns northward, towards the downward direction of the relief, and begins to spread over a large area due to a decrease in the velocity flow deviation. It penetrates up to 100 km into Mirzachul. The width reaches 10-15 km. The wind speed reaches its maximum value at an altitude of 300-500 m in some cases at an altitude of 600-800 m, which is 2-2.5 times higher than the wind speed in the plain. Its direction can vary up to 700. December-April is the best time for the Hawas wind to occur, with wind speeds of 10-15 m / s in Bekabad being observed for around 102 days. The average annual wind speed is 4.7 m / s.

We determine the non-shading coefficient for their effective use in the installation of aggregates.

Go to our website https://agir.academiascience.org for more

ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

If n aggregates are set to the width L of the wind zone, and the length of the aggregate is l to block the wind flow, the following coefficient is selected so that they do not have mutual aerodynamic shading [3]:

$$k = \frac{a}{\ell} \quad (4)$$

Here, a is the closest distance between wind devices in a direction perpendicular to the wind speed vector.

According to experiments in this area $6 \leq k \leq 12$ the spacing will be sufficient in terms of both environmental and aerodynamic shading. It can be seen from the inequality that the denser the aggregates are installed in the region, the greater the value of the coefficient.

The width of the wind zone can be expressed by the above equations and notations as follows:

$$L = \ell \cdot n + a(n-1) \quad (5)$$

The number of aggregates, respectively,

$$n = \frac{L+a}{\ell+a} \quad (6)$$

takes a look. Hence the length L of the wind region

$$L_1 = n \cdot \ell \quad (7)$$

length or $e = \frac{L_1}{L} = \frac{n \cdot \ell}{L}$ (8)

part of the aggregates is the length of the working surface [4].

If we calculate the rotor radius R = 20 m, the length of the working surface of the wing $\ell = 12$ м ($\frac{\ell}{D} =$ 0,6 relative f.i.k. using a vertical axis rotor (Fig. 1), which is the highest), we can install 120 such SHES (complex of small wind power stations) along a 30 m high horizon in an area with a width of 10 km [5]. In this case, we assume that the distance between the working wings of the unit is equal to 6, placing the sparse ani. Given that the height of the wind zone is a minimum of 300 m, the height of the rotor wing is practically not limited. There may be only technical and technological limitations. In this case, since the wind absorption distance is 100 km, according to our technical capabilities for Uzbekistan, the height of the rotor wings is 3 m, with an average working surface of 30 m2 and 1,200 units installed in the area in the form of chessboard. It is possible to create a system of SHES.

Year-round repetition of wind speed: Wind speed has periodic changes along with instantaneous changes. What average speed is observed in which months of the year - this helps to determine in which months of the year the aggregates can accumulate maximum energy. Here is how many hours a year the wind speed, which is convenient for the unit, will occur. Figure 3 shows a graph of the Havos wind region $t = f(\vartheta)$. Figure 4 shows a graph of the amount of energy produced annually, taking into account the wind speed blowing time of an aggregate. Here,

$$E = \frac{1}{2} \cdot \rho \cdot S \cdot \vartheta^3 \cdot t \quad (9)$$

we use the equation. If we take the total efficiency of the unit as a minimum of 0.2, the wind speed $3 \leq \upsilon \leq 20$ The unit generates 19.4MWh per year

Academicia Globe: Inderscience Research

ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

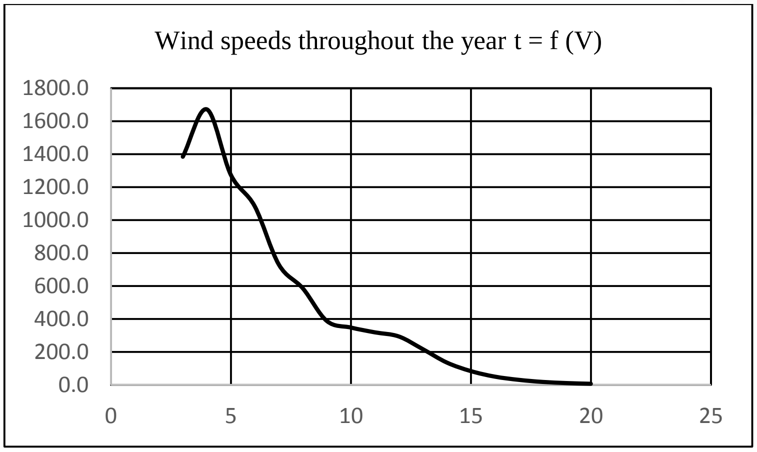

Figure 3. Graph of the relationship between the value of wind speed and its annual blowing time

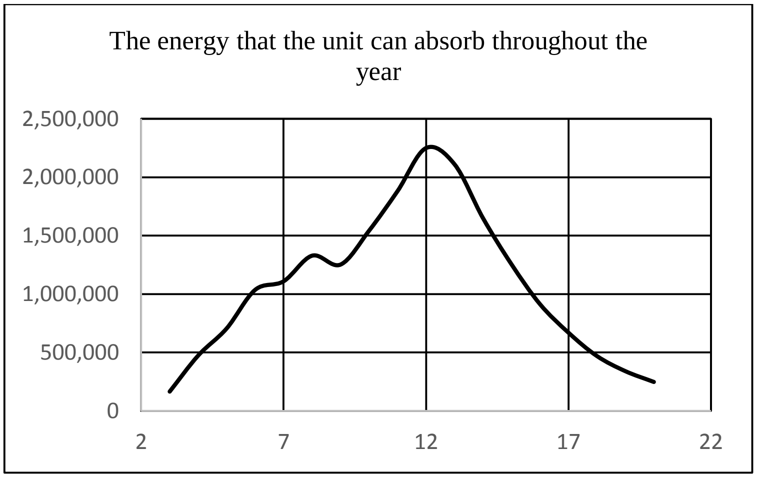

Figure 4. From the surface of 30 m2 per year of annual wind speed
the amount of energy flowing: $\eta_{\text{k.p.d. aggregate}} = 0{,}2$

produces energy. This value was found by calculating the surface value generated by the graph line in Figure 4. Assuming that the number of units is 600 instead of 1,200 as shown in the calculations, the aggregate complex can produce 17.5 GWh of energy per year. For comparison, Takhiatash TPP produces 3,185 GWh of energy, consumes 200 million cubic meters of gas per year, and employs 255 engineers. Approximately 1.1 million kWh of Takhiatash TPP is required to generate 17.5 GWh of energy per hour. cubic meters of gas would have been consumed. Its price is 220 mln. soums (200 soums / cubic meter in the domestic market). It prevents the release of 20.5 tons of carbon dioxide per year into the environment [6].

In conclusion, the use of wind energy will contribute to overcoming the growing energy shortage in the country by adding a new type of energy source to the existing energy sources, allowing to obtain environmentally friendly energy sources, the country's large wind energy potential shows that it can be converted into one of the main energy sources.

ISSN: 2776-1010 Volume 2, Issue 7, July, 2021

References

1. У.Ғ. Деҳқонов, У.Г. Ўришев. Иҳтиро патентига талабнома, № LAP 20200106, ИМА, Тошкент. - 2020 й. 7 бет.
2. Деҳқонов У.Ғ., Холмурзаев А., Ўзбекистоннинг шамол ҳудудлари ва Хавос шамолининг энергетик потенциали. Инновация-99. Халқаро илмий-амалий анжуман, 1999, Термиз.
3. Шефьтер Я. И. Использование энергии ветра. Москва: 1990.-168 стр.
4. Шефьтер Я.И. Ветроэнергетические агрегаты. Москва.:1991.-285
5. У. Ғ. Деҳқонов, Б. Х. Ибрагимжонов, А. Таджибаев. Шамол агрегати вертикал ўқли роторининг фойдали иш коэффициенти. Наманган мухандислик технология институти илмий техника журнали, 4-сон. Наманган: 2019 й.-114 б.
6. Нокоряков В.Е., Энергетика и экология. Новосибирск.: Гидро-метоиздат, 1988.-105 стр.
7. Zokirjon Mahmudov. “Application Of Venn Diagrams In Lectures On Theoretical Mechanics”. International Journal of Progressive Sciences and Technologies (IJPSAT) Vol.24 No.1 December 2020. pp. 219-222.
8. Zokirjon Mahmudov Sotivoldievich. “A Way To Increase Students Activity In The Organization Of Lectures”. International Journal of Progressive Sciences and Technologies (IJPSAT) Vol.25 No.1 Februare 2021. pp. 90-92.
9. Mahmudov Z.S., Daminov J.A., RahimovA.M. “The Use Of Cluster Method In Lectures On Theoretical Mechanics”. International Journal of Progressive Sciences and Technologies (IJPSAT) Vol.27 No.1 Junio 2021, pp. 145-147.
10. DehqonovU.,Tillaboev Y.“Rotors Of Wind Aggregates and Their Construction Problems”. International Journal of Progressive Sciences and Technologies (IJPSAT) Vol.27 No.1 Junio 2021, pp. 148-154.
11. Махмудов З.С., Дехканов У.Г. “Повышение благосостояние народа – основная цель государства”. «Электронный инновационный вестник», периодический журнал научных трудов, 2021 год, № 3 , стр. 12-14. www. Elvestnik. com.
12. Sotivoldievich, M. Z., Abduvalievich, D. J., & Mutalovich, R. A. (2021). The Use Of The Cluster Method In Lectures On Theoretical Mechanics. International Journal of Progressive Sciences and Technologies, 27(1), 145-147.
13. Sotivoldievich, Z. M. (2021). A Way To Increase Student Activity In The Organization Of Lectures. International Journal of Progressive Sciences and Technologies, 25(1), 90-92.
14. Mahmudov, Z. (2021). Application Of Venn Diagrams In Lectures On Theoretical Mechanics. International Journal of Progressive Sciences and Technologies, 24(1), 219-222.
15. Mahmudov, Z., & Ahmadaliev, K. M. (2009, September). On a way to increase the activity of students in the organization of lectures on theoretical mechanics. In Proceedings of the International Scientific and Technical Conference" Modern Problems of Mechanics", Tashkent (Vol. 2, pp. 381-383).