

## ИСПОЛЬЗОВАНИЕ ВЕТРЯНОЙ ЭНЕРГИИ В САНКТ-ПЕТЕРБУРГЕ USAGE OF WIND ENERGY IN SAINT-PETERSBURG

В работе рассматриваются возможности использования ветровых электростанций в Санкт-Петербурге и Ленинградской области. В настоящее время в России использование аэрогенераторов не так распространено, как в других странах. В работе приводится анализ экономической и экологической целесообразности использования данного источника энергии и делается вывод, что при помощи аэрогенераторов возможно снабжение электроэнергией отдельных домов и небольших предприятий.

The traditional fuel reserves are limited, and the rates of consumption are increasing every day. It poses a threat of significant energy problems. For a long time wind power has been considered as a green renewable energy source. However, before wind energy can bring significant advantages, a lot of problems must be solved, the most important of which are: high costs of aerogenerators and their ability to work in an automatic mode for many years providing uninterrupted power supply.

At present there are only about forty small windmill electric generating plants that operate in Russia. But their contribution to total power generation in the country is so small, that they are very often not taken into account at all. Positive operating experience of using aerogenerators in several countries proves that for areas with high average annual wind speed they can be profitable and economical. The North-West of Russia is a region where there are necessary conditions for using aerogenerators of various classes of capacity.

The analysis of observations has shown that the southern coasts of The Gulf of Finland have the biggest potential for wind-power engineering, because this is the area where winds of south-west and western directions prevail during most of the year. Average annual wind speed across St-Petersburg and Leningrad region is 6 m/s [1].

For the last few years St.-Petersburg and Leningrad region have developed a demand for aerogenerators for powering enterprises and individual users. Aerogenerators of small and average capacity root successfully. The windmills brought from abroad are too expensive for our market. Therefore for today we have our own manufacturers of household aerogenerators with the capacity from 0,5 kW/h up to 5 kW/h.

To understand whether it is possible to save using wind power, it is necessary to compare the cost of a kilowatt-hour, generated from a windmill, with the cost of a kilowatt-hour in the central network. We shall make simplified calculations for conditions in St-Petersburg and Leningrad region, taking into account that service life of a windmill is approximately 20 years. As the average annual speed of wind here is 6 m/s, the consumer could receive 250 kW/h a month from a windmill of one-kilowatt [1]. During a year it will produce 3000 kW/h, and for 20 years - 60000 kW/h. The current cost of such a windmill is about 220 000 roubles. Thus, the cost of 1 kilowatt-hour will be about 3,67 rub. per kW/h. The more powerful the windmill is, the cheaper the electric power will be. Similar calculations for a windmill of 5 kilowatts give us a figure of 1,17 rub. per kW/h. Today we pay 1,63 rub. per kW/h for electric power [2].

Thus establishing windmills of low power in St-Petersburg and Leningrad region in order to economize makes no sense. It is possible to economize, only by buying a windmill with the capacity of around 5 kilowatt-hour.

It is worth noting, that low-power wind-driven generators (1 - 2 kilowatt-hour) are able to provide electric power for illumination, operation of a TV-set, a refrigerator and other low-power household appliances in the house. It is possible to receive a capacity up to 3 kilowatt and to electrify a country house by using several similar wind-powered generators [3].

Nowadays the demand for aerogenerators is unstable. It is sometimes connected with incomplete understanding of the final efficiency of aerogenerators, as various benefits are often not considered:

- Social - using of an independent source of the electric power for household needs;
- Economic – supplying electric power through large distances often appears much more expensive. Now there is an alignment of the cost of energy of traditional sources and wind power, first of all this is happening because of toughening of ecological requirements, increase of energy costs of traditional power plants and continuous reduction of the equipment costs of renewed power due to technological perfection.
- Ecological - decrease in emissions, conservation of natural resources, and purity of the environment.

The main negative side of wind power is that it is dependent on weather conditions.

As for the ecological aspect of aerogenerators, a windmill-electric generating plant that has been recently launched makes an infrasound within the limits of admissible norms. As for birds it is true that one aerogenerator leads to the same consequences as 2-3 km of electric mains [4]. As windmill-electric generating plants are local energy sources and reduce the need for construction of electric power lines, cumulative effect from their introduction is most likely positive for the birds.

In 2001 the plan of a windmill-electric generating plant with the capacity of 3 megawatts on Kotlin Island was developed [5]. Kronstadt, located on this island, receives power from the continent by cable lines. There aren't private generating capacities on the island. Construction of the windmill-electric generating plant in this area is convenient because there is a building base, access roads, the agricultural grounds are not touched, and corresponding distance from the occupied areas is provided.

Factors that influence windmill-electric generating plants in the environment, such as acoustic, ornithological, electromagnetic factors, infringement of landscapes and others are considered. Referring to the developed plan, the total expenses should pay back in 4,3 years [4].

This windmill-electric generating plant could become base and experimental. So it will be possible to build windmill-electric generating plants both in the North-West, and in other regions of Russia based on the operating experience of this project.

To conclude, it is possible to say that using wind for production of energy is still ineffective. Despite huge benefits of such energy, the problem of its economic usage has not been solved yet. As for St-Petersburg and Leningrad region, the usage of aerogenerators of average capacity (5 kW/h) for supplying electric power to separate houses or small enterprises could be economic, but thus it is necessary to consider the speed of wind of the specific area.

In order to develop wind-power engineering in scales of the St.-Petersburg and Leningrad region it is necessary to receive support for this project from the government and regional authorities.

#### ЛИТЕРАТУРА:

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