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Wind power engineering

Использование энергии ветра

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Today everywhere we can hear about ecological problems: the pollution of atmosphere, soil, water, global climate changes, fossil fuels exhaustion and so on. All these subjects are dangerous for our life and all of them are closely connected with energy.

To give a worthwhile and effective answer, first of all we should look into the structure of energy production. Energetics is divided into two big groups. The first is traditional. It is mainly based on fossil fuels such as oil, coal and natural gas. They are rather effective and cheep. But there is another cost – the cost to the environment. Because of burning processes these means pollute the nature with carbonic acid, carbon monoxide, compounds of sulphur, ashes and carbohydrates.

But fossil fuels are running out. From the point of view of environment, perhaps it is good. But if we remain dependent on fossil fuels for most of our energy needs there will be a sudden disaster when the reserves are exhausted. We must try to do something before this disaster happens. The solution can be found if we draw attention to alternative energy and renewable sources. It's the second group. Renewable resources are such as: biomass, sun, water and wind. And I suggest now to stop at wind power. People have used it from ancient times and today is the second advent of wind power. The device which helps to catch the energy is a wind turbine. Simply stated, a wind turbine works the opposite of a fan. Instead of using electricity to make wind, wind turbines use wind to make electricity. A more detailed scheme you can see on the picture. Wind comes from atmospheric changes; changes in temperature and pressure makes the air move around the surface of the earth. A wind turbine captures the wind to produce energy. Wind blows and make the rotor to spin like a propeller. The motion of the blades gives kinetic energy, which is converted into electricity by magnets moving past stationary coils of wire known as the stator.

There is a variety of them, but all they can be divided into two groups: horizontal- and vertical-axis. The choice of type and model depends on the features of the place, where it is planned to work.

But the main characteristic of the land for wind turbine is of course wind speed. The average wind speed needs to be above 3-5m/s (18km per hour) to make installing a wind turbine worthwhile. Ideal locations for wind turbines are in the country, on farms, or on the coast: basically anywhere away from built-up areas. The more buildings around the wind turbine, the less wind there is. But if the wind speed is very high the turbines automatically stop for protection from damage. Also there is dependence between the power from one side and wind speed and rotor size from the other side.

But theory must be put into practice. Let's look at our country. Belarus doesn't dispose of its own fuel-energy resources. It's the fact. And the price for fuel and electro energy grows constantly. This means that our country is strongly dependent on countries-importers of energy resources. Well, is it reasonable to use wind power in Belarus? The answer can be given after region wind speed analysis. (See the table.)

Table 1. Recurrence (in %) of winds in some regions of Belarus

Wind speed (m/s)	During the year		
	Polotsk (north)	Minsk (centre)	Vasilevichi (south)
0 – 1	19,9	13,4	27,3
2 – 5	54,2	59,4	60,2
6 – 9	20,7	23,6	11,3
10 – 15	4,8	3,4	1,0
16 – 20	0,4	0,2	0,2
1 – 24	-	0,004	-

Average wind speed is 4 m/s at open places and 3 m/s in hollows. From the wind statistics we can also see that the speed is not the reason to avoid this mean of energy. The practice confirms it. Till now there are three big turbines at the territory of our republic: two of them are placed in Zanaroch (the region of lake Naroch) and one is in Gorodok (near Vitebsk). One day I made a trip to see two first turbines installed in Belarus, where I found some interesting facts and got a huge mass of emotions from these machines.

Nordex Rostock" (Germany)
Power: 250 kilowatt
Rotor diameter: 29,7 m
Two brake systems
Tower type: lattice steel post
Hub high: 50 m
"Repower Gusum" (Germany)
Power: 600 kilowatt
Rotor diameter: 48,4 m
Two brake systems
Tower type: 2-conical steel post
Hub high: 65 m

hese two turbines produce 1,3 million kW of energy during the year. It's the amount which at the average 700 belorussian families consume. We can see, it's a good result and an occasion for adoption of a new technology.

But except of climate reasons there are some other problems. It's no secret that public opinion is very important, but it's also well known that it can be wrong. Let's shatter some myths. Noise. On the level of wind wheel close by it the noise can reach about 104 decibel. But at the distance of 300 m the noise level sinks to 42-45 decibel. (To compare: noise of busy streets is greater).

Collision with birds. A lot of research was made and all the results refuted the danger of wind turbines for birds. The number of dead from wind turbines birds is trifling even if to compare it with such from hit with windows, electricity transmission lines, masts and cars. But for the public tranquility some turbines are enclosed by net.

Ground usage. Wind turbines must stay one from another in the distance of 5-10 tower high. This territory cannot be used for building and forests. But wind turbine itself occupies only 1% of this square. The rest can be effectually used for example for farming.

We can see that the harm from the turbines is grossly exaggerated and advantages of wind energy are evident. So let me make some conclusion. If we want to stop air, soil and water pollution, if we want to satisfy our needs in energy in conditions of fossil fuels depletion, if we want to be economically independent we have a good variant of wind energy use. If we do nothing it will lead to the end. We have no right to stay aside. We

must save our planet for us, for our children, for our children's children. And all together we can do it.

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Customs and its meaning in the world

Таможня и ее значение в мире

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Custom, in English law, is an ancient rule of law for a particular locality, as opposed to the common law of the country. It has its origin in the Anglo-Saxon period, when local customs formed most laws affecting family rights, ownership and inheritance, contracts, and personal violence. The Norman conquerors granted the validity of customary law, adapting it to their feudal system. After the great transformations of the 13th and 14th centuries, when English law was given statutory authority under the crown, the "customs of the realm" became England's common law.

Customs are duties paid to a nation's government on items that people bring in from another country. Each nation has its own regulations regarding the quantity and kinds of articles that may be imported. All articles acquired abroad must be declared – that is, they must be identified and their value given to an inspector. If a person fails to declare an article or understates its value, the article may be taken away and the individual may be fined.

The main functions of Customs are: taking measures to protect the rights and interests of citizens, companies, establishments and organizations during customs clearance procedures; protecting the economic interests of the country; providing customs services to regulate trade-economic relations; participating in the development of economic measures with regard to the goods transported through the customs border; ensuring the due observance of administrative procedures of transportation of goods and vehicles through the customs border; taking measures to protect the intellectual property rights when goods are transported through the customs; collecting customs duties, taxes and other customs payments.