Video/ Slide show

You will watch a film about wind power and talk about renewable energy resources.

Energy is a measure of how much work a system is able to perform. In particular, wind energy defines how much useful work (performed, for example, by engines or pumps) we are able to obtain from wind. The greater the speed of the wind, the greater its energy.

Renewable and non-renewable energy sources

Renewable sources of energy come from resources that are renewed within a short period of time. These sources include:

- Wind energy
- Solar energy
- Hydropower
- Tidal and wave energy
- Geothermal energy
- Biomass energy

The opposite of the above are non-renewable energy sources – originating from resources that are renewed very slowly or not at all. These include:

- Coal
- Oil
- Fissile materials (uranium, plutonium)
- Natural gas

Experiment

Students perform the experiment and check whether their model wind turbines really works. They observe the whole cycle during which energy is obtained from wind and converted into electrical energy.

Wind turbine – construction and operation

Structural diagram

A wind turbine comprises a rotor and a nacelle located on a tower. The most important part is the rotor, which converts wind energy into mechanical energy. It is mounted on a shaft, which drives a generator. Inside the generator, mechanical energy is converted into electrical energy. Three-blade rotors are the most common. The nacelle must be able to rotate 360 degrees so that it can always face into the wind. Wind turbines, and groups of them in particular (called wind farms), have a significant impact on the landscape. Modern wind turbines are huge structures that can exceed 100 meters in height. For example, the Vestas 2 MW wind turbine has a rotor with a diameter of 80 m positioned on a tower that is 60 to 100 meters tall.

Description of operation

The air stream flowing onto the blades causes the rotor to rotate. The rotor in motion transfers energy to the transmission, where the rotational speed is increased and conveyed to the generator. The generator converts mechanical energy into electrical energy, which is conducted by wires down the tower until it reaches consumers. A device such as a wind vane (or a more complex apparatus in larger turbines) ensures that the rotor points into the wind.