

How a turbine works

Explanation and exercises linked to diagram (20) of the Inside of a Nacelle



The movements of a wind turbine are controlled via an electronic **controller** which takes data inputs from an **anemometer** measuring the speed of the wind, and a **wind vane** detecting the direction of the wind. The **nacelle** - the sealed unit at the top of the **tower** housing all the workings for the turbine - is automatically rotated to face into the wind with a **yaw motor** turning the **yaw drive**.

The three **blades** catch the wind and turn the **rotor** to which they are joined. The **pitch** of each blade can be changed (i.e. the blade can be rotated) to increase efficiency in low winds and to decrease efficiency (to protect the wind turbine) in very strong winds. The blades can be feathered to allow the wind to flow past them with ease and thus stop the turbine.

The **rotor** is connected to the nacelle. The rotor turns the **low-speed shaft** which connects to a set of cogs called a **gear box** which accelerates the speed of rotation to the levels necessary to generate high voltage electricity within the **generator**. Each turn of the rotor is called a revolution. The rotor turns at 13 or 19 revolutions per minute (RPM). But, in order to generate electricity, the generator has to turn 1,500 RPM. The gear box converts the 19 revolutions to 1,500 revolutions.

The electricity is sent down **thick cables** which run down the tower to the ground. A **Transformer** converts the electricity to a direct current and changes the voltage so that it can be sent to the national grid. (See document 12 on electricity distribution.)

For further exercises

1. Add labels to diagram 19
2. Cut out, arrange and label pictures 18
3. Write your own explanation without using this page