



## I Spy

### National Curriculum

Science – investigative skills, observation, forces and rotation, electricity and magnetism  
English – logical thought, discussion and observation

### Teacher's Notes

Using the clues in the picture, the children identify what each part does. The rotor is turned by the wind, which in turn makes a shaft go round at the same speed as the rotor. This is attached to a big cog which has a much smaller cog turning against it. This small cog has to rotate at 1500 revolutions per minute before the turbine can start to produce electricity. If the wind drops below 4m/s (approx 9mph) there isn't sufficient energy in the wind to generate electricity, so the turbine automatically stops. If the wind speed exceeds 25m/s (59mph) the turbine automatically slows down and stops to protect the gearing from damage.

The turbine's computer knows how fast the wind is blowing because there is an anemometer measuring the wind speed, situated on the back of the nacelle.

To get the maximum energy from the wind, the turbine rotor must always face into the wind. On the back of the nacelle there is a weather vane which tells the controller the wind direction. The rotor automatically 'yaws' (turns) into the wind. It does this using the yaw motor which turns the whole nacelle around on bearings at the top of the tower.

### Aim

To familiarise the student(s) with the internal working of a wind turbine.

### Resources

Copies of the activity sheet, one for each child or pair of children. Alternatively, this could be done as a class session using the interactive white board.

### Timing

30 mins

### Outcomes

By the end of the task the students can identify parts of a wind turbine, describe how the parts go together and explain how the speed is controlled.

### Differentiation

More able students could be asked to explain how they think the energy in the wind is harnessed in a wind turbine.

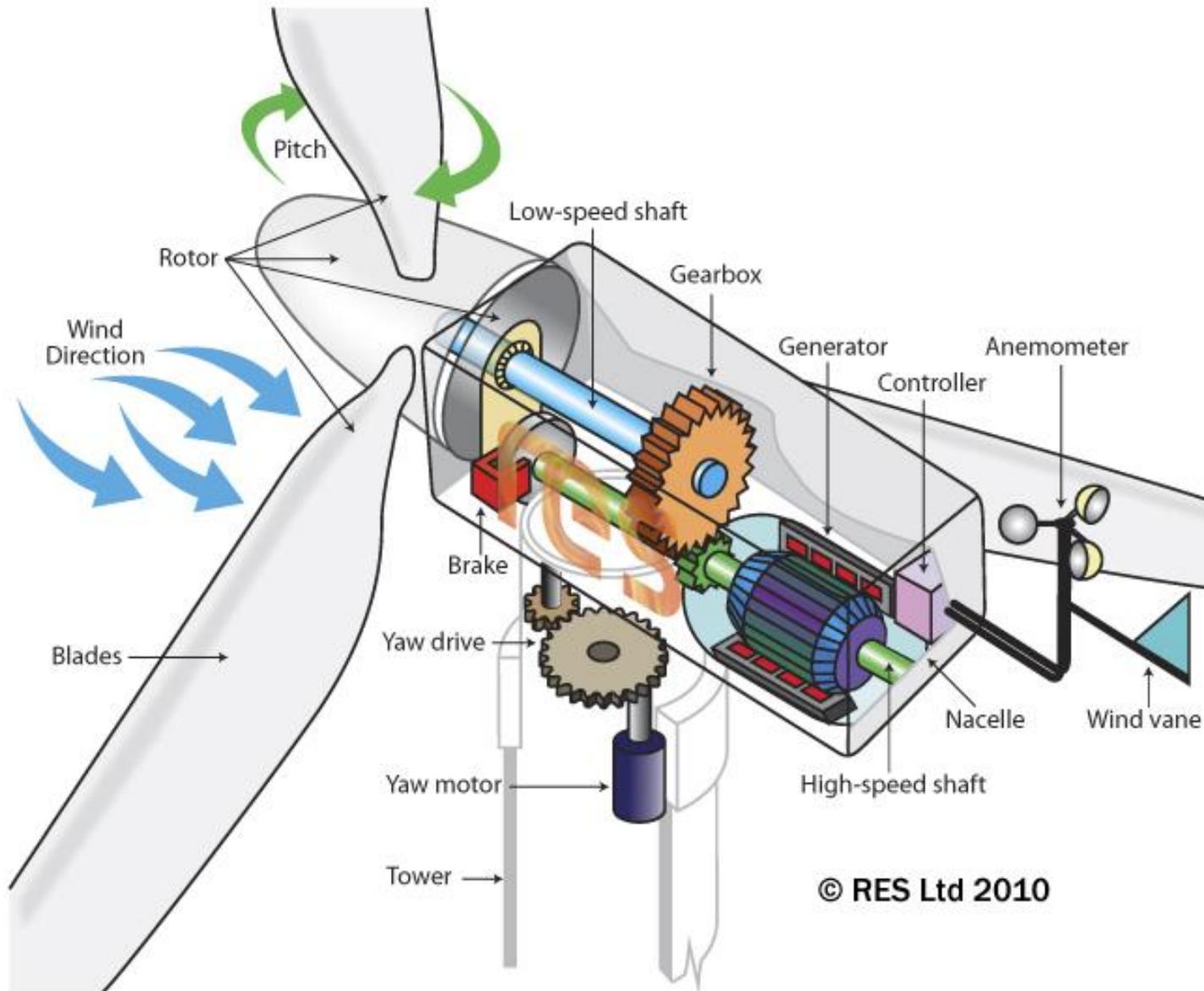
## Task

The students are asked a series of questions about the cut away image of the nacelle of a wind turbine.

## Answers

- 1) Find the low speed shaft, what is it attached to?
  - A. *Rotor*
  - B. *Gearbox*
  
- 2) Is the gear larger or smaller on the low speed shaft compared to the high speed shaft?  
*Answer: Larger*
  
- 3) At the top of the tower there are more gears called the Yaw Drive. What do you think this machinery does?  
*Answer: Rotates or 'yaws' the nacelle on the tower.*
  
- 4) There's a device that measures the wind speed. Write down its name  
*Answer: anemometer*
  
- 5) A What does the high speed shaft pass through? *Answer: the generator.*  
B What happens here? *Answer: This is where electricity is made,*  
C What energy transfer is involved? *Answer: transferring the kinetic energy of the spinning shaft into electrical energy and heat energy.*

# I Spy: WORKSHEET



Look carefully at the picture of the nacelle at the top of a wind turbine.

Now answer these questions:

1) Find the low speed shaft, what is it attached to?

A:

B:

2) Is the gear larger or smaller on the low speed shaft compared to the high speed shaft?

3) At the top of the tower there are more gears called the yaw drive. What do you think this machinery does?

4) There's a device that measures wind speed. What is it called?

5) A What does the high speed shaft pass through?

B What happens here?

C What energy transfer is involved?