

Wind Energy

Investigate
wind
turbines.

Why are
they
needed?

Are they
beautiful or
ugly?

Are they
good for us?

How?

Why?

How do they
work?

Are they
noisy?

Who do they
affect?



Wind turbines: <https://www.youtube.com/watch?v=gmxqjda3uZY>

Teacher Instructions

Begin the process of designing and building a model turbine in class.

You will need to refer to gears and explain how a spindle which is turning relatively slowly can turn another quickly by using a gear wheel or pulley.

This will lead to building a simple turbine that will generate electricity in the classroom.

Wind Turbines

You will discuss wind turbines as a class and your teacher will record the information on a GED grid.

- What is a wind turbine?
- What is its purpose?
- Are there any wind turbines in your area? Have you seen any?
- Are wind turbines a good thing? Why? Why not?
- Do you know how humans use wind energy for other purposes?
- Are wind turbine technologies similar to coal power stations?

What do I know about
wind turbines?

What do I want to know
about wind turbines?

What have I learnt?

This is a wind turbine built on the land of Ysgol Y Traeth, Barmouth.

Questions

How does the school benefit?

What do you think about children playing so close to the turbine?

Are there houses nearby? What do local people think about the turbine?



Can you think of advantages and disadvantages of having a wind turbine on school land?

Advantages

Disadvantages

Research Activity

- Can you work out how much electricity your school uses?
- What unit is used to measure electricity?
- Can you keep a record of how much electricity is used every week?
- How much electricity does the wind turbine generate?
- Does every turbine generate the same amount of electricity?
- The wind turbine at Ysgol y Traeth generates 5 kwh. What does this mean?
- How many turbines would you need to generate enough electricity to run your school for a year?
- Would a turbine like the one at Ysgol y Traeth generate enough electricity for your school?

People and their opinions



For and Against Wind Turbines :

<https://www.youtube.com/watch?v=SqpSD327dUU>

For and Against

Fill in the table below to show why *you* are **for** or **against** wind turbines.

For

Against

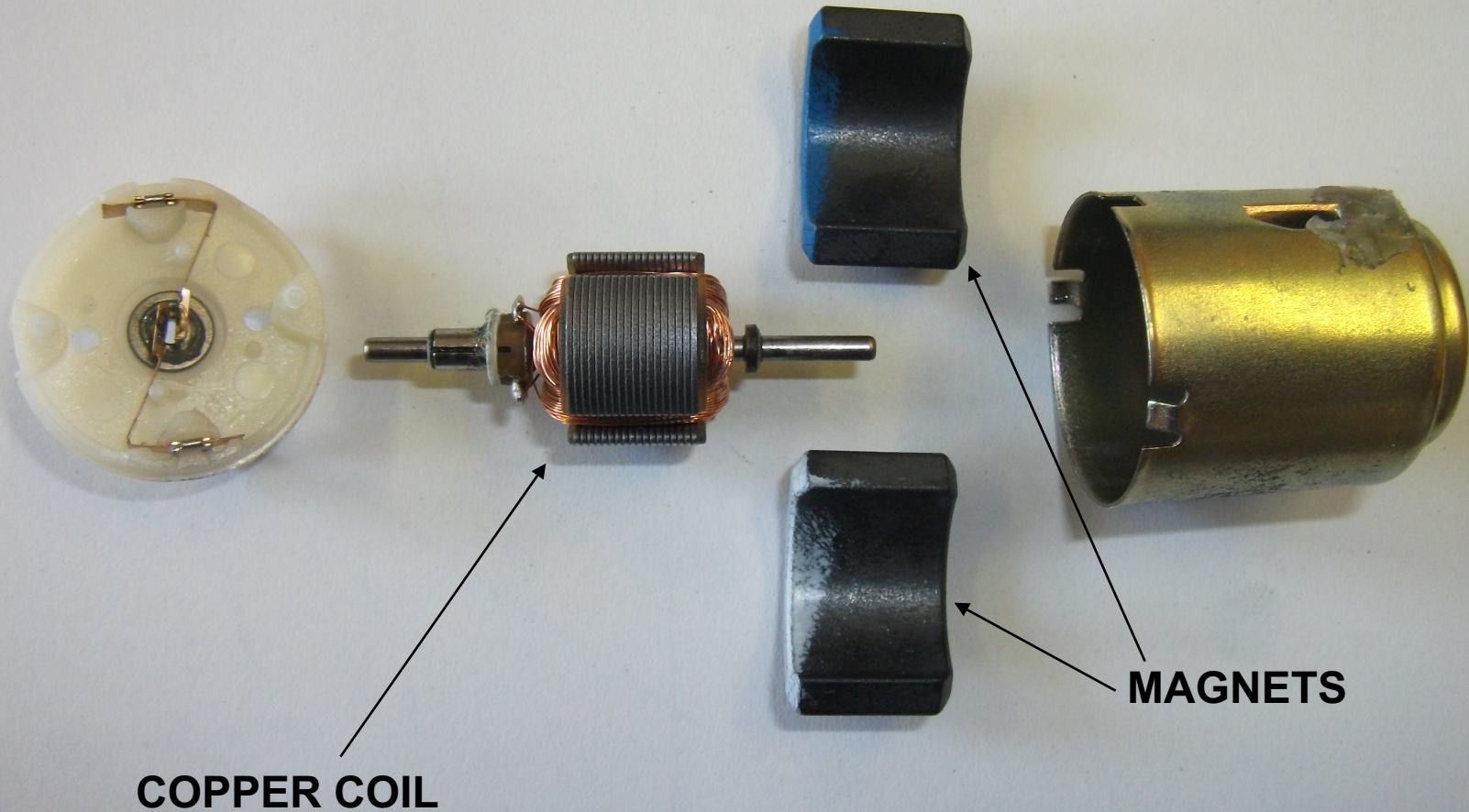
Discuss:

- How would your local area be affected if a wind farm was built nearby?
- Can you think of any good or bad things which would happen if there a wind farm was built close to your home?

Effect 1

Building a
wind farm
on a hill
close to
my home

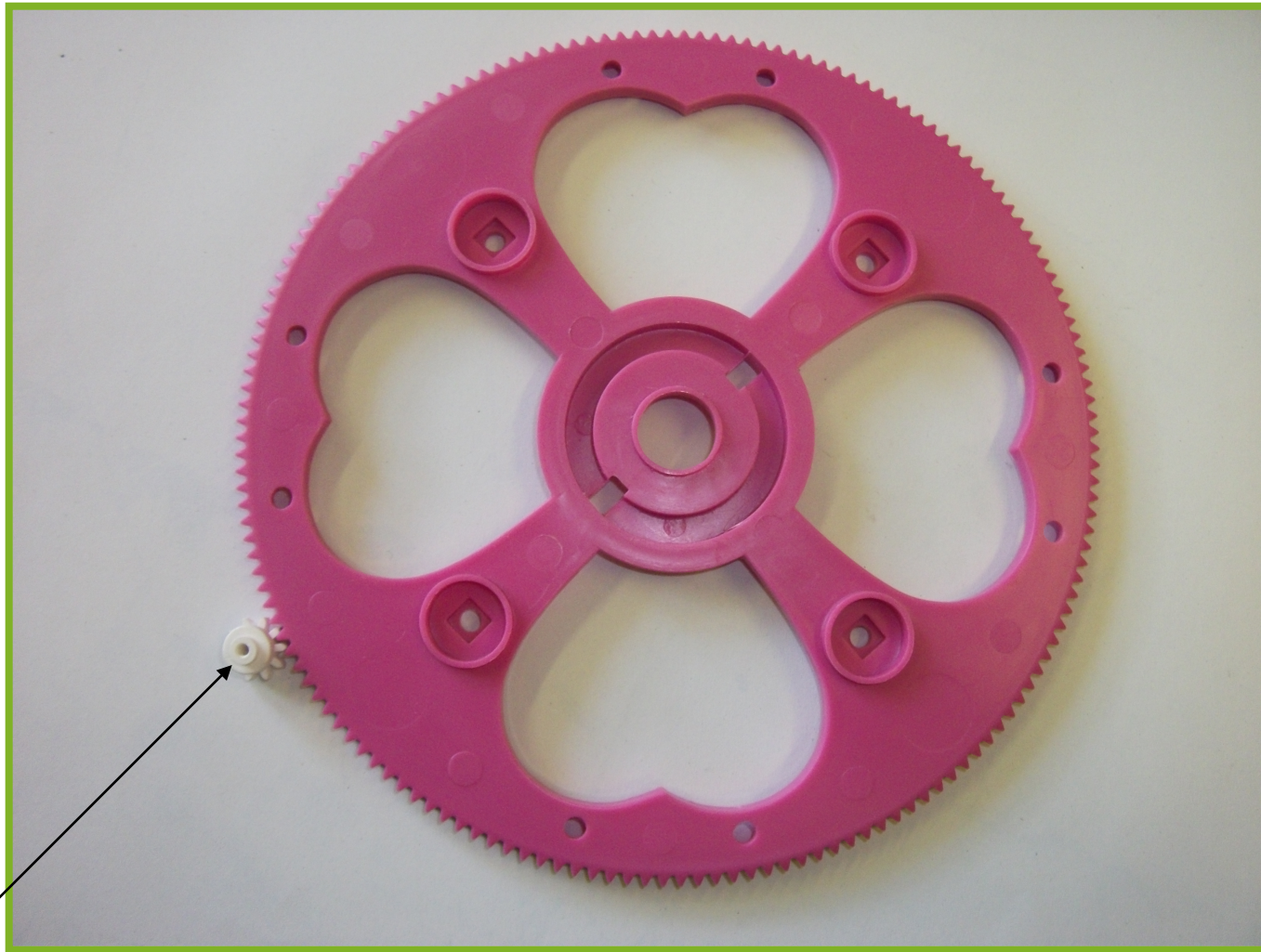
This is a picture of a motor – **Why is this similar to a generator?**





Spindle

As the motor is more or less the same as a generator / turbine, if you can turn the spindle fast enough, the motor will generate electricity.



Small wheel gear. Where there are two gears of different sizes the smaller gear will rotate faster than the larger gear. The number of teeth on both gears will determine the output speed of the mechanism.





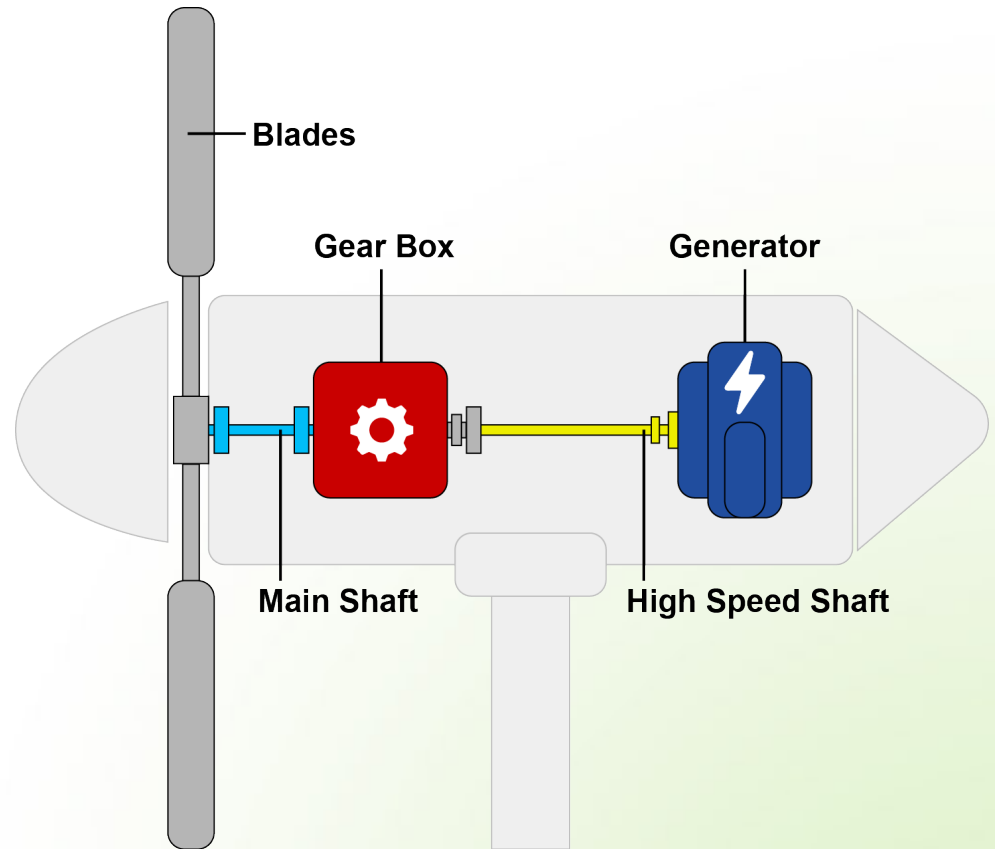
Placing the small wheel on the motor and the larger wheel on the blades of the wind turbine.



If you turn a wheel which is attached to the motor fast enough, you can light a bulb with the electricity you are generating.



- Gears are used inside a wind turbine to generate electricity.
- The blades are connected to the gear box via the main shaft. The main shaft has a large gear attached to it. When the energy from the wind turns the blades, the large gear on the main shaft spins.
- The large gear is attached to a smaller gear on the high speed shaft. The smaller gear turns faster and spins the generator to create electricity.



Research Task

Investigate the different kinds of wind turbines.

Creative Task

Design and build a model of a wind turbine

The class will be divided into groups of 3 – 4.

- Investigate the different types of wind turbines. What is particular about the different types?
- Criterion – the design must contain the mechanisms / gears that turn the motor to generate electricity.
- Why don't you include a list of your own criterion?

To begin:

- Every member of the group should sketch some simple ideas to show what structure the wind turbine should be.
- Discuss the ideas one by one and then pass your idea onto someone else in your group. The next person should use your idea as a starting point to sketch a better idea.
- By the end of the session, you will have a number of good original ideas. Choose the idea you think would be most likely to succeed.

Final Design Concept

Show clearly what the final model will be able to do on this page and note how it will be built. You will need to create a full-size image of the model.

The final concept should contain:

- Measurements
- Angle sizes should be noted.
- Parallel and perpendicular lines should be recognised.
- Annotate the diagram to show the key points and uses.

Organising the work

Note which steps you would take during the building process.

1 Use sketches here as well.

2



5

4

3



6

7







Irrelevant points



Relevant points

Most relevant points

The Key Question