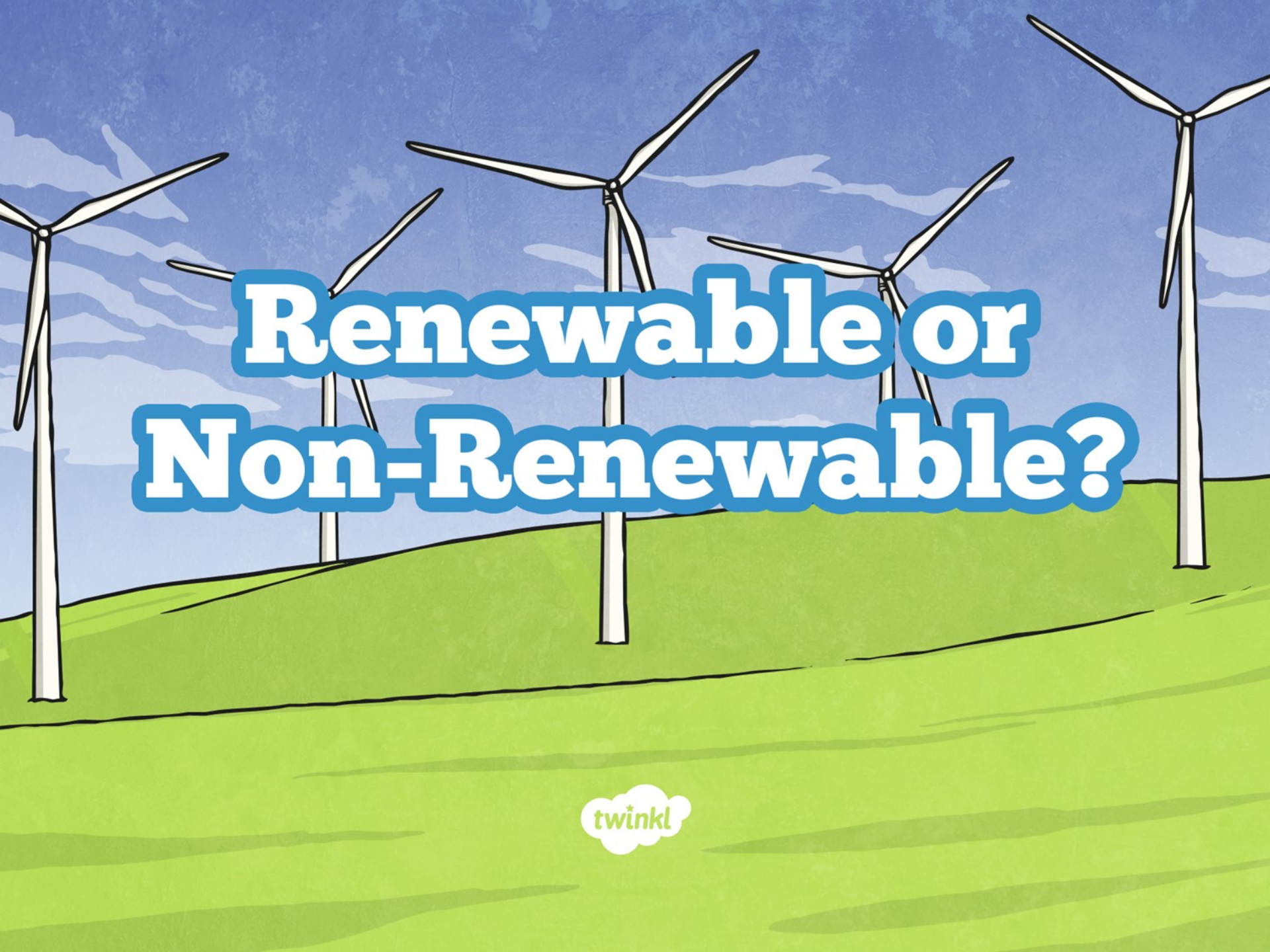
Geography

Enough for Everyone


Renewable or
Non-Renewable?
twinkl

Aim

- I can explain renewable sources of electricity.

Success Criteria

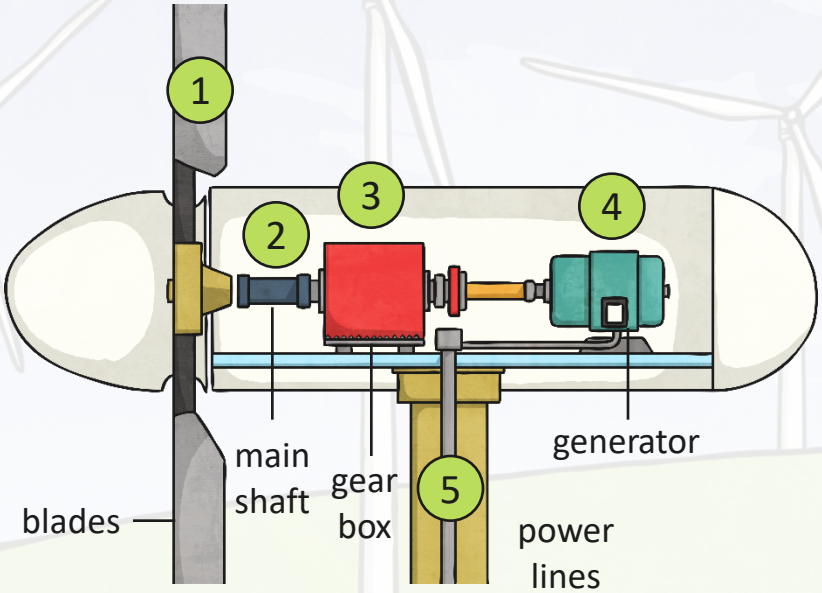
- I can identify what makes an energy source renewable.
- I can name some of the renewable methods of power generation used in the UK.
- I can explain some renewable methods of power generation.
- I can describe the impact renewable sources have on UK electricity production.

Renewable Energy

How is electricity being generated in these places?

What do you think renewable energy is?

Wind Power



1. When the wind blows, the blades turn.
2. The blades turn the main shaft which connects to the gear box.
3. The gear box increases the speed of rotation to around 1500 rpm (revolutions per minute).
4. The shaft turns a generator which generates electricity.
5. The electricity is carried along power lines in the tower.

Wind Power

Advantages	Disadvantages
• Once the wind turbine is built, running costs are very low. • It does not produce any CO_2. • The land occupied by a wind farm can still be used for farming. • Wind is a renewable source so it will not run out. • Wind farms are safe and easy to build.	• Wind turbines must be shut down in very strong or very weak winds. • They can only be built in certain areas. • Not everyone likes the appearance of wind farms.

Renewable.

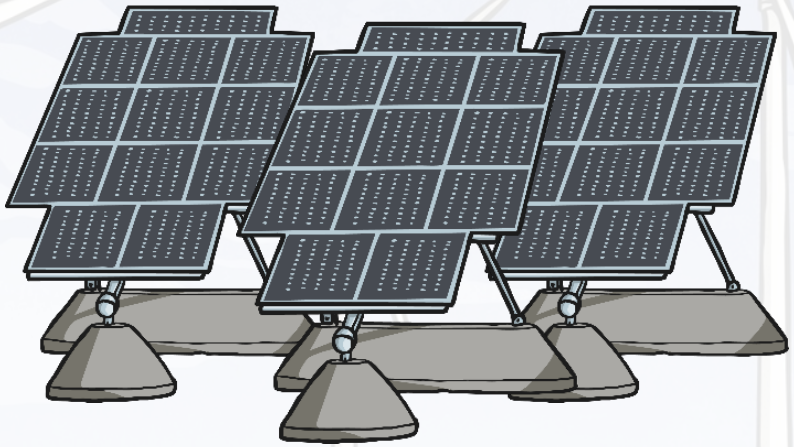
There are many wind farms in the UK.

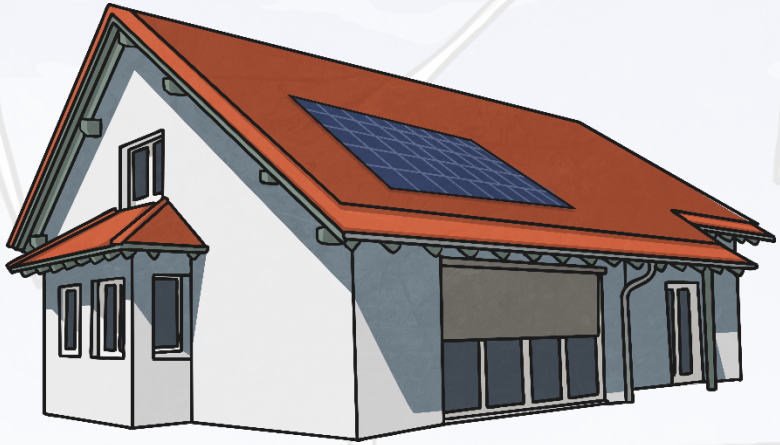
Wind farms vary from a single turbine to fields of over 200!

Did you Know…?

Other parts of the mechanism allow the turbine to be turned to face into the wind. In high winds, the pitch of the blades can be changed to stop the turbine turning at all and prevent damage.

Solar Power





1. The Sun shines on solar panels, usually located on the roof of a building or in a field.
2. Photovoltaic cells (PV cells) inside the panels convert the Sun's energy into electrical energy.
3. The electricity can either be used or carried along power lines to the National Grid.

1. Some solar panels are used to provide heating.
2. The Sun shines on solar panels, usually located on the roof of a building.
3. Water inside the panels is heated.
4. The water is pumped around the heating system in the building.

Solar Power

Advantages	Disadvantages
• Solar energy is renewable and the Sun's heat and light are free. • Solar energy can be used to generate electricity in remote places where other electricity supplies are hard to come by. • It does not produce any CO_2. • Energy is usually generated at or near to the location it will be used, reducing transmission costs.	• PV cells do not work so well when it is cloudy and do not work at night. • The UK is not a very sunny country! Solar power works better in hot places, so its use is therefore limited.

Renewable.

There are increasing numbers of solar farms in the UK.

Many buildings are now fitted with solar PV cells.

Biomass

Whole Class

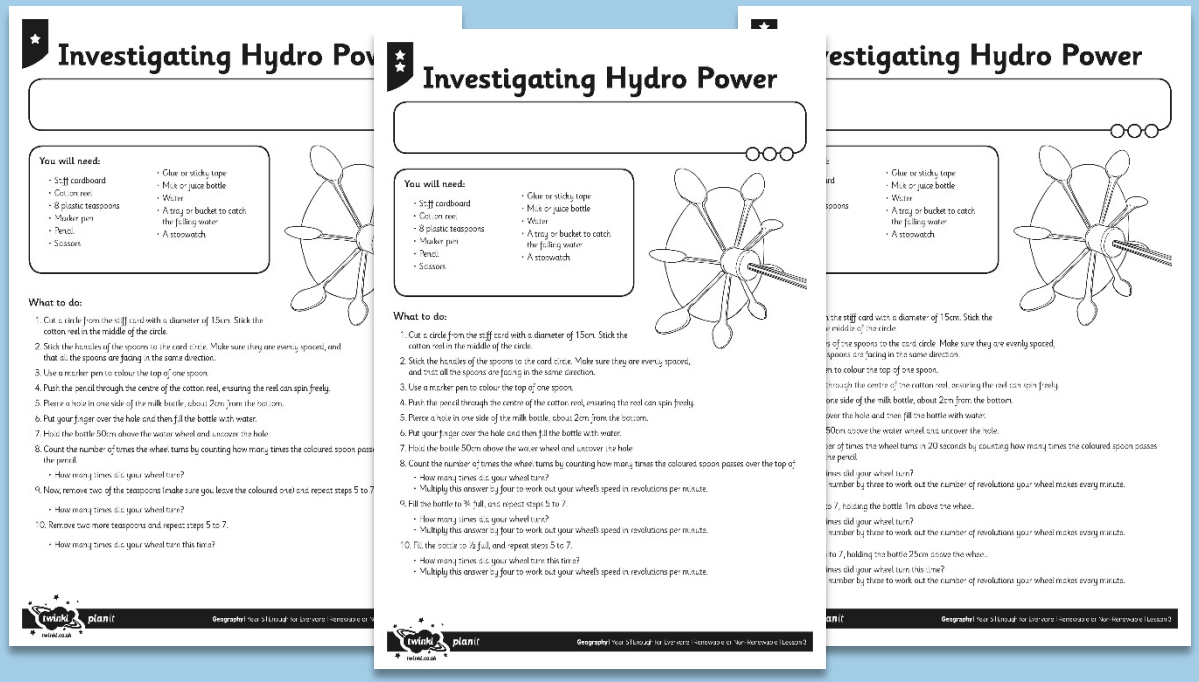
Watch this video.

Is this a renewable source?

How is this method similar to non-renewable methods?

Investigating Hydro-Power

Use the equipment to make your own model turbine and investigate some of the key features of the design of a hydroelectric power plant.



Investigating Hydro Power

You will need:

- Stiff cardboard
- Cotton reel
- 8 plastic teaspoons
- Marker pen
- Pencil
- Scissors
- Glue or sticky tape
- Milk or juice bottle
- Water
- A tray or bucket to catch the falling water
- A stopwatch

What to do:

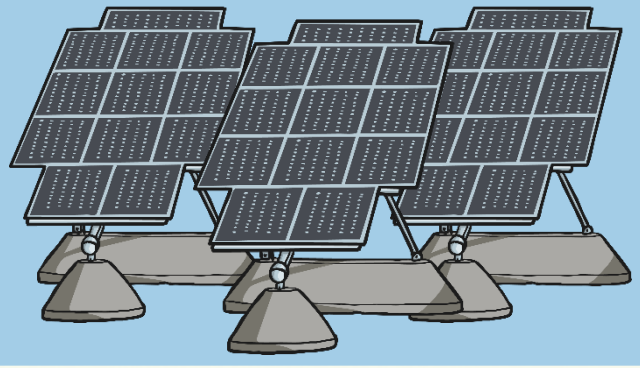
1. Cut a circle from the stiff card with a diameter of 15cm. Stick the cotton reel in the middle of the circle.
2. Stick the handles of the spoons to the card circle. Make sure they are evenly spaced, and that all the spoons are facing in the same direction.
3. Use a marker pen to colour the top of one spoon.
4. Push the pencil through the centre of the cotton reel, ensuring the reel can spin freely.
5. Pierce a hole in one side of the milk bottle, about 2cm from the bottom.
6. Put your finger over the hole and then fill the bottle with water.
7. Hold the bottle 50cm above the water wheel and uncover the hole.
8. Count the number of times the wheel turns by counting how many times the coloured spoon passes over the top of the pencil.
   - How many times did your wheel turn?
   - Multiply this answer by four to work out your wheel's speed in revolutions per minute.
9. Fill the bottle to ¾ full, and repeat steps 5 to 7.
   - How many times did your wheel turn?
   - Multiply this answer by four to work out your wheel's speed in revolutions per minute.
10. Fill the bottle to ½ full, and repeat steps 5 to 7.
    - How many times did your wheel turn this time?
    - Multiply this answer by four to work out your wheel's speed in revolutions per minute.

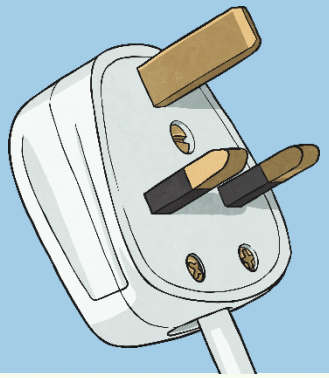
Making Comparisons

Whole Class

Look at the real-time generation data here.

How much electricity is being generated from renewables today?





Can you work out what percentage this is of the total electricity being produced?

On Target?

Whole Class

In 2014, renewables supplied 7% of the UK's electricity.

The European Union target is for the UK to source 15% of its electricity from renewables by 2020.

‘Passive’ Homes

Whole Class

‘Passive’ homes are energy efficient houses.

They have no central heating and very low energy bills.

Schiestlhaus, Austria – the first ‘passive’ mountain hut to be built in the Alps.

Cool air from the outside is drawn in and is heated using energy from within the house.

Lots of large windows allow heat and light from the sun in to the house.

The house is draught-free. There is no letterbox.

Solar panels heat the water.

A log burner is used to heat the home during winter.

On Target?

Whole Class

‘Passive’ homes are also being built in the UK.

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