

Electricity and Me

Your guide to becoming an energy champion



Introduction

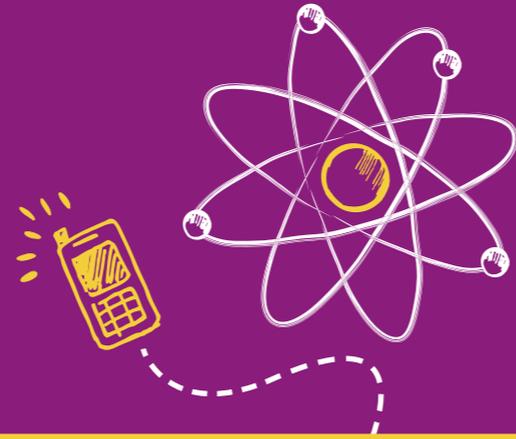
Energy for Life

Imagine if there was no energy in the world – it would be a very different place indeed! There would be no fuel to power your mum or dad's car. No electricity to switch on your bedroom light or turn on the TV. No gas to keep your house nice and toasty and warm in the winter. Wow! Just imagine... it really would change everything!



Packed with lots of fun and interesting information, this guide will help you learn about energy by taking part in activities that you can do in the classroom or at home! They cover lots of weird and wonderful things, such as working out your carbon footprint, learning about low-carbon energy, understanding how nuclear energy works and even finding out if your school could be powered by wind energy – fancy that!

Even though we can't see it, energy really is super important. Everybody on the planet uses it. The more we use it, the more important it is to understand it. For example, what is it? Where does it come from? How is it made? What impact does it have on the environment? Want to know the answers? Keep reading for more details!



Each activity will help you to develop the skills you need to become an Energy Champion. You never know, you may just end up helping to save the planet one day!

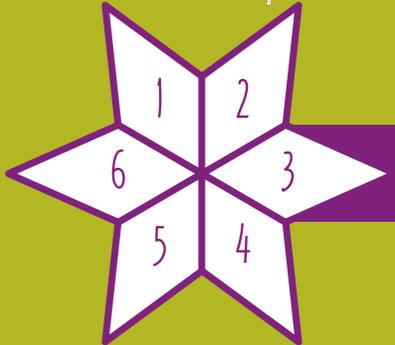
Join Jack and Bethan and become an Energy Champion!

This guide will help you explore:

- ✓ The different sources of energy and their impact on the world
- ✓ Your energy use and carbon footprint
- ✓ How to reduce your impact on the environment
- ✓ The science behind energy
- ✓ Some of the skills that could help you in your future career



"Don't forget to colour me in when you complete each activity!"



Activity 1

Calculate your Carbon footprint

For this exercise, you'll need to dig out the information you've already been asked to find out about your personal travel and home energy use.

Using the carbon footprint calculator, work out how much carbon dioxide (also called CO₂) you use each year.

How does your footprint compare to the UK average of 6.5 tonnes? Where do you think you use the most energy during your day, or year?

FOLLOW-ON ACTIVITY

Can you think of 5 ways you can reduce your carbon footprint?

FOLLOW-ON ACTIVITY

Calculate your footprint again following your answers – can you bring your carbon footprint down to 2 tonnes? How easy or hard would this be to do in real life?

'How big or small is your carbon footprint?'



Did you know? A cow releases on average between 70-120kg of methane a year?

Activity 2

What is low-carbon energy?

Name the differences between fossil fuels and renewable or low-carbon energy sources. Next, think of renewable and low-carbon energy sources – can you name four? Hint: The pictures might help!

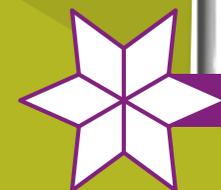
Finally, using the landscape sheet provided, decide the best place to put each low-carbon energy source (use the stickers if you have some!).

FOLLOW-ON ACTIVITY

Your teacher will now place communities on your landscapes – does this change your decisions? If so, why? Explain your final choices for each low-carbon energy source.

FOLLOW-ON ACTIVITY

Choose an area that is local to you and research the landscape, climate and conditions. Which of the four low-carbon energy sources would be best suited to the area? Share your decisions with the rest of the class.



Activity 3

How much low-carbon energy are we using?

List all the different ways that we make energy in the UK that you can think of. What are the advantages and disadvantages of each one?

FOLLOW-ON ACTIVITY

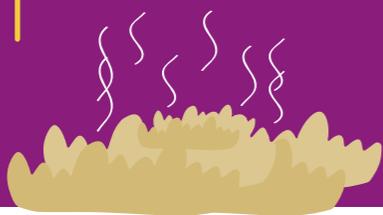
What is your favourite energy source? Research why it is the best energy source and talk about what you have discovered about it, and the reasons why you've chosen it, with the rest of the class.

FOLLOW-ON ACTIVITY

Find out the percentage of energy used in the UK that is supplied by low-carbon energy sources. Design and produce a bar or pie chart that shows this information.

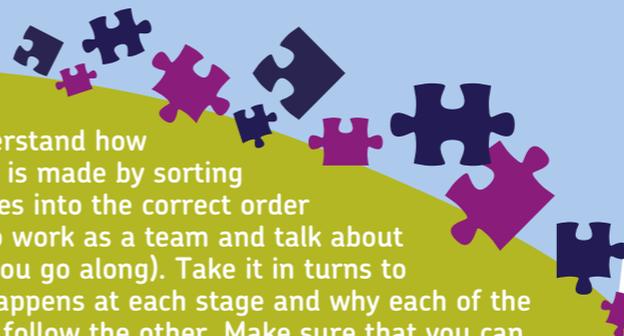


'My favourite energy source is... biomass energy.'



Activity 4

How does Nuclear energy work



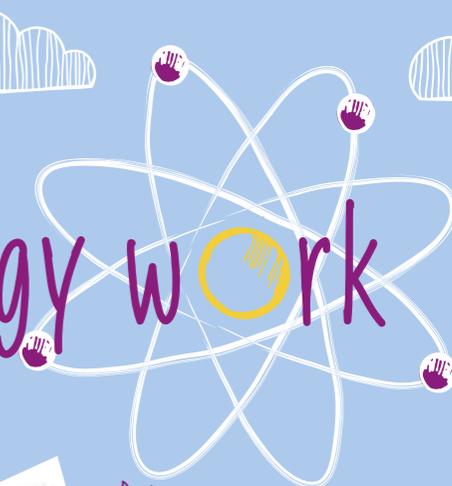
Show you understand how nuclear energy is made by sorting the jigsaw pieces into the correct order (don't forget to work as a team and talk about your ideas as you go along). Take it in turns to explain what happens at each stage and why each of the different parts follow the other. Make sure that you can explain this to the class if your teacher asks you to.

FOLLOW-ON ACTIVITY

Different types of nuclear reactors use different coolants. Can you find out what they are? Which is the most common?

FOLLOW-ON ACTIVITY

Your teacher will give you a part of the nuclear process to look at, such as uranium, the atom or coolant. Research it and then tell the class about what you have found by giving a short presentation. Make sure you include lots of interesting facts!



Did you know? Everything is made from atoms - there are over 100 different types!

HORIZON
NUCLEAR POWER



Activity 5

How you can Save the planet

(you really can!)

'You might not be able to see it, but energy is everywhere!
Think about how you use it and how you can reduce the amount you use!'

Have a think about energy. What is it and where do we use it? How many types of energy can you list? Talk to your teacher and the rest of the class about what you think. Now think about all of the ways energy is wasted or lost in everyday life. To help save the planet we need to reduce the amount of energy – especially electrical energy – that we waste. What steps can you take to help do this? Create a poster or information sheet showing what you can do to save energy and reduce waste in your school.

FOLLOW-ON ACTIVITY

Plan and carry out a review of the energy your school uses. Where is the most energy used? You might need to talk to someone who takes care of the school building to help you.

FOLLOW-ON ACTIVITY

How does your school's energy use compare with the recommended guidelines? Can you think of any ideas that would help you become an eco-school? For example, some schools use rainwater to flush the loos! Visit the eco-schools and carbon trust websites for information or visit the website for your local water company.



Activity 6

Power your school with low-carbon energy

PART ONE: INSIDE

You will be shown what a simple anemometer looks like and how it works. Now have a go at making your own anemometer.

PART TWO: OUTSIDE

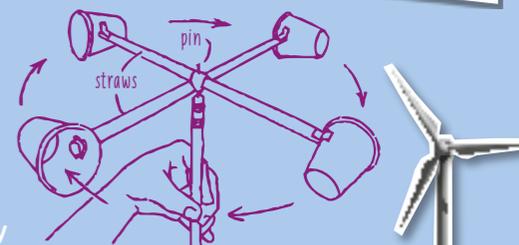
Go outside and test your anemometer by counting how many times it spins round in a minute. Discuss your design and why you chose to make it the way you did. If you're in a group, which one do you think is the best and why?

FOLLOW-ON ACTIVITY

Design a way to test which part of your school is the windiest. Choose 4 different areas, and test the wind speed at times throughout the week.

- Include background research
- Estimate how much your school would benefit
- Do an experiment to test this (using your anemometer)
- Analyse your data, draw conclusions and share your findings with the rest of the class

Example Anemometer



Word bank

A simple machine that measures the speed of the wind

Anemometer

Atom

A tiny particle – the smallest building block of all things

Boiler

A machine that burns gas to heat water for taps and radiators

Electricity generated by burning the gas given off by rotting plant waste

Biomass energy

Carbon footprint

A measure of how much CO₂ is released into the atmosphere through human activities

Greenhouse effect

The warming of the planet caused when gases – such as CO₂ – are released into the atmosphere

Electricity generated from the movement of falling or running water

Hydro energy

Indirect impact

When the things we use also release CO₂ into the atmosphere during the process of it being made

Non-polluting energy – such as solar, wind, tidal, hydro and also nuclear

Low-carbon energy

Marine energy

When the power of the sea, as in waves and currents, is used to generate electricity

A tiny particle found in the core – or nucleus – of most atoms

Neutron

Renewable target

Electricity generated from unlimited natural sources, such as the sun, wind and waves

Renewable energy

The UK Government's commitment to meeting at least 15% of our energy needs through renewable sources by 2020

When the sun's rays are converted into electricity

Solar energy

Solar panels

Flat panels of special cells that turn the sun's light into electricity

A gas released into the atmosphere by burning fossil fuels, such as natural gas, oil or coal

CO₂ Carbon dioxide

Coolant

The material – normally water – which takes heat from the nuclear fission process and uses it instead to generate electricity

The things you do that use energy and release CO₂ into the atmosphere, such as travel and heating your home

Direct impact

Fossil fuels

Coal, oil and natural gas. Formed from prehistoric remains, they produce energy and release CO₂ when burnt

Electricity generated from the Earth's heat, which is found in hot springs and geysers for example

Geothermal energy

Nuclear energy

Electricity generated from the heat produced by smashing small uranium particles together during the fission process

The process of splitting the nucleus of a uranium atom by firing neutrons at it. This releases a huge amount of heat energy

Nuclear fission

Nuclear reactor

The structure that contains and controls the entire nuclear power process

Fossil fuels which release CO₂ when burnt to power vehicles

Petrol & diesel

Recycling

Converting home waste into reusable materials so that less energy is used

Thermostat

A small device at home used to turn central heating up and down

Nuclear fuel in the form of rods

Uranium

Wind energy

The movement of the wind, which can be used to generate electricity

Wind speed

Measured in metres per second (m/s)

Wind turbine

A piece of equipment that turns with the wind and converts this energy into electricity

Certificate

Official

Energy Champion

This certifies that

- calculated their carbon footprint
- considered the different ways that energy is generated
- developed a good understanding of low-carbon energy
- explored how nuclear energy is converted into electricity
- identified ways of reducing their impact on the planet
- designed a way of measuring the benefits of wind energy

Signed

