# Unit Two: Energy

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## CURRICULUM LINKS

**SCN 2-04B :** Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use.

**SCN3-04B:** By investigating renewable energy resources and taking part in practical activities to harness them I can discuss their benefits and potential problems.

## TIME

Ideal: 2 x 1 hour
Minimum: 1 hour

## QUICK LINKS

Refer to Quick links sheet on DVD

## RESOURCES

Reward map
Photocards 10-16
Activity Sheets 2, 3
Student Investigation 2
Fizzy drink bottle

## KEY WORDS:

**Energy**
**Greenhouse gases**
**Carbon dioxide**
**Fossil fuels**
**Carbon sink**
**Atmosphere**

## OBJECTIVES

Most pupils will:

- have an increased understanding of what energy is and where it comes from;
- have an increased awareness of what we use energy for;
- begin to recognise the link between energy use and climate change.

## PRE-UNIT KNOWLEDGE

Understanding of what a greenhouse is and how it traps heat.

"The greenhouse effect is quite a tricky, abstract concept for pupils. Spending time on the practical demonstrations and videos is very beneficial to their understanding."

## STIMULUS

Watch the climate change video at Quick link 2.1 Discuss using the questions below. Ask pupils to list all the examples of what used energy in the video. Extend this to what uses energy (electricity and fuel) in their lives.

**What does this video show us?** *Recap climate change discussion*
**What is energy?** *Energy is what makes things go*
**Where do we humans get our energy from to move?** *Food*
**What things used energy in the video?** *E.g. cars, computers, heating homes*

## THE ENERGY JOURNEY ACTIVITY:

| | |
|---|---|
| The coal, oil or gas made millions of years ago is mined | (pupils mining coal) |
| It is then transported to a power station | (pupil driving) |
| Where it is burnt in furnaces | (pupils jumping up and down) |
| The furnaces heat water to make steam | (pupils whistling) |
| Steam turns a turbine, which then turns an electricity generator | (pupils spinning round) |
| Electricity is carried to our homes using pylons | (pupils as pylons with arms out) |
| We use electricity to watch TV, play computer games, cook..... | (pupil switching light on) |

To reinforce, give pupils cards with the different stages of the energy process which they can arrange in the correct order.

## Activity 1: Where does our energy come from?

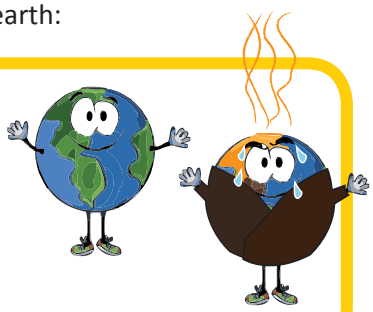
Explain that the energy we use in our homes, school and transport mostly comes from burning fossil fuels – coal, oil and gas. These were formed millions of years ago and are buried deep in the ground. Watch short explanation animations at Quick link 2.2 and 2.3. Explain that nearly 70% of the UK's energy comes from burning fossil fuels but there is not an infinite supply; they will eventually run out. Try the kinaesthetic activity 'The energy journey' (in the yellow box overleaf) to demonstrate the energy journey from mining fossil fuels to turning on a light.

## Activity 2: How does our energy use affect our climate?

**In the stimulus video, what was the gas that is released when we burn fossil fuels and helps keep our planet warm?** *Carbon dioxide, $CO_2$. Explain that whenever we burn fossil fuels that puts carbon dioxide into the air.* Demonstrate what $CO_2$ is with a fizzy drink: the gas is dissolved in it, simply shake and open a new bottle. As the carbon dioxide 'escapes' out of the liquid it causes the bubbles and makes a hissing sound. Pupils can observe that carbon dioxide is colourless and odourless – we can't see it or smell it. We breathe it out and plants breathe it in. Show Photocard 10 of deforestation. **Why is this affecting the amount of carbon dioxide in the air?** *There are fewer trees to absorb the gas and when the trees are burned they produce even more carbon dioxide.*

Explain that the earth has a blanket of gas around it, called the atmosphere, which keeps it warm. This is a good thing, allowing life on earth as we know it. Use this role-play activity with a pupil as earth:

Imagine you are standing outside in winter wearing shorts and t-shirt. **How would it feel?** *Very cold.* Put a coat on them, explaining that this is the blanket of gases that keeps the earth warm. Carbon dioxide is one of these gases, and as we have been learning, more of these gases are going into the air. Put another coat onto the pupil, then another and another. **How do you feel now?** *Hot!* Explain that this is the effect the carbon dioxide is having on the earth when we burn fossil fuels - it is called the greenhouse effect.



Watch the Met Office video again at Quick link 1.1 from 2:53 to 3:48, demonstrating the Greenhouse effect, and reinforce with Photocard 16. If time, use the kinaesthetic activity in Quick link 2.4 to explore the greenhouse effect further. Look back at Photocards 10 - 15 showing the causes of climate change and emphasise that they produce greenhouse gases.

History extension: Explore Victorian Britain's energy and children working in the coal mines, Quick link 2.5.

## NOW LET'S TAKE SOME ACTION!

*Allow pupils to select an action from below. When it is completed they should colour in one of the continents on their reward map.*

**Sunny** Keep an energy diary at home for 1 week, noting everything you use which requires energy (fuel or electricity). Ask your parents how things have changed, and ask them to list how many electrical appliances were used when they were children.

**Sunnier** Use Activity Sheet 3 to find out more about your family's attitudes to energy.

**Sunniest** Use Student Investigation 2 to independently research energy saving.

## Plenary

Definitions activity: use the story of Colin $CO_2$ at Quick link 2.6 then use Activity Sheet 2 to ensure pupils understand the new vocabulary. Pupils could work in groups to write sentences using key words, or create a whole-class glossary for display.

# Definitions

With your partner, pick one of the boxes below. Put the words into sentences to create a definition. To help, you could try writing the words onto pieces of paper and arranging them into groups.

When you are happy with your definition, read it to another pair and see if they can guess which phrase you are defining.

## Climate Change

hotter faster

flooding drought

drier time

weather cooler

unpredictable

## Fossil Fuels

coal, oil and gas

millions of years

$CO_2$ burning

carbon energy

plants and animals

## Greenhouse Effect

$CO_2$ sunlight

atmosphere hotter

gases temperature

heat escaping

trapped faster

## Carbon Sinks

trees and plants

atmosphere $CO_2$

store oxygen

greenhouse effect

breathe

# Research question: How do we save energy?

Use the websites listed below to help you find the information you need. There is a lot of information written on these pages – you will need to read and then summarise what you have found out.

## Supporting inquiry 1a: Give 3 reasons why we should save energy.

http://tiny.cc/fpixr

## Supporting inquiry 1b: Find out 5 ways of saving energy at home.

e.g. putting your desk near a window to make the most of natural light

http://tiny.cc/t7rcc http://tiny.cc/qttmyw

## Supporting inquiry 1c: Find out 5 ways of saving energy at school.

e.g. turning the school's central heating down by 1 degree

http://tiny.cc/l6uxf

# Take action!

The more people who take action to save energy, the bigger the difference we can make. So let's spread the word! Use the space below to design a way of letting people know how they can take action to save energy and why they should. Remember to keep your message clear and simple.

Some ideas: a poster, a poem, a rap, a TV advert, a leaflet....

Get creative!