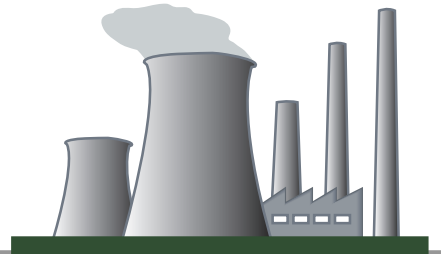


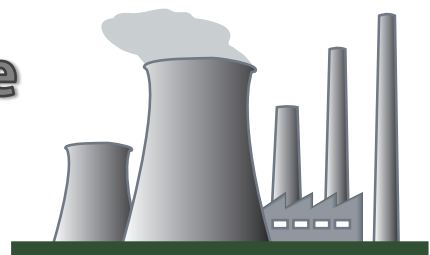
# Chapter 1



## 2. Energy, Fuel and Climate Change

# Energy, Fuel and Climate Change

## Teacher Notes



### Activity Description

The students will learn about energy, where it comes from and consider the consequences of our current energy consumption. They will understand the implications of using fossil fuels for the environment and they will be introduced to CCS in this context.

### Time

1 hour

### Learning Outcomes

- To understand what energy is
- To know where electrical energy comes from
- To understand the implications of fossil fuels for the environment
- To consider carbon CCS as a CO<sub>2</sub> remediation solution

### Student Organisation

Individual

### Materials Needed

Energy, Fuel and Climate Change Student Worksheet  
Make Your Own Power Station Experiment resources (see below)

### Talking Point

What do you think energy is?

Is the energy you use to swim, run, and dance the same as the energy used by the TV and the microwave?

### Energy Facts:

- Energy has lots of different forms.  
Energy cannot be created or destroyed, it can only be transferred from one type to another. For example, energy eaten as food is transferred to kinetic energy and energy stored in coal is transferred to heat energy.

### Fuel Facts

- The energy we use to generate electricity can be created in many ways; most commonly in the UK we burn fossil fuels. Fossil fuels include coal, oil or gas. They form when organic matter such as plants, trees, and animals die and are rapidly buried under many layers of rocks.

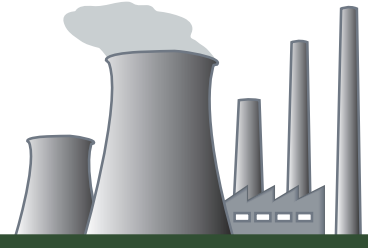
Fossil fuels take millions of years to form. When we take them out of the ground and burn them we rapidly release energy they have been storing for that time. Fossil fuels are an **unsustainable** energy source – we use them faster than they can replenish themselves. **Sustainable** energy sources cannot be exhausted and readily replenish themselves.

### Talking Point

Can you think of any problems we might have if we only use sustainable sources of energy?

# Energy, Fuel and Climate Change

## Teacher Notes



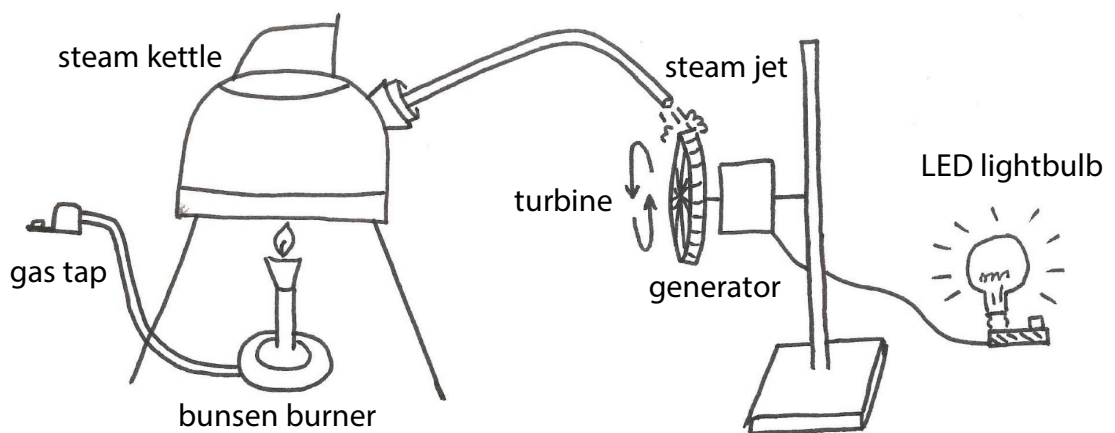
Hint: Energy companies choose to burn fossil fuels at times when electricity is in high demand. What happens on a wind farm when it is windy, but our demand for energy is not as high?

### Classroom Activity

#### Make Your Own Power Station Experiment

##### You will need:

- Bunsen burner
- Steam kettle on a stand
- Cork stop for kettle
- Pipe to direct steam
- Turbine
- Generator
- LED lightbulb and connector cable



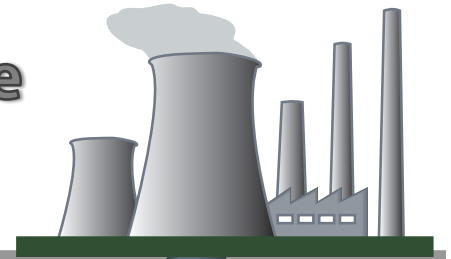
This experiment illustrates how power is generated in power stations. It also requires the students to think about scale. LEDs require a very small amount of energy to run. Ask the students to imagine the scale at which a power station supplying 500,000 homes must operate.

#### » Talking point:

A byproduct of burning fuels is waste  $\text{CO}_2$  gas.  $\text{CO}_2$  contributes to the greenhouse effect and prevents the sun's rays escaping from our atmosphere, consequently warming the planet. If we want to continue to use fossil fuels we must find a way of dealing with  $\text{CO}_2$ .

# Energy, Fuel and Climate Change

## Student Worksheet



Draw three things that use different types of energy. Write down the type of energy in the system and if the energy has changed from one state to another. *e.g. heat to light, electrical to heat, etc.*

A large, empty rectangular box with a thin black border, intended for a student to draw a system that uses energy.

---

---

---

---

---

---

A large, empty rectangular box with a thin black border, intended for a student to draw a system that uses energy.

---

---

---

---

---

---

A large, empty rectangular box with a thin black border, intended for a student to draw a system that uses energy.

---

---

---

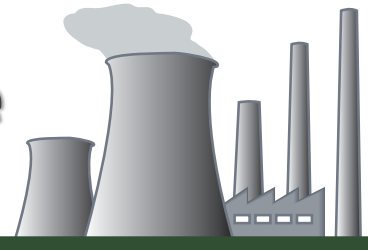
---

---

---

# Energy, Fuel and Climate Change

## Student Worksheet



Where does electrical energy come from?

---

---

Draw and name three sustainable energy sources.

A large, empty rectangular box intended for a student to draw a sustainable energy source.A large, empty rectangular box intended for a student to draw a sustainable energy source.

---

---

A large, empty rectangular box intended for a student to draw a sustainable energy source.

---

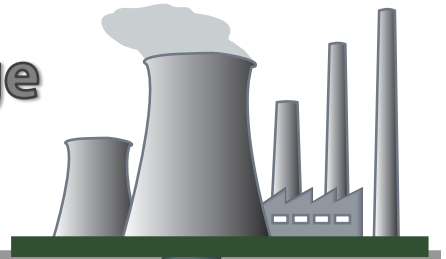
What problems might we have if we only used sustainable forms of energy?

---

---

# Energy, Fuel and Climate Change

## Student Worksheet



Draw a sketch of your power station in the box below and label each component.

With a coloured pencil, label each energy change in the experiment.  
e.g. potential energy (*fuel*) -> light + heat energy (*flame*)

A large, empty rectangular box with a thin black border, intended for a student to draw a sketch of a power station.

In the boxes below, brainstorm the advantages and disadvantages of renewable and non-renewable energy types.

Advantages of Renewable Energy	Advantages of Fossil Fuels
Disadvantages of Renewable Energy	Disadvantages of Fossil Fuels