Mission 5: Energy And The Environment
Fossil fuels play an important role in our lives as they provide us with a lot of our energy. We already know that fossil fuels like coal, oil and gas can be used to make electricity, but did you know there are many other ways in which we use fossil fuels?

Coal, oil and gas are used to heat our homes

Oil is used to make different types of plastic

Oil is used to make petrol and diesel for cars...

...and fuel for aeroplanes

The fossil fuels we use today were made over 300 million years ago - that means they’re even older than the dinosaurs! Er, not that you look that old of course...
Look at the picture above. Circle three things that we need fossil fuels for. Write each of them in the space below, then colour in the picture.

1. ________________________________
2. ________________________________
3. ________________________________

Draw a line from each fossil fuel to show the things it can be used for.

- coal
- oil
- gas

- making electricity
- making plastic
- aeroplane fuel

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Wow Sparky, I didn’t realise we used fossil fuels so much. There must be loads and loads of fossil fuels underneath the ground!

Actually Nathan, that’s where you’re wrong. Scientists believe that there is only a limited amount of fossil fuels underneath the ground. Take a look at this...

The Earth contains a certain amount of fossil fuel resources beneath its surface. Scientists think these resources can be divided up as follows:

- coal (69%)
- oil (17%)
- gas (14%)

OH NO! It says here that fossil fuels are NON-RENEWABLE, which means once they run out they can’t be replaced!

What will we do without fossil fuels?!
Non-renewable Energy

Look at the pie chart on the previous page.
If we used each of the fossil fuels at exactly the same rate...

1. Which fossil fuel would run out first? ____________________________

2. Which fossil fuel would last the longest? ____________________________

Blah blah blah... And finally, it was announced today that the world has run out of fossil fuels...

Imagine what the world would be like if we ran out of fossil fuels. Think of all the ways your life would be different if this happened.

1. How would you heat your home?

2. What would you do without petrol or diesel?

3. Could you still use electricity? If yes, where would it come from?

4. Name 5 things in your house that are made out of plastic.

5. What could be used instead of plastic?

Fill in the blanks in the sentences below:

 cannot oil used heat vehicles

Fossil fuels are _________ to make electricity, _________ our homes, and make fuel for _________. _________ is used in the manufacture of plastics. Fossil fuels are called non-renewable, because when they run out they _________ be made again.

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Sparky, I'm worried about fossil fuels running out. They play such an important role in our lives.

Well Nathan, fossil fuels are important, but they're not all good you know. Unfortunately when we use fossil fuels we also harm the environment...

When fossil fuels are burnt in power stations, factories, cars, planes and our homes they give out smoke. This smoke contains gases which are harmful to the environment. This is called **air pollution**.

In very busy cities where there are a lot of people, cars and factories making smoke, there is often a brownish haze in the air called **smog**. Smog is a mixture of smoke and fog. As well as not looking very nice, smog can damage our lungs if we breathe it in.

**THE GREAT LONDON SMOG**

In December 1952, London was engulfed by a terrible smog, which lasted for five days. Road, rail and air transport were brought to a standstill. Shows had to be cancelled when fog in the theatres made performances impossible, and nurses reported not being able to see from one end of the hospital wards to the other.

Worst of all, the smog, said to be like pea soup, caused the death of around 12,000 people and illness to many others.

The deaths which resulted from the smog were mostly due to:

- Pneumonia
- Tuberculosis
- Bronchitis
- Heart failure

The main cause of the smog was smoke from people burning coal on their fire at home. In 1956 the Government introduced the **Clean Air Act**, which aimed to get people to change from traditional coal fires to heaters fuelled by gas, oil, smokeless coal or electricity.

Today "pea-soupers" are a thing of the past, but a heavy smog in London in 1991 reminds us that we still need to cut down on the levels of pollution in our cities.
Quiz - Air Pollution

Read the passage about The Great London Smog again and see if you can answer the following questions.

1. Circle the phrase that means the same as engulfed:
   swallowed up        picked up        cleaned up        fed up

2. Why do you think air transport was brought to a standstill?

3. What phrase tells us the smog was very thick?

4. What caused the smog?

5. Name 3 diseases caused by the smog.

6. Name 2 types of buildings affected by the smog.

7. What did the Government do?

8. Name 3 alternatives to coal for heating homes.

Oh no! Sparky tried to write these words in the smog and has got the letters all mixed up! See if you can help him by unscrambling the words. You can find them all on the previous page.

etacrfois
emosk
nenvieromnt
sunlg
loca
Acid Rain

Pollution produced by fossil fuel power stations, factories and cars contains sulphur and nitrogen gases.

When they are released into the air, these gases mix with the rain inside the clouds to make acid rain.

When acid rain falls it can cause damage to trees and plants. It can also kill fish living in ponds and rivers.

Some buildings made out of a chalky stone called limestone can start to crumble because of years of acid rain falling on them.

Scientists use special paper to test the acidity of liquids. This paper is called pH paper. It changes colour depending on how acidic the liquid is. We can use pH paper to test rainwater, to find out whether or not it is ‘acid rain’

Although acid rain can cause a lot of damage to plants, fish and buildings, it does not do us any harm if it falls on us!
Colour in the picture below, showing the damage caused by acid rain.
In the space provided, draw the scene as you think it looked before it was affected by acid rain.
Quiz – Acid Rain

Fill in the blanks...

Acid rain is made when __________ from burning __________ __________ goes into __________. When acid rain falls it __________ rivers and land. It can kill __________ and __________. It can also damage some __________.

Find the following hidden words:

acid rain smoke fossil fuels cloud pollution fish plants river
Choose three plants the same size and type for this experiment. Make sure that they are in the same size pots and are given equal amounts of sunshine and liquid. Over two weeks give plant A water, plant B water and lemon juice and plant C vinegar. Vinegar and lemon juice are both acidic.

Record how the plants look each day.

<table>
<thead>
<tr>
<th>Day</th>
<th>Plant A</th>
<th>Plant B</th>
<th>Plant C</th>
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<tbody>
<tr>
<td>1</td>
<td>Healthy</td>
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</tbody>
</table>

At the end of the investigation...

Which plant looked the healthiest? ___________________

Which looked the least healthy? ___________________

Which liquid was the most acidic? ___________________

Which liquid was the least acidic? ___________________

What can you say about the effect of acid on plants? ___________________
Burning fossil fuels releases the carbon stored in these fuels into the atmosphere as Carbon Dioxide. This is a type of Greenhouse Gas.

Fossil fuels have been formed over millions of years from the remains of dead plants and animals. These remains contain carbon.

Too many Greenhouse Gases in the atmosphere act like a blanket around the Earth, making it feel warm, like the air inside a greenhouse. It's called The Greenhouse Effect. When the earth gets warm like this we call it Global Warming.

Global Warming sounds great! It'll feel like we're on holidays all the time!

Wrong again, I'm afraid. Global Warming is bad news, I'll show you why...
Global Warming

Look at the picture below, showing the Sun and the Earth. Follow the instructions to find out how Global Warming occurs.

1. Colour in the layer around the Earth light blue. This is called the atmosphere.

2. Around the outer edge of the atmosphere draw a thin brown layer. This is a layer of greenhouse gases which keep heat in.

3. Now make the brown layer a little thicker. This shows that there are too many greenhouse gases in the atmosphere.

4. Draw an arrow from the sun to the Earth. This is the heat coming to Earth from the sun.

5. Continue the arrow so it is now coming out from the Earth and bouncing off the brown layer back towards Earth. This shows how the heat from the sun is unable to escape through the layer of greenhouse gases, and the Earth starts to heat up. This is how Global Warming occurs.

6. Now label each part of the diagram and finish colouring it in.
Global Warming

Look at the graph showing the level of Carbon Dioxide (CO2) in the atmosphere. See if you can answer the questions below.

1. What was the level of CO2 in the year 1200?

2. In what year was the lowest level of CO2?

3. In what year was the highest level of CO2?

4. Overall, is the level of CO2 increasing or decreasing?

5. From the graph, what level do you think CO2 will be at in 2000?

6. CO2 is a greenhouse gas. Explain what a greenhouse gas is.
Climate Change

Global Warming can cause strange things to happen to our weather. This is called Climate Change. It won’t just mean warmer weather, lots of other changes will happen as well...

Changes in the weather will mean that some places will have lots of sunshine and no rain. This will lead to droughts, where crops cannot grow due to lack of water, and people may have no food to eat.

As the Earth gets warmer ice in Antarctica and Greenland will begin to melt. This will cause the level of the sea to increase and some land will disappear under water due to flooding.

Diseases like malaria may spread to a lot more people because the mosquito, which carries the disease, does well in warmer climates.

Weather will become more extreme, with terrible hurricanes and floods becoming much more common than they are today.

Wa-hey! When’s the Global Warming starting? I can’t wait!

So, you still think Global Warming sounds good? Try reading this and then see if you still think so!
Quiz - Climate Change

Fill in the answers to the questions in the puzzle below. The grey squares spell a mystery word downwards. Write the word in the space below and explain why it is related to Climate Change.

1. This type of warming causes our climate to change.
2. This happens when there is no rain.
3. Something which can melt due to global warming.
4. This may get deeper after number 3. happens.
5. A type of weather that can be caused by global warming.
6. This weather type may also be caused.
7. A disease which is spread by mosquitoes.
8. If there is none of this then number 2. will occur.
9. If seas rise land may start to do this.

The mystery word is __________________________

This is related to Climate Change because...
Global Warming Activity

Choose one of the four disasters caused by Global Warming which I’ve told you about. Write your own newspaper article all about it. Answer the questions below to help you plan your article.

When you are writing your article, remember to include the answers to the following questions...

**WHO** did the story happen to? This person could be real or imaginary.

**WHAT** happened in the story? The main event(s) that occurred.

**WHERE** did the story happen? This place could be real or imaginary.

**WHEN** did the story happen? It could be today or in the future.

**WHY** did the story happen? What caused it?

**HOW** did the story happen? What happened first? Then what?

Once you have answered the questions above you can use your answers to write your article. Don’t forget to include pictures and give your paper a name to make it look as real as possible!

This is the way real newspaper journalists write a story!
<table>
<thead>
<tr>
<th>Keywords and Definitions</th>
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<tbody>
<tr>
<td><strong>Air Pollution</strong></td>
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<td><strong>Acid Rain</strong></td>
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<td><strong>Atmosphere</strong></td>
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<td><strong>Carbon Dioxide</strong></td>
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<td><strong>Fossil fuels</strong></td>
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<td><strong>Greenhouse gases</strong></td>
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<td><strong>Non - renewable</strong></td>
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