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G4001

RENEWABLE ENERGY

Activities To Build Awareness & Understanding



Malcolm Watson

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RENEWABLE ENERGY

Acknowledgements

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RENEWABLE ENERGY

Where Does Energy Come From?

Teacher's Guide & Planning

The Key Issues

- To understand that energy comes from using power stored in fossil fuels such as wood, coal, oil and natural gas, or comes from active sources such as water, wind, sea and the sun.
- To understand that some sources of energy are finite, but others such as water, wind, sea and the sun are renewable and will last for ever.

Additional Activities

Language

- Pretend you are a sun beam. Tell the story in comic strip form of the journey from the sun, reaching the earth's surface and either being directly used by solar cells or being converted by a plant into stored energy to be eventually made into oil and then used in a vehicle.

Science

- Investigate the energy we receive from the sun. Measure the temperature simultaneously in the shade and in direct sunlight. Do the same for a jar of water and plot the temperature for each jar.
- If you have safe facilities such as a fume cupboard, burn 10 gms of different fossil fuels (wood, oil, etc.) and see how they heat up the air in the enclosed space. That is a measure of their stored energy.

Art

- Paint a sun ray picture representing how the sun's rays are the source of life and energy.
- Some artists such as Van Gogh had strong styles to represent the sun. The Egyptians and Aztecs also worshipped the sun and this is represented in their art.

Research

- Have a research race.
- Give each student (or groups) a fuel type to research on the internet.
- Let them have just 15 minutes to discover:
 1. Is it renewable or finite?
 2. How is it converted to energy we can use?
 3. If finite, how many years' supply left?
 4. If renewable, what can cause the supply to vary?
- Report back to the whole class.

More Information

Almost all energy, ultimately, comes from the sun. Solar is direct from the sun. Fossil fuels such as oil, gas and coal come from decayed plant matter which grew originally because of sunlight. Hydro power depends on the sun's energy to drive the water cycle. In most cases we are using energy from the sun which has become stored in another form. So by burning oil we are using up solar energy which shone on the earth over 250 million years ago.

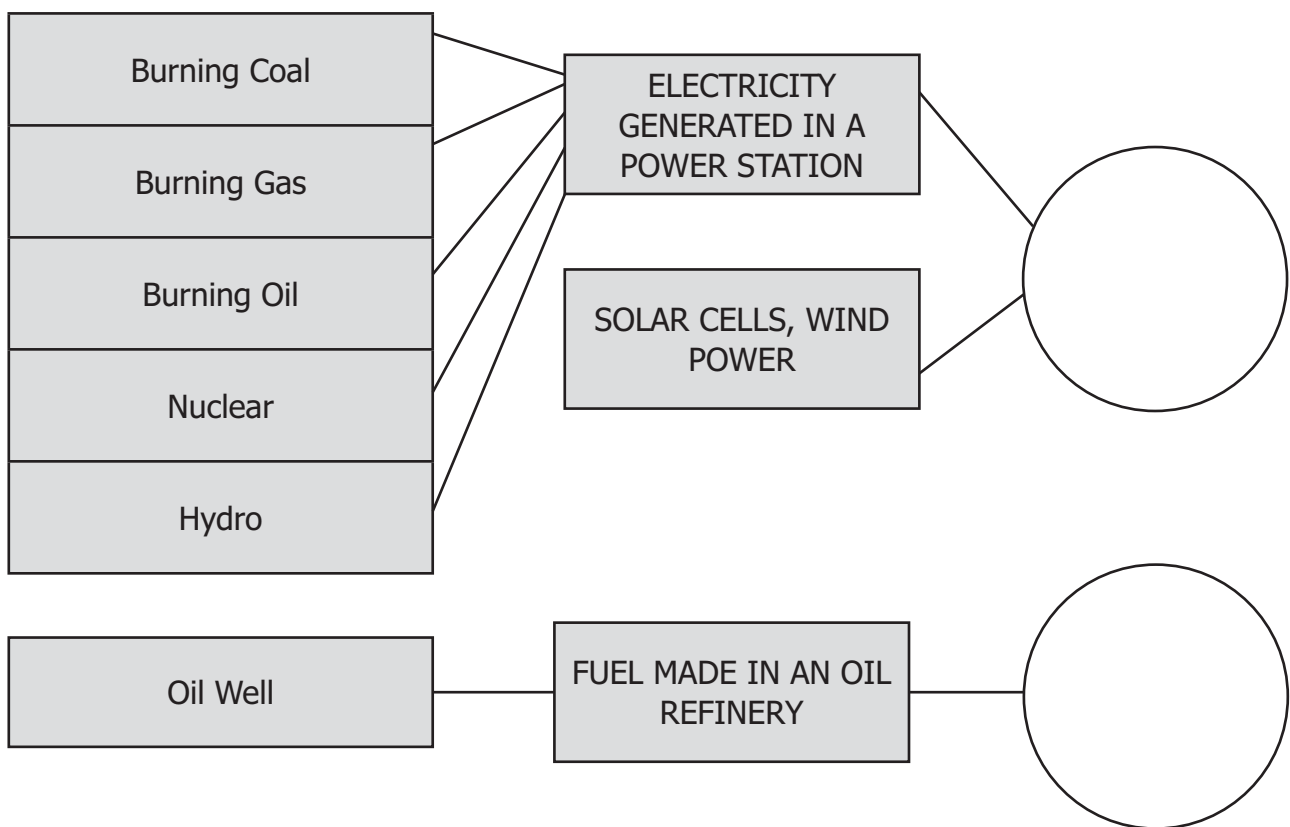
RENEWABLE ENERGY

Where Does Energy Come From?

Energy makes things move. Without energy nothing would work. In the days of the cave man, everything was done by human power. Then people learned to use the power of animals. They also used the power of water and the wind to move their boats and power their windmills.

Modern power does not depend on wind, animals or water. We have light and heat by turning on electricity, transport by burning petrol and diesel. But where does this power come from?

Write what is produced in the circles below.



Think about where the energy comes from for the things you use.

Write the labels above the correct photograph to show what energy it uses.

ELECTRICITY. GAS. WIND. OIL (Petrol , Gasoline or Diesel). HUMAN POWER.



RENEWABLE ENERGY

What Is Renewable Energy?

Teacher's Guide & Planning

The Key Issues

- To understand that renewable energy will never run out.
- "Renewable" is not a simple term.
- Some children think that petrol or gas is renewable because every time they want more they just turn on a tap or go to the petrol pump. The key is to demonstrate that finite energy sources will run out one day. For some energy sources such as oil and natural gas that could effectively be in their life time.

Additional Activities

Science

- Develop as a whole class on the whiteboard a backwards developed flow chart. Start with the drawing of a petrol (gas) pump. Ask "So, where did the petrol/gas come from?". Then draw the oil refinery. Keep asking "So where did the _____ come from?" until you reach the crude oil underground. Then point out that it took 250 million years to create but will all be used up in 100 years to show how finite it is.
- Develop as a whole class on the whiteboard a backwards developed flow chart. Start with the drawing of a solar calculator. Ask "So, where did the energy to run this calculator come from?". Then draw the solar cell. Soon you will reach the sun as the source. Point out how the sun is always there and hence energy from it is renewable.

Research

- How long has the sun been shining?
- How long is it estimated that the sun will continue to burn (shine) for?
- How much energy does the sun give out in a year?
- How much energy does the earth use in a year?
- This will show how the sun has the capacity to provide all of the earth's energy needs for almost ever, as long as we can find efficient ways of capturing, storing and converting its energy.

More Information

The sun is the ultimate source of all our energy, although the process of converting and storing and releasing that energy into a fuel we recognise and can use is very complex for most young students. Solar panels are the easiest and most immediate to demonstrate. Of the fossil fuels the conversion of sunlight into plant cells, and hence wood for burning or plants for biofuels is the most straightforward to explain.

RENEWABLE ENERGY

What Is Renewable Energy?

When you make a fire energy is made. There is light from the flame. There is heat. We can set fire to something with this heat. When the match goes out you cannot use it again. It is not renewable.



A sailing boat is moved by the wind. The wind blows on the sails and the boat moves. Even when the winds dies we know it will come back again. Energy from the wind is renewable.



Match the correct picture to the correct sources of energy from the list below.



THE SUN.

THE WIND.

NATURAL GAS.

OIL.

WATER.

HUMAN.

Think about the sources of energy shown in the pictures.

Some do not disappear once used. Some are renewable – they never disappear.

Put a TICK by the photos of renewable energy and a CROSS by the photos of each source of energy that is not renewable.

RENEWABLE ENERGY

Are Energy Sources Running Out?

Teacher's Guide & Planning

The Key Issues

- The finite sources of oil, gas and coal will run out unless more reserves are found.
- Energy use is rapidly increasing and oil and gas will be in short supply very soon.
- Many countries have to buy in energy which is a strategic risk.
- Oil, gas and coal are also the main producers of CO₂ so alternatives must be found quickly.

	COAL		GAS		OIL	
	Reserves	Ann. Use	Reserves	Ann. Use	Reserves	Ann. Use
	Billion Tonnes Oil Equivalent	Billion Tonnes Oil Equivalent	Billion Tonnes Oil Equivalent	Billion Tonnes Oil Equivalent	Thousand Million Barrels	Thousand Million Barrels
World	606,000	3,177	277,000	2,940	2,190	31

Additional Activities

Language

- Design the front page of a newspaper for the day when the country has run out of petrol.

Maths and Science

- Plot a time line from now to 90 years in the future.
- Label every 10 years, 2020, 2030, etc. Have the children work out how many years oil, gas and coal are left at each mark (see the chart on the activity page).

Art and Humanities

- Draw a vehicle of the future that would run on solar power.

Research

- Find out which countries have the biggest reserves of oil, gas and coal.
- Which countries use most oil, gas and coal?
- How could we use less oil, gas and coal and make it last for longer?

More Information

There are widely different estimates of how much energy the world has left. The rate of use of energy is also increasing rapidly, especially in countries such as China and India where, as yet, only a small proportion of the population consume much energy. As they become richer, so car ownership, use of air conditioning and greater industrial demand will further increase world demand. Unfortunately for CO₂ emissions, India and China are rich in coal but have little of the cleaner, oil and gas.

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Are Energy Sources Running Out?

When you burn a piece of coal, or use a litre of petrol, it is gone forever. Little by little we are using up the amount of coal, gas and oil in the world. Each year there is less to use. Even before the oil and gas runs out there will not be enough for everyone. Unless we start to use renewable sources of energy, like sun, wind and water, life as we know it will change for the worse.

Talk about what the following will mean for the future.



OIL

70 years supply left



GAS

90 years supply left



COAL

200 years supply left

Unless we find more oil, gas and coal they will start to run out by the end of your life time, and all but coal will soon be in very short supply. We have to use other types of energy.

If there was no petrol how would we travel?

If there was no gas how would we cook or heat our homes?

RENEWABLE ENERGY

Does Everywhere Have Sources Of Energy?

Teacher's Guide & Planning

The Key Issues

- Some places have a lot of fossil fuels. Some have very little.
- All countries have some renewable energy sources.
- The amount of renewable energy available from place to place varies.

Additional Activities

Language

- One day you are digging in the ground and oil comes flowing out Continue the story. What happened? How did it change your life? Is the ending sad or happy?

Maths and Science

- Show how all energy has come from the sun at some point in time.
- Without sunlight plants do not grow. Decayed plant matter from millions of years ago have produced the coal, oil and gas deposits we find under the ground now.
- Of the renewable energy sources wind and wave power are due to the differential heating of the earth by the sun. Rain needs evaporation from the sun to form the clouds to give water for hydroelectricity.
- Make this information into a giant wall display.

Art and Humanities

- Energy stories are almost always in the news. Collect newspaper or internet articles about oil, gas, coal, solar, hydro, nuclear, etc.
- Have a large world map on the wall and link the article to the correct place(s) in the worlds to build up a picture of "World Energy Hotspots".

Research

- Look into the energy resources that you use in your own country. You may have to simplify figures for the children. You can access the latest figures, by country, from sites such as www.bp.com (look for the statistical review of world energy). For renewable energy data look at the Greenpeace site.

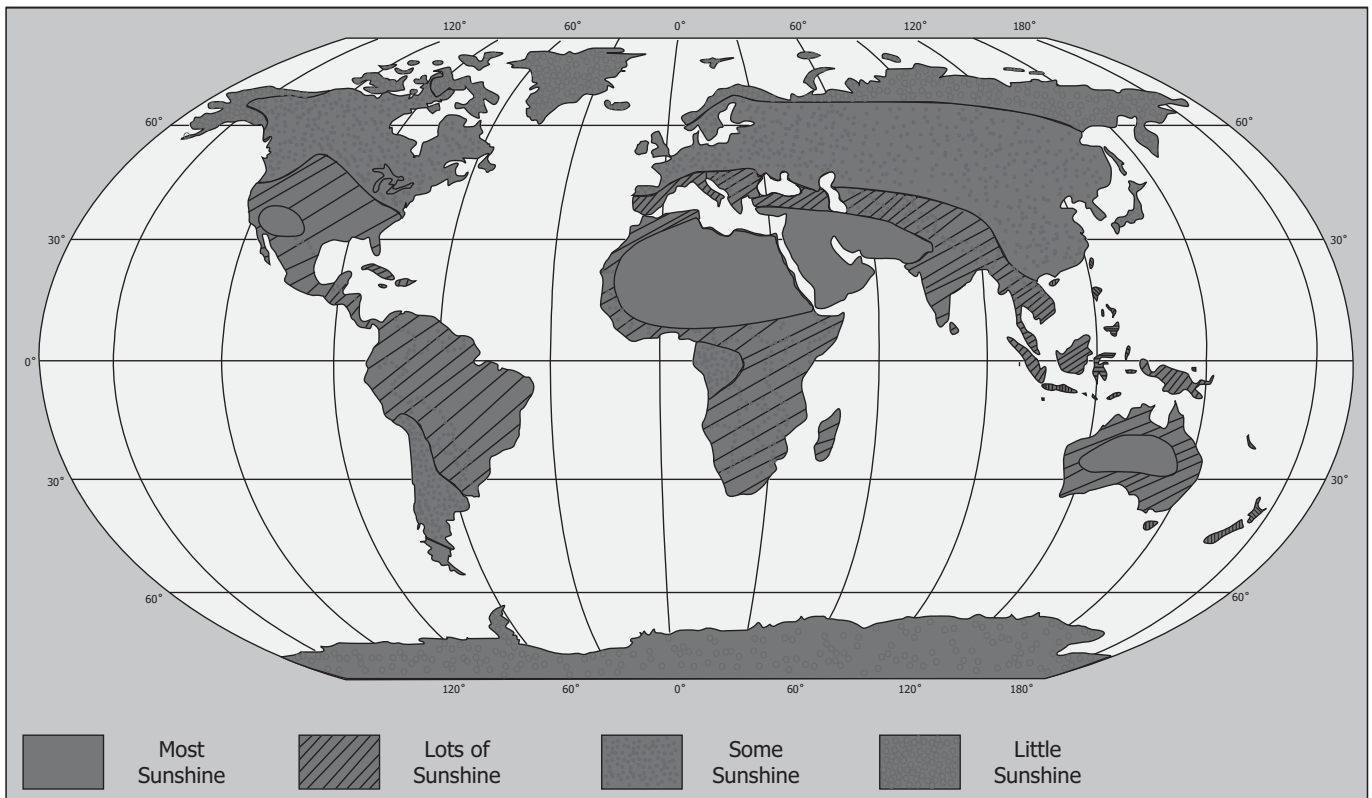
More Information

Energy data varies according to the source. Oil companies tend to be optimistic about world reserves and being able to find and extract more oil and gas. Environmental groups tend to put emphasis on renewable sources. The broad picture will remain the same. Many nations are short of energy and will find the cost of buying it increasingly expensive. Renewables and energy saving measures make lots of sense and will also help minimise global warming.

RENEWABLE ENERGY

Does Everywhere Have Sources Of Energy?

Everywhere has sources of energy. Few places have what they need when they need it.



This map shows how much the sun shines in the world. Solar power needs lots of sunshine to make most energy.

Talk about where the sun shines most in the world. Use an atlas to help you name some of the sunniest places.

Where would be some of the worst places to try and use solar power?

Does the sun shine every day where you live?

Look at the map. Do you live in one of the sunniest parts of the world?

How windy is it where you live?

How often is the wind strong enough to blow your cap off?

That is how strong the wind needs to be to make lots of wind power.

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