



Exploring energy

Part of the British Science Association's National Science & Engineering Week activity pack series. www.nsew.org.uk

BIS | Department for Business Innovation & Skills



Activities

Activity 1:

Take part in an energy audit for your school or home to work out how much energy you currently use and where you can start to make savings.

Check the Energy Saving Trust website for more information on how to get started

Schools - <http://www.est.org.uk/schools/involved/>

Your home - <http://www.est.org.uk/myhome/>

Activity 2:

Design a self sufficient home which can be built and powered by environmentally friendly methods. Think about where your water, electricity, heating is going to come from and what you are going to do with all your waste. How are you going to keep your energy usage down?

Activity 3:

Recreate the Greenhouse Effect

You will need: Two identical glass jars, 4 cups of cold water, 10 ice cubes, 1 clear plastic bag, Thermometer.

- Split the cold water and ice cubes evenly between the two jars.
- Wrap one of the jars in the plastic bag.
- Leave both of the jars out in the sun for one hour.
- Measure the temperature in each jar.

What's happening?

In real life, sunlight passes through the atmosphere and warms the Earth's surface. The heat radiating from the surface is then trapped by greenhouse gasses. This warming, due to the heat-trapping gasses, is called the "Greenhouse Effect." In this experiment, the plastic bag acts as the greenhouse gas layer, trapping in the heat and causing the water to become warmer in the jar with the bag.

Activity 4:

Find out how to keep your home cool

Design an experiment to see whether factors like shading or house colour would be able to keep your house cool. Try using a small cardboard box as your house and, if it isn't very hot outside, an anglepoise lamp for the sun.

Activity 5:

Make recycled paper

Did you know it takes six trees to meet the average family's paper requirement for a year? And did you know that producing recycled paper involves 28 – 70% less energy consumption and 95% less air pollution than if produced from scratch? Why not have a go at recycling your own paper and help put some of your waste to use!

You will need: Old newspaper or printer paper, a bucket, water, a big wooden spoon or

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blender, a square tray or pan, thin mesh or netting, a flat piece of wood or a large book.

- Tear up 3 sheets of newspaper and put them in a bucket with 5 cups of water and leave it to soak overnight.
- When the paper is soft use a wooden spoon, or a blender, to mash it up into a pulp.
- Pour 2cm of water into the square pan and lay the mesh in the pan.
- Take a cupful of paper pulp and spread it over the mesh. Gently move the mesh up and down so that the pulp settles in an even layer.
- Carefully lift out the mesh and place it on some spare newspaper to drain.
- Place another section on newspaper on top of the pulp and carefully turn the whole thing over so that the mesh is now on top of the pulp. Leave both sections of newspaper in place.
- Place your wood, or heavy book, onto the newspaper and push it down to squeeze out the water.
- Remove the top piece of newspaper and mesh and leave the pulp to dry for at least 24 hours.

If you have any pulp left over you could even freeze and use it later!

Activity 6:

Make a draught excluder

Did you know that in a typical house, 20% of all heat loss is through ventilation and draughts? Draught proofing is an easy and cost effective way to reduce the energy you use to heat your home.

You can make a draught excluder by either filling up a stocking with scrap material, or some other insulating material (see above!) or by rolling up a length of scrap carpet. Alternatively you could make a brilliant cat or dog draught excluder out of an old jumper.

Activity 7:

Discover what makes good insulation

In a typical home, around about 40% of heat is lost through the walls and loft due to ineffective insulation. The better the insulation your house uses, the less energy will be wasted. Find out what makes good insulation in this simple activity.

You will need: 10 jars with lids, a big jug of hot water, a thermometer, a selection of potential insulating materials. Use any of the following or choose your own

- a cotton sock
- a pair of woolly gloves
- a pair of sheepskin gloves
- any other types of material
- paper, shredded or crumpled
- aluminium foil
- cling film
- soil
- leaves
- bubble wrap
- plastic foam
- cotton wool

a plastic bag
cardboard

- Fill each of the jars with hot water and measure and make note of the temperature (all the jars should be the same). Make sure you tightly replace the jar lids.
- Quickly wrap each of the jars with a different type of insulation, leaving one jar unwrapped as a control, and place them somewhere cold.
- After 30-40 minutes, remove the insulation and re-measure the temperature of the water within each of the jars.

Compare the temperatures and work out which materials are the best insulators.

Activity 8:

Run a traffic survey

Vehicles make up 25% of greenhouse emissions per year and a 1.4 litre car produces around 3.5 tonnes of CO₂ per year. Design a survey to find out how people travel around. How do they get to school or work? How often do they use public transport? Which methods of travel do they use?

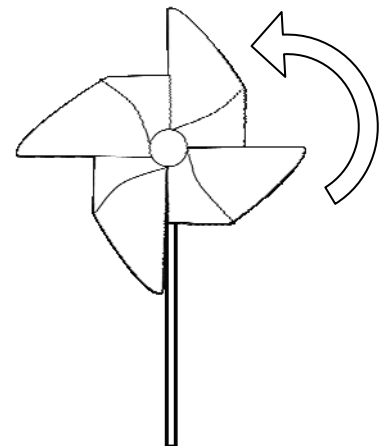
What are the most popular forms of transport? Which forms of transport do you think are the most environmentally friendly? Think about how you could present your findings.

Activity 9:

Make a wind turbine

In the UK, the majority of electricity is generated by a mix of fossil fuels and nuclear power, releasing millions of tonnes of carbon dioxide into the environment. Wind power is just one of the sustainable energy sources available that does not emit greenhouse gases, will not run out and is free to use. Although wind's contribution to the generation of the UK's energy supply is currently very small, it has huge potential to grow in order to meet the government's target of 15.4% of electricity being generated by renewable sources by 2015.

You will need: Lightweight paper, ruler, pencil, scissors, a pin, an unsharpened pencil with a rubber on the end or a piece of dowel, a couple of small beads.



- Start with a square of paper, fold corner to corner and then unfold.
- Make a pencil mark about a third of the way from the centre and cut along the fold lines until you reach the mark.
- Bring every other point into the centre of the square and stick a pin through all four points.
- Turn the pin wheel over and check that the pin goes through the exact centre of the paper. You might also want to wiggle the pin around a bit to make the hole slightly larger so that the wheel can spin freely.
- Put one or two small beads onto the end of the pin and push the pin into either your piece of dowel or into the rubber at the end of your pencil.
- You should now have your pinwheel!

Activity 10:

Grow a tree or plant

A medium-sized deciduous tree will capture approximately 1.5 tonnes of CO₂ over its lifetime. Taking in consideration a survival rate of 25% then each tonne of CO₂ emissions will require the planting of 2.67 trees.

If you don't have enough space to plant a tree, why not try planting something on a smaller scale to soak up carbon dioxide.

For plants to grow, they need certain conditions. Think about what conditions this includes, for example light, water temperature and the type of soil can affect growth and the rate of growth of a plant. Remember to change only one variable (or condition) at a time to see how each affects the plants.

In groups, or on your own, germinate some seeds in the different conditions you decide upon.

You will need (dependent upon what you would like to vary): Some quick growing seeds like radish cress or mustard, soil, pots/trays to plant seeds in (maybe yoghurt pots or whatever you can find), water, light (or darkness!), temperature, thermometer (if you wish to monitor this).

Remember to think about how deep the seeds need to be in the soil and how you would like to arrange them in the pots or trays you have. Also think about how much water you should give them and how to keep the conditions equal except for the variable you wish to look at.

Leave the plants to germinate!

Think about:

- How long it takes for the seeds to germinate?
- How many of the seeds germinate?
- Under what conditions do the most seeds germinate?
- Under what conditions do the seeds germinate the quickest?

Thank you for using Exploring Energy!

We hope you enjoyed the activities within this pack. To help us to continue to provide new activity packs, we'd like to ask you to tell us a little about what you did for National Science & Engineering Week.

Please take a few minutes to fill in this form. If you used this activity pack for NSEW, send in this completed form and we will send you a National Science & Engineering Week Certificate.

Organisation: _____

Address: _____

Postcode: _____

Tel: _____

Fax: _____

Email: _____

Which dates did you do National Science & Engineering Week activities on? _____
What did you do?

Please make any comments about this activity pack, National Science & Engineering Week and/or other possible topics for future packs (feel free to continue on a separate sheet of paper).

Tick this box to be added to our mailing list. This will keep you up to date with NSEW, including grants, resources and activities. Your contact details will not be passed onto third parties.

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For more information on how to register and receive your Crest ★ Investigator packs, visit our website at www.britishtscienceassociation.org/creststar or call 020 7019 4943.