



Learning about solar power

Build a solar oven

Learning objectives:

Children will understand that concentrating the sun's rays can produce heat that can be used by people to carry out useful work.

Start learners off

Take two safety thermometers or medical 'stick on' thermometers (do not use ordinary glass thermometers to avoid risk of shattering). Place each on a piece of white paper outside on a sunny day. Position a mirror next to one of the thermometers in such a way that it is reflecting the sun's rays on to the thermometer. Observe which thermometer heats up fastest. Why do the children think this is happening? The mirror is concentrating the sun's rays so that more heat is being directed at the thermometer.

Move learners on

Explain that by concentrating the sun's rays, we can create enough useful thermal energy to do work. For a simple demonstration of the way that concentrating the sun's rays can be useful for generating heat, try making this solar oven. On a sunny day, you should be able to use it to melt cheese, chocolate or marshmallows.

You will need:

- *A pizza box
- *Some aluminium foil
- *sticky tape
- *Scissors
- *A pen or pencil
- *A piece of wire (you can prop open the lid with a pencil if you don't have wire)
- *A sheet of plastic film such as a file divider, some acetate or some food wrap.



First, you will need to cut a flap out from the lid of the pizza box.



Next, stick the sheet of plastic over the hole you have just cut out.



Cover the flap with the aluminium foil on the inside, to reflect heat on to your food when it is inside the 'oven'. Line the box with more foil. Keep the shiny side of the foil outwards.



Hold the flap of your oven open with a piece of wire, folded and taped into place.



Adjusting the length of the wire will allow you to angle the flap so that the sun can hit the food inside.



Place your completed oven in a sunny place. You can choose which sort of food to try melting. It might take a while for you oven to direct enough heat on to your food to melt it. Keep checking back regularly to see what is happening!



Challenge learners further by:

Investigate places where concentrated solar energy is used in real life. In very sunny places, mirrors can be positioned to reflect the sun's rays on to a specific point in concentrated beams. This point has a fluid such as oil running through it, which can be heated to around 400 degrees centigrade, which is hot enough to make high pressure steam. This can, in turn, drive a generator to make electricity.

There are many Concentrating Solar Power (CSP) plants in the world that you could investigate. They use different techniques to concentrate the sun's rays such as towers with mirrors pointing at them, or 'trough' shaped mirrors with tubes running through them.

You might like to research the Kathu Solar Park in South Africa (a trough system), the Hami plant in China (a solar tower), and the Dhursar project in India (Fresnel reflectors).

Which types of geographical location are especially well suited to building CSP plants?

At the end of this activity:

All children will be able to explain that the sun's rays produce heat and the heat is stronger when the sunlight is concentrated on to one point (eg using mirrors)

Most children will be able to explain that heat energy from the sun can be concentrated so that the heat can be used to do useful work - such as heating the food they melted.

Some children will carry out further research and will be able to talk about the ways that concentrated solar power is used in real life applications.