



## SOLAR OVEN

### Goal(s):

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To make a very basic solar oven to illustrate how the sun can be a source of renewable energy.

To illustrate the 'Greenhouse Effect'

### General description of the activity:

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The pupils are divided into several groups where they can build different types of solar oven. Full instructions on how to build different solar ovens are provided in a special work sheet that comes with this activity (see Aid 2 below). After completion of the different types of oven, the pupils can measure and compare their performance. A fun way of doing this would be to melt a piece of chocolate in the ovens.

### Required materials:

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- A box from carton (pizza box for example);
- A roll of aluminium and plastic foil;
- Black paper;
- Tape

### Required pupil skills:

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Measuring in cm

Cutting and other craft skills

Knowledge of the materials used

Ability to work in a group

Filling in tables and graphs

### How does this activity fit into the curriculum:

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Science, Geography, Mathematics, Literacy.



### Safety issues:

The pupils should be made aware that the temperature in the oven can be high.

### Individual steps of the activity:

### Required time:

1. Explain the purpose of the activity. Refer to the use of renewable energy in general, and explain its importance in the fight against climate change and the depletion of fossil fuels.	Introduction and preparation of materials – 1 lesson
2. Explain 'solar energy' and show its different forms and applications, i.e. water heating, production of electricity, cooking etc.	
3. Building a solar oven: Divide the pupils into several groups and explain the purpose of the activity with instructions.	Building, experiment and analysis – 1 or 2 lessons
4. The pupils can do several ovens of only one type and try to do the most efficient oven. One way to decide which one is most efficient could be the highest temperature achieved when "cooking" outside in the sun.	
5. The pupils measure the oven temperatures every 5 minutes. They observe how the heat is increasing in the oven and even observe how the chocolate is actually melting. The pupils are outside in the sun and are also feeling the heat!	
6. Use the results for discussion, including an evaluation of the way the ovens were made.	Reflection – 1 lesson

### Suggestions for combination with other AL activities:

"Make your own sun boiler" – The pupils construct a sun boiler and heat water.  
[The listed activities above may change when all the activity sheets have been finalised.]

### Variations:

*Increased complexity of the experiment:* Mark the temperature changes of the temperature in the oven, every hour and compare with outdoor temperature (and time of day/year).

The pupils can build a real solar oven and cook real food.

The pupils can build different types of solar ovens. Each group competes with the others to see which oven performs the best (this activity can include the pupils coming up with their own designs).

### Available aids:

Aid 1 – Relevant web sites



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Aid 2 – Guide for construction of a solar oven

Aid 3 – Table for registering temperature changes



## Solar oven – Aid 1



### Relevant web sites

<http://www.solarnow.org/pizzabx.htm>

[http://www.ehow.com/how\\_2083\\_make-solar-oven.html](http://www.ehow.com/how_2083_make-solar-oven.html)

[Each partner may add more if interested]



### Guide for construction of a solar oven



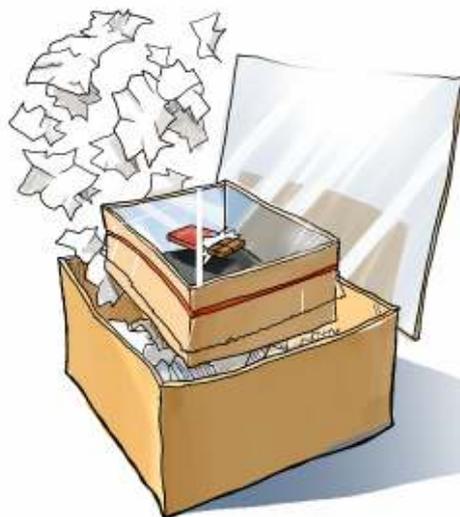
#### Solar oven type 1

1. Use pizza boxes and put aluminium foil inside the box on all surfaces (bottom and sides) except the top, with the shiny surface facing inwards to reflect the sunlight. Smooth out any wrinkles.
2. Tape black paper to the bottom of the box. The black surface will absorb the incoming sunlight.
3. On the lid of the box draw a line a few centimetres from the edge. Cut along three of these lines but leave the line at the back of the box uncut to form a flap.
4. Cut a piece of clear plastic wrap, making sure that it is larger than the hole you have cut in the lid. Stretch and secure the wrap to the underside of the lid, making sure it is properly sealed.
5. Glue a piece of aluminium foil to the inside surface of the flap you have previously created, again with the shiny side visible.
6. Seal the edges of the oven with tape to avoid air leaks.
7. Put a piece of chocolate on a small plate and place it inside the oven.
8. Adjust the reflector so that sunlight is reflected into the oven.
9. You can also measure the temperature. See how long the chocolate takes to heat up and melt.



### Solar oven type 2

1. Find two boxes. One should fit inside the other with a few centimetres (5-7 cm) space on each side.
2. Line the bottom of the large box with crumpled newspaper.
3. Place the smaller box inside the large box.
4. Fill the space between the sides of the two boxes with crumpled newspaper.
5. Line the sides of the inside of the smaller box with aluminum foil. Secure it in place.
6. Line the bottom of the inside of the smaller box with black paper to absorb heat.
7. Lay a piece of cardboard on top of the large box and trace the shape of the box onto the cardboard adding 5cm to the perimeter
8. Cut this out to make a reflector.
9. Cover the piece of cardboard with aluminium foil. Smooth out any wrinkles and secure the aluminum foil to the cardboard with non-toxic glue or tape.
10. Staple the reflector to the outside back of the large box. Place the oven so that the reflector faces the sun for maximum heat.
11. Place a piece of chocolate to be melted in the solar oven. Stretch clear plastic wrap across the top of the large box. Secure the plastic with tape around the entire box.







## Solar oven – Aid 2



### Search words:

<b>General topic</b>	<b>Energy topic</b>	<b>Educational subject</b>	<b>Age level</b>
Transport	General sustainable development	<b>Mathematics</b>	6-8 years
<b>Space heating &amp; cooling</b>	<b>Renewable energy</b>	<b>Science</b>	<b>9-10 years</b>
Hot & cold water	Energy efficiency (saving)	<b>Geography</b>	11-12 years
Lighting	CO <sub>2</sub> wise transport	<b>Literacy</b>	
Electric appliances			