



## MAKE YOUR OWN SUN BOILER

### Goal(s):

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To understand the nature and potential of renewable energy technology.

### General description of the activity:

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One group to make a sun boiler, while another group makes a grass boiler (see other activity sheet), so that both ways of water heating can be compared. Full instructions on how to build the boilers is provided in a special work sheet that comes with both activities. Obviously it's best to test the sun boiler on a sunny summer day, preferably in the afternoon when the sun is hotter.

### Required materials:

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- One large box from carton (or wood);
- One sheet of black tissue the size of the box;
- One sheet of plastic or household foil (the size of the box);
- One roll of aluminium foil;
- Tape;
- Hose or plastic tube about 2 metres long, as found in gardening or aquarium pet shops;
- Tap or a clamp;
- Two corks or stops.

### Required child skills:

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Measuring in cm & m, measuring temperature, cutting skills, ability to work in a group, having concept of 'renewable energy'.

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

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Design Technology, Arts & Crafts, Science, Biology, Physics, Chemistry and Mathematics



### Safety issues:

The pupils should be aware that the water in the boilers can be hot. They also need to cut safely.

### Individual steps of the activity:

1. Explain the purpose of the activity. Refer to sources of renewable energy in general and explain their importance in the fight against climate change and the depletion of fossil fuels.
2. Explain the difference between solar energy and energy from biomass and their different forms and applications, i.e. water heating, production of electricity, etc.
3. Show real examples of solar boilers and water collectors (see Aid 3 below). In most countries you can get help from NGO's or agencies specialising in renewable energy, which often have demonstration models for schools. Otherwise, a visit to a local renewable energy site would be useful.
4. Start collecting the materials for the self made models. Show the worksheets (see Aid 1 below). They give a full description and illustration of the sun boiler and the grass boiler. It is honestly very simple and good fun to make one, or preferably both.
5. After finishing the sun boiler - the same day, or otherwise another sunny afternoon - the box is put outside, the tube filled with cold tap water and the temperature is measured. A few hours later the water temperature is measured again, and then every hour (see Aid 2 below).
6. Discussion of results, by comparing and analyzing the temperature changes. These experiments can be compared with examples of more sophisticated and large scale applications of both forms of water heating using renewable energy

### Required time:

Introduction and preparation of materials – 1 lesson

Building, experiment and analysis – 1 or 2 lessons  
(depending if one builds one type or two boilers)

### Suggestions for combination with other AL activities:

"Tiny drops but a huge waste of water" – Measurement of water waste due to dripping taps in the school.

"Throwing money down the drain" – Saving water at school

"Solar oven" – Exploiting another form of solar energy

[The listed activities above may change when all the activity sheets have been finalised.]



## Variations:

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Increased complexity of the experiment: Mark the temperature changes of the water in the sun boiler every hour and compare with outdoor temperature (and time of day/year).

Lasting energy benefits: A longer lasting self-built sun boiler or solar collector can be built for the school, which can be used for warm water production in a detached building or elsewhere. Other forms of solar water heating can be demonstrated, such as the solar shower bag, now available in most outdoor sports and camping shops or to be found and ordered on internet.

## Available aids:

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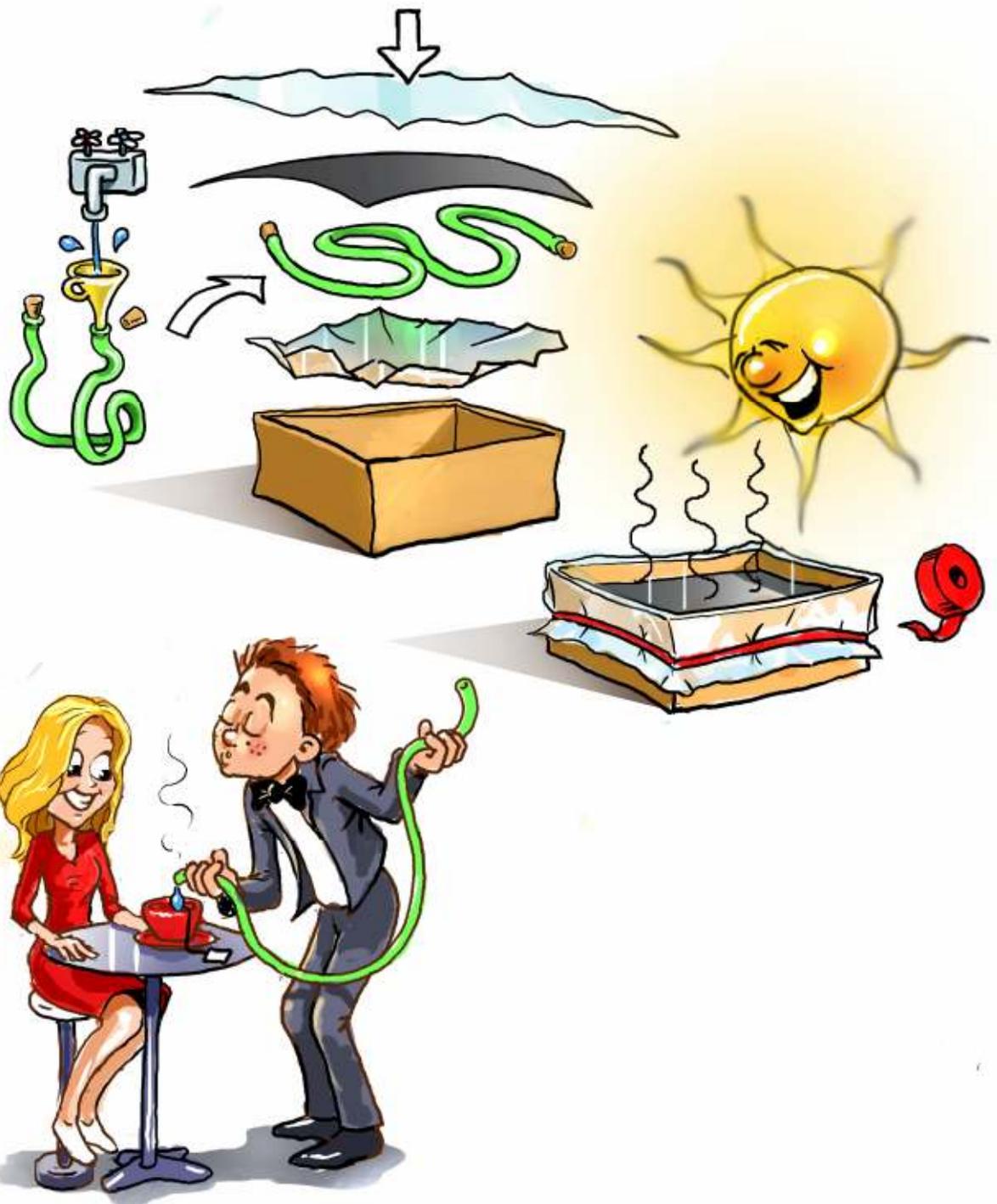
Aid 1 – Illustrated building instructions

Aid 2 – Table for recording temperature changes

Aid 3 – List of websites with demonstration models and education materials



### Illustrated building instructions







## Make your own sun boiler – Aid 3



### List of websites with demonstration models and education materials

Belgium – [www.apere.org](http://www.apere.org)

[Additional sites should be suggested by the individual partners]

#### Search words:

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