

TECHNOLOGY



Solar energy

SEQUENCE 1

Age group	7-10 y.o
Prior knowledge	None
Material needed	Tarp, laser thermometer
Subjects	Sciences - technology – energy
Skills involved	Name the different renewable energy sources, Understand the greenhouse and albedo effects, and implement a scientific approach to create a solar oven.
Time to carry out the sequence	4 hours

Note: These experiments are performed on a sunny day with a relatively high temperature.

Step 1: Introduction to renewable energies – Using the first part of the box's content

As a class, collect initial perceptions of "renewable energy": what does it evoke for the pupils, where have they heard about it, what areas does it refer to, etc.?

Using the storytelling material in the box, ask them if they can name the different types of renewable energy or get them started by showing them photos of wind turbines, hydroelectric dams, and solar panels.

Make the pupils aware that human beings need energy at all times. "What types of energy do you need in the course of a day and why?"--> by retracing their day.



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Get them to say "solar energy" at the end of this discussion. Conclude that solar energy is renewable energy.

Step 2: Introduction to the greenhouse effect and the albedo effect

Carry out two simple experiments to understand the greenhouse effect and the albedo effect, two effects induced by solar energy.

First experiment: greenhouse effect

On a sunny day, ask the pupils to set up a tarp in the courtyard in full sun. By staying under the canvas, the pupils will begin to feel the greenhouse effect and be able to note the minute-by-minute temperature difference between the outside and inside of the tarp.

Second experiment: albedo effect

Give the pupils one or two laser thermometers and walk along the street (or the school), taking the temperature of different materials, a white facade, black tarmac, car pavement, a car, a tree, etc. This would help them understand how the sun heats the Earth and which materials will most likely heat up.

Summarise and formulate observations by completing a synthesis and a diagram.

Step 3: Discover the second part of the box's content – experience

Let the students discover the box's contents and ask them what they think is possible to make with the material.

- The box's contents could be used to solve the following problem: " How fast can you melt a piece of chocolate just using the sun." They would, therefore, have to build a small solar oven using the materials and their knowledge of solar energy (greenhouse effect, albedo effect, mirror reflection). You can show your pupils an example of an **odeillo oven**.



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- Before building, establish a protocol as a class, using what they've learned previously. The teachers will then guide the pupils through the construction.

Step 4: Extension

The teacher can invite the students to compare solar energy with other types of energy (e.g. fossil fuels, electricity) and point out the advantages and disadvantages of each. Discussing the importance of using renewable energy sources is also a good idea.



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SEQUENCE 2

Age group	10-12 y.o
Prior knowledge	None
Material needed	Tarp, laser thermometer
Subjects	Sciences - technology – energy
Skills involved	Name the different energy sources, understand the greenhouse and albedo effects, and Implement a scientific approach to create a solar oven.
Time to carry out the sequence	4 hours

Step 1: Introduction

Ask the students to retrace their typical day and identify the energy sources they use.

Ask them to name the different sources of energy that exist.

Classify the different types of energy into two categories: fossil fuels and renewable energies. -> Give the characteristics and differences between the two.

You can show them photos of the different energy sources: wind turbines, hydroelectric dams, solar panels, nuclear energy and fossil fuels (coal).

Step 2: Research

Provide resources (books/articles) on renewable energies and ask the pupils to research solar energy. To guide their research, give them a document to complete (definition, common use, collection methods, greenhouse effect, albedo effect, Principle of a solar oven, the Odeillo oven).



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They can also use the Internet to conduct broader research and practise their online research skills.

Step 3: Discover the box's content

Let the students discover the box's contents and ask them what they think is possible to make with the material.

- The box's contents could be used to solve the following problem: "How fast can you melt a piece of chocolate just using the sun." They would, therefore, have to build a small solar oven using the materials and their knowledge of solar energy (greenhouse effect, albedo effect, mirror reflection). The box can also show an example of an oven (**Odeillo oven**).
- Before construction, the pupils are placed in groups of 4-5 and work out a construction plan. The teacher validates the different protocols individually and guides the pupils through the construction.
- For students who finish earlier, or as a challenge, the teacher can ask them to research what needs to be changed in the solar oven to be able to make popcorn. (A surface more reflective than aluminium, placed in the shape of a parabola and correctly oriented to the sun (on a hot, cloudless day))

Step 4: Extension

The teacher can invite the students to compare solar energy with other types of energy (e.g. fossil fuels, electricity) and point out the advantages and disadvantages of each. Discussing the importance of using renewable energy sources is also a good idea. Get students to think about the different energy sources a house needs (electricity for lights and sockets, choosing the most environmentally friendly heating system, thinking about an ecological water management system).



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