

FUN WITH THE SUN

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The nuclear leak at the Fukushima plant will trouble the Japanese for a long time. Why did a country which suffered a Hiroshima and Nagasaki set up such gargantuan nuclear plants? Perhaps with no coal or oil they had no option.

Fossil fuels add a lot of carbon di-oxide to the atmosphere and have a greenhouse effect. This raises the earth's temperature and result in global warming. We speak of "producing" oil as if it were made in a factory; but only God produces oil, and all we know is how to mine it and burn it up. The world has been searching for a cleaner source of energy. The sun might offer a plausible answer.

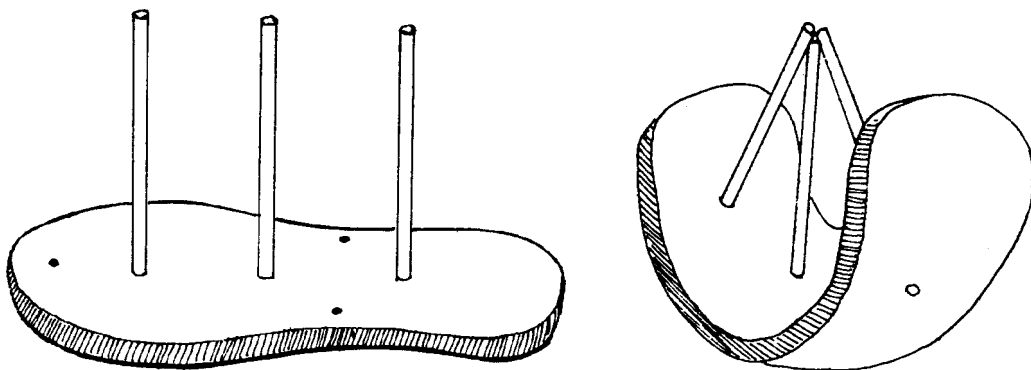
The Sun is the source of all energy on earth. It will keep delivering large amounts of energy to the earth for the next 5 billion years.

We have always used the sun. On cold days we sit out in the sun. We wash our clothes and dry them in the sun. Houses in cold countries are built with openings facing south to catch maximum sunlight.

The Romans were the first to use glass for windows. The glass let in the short waves of visible light but prevented the longer infrared waves to pass outwards. This warmed the house. They also built small glass houses to grow plants. Plants grew well in these greenhouses. The way in which glass traps heat is called the "greenhouse effect."

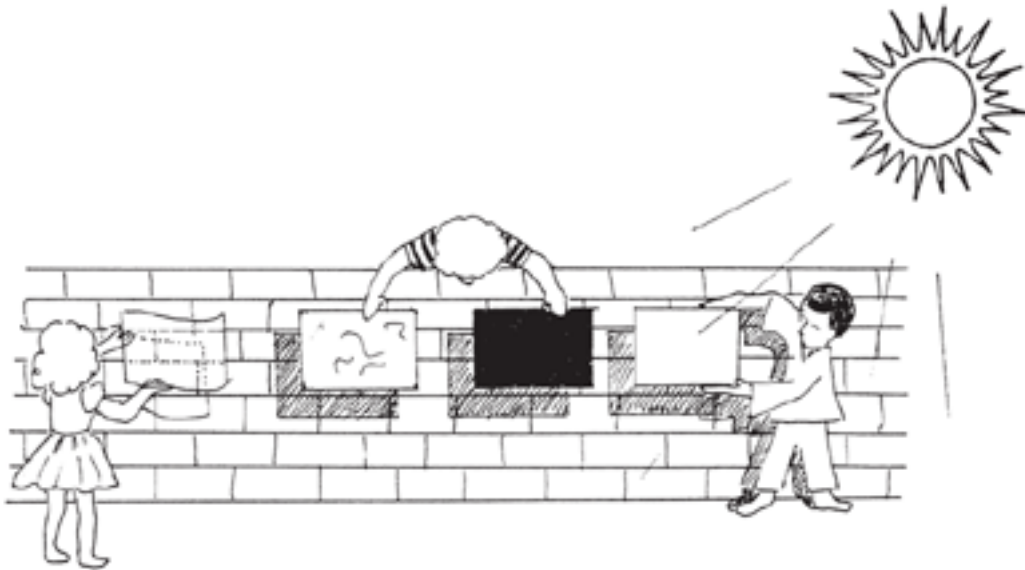
Can the sun's rays be squeezed in a small area? More energy will pour in thus raising the temperature. The ancient Greeks discovered that if light was reflected from a piece of polished metal that was concave then the sun's rays would be concentrated.

This can be clearly understood by fixing three pencils on an old rubber slipper. The pencils at right angles represent parallel rays striking a plane mirror. Now bend the slipper inwards such the pencils meet at a point called the focus a Latin word for "fireplace".



Archimedes is said to have used mirrors to concentrate sunlight to burn an enemy ship.

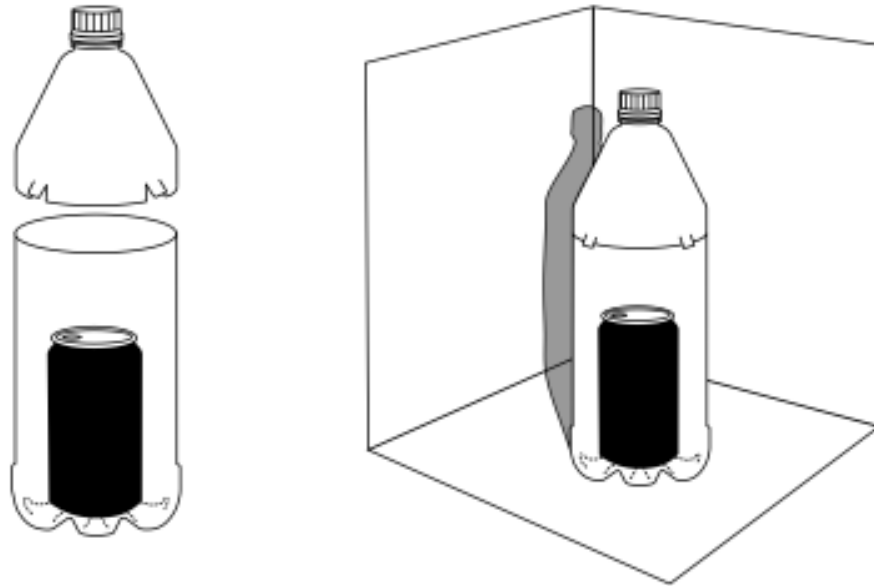
How does a Solar Cooker work? There are four main principles.



1. Dark surfaces absorb more heat. Place a black and white tile in the sun for a while. Then touch the tiles. Which feels hotter?
2. Glass allows sunlight to get in but prevents the heat rays from escape.
3. Orient / tilt the cooker to catch maximum sunlight.
4. Capture extra sunlight with panels and direct them to the pot for extra heat.

Solar cookers have many advantages. Solar energy is non-polluting and free. In India we have between 250-300 sunny days. The smoke from firewood causes many respiratory diseases. Food cooked in a solar cooker is more nutritious and does not burn. The only expense is the cost of the solar cooker, the running cost is zero.

There are also a few disadvantages. It doesn't work on a cloudy day or at night. Many foods like chapattis cannot be cooked in a solar cooker. But importantly, people are simply not used to them. Many eco-conscious people are making a deliberate attempt to use solar cookers. With the looming energy crisis – solar cookers and heaters will become more popular in future.



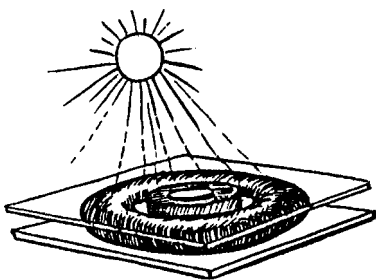
Based on the above principles we will make a small water purifier.

Take an aluminum can and paint it black. Fill it with ordinary tap water. Cut a 2-litre water bottle and place the can inside the bottle. Place the bottle on a shiny reflector out in the sun. After about 6 hours the pathogens in the water will be killed and it will become potable.

POOR MAN'S WATER PURIFIER

Many water purifiers pass water through ultraviolet rays to kill germs. Sun's rays have ultraviolet rays and can be used to sterilize water. Poor people in many parts of the world fill plastic bottles (painted half black at the bottom to absorb more sunlight) and place them in the troughs of their corrugated roofs. After a few hours the water is free of pathogens and fit for drinking.

CAR TUBE SOLAR COOKER



There is a fuel crisis in our villages. Women often spend half the day trudging to collect firewood. This solar cooker was designed by Suresh Vaidyarajan – an architect who has a passionate interest in building solar houses.

1. Inflate an old car tube and keep it on a black wooden board.

2. Place rice + water in a black aluminum cooking pot.
3. Place the pot in the well of the tube. Cover the tube with plain glass. This seals the tube. Air can't get in or get out.
4. The air inside the tube provides good insulation. Sun rays enter the glass and get trapped. Slowly the temperature rises and the rice gets cooked.

PV-PANELS



If we can convert sunlight directly into current then it will be a great leap forward. The Photo-Voltaic panels do exactly that. When sunlight falls on silicon wafer it knocks off a few electrons and starts a flow of current. Many-many such wafers can be connected together into cells and panels to produce electricity for remote households.

In our unequal world over 2 billion people do not have electricity. We can use the power of the sun to provide them with clean energy. The current costs may appear high but solar appears to be a sustainable source of energy in the long run.