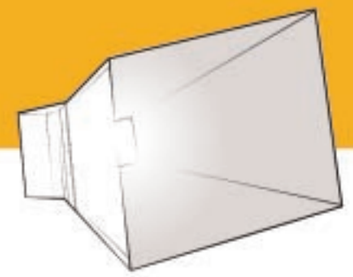
BUILD YOUR OWN SOLAR OVEN

This construction plan tells you how to build a solar oven that really works. On a clear sunny day, this oven will easily bake potatoes, cookies, or even a cake. It will only take about 15 minutes to reach the same temperatures as a regular electric or gas oven.



Getting Started

Materials

Four sheets corrugated cardboard, approx. 70 cm by 70 cm

Duct tape

Black tempera paint, powdered

White glue

Plastic container

Aluminum foil
(heavy duty, 45.7 cm by 7.6 cm roll)

Large aluminum foil loaf pan
(15 cm by 30 cm by 8 cm deep)

Small aluminum foil loaf pan
(8 cm by 15 cm by 8 cm deep)

Large (turkey-sized) transparent plastic oven bag

Shredded paper

Cardboard box
(with flaps, approx. 25 cm by 35 cm by 16 cm)

Sandpaper or steel wool

Tools

Plastic spoon
Retractable utility knife
Metre stick or metric tape measure
Felt tip marker
Sunglasses
Paint brush, 3 to 5 cm wide
Oven mitts
Oven thermometer

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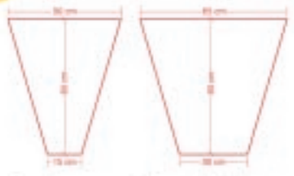
Solar Energy
HEAT–POWER–SUSTAINABLE

1 Measuring and Cutting the Reflector

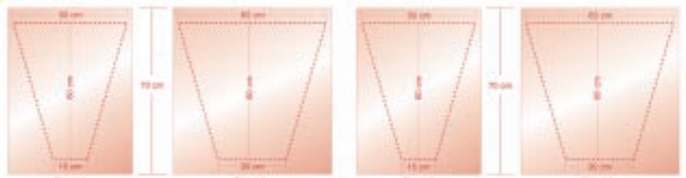


Transfer measurements to the cardboard sheets.

Mark the outlines with a felt pen.

SAFETY Use extreme caution when working with the utility knife. Extend the blade only as far as is needed to cut through the material, and lock it into position.

2 Applying Aluminum Foil



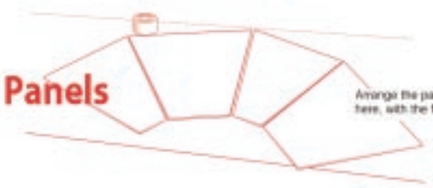
Cut eight pieces of aluminum foil (each approx. 70 cm long).

In a plastic container, mix together 100 ml of glue with 30 ml of water.

Spread the glue thinly on a cardboard panel.

Apply the foil to the panel and smooth out. Repeat for other panels.

3 Joining the Panels



Arrange the panels as shown here, with the foil side down.

Cut four pieces of duct tape (each approx. 70 cm long) and carefully set aside.

Apply tape to join panels
TIP—So that you can later fold them at the join, allow a small space (3 mm) between sections before taping.

Stand the joined panels with the foil side in to apply the last strip of tape to the outside.

4 Preparing the Cooking Chamber

Roughen the inside of the larger loaf pan using sandpaper or steel wool. Do the same to the outside of the smaller aluminum loaf pan.

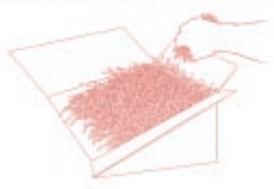
Mix 10 ml of powdered black paint with 5 ml of white glue, and 10 ml of water.

Apply 2 coats of black paint and glue mixture to the inside of the large aluminum loaf pan.

Apply 2 coats of glue and paint mixture to the outside of the small aluminum loaf pan.

5 Adding the Insulated Box

Shred the newsprint to make insulation.



Stuff the cardboard box.

Tape the box to the reflector.

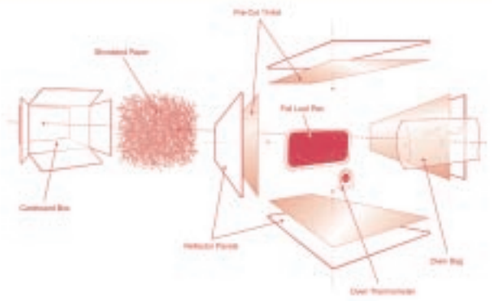
6 Setting Up and Testing

Place the small loaf pan and thermometer inside the large loaf pan, and slip both into the plastic oven bag. Close the bag by twisting the plastic and folding behind the loaf pan.

Place the empty cooking chamber at the bottom of the reflector.

Position the oven so sunlight shines directly into the reflector and the cooking chamber.

Wearing sunglasses, monitor the temperature inside the oven. Allow the oven to reach 200°C (390°F or higher) to burn off unwanted materials in the paint and glue.



Solar Cooking!

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THE SUN PERMANENT POWER

The sun is the ultimate renewable energy source.

Every day for the past 10 billion years or so,the sun has been pouring out unimaginable amounts of energy. The Earth, orbiting at a distance of 150 million kilometres from the sun, intercepts a tiny fraction of this solar output. At the Earth's surface, incoming energy from the sun is absorbed by the land, water and atmosphere, and converted into measurable heat. This heat acts like a giant engine, creating winds and currents in our atmosphere, oceans, and rivers. The sun 's energy also keeps the Earth hospitably warm, a balmy plus 15°c on average. Most of the sun 's energy is emitted as visible light. The trick to using it as an energy source is being able to convert it from visible light into heat, electricity, or some other useful form. Most systems that capture solar energy convert it to heat or electricity, the two forms of energy we use the most. As an energy source, the sun has a few limitations. Obviously, sunlight is available only during the day-time. And when it is available, sunlight may be hindered by clouds, dust, or pollution in the atmosphere, or by trees, buildings, or other physical obstructions. Nonetheless, sunlight is a highly practical and clean source of energy in many places around the world.

Sustainable ENERGY

Getting Heat from Sunlight

If you want to capture heat from sunlight, you will need three things: bright light, a surface or fluid that can absorb the light and change it into heat, and a way to store and use the heat once it has been produced. Most solar heating systems depend on at least two of these factors working together. A good example is a greenhouse. Greenhouses are designed to allow sunlight in, and then trap heat so that young plants can get a head start in the growing season. The glass of the greenhouse lets in lots of sunlight, which is absorbed by the plants, floor, soil, and other dark surfaces inside. As these surfaces absorb sunlight, they warm up, causing the air above them to get hotter. Because the greenhouse an enclosed space, the heat accumulates inside the building. Most greenhouses can get so hot in the summer that, without ventilation, the heat would eventually kill all the plants.

Concentrating Sunlight

To get the high temperatures needed to heat water or cook food, it is sometimes necessary to concentrate large amounts of sunlight on a small light-absorbing area. The most common approach is to use some kind of curved reflective panel. A reflector with a parabolic curve can easily concentrate enough sunlight on a very small spot to start a fire.

Practical Uses for Solar Heat

Solar heat is one of the cheapest and most practical forms of renewable energy. Here are few of the most common applications:

Solar hot water heaters: The sun 's light is an excellent source of hot water for home or commercial use, such as swimming pools, car washes and laundromats.

Cooking: Simple solar ovens and cookers are used around the world in both commercial kitchens and in people 's homes. Solar cookers can be made with everyday materials such as cardboard and tinfoil.

Home heating: Many homes are designed to take advantage of the sun to provide at least part of the heat required over the course of a year.

Solar Hot Water Heating

Each of our homes uses quite a lot of hot water, usually supplied by a gas or electric hot water heater. These appliances can be expensive to run and they cause environmental impacts. A great way to make lots of free hot water for the home is with a solar-powered hot water heater. A solar hot water heater consists of a large, flat metal box mounted on the roof of a building. It contains a network of water pipes connected to the home 's plumbing system. The metal lining and the pipes generate heat when sunshine falls on the box. The heat is carried away by water that flows through the pipes and is then stored in an insulated tank for later use. The hot water can be used for laundry or showers, or it can be sent through pipes under the floor to heat a room or building. This system can supply some or all of the hot water needed by the home, which can make a big difference in monthly energy costs!

Solar Cookers

If you have ever stepped into a car that was parked outside on a hot sunny day, you already know something about solar cookers! A solar oven works much like a mini-greenhouse, but with a few differences. The light-absorbing surface is enclosed in a tightly sealed, well-insulated box. Sunlight comes in through a pane of glass and is then absorbed and changed into heat by the black surfaces inside the box. Insulation around the box keeps the heat in. Reflective panels increase the amount of sunlight entering the box. When pointed at the sun, the temperature in a solar cooker can easily rise high enough to bake bread.

Home Heating

Many homes are designed so they can meet at least some of their heating requirements from the sun 's energy. Such homes have large south-facing windows (or north-facing if located in the southern hemisphere) that allow sunlight to heat up a room. The house 's insulation helps keep the heat in. This is called passive solar heating, because no pumps, fans, or other types of equipment are used. For example, the Toronto Healthy House derives 75% of its space heating needs from the sun.

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