Simple Solar Oven

by Dan Dorsey

The oven described here is easy and inexpensive to build. Its shape is a triangle with 30, 60, and 90 degree angles. This design allows the oven to be used at high and low sun angles. Around the winter solstice, or late in the afternoon, the oven is placed with the 60 degree angle on the bottom. At summer solstice, the 30 degree angle is on the bottom to capture the high sun.

This solar oven will reach 200 to 225 degrees Fahrenheit on a good day, high enough to bake just about anything. If a recipe calls for 350 degrees, the dish will still bake, only it will take longer to cook. An increase in temperature can be obtained by substituting more expensive materials. For example, the outside box could be built from plywood, and rigid commercial insulation could be used instead of cardboard. (I recommend experimenting with cheaper materials first.) My aim was to use the most inexpensive materials available while still developing a durable product.

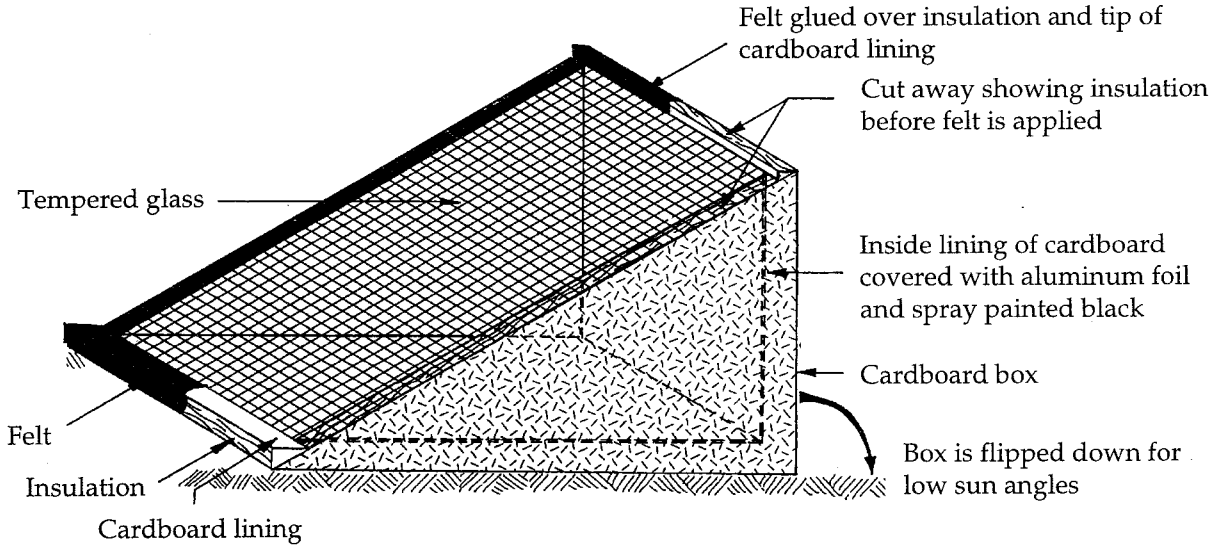
This article originally appeared in Permaculture Drylands Journal *Issue No. 16.*

The oven needs to be moved periodically to track the sun as it moves east to west. If I am going to be gone for the day, I position the oven slightly west of south, and my meal is usually cooked by evening.

The solar oven has other uses. Since drying is an excellent way to store excess fruits and vegetables in drylands, I have used mine as a food drier. Just grate or cut food into small pieces and dry at low heat. 125 degrees Fahrenheit is the optimum temperature to dry fruit. By leaving the glass slightly open, a lower temperature can be maintained. Check it often to prevent burning.

The oven could be built to fit into a south facing window where it would double as a solar collector in the winter. A door could be cut into the back, and a small photovoltaic-powered fan could blow hot air from the oven into the house. Finally, the oven provides a surface for culturally relevant information, such as pictures of friends and family, flyers about upcoming events, radical manifestos, and notations on the amount of rainfall received each summer.

A solar oven is one small step in creating a sustainable way of living. By combining small steps into beneficial and overlapping strategies, we create sustainable living systems



SCHEMATIC OF SIMPLE SOLAR OVEN

MATERIALS AND TOOLS NEEDED FOR SOLAR OVEN CONSTRUCTION

- sturdy cardboard box
- extra cardboard or newspapers
- heavy-duty aluminum foil
- high temperature black paint
- sheet of tempered glass
- strips of felt
- carpenter's wood glue
- high temperature caulk
- oven thermometer
- caulk gun
- sharp x-acto knife
- straight edge (yardstick)
- scissors
- protractor

How to build a simple solar oven

Step 1: Find a sturdy cardboard box about 2 feet by 2-1/2 feet or larger, and remove the top.

Step 2: Cut the sides of the box into a 30/60/90 degree triangle. (Use a protractor to mark off degrees on the box.) Try to get clean even cuts with the x-acto knife and straight edge.

Step 3: Using extra cardboard or newspapers, line the sides, bottom, and back of the box with an inch or more of insulation.

Step 4: Create the inner lining of the oven by cutting pieces of cardboard to fit the sides, bottom, and back. Glue aluminum foil to one side of these pieces. The best way to do this is to lay a square of aluminum foil down on a hard surface, apply glue to it, then press the pre-cut cardboard shapes down onto the foil. Weight the cardboard until the glue dries. The edges can then be trimmed with the x-acto knife or scissors.

Step 5: Put the cardboard pieces in the oven with the foil side facing into the oven. Caulk all seams and allow to dry. Spray paint the interior black.

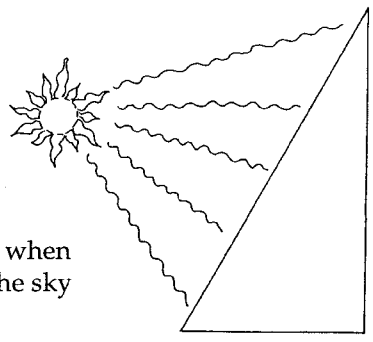
Step 6: After trimming away any excess insulation or cardboard sticking above the top, bottom, and sides of the box, glue felt strips over the insulation and inner edges of the cardboard pieces. Take care to get a smooth surface along the slanted sides where the glass will rest.

Step 7: Measure the dimensions for the sheet of tempered glass to fit over the box. Note from the diagrams how the glass fits the oven. The width dimension is measured from the *outside* of the box to the *outside* of the box. The length dimension is measured from the *inside* of the insulation on top to the *inside* of the insulation on the bottom. Have the glass edges smoothed by the glass cutter to prevent cuts during frequent handling.

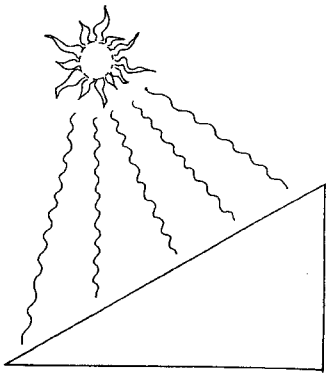
Step 8: Place the oven thermometer inside to test how hot the oven will get. Put the glass over the oven and face the oven south. Read the thermometer between noon and 2:00 pm. The temperature should be between 150 and 175 degrees Fahrenheit. If it is not, check for any places hot air may be escaping and try plugging these gaps with small pieces of felt.

Step 9: If your food doesn't cook, reflectors can be added to the sides of the oven to increase solar gain and temperature. An angle of 110 degrees from the surface of the glass works well. Cut the reflectors the same shape as the sides. Glue aluminum foil to the reflective surface using the same procedure described in Step 4.

Step 10: You're ready to cook. Set your oven in its "flat" position in the summer when the sun is high in the sky. Set it in its "tall" position in the winter when the sun is low in the sky. Since the glass piece is not anchored to the box, you will need to use care when opening it to put in an take out food. **When your oven is hot, so is the glass; use a hot pad to handle it if necessary!** While special cookbooks for solar ovens exist, generally, any recipe will do well. Heavy, dark colored pots (black) work best. Keep the oven facing toward the sun by periodically turning it to track the sun.



Oven position when sun is low in the sky (winter)



Oven position when sun is high in the sky (summer)

POSITION OF SOLAR OVEN