Make a Pizza Box Solar Oven!

Creating and adapting new ways of using our natural renewable resources like sunlight is important. The Pizza Box Solar Oven is just one example of how we can use the sun's energy to change our lives for the better. Every step in creating the Solar Oven represents an important concept about how energy from the sun is harvested.

This solar oven has been adapted from many designs. Please feel free to improvise! You may want to try making s'mores (graham crackers with melted marshmallow and chocolate) or English muffin pizzas in these ovens.

The pizza box solar oven can reach a temperature of 275 degrees Fahrenheit, which is hot enough to cook food and kill germs in water. A general rule for cooking in a solar oven is to get the food in early and not worry about overcooking. Expect the cooking time to take about twice as long as conventional methods, and allow about half an hour to preheat.

Solar cookers can be used for six months of the year in northern climates and year-round in tropical locations.

What You'll Need:

Recycled Pizza Box
Black Construction Paper
Aluminum Foil
Clear Plastic (heavy plastic laminate works best)
Non-toxic Glue, Tape, Scissors, Ruler, Magic Marker
Wooden Dowel or Straw

Why Use These Materials?

Aluminum Foil reflects the light from the sun into the oven.

The **Black Construction Paper** absorbs the light reflected off of the aluminum foil. Black absorbs the most light because it contains no colors in the visible light spectrum and absorbs all the light that contacts it. In turn, it gets hotter than any other shade or color. The molecules that make up the paper get excited when they come in contact with light, causing the light energy to turn into heat energy. Think about wearing a black shirt on a sunny summer day!

And once the light is reflected and the black paper is warmed up, the **Plastic Wrap** traps the heat from escaping the Solar Oven - which in turn, cooks your food!

How Does it Work?

The heating process occurs through:

Conduction: The transfer of heat between objects that are touching each other directly.

Convection: The up and down movement of gases and liquids caused by the transfer of heat: When a gas or liquid is heated it expands and rises. When it is cooled, it condenses and falls. Convection is how heat moves through gases.

Radiation: Electromagnetic waves moving through space. When these waves come in contact with an object, the energy stored in the waves turns into heat which is radiated from the object. The sun transfers heat through space through electromagnetic waves, which once they strike the earth they *radiate* heat.

Greenhouse Effect: In terms of this project, the Greenhouse Effect refers to the fact that light from the sun reflects off of the foil and through the plastic wrap, where it is then absorbed by the black paper. The black paper radiates heat and that heat is *trapped* under the plastic wrap by the **Greenhouse Effect.** The light can pass through the plastic wrap but the *re-**radiated*** heat cannot escape.

Okay, Let's Get Started!

How to Make Your Pizza Box Oven

1.With your ruler, draw a one – inch border on all four sides of the top of the pizza box. (Diagram #1)

(INSERT 2/3)

4) Cut a piece of aluminum foil to fit on the inside flap. Smooth out any wrinkles and glue the foil into place. Make sure the aluminum foil is as flat as possible against the pizza box. Flat surfaces reflect more light!

5) Cut another piece of aluminum foil to fit the bottom of the pizza box and carefully glue it into place. The black construction paper is there to absorb light, make sure it covers the entire bottom of the box.

(INSERT 6/7/8/9)

10) All of the pieces of the puzzle are connected here. Make sure the lid is angled

correctly so the light can reflect onto the paper efficiently. Different times of the year provide different amounts of light and heat for your solar oven. The summer is the best time to use the oven. Why? -

Angle of Insolation, which changes all through the year. What is that? Well, the Earth tilts slightly on its axis during different seasons, which makes the sun's rays hit the earth at different **angles**. During the summer months, the Earth is tilted so the sun's rays strike directly straight onto the Earth. During the winter months, the Earth is tilted differently and the rays hit on more of an angle, which decreases the concentration of light energy.

Your oven is ready! You can try heating s'mores, English muffin pizzas, or hot dogs. You can eve try baking cookies or biscuits. Test how hot your oven can get using a simple oven thermometer.

Source: Adapted from Solar Now, INC.
www.solarnow.org