



# EVERYDAY SOLAR COOKING

If you can't stand the heat, get out of the kitchen and cook with free power from the sun.

By Joel Dufour

Summer's arrived and the heat is inescapable. You don't want to turn on the stove to make dinner, which will heat up the house even more. If you're like me and don't have air conditioning—or if you're energy conscious and keep the AC low—cooking indoors can be unbearable. Instead, why not use the source of all this heat to your advantage?

Solar radiation is the most prolific source of energy on our planet. About 84 billion kilowatt-hours of sunlight reach Earth every day—that's five times our global energy consumption. The challenge is to efficiently harness this energy. Most people settle for gathering solar energy by eating vegetables growing in their gardens or catching its reflection with their cameras. Trap that energy in an insulated box with some food—then you'll really be cookin'!

The functioning principles of a solar oven are simple: concentrate, convert, contain. Sunlight, or visible light, is concentrated by several reflective surfaces to pass through a glass lid into an insulated box. A pot of food you put inside the box will absorb the light and convert it into longer wavelength radiant energy, or heat. The insulation will inhibit the heat from escaping, and the wavelengths will be too long to pass back through the glass lid. So, they'll bounce around and heat up your food. Ever leave your car windows closed on a bright, warm day? Then you'll recognize the basic principles of solar cooking.



Joel and his daughter Sophie are shown with one of their solar ovens. This model includes a rear door for fast food removal and wheels for mobility.

## Building the Solar Oven

Nearly 20 years ago, as I was helping a friend build his straw bale house (at which point he figured out I was into “weird stuff”), he mentioned that some people he knew were teaching a solar-oven-building workshop. I was intrigued, so I sent in my 50 bucks to attend. Three weeks later, I was at a homestead out in the Kentucky woods, looking at the piles of plywood, cardboard, tinfoil and glass that were to become solar ovens. The instructors, Mark and Andy, had just returned from a non-profit-sponsored trip to Peru, where they taught people how to build and use solar cookers. Many of the mountain villages

there suffer from deforestation, so solar cooking offers a good alternative to cooking with wood.

That day, using only hand tools, I built my own “yard appliance.” This solar cooker requires only cheap materials and the design is so simple: square, with an inner box and an outer box separated by 1 or 2 inches of insulation, and a glass cover on the inner box to let in sunlight. Additionally, four reflectors are arrayed at obtuse angles to the glass to focus more light into the box and raise its internal temperature enough to make cooking possible. We used plywood for the outer box for rigidity and durability, and crumpled

newspapers for insulation. A variety of materials can serve as insulation, including sawdust, chicken feathers or fiberglass batting. Insulation is key, because you want to trap heat in the box as effectively as possible to offset shading by clouds that will invariably show up to block the sun. In optimal conditions, the cookers we built can heat to 400 degrees Fahrenheit in about an hour, which is hot enough to cook anything from a casserole to biscuits. That’s a pretty good appliance for only a \$50 investment. For me, the deal was even sweeter—I married Mark’s sister a few years later and we’ve been solar cooking together ever since.



Whether you build a solar oven or buy one, such as the Sun Oven (left) or Solavore Sport (top, right), baking and roasting are still on the menu.



## Operation Basics

You can easily manage a solar cooker by keeping these elements in mind:

**Sun.** Don't put the oven where a shadow will fall across it. If you use recycled glass for the top, make sure it hasn't been treated with UV resistant coating.

**Time.** Cooking times are longer than in a conventional oven because average temperatures fluctuate during the day. As long as the temperature remains above 200 degrees, your food is still cooking.

**A sense of adventure.** You never really know what the weather will do.

For best results, the oven should be preheated for at least 30 minutes—allow it to heat while empty or with an empty pot inside. Also, someone should be around to adjust the cooker now and then. The reflectors will angle sunlight into the box for about two hours of the sun's path across the sky, after which you should rotate the cooker to follow the sun. With this method solar cooking takes about twice as long as cooking with electricity or gas, but time decreases dramatically if you rotate the oven every 30 minutes.

Reflectors can be covered with basic aluminum foil, Mylar tape, acrylic mirror or other highly reflective products. The top of your solar cooker should be inclined, either by design or by setting it on blocks. The best angle is based on your latitude and the declination of the sun, but in the Northern Hemisphere it should be about 30 degrees during the summer and 60 degrees during the winter. To increase your solar oven's ability to convert heat, paint the bottom of the interior with black, high-heat paint. To improve heat-holding ability, add some thermal mass, such as a



**Delicias del Sol Villaseca, a restaurant north of Santiago, Chile, turned to solar energy when deforestation depleted its fuel source. Its fleet of solar ovens can feed up to 120, daily.**

large rock or brick. On days with strong sun and no cloud cover, two to three hours is enough to cook most anything, from a pot of rice to a loaf of bread, without adjusting the cooker.

## Success with the Sun

I put my oven to use right away and had fun figuring out what worked. When cooking grains or beans, you only need a little more than half as much water as on a stovetop. Cooking veggies in the slow, even heat results in incredibly savory dishes. Food rarely burns, and only ever on top, so nothing ever sticks to the bottom of the pot. Even bread, pastries and meat will do well, although you'll need to maintain a high average temperature, so plan in advance, and cook on days forecasted to be completely clear and sunny. Frying is difficult as the temperature typically isn't high enough and you'll lose heat every time you open the cooker to stir the pan—but you could experiment with quick-cooking foods, such as eggs.

Dark-colored cookware works best—dark objects convert sunlight into heat energy more easily than light-colored or reflective objects. Cast iron, black enamel and dark ceramic are good choices, and using a lid will help hold in heat. But, when cooking colorful veggies, don't use a clear lid. The concentrated sunlight will bleach their color.

I painted the outside of a couple of wide-mouth, quart-sized Mason jars flat black with high-heat paint (including the

outside of the lids), and these became my rice- and bean-cooking jars. They heat up quickly, are space-efficient, and double as storage jars for leftovers. Never fill the jar more than half-full, including water. A cup of brown rice needs 1½ cups of water and is usually done after 70 minutes. Don't tighten the lid all the way when cooking in a jar or you'll risk an explosion.

I used that first oven for five years before my wife and I replaced it with a much larger unit. We mounted the new cooker on the roof of our earth-bermed house. We live in the woods, and the roof is the only place with reliable sun—but it's easy to access because we can walk right onto the roof from the rear of the house. We use the solar cooker for the majority of our hot meals from April through October. The sun is too weak, spotty and low in the sky in our area to rely on for solar cooking during winter. And by then, we're using our woodstove for heat, so we often cook on that. We tarp the solar cooker during the winter to prolong its lifespan. For a small investment and a little know-how, you, too can get cookin' sun! ☀️

Joel Dufour lives in an electricity-free home he built with his wife, Chris, in the woods near Frankfort, Ky. He's been solar cooking since 1994. He owns and operates Earth Tools, a gardening-equipment supply company ([www.EarthTools.com](http://www.EarthTools.com)).

## RESOURCES

### BUILD A SOLAR COOKER

#### Solar Cookers International:

[www.SolarCookers.org/Involved/Basics](http://www.SolarCookers.org/Involved/Basics)

#### Solar Cooker at CantinaWest:

[www.SolarCooker-at-CantinaWest.com](http://www.SolarCooker-at-CantinaWest.com)

### BUY A SOLAR COOKER

**Sun Oven:** [www.SunOven.com](http://www.SunOven.com)

**GoSun:** [www.GoSunStove.com](http://www.GoSunStove.com)

**Solavore Sport:** [www.Solavore.com](http://www.Solavore.com)

**SolSource:** [www.OneEarthDesigns.com](http://www.OneEarthDesigns.com)