



Cookin' in the Sun



By Barbara Lunde

Solar cooking is lots of fun, with many advantages. It is the simplest and most convenient way to cook without consuming fuel or heating up the kitchen. You supply no fuel and emit no carbon dioxide or smoke. Food does not burn. Below I describe several types of solar cookers.

Panel Solar Cooker

The simplest and lightest solar cooker is a panel solar cooker, such as the Haines 2 (see Figure 1). It weighs less than two pounds and costs about \$65. You assemble it in about five minutes and face it toward the sun. For faster cooking, if your recipe takes more than an hour, you rotate the cooker a little every hour to face the sun again. Put your food in a black or glass pot with a glass cover and put the pot in the panel cooker. In an hour or two, on a sunny day, you will have cooked food. At 86 degrees air temperature, a quart of water can come to a boil in 48 minutes. When you've finished cooking, the cool solar oven folds into its shipping box of 1/3 cubic feet for storage.

The website for the Haines cooker is hainessolarcookers.com.

Parabolic Solar Cooker

The parabolic solar cookers are the most spectacular (see Figure 2). The Sunplicity is almost as light and easy to set up as a panel solar cooker. The Sunplicity weighs six pounds. You can set it up in one minute to make a 33"

Luther doesn't have three heads. You are seeing him and reflections of him in the upper and lower mirrors that feed sunlight into his indoor solar cooker.

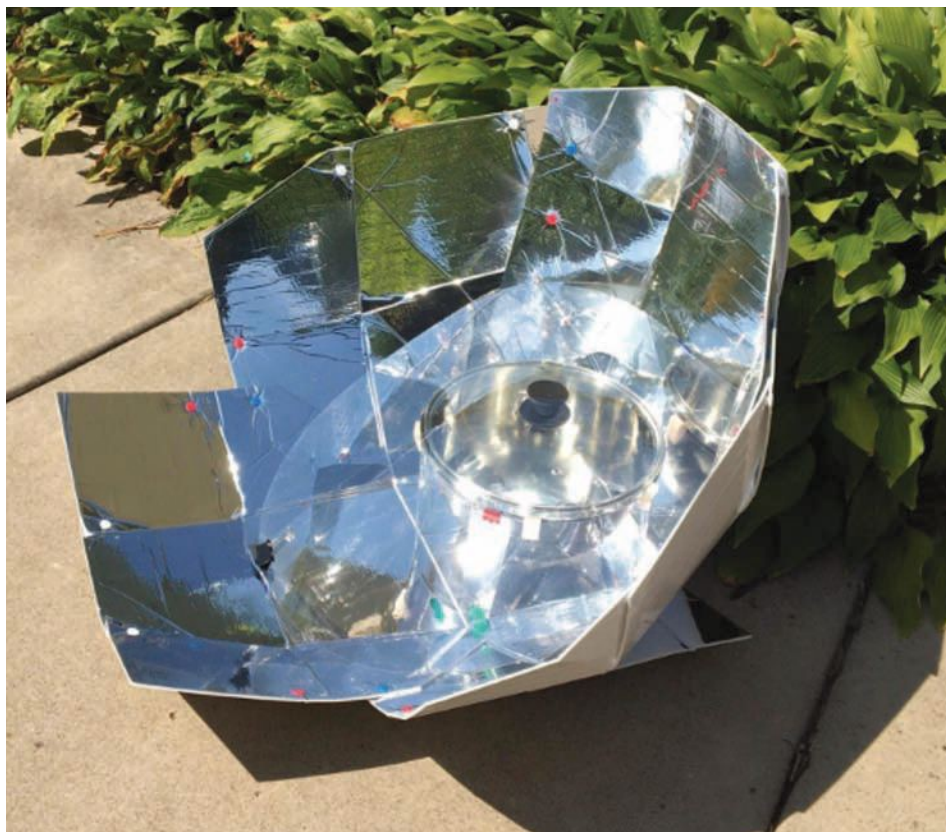


Figure 1. Haines 2, a panel cooker, boiling water. The red, white, or blue dots are actually parts of snaps that hold the cooker together. There are two sets of snaps. The correct snaps to use depend on the sun angle. In Minneapolis, we use the blue snaps.

diameter dish that collects sunlight and focuses it on your cooking vessel. It will heat a small vessel to 445 degrees in less than 10 minutes, or It can bring a quart of water from 70 degrees to boiling in half an hour. It costs about \$400 and concentrates the energy in a smaller volume than a panel cooker, so it is more useful in colder climates. It does need to be aimed to face the sun again about every hour. If you get distracted and leave your cooking unattended, the focal point of the sun, providing heat to the food, will move, and the cooking will stop. The food will not be over cooked. The cooker is

made in workshops in France that employ people with disabilities. The website is sunplicity.fr/en/parabolic-cooker. It is safe by design, because the focal point of the mirrors that forms the hot spot to cook the food is inside the mirrored dish, so nothing outside the dish can be accidentally set on fire.

An additional design of parabolic solar cookers takes the shape of a tube, such as those made by GoSun – see gosun.co/collections/solar-ovens.

Box Solar Cooker

The most common type of solar cooker

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Figure 2. The parabolic Sunplcity Solar Cooker in Luther Krueger's Solar Cooker Museum.

is the box solar cooker, such as the Global Sun Oven (see Figure 3). This is an insulated 19" by 19" box, 11" deep with a black interior, four exterior reflectors, and a tempered glass lid. It weighs 23 pounds and costs \$330. When opened, the reflectors are 33" across the top. Its website is sunoven.com. Box cookers, in general, can cook more food at the same time than a parabolic cooker. Delivery of Sun Ovens has been delayed in July 2020, because of high demand due to COVID-19. Other box cooker manufacturers have also seen increased demand due to the pandemic.

Hybrid Solar Oven

Another type of solar oven is called a hybrid (see Figure 4). It is a box cooker with a 465-watt electric cooking element. If clouds come, and electricity is available, you can finish your cooking

as you would in a Crock-Pot. An example is the UGLI Hybrid Solar Cooker. This is 22" by 22" by 12" high, plus extra reflectors. It weighs 32 pounds, and costs about \$420. The website for this oven is sunbdcorp.com/product/ugli.

All the reflective solar ovens use aluminum for reflection. Some use spectral grade aluminum sheeting and some use aluminized mylar. Fresnel lenses are being adapted as collectors of solar energy.

Solar cookers seem particularly good for areas near the equator, with lots of sun, and often few sources of energy. In some cases, women walk for miles daily looking for wood fuel for cooking. The sun provides energy for free. International charities have manufactured and shipped large quantities of ovens

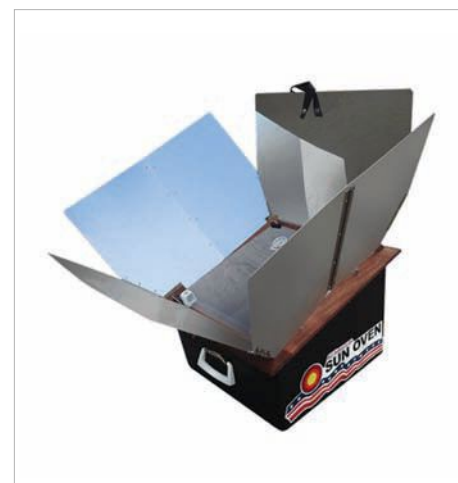
to cook food, without the environmental and human effects of wood use, including smoke inhalation. For example, over the 4th of July weekend, 2020, a shipping container of solar cooker kits was sent by a church in Pierre, South Dakota to the Dominican Republic. They require those who want a solar cooker to attend a two-day course in solar cooking and pay \$20 to get one.

Solar Cooker Museum

Luther Krueger collects, demonstrates, designs, and promotes solar cookers in south Minneapolis, Minnesota. He has a museum of solar cookers in his backyard. His museum hosts Solar Cooking Brunches. When the upcoming weather forecast is for full sun, he invites guests to bring food to cook. He provides the pots and appropriate solar cookers. It is a relaxed atmosphere, because solar cooking is not a speed sport. Except for the occasional redirection of the solar cookers to the apparently moving sun, guests can relax while their food cooks. The northwest corner of the yard is shaded by a tree and has chairs and a table. The tree provides welcome shade on sunny days. Of course, the solar cookers are in the sun, but the cooks can relax in the shade.

In 2004, he began collecting solar cookers. One by one, he acquired classic designs

Figure 3. Sun Oven Box Solar Cooker



© sunoven.com

and contemporary models, made all over the world. He once drove to Oregon to get one of the few remaining solar cookers of a particular parabolic design. Luther is a font of knowledge about solar cookers. He has at least 57 cookers and appropriate accessories. The museum's mission is to demonstrate that any dish, from any culture, can be cooked using solar energy, in a cooker appropriate for the task. Each cooker in the collection has been used or tested and is made available for hands-on cooking by the guests.

His one nod to Minnesota is that he has installed a unique solar window on the south side of his backyard studio (see page 12). It is double pane, with generous, adjustable reflectors above and below the window. The window is 18" by 13" and forms the side wall of a solar cooker, which is inside the heated studio. This allows him to solar cook inside, effectively extending the solar cooking season.

Luther is seeking a more permanent location for his solar cooker museum and welcomes your questions and ideas by email at kruegerian@gmail.com. ■

About the Author

Barbara Lunde, PE, PhD (Physics), designed and supervised construction of a solar steam generator for the Iowa Capitol Complex in 1977 and a residential solar water heater. She is a member of ASES and on the board of the Minnesota Renewable Energy Society (MRES). She has exhibited and answered questions about solar energy in Minneapolis, St. Paul and Duluth in Minnesota and in central Iowa. Recently, she has been analyzing the output of MRES' Solar Garden, designed to serve 200 low income families.



Figure 4. Luther adjusting the UGLI Hybrid Solar Cooker

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DIY Solar Cooker Designs



You can also make your own solar cooker for a very low cost. Check out these guides:

- homesciencetools.com/article/how-to-build-a-solar-oven-project
- education.com/science-fair/article/design-solar-cooker
- instructables.com/id/Best-Solar-Oven