



ESN Bigger Meals Solar Oven & Energy-saving Potskirts



Introduction

We are designing and developing a durable, highly efficient and very innovative solar oven called the *Bigger Meals Solar Oven* that can be industrially-mass-produced using inexpensive parts made mostly from recycled, raw materials. Our long-term goal is that once fully assembled our solar oven should cost no more than \$10 US per unit and possibly as low as \$5 US through economies of scale and subsidies from carbon credit revenue. The key objective will be to make the solar ovens affordable to those living in extreme poverty.

Key Functions and Design Features

Our solar oven can be used to either cook food or pasteurise water with its innovative large volume flow-through system, and it only uses clean and free energy from sunlight. Our solar oven's key functions and design features are as follows:

Full power mode: when operating empty with the solar reflector fully engaged the oven should pre-heat to 100°C (212F) within 10 minutes in the midday sun. The oven is also being designed to reach a maximum oven operating temperature of 200°C (392F) to enable it to easily cope with large pots with volumes that cater to large families. (This temperature is the maximum an *All American Sun Oven* can reach in the US) Our oven has been designed to accommodate standard issue United Nations High Commission for Refugees (UNHCR) 5 and 7-litre pots placed together, side-by-side, in the oven.

Slow cooker mode: by disengaging the solar reflector the oven is being designed to convert to a slow cooker that operates at about 90°C. So if there is adequate sunshine predicted and people want to leave the cooker unsupervised for long periods while they go and work in the fields, for example, their food will cook slowly, and it won't spoil or dry out.

Thermal food container mode: after lunchtime meals have been cooked and served, the insulated reflector cover is being designed to tightly close over the oven lid so the oven can hold in its residual heat effectively enough to keep any excess food hot for long periods so families don't need to start a fire in the evening to reheat their food or cook new meals.

Large volume flow through water pasteurizer mode: we are designing a special, inexpensive, water-pasteurising-kit that adapts the oven into a high-volume-flow-through-water pasteurizer via an inlet and outlet valve in the side of the oven. The kit will consist of a flat black aluminium box with coiled heating pipes inside that goes in the oven; a basic filter and an inexpensive thermostatic valve that only opens when the water temperature reaches 82C (180F). (Water pasteurisation begins at 65 C (149F), but the process is sped up as the temperature rises above this). It will also close tight if the clouds come over and the temperature falls below 82C. In this way, a large water container can be safely pasteurised quickly and efficiently on a sunny or even partly cloudy day without needing any supervision. Therefore, we anticipate that our oven could help to save a great many lives by providing a free, safe, effective and convenient means to pasteurise large volumes of water.

Environmentally-friendly: The solar oven is being designed to be industrially, mass-manufactured in an environmentally-friendly way. For example, the outer casing and reflector lid will be made from injection-moulded recycled-grade plastic. The inner heat absorber that forms the oven floor and walls can be made from recycled aluminium. Finally, the oven relies on first-class insulation to retain heat which is made from rice husk particle board. Rice husks are generally regarded as a waste product in Uganda.

Fuel-saving Adjustable Pot-skirts

Adjustable pot-skirts were designed and developed by Aprovecho Research Center in the US to fit tightly around pots. They create a 6 mm air gap that forces hot air to also heat the sides of the pots instead of just heating the bottom of the pots. The pot-skirts also help to protect the fire from wind. This simple and inexpensive device reduces smoke by 20% and fuel consumption by 25%. Using it should give people living in poverty a means to reduce their fuel costs and save up for more expensive, fuel-efficient rocket stoves. The pot skirts further improve the fuel-efficiency of most rocket stoves.

We now need to hire specialist product designers and engineers to help us get our solar oven and water pasteurization kits ready for industrial mass-production. If you's like to help please consider donating via www.esnbiggermeals.org