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The Solar Box Oven

The Solar Box Oven

My work with solar ovens began as early as year 2000. from the design by Beth and Dan Hallacy of US which I found in the Appropriate Technology Library

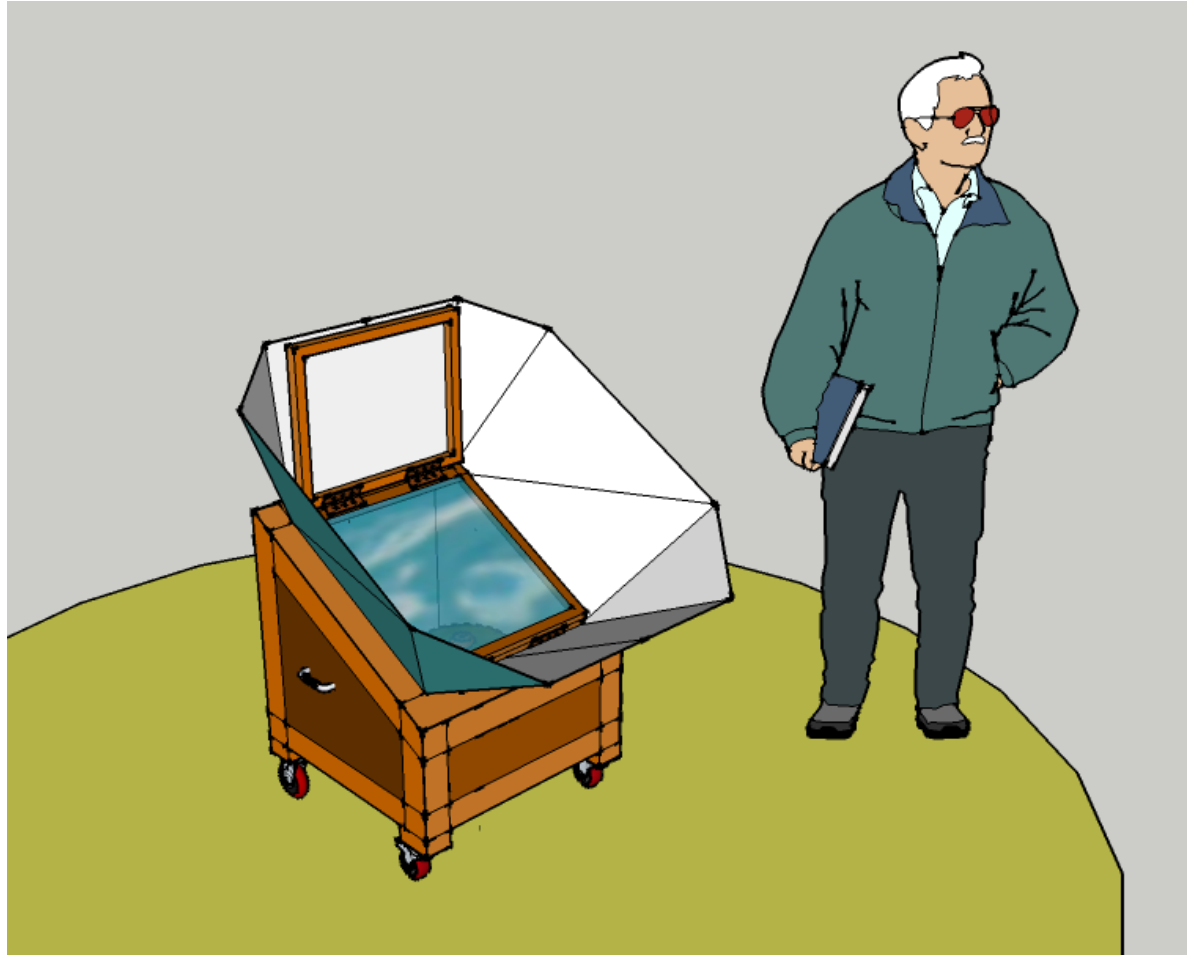
On March 2013 during a conference by the GACC in Cambodia, my enthusiasm with the solar oven was revived by the works of Bolivia Inti Sud Soleil, through its delegate, Ms. Rocio Maldonado. Then again on July 2014 during the convention by the Solar Cookers International at Sacramento, California, Ms. Maldonado, along with several other delegates presented their solar cookers.



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From all the exciting models presented, I decided to stick with the model of Bolivia Sud Soleil for reasons of its doability, durability, power and reliability.

From January to February 2016, I was commissioned by the Culinary Education Foundation to undertake a project on renewable energy technologies for their kitchen. At that point, I once again fabricated a model from this design.



The Solar Box Oven

The solar oven project was undertaken alongside the construction of two other projects the solar dryer in wings and the brick bread oven.

This is our temporary workshop. It is a parking lot filled with a lot of reusable junk materials where we extract our stuff for the fabrication.



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Constructing the double glass panels was an extra challenge. I had to do it three times...



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I constructed the box extra deep to accommodate bigger pots.









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I also found some wheels from an old washing machine.



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I also found some discarded foam boards that was used in a food exhibit; cut them to size and fixed the reflectors.



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The thermal blanket as it is being installed.



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Used food packets is also an option. I cut them well and clean and attached them to the reflectors.



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I used velcro to attach the reflectors to the box. The velcro holds them very well.



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Fixing the velcro to the sides of the glass panels.



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Hmmm..... I doubt if a reflector panel of six pieces is a wise decision. It is too woobly. I may have to do a four piece panel instead.



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The used foam boards the thermal blanket and the velcro becoming the reflectors.

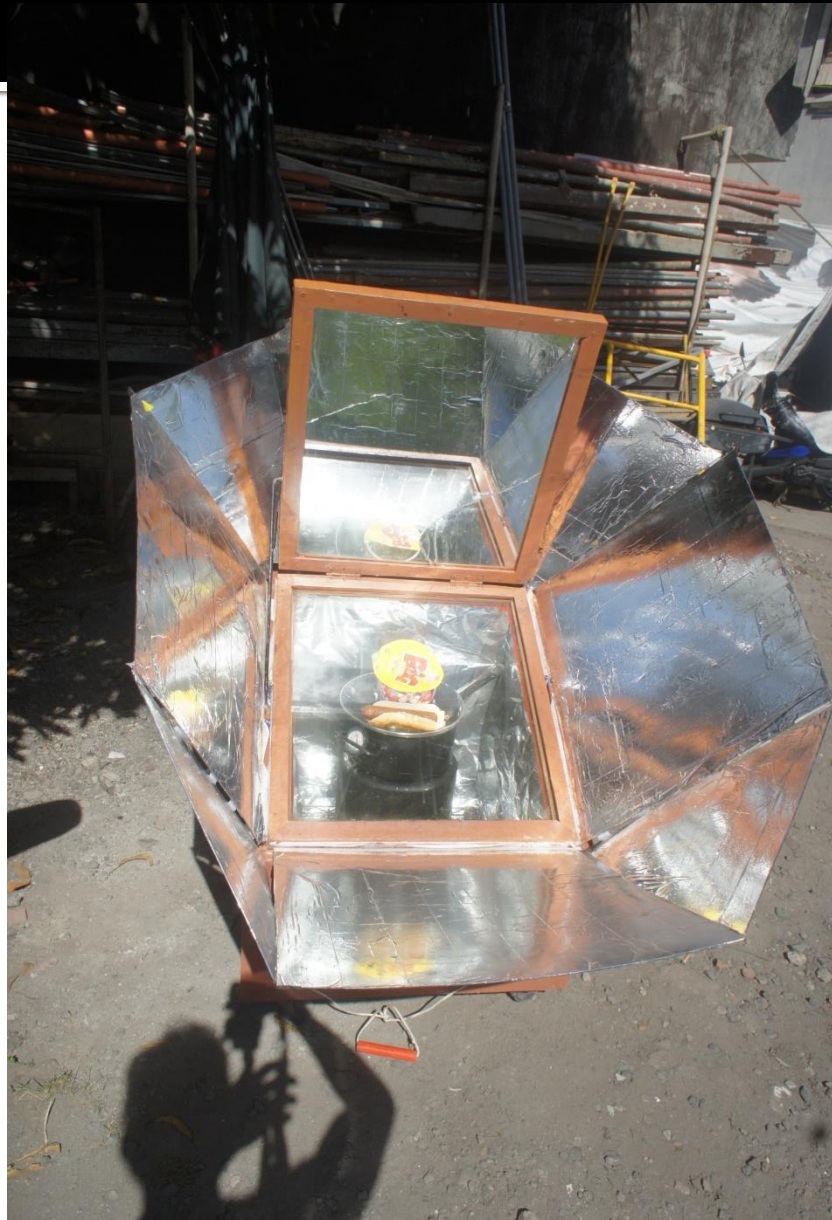






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Gladly, after several trials, the oven gained 120 degrees Celsius at 9:00 in the morning and again on 2:30 in the afternoon. (No tests was conducted yet at noon time).



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Rice, hotdog and noodles was cooked in this test. And they were cooked well.

More tests will have to be conducted in the coming days for different recipes.







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- Lessons learned.
 - The six piece reflector is difficult to fold. A four piece reflector is hereby recommended instead.
 - Thermal blanket is an excellent material for the reflectors. But it is not advisable to use them inside the walls of the box. Thermal blankets are laminated with a thin layer of plastic thus, may melt as the oven gets very hot. For the inner box, I used a Reynolds Wrap aluminum foil instead.
 - The gap between the glass panel and the box should be well sealed lest the heat will escape. For this unit, I used a high temperature gasket silicon rubber. In the future, organic materials such as cork may be tried as long as they can be installed snugly to fill in the gaps.

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- The metal pots should be painted flat black. For this unit, I installed a bigger thick metal pot at the bottom of the oven. It is turned upside down and the second pot for cooking rests on this inverted pot. The bottom pot serves as a heat bank.

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■ Questions

- In the old reference books for solar ovens, the walls of the inner box are painted flat black. The latter models up to these days are instead with reflectors. Why is this so? What was discovered?
- What is the optimum distance between the double glass panels? (I maintained 1/4 inch gap)
- Is the second metal pot as heat bank really helping? Or is it competing with the heat absorption with the cooking pot?
- I attained 120 degrees Celsius. Is this the maximum temperature that this oven model can attain? What should I do to improve further?