



# Solar Cooker

## “Cookit” model experience in Eastern Chad

An alternative solution to firewood

### Overview

The solar cooker uses energy from the sun's rays to cook food. Reflective panels concentrate the beams onto the dish to be cooked. In situations where there is a shortage of wood it is an alternative to cooking with firewood.

The Cookit model is made of basic materials (cardboard, aluminum foil and adhesive tape). It is not the most efficient solar cooker, but it can be made in camps for a modest price.

### Arguments For/Against the Promotion and Use of Solar Cookers in Eastern Chad

#### Opportunities

- Collecting wood around the camps is difficult because it is scarce, dangerous for the people collecting the wood, and cutting down living trees is banned.
- Energy distributions (wood and gasoline) are insufficient to cover refugees' needs. These distributions are will likely be reduced or stopped in the future.
- Humanitarian actors would like to preserve the local timber resources around the camps.

#### Threats

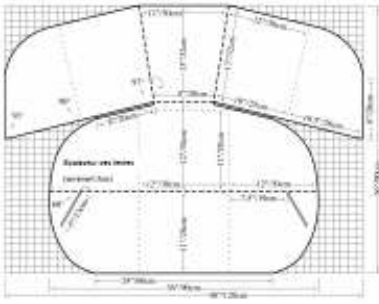
- Low sunlight (rainy weather or sand storms), during which the solar cooker cannot be used.
- Reluctance of the populations and a negative attitude by actors towards this technology.

#### Strengths

- Can be made and repaired in camps
- Low-cost (about 7 Euros, 10 US dollars)
- Free source of energy
- Promotes population autonomy
- An income generating activity
- Gives women more free time
- Eliminates risks related to firewood collection

#### Weaknesses

- Requires a change of habits, therefore training and monitoring are necessary
- Fragile (should be regularly repaired/changed)
- Cooking time is long and meals can only be prepared at certain times of day



Cookit schematic (details at: [www.idcook.com](http://www.idcook.com))



Construction workshop in the Touloum refugee camp



Cooker in use in the Ouré Cassoni refugee camp

## Experience Details and Introduction of the Cookit Model Solar Cooker in Eastern Chad

### Who and Where

The Solar cooker was diffused by Tchad Solaire in the Iridimi, Touloum et Ouré Cassoni refugee camps (in 2006, 2007 and 2008 respectively). These refugee camps are the most northern of the eastern refugee camps, in the most arid and desert environment. There are 330 days of sun annually.

### Operation

#### « Hardware »

- The Cookit model solar cooker is made of a piece of cardboard folded into a concave form and covered with aluminum paper. It reflects the sun's rays towards a cooking pot placed in the center, painted black and placed on a small piece of wood. It is put into a plastic bag closed with an elastic band to conserve the heat. During cooking, the vapor inflates the bag and moves it away from the cooking pot.
- While using this model in the refugee camps in Eastern Chad, two solar cookers are used to prepare a meal; one for the cereal and one for the sauce. For families of more than 5 people, a second solar cooker is needed for the cereal.
- The solar cooker should be oriented facing the sun, with its shadow directly behind it. It needs to be reoriented regularly to follow the path of the sun. Cooking lasts several hours (3 -4). It is possible to cook two meals a day, one from 8am-12pm and the other from 12pm-4pm.
- The user knows when the dish is cooked by looking at the contents (moving the cover without opening the plastic) or looking for condensation that forms under the plastic. Other than cereals, the dish cannot be overcooked; instead it simmers and remains warm.
- The cooker is relatively fragile. Good maintenance is very important. It should be protected from the rain and put into a case or cloth bag after each use. If it is well-maintained it can last for one year. The plastic bag that surrounds the container should be changed regularly.

#### « Software »

- Each woman follows a week-long training course. A team of trainers train several dozen additional trainers who in turn train the women in groups of 8. All of the women in Iridimi were trained in 2007, in Touloum in 2008 and in Ouré Cassoni in 2009. In total, 7,000 women have been trained in these camps.
- Each woman received two free solar cookers. She uses her own cooking pots (often obtained from HCR) that she paints black in the workshop. A fabric sack is distributed with the cooker so that she can carry her cooker home.
- When all of the women in the camp have been trained, the trainers perform the monitoring, "service after training." They go through each area and make recommendations.
- Retraining weeks are organized (ongoing training).
- The women can at any moment repair or replace (for free) their damaged cooker. The cookers are generally replaced every 4 to 9 months depending on the care the woman takes to maintain her cooker. Instructions advising replacements (who and when) are given to avoid abusing them.

### Evaluations

Two evaluations of the solar cookers have been conducted so far. One in Iridimi in 2007, by the donor representatives and UNHCR, and another in Touloum at the end of 2008. According to Tchad Solaire, these evaluations show that an estimated 85 to 90% of households in Iridimi and Touloum use solar cookers. A third evaluation is planned for fall 2009 in Touloum with solar cooking organizations (Solar Cookers



From fabrication to use

Frequently Asked Questions	
Question	Response of a Current User
Isn't the <b>cooking time</b> too long?	Solar cooking is long since it lasts 3-4 hours, but oddly, it frees up time in comparison with cooking with wood. Besides the fact that there is no need to go and collect firewood, which can take several hours per day, solar cooking cooks by itself. You do not need to feed the fire or stir the dish to prevent it from sticking. The only thing that needs to be done is to regularly reorient the cooker to face the sun, which children quickly learn to do. Therefore is it not necessary to stay close by the cooker . Women say that they find themselves with more time to take care of children, the house, a sick person, to go to the market or the well, to braid hair or weave.
Does the food not <b>taste</b> as good?	On the contrary, the solar cooker makes the food taste better. Its low temperature (between 82°C and 121°C, whereas cooking with wood raises the temperature above 260°C) preserves the flavors and the taste of food and prevents them from burning. This also preserves the nutrients. "Even the tea tastes better." Of course, this cooking method is not appropriate if you want a smoked or grilled flavor.
Can <b>all dishes be prepared, including "la boule"</b> (traditional Chadian dish)?	Solar cooking is limited to a maximum temperature of 121°C. Food cannot be fried, but cakes can be baked. All of the refugees' traditional foods can be prepared: boule (sorghum flour and water), tea, pearl millet, lentils, wheat, rice, pasta, chick peas, corn, eggs, meat, etc. (the food that PAM distributes). For "la boule;" the cooking technique is different, but the results are the same. The sorghum flour and water are cooked together, and at the very end the pot is taken out of the solar cooker and stirred. The same "boule" is obtained as if it had been stirred for an hour and half over a wood stove.
Can the cooker be used when <b>sunlight is reduced</b> ?	The cooking time will be longer when sunlight is reduced since the cooker will only be using diffuse sunlight. The cooker also works when it is cloudy because it normally cooks 50% with direct sunlight and 50% with diffuse sunlight. The cooker cannot be used when it is too dusty, for example during a sand storm (about 30 days a year in Iridimi). When the solar cooker cannot be used, a back-up fuel should be used (wood, natural gas, oil, etc.).
Can <b>breakfast</b> and evening meals be prepared with the solar cooker?	It is possible to cook breakfast the day before (by cooking a larger portion than necessary for dinner) and then reheat it in the morning with a back-up energy (wood, natural gas, oil, etc.). Otherwise, an alternative source of energy needs to be used. For the evening meals, they can be reheated in the same way. An insulated basket/thermos can also be used to keep the dish warm.
What can be done about	It is possible to ask a neighbor or a child to orient the cooker while the women is absent in the morning. In an extreme case, the cooker can also be put in a middle position

<p>cooking if the woman is <b>absent</b> in the morning?</p>	<p>(south-east in the morning); however, regular adjustments are always preferable.</p> <p>In addition, it is never too late to start the solar cooker because the two cooking methods can be combined. You can always start cooking with the solar cooker and when you would have started cooking with wood, finish using that cooking method.</p> <p>You can also start cooking the dish before leaving in the morning, stop cooking when you come back, and then reheat the dish in the evening with a back-up fuel.</p>
<p>What <b>other advantages</b> are there to using the Cookit model solar cooker?</p>	<ul style="list-style-type: none"> <li>• People with reduced mobility can use the solar cooker to prepare meals (sick, older or handicapped persons).</li> <li>• The solar cooker does not emit smoke (therefore no coughing, eye irritation or running noses). "We stay beautiful."</li> <li>• The solar cooker does not make people dirty (all the more important when there is very little water available for bathing).</li> <li>• The solar cooker is not dangerous for children (risk of burns).</li> <li>• The solar cooker eliminates the risk of fires (there were incidences at Ouré Cassoni when oil was used).</li> <li>• The refugees can bring back the solar cooker with them if they are sent home.</li> </ul>

### Group URD's Observations

Many solar cookers are installed in the camps visited (Ouré Cassoni and Touloum). The women questioned affirm that they use the solar cookers every day, one or several times. Often, the solar cooker is used to cook lunch, with firewood being preferred for the preparation of tea in the morning and the evening meals. When there is no wood, it is the only cooking method used.

In general, humanitarian actors have a negative attitude towards this cooking method, despite the fact that solar cookers have many advantages over cooking with firewood. Women recognize that the principal advantages are more free time, a better taste, lack of smoke and the safety of the technology, among others.

Far from being a solution only to be used when there is no alternative energy source available, the solar cooker is perfectly adapted to the needs of the beneficiaries. It is the logical cooking method in an environment like Chad, where there is plenty of sunlight and very little wood. All of the physical conditions are united to make solar cooking the principal cooking method, complimented by a back-up energy source (wood, natural gas, oil, etc.) for circumstances where the solar cooker cannot be used (breakfast, rainy periods, etc.). Taking these advantages into account, the solar cooker merits to be diffused in zones where there is still wood available.

The solar cooker does however imply a change of habits and therefore a significant amount of training and accompaniment should be carried out with the beneficiaries. Today, the system is under-exploited for diverse reasons, such as the fact that people are not aware that they can or don't combine different cooking methods (such as starting cooking with the solar cooker and finishing with firewood).

### TCHAD SOLAIRE'S Advice for Implementing Solar Cookers in a Refugee Camp.

- Obtain the acceptance of the beneficiary representatives and of the NGO managing the camp.
- Perform group demonstrations with traditional dishes and have them tasted.
- Favor Ramadan to diffuse the solar cooker because it allows women to prepare lunch for the children, and the evening meal for the family, without having to smell cooking odors.

### Opportunities to Explore

- Diffuse this cooking method in other camps experiencing a shortage of cooking fuel.
- Diffuse this cooking method in camps that are not experiencing a shortage of cooking fuel, and put emphasis on the advantages of the solar cooker in comparison with cooking with wood (especially the free time gained).
- Diffuse this cooking model with the local population.

- Use a solar cooker model with a higher performance, such as a parabolic solar cooker, if the cooking time becomes a limiting factor.
- Use the many aluminum cans found in the camps to build collective solar cookers.
- Use the solar cooker to pasteurize water. Bacteria present in the water are killed when the water is heated by the sun to 65°C for 20 minutes. Worms, protozoa, bacteria (cholera, salmonella, etc.) viruses (such as hepatitis A), microbes (Esherichia coli, Rotavirus, Giardia, etc.). Boiling the water is not necessary.

## Contacts

**Tchad Solaire** (NGO based and registered in Chad)

BP 5955 N'Djamena

Tel. +235 629 14 65 ; +235 251 14 59

[tchadsolaire@yahoo.fr](mailto:tchadsolaire@yahoo.fr)

**Marie-Rose Neloum**, Country Coordinator:

[mrneloum\\_1@yahoo.fr](mailto:mrneloum_1@yahoo.fr)

**Derk Rijks**, Founder:

[rijks.agrometeo@wanadoo.fr](mailto:rijks.agrometeo@wanadoo.fr)

Tel. +235 640 32 88

Tel. +33 (0)6 85 70 61 88

**Groupe URD** (Urgence, Réhabilitation, Développement)

**Headquarters** (France): [urd@urd.org](mailto:urd@urd.org); [www.urd.org](http://www.urd.org)

Tel. +33(0)4 75 28 29 35

**Masse Niang**, Country Coordinator Chad:

[mniang@urd.org](mailto:mniang@urd.org)

Tel. +235 362 67 76

**Blanche Renaudin**, Environment Advisor:

[brenaudin@urd.org](mailto:brenaudin@urd.org)

Tel. +33(0)4 75 28 29 35