

**INJERRA high temperature SOLAR COOKERS for Ethiopië**  
**A PRELIMINARY REVIEW**  
**Concerning Pilotproject solar cooking NGO PISDA**  
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**Some observations**

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In the context of the solar cooking project in Ethiopië the NGO in cooperation with Solar Cooking Netherlands (SCN) has a main purpose to develop a cheap high temperature solar cooker for baking injerra, the traditional and most important food of everyday life. In rural areas women bake each 3 days injerra. Traditionally this exists for many generations. In urban areas women sometimes buy injerra's in injerra bakeries. In rural areas women are not likely to walk for one or two hours to a bakery. Most of the adequate injerra solar cookers are very convenient for collective baking / cooking.

Following a review written during fieldtrip SCN, march 2007

## **1. General**

- ❖ The Cookit for cooking food is now being introduced in the PISDA project funded by SCN.
- ❖ Major food in PISDA project area is injerra, which can not be baked in the Cookit.
- ❖ For injerra baking a pan of 60 cm diameter with a constant and equally spread surface temperature of 220 degrees C is needed.
- ❖ The following alternatives have been studied and briefly evaluated.
- ❖ The present cooking culture in the rural areas of PISDA 's solar cooking project does not permit introduction of collective injerra baking or buying. Therefore all research for a solar injerra pan shall be directed for use in the individual household. It shall be simple and low cost.
- ❖ Solar injerra pans for collective use or for bakeries, schools, etc., remains to be intensely researched.

## **2. Biomass**

### **2.1. Firewood**

- In the project area of PISDA already low cost firewood efficient stoves have been introduced (apparently initiated by GTZ). This program may be continued by SCN
- during 2007? or 2008?

- The Philips wood-stove is a recent development which still needs to be investigated for injerra baking efficiency. Prices unknown. There might be maintenance problems in view of delicate part?
- The fuel efficient injerra stove developed by Pieter van der Pols in the Netherlands (Breda) needs still investigation for details.

## 2.2. Jatropha oil

- Jatropha oil containing nut may present good possibilities.
- Oil expellers for Jatropha seeds are already on the market. Machine operated as well as hand operated schemes for small communities or individual households are available.
- The fuel oil could be used to develop a baking plate heated by oil burners.
- Alternatively a small electric house hold generator could do the job (available in India).
- The bare lands in the solar cooking project area of PISDA seem very suitable for Jatropha plantation.
- SCN would support PISDA if they decide for a more comprehensive review of possibilities.
- Associating further local professional expertise (GTZ?) and funds (The Netherlands Embassy?) would be essential.
- A promotional type of pilot project in the project area should then be the objective as a first step.

## 3. Solar energy

- Scheffler injerra pan solar cooker. The pilot plant at sight of Salam in Addis Abeba, is a somewhat sophisticated parabolic construction together with one pan injerra bakery which today costs in the order of 20.000 Bir (E 2000).  
Can such investment be justified considering the limited capacity?  
Research towards a 3 or more-pans capacity by one Scheffler is required.  
Also the temperature spread over the cast iron plate needs equalisation according to the women who used this solar pan. The temperature at focus point is approximately 700°C.  
Bereket Solar as the original fabricator is prepared to undertake this research if he were compensated for the costs.  
SCN believes that the inventor / fabricator Scheffler, should take an initiative to up grade the installation.  
Could GTZ be involved?

- Tablesol (Xavier Devos) France. The design of this tabletype solar pan - cooker would serve as a possible basic model for an injerra pan cooker by modifying the solar reflector such that an equally spread plate temperature of 220°C is reached. Bereket Solar is capable and willing to undertake this research towards a pilot unit. If PISDA joins, SCN is prepared to fund the purchase of 1 unit from Devos, on condition that Bereket Solar undertakes the research for his own account possibly supported in funds by third parties / donors?
- 'Butterfly' solar cooker (Bereket Dessie). Bereket Solar has developed a butterfly type of solar reflector which could possibly be used for a table model injerra cooker. Bereket solar has been invited to continue research and build a pilot unit for testing together with a sun-roof to protect the pan users. This research could possibly, may be ideally, be combined with the 'Tablesol' design.
- Schwarzer type injerra solar cooker. A student (Rogier G. Kauw-A-Tjoe). Of Twente University in the Netherlands, after a survey in Ethiopia, has designed an injerra pan which is based on circulating hot oil under the injerra pan. Progress has so far been slow. SCN follows further development.
- Seiffert. So far SCN has not shown much interest for the SK 14 (parabolic solar cooker) as being suitable for injerra baking. SCN might consider if PISDA agrees to fund 1 or 2 SK 14's for collective cooking (not for injerra).
- Ghadia injerra solar cooker. The heat storage type of injerra pan appears to be effectively used in India in collective cooking situations. Since in the PISDA project the emphasis is on family self sufficiency, we have so far not continued investigation.

#### 4. PV Solar panels for electric injerra pan heating

- SCN invited budget prices for a complete installation from Bereket Solar. These prices far exceed the costs for other alternatives. Also pan temperature fluctuations cause considerable intermittent waiting times.