HOW TO USE
Integrated Sustainable Solar CooKing
_________________(ISSC)__________________

ISSC MANUAL FOR INSTRUCTRESSES AND TRAINERS

1 Solar CooKitset and 1 Heat-retention hay basket

1 Rocket stove and/or 1 Awra Amba Stove

Water Pasteurisation Indicator (WAPI)  Jatropha cooker (in development)

You have to pay for solar cookers and fuel saving stoves, BUT ...............  
• After a short time you can save and earn money by using very little firewood;  
• You will save time by collecting much less firewood;  
• Your and your baby’s health will improve by using this ‘New Cooking' (CooKit, Heat-retention hay basket) causing no or hardly any smoke (Rocket and Awra Amba stove). You will save your environment
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Other sources:
Solar Cookers International, Sacramento, California, U.S.A.
www.solarcookers.org  www.solarcooking.wikia.com
KOZON Wageningen, The Netherlands www.kozon.org

How to use the CooKit, Heat-retention hay basket, Fuel Saving Stoves, WAPI
HoA-REC/N, Addis Ababa, Ethiopia
SCN, the Netherlands March 2011
1. HOW TO USE THE SOLAR COOKIT

The **Solar CooKit** cooks good meals, stews, meat, fish, vegetables, eggs, everything but stir-fry. It is safe for children, is convenient and stores flat.

### 1.1. CooKit set

To cook and pasteurise water in the Solar CooKit you need:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| ![Diagram](image1.png) | • Reflecting panel  
• 2 clothes pegs |
| ![Diagram](image2.png) | • Heat-resistant plastic bag  
• two strings  
• one pot stand  
• lightweight 4 litre black pan (or painted black) with lid (or a jar) |
| ![Diagram](image3.png) | • WAPI (Water Pasteurisation Indicator).  
• black painted 3½ litre water kettle |
| ![Diagram](image4.png) | • rubber band |
| ![Diagram](image5.png) | • cotton bag |
1.2. The start

To set up the COOKIT, lay it flat with shiny side up. Fold front round part. Fold back part and pull ends forward to fit into slots in front. Close with clothes pegs left and right. On windy days, place rocks in the outer corners. If extremely windy, tie it down with a heavy stone as well.

Put FOOD into BLACK PAN with lid

Add NO water to fresh vegetables and meats. For most other food, add the usual amount of water. If it turns out too dry or too moist, next time add more or less water. (When making sauces add more water)

Put the pan on the POT STAND (wood or stone) into heat-resistant plastic bag to hold air all around and under pan. Close the bag with a string, not too tight so that air can escape.

• Place the COOKIT into a sunny spot out of the wind.
• Orient shiny side toward the sun in the morning.
• Adjust front panel with the clothes pegs so that there is a small shadow under it (higher midday, lower early and late in the day).
• While putting the pan into or taking it out of the CooKit, stay in front of the COOKIT to create a shadow, avoiding glare in your eyes.

After cooking:
• Turn plastic bag inside-out and use clothes pegs to hang it up to dry.
• Fold up the COOKIT.
• Put in cotton bag and hang up on a nail inside the house.
1.3. Cooking speed

**OK**

- Sun high in the sky
- No clouds
- No wind
- 4 litre lightweight pan, painted black
- Small pieces
- Little or no water added

**NOT OK**

- Sun low in the sky
- No sun
- Rainy
- White or shiny large, heavy pot
- Large quantity Large pieces
- A lot of water

To cook under any of these conditions you may need to preheat food on a fuel-saving stove before putting it in the CooKit to finish OR partly cook it in the CooKit, then quickly finish it on a fuel-saving stove or in a heat-retention basket.
1.4. Cooking hours

- Start early, allow several hours
- Use a heat-retention hay basket every day to keep your food warm, or to continue the cooking (rice, porridge, sauces, beans, meat).

Approximate cooking times for 4 pounds (2 kilos) of food on a sunny day:

<table>
<thead>
<tr>
<th>EASY TO COOK</th>
<th>HARDEST TO COOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs</td>
<td>Pieces of beef</td>
</tr>
<tr>
<td>Rice</td>
<td>Most dried beans</td>
</tr>
<tr>
<td>Fish</td>
<td>Soup and stew</td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
</tr>
<tr>
<td>Porridge, sauces, baby food, bread, cakes</td>
<td></td>
</tr>
<tr>
<td>Vegetables (above ground)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

- 1 – 2 hours
- 3 – 4 hours
- 5 – 8 hours
1.5. Folding instructions

- Small left part forward
- Whole left part backward
- Small right part backward
- Whole right part forward

- Close big part forward
- Close small part towards big part
- Fold left wing backward
- Fold right wing backward
- Put rubber band around the folded CooKit
- Put Cookit in cotton bag
- Hang cotton bag in dry place
2. HOW TO USE HEAT-RETENTION HAY BASKET or THERMAL BOX

- The heat-retention hay basket or thermal box is a very useful cooking appliance and is of special importance in saving wood as fuel for daily cooking.
- The heat-retention hay basket or thermal box keeps cooked food warm for 3 hours or lets the cooking process proceed by putting the pan with food into a well-insulated basket or box.

2.1. What you need

Depending on the size of the pan needed, adapt the size of the basket or box. For a 10-litre pan a very large basket or box is needed. For a small saucepan, you can use a smaller basket or a shopping basket insulated with woollen rags or pillows.

Cloudy or rainy weather

- Reduce cooking time in solar cooker or fuel-saving stove or 3-stone fire by putting pan/kettle in basket.
- Then you can use the solar CooKit for other food or water/milk
- Use the insulated basket ALWAYS and EVERY DAY.

2.2. How to use a heat-retention hay basket?

- Use a heat-retention hay basket for all food and pasteurised milk:
  Cook food in solar CooKit (or solar box), take pan out when the food is ready and keep it warm in the basket / box for 3 hours.
- Use the basket for rice, some easy beans, fish, baby porridge, etc.:
  Cook for a very short time on Rocket stove or in CooKit, put the pan with food in basket / box. The cooking process continues in the basket / box. The food will be delicious.
2.3. To earn money by saving wood
You earn money by using a basket / box in combination with a solar cooker or a fuel-saving stove.

<table>
<thead>
<tr>
<th>Cookers</th>
<th>Pieces of wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image]</td>
<td>10</td>
</tr>
<tr>
<td>![Image]</td>
<td>5</td>
</tr>
<tr>
<td>![Image]</td>
<td>0</td>
</tr>
<tr>
<td>![Image]</td>
<td>2</td>
</tr>
<tr>
<td>![Image]</td>
<td>4</td>
</tr>
</tbody>
</table>

2.4. To buy a basket
Most of the time plain baskets are for sale in the local market, traditionally made by local basket experts. One has to consider whether the size of locally manufactured baskets is convenient for the pans. Use the same pan for the CooKit as for the basket: 4-litre pan.

2.5. How to make an heat-retention hay basket.

- **Layers of woollen cloth or a blanket**, with a pillow at the bottom and on top. Put the pan inside and place the pillow on top.
- Locally available **grass, banana leaves, straw, chicken feathers**, etc.
- Combination of **sponge, black plastic, grass, old newspapers**.
- In a box, use enough straw / grass to cover the pan on all 6 sides / all around.
- **Note**: Insulation should cover all the sides of the basket / box! Always use a pillow on top of the pan/kettle.
2.6. To start up small business

Women can start up small businesses by manufacturing the insulation and sell the heat-retention baskets in the local market.

Women are often very creative and skilled to do this!

This is an **Income-generating activity**.
3. HOW TO USE THE WAPI

3.1. What is a WAPI?
A Water Pasteurisation Indicator (WAPI) is a simple thermometer that indicates when water has reached pasteurisation temperature and is safe to drink. Pasteurisation destroys all microorganisms that cause diseases from drinking contaminated water and milk.

A small plastic tube contains wax that melts when water or milk is heated enough to be pasteurised (65°C/149°F). This saves much fuel by eliminating the need to boil water or milk to ensure that the pasteurisation temperature has been reached. The WAPI has a stainless steel washer around it to keep it at the bottom of the water kettle. Since top water temperatures are often 2-5°C hotter than bottom water temperatures, lower WAPI placement helps to further insure that pasteurisation conditions have been achieved.

3.2. What do you need to pasteurise water?
To pasteurise water you need:
- a WAPI,
- a black painted water kettle (or black painted bottle or jar),
- a CooKit (or fuel-saving stove, or 3 stone fire)
3.3. How to pasteurise water with the solar CooKit

If the water is perhaps contaminated it can be made safe to drink by heating it in a CooKit. A simple WAPI tells you for sure if it is safe.

- Put water in a black painted water kettle
- Put a small piece of paper into the spout to avoid that too much condensation escapes.

- Put WAPI in the water with wax up, washer down, the end of the string down

- Put the lid on the water kettle and put it on the pot stand inside a heat-resistant plastic bag so that there is air under and around the kettle.

- Put the CooKit in the sun. Close the bag with a string, not too tight so that the air can escape.

- When the wax has melted and run down to the washer, the water is pasteurised and safe for drinking.

- Keep pasteurised water covered until used. Don't let fingers or unclean objects touch clean water. Don't pour the safe water into another vessel. Keep the water warm by putting the water kettle into the heat-retention basket.

- After each use, pull the WAPI string to the other end, so that the wax is again at the top and the washer at the bottom.
3.4. How hot does a CooKit get?

![Temperature Chart]

Note:
**Food safety**: Pasteurisation temperatures kill germs and parasites that cause illness if eaten.
**Water safety**: To be safe, water only needs to be heated to 150 degrees °F (65°C). To know if water has been heated enough either use a water pasteurisation indicator (WAPI) or otherwise observe it boiling at 212 °F (100°C).

4. NEW COOKING for 6 person household

New cooking means:

4.1. Bright sky, sun soon high in the sky

*Food for breakfast*
Use your solar cooked food of the day before Or cook your food on a FSS' Rocket stove

*Food for lunch*
Start 8.00 or 8.30 AM, cooking with CooKit;
If you leave your house very early, put the CooKit with food in a spot where the sun will shine, protect the CooKit by putting it on a low roof or put branches around it to stop goats from eating the cardboard.
After 1 ½ hours put pan with rice / baby food / vegetables / sauce in the Heat-retention basket;

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1 Fuel Saving Stove

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At the same time start another pan with food or water in the water kettle in the CooKit; if needed bake injera on Awra Amba FSS.
To make traditional coffee you need some charcoal for Lakech.
At noon your food will be ready.

Food evening meal
During the day put food in the CooKit. After 4.00 PM the sun is less powerful. Keep food warm or continue cooking process in Heat-retention hay basket. If you want to eat and your food is not ready yet, cook it for a short time on the Rocket stove to finish your cooking.

4.2. Partly cloudy with long periods of sun
Food for breakfast
Eat solar cooked food of the day before. Or cook your food on an FSS Rocket stove.

Food for lunch
Start 8.00 or 8.30 AM, cooking with CooKit; the cooking process takes more time. If food is not ready at 12.00 noon finish cooking on FSS Rocket stove. If needed bake injera on Awra Amba FSS. Put water in water kettle to make safe (drinking) water for you and your baby.

Food for evening meal
Put pan with food in the CooKit; cooking process takes more time. If food is not ready finish cooking on FSS Rocket stove.

4.3. Mainly cloudy with very short periods of sun
Food for breakfast
As described above.

Food for lunch
Prepare food on Rocket stove and put pan with food in Heat retention basket to continue cooking process. If needed bake injera on Awra Amba FSS. Watch the sky if there are longer sunny periods; if so, change to the CooKit and basket to cook the food.

Food for evening meal
Cook your food in the Rocket stove and use the basket as much as possible.

4.4. Rainy days / rainy season
Food for breakfast
Prepare food on Rocket stove.

Food for lunch
Prepare food on Rocket stove; shorten cooking time and reduce firewood by using Heat-retention basket. Pasteurise water on Rocket stove; keep water warm in Heat-retention basket; always observe the sky if the sun is shining; if so put the pan or kettle in the CooKit.

Food for evening meal
Prepare food on Rocket stove and Awra Amba FSS and reduce firewood by using Basket.
### SAVING WOOD / FIRE WOOD

<table>
<thead>
<tr>
<th>Cooking with power of the sun</th>
<th>→ saving firewood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving firewood</td>
<td>→ saving money</td>
</tr>
<tr>
<td>Saving time by less collecting</td>
<td>→ earning money</td>
</tr>
</tbody>
</table>

### COST PRICES in Birrs

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat-Retention Hay Basket</td>
<td>Birr</td>
</tr>
<tr>
<td>Solar CooKit + pan / WAPI</td>
<td>Birr</td>
</tr>
<tr>
<td>FSS Rocket stove</td>
<td>Birr</td>
</tr>
<tr>
<td>Awra Amba FSS</td>
<td>Birr</td>
</tr>
</tbody>
</table>

#### Total

- Heat-Retention Hay Basket: Birr ...
- Solar CooKit + pan / WAPI: Birr ...
- FSS Rocket stove: Birr ...
- Awra Amba FSS: Birr ...

#### Total

- Total: Birr ± 400

### FIREWOOD CONSUMPTION - COSTS - SAVINGS

#### EXAMPLE Household of 6 persons

##### Example Firewood consumption

<table>
<thead>
<tr>
<th>Day</th>
<th>Amount (kg)</th>
<th>Cost (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One day</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>One week</td>
<td>7 x 6</td>
<td>6</td>
</tr>
<tr>
<td>One year</td>
<td>52 x 42</td>
<td>2184</td>
</tr>
</tbody>
</table>

##### Example Firewood costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kg firewood</td>
<td>1</td>
</tr>
<tr>
<td>One day 6 p x 6 kg x 1 Birr</td>
<td>6</td>
</tr>
<tr>
<td>One week 7 days x 6 kg</td>
<td>42</td>
</tr>
<tr>
<td>One year 52 weeks x 42 Birr</td>
<td>2184</td>
</tr>
</tbody>
</table>

##### Example Firewood saving in kg wood

<table>
<thead>
<tr>
<th>ISSC cooking gives 70% savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% per day saving 4 kg wood</td>
</tr>
<tr>
<td>70% per week saving 28 kg wood</td>
</tr>
<tr>
<td>70% per year saving 1456 kg wood = saving approx 7 trees</td>
</tr>
</tbody>
</table>

##### Example Firewood saving in Birrs

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In one day .. kg x .. Birr I save ... Birr</td>
<td></td>
</tr>
<tr>
<td>In one week 7 x .. Birr I save ... Birr</td>
<td></td>
</tr>
<tr>
<td>In one year 52 x .. Birr I save ... Birr</td>
<td></td>
</tr>
</tbody>
</table>

### My firewood consumption

#### Example Firewood consumption

<table>
<thead>
<tr>
<th>Day</th>
<th>Amount (kg)</th>
<th>Cost (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One day</td>
<td>...kg</td>
<td>...kg</td>
</tr>
<tr>
<td>One week</td>
<td>...kg x ...kg</td>
<td>...kg</td>
</tr>
<tr>
<td>One year</td>
<td>...kg x ...kg</td>
<td>...kg</td>
</tr>
</tbody>
</table>

#### Example Firewood costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kg firewood</td>
<td>...Birr</td>
</tr>
<tr>
<td>One day 6 p x .. kg x .. Birr</td>
<td>...Birr</td>
</tr>
<tr>
<td>One week 7 days x .. kg</td>
<td>...Birr</td>
</tr>
<tr>
<td>One year 52 weeks x .. Birr</td>
<td>...Birr</td>
</tr>
</tbody>
</table>

#### Example Firewood saving in kg wood

| I have ISSC package, thus saving 70% wood |
| 70% per day saving kg wood |
| 70% per week saving kg wood |
| 70% per year saving kg wood = I save approx ... trees |

#### Example Firewood saving in Birrs

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In one day .. kg x .. Birr I save ... Birr</td>
<td></td>
</tr>
<tr>
<td>In one week 7 x .. Birr I save ... Birr</td>
<td></td>
</tr>
<tr>
<td>In one year 52 x .. Birr I save ... Birr</td>
<td></td>
</tr>
</tbody>
</table>

### My firewood saving

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (Birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A complete ISSC package costs appr 400Birr</td>
<td></td>
</tr>
<tr>
<td>A complete ISSC package costs appr 400Birr</td>
<td></td>
</tr>
</tbody>
</table>

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