Fireless cooking with

Insulated baskets

Participating Organisations:

"waste no waste"
Natural Resources and Waste Management Alliance, Nairobi

Giving Hope Foundation, Kampala

Friends of the Old, Kisumu

Sustainable Utilisation of Renewable Energy, Kisumu

Bernhard S. Müller
Copy editor: Zoë Williams

Lernen-Helfen-Leben e.V.
Büro Düsseldorf
Postfach 260124
40094 Düsseldorf
Germany
Published: August 2016

Fireless cooking has many advantages:

- Suitable for all cooking tasks up to 100°C.
- Cooking can be left unattended.
- Fireless cookers save 50% of the energy needed to cook (meaning far less fuel is used, whether wood, charcoal, gas, electricity...).
- As much as 80% of the energy can be saved if fireless cookers are used with solar cookers whenever possible.
- Fireless cookers are easy to make and easy to use.
- Fireless cookers empower women.
- Fireless cookers are well utilized when adopted.
- The insulated baskets can also be used to keep food cool.

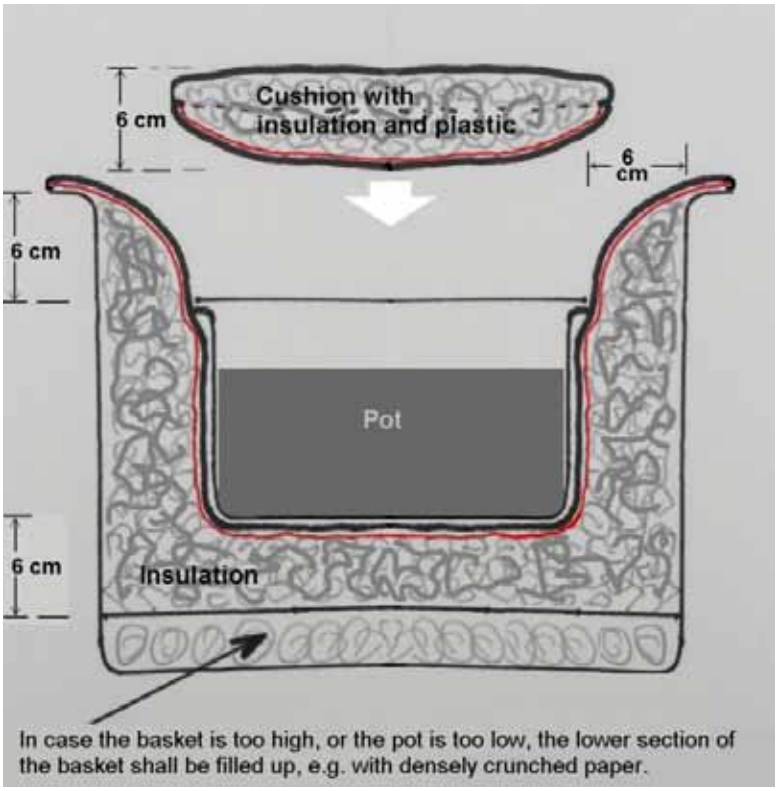
There are two minor disadvantages:

- Fireless cookers cannot be used for higher temperature cooking tasks, such as baking or frying.
- Fireless cookers are designed for just one specific pot size.

How to make a fireless cooker:

This is what you need:

- A round basket with an inner diameter at least 12 cm wider than the designated pot. The height of the basket should be at least 12 cm higher than the height of the pot.
- A pot with a lid, preferably without handles.
- Paper, preferably used newsprint.
- Insulation material, such as crude cotton, kapok, shredded textiles...
- Black cotton cloth.
- Patterned cotton cloth of a different colour to indicate the upper side of the cushion lid and to make it look nice.
- Heat-resistant flexible plastic sheeting.
- Scissors, a needle and some strong cotton thread.



Sketch 1

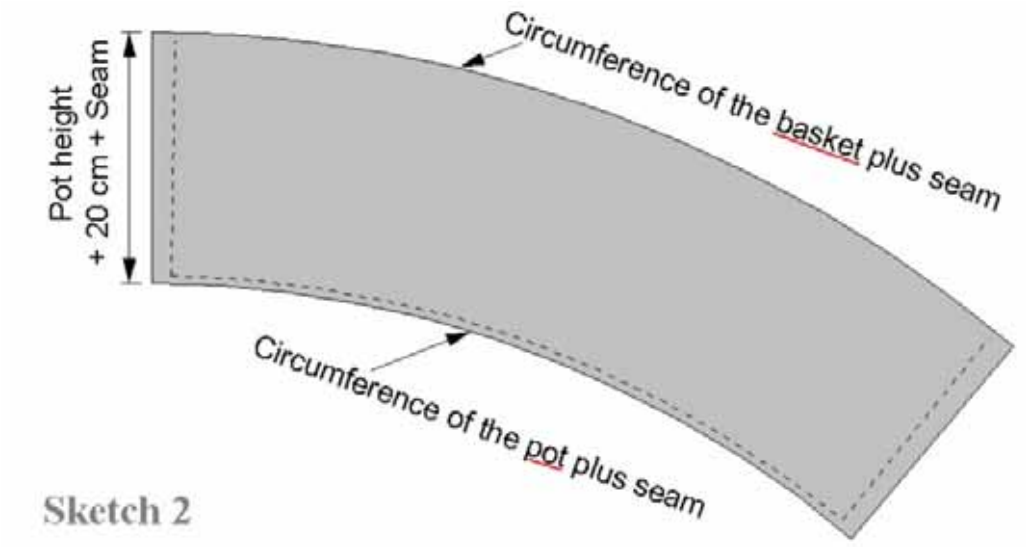
Step-by-step instructions:

1) **Put a layer of paper inside the basket. This is to protect the insulation against wind or ambient air circulation.** Also, this way the fibres of the insulation material do not poke through the gaps in the basket.

Photo 1: The basket with the various layers of paper, insulation (in this case shredded textiles) and the plastic sheeting. © Faustine Odaba.

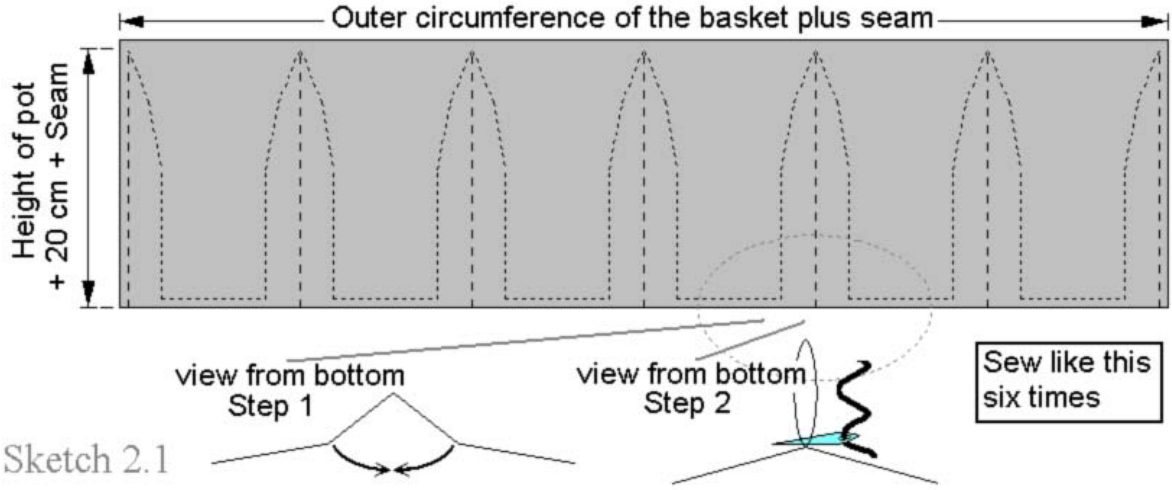
2) **If the pot is not high enough (or the basket too high),** stuff some material, e.g. scrunched paper, in the bottom of the basket, underneath the insulating material (see Sketch 1).

3) **Measure and cut the interior black cotton layer according to these instructions:**

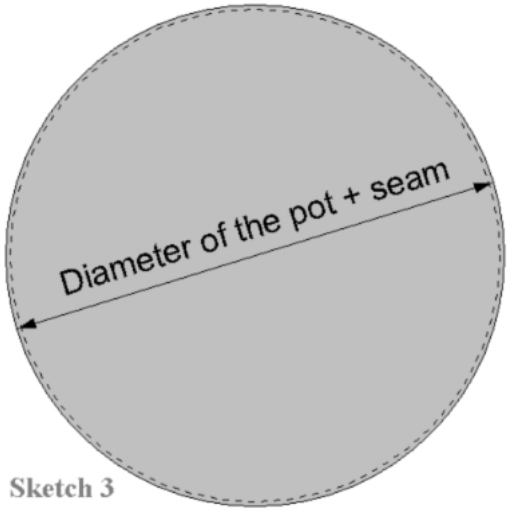


Sketch 2

or alternatively :



Sketch 2.1



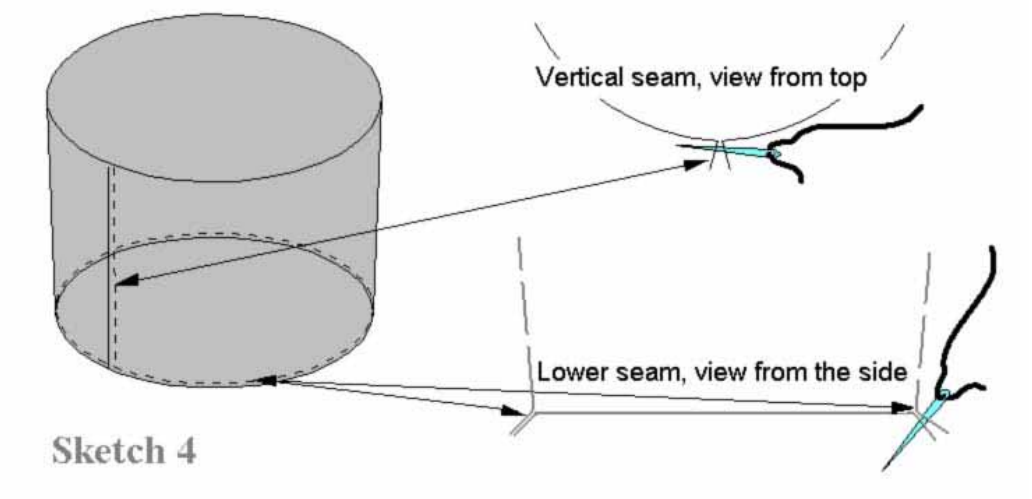
Sketch 3

Note about Sketch 2.1: The height of the internal black cotton layer should be the sum of the height of the pot + 20 cm + seam. The mentioned 20cm covers twice the insulation (2 x 6cm) plus the vertical curvature of the basket.

Sketch 3 indicates the bottom of the internal black cotton layer.

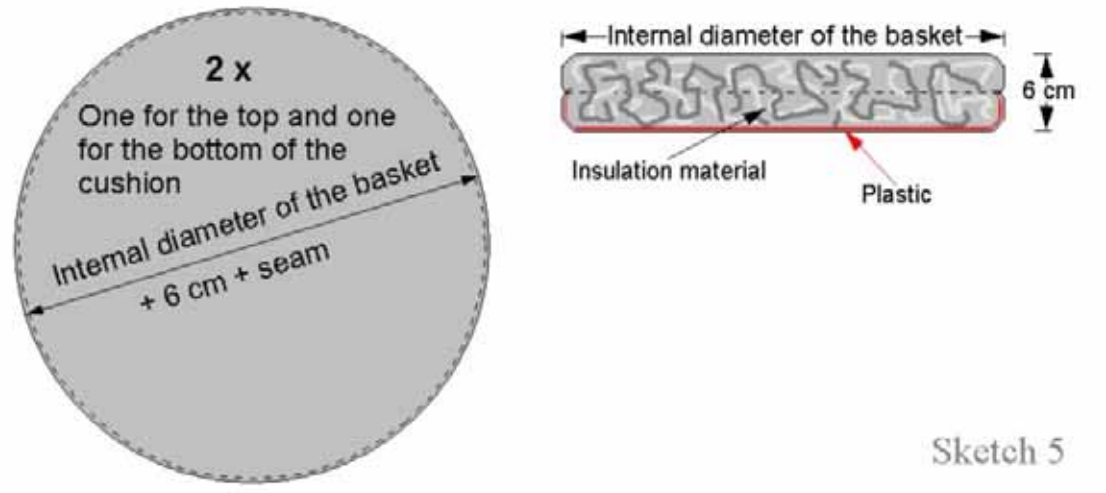
Don't forget that you will always need to allow an additional amount of cloth for hems or seams!

4) Sewing of the internal black cotton layer:



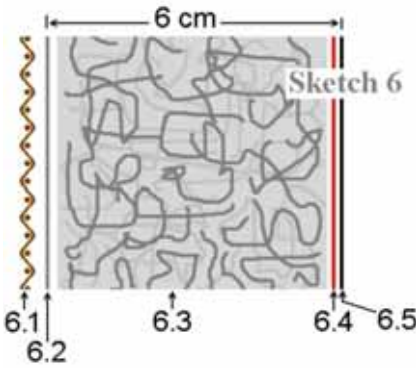
Sketch 4

5) Making the cushion lid (please consider sketch 1 as well) :



Sketch 5

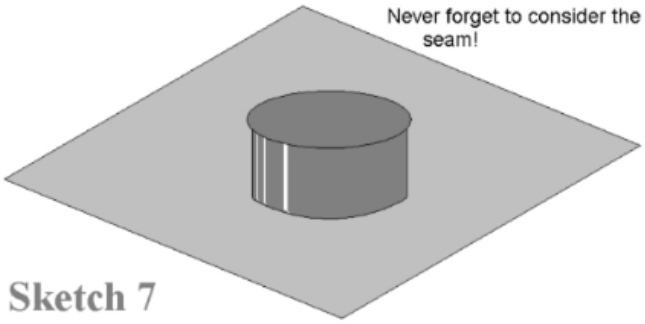
6) The different layers from outside to inside.



6.1 Basketwork
6.2 Paper
6.3 Insulation
6.4 Plastic
6.5 Black cotton cloth

The layers for the cushion lid are as follows (from upper to lower layer):
Patterned cotton, insulation, plastic, black cotton.
(See Sketch 5)

7) Cloth in which to wrap the pot. This means it can be inserted and removed without touching the hot surface.



The square shaped cloth measures 2 times the diameter of the pot + 2 times the height of the pot + hems.

Length of cloth sides = (2 x pot diameter) + (2 x pot height) + hems.

8) Continuing the construction of the fireless cooker.

Insert a layer of insulation material on top of the paper layer, at the bottom of the basket. The insulation should be at least 6 cm thick. After that insert the plastic layer which shall have the same size and shape as the black cotton layer. Then insert the black cotton layer and attach it with stitches. This is done to keep the inner fabric in position when removing the pot. Stitch the upper edge of the internal black cotton to the rim of the basket. Form a seam first. This step can be done more accurately by fixing the cloth with clothes pegs temporarily. Stitch from the seam at the bottom of the inner fabric layer all the way through the plastic, insulation and paper to the basket. The aim is to securely attach the bottom seams of the cotton to the basket, without compressing the insulation - the stitching is rather like the webbing at the edges of a trampoline (see sketch 8).

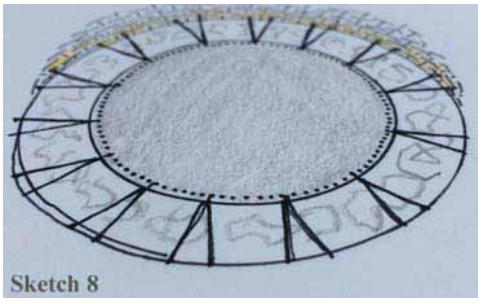


Photo 2: Different stages of the production.
© Bernhard S. Müller

Guidelines for use:

- The specified insulation materials have excellent insulating properties, with a thermal conductivity of only 0.035 W/(m · K). The lower the thermal conductivity, the better the insulation. If the pot is filled to 3/4 of its volume, the temperature should still be above 70°C after 3 hours of fireless cooking. Hence, cooking has continued without needing any additional input of energy.
- All steps should be executed with the utmost care and accuracy. Gaps or wrinkles lead to a drastic decrease in performance. The internal black cloth and the covering cushion must fit snugly to the pot and lid.
- The temperature decreases faster if the pot is half full or less. For best results, try to fill up the pot to 3/4 of its capacity or even more.
- To indicate that cooking is in progress, please put a sign (e.g. "it's cooking") on the fireless cooker. This is to avoid someone accidentally moving the basket and spilling the contents.
- The plastic layer is important because a certain amount of steam leaves the pot during the fireless cooking process. Thanks to the plastic, the moisture will not penetrate the insulation, which avoids odours and mildew.
- The lower side of the cushion faces the pot and shall have a plastic layer right between the cloth and the insulation. The lower side of the cushion shall be of black colour, the upper side with a nice looking design, to avoid a mix-up.

Cooking times:

Food that can be cooked in a Fireless Cooker

(Usually food that does not require constant stirring)
Indicated times are experience-based for fireless cooking in a pot filled to 1/4 and 3/4 of the total volume.

Type of food	Simmering time (solar or fire)	Fireless cooking in 1/4 filled pot	Fireless cooking in 3/4 filled pot
Rice	5 minutes	45 minutes	30 minutes
Pre-soaked maize/beans (Githeri)	30 minutes	3-4 hours	3 hours
Meat stew	10 minutes	90 minutes	60 minutes
Fish, Chicken	10 minutes	30 minutes	20 minutes
Green vegetables (Sukuma)	Fry 10 minutes	10 minutes	10 minutes
Chickpeas, green grams, Pork	10 minutes	2 hours	90 minutes
Boiled eggs	Bring to boil	10 minutes	10 minutes
Offals (Matumbo), Beef	10 minutes	3 hours	2 hours
Potatoes	10 minutes	30-40 minutes	25 minutes
Green bananas (Matoke)	5 minutes	40 minutes	30 minutes
Sweet potatoes, arrow roots, Yams	5 minutes	1 hour	40 minutes
Maize on the cob (green)	10 minutes	1 hour	40 minutes
Peanut butter stew	10 minutes	1 hour	40 minutes
Manioc, Tapioca (Cassava)	10 minutes	1 hour	40 minutes
Mushroom stew	10 minutes	1 hour	40 minutes

This information leaflet has been issued according to the Faro Declaration of Intent, published after the international conference of Solar Cooking and Food Processing CONSOLFOOD2016, 22 and 23 January 2016, Faro, Portugal: The support of grass-roots workers has priority in order to ensure the fastest and most widespread dissemination of high quality information.

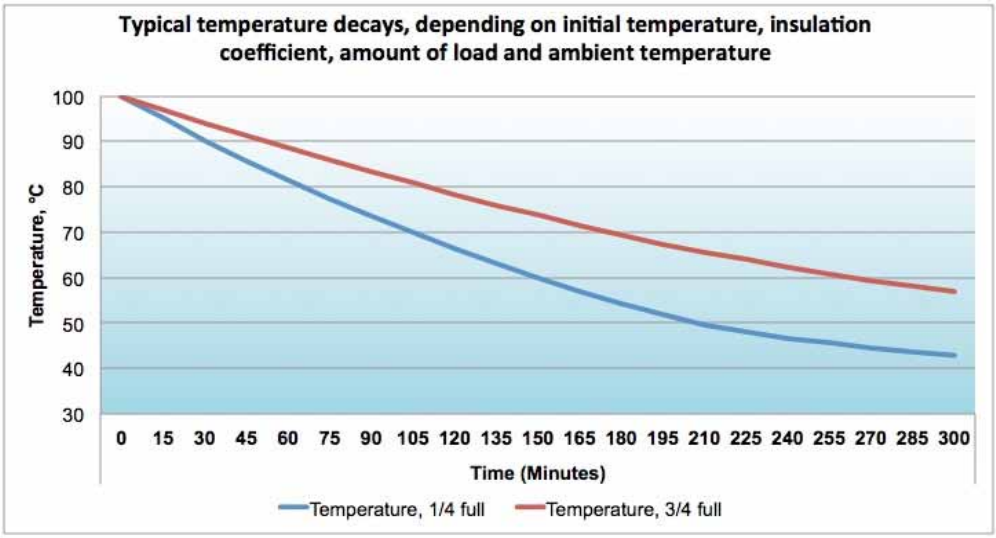


Photo 3: A women's initiative making fireless cookers in Kisumu, Kenya. © Bernhard S. Müller.

Photo 4: The production comes to the end. The cloth is sewed onto the basket. The clothes pegs hold the textiles in position temporarily. © Faustine Odaba.

Photo 5: Here's how it is done in Uganda: instead of clothes pegs to hold it in place while sewing, the pot with the covering cloth is used, with bricks on top. It should be well centred with the cloth held tight by the pot and bricks. This method is advisable if just one person is making the fireless cooker on their own. © Robert Echobu.

Photo 6 (following page): A beautiful collection of fireless cookers, Nairobi, Kenya. © Faustine Odaba.

Title photo © Bernhard S. Müller.

Lernen-Helfen-Leben e.V.
Büro Düsseldorf
Postfach 260124
40094 Düsseldorf
Germany

This document can be downloaded from www.mueller-solartechnik.com

A version in French language is available upon request.

Supported by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Sector Program Basic Energy Services