

# FIRELESS COOKERS

Fireless cookers are a simple insulating covering that allow pots to continue to cook food even when they are taken off a source of heat. This helps reduce the need for an open fire, for fuelwood and also reduces indoor air pollution.

## Introduction

The "fireless cooker" uses stored heat to cook food over a long period of time. The food is cooked on any stove type before it's transferred to the fireless cooker. Fireless cookers are not a new invention, it has been around for many years but has been forgotten about in areas where it used to be used and is new to others.

They are also known as hay boxes, straw box, insulation cookers, or retained-heat cookers.

Practical Action has been promoting the use of Fireless Cookers in Kenya in recent years although they could be used in many parts of the world. Fireless cookers are seen as an accessory that can be used with all types of stoves including solar, LPG, electric and other modern fuels.

Practical Action's aim was to primarily reduce indoor air pollution in people's homes using a variety of low cost technologies that could be adopted by women in Kenya. However, the fireless cooker is not just about reducing pollution it can also reduce the amount of fuelwood used in the home.

The fireless cookers have allowed people to continue to use their open fire which they are familiar with and experienced in using while also reducing the negative effects of the traditional way of cooking and is seen as an entry point to others, more expensive smoke alleviation technologies.

It was one of a series of interventions introduced by Practical Action in Kenya to alleviate smoke along with smoke hoods, improved stove designs, structural changes to traditional houses such as the introduction of larger windows and solar cookers. These cookits parabolic solar cookers were promoted in partnership with Solar Cookers International, which was the technical partner for solar technology.



Figure 1: a new fireless cooker on show with a ceramic jiko stove in the background.

## Advantages and disadvantages

### Advantages

- Fireless cookers can save fuel. At its simplest level the fireless cooker comprising of a basket, insulated with locally available materials such as banana leaves or old clothes can reduce fuel use by 40%.
- Reduce smoke in the home thus improving the health of women and children.
- Can be cheap, use local materials and made locally.
- It can reduce water use in cooking by 25%. Water is retained, rather than evaporating, preserving nutrients, flavours and drinking water.
- Help preserve local forests and the environment. This 'green technology' will help to reduce the demand for scarce natural resources.
- Fireless cookers can also be used to keep food cool.
- Most significantly, allows for greater opportunities for income generation as women no longer spend so much time collecting wood therefore freeing up time to earn money at the market or in the field.

### Disadvantages

- It is little known and potentially disregarded by many.
- Approaches to cooking need to be adapted.
- There is potential for contamination if the food stays in the "danger zone" for too long. The danger zone is the term used for the temperature range between 5–60°C which increases bacteria growth.

### The layout of a fireless cooker

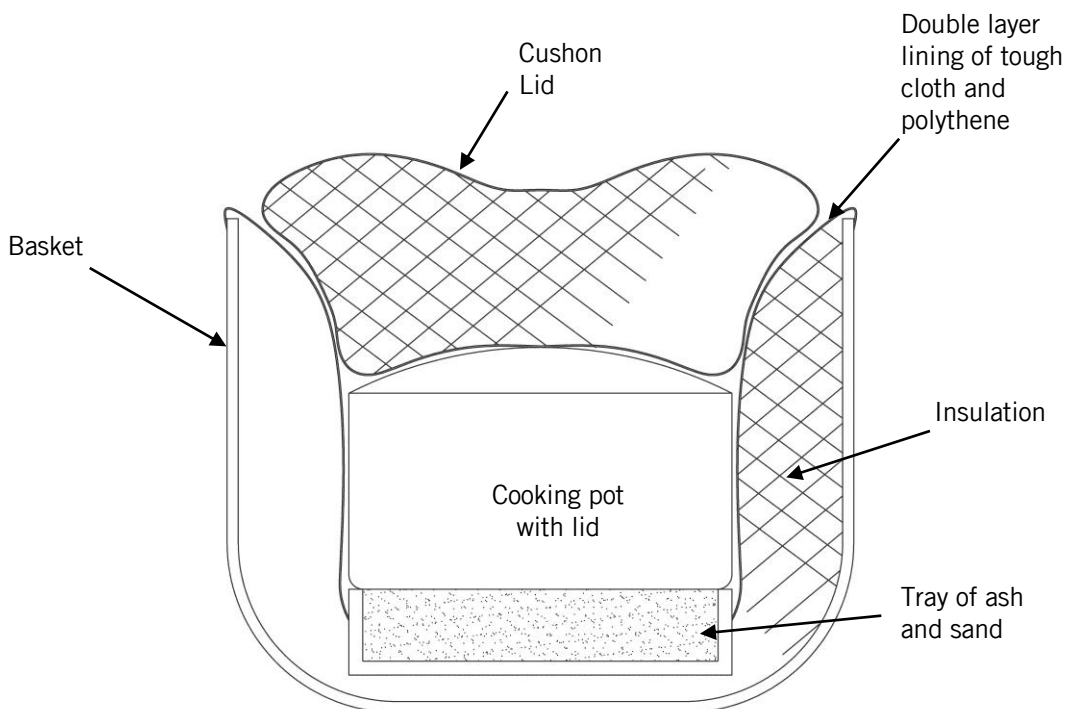


Figure 2: The components of a fireless cooker.  
Illustration: Neil Noble / Practical Action.

## How to make a fireless cooker



Figure 3: Locally-available material such as recycled clothing is collected for insulation.



Figure 5: Dry heat-resistant polythene covers line the cloth on the inside.



Figure 7: Two cloth cushions are packed around the top and bottom of the pot.

In Kenya the main structure was provided by means of a basket. The basket may be bought or it can be made by the user. However, the structure does not need to be made from a basket, a wooden box or other containers would be just as suitable.

The inside of the container is then fitted with a lining which is then stuffed with the insulating material. Insulation can be made from a variety of materials, straw or hay can be used, hence the name hay box which is used for fireless cookers. In the case of the work in Kenya, recycled clothing was used. The basket or container needs to be quite large so that there is room for the pot and the insulating material. The general approach is to use the size of the biggest pot, being used for cooking, to select the basket size.

The insulation is densely packed so that there is just enough room to fit the pot without any gaps for heat to escape from. A lining of tough cloth needs to be cut so it can be used to protect the cloth and insulation. It is circular in shape, to avoid waste, but any shape will work as long as it can fit all around without the need for an extra piece. A good seamstress can use several waste pieces quite economically and still get a good fit. It also needs to be slightly bigger than the basket as the lining is attached on the outside of the basket. The lining is stitched to hold the insulation in position. A dry heat-resistant polythene cover is fitted over the lining on the inside, to protect and prevent moisture from getting into the insulating material as this reduces the effectiveness of the insulation.

Place the lining on top (at this point ensure that the saucepan just fits inside), if not remove some insulation until it does.

Sew the lining to the outside of the basket (see figure 4). This is done with large needles and tough thread.

When cooking, a metal plate is put inside the basket and filled with hot sand and wood ash. This ensures that there is sufficient heat to cook food properly.



Figure 4: The insulating material is sewn into a strong basket or box.



Figure 6: A lining of tough cloth is glued or pinned to hold the insulation in position.



Figure 8: A fireless cooker, ready to use.

## Practical Action's approach to Fireless Cookers

As part of Practical Action's work into reducing smoke in the home the concept of the fireless cooker was introduced to women in Kenya but initially had little success.

The early fireless cookers that were demonstrated by Practical Action had been made from brand new baskets with nice materials and were shown cooking foodstuffs such as rice and beef, or potatoes. It was found that this actually put off the women that the fireless cooker technology was aimed at, as they perceived them as being "too expensive" and not appropriate or suitable for their own simple foods and diet.

The approach of the later demonstrations then changed and focused more on making the technology accessible to women. They could make their own baskets with locally available materials and whatever insulating materials were available. It didn't rely on them having to spend a lot of money. The materials used included dried grass, sawdust, dried banana fibre and rice husks or whatever they had in their homes.

They could also bring their own food and discover that they didn't need to change to expensive foods but could cook the same foods that they were used to and could afford. These included sweet potatoes, traditional vegetables, dried fish and corn on the cob for testing.

The approach to promote the principle of insulation and conduction, rather than the item of technology worked in convincing potential users that they could acquire and use the technology. This approach engaged much more with women who did not work in a conventional situation. Previous approaches assumed that women have a kitchen and were ready to take up a new technology once she is shown that it works however there are many reasons why this is not the case.

From the three smoke reduction projects that Practical Action implemented, several women owners of participating kitchens explained they hadn't taken up the technologies on offer:

- I have no kitchen (meaning that she has nowhere to put anything).
- I share a kitchen with my mother-in-law (meaning that she has no rights in the kitchen she is using).
- I lost my husband recently and I am not allowed to do that (meaning that her culture forbids her).
- I do not have the money (meaning that her hierarchy of needs does not necessarily include purchases for her kitchen).
- I do not have a job (meaning that she associates any technology with salaried employment, such as teachers and nurses, and not with improved kitchens).
- I do not want to rise above my mother-in-law (meaning that her culture forbids her to appear better than the mother of her husband).

We witnessed responses that had no apparent link, in our 'modern' thinking, with the act of cooking, but which were matters closest to the hearts of those cooking that wished to have a kitchen and to be comfortable in the knowledge that her closest community members - mum-in-law, were similarly endowed.

In the light of such contextual matters, the apparently technically-sound technologies found little audience and subscription and we found that the old faithful open fire soon found its way into the cooking routine when the project monitoring stopped. Sporadic surprise visits to the kitchens revealed that the open fires are never completely expelled from the home and were kept within close proximity to allay any lingering doubts that the newcomer could meet all the needs of the woman.



## Cooking with a fireless cooker

Food is precooked in a conventional fire or cooker. The actual time needed depends on the type of food.

Soft foods such as bananas should be cooked for around 3 minutes. Harder food need to be cooked for longer, beans and meat should be cooked for 20 to 25 minutes.

The heating stone is heated and placed in the cooker. Then the covered cooking pot is set on the hot stone in the cooker and the lid is placed on the well.

For softer foods it will take around 25 minutes in the fireless cooker and for harder food it can take around 2 to 2 ½ hours.

Due to the risk of contamination when food stays in the danger zone it is important to minimize the time food spends in this temperature zone and should move through this temperature zone. The food should not be left for too long within the fireless cooker as this encourages the growth of bacteria.

One way to get round this potential problem is to reheat the food to boiling on a conventional fire before eating which will kill off any bacteria.

It is also important to cook the food at high temperature sufficiently before using the fireless cooker as this will kill off any dangerous bacteria present in the food and this reduces the risk of bacteria growing while the food is cooking at lower temperatures.

Some foods carry greater risks than others. Higher risk foods include meat and legumes such as kidney beans and chickpeas.

## Conclusion

Their success in low-income communities is evidence that women have been able to take up the technologies, but under their own terms and conditions.

## References and resources

[\*Engaging Communities in Alleviating Smoke - What The Real Experts Tell You\*](#) Vincent Okello  
[\*Fireless Cookers\*](#) Development Alternatives Environmental Information Services  
[\*Guide to Designing Retained Heat Cookers\*](#) Don O'Neal, HELP International  
[Haybox, Retained Heat or Fireless Cooker](#) BioEnergy Discussion Lists  
[Heat-retention Cooking](#) Solar Cookers World Network, Wikia  
[Cooking in a Basket](#) blog  
[Chimney Stoves and Smokehoods](#) – [English](#), [Kiswahili](#), Practical Action Technical Brief  
[Solar Cookers and Health](#) - Practical Action Technical Brief  
[Nashetu-E-Maa: Building in Partnership with the Maasai](#) Practical Action Technical Brief

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Practical Action, East Africa  
PO Box 39493 - 00623  
Nairobi  
Kenya  
E-mail: [practicalaction@practicalaction.or.ke](mailto:practicalaction@practicalaction.or.ke)  
Tel: +254 20 2595 311 / 5  
Fax: +254 20 25953116

Practical Action  
The Schumacher Centre  
Bourton-on-Dunsmore  
Rugby, Warwickshire, CV23 9QZ  
United Kingdom  
Tel: +44 (0)1926 634400  
Fax: +44 (0)1926 634401  
E-mail: [inforsew@practicalaction.org.uk](mailto:inforsew@practicalaction.org.uk)

Website: <http://practicalaction.org/practicalanswers/>  
Twitter: @practicalanswer

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# technical brief