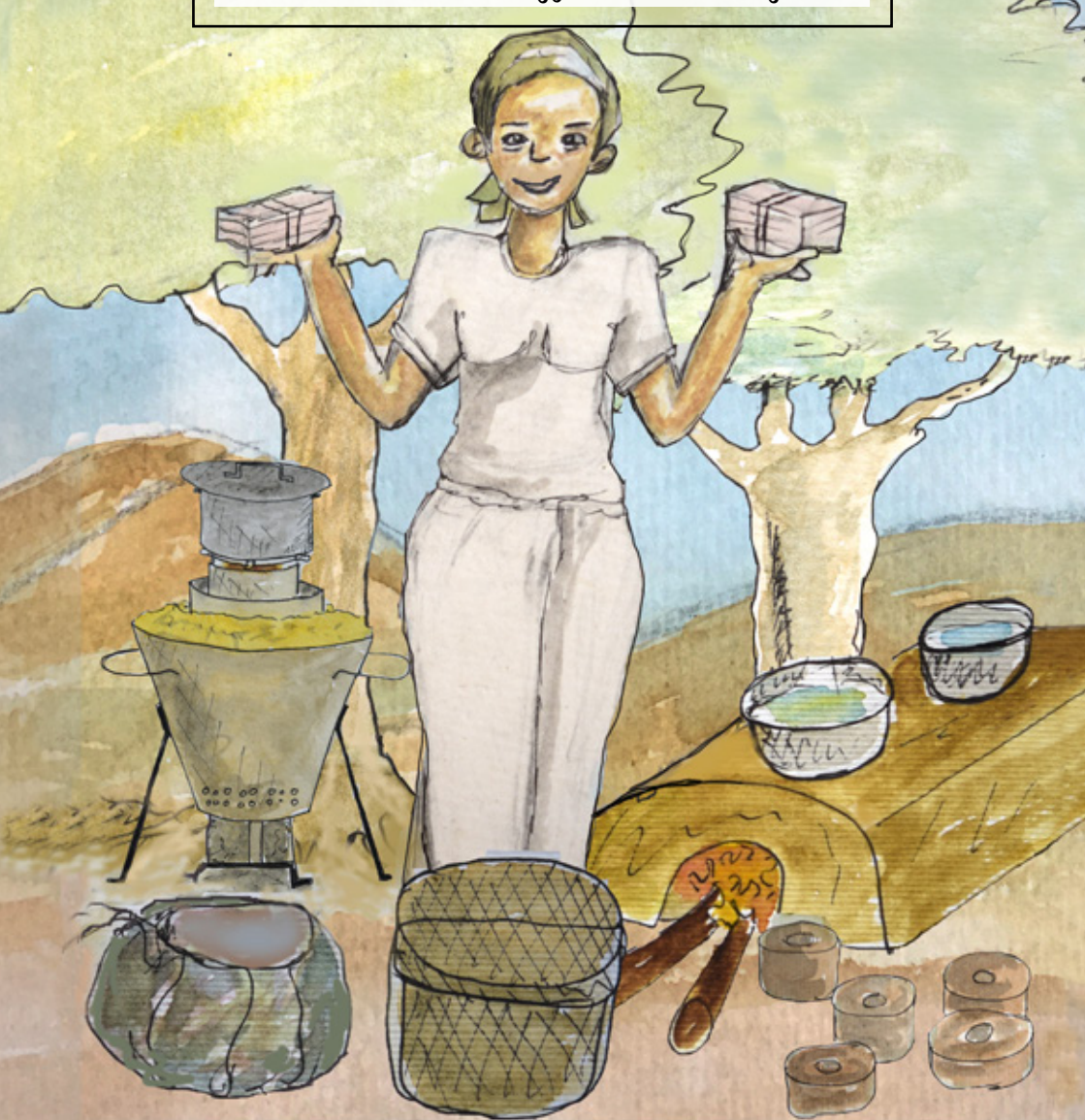


# ENERGY TECHNOLOGIES

A short manual on energy-efficient technologies





This manual is in kind memory of Simon Ignas  
Nkalyamunu, our Babu Simon

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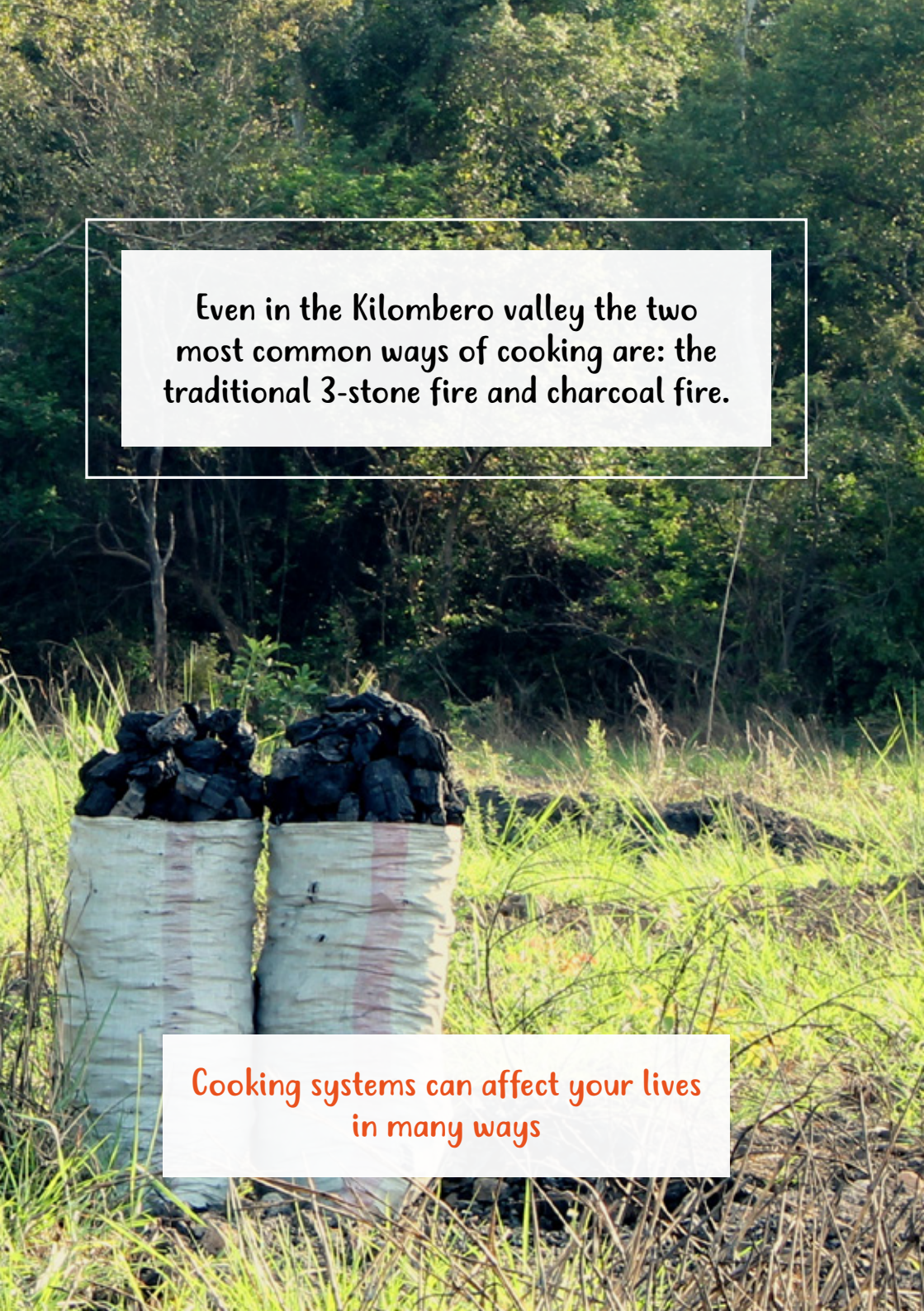




# INTRODUCTION

When it comes to heating and cooking, we always think of wood as the first resource. Nearly three billion people across the globe still cook every day using very primitive systems: open, three-stone fires, or rudimentary stoves that burn wood, agricultural waste, animal dung and charcoal. Cooking with these traditional and primitive cookstoves is inefficient and very polluting, a danger to health and the environment and contributes to global warming. Cooking over open indoor fires is the greatest environmental health risk in developing countries. In many places worldwide women walk for hours to collect firewood, risking their safety and sacrificing energy and time that could otherwise be used to earn a living.



The image shows two large, white, cylindrical sacks filled with black charcoal, standing in a grassy field. The background is a dense, green forest. The text is overlaid on a white rectangular box in the upper half of the image.

Even in the Kilombero valley the two most common ways of cooking are: the traditional 3-stone fire and charcoal fire.

Cooking systems can affect your lives  
in many ways





# 1. DRAWBACKS OF THE 3-STONE FIRE

## UNHEALTHY

Nearly 4.3 million people each year die from indoor air pollution, more than twice as many as from malaria. According to public health researchers, "A fire in the kitchen, if you're cooking a meal, produces about the same pollution per hour in a typical house as a thousand burning cigarettes."





### Diseases from indoor air pollution

- pneumonia,
- low birth-weight,
- acute lower respiratory infections (ALRI)
- lung cancer,
- emphysema,
- chronic obstructive pulmonary disease,
- cataracts,
- bronchitis.



## HIGHLY INEFFICIENT

The three-stone fire is **EXTREMELY** inefficient, wasting up to 90-95% of the heat from the fire: literally your wood goes up in smoke instead of cooking your meal.



## CAUSES DEFORESTATION AND ENVIRONMENTAL DEGRADATION

Firewood collection and charcoal production are among the causes of environmental degradation and deforestation.





## FORCES WOMEN AND CHILDREN TO SPEND MANY HOURS PER WEEK COLLECTING FIREWOOD

These hours could be spent in more productive activities (farming, education, entrepreneurship, family chores, entertainment).



## DANGEROUS: WOMEN AND CHILDREN OFTEN GET SEVERELY BURNT

By stepping into open fires, clothes catching fire or from spilling hot water from falling pots.



## EXPENSIVE

A bundle of firewood can cost up to TZS 90,000 per month for a 4-person family. The money a family spends on wood means less money being available for food, education, and medical care; so an improved cooking stove is seen as a way of boosting a family's income.



## CAUSES CLIMATE CHANGE

Burning firewood releases greenhouse gases, adding to global warming and climate change.











## 2. POSSIBLE SOLUTIONS AND LIFE IMPROVERS

In order to solve all these problems and reduce environmental degradation, Mazingira is promoting the use of simple and low-tech energy-efficient technologies in the Kilombero valley villages, that use alternative fuels and improve the life of everyone:

- Mud stoves
- Mayon Turbo Stove
- Briquettes
- Heat-retention baskets and/or bags





## ADVANTAGES OF ENERGY-EFFICIENT TECHNOLOGIES

These technologies are MORE efficient, safe and easy to use, improve the health and wealth of the family, the cleanliness of the kitchen and pots, reduce cooking costs and the time spent in firewood collection, decrease deforestation, environmental degradation and global warming.

**Mazingira specifically trains women to adopt these technologies house by house.**



Energy-efficient technology	Fuel	Cost	Smoke	Advantages
<b>Mud stove</b>	Firewood, even sticks (up to 60% firewood saved)	TZS. 2,000	Smokeless, if improved with a chimney	Saves firewood, cooking with 2 pots, safe and easy to use, can use even small sticks
<b>Mayon Turbo Stove</b>	Rice husk, sawdust, dry fruit or vegetable remains (freely available )	TZS. 35,000-40,000	Little smoke at the beginning and then smokeless	No firewood or charcoal needed, uses free fuel, cooks quickly, transportable
<b>Briquettes</b>	Rice husk, leaves, charcoal remains, sawdust, dry fruit or vegetable remains, recycled paper (freely available)	TZS. 100 per briquettes	Smokeless	No firewood or charcoal needed, uses cost-free fuel, smokeless, transportable, safe and easy to use
<b>Heat-retention basket/bag</b>	No fuel needed once food is put into the basket/ bag	TZS. 10,000-15,000	Smokeless	No firewood or charcoal needed for part of the cooking process, smokeless, transportable, safe and easy to use





## 3. MUD STOVES

A mud stove is an oven made from bricks and mud or only from mud (if bricks are not available). A rudimentary chimney ensures the draft and the expulsion of the smoke to the outside.

### 3.1 FACTS ABOUT MUD STOVE

- Reduces firewood consumption by up to 60% (less money spent; more time for extra activities)
- You can cook with two pots with the same amount of firewood
- Smokeless
- Reduces cooking time
- Reduces environmental degradation and deforestation
- Safe to use (no accidents related to open fires)
- Excellent pot stability
- Easy to use

## 3.2 HOW TO BUILD AND USE A MUD STOVE

Mud stoves are easy to build.



**1.** All you need is water, soil (clay), bricks, iron sheet or metal pipe or a bamboo stick as a mold. But they require constant repair and maintenance. If maintenance is not done regularly, the stove will deteriorate.



**2.** You need to build a shelter over the oven to protect it from the rain.



**3.** After the stove has been built, allow 3-4 whole days to dry.







**4.** When cooking, put firewood in the oven door. Then cover the pot hole closest to the chimney with a pot, a lid or brick, if you don't want to use both holes for cooking. Start the fire in the other pot hole (from the top).



**5.** You can use small sticks and twigs.



**6.** Allow the fire to pick up. When the flames have developed, close the hole with the pot and start using the stove. To limit smoke be sure to always use dry firewood.



## CLEANSING THE STOVE

Every morning remove the ashes and use them for repairing cracks.

## REPAIR AND MAINTENANCE

In order to prevent cracking, mix clay soil with ashes and a little water and apply the mixture on the oven surface. Filling any cracks with the mixture. No need to dry. This procedure will keep your stove in good condition for a long time.





### 3.3 COMMON PROBLEMS FOUND WITH USING MUD STOVES:

#### QUESTIONS AND ANSWERS

**Q** My stove crumbled away and was destroyed when I pounded food on it. What do you think went wrong?

**A** *The thickness of the walls is probably not adequate and therefore not strong enough to hold the weight of the pot. For your next stove ensure that the thickness is not less than the width of your hand.*

**Q** Lately, my kitchen gets very smoky when I use my stove. What could be the problem?

**A** *One reason might be that your chimney is clogged with dirt. Clean it. Another reason could be that the pot holes have deteriorated and enlarged so that smoke emerges from here. Repair them with a mixture of clay soil, ashes and water. One other reason is that the oven is not well cleaned of ashes.*

**Q** Should I always use the two pot holes?

**A** *Yes. You should use both of them at the same time or cover the second hole with a pot full of water to avoid smoke passing through it. This helps to prevent the loss of heat and therefore ensures efficiency.*



**Q** I find it difficult to light my new stove. If it lights, it is very smoky and the fire does not burn well. What could be the problem?

**A** The most common problem is related to the air ventilation of your stove. The oven door should not be too small, pot holes should be properly covered and the chimney should be clean. Another problem could be the distance of the pot from the fire. If the pot sits too low, this could stop the air flow and obstruct the oven so generating smoke. A good air flow is essential to light the stove. If the stove is new, be sure it has dried completely.

**Q** My stove uses a lot of firewood. Why?

**A** Inefficiency may be caused by the height of the fire chamber. When the fire chamber is deeper than required, the pot sits high above the flames, making the stove inefficient. Also when it is too shallow the flames engulf the pot and much of the energy is dispersed into the air and wasted.

**Q** What size of firewood should I use in my stove?

**A** Mud stoves are made to minimize the amount of firewood for cooking. So for small meals and family you should use twigs and sticks whenever possible. Use logs only if you are cooking big and long meals and for numerous people. The size of firewood also depends on the stove door size. The size should be such to minimize the use of big logs but at the same time allowing good air circulation.

**Q My stove developed so many cracks when I first used it. Why?**

**A** *Probably you did not give the stove enough time to dry before you started using it. It is important to wait for at least 3-4 days for a mud stove to dry before use. This will help avoid cracks and disappointments. It has been observed in some cases that cracking is caused by users trying to push big pieces of firewood through small stove doors.*

**Q My stove takes too long to light in the morning. Is there anything that can be done?**

**A** *One thing you can do is to keep the door of your stove closed when you are not using it to keep it warm. If this is done overnight, lighting the stove in the morning becomes easy.*

**Q Although I have reduced the amount of firewood that I use quite significantly, I would like to know what other measures I can take to conserve more fuel?**

**A** *Simple good cooking practises such as using lids, chopping wood into small pieces and soaking dry grains before cooking help in conserving fuel. You should also integrate mud stoves with other energy-efficient technologies as explained below.*

## STOVES WITH CHIMNEYS

**Q My chimney is clogged and my kitchen is very smoky these days. What can I do?**

**A** *Constant use of wet wood or firewood that is not well dried results in clogging of the chimney. When a chimney is clogged, smoke is discharged from the firewood feeding door or from the sides of the cooking pot. In some cases the stove does not light. Chimney cleaning is essential.*

**Q My food takes too long to cook. What might be the problem?**

**A** *One problem could be the height of the fire chamber. If the fire chamber is deep and the pot is very distant from the flames, cooking will take a long time and a lot of firewood. Even the position of the chimney and its height are important. They determine the draught created in the stove. If the chimney is shorter than the required height, it creates a low draught and a lot of heat is lost. Low draught in the chimney may also result in clogging. When the chimney is too long, it creates excessive draught, also resulting in unnecessary loss of heat.*





## 4. MAYON TURBO STOVES (MTS)

The metal sheet stoves, called the Mayon Turbo Stove (MTS), use rice husk or sawdust as fuels. Some local blacksmiths build the stoves then sell them to the local population. The rice husk or sawdust, introduced into the stove, slowly slips down the cone towards the bottom to feed the fire that develops lively and smokeless flames.



## 4.1 FACTS ABOUT MTS

### ECONOMICAL

Fuels used for MTS are often free. Stoves can be purchased from approximately TZS 30,000 to 40,000, compared to TZS 90,000-300,000 when cooking with purchased firewood or charcoal.



### HIGH EFFICIENCY AND CLEAN COMBUSTION

High quality, swirling blue flames are created by the cooker, it is easy to light, burns cleanly and cooks rapidly.

### FAST BOILING

1 litre of water can come to the boil in 6-7 minutes.





## HEALTHY

The MTS can be used in the open air and, if properly used, are smoke-free and don't cause smoke-related diseases.



## ENVIRONMENTALLY FRIENDLY

Using alternative biofuels and agricultural by-products, MTS reduces climate change, household air pollution, environmental degradation and deforestation.





### CONVENIENT TO USE

Only tapping to feed the flames is required, approximately every 7-10 minutes.

### LOW FUEL CONSUMPTION

Approximately 2.5 sacks (25 kg) of rice husk/family/week, the stove consumes approximately 1.2 - 1.5 kg of husk per hour.





## USES A VARIETY OF BIOFUELS

Many cost-free fuels can be used in conjunction with rice husk, including corn cobs, peanut shells, cocoa shells, crushed coconut shells, millet husk and sawdust.



## SAFETY

A ring-structured holder provides excellent pot stability.



## PORTABLE AND LIGHTWEIGHT

A steel construction, weighing approximately 4 kg; can be used both indoors and outdoors.



## OTHER ADVANTAGES

Ashes can be used as a soil conditioner and fertilizer as well as a cleaning material for pots and pans and an ant-repellent around the base of plants. MTS much reduce the firewood-collecting burden upon women.



## 4.2 PARTS OF THE STOVE

### MAYON TURBO STOVE

Pot holder

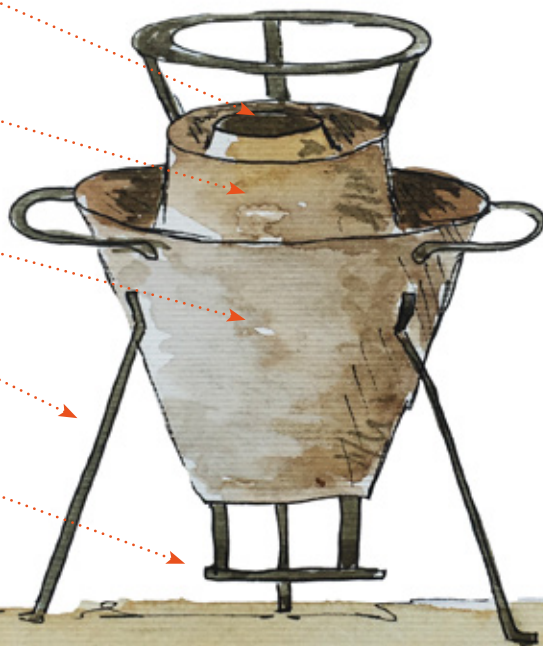
Inner cone

Centre drum

Hopper

leg

Ash pan



## 4.3 HOW TO USE THE MTS

### FUEL

Although many fuels can be used in the stove, rice husk is the most common choice. Other fuels such as peanut shells, corn cobs and sawdust can be mixed in with rice husk. Before using, DRY the fuel very well in the sun to prevent smoke and difficult ignition. Store the fuel in a dry place for future use.



## LIGHTING THE STOVE



**1.** Pour husk between the main drum and the inner drum, approximately to half way. Take care not to fill the entire space between the inner drum and the main drum to facilitate airflow, leave a hole free of husks.



**2.** Drop a small amount of burning paper, wood twigs or sticks into the inner drum to ignite the fuel. If the rice husk is wet, use supplementary starter (es. kerosene). Continue to drop paper till a steady flame is created. Rice husk should catch fire.





**3.** When the stove is well lit (usually after 1 minute), fill the gap between the main and inner drum and put the cooking pot on the stove. Combustion should be steady before filling the gap and putting the pot on the stove.



**4.** If the flame stops, new rice husk should be put in again to help the restarting process and air circulation should be ensured.





5. Grey ash eventually develops at the bottom of the centerpiece. When the rice husks inside the inner drum turn grey, tap the main drum with a stick to feed the flames again (approx. every 5-10 minutes).



6. About every 12-15 minutes remove the ashes from under the ashpan with a stick. Too much ash can cut off the airflow. Don't completely remove the burning ash as this feeds the fire.



7. If the flames die out while cooking, tap the main drum to refuel. If this does not work, check the air draft between the main drum and centrepiece.

8. As long as the fuel burns the MTS should not smoke. Most smoke will occur during the start and at the end of burning.



9. Supplementary fuels such as sawdust, small pieces of wood, dried coconut husks, peanut shells, corn cobs can be placed in an upright position in the inner drum or mixed with rice husk in the main drum. Add them in small quantities so avoiding smoke from the addition of too much fuel.

10. After a while, rice husk touching the centrepiece can burn and smoke excessively. Therefore cover with new rice husk. Keep the fuel bin half full and add additional fuel as required.

**Note:** The stove is easiest to start if rice husk is dry. Starting the stove early in the morning or in rainy weather may take extra patience and practice.



## STOVE LOCATION

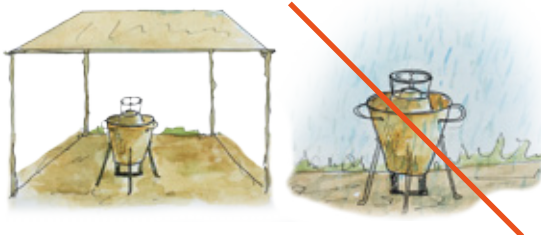
The MTS can be used both indoors and outdoors: if outdoors, ash is easily disposed of and smoke exposure is minimized, but wind can make lighting difficult and cooking less efficient. Whereas indoors ashes can dirty the floor and air quality can be affected. If cooking indoors, use the MTS in a well-ventilated location with chimney. Care should be taken not to inhale the ashes.



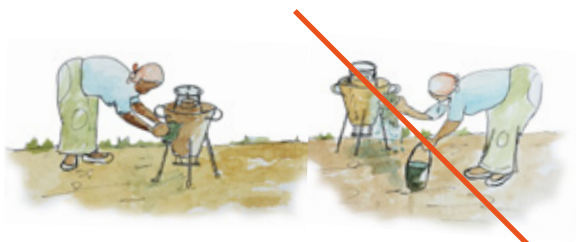
## PROPER MAINTENANCE OF THE STOVE

The MTS has an estimated lifespan of 2-3 years. If you want your stove to last, treat it well.

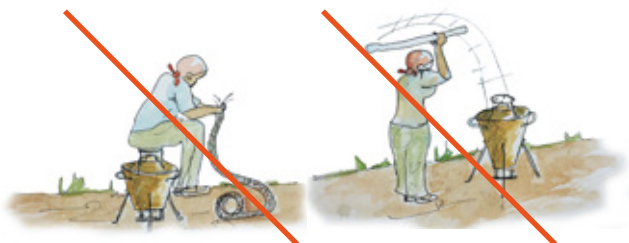
- Store it in a dry location to prevent rusting. Don't leave it in the rain or damp place.



- Clean the stove using a dry rag and wipe the surface dry, DO NOT use water.



- DO NOT sit on the stove, or put excessive weight or pressure upon the stove.



- DO NOT bang the stove excessively.





## 5. BRIQUETTES

If firewood is scarce, other types of cost free fuels can be used: waste paper, rice husk, sawdust, dry leaves, fruit peel and dried remains of charcoal. These residues are finely powdered in mortars then mixed with macerated paper that acts as a glue. The final mixture is drained of excess water with a large hand press and dried in the sun for a few days. The briquettes, so produced, can be used as charcoal in small clay braziers, they do not emit smoke and burn for a long time and are a good alternative to wood or charcoal for cooking.





## 5.1 FACTS ABOUT BRIQUETTES



**1.** Made of organic waste (rice husks, sawdust, dry leaves, peanut shells, charcoal remains) powdered in mortars



**2.** Possible to use soft woods unsuitable for regular charcoal



**3.** They are long lasting: 30-40% extended burning time due to higher density



**4.** They burn like charcoal: with slower, steadier heat release due to compactness



**5.** Cheaper than charcoal (TZS. 36,000 per month for a standard family instead of TZS. 50,000 per month)



6. Smokeless

7. Clean



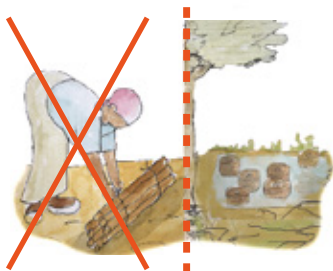
8. 3-4 briquettes needed for a standard meal



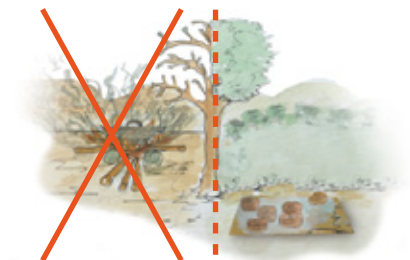
9. Light and easy to transport



10. Easy to sell in small, standard lots so becoming also an income-generating activity



11. No firewood or charcoal needed, so time and money saved



**12.** No deforestation nor environmental degradation

**Make your own briquettes from waste materials and cook for free!**

## 5.2 HOW TO MAKE THE BRIQUETTE MIXTURE



**1.** Get waste paper (school notebooks, old magazines, newspaper, cardboard).



**2.** Shred into small pieces in a bucket.

**2-3 dys**



**3.** Soak in water for 2-3 days. The paper will bind the briquette materials together.



4. After 2-3 days macerate the paper in a mortar and pestle till it becomes like soft porridge. Do it well!



5. Also use alternative fuels such as rice husk, sawdust, maize peels, leaves, fruit peel, charcoal remains.



6. In case of leaves, remove the main vein to reduce smoke production. Dampen with water and seal them in a plastic bag for 2-3 days.



7. Sieve rice husks, sawdust and charcoal remains to remove unwanted material.



8. Powder them in a mortar.





**9.** Mix 1 part of macerated paper to 3 or 4 parts of fuelling material (roughly 20% paper). Paper + sawdust + rice husk + charcoal remains is the commonest mix. Chopped grass, leaves, fruit peel can also be used.



**10.** Replace macerated paper with long-boiled cassava flour or cassava peel to bind the fuelling material together, if you want.



**11.** Mix water, macerated paper and powdered fuelling material in a mortar and pound them till the mix holds together when it is squeezed.



**12.** Once the briquette mixture is obtained, compress it into briquettes, getting rid of the excess water by using a wooden press machine or a small mould (see instructions below).



**13.** Let the briquettes dry in the sun for 3-4 days.

**14.** Once dried use the briquettes in a charcoal burner. Light them with straws or sticks. The inner hole facilitates air circulation and burning.

### 5.3 HOW TO PRODUCE BRIQUETTES WITHOUT THE PRESS MACHINE



**1.** Cut off the upper quarter of a 2L soda bottle or similar plastic bottle.



**2.** Punch 10-20 holes in the bottom and lower sides.



**3.** Use a thin plastic bag as a liner to ease extraction of the briquette from the bottle at the end. Punch holes in the bag so water can drain out.



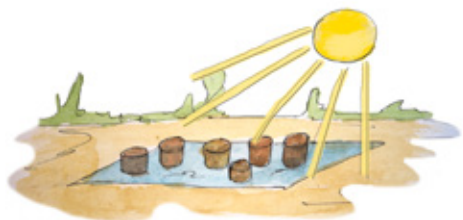
**4.** Put the briquette mix into the plastic bag and insert into the bottle mould. Alternatively, you can use a plastic flower pot as a mould and a second one as a piston.



**5.** Press out the water with a can, a piece of wood or banana stem that fits into the mould.



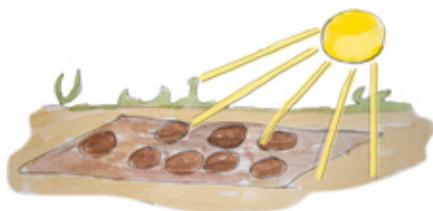
**6.** By standing on the mould, drain out as much water as possible.



**7.** Extract the plastic liner with the briquette from the mould and then the briquette from the liner. Dry the briquettes well in the sun for 3-7 days to avoid smoking when cooking.



8. You can also make fuel balls by squeezing the mix with your hands.



9. Dry them well in the sun.



10. Once dried, you can use the briquettes in a normal charcoal burner. Light them together with some straws or sticks.





## 6. HEAT RETENTION COOKERS

There is also a way to cook without fire. Heat-retention cookers, specially insulated, save firewood whilst cooking food perfectly. The food is half-cooked on an energy efficient cooker and then placed inside the basket where it continues to cook for hours using the stored heat. Even beans come out soft and tasty from this magical basket. In addition these technologies can even be used to keep things cold, also becoming small portable fridges. These cookers are made of locally available materials.

### 6.1 FACTS ABOUT HEAT RETENTION COOKERS

#### SOCIAL:



**1.** Portable, you can bring it with you into the fields.



**2.** Leave the kitchen clean and your house smokeless. No risk of burning the pot.



**8 hrs**



**3.** Keep the food warm for up to 8 hrs.



5-6 hrs



4. They also work as small portable fridges, keeping food and drinks cold for up to 5-6 hrs.



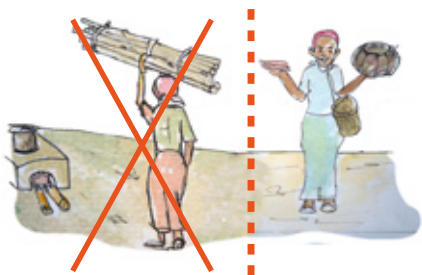
5. No time consumed in collecting firewood or sitting at the kitchen while cooking. Spare time for family chores, entertainment, education and work.

## ECONOMIC:



1. Cheap to buy/construct (TZS 10,000-15,000).

It is made locally from inexpensive materials.



2. Reducing fuel by up to 40%, saving money spent on charcoal, firewood, kerosene and other energy.

## HEALTHY:



**1.** Smokeless. Improve the health of women and children. No coughs, pneumonia, and eye problems.



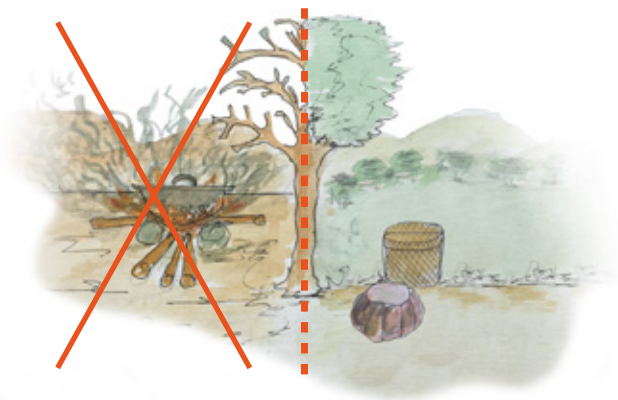
**2.** Food healthier and tastier: cooking at lower temperatures, preserve flavour and nutrients.



**3.** Cooking with 25% less water. Water is retained, not evaporating, preserving nutrients, flavours and drinking water.



## ENVIRONMENTALLY SOUND

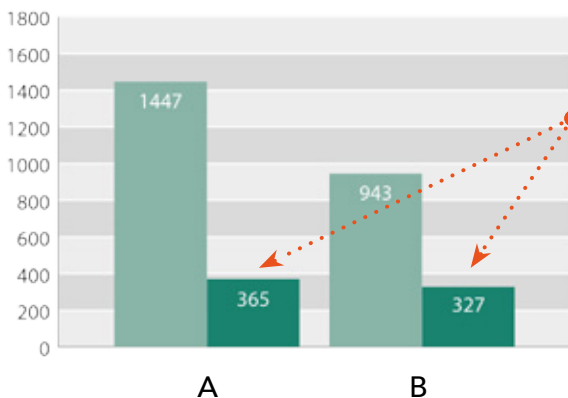


1. Less firewood and charcoal used: conservation of forests, environment and biodiversity.
2. Reduces global warming.

## GRAMS OF WOOD NEEDED TO COOK 484 GM OF BEANS

A) Three-stone fire B) Energy-efficient stove

GRAMS



In combination with a heat-retention cooker



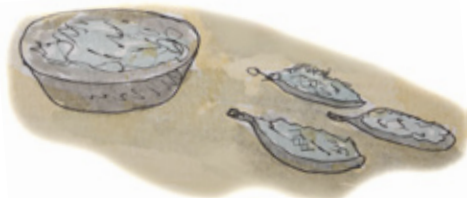
## 6.2 CONSTRUCTION OF A HEAT-RETENTION BASKET - PROCEDURES AND STEPS



**1.** Get a round basket by buying it or making it.



**2.** The basket should accommodate the pots usually used for cooking and the insulating material. Check your biggest pot fits easily inside.



**3.** Insulate the inside of the basket by using a lining, stuffed with insulating material such as straw or hay, recycled clothing, foam rubber. Mazingira uses kapok.



4. For the lining use a tough cloth and measure the inner circumference of the basket and its height.



5. Cut the cloth into a big rectangle (base = the basket inner circumference; height = double height of the basket).



6. Fold the rectangle along the height edge and sew it along the margins, leaving the upper part open.



7. Stuff the lining as densely as you can with insulating materials.



8. Sew it closed into a long cushion. The lining should fit the inner basket perfectly.





**9.** Stitch the cushion to the basket to hold the insulation in position.



**10.** Fit a dry heat-resistant polythene cover over the lining on the inside. This prevents moisture from getting into the insulating material and reducing its effectiveness.



**11.** Cut 4 round identical pieces of cloth of a diameter slightly larger than the basket bottom.



**12.** Lay one over the other and sew them into 2 big cushions, leaving a gap for stuffing.



**13.** Stuff them very densely with insulating material and sew the opening.



**14.** Use the 2 cushions to complete the inner lining, one for the bottom and one for the top.

## INSTRUCTIONS FOR CONSTRUCTING A HEAT-RETENTION BAG



**1.** Get a tough cotton cloth and a strong cord of approximately 5m in length.



**2.** Cut 2 big circles of a radius equal to 1.5 times, the height of the biggest pot you are going to use.



**3.** Draw 2 small central circles in each and cut out one of them. The central circles should be of the same size as the bottom of your biggest pot.



**4.** Sew the two big circles together leaving 2 short gaps directly opposite each other in the perimeter, these will be the cord holes. Then sew the two circles again 5 cm from the outer edge, this is the space for putting in the bag cord.



**5.** Draw 8 slices in the 2 big circles departing from the central circles to the 5cm cord seam.



**6.** Sew them together along the slices leaving open gaps near the inner edge to stuff the insulating material.



**7.** Stuff each slice very densely with insulating material.



**8.** After stuffing each slice, sew up the gap.



**9.** Sew in the central circle, cut out before, into your new bag, leaving a gap to stuff the insulating material.



**10.** Stuff the bottom circle very densely with insulating material and sew up the gap.



**11.** The main bag is ready. Now you have to prepare the lid cushion.



**12.** Cut out two circles slightly bigger than the lid of the biggest pot you are going to use, add an extra 10 cm around the lid circumference so the lid cushion fits comfortably into the main bag. Add a 10 cm tab along the edge, this is for attaching the lid to the bag.





**13.** Sew the 2 circles together leaving a gap.



**14.** Stuff the lid cushion densely with insulating material and sew up the gap.



**15.** Sew the lid cushion by the 10 cm tab into the inside of the bag, 5 cm from the brim and half-way between the cord holes.



**16.** Cut the cord into equal lengths. Using a big needle thread one cord completely through the cord seam and tie the ends securely. Repeat this with the second cord starting from the other opposite cord hole. You now have 2 pull-strings emerging from opposite sides of the bag.

## HOW TO USE



1. Food is cooked to boiling point on an energy-efficient cooker (MTS, mud stove, briquette burner). Boil the food for a few minutes. The actual time depends on the type of food. Soft foods (eg. bananas) should be cooked for about 3 minutes. Food such as beans and meat for 10-20 minutes.



2. Make your heat-retention basket ready beside the stove.



3. After cooking on the stove put the pot with its lid into the bag and cover it using the top cushion.



4. If cooking beans or other hard food, prepare the food before going to bed. It will cook overnight and you can enjoy it the next morning!



5. Otherwise cook it in the morning for eating in the evening.



FOR OTHER TYPES OF FOOD, USE THE TABLE  
BELOW AS A GUIDE TO COOKING TIMES:

Type of Food	Time on energy-efficient stoves	Time in the heat-retention basket/bag	Total cooking time	Comments
<i>Rice, white</i>	5 min	25 min	30 min	
<i>Rice, brown</i>	10 min	30 min	40 min	
<i>Maize, beans</i>	45 min 1 hrs	4-6 hrs	7 hrs	Green maize and beans take less time to cook, so reduce the time accordingly
<i>Maize, beans soaked</i>	10-15 min	3-4 hrs	4 hrs and 15 min.	Legumes take less time to cook if soaked
<i>Meat stew</i>	5-10 min	2-3 hrs	3 hrs and 10 min	Cut the meat into small pieces to cook faster. Wash the meat before cutting, not after
<i>Meat roast</i>	20-30 min	3-5 hrs	5 hrs and 30 min	
<i>Fish</i>	10 min	1 hr	1 hr and 10 min	Dried fish takes longer than fresh fish
<i>Potatoes Plantains Cassava</i>	10 min	30 min- 2 hrs	2 hrs and 10 min	Cut into small pieces before cooking, they will cook faster
<i>Green legumes</i>	20 min	2 hrs	2 hrs and 20 min	Put the legumes in water already boiling to help get them tender quicker



## FOODS WHICH CAN NOT BE COOKED WITH THE HEAT-RETENTION COOKERS

- Roasts - or anything cooked in oil.
- Crusty, baked foods, such as bread, cakes and biscuits.









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