

# MAKING FUEL BRIQUETTES FROM EVERYDAY WASTE

## What is this Action Sheet about?

This Action Sheet is about one way to take advantage of the waste that is produced in the city everyday. Making fuel briquettes out of rubbish takes the waste from the city and turns it into a source of energy. Fuel briquettes can be made and sold by entrepreneurial community groups and business people.

## What are the benefits of fuel briquettes?

- Using fuel briquettes means less firewood to chop and charcoal to buy, saving you time and money and putting less pressure on natural resources
- If you make your own briquettes from waste materials, you cook for free!
- You can make money from selling briquettes
- Briquettes mean less rubbish in the streets and in dumps

## Are there any problems with fuel briquettes as a source of energy?

Like any burnt fuel, fuel briquettes produce smoke. It is bad for your health if you inhale too much smoke whilst cooking. *Action Sheet 57: Reducing Indoor Smoke Pollution* suggests ways to make your kitchen less smoky.

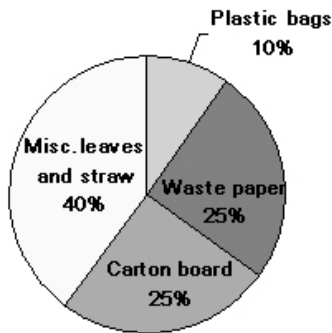
Materials used for fuel briquettes may have other more profitable uses. For example, good quality waste paper can sometimes be sold back to paper companies for recycling. If this is the case, fuel briquettes should only be made from low-quality dirty paper. Leaves and other agricultural waste might be more useful if composted or left on the soil as mulch – removing too much organic matter from the farmland can lead to soil erosion and loss of soil fertility.

## What materials can be turned into briquettes?

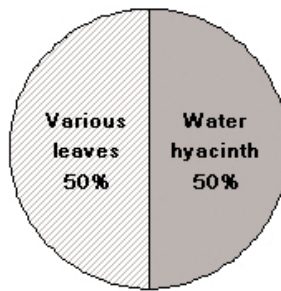
Having sorted the rubbish, you can make briquettes from anything that burns without producing toxic ash or fumes. Fuel briquettes can contain things like:

- Waste paper and cardboard
- Water hyacinth
- Agricultural residue - Leftover leaves, grasses, stems and straw from agriculture (if not needed for soil improvement)
- Charcoal dust
- Sawdust

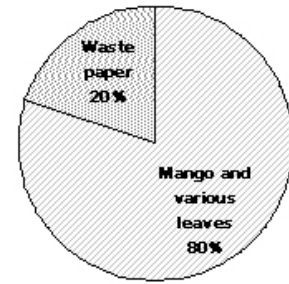
Contents of fuel briquettes in Bamako, Mali



Contents of fuel briquettes in Upper Shivi River, Malawi (Location 1)



Contents of fuel briquettes in Upper Shivi River, Malawi (Location 2).



*Fuel briquettes from around Africa (Source: Richard Stanley, Legacy Foundation)*

It's important to make sure the materials you are using are safe to burn inside people's houses, so do get advice about this before getting started.

### How are fuel briquettes made?



The basic process is simple, although the details vary slightly according to what sort of rubbish is used.

- Step 1: Sort out the materials you wish to put into the briquette: Agricultural residues and municipal processing waste
- Step 2: Chop the material up and let the agricultural residues stand until partially decomposed
- Step 3: Mix the material into a soupy slurry in water
- Step 4: Squeeze the slurry inside a porous cylindrical mould to create hollow round cylinders or briquettes
- Step 5: Dry the briquettes for a few days before use



*Hollow core briquette making process (Image: The Legacy Foundation)*

With the press shown above, a six person team can reach a local market of 50 families per day. This activity generates about \$3.00 per worker per day while providing sustainable and efficient fuel at 10% to 20% less cost than fuelwood. In serving the 50 families, one press group reduces fuelwood demand by 125 tons per year. Where wood is used for charcoal-making, providing 50 families with biomass fuel briquettes would reduce the demand for wood by about twice this amount.

-  This machine was developed by the Legacy Foundation. The Legacy Foundation and its partners are now working in Kenya, Nepal, Haiti, Peru, Southern Mexico, South Africa, Uganda and Malawi.
-  In making the briquettes using the machine above, paper is not essential. The hole in the centre of the briquette encourages rapid drying, easy ignition and highly efficient burning (due to the draft and insulated combustion chamber which the hole creates).

In urban areas where there is waste paper, some people may prefer to make pure paper briquettes in a block form, as described on the next page.

## The So Afr Eco Experience: Making paper-bricks for burning

Here is how the So Afr Eco community group from South Africa makes fuel briquettes from waste paper.

### Phase 1: Getting organised!

- Each community trained is given 1 paper-brick machine to keep.
- Each family in the community then **rent** the paper-brick machine for 1 week: a fair rental fee for each family is **R1.00 per day**.
- Each family collects as many bags of newspaper as possible before they get their turn to rent the paper-brick machine. This way no time is wasted when their turn comes. All family members can help by finding old paper in many places, including schools, offices, and other households.

### Phase 2: Making the bricks!

On their turn to use the paper-brick machine, all family members can help make them. Each person helps tear all the papers they have collected into small strips. The strips are then put into a bucket or drum full of water. The bricks are then made as follows:

The paper strips are thoroughly mixed with the water to make a pulp. →



The brick machine is ready to be filled. →



The pulp is taken out and packed carefully into the brick machine. →



The handles of the brick machine are closed, squeezing the water out. →



The paper-brick is taken out and put in the sun to dry out. →



After **drying** completely, the brick is ready for use. →



### Phase 3: Using the bricks: Cook for free, and make a profit!

When they are **completely dry**, the paper-bricks burn better than wood, and each last up to 3 hours. If you make many bricks, you will cook for free!

If everyone in the family helps to make the bricks, that family can make far more bricks than it needs for cooking.

This means that extra bricks that you make can be sold to others. The So Afr Eco group sell their excess paper-bricks for **20 or 30 cents** each. So:

100 paper-bricks sold = R30.00 profit  
200 paper-bricks sold = R60.00 profit  
500 paper-bricks sold = R150.00 profit  
and so on...

If your community also makes paper-bricks each family will benefit in these ways. Each family will also **save many days of hard work** chopping wood and carrying it home. The **trees and bushes of your area will not be cut down**, and your community will have more shade and look better.

**The paper-brick machine costs R.100.00.** In South Africa, you can order one from RUTEC.

*Source: So Afr Eco Training Manual*

## **Briquette business**

Nairobi-based business City Garbage Recyclers and Chardust Ltd. make fuel briquettes from charcoal dust collected from places where charcoal is sold. The briquettes they produce are a high-quality fuel for sale to hotels and hatcheries.

The technology involved is simple: Charcoal is broken down into dust and mixed with water to produce a thick paste. Small amounts of soil may be added to the paste, which is then moulded into balls by hand and left to dry in the sun for a week. Then they are ready to use as fuel.

Making charcoal dust fuel briquettes can be good business...50 kg bags sell for the equivalent of US\$3.15 - that's US\$63 per ton. As they are 40% **cheaper** than the same weight of wood charcoal but burn better without any smell, charcoal dust briquettes are easy to sell. Chardust Ltd. estimates that there are 2,500 tons of dust waiting to be collected in Nairobi alone.

## **How to get started with fuel briquette-making?**

It depends on the scale of your project. If you want to go into business and produce a lot of fuel briquettes, you need to be involved in collecting and sorting waste. See *Action Sheet 72: Reduce, Re-use, Recycle* for suggestions on how to get organised.

You may need to find funds to buy or make

- 1) Equipment to break down and mix up the briquette ingredients (US\$50 - \$1,500) and
- 2) A briquette-making machine (US\$150 - \$300).
- 3) You might also need to organise training on how to use the equipment and run the business. For example, you might wish to employ several teams of people to produce lots of briquettes for sale. The Legacy Foundation (see below) estimate that a single briquette-making team can earn over US\$6,500 per year.

Funds could be made available through a micro-credit scheme or community project. Briquette-making machines can be bought from the international organisations cited below. You may also find local or national organisations such as community groups, universities or recycling businesses that supply machines and training.

## **Are there other ways to turn waste into energy?**

There certainly are. Cooking oil from hotels can be processed and turned into biodiesel fuel for stationary diesel engines. It is usually cheaper than ordinary diesel fuel. Biogas (See Action Sheet 66) can be made from human and animal excreta and vegetable waste. Other kinds of waste can be incinerated (burnt directly) to produce heat, but care must be taken to avoid dangerous pollution.

**ACKNOWLEDGEMENTS:** This Action Sheet was compiled by Nancy Gladstone using information from the following sources: ITDG Urban Waste Management for Small Scale Energy Production, So Afr Eco Training Manual; Legacy Foundation website: [www.legacyfound.org](http://www.legacyfound.org) and information provided by Legacy Foundation director Richard Stanley; Chardust Ltd. website ([www.chardust.com](http://www.chardust.com)). Photos by Sarah Watson, PACE.

## FOR MORE INFORMATION

### CONTACTS

Legacy Foundation – [www.legacyfound.org](http://www.legacyfound.org)

Practical Action (ITDG) – [www.practicalaction.org](http://www.practicalaction.org)

Chardust Ltd – [www.chardust.com](http://www.chardust.com)

City Garbage Recyclers Self Help Group

RUTEC (South Africa) – [www.rutec.co.za](http://www.rutec.co.za)

Sustainable Village – [www.thesustainablevillage.com](http://www.thesustainablevillage.com)

### DOCUMENTS

Training Guides available from the Legacy Foundation:

1) Fuel Briquette Press Kit: A Construction Manual: This manual describes how to make the hand-press for briquette making. It is a how-to manual for the beginning rural or urban individual or group with access to basic carpentry facilities. \$35.00 for full-colour hard copy \$25 for the electronic version, downloadable as a PDF file.

Briquette Making: A Users Manual: This manual is a step-by-step guide for briquette production for individuals or small groups. It describes the process of collecting, blending and using materials for briquette production. Basic work organization hints are also provided to enable a team to begin production for profit. \$35.00 for the full-colour hard copy; \$25 for the electronic version, downloadable as a PDF file.

3) Fuel Briquettes: A Trainer's Manual: This manual presents essential information on how to plan, organize, and manage a briquette production training event by an NGO or development organisation. As with the *How to produce Briquettes* book, this manual provides essential information for briquette making. It follows each step of the production process with trainer notes, enabling the trainer or extension worker to provide full training and follow-up. \$45 for the full-colour hardcopy, \$35 for the electronic version, downloadable as a PDF file.

4) Fuel Briquettes: The Theory and Applications From Around the World: This guide concentrates on the more technical aspects of briquetting. Starting with basic materials and blends, it moves into bonding theory, raw materials and assessment of availability, assessment, burning characteristics and emissions, and concludes with assessment of a variety of stoves suggesting design possibilities for adaptations as well as specific designs for briquette stoves. Several references to highly qualified biomass and stoves design newsgroups are also provided for further information. \$45 for the full colour hardcopy; \$35 for the electronic version downloadable as a PDF file.

### Training Guide available from Sustainable Village:

Fuel Briquette Making: A Users Manual

This "how to" manual for making briquettes includes a design for making the briquette press. However, it's difficult to do this properly without more personal training. In situations without enough funding to cover the trainer's expenses, we suggest a collective approach so the costs can be shared by other interested groups in the same general area. Though a well-funded situation is ideal, some of the best examples of ongoing self-sustaining briquetting projects are based almost voluntary training efforts. us\$24.00

### Briquette Making Products from Sustainable Village

[www.thesustainablevillage.com/servlet/display/product/detail/26553](http://www.thesustainablevillage.com/servlet/display/product/detail/26553)

Paper Brick Maker - US\$69.00

Recycle waste paper and cardboard into burnable bricks! Use in place of firewood in a stove. This process will save trees, prevent negative health effects in places that burn only dung (and save the dung for fertilizer), as well as creating many micro-enterprise possibilities. Use paper alone or mix with many combustible fuels like wood chips, grass or coal dust. Since paper is such a good binder, it's best to use in combination with any other available waste fuel. You can make bricks at a rate of about 1 every 45 seconds. The soaking of the paper takes about 1 hour minimum, 1 day maximum depending on the volume of the container.