

# BIOMASS FUEL BRIQUETTES

## REALISTIC ALTERNATIVES TO THE USE OF CHARCOAL AND WOOD IN MALAWI

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### Problem Definition

Malawi's forest resources are being harvested at unsustainable rates. Much of this deforestation is caused by the country's demand for charcoal and wood to meet its daily energy requirements. It has been reported that 42% of Malawians use charcoal or wood as their primary source of energy for cooking, with over 85% of the population using charcoal or wood to some extent. In 2004, this amounted to a forest consumption rate of 15,000 hectares every year. Charcoal made from wood is often transported distances in excess of 40 miles on a bicycle for purchase by consumers. This raises the price of charcoal and creates the opportunity for alternative fuels to become more economically feasible.

In 2006, a small Malawian company called Yaditz Coffee, began to procure, roast and distribute coffee. Initially the energy source used to roast the coffee was charcoal and wood, however, the company moved quickly to develop its own fuel source called briquettes made from agricultural waste products. Through the Brighter Days Briquettes project, a collaboration between Yaditz Coffee and REMAP, the process was replicated by other entrepreneurs and organizations.



Fig. 1: Briquettes produced by REMAP as a part of the Brighter Day's Briquettes project in Malawi.

### Clients

This project is still in search of a client. The project is building upon REMAP and Yaditz Coffee's Brighter Days Briquettes program which introduced briquettes as a fuel alternative for in Lilongwe, Malawi. During this introductory semester, a concept paper was drafted to be sent out in order to propose potential partnerships with organizations such as USAID.

### Project Goals

The goal of the Collaboratory's briquettes project is to significantly reduce charcoal and wood consumption in Malawi by introducing a network of profitable briquette franchises. This will be accomplished by developing and improving upon a process using locally available equipment to convert abundant natural by-products into fuel briquettes which are an economically feasible and competitive alternative to charcoal and wood. The following table outlines some of the different improvements that will be made over the next several semesters to the production process for briquettes.

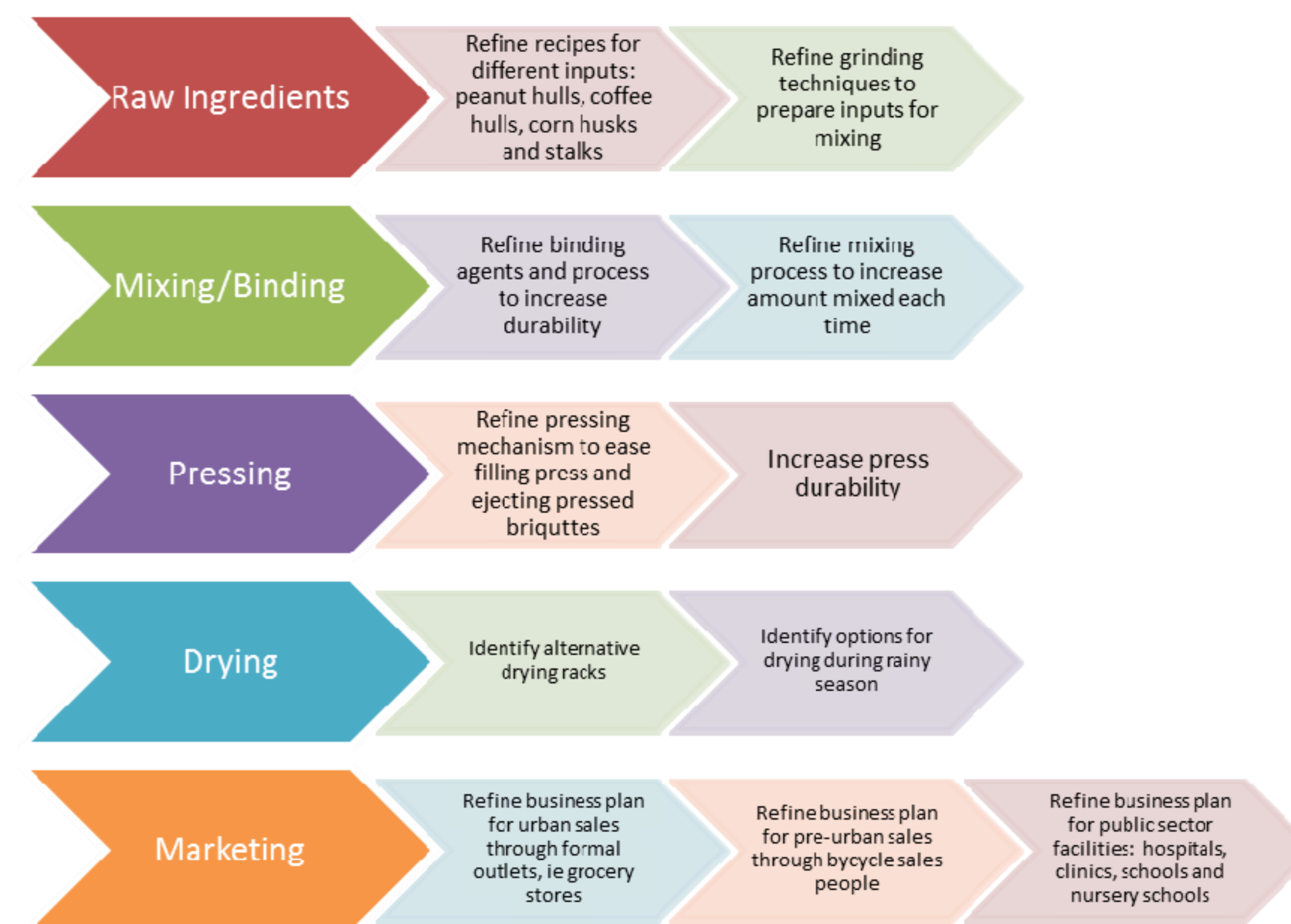


Table 1: Potential improvement's to the REMAP briquetting technology and business plan

The first step in this process involved conducting a literature review concerning each of the different aspects of briquetting technology including the production of the briquettes and the raw ingredients used. A broad overview of the results from that research is presented on the upper right portion of this poster.

### Further Information

For more information, visit our web page on the Collaboratory wiki at [http://www.thecollaboratoryonline.org/wiki/Brighter\\_Days\\_Briquettes](http://www.thecollaboratoryonline.org/wiki/Brighter_Days_Briquettes)  
Or feel free to contact us for more information at [Collabenergy@messiah.edu](mailto:Collabenergy@messiah.edu)

### The Production Process

The project team has broken down the goal of designing a better briquette into three key aspects. Research was focused into the following areas:

#### Raw Ingredients



Fig. 3: Briquette Ingredients from the REMAP project

Briquettes can be made from agricultural waste products. Most broadly, these can be subdivided two different types of ingredients: fillers and binders. Fillers are the materials that make up most of the briquettes content and can come in almost any form. Some characteristics that make a good filler include low ash content and high density and energy content. Binders are generally fibrous materials that are used to hold briquettes together. Some common binders include recycled paper, cardboard, banana peels, and cassava starch.

#### Manufacturing Processes



Fig. 2: Briquette Production from the REMAP project

Briquettes go through several key phases during production. First the raw materials are soaked, ground up, and pounded into a slurry mixture. The biomass is then compressed using a dye and a press which compacts the material into the form of a briquette. The pressure at which briquettes are pressed has a significant effect on the raw material requirements, as it can reduce the amount of binder materials that are required. The briquettes are then extracted from the dye, and placed on drying racks until they have been dried significantly enough to be sold and burned.

#### Testing Procedures



Fig. 4: Finished Briquettes from the REMAP project

After production, briquettes can be evaluated based on several different measureable qualities. These qualities include the structural integrity (the ability to stay together), the flammability, the ignitability, and the energy content. Testing procedures have been developed that will be used to measure each of these qualities.

### Conclusions

Briquettes are made from agricultural waste products and are a proven and viable alternative to charcoal and wood. The Collaboratory's briquettes project will aim to significantly reduce charcoal and wood consumption in Malawi by introducing a network of profitable briquette franchises.

### Acknowledgements

**Project Members:** Giuliana Angione, Samuel Stiffler

**Project Advisor:** Dr. Thomas Soerens      **Other Consultants:** Ron Hodge, Ken Patterson