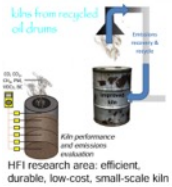
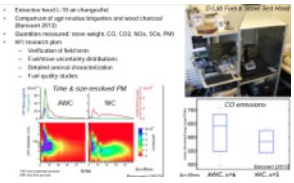
WHAT IS FUEL FROM THE FIELDS?



HOW IS BIO-MASS CHARCOAL MADE?
HOW DO WE BENEFIT?



WHAT TESTING HAS BEEN DONE?
HOW GOOD ARE THEY?

WHY USE AWU FUEL BRIQUETTES?
WHERE CAN I GET THEM?

AWU FUEL FROM THE FIELDS

What is AWU Fuel From The Fields?

The continued use of timber for firewood and the cutting of trees for making charcoal is creating a world-wide environmental problem.

The burning of firewood and wood-based charcoal in homes across Africa is causing major health issues.

To help solve these problems, across the world researchers have looked for an alternative that can replace wood charcoal fuel and reduce the harm that is being done from burning unprocessed firewood.

Fuel Scientists and farm planners at MIT (*Massachusetts Institute of Technology*), Oxford University, Duke University, D-Labs and Banzaert Laboratories have identified a procedure that turns Bio-mass (agricultural waste such as corn / maize cobs, coffee husks, sugar-cane waste) into '*Green*' environmentally-friendly charcoal. This is then processed by the Amaha We Uganda team and turned into fuel briquettes: **"Fuel from the fields".**

How is Bio-mass Charcoal Made?

In summary, bio-mass material is Pyrolized in a kiln to produce charcoal that is not made from wood. This material is then processed, blended with a binder, compressed, shaped and then dried into Fuel Briquettes.

Pyrolyzation = Heating raw fuel with high oxygen deprivation so that the fuel is toasted or "half burned," thus producing charcoal. This half-burn method removes contaminates (SOx, NOx, & heavy volatile particulates) from the fuel, as well as its natural colour and texture, but allows the cellulose structure to remain mostly intact.

Every year over 500,000 acres (2,000 sq km) of African forest is cut.

Fuel Briquettes could save over 17,000 trees in Kasese District annually.

Deforestation for wood charcoal destroys landscapes and accelerates soil erosion.

Energy Poverty affects 50% of people in Africa.

After cooling, this highly porous, black charcoal can then be processed into Fuel Briquettes and burned a second time. This will burn cleanly (with little to no smoke) and slowly (highly efficiently) to produce ash - a final product consisting of metal oxides.

How does the Bio-mass 'cook' and how do we select the the most non-harmful, efficient, cost-effective materials?

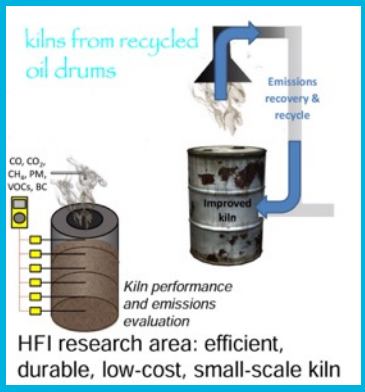
The pyrolysis of wood in simple apparatus such as the ARTi Kiln or D-Lab kiln basically resolves itself into 3 different stages.

Evaporation of the moisture present in the wood takes place as the initial phase, up to an average temperature of 170 °C (338°F). During this period scarcely any gas is produced.

As the fire builds up inside the kiln, the temperature rises and at approximately 280 °C (536°F) the exothermic reaction begins to take place. Gas consisting almost entirely of carbon monoxide and dioxide is evolved and a certain amount of acetic acid is formed together with small quantities of wood-naphtha and tar.

The exothermic reaction then continues, during which concentration of carbon in the charcoal takes place. Large quantities of hydro-carbons, acetic acid and wood-naphtha and tar are produced while the temperatures rise to 380 to 400 °C (716 to 752°F). Harmful gasses are burnt of at the head of the kiln (unlike during normal wood-charcoal production, when they are simply released into the environment).

Bio-mass Charcoal Production:



HFI research area: efficient, durable, low-cost, small-scale kiln

		Sawdust	Maize cobs	Rice husks	Maize stalks	G'nut shells	Coconut shells	*Acacia mearnsii*
Proximate analysis	VM (wt%, dry)	76-86	80	64	74	74	70	84
	FC	13-19	19	18	19	22	27	15
	A	0.1-4.2	1	18	7	4	3	1
	HHV (MJ/kg)	19-20	18.8	16.1	17.7	18.6	20.1	19.1

VM – volatile matter, FC – fixed carbon, A – ash, HHV – higher heating value

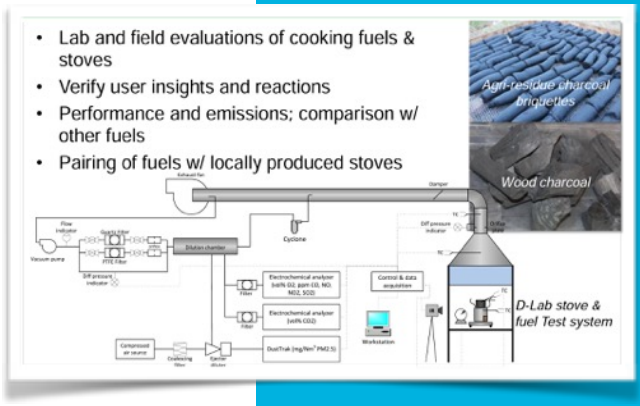
Data reproduced from: Vassilev et al. (2010), Domalski et al. (1986)

What Testing Has Been Done?

University fuel scientists and agricultural management teams from the UK, USA and Uganda have been developing this process since 2007.

Alternative Fuel Briquette recipes and burning methods have been analysed to create a fuel that limits noxious gasses, reduces smoke in the cooking environment, burns efficiently and is cost-effective to use in both a household and a public (eg hospital, school, restaurant) environment.

Significant testing has been carried out both in international University Laboratories and in villages here in Uganda.



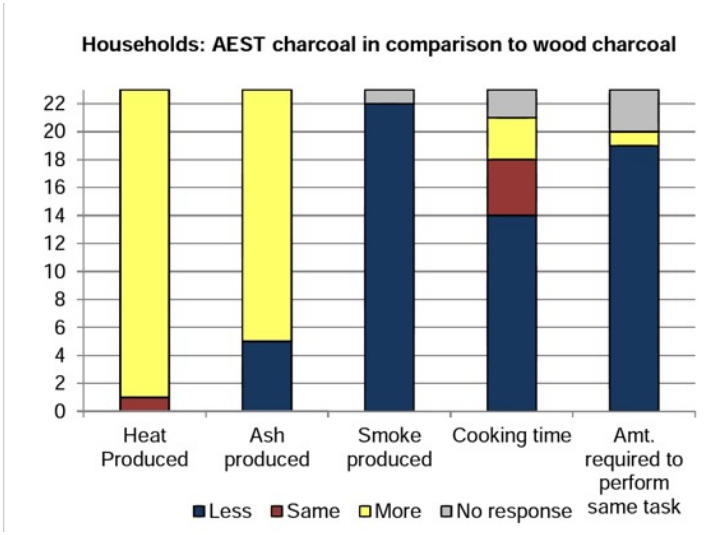
The results of these tests are clear:-

Bio-mass fuel briquettes have the highest Thermal Efficiency (Briquettes = **22%**, wood charcoal = 18%: firewood = 11%).

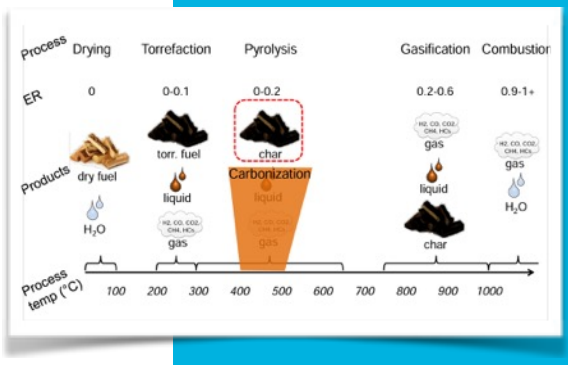
Bio-mass fuel briquettes burn cleaner, producing less particulates (briquettes = **4.2mg**, wood charcoal = 29.8mg, firewood = 929.8mg).

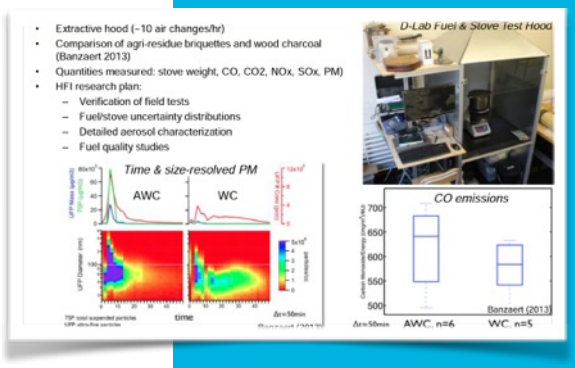
Bio-mass fuel briquettes give off less harmful gas (grammes of Carbon Monoxide: briquettes = **16.3**, charcoal = 18.6, firewood = 42.4).

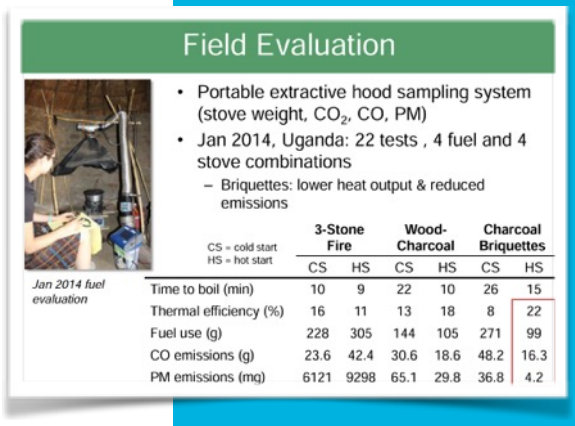
Bio-mass fuel briquettes are cheaper to use than charcoal, using less fuel in tests to boil water (briquettes = **99** grammes, charcoal = 105 grammes, firewood = 305 grammes).



Scientific Analysis:







SOURCE:

MIT & OXFORD UNIVERSITIES

Testing carried out April 2008 - January 2014, Nkokojeru, Nakabale & Teso, Uganda by

HFI

Harvest Fuel Initiative

&

D-lab/mit.edu/scale-ups

Why use AWU Fuel Briquettes?

The 2013 study commissioned by The European Union (in partnership with GVEP) concluded that: *"Briquettes alone will not solve the major sustainability problems of wood fuel use in Uganda. However, it is noted that **16%** of the country's total wood consumption and up to **50%** of the charcoal trade could be replaced by briquettes from biomass waste."*

Amaha We Uganda Fuel Briquettes are sourced from sustainable materials; collected as agricultural waste products; turned from Bio-mass into charcoal; then pressed into Briquettes that burn cleaner, burn longer, burn healthier and burn cheaper than either Wood-Charcoal or firewood.

The European Union Study also went on to state: "*Institutions, households, restaurants and farmers all have different heating requirements and by meeting those needs briquettes will become more attractive to them. Customisation through blending feedstocks will also provide briquettes with a competitive advantage over conventional charcoal.*"

The environmental impact of using Bio-mass Briquettes rather than wood charcoal is significant. Briquettes are made from waste material, so the Greenhouse Gas emission savings can be calculated as the number of trees left standing by replacing firewood charcoal with Fuel Briquettes.

It is estimated that each tonne of charcoal requires the felling of 88 medium size trees. If so, the total amount of deforestation avoided by the target market of 3,000 consumers participating in the AWU Kasese programme can be estimated at **17,600 trees annually.**

How are we making this happen?

AmahaWe Uganda has 9 full-time briquette production groups receiving financial support, training and mentoring across the Kasese District. Briquette presses are located throughout the AWU network of 80 Women's Cooperative teams established since 2005 through our Micro-finance and mentoring programmes.

Over 900 women are involved in these AWU groups.

Most of their businesses have started in the last two years and 100% of the teams in the programme were introduced to briquettes as a new business venture or a diversification from their existing product lines.

The AWU cooperatives are located in Kasese Town, Nyakasanga, Kidodo, Kisinga, Kamughobe, Kabatunda, Kajwenge, Rwsande, Kitswamba and Bwera. These areas were chosen by the AWU mobilisation team for the recruitment of entrepreneurs as part of our ongoing mission to raise rural teams out of poverty and having identified the high potential in Kasese District for this crucial industry to grow.

Environmental Impact:

AWU F3 Briquettes. Manufactured & distributed in Kasese District by:

Amaha We Uganda

www.amahaweuganda.org

Email:

helene@amahaweuganda.org

Telephone:

+256 782 735 619

Contact us to find out how you can purchase AWU Fuel Briquettes for your home, community or business.