



RICE HUSK GASIFIER STOVE

Product Catalogue - 2015

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EUROPEAN
MICROFINANCE
PLATFORM

NETWORKING WITH THE SOUTH

e-MFP ACTION GROUP
ON MICROFINANCE
AND ENVIRONMENT

Description and Working Principle

“From waste to fuel - turning rice husk into cheap, clean energy for cooking”

This low-cost and clean-burning stove utilizes rice husk as fuel to cater to domestic rural households and small cottage industries where abundance of rice husk is accessible. It is estimated that a ton of rice husk has a direct energy conversion of about 23 tanks of 11 kg LPG fuel thereby significantly reducing expenditure on conventional fuel sources. The production of combustible gases, primarily carbon monoxide and hydrogen, takes place by oxidizing the biomass fuel with a limited amount of air. Gasification of rice husks is achieved by controlling the air supply with a small fan.

Technical Characteristics

Reactor diameter and height	16 cm ø x 60 cm
Fuel consumption rate	2.6 kg/hr
Fan	120 mm x 120 mm, 16 watts 12 V DC
Boiling time test	14 to 20 min for 1.5 liters of water
Temperature beneath the cooking pot	420°C
Thermal efficiency	26%
Product lifetime	2 - 3 years

Ease of Distribution, Installation and Maintenance

Fabricated rice husk stoves are available in regions where rice growing is the major economic activity such as India, Indonesia and Philippines. This simple stove requires no installation and is ready for use by end-users with basic instruction. Operation of the stove is best performed outdoors where proper air ventilation exists and fuel loading and char unloading processes are eased. Regular maintenance is carried out annually by users based on the usage frequency.

Typical maintenance work:

- Removal of char from the reactor (can be used as fertilizer due to its property to retain high water capacity)
- Cleaning and drying of the stove
- Replacement of fan after lifecycle

Technology Options

Two types of gasifier stoves are commercially available at present, namely continuous and batch type. The main difference between these types is continuous operation without entirely discharging and reloading the stove. Also, the number of burners and material quality (e.g. stainless steel) can be selected according to clients' needs and capacity. Commonly, one and two-burner models are viable options, and these stoves are adaptable for AC or DC electrical inputs using a grid connection or a solar panel and battery.

Price Range

A simplest and complete one-burner batch type gasifier set costs around USD \$70.

Type of target group	Price range
Domestic households	Between USD \$70 - \$100
Small cottage industries, restaurants	USD \$160 upwards

Type of Financing

Microfinancing as well as financial and operational microleasing can be provided to households and restaurants. Depending on the required size of the stove; home improvement, fixed-asset, or leasing-to-own loans can suit both, MFI and end-user.

Economic and Social Impacts for End-users

This stove appeals to end-users as it reduces operation cost by 80 - 90 percent compared to LPG fuel. Depending on rice husk availability, it also reduces time intensity contrary to traditional biomass stoves. Its low-emission clean burning minimizes health hazards and is safer compared to traditional wood stoves. Moreover, the rice husk ash can be reused as soil fertilizer as an added value.

Example: The breakeven period of a one-burner batch type rice husk gasifier substituting an LPG gas stove is between 4 - 5 months for a medium consumption of 3 hours of cooking daily in the Philippines. This benefit will become more apparent as the cost of LPG continues to rise.

Benefits for the MFI

Savings on cooking fuel expenses ensure reliable loan repayments for MFIs financing gasifier stoves. As this technology caters to a wide range of users and clients in rice-growing regions, MFIs can reach out their loan products to new clients.

Environmental Benefits

Environment: Rice husk gasifier stoves reduce accumulation of rice husk in rivers banks and along roadsides. Rice husk ash can be used as organic fertilizer, pest/insect repellent, or for eco-friendly constructions. It can offset deforestation and pressure on natural resources: Every 1 ton of rice husk (average rice husk fuel needed annually per household) avoids burning 848 kg of wood and 510 kg of wood charcoal. It can offset the use of cow dung for heating, which can instead be used as organic fertilizer.

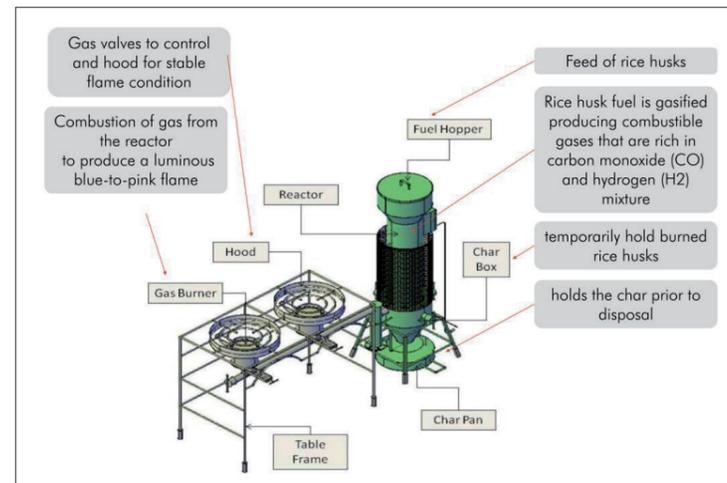
Climate change mitigation: It reduces the production of greenhouse gas (GHG): for example offsetting the use of LPG (replace 11 kg LPG tank monthly reduces a total of 86 kg CO₂ emissions annually), but also avoids change of land use and deforestation.

Climate change adaptation: It reduces the households' vulnerability to cost volatility of non-renewable fuels, and vulnerability to weather shocks due to environmental degradation (if the use of husk gasifier offsets trees cut).

Potential positive synergies with: Increase in environmental awareness, income diversification strategies or use of weather adapted calendar, certifications and TA for organic production with natural fertilizers¹.

References

- Alexis T. Belonio, Rice Husk Gas Stove Handbook, 2005
 Altenphil, CO₂ Emission Factor for LPG, 2008
 Stoves Bioenergylists <http://stoves.bioenergylists.org/beloniolowcostrhstove>



Source: Engr. Alexis T. Belonio



Source: Bioenergylists Stoves



Source: Bioenergylists

¹ For further information on potential synergies check the other product catalogues for EE and RE technologies.

European Microfinance Platform

The European Microfinance Platform [e-MFP] was founded formally in 2006. e-MFP is a growing network of 120 organisations and individuals active in the area of microfinance. Its principal objective is to promote co-operation amongst European microfinance bodies working in developing countries, by facilitating communication and the exchange of information. It is a multi-stakeholder organisation representative of the European microfinance community. e-MFP members include banks, financial institutions, government agencies, NGOs, consultancy firms, researchers and universities.

e-MFP's vision is to become the microfinance focal point in Europe linking with the South through its members.

e-MFP Microfinance and Environment Action Group

e-MFP Action Groups facilitate synergies among e-MFP members and encourage them to implement activities together, thus contributing to the advancement of the microfinance sector.

The aim of the e-MFP Microfinance and Environment Action Group is to bring together microfinance practitioners to discuss and exchange experiences in dealing with environmental issues and to create new practical tools to advance environmental microfinance. The Action Group is also intended to act as a think tank that disseminates its results among e-MFP members and the microfinance sector at large with a view to increasing the awareness of and commitment to act on these issues. It is meant both as an internal knowledge-sharing and external awareness-raising platform that serves as a reference in the microfinance sector.

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