

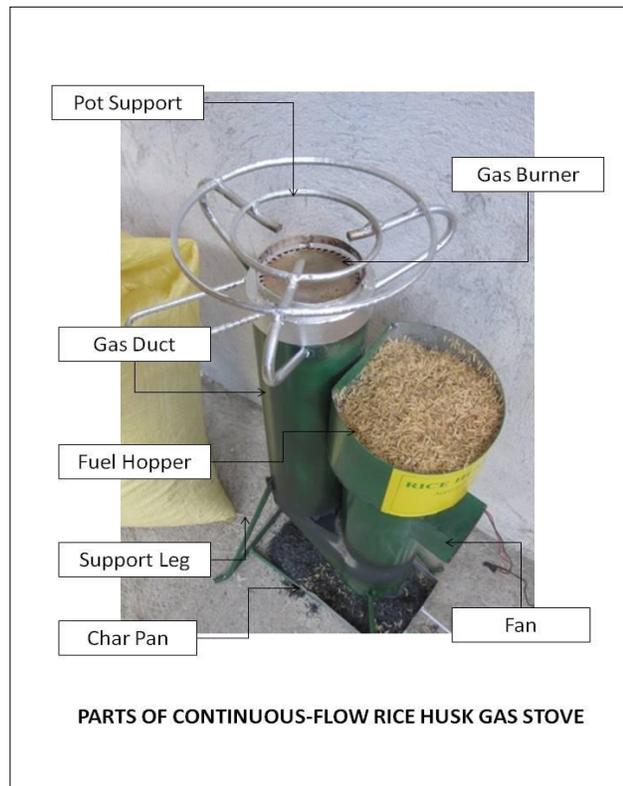
HOUSEHOLD-SIZE CONTINUOUS-FLOW RICE HUSK GAS STOVE

by: Alexis T. Belonio, Emmanuel V. Sicat, and Francisco D. Cuaresma

Again, good news and glory to God!

The rice husk gas stove technology which was recently developed for domestic application now operates on a continuous mode. Instead of discharging char and reloading fuel every 40 minutes to continue its operation, the rice husk gas stove can now be operated continuously until all cooking jobs is finished. Rural households can now cook more conveniently using this stove model than with the batch-mode model.

This development in the rice husk stove technology was realized with the funding support from the Rolex Awards for Enterprise 2008 and The Tech Awards 2010. The stove, as shown in the upper right photo, is a modified version of the single-burner rice husk gas stove. As shown, this stove model has feeding hopper and a discharge mechanism in one reactor to allow continuous feeding of rice husks and discharging of char during operation. Similarly, the stove consists of the reactor where rice husks are burned with limited amount of air producing combustible gases that are rich in carbon monoxide (CO) and hydrogen (H₂). Rice husks are fed onto the hopper which is positioned directly above the reactor, and char is discharged into the pan placed directly beneath the reactor. The gas generated during the process is diverted through a duct to the other cylinder with the gas burner mounted on it. After cooking, the char is collected using a



Burning Gas from the Stove

pan for proper disposal.

The proto-type model of the stove has a reactor diameter of 12 cm and a height of 30 cm. A 3-watt, 12-volt DC fan supplies the air needed in gasifying rice husks. The fan can be energized by plugging it into a 220-volt AC convenience outlet with the use of an AC-DC Adoptor, a 12-volt DC battery, or at least 1.5 watt with the same voltage solar panel. The average amount of rice husks consumed per hour of operating the stove is 1.1 kilogram with a computed thermal output of 1.19 kWt.

The intensity of flame can be varied by shifting the Adoptor switch from 1.5 to 12 volt or by changing the opening of the fan inlet. The time required to produce gas from the time of ignition of fuel is 2 minutes. Two liters of water can be boiled using the stove within 14 minutes with a thermal efficiency of about 21%. Specific gasification rate was computed at 96 kg per hour-m². The temperature measured beneath the pot during boiling test varies from 250 to 400°C. The expected black carbon emission is no more than 100 ug/m³ of gas, which is almost the same with that of the batch-type rice husk gas stove.

A unit of this stove costs P2,000.00-2,500.00 depending on the kind of materials and the method of manufacturing used. This selling price is almost the same with that of the commercial units of the batch-type rice husk gas stove being produced. Investment can be recovered within 3 to 4 months as compared with LPG stoves.

For further information, please send email to atbelonio@yahoo.com or write to Center for Rice Husk Energy Technology, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines.

Stove Design and Performance Specification

Model	12D
Reactor Diameter (m)	0.12
Heat Output (kWt)	1.19
Fuel Requirement (kg/hr)	1.1
Ignition Time (min)	1
Time to Boil 2 liters of water	14
Fan Size	6 cm x 6 cm
Fan Input Voltage (Volt)	12 DC
Fan Wattage (Watts)	3
Overall Dimension L x W x H (m)	0.4 x 0.4 x 0.75

