

SMALL-SCALE RICE HUSK GASIFIER PLANT FOR COMMUNITY STREET LIGHTING

by

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Glory to God!

A rice husk gasifier plant, enough to provide electricity for community street lighting, was recently developed by Suki Trading Corporation in Lapu-Lapu City, Cebu, Philippines in collaboration with Kanvar Enterprises and the Center for Rice Husk Energy Technology (CRHET).

The project aimed at using wastes from rice mills to fuel a spark-ignition engine that will drive a generator to produce electricity. Instead of dumping rice husks along roadsides, it can now be converted into valuable fuel that can help communities energize their street lights.

The gasifier basically employs a moving-bed downdraft gasifier reactor developed by CRHET in combination with a gas-conditioning devices that remove impurities from the gas thereby making it highly suitable fuel for heat engines.

As shown, the gasifier is a small unit with 40-cm diameter reactor equipped with 3-in., 220-volt electric blower to provide the air needed in gasifying rice husks to produce carbon monoxide (CO) and hydrogen (H₂) gases.

Rice husk is fed at the top end of the reactor either manually using a ladder or with the use of a bucket elevator.



On the other hand, char is removed from beneath the char box using a screw conveyor.

The gas coming out of the reactor is conditioned by allowing it to pass through the gas-cleaning devices which consisted of wet scrubbers, tar condenser, and a series of packed and bag filters.

The gas is fueled to a 3-cylinder, 12-valve surplus Susuki engine which directly drive a 10-kWe AC synchronous generator at a speed of 1,800 rpm producing 220 volt current.

A total of 160 pieces of 50-watt bulbs can be energized by the plant for 8 to 10 hours continuous operation. The plant consumes rice husks at an average rate of 19 kg per hour.

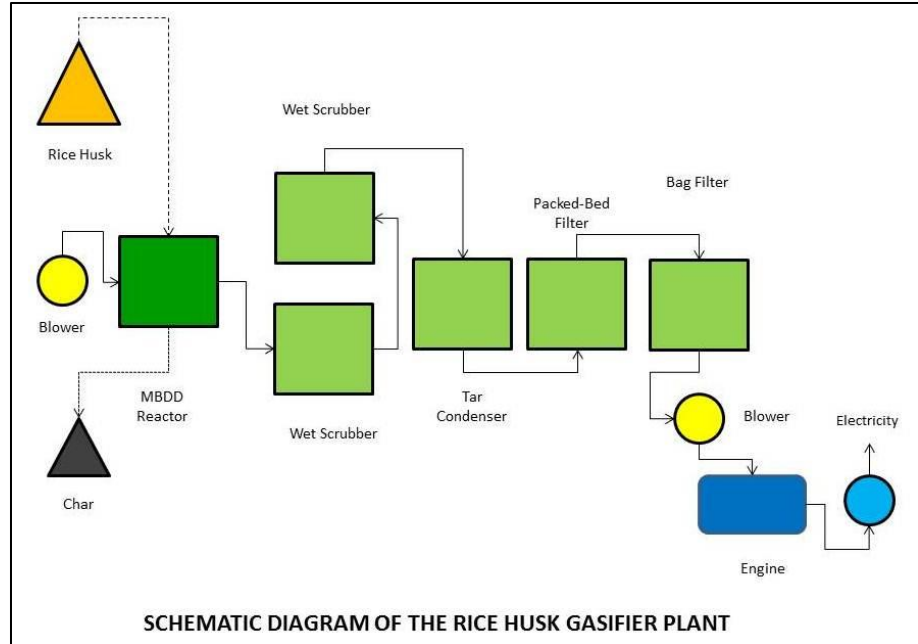
The gas temperature coming out of the reactor ranges from 400 to 550°C. It dropped between 50 to 70°C after passing the wet scrubbers, and further cooled down between 35 to 42°C before entering the intake manifold of the engine.

Gas flow rate is at 24 Nm³ per hour.

The engine is entirely fueled by the gas generated, except at the start-up and at the end of the operation. Furthermore, a parasitic load of 15% of the power output is needed to run the plant itself.

One trained person is required to operate the plant, to load the fuel and discharge the char and at the same time to oversee the operation of the plant.

The gasifier produces a clean gas with a very low amount of black carbon (i.e., only 50 um/m³ of gas), and so the gas coming out of the muffler of an engine is also clean. CO₂ emission is



likewise relatively low of about 0.6 kg per ton of rice husks.

The char produced is about 30 to 35% of the rice husks consumed. Char is a good material in increasing the water holding capacity of the soil.

The advantage features of the gasifier system are:

- (1) It makes use of available wastes in rural areas to fuel engines that usually drive generators;
- (2) The tar problem which is common among conventional rice husk gasifier systems is eliminated in this gasifier technology;
- (3) Operation can be done continuously without the need to restart the reactor;
- (4) It can easily be adopted with surplus spark-ignition engine that is readily available in the locality;
- (5) The technology can be locally produced making use of available fabrication resources and skills;
- (6) It can be scaled up to meet the power demand of a certain community or application; and
- (7) Investment and operation costs are at the reach of the local community.

The entire plant requires an investment cost of P420,000.00, excluding shipment. With proper operation and maintenance, it can last even for a minimum period of 5 years. It can be recovered within a year when operated at 8 hours per day, and 365 days per year.

Development of a large-scale unit of the gasifier plant, aimed at utilizing city garbage so as to avoid trashslide, is now underway.

This development platform of GIFO Project is geared towards helping communities or local government units eliminate the problem of garbage disposal while, at the same time, providing a solution to both energy and environmental problems.

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