

Continues Feed Biomass Gasifier for Thermal Applications

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Energy from Waste project

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Save the waste, save the world.

A biomass waste wood gasifier plant, to provide thermal energy to dry 6 m³ of wood in 12 days. This system is developed by Biomass Energy Purworejo, Java Tengah, Indonesia for small industry thermal applications to save fossil fuel, create energy from waste and reduce carbon footprint of the business and industries.

System design and developed by Pt. Biomass Energy

Built by Muslim Gunawan at his work shop.

This project goal was using waste wood from the furniture manufacturing process to gasify and use the wood gas to burn inside of the wood drying kilns to save energy cost. Instead of burning waste wood inefficient and dirty way, now the waste wood can be converted to valuable energy to use by small manufacturing facilities. In the picture Mr. Wahyono with gasifier.

The gasifier design is downdraft with 5 nozzles, which the air is heated while pumped into reactor area. Continues feed of the wood waste is being made possible by locking feed chamber, which is sealed by water. The gas generated is cleaned from the particles by cyclone. After the tar is removed, excessive tar is burned or collected on the bottom of the special designed gas burner. The system design improves the quality of the drying wood, by removing excess water particles from air. Direct burning of the wood gas in the drying chamber, also cuts down drying time by 15 to 20 %.



The gasifier is a small unit with 33 cm diameter reactor equipped with 2 inches pipes and 220 volt electric blower. Blower is used for supplying the gasifier with heated air to the reactor.

Wood waste is fed from the top manually and larger systems can be designed for automatic loading systems as well. Here is the picture of waste wood used for fuel.



According to Mr. Wahyono, who is the production manager for Pt. Indonesia Online Furniture Company, the cost of the drying wood is now much less than before. Production facilities have two wood drying kilns each with 6 m³ each. Before the gasifiers, each oven used 84 coal briquettes and wood waste for each drying session of 12 days. Each coal briquettes were priced at 1200 rupiah. Now the drying time is reduced to 10 days, and the gasifier is shut down at night. Mr. Wahyono says, “We save about \$ 450.00 dollars a month. Our gasifiers paid in less than 4 months. Now drying wood is faster, more economic and clean. We also feel good about not burning coal anymore.”

Operation of the gasifier is very simple; every morning gasifier is filled with waste wood than fired. Burnable gas is come in less than 3 minutes and lighted. Gasifier need to be refueled every hour about 12 kg of waste wood. Every 3 days the ash chamber is cleaned and 7 to 10 kg. Of ash is taken out.

The gasifier was in operation since April 2011. No major problems are encountered, because of simple design and no moving parts other than blower. Gasifier an be operated by one trained man in a part time bases.

Using gasifiers has many advantages for small manufacturers;

- 1- It makes use of available waste wood or waste biomass such as rice husk, empty fruit bunches, saw dust, wood chips for generating thermal energy.
- 2- The gasification system design is very operator friendly.
- 3- Gasifier can be operated continuously. Waste wood and biomass fuel can be loaded without interruption to operation.
- 4- This design can be easily scalable up to 750 Kw thermal power.
- 5- Gasifier can be built by local craftsmen in a simple steel fabricating shop, using local parts and material.
- 6- Cost of building the gasifier is in reach for the small manufacturer. In most cases investment payback time is less than 6 months.

Gasifier built with ss reactor. More than 6 months of operation shows no wear and tear on the gasifier and is expected to last 10 years.

Our company has also developed a chicken waste gasification system. It has been tested for more than 2 weeks of continuous operation. Gasification has been done for less than 750 degrees Celsius in reactor. The new design chicken waste gasifier can be scalable for any desired size. New thermal and electric producing gasification systems will be develop using

chicken waste. After gasification process, chicken waste received as bio char from the ash chamber and it turns a problem waste in to a valuable fertilizer.
Different size and systems are available for thermal and electrical applications from 10 Kwe smaller units and from 2 Mwe for larger systems. Biomass waste to energy systems.
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