

ABSTRACT

The utilization of sengon wood pellet biomass can be used as an alternative energy that can be applied to the stove using biomass gasification techniques. Sengon wood pellets were chosen because it contains high volatile matter and one of environmentally friendly renewable fuel than fossil fuels such as kerosene and natural gas (LPG), have lower CO₂ emissions than coal and oil, and are practical in terms of use and storage. In addition, the availability of abundant wood pellets and water content which tends to be low compared to other biomass. In this study, a biomass gas stove was designed using the principle of the Top-Lit Up Draft Gasifier that burns pyrolysis gas from biomass pellets and is expected to produce a better biomass stove performance performance than previous studies. The stove has an overall diameter of 50 cm, with the gasification reactor inside is 30 cm and 15 cm in diameter. Each gasifier is given eight variations of the primary air flow velocity (0.5 m / s; 1 m / s; 1.5 m / s; 2 m / s; 2.5 m / s; 3 m / s) s; 3.5 m / s; 4 m / s). Biomass stove testing is carried out in accordance with SNI Procedure of Biomass Stove 7926: 2013 with the aim of obtaining thermal efficiency and fuel consumption rates in accordance with the standards that have been applied. The highest value of thermal efficiency is 23.04% for gasifier with a hole size of 7 mm, then 20.71% for gasifier with a hole size of 5 mm, and 20.41% for gasifier with a hole size of 3 mm.

Keywords: *biomass pellets; sengon wood pellets; gasification; biomass stove; Top-Lit Up Draft Gasifier; SNI Biomass Furnace.*