

Biomass Based Electricity Generation

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At present, reusable resources such as wind, hydroelectric, solar, biomass are being used around the world to reduce environmental damages. Thus, man is becoming accustomed to the usage of biomass to generate electricity in the world. In the process of thermochemical biomass gasification, synthesis gas, a gas product, which is converted in to solid biomass by a gasifier is produced by means of partial oxidation with air, oxygen, and/or steam. This gas contains the desired components CO, H₂, CH₄, CO₂, N₂, water, tars and impurities. In order for this synthesis gas to be used effectively, it must be very clean and the tar and impurities in the synthesis gas must be separated. The gasification reaction takes place in four zones according to the conventional theory of synthesis gas which are oxidation, reduction, pyrolysis and distillation zones. In this project, downdraft gasifier was designed to run six cylinder, 4-stroke and air-cooled direct injection gas engine, developing a power of 200 kW, at a rated speed of 1500 rpm. Wood offcuts were used as a feed stock and were loaded into the gasifier from the top at every 10-15 minutes of the operation. The desired specification was for 750-1500 kWh/day electrical output, ideally from a system operating less than 15 hours per day, 6 days per week.

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