

PROTOTYPE DESIGN AND ANALYSIS OF GAS POWER PLANT USING ANAEROBIC METHOD

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ABSTRACT

This research aims to design and analyze a prototype Methane Gas Power Plant based on biogas derived from organic waste, as well as to compare the performance of methane gas and LPG as fuels for the power generation system. The system is designed using a 150-liter biodigester to produce biogas, which is then utilized to heat water in a pressure cooker boiler, generating high-pressure steam. The steam is directed to drive a 12-bucket Pelton turbine connected to a DC generator, converting mechanical energy into electrical energy.

The analyzed parameters include steam pressure in the boiler, turbine rotational speed (RPM), generator output power, and energy conversion efficiency using both fuel types. The test results indicate that methane gas provides more stable and efficient performance compared to LPG. Under no-load conditions, the system produces higher voltage and current with methane gas, while under load conditions, LPG shows higher energy consumption.

Overall, this prototype demonstrates that methane-based biogas has significant potential as an environmentally friendly renewable energy source.

Keywords: *Biogas, Methane Gas, LPG, Pelton Turbine, Power Generation, Renewable Energy.*