

## Design and Construction of a Solar Mobile Anaerobic Digester for Rural Communities

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**Abstract :** An anaerobic digestion system that was completely operated on solar power (both photovoltaic and solar thermal energy), and mounted on a trailer to make it mobile, was designed and constructed. A 55-gallon batch digester was placed within a chamber that was heated by hot water pumped through a radiator. Hot water was produced by a solar thermal collector and photovoltaic panels charged a battery which operated pumps for recirculating water. It was found that the temperature in the heating chamber was maintained above ambient temperature but it follows the same trend as ambient temperature. The temperature difference between the chamber and ambient values was not constant but varied with time of day. Advantageously, the temperature difference was highest during night and early morning and lowest near noon. In winter, when ambient temperature dipped to 2 °C during early morning hours, the chamber temperature did not drop below 10 °C. Model simulations showed that even if the digester is subjected to diurnal variations of temperature (as observed in winter of a subtropical region), about 63 % of the waste that would have been processed under constant digester temperature of 38 °C, can still be processed. The cost of the digester system without the trailer was \$1,800.

**Keywords :** anaerobic digestion, solar-mobile, rural communities, solar, hybrid

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