“Powering a village sustainably: Generating electricity from waste-based biogas”

June 2012

International Energy Initiative - Asian Regional Initiative (IEI-Asia),
80-B Spencer Road, 2nd Cross,
Fraser Town, Bangalore 560 005
India
Telephone: 91 80 2555 3563
E-mail: ieiblr@iei-asia.org
Web-site: www.iei-asia.org

Abstract

This Report describes IEI-Asia's village-based income-generation and waste to electricity project, selected for funding by the Wuppertal Institute through the 6th Round of their Sustainable Energy Project Support Programme. The project has the objective of providing sustainable rural access to electricity through a community enterprise that generates electricity from local renewable resources, integrated with employment- and income-generation activities.

A village-based dairy has been established; this consisted of the construction of cattle-sheds and related (e.g. water-supply) facilities and the purchase of cows and training of local people for cattle-caring activities. A biogas plant, consisting of a floating-drum digester and inlet and outlet tanks, has been constructed nearby. Here, cattle-dung from the dairy is regularly deposited for the generation of biogas through anaerobic digestion. A room has been constructed adjacent to the biogas plant to house a 20 kVA engine-generator, running 100% on biogas; a pipeline links the gas-holder of the biogas plant to the engine. The existing electricity distribution grid has been extended to include the un-connected homes, school, and pump for water-supply. Electricity is generated daily for supply to the entire village, when supply from the state-run regional distributing utility (BESCOM) is not available. Efficient lighting (through CFLs using about 25% of the energy used by incandescent bulbs) has also been introduced, because the low end-of-line voltage from the grid did not permit fluorescent lamps to glow. The electricity generated through the project is being recorded and the corresponding avoided carbon emissions through replacement of conventional electricity and lighting sources by biogas has been estimated.

Through this project, all the occupied dwellings have been electrified, the entire village enjoys electricity-based services including efficient lighting, at times when grid supply is not available, and this electricity is derived from a continuously-available renewable source.

Keywords: methane-fuelled electricity generation, village energy system, renewable energy source, biogas, waste to energy

International Energy Initiative – Asia (IEI-Asia),
Bangalore, India

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For further details, contact:

International Energy Initiative – Asian Regional Initiative (IEI-Asia),
80-B Spencer Road, 2nd Cross, Fraser Town,
Bangalore 560005, India

E-mail: ieiblr@iei-asia.org
Web site: www.iei-asia.org