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Optimised model for community-based hybrid energy system

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Abstract

Hybrid energy system is an excellent solution for electrification of remote rural areas where the grid extension is difficult and not economical. Such system incorporates a combination of one or several renewable energy sources such as solar photovoltaic, wind energy, micro-hydro and may be conventional generators for backup. This paper discusses different system components of hybrid energy system and develops a general model to find an optimal combination of energy components for a typical rural community minimizing the life cycle cost.

The developed model will help in sizing hybrid energy system hardware and in selecting the operating options. Micro-hydro-wind systems are found to be the optimal combination for the electrification of the rural villages in Western Ghats (Kerala) India, based on the case study. The optimal operation shows a unit cost of Rs. 6.5/kWÂ h with the selected hybrid energy system with 100% renewable energy contribution eliminating the need for conventional diesel generator.



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Keywords

Hybrid energy system; Micro-hydro; Solar PV; Wind

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