

Comparative Study of on and off Grid Tied Integrated Diesel /Solar PV Battery Generation System

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A proposed hybrid system based on diesel generator and solar photovoltaic (PV) as an effective option to power a small remote community have been presented in this work. Running diesel generator constantly due to epileptic electricity supply in a small remote community which is not connected to the grid system is very expensive and not eco-friendly.

The main objective of this proposed system is optimal design of a solar PV powered supply system to produce green power and reduce or augment the use of continual diesel generator sets, resulting in reduced cost of operation and maintenance. Solar radiation data is firstly analyzed and proper sizing and specification of the PV system and battery bank was done. The cost, hourly solar radiation, temperature and other design considerations were used as input of the hybrid optimization model for electric renewable (HOMER) software to analyze the system.

In addition, a comparative study was carried out considering two scenarios of the proposed model system. In the first scenario, the diesel generation, solar PV system was treated as autonomous (or standalone). In the second scenario, the proposed model system was connected to the grid system. It is found that electrifying the small remote community using the proposed hybrid system is very beneficial and competitive with other types of conventional sources due to the fact that it decreases both operating costs and pollutants emissions. Also, results from the HOMER software are realistic and give promising results for on-grid schemes.

Keywords: Renewable Energy; Grid system; Solar PV; Efficiency; Battery