

Estimating the Power Influence of an Off-Grid Photovoltaic Panel on the Indicating Rate of a Storage System (Batteries)

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Abstract : The current resurgence of interest in the use of renewable energy is driven by the need to reduce the high environmental impact of fossil-based energy. The aim of this paper is to evaluate the effect of a stationary PV panel on the charging rate of deep-cycle valve regulated lead-acid (DCVRLA) batteries. Stationary PV panels are set to a fixed tilt and orientation angle, which plays a major role in dictating the output power of a PV panel and subsequently on the charging time of a DCVRLA battery. In a basic PV system, an energy storage device that stores the power from the PV panel is necessary due to the fluctuating nature of the PV voltage caused by climatic conditions. The charging and discharging times of a DCVRLA battery were determined for a twelve month period from January through December 2012. Preliminary results, which include regression analysis (R²), conversion-time per week and work-time per day, indicate that a 36 degrees tilt angle produces a good charging rate for a latitude of 26 degrees south throughout the year.

Keywords : tilt and orientation angles, solar chargers, PV panels, storage devices, direct solar radiation.

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