

Pragmatic Analysis of the Effectiveness of a Power Conditioning Device (DC-DC Converters) in a Simple Photovoltaics System

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Abstract : Solar radiation provides the largest renewable energy potential on earth and photovoltaics (PV) are considered a promising technological solution to support the global transformation to a low-carbon economy and reduce dependence on fossil fuels. The aim of this paper is to evaluate the efficiency of power conditioning devices with a focus on the Buck and Boost DC-DC converters (12 V, 24 V and 48 V) in a basic off grid PV system with a varying load profile. This would assist in harnessing more of the available solar energy. The practical setup consists of a PV panel that is set to an orientation angle of 0° N, with corresponding tilt angles. Preliminary results, which include data analysis showing the power loss in the system and efficiency, indicate that the 12V DC-DC converter coupled with the load profile had the highest efficiency for a latitude of 26° S throughout the year.

Keywords : poly-crystalline PV panels, DC-DC converters, tilt and orientation angles, direct solar radiation, load profile

Conference Title : ICEPE 2018 : International Conference on Electrical and Power Engineering

Conference Location : Chicago, United States

Conference Dates : October 10-11, 2018