



Comparative assessment of global horizontal radiation and temperature data for photovoltaic plant applications

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Abstract

Global demand for energy is growing beyond the limits of installed generation capacity. To meet these future demands alternative energy sources need to be investigated. Photovoltaic (PV) power generation is a prominent source of alternative energy and is the focus of this study.

Acquisition of the finance needed to develop a PV plant requires an assurance of the amount energy yield that a plant will generate. The energy yield available at a potential PV site is highly dependent on the amount of solar radiation. Most sites in South Africa that are suitable for PV plant applications do not have sufficient or reliable data available to determine adequate solar radiation estimates. To address this limitation a number of software packages can be used to estimate solar radiation data. This study will investigate the use of one of these software packages, namely Meteonorm.

This study evaluates the accuracy of the database of Meteonorm by comparing the results to actual measured data in South Africa. A profile analysis will be used to test whether the overall trend of global horizontal radiation and temperature estimates of Meteonorm are significantly different from actual measured data.

An additional investigation will be conducted on interval estimates of global horizontal radiation and temperature. Interval estimates for these variables were calculated using 10 year solar radiation data generated from Meteonorm. If the algorithms within Meteonorm are accurate the simulated data should provide interval estimates, which include the actual measured data.

Keywords: solar radiation; profile analysis; confidence interval estimates.