



Contribution ID: 227

Type: Oral Presentation

Sizing optimisation and installation of a stand-alone PV water pumping system for irrigation

Wednesday, 10 July 2019 14:20 (20 minutes)

To deal with the shortage in electricity and high diesel costs affects the pumping requirements of community water supplies and irrigation; so using solar energy for water pumping is an alternative to conventional electricity and diesel based pumping systems. Solar water pumping is based on photovoltaic (PV) technology that converts solar energy into electrical energy to run a DC or AC motor based water pump. The use of such a system is appropriate since there is a natural relationship between the availability of solar energy and the water requirement. The current study seeks to establish the optimal sizing and installation of a stand-alone PV water pumping system to meet the water requirements and the additional electricity load required in the farm located in Limpopo Province. The water was pumped by the submersible pump rated at 5.5 kW from the borehole with capacity of around 15 000 L/h powered by 18 solar panels with a power rating of 350 W for a total of 6.3 kWp. The mathematical model to determine the relation between water flow rate and PV power will be matched with the data obtained experimentally for future performance predictions in other locations. Furthermore, the performance of the system was verified in terms of meteorological data.

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD, N/A)?

PhD

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Session Classification: Applied Physics

Track Classification: Track F - Applied Physics