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Estimation of energy production decrease due to shading for the Nampower rooftop system

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Abstract content
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Photovoltaic (PV) energy has become one of the most important renewable energy technologies and the installation of PV systems on rooftops in industrial, commercial and residential sectors has become common. The operation of these systems is not without challenges and one of the challenges faced by rooftop systems is the effect of shade on the performance of the system. Potential shading of arrays or parts thereof need to be carefully considered when designing a system. In this study an operational 63.45 kW rooftop PV system, on the roof of the NamPower building in Windhoek, was investigated. The focus of this paper is the effect of the partial shading that some of the module strings of the system experience during part of the year due to surrounding buildings. We estimate the loss in energy production due to shading using simulation software and compare this to actual performance data. In the analysis of the effects of shading the current-voltage (I-V) curves for module strings that experience varying levels and configurations of shading are compared to unshaded strings. The results highlight the importance of considering the effects of shading on system performance and illustrate potential negative impact of unsuitable string configuration.

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PhD

Main supervisor (name and email) and his / her institution

Prof. E. van Dyk
Ernest.vanDyk@nmmu.ac.za
NMMU

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Primary author: Ms DOBREVA, Petja (NMMU)

Co-authors: Prof. VAN DYK, Ernest (NMMU); Dr VORSTER, Frederik (NMMU)

Presenter: Ms DOBREVA, Petja (NMMU)

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