Humidity Effect on the Energy Production Performance of Photovoltaic Cells in Arid zone

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Abstract

Among the most important main points of this work is to study the effects of humidity on photovoltaic panels. The performance of the panels was studied at the ENERGARID laboratory under different experimental conditions. The performance parameters of the photovoltaic panels were calculated by measuring the output voltage, current, solar radiation incident on the surface of the panel, its surface temperature, efficiency, and fill factor, while practically varying the humidity level. These studies showed that increased humidity leads to a decrease in power and efficiency. When humidity increases from 16% to 30%, the power of the panel decreases by 7.69%. When humidity rises to 50%, the power of the panel decreases by 76.92%. Furthermore, Pv service costs were reduced by 11.11% at 30% humidity and by 65.55% at 50% humidity. Additionally, the efficiency of the panel decreased from 68.88% at H30% to 72.66% at H50%. The studies show that humidity can reduce the efficiency of solar panels by more than 10% in very humid environments.

Keywords

Humidity, Output power, Solar radiation, PV panel, Temperature, Renewable energy.