

## TEMPERATURE EFFECT ON SOLAR PHOTOVOLTAIC POWER GENERATION

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The photovoltaic power generation is commonly used renewable power generation in the world but the solar cells performance decreases with increasing of panel temperature. The solar panel back temperature increases up to 60 °C-70°C in Sri Lanka.

The objective of this research is to identify the temperature effect on the solar photovoltaic (PV) power generation and explore the ways to minimize the temperature effect. The photovoltaic (PV) cells suffer efficiency drop as their operating temperature increases especially under high insolation levels and cooling is beneficial. Commercially used two polycrystalline solar modules (225W and 315W) are observed in this research. The observed locations are Colombo 07 (Sri Lanka Sustainable Energy Authority) and Hambanthota (Solar power plant). Characteristic parameters of selected photovoltaic modules are the Short-circuit current ( $I_{sc}$ ), Open-circuit voltage ( $V_{oc}$ ) and Maximum power ( $P_{max}$ ). These parameters are determined by varying the module's temperature by spraying the water at ambient temperature state when irradiation is constant. The above results are compared with standard rest condition (STC) and theoretically predicted values.

After observing the above system it has been identified that PV panel efficiency has a correlation with PV panel temperature. Thereby it was observed that when the temperature decreases the overall efficiency of the PV panel output power increases. From the gathered data, a suitable photovoltaic thermal system (automated active cooling) is designed with Arduino UNO board for solar panels. From the above thermal system solar panel efficiency can be increased up to 10% with measured power output. The suggested active cooling system increases the solar panel efficiency. Another advantage of using the proposed system is that clean and increase solar panel life time. These techniques are anticipated to contribute towards wider applications of PV systems due to the increased overall efficiency.

**Keywords:** *photovoltaic power, solar power, renewable energy, temperature of PV module*