

Solar PV surface cooling using small companion solar cell-blowers

ABSTRACT

Solar PV surface temperature has been shown to affect the performance of Solar PV especially in temperate and dry weather systems. Many innovative solutions have been proposed by researchers to reduce the operating temperature of the solar PV. Most of this solution is more inclined in using active cooling methods as opposed to the passive cooling method. This is because the active cooling method tends to have a better cooling effect as compared to passive cooling method. However, it is also known that active cooling method is expensive due to the underlying maintenance work and drawing power from the main solar PV system. In this paper, a cooling technique based on the forced air-cooling method is proposed and experimented. The companion system is relying on small blowers powered by small independent solar cell; providing forced air cooling based on the intensity of solar radiation at any given time of day. This system was experimented under a halogen lamp in the lab to establish the power-light intensity-temperature relation. Experiment result shows that average solar PV surface temperature was reduced up to 6° C using 2 blowers while a single blower able to reduce average surface temperature up to 4° C at 15600 lx by a direct halogen lamp. On average, the solar PV efficiency was increased by 4% especially using a 2-blower configuration. The result of this experiment shows that a small independent solar-powered blower system was able to cool down solar PV surface temperature and increases solar PV efficiency at minimal maintenance effort.