

THE PERFORMANCE OF A 20 kW SOLAR PHOTOVOLTAIC SYSTEM AT INDIAN INSTITUTE OF SCIENCE

A 20 kiloWatt (peak) solar photovoltaic system was established at Indian Institute of Science in April 2013. The system has produced around 80 kWh/day for the past four years. The annual energy generated was around 29 MWh (MegaWatt hours). The monthly energy generated was above 3 MWh in March and around 1.6 MWh in July. The analysis of the performance of this system has provided new information regarding the performance of such systems in India.

The temperature of the solar module plays an important role in the energy output of the system. The annual average module temperature was around 45°C. In summer, module efficiency decreased by 0.08% per degree rise in module temperature. In the monsoon season, the efficiency reduced by 0.04% per degree rise in module temperature.

In post monsoon period, it reduced by 0.06% per degree rise in module temperature. In winter the module did



20 kW Solar power system at IISc.

not exhibit much drop in the efficiency. This is because of intermittent natural cooling that took place at the surface of the modules due to lower ambient temperatures.

A mathematical model was developed to predict the yield from a solar photovoltaic plant based on the weather forecast at the location. This model can be deployed in the management of distributed energy generation systems consisting of SPV systems. The deviations of this model from the measured values are around 15% for most of the days. The methodology adopted to develop the model can be used in any location. This model is simple to adopt as it uses performance data from a SPV system installed at a specific location and weather forecast data available in the public domain. Hence, it would be a powerful tool for private solar power producers availing net-metering facility.

References :

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