

Online Monitoring of Rooftop SA-SPV System on Residential Building

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Abstract

The technologies involved in solar photovoltaic (SPV) conversion have been advancing rapidly. Since last decade, the costs of SPV panel and other subsystems have been regularly decreasing which resulted in increase in demand and competition in business. The future demand for the SPV systems, will largely depend on user's perception of successful performance of the SPV systems. Recognizing this fact, the SPV systems integrators and operators have started incorporating modern technology features such as net-metering, advanced/smart metering, data recording and acquisition facilities and web-based platform for online monitoring. These features are important to users of the system, as well as system operators, researchers and developers. In this work, we present results of online monitoring of performance of a stand-alone SPV (SA-SPV) system (3.7 kWp), installed on a residential building, located 25 km away from the monitoring station, with the objective of generating accurate performance records of SA-SPV systems in the region. The results are useful for setting benchmarks for enhancing performance of SA-SPV systems, for large number such systems to be installed in the region. The widely varying orientations of roof surfaces of existing residential buildings offer stiff challenges to system integrators in guaranteeing performance of the system. Also, the load matching for the installed system is a challenging task, particularly in residential buildings. The online monitoring also provides insights into the performance of the sub-systems during short interval of 10minutes. The performance is measured in terms of power output of PV array, state of charge (SoC) of battery, and energy supplied to load by the PV array or by the utility grid. The online monitoring also helps in predicting performance of the system. The challenges in using online monitoring system are due to limited access to internet and loss of performance data at SA-SPV end. It is suggested that the scope of online monitoring system may be enhanced by including web camera for live streaming of data for periodic visual inspection.