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Design and performance evaluation of a virtual grid-connected photovoltaic system in Indian climatic conditions

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Present study deals with the design and performance evaluation of photovoltaic (PV) system connected with virtual grid. Analysis has been done by monitoring 500 W_p crystalline photovoltaic systems mounted on inclined structure at flat roof of Indian Institute of Technology (IIT) Delhi, India. The system was monitored for one year using linear and non linear load at 220 V, 50 Hz. Daily, monthly and annually performance parameters of the PV system are evaluated which include: Average generated electrical energy (kWh), different efficiencies (system efficiency, inverter efficiency etc.), average power output, performance ratio, capacity factor, yields and losses. The average electrical energy generated was 3.75 kWh per day per kW_p for the average solar radiation 5.4 kWh per day per unit area. The average module efficiency, system efficiency and inverter efficiency were 10.8%, 8.5% and 94.8% respectively. The average final yield in outdoor test condition was 3.1 kWh per day per kW_p. The performance ratio of the system per month was 63.27 with 12.9% capacity factor. The average temperature losses, capture losses and system losses were 0.26, 0.73 and 1.06 hour/day respectively.

Biography

Arjun Deo has completed his Master of Technology (MTech) degree in energy studies from Indian Institute of Technology, Delhi, India in 2013. After completing his Bachelor of Technology (BTech) degree in electrical and electronics engineering in 2008, he has 3 years teaching experience at graduate level engineering programme in electrical engineering. Presently, he is pursuing his PhD degree at Indian Institute of Technology, Delhi, India. He has published three research papers in reputed international journals and many conference papers of national and international repute. His areas of research interest are photovoltaic systems, economics and planning, carbon trading and electrical engineering.

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