

Comparison of normal and weather corrected performance ratio of photovoltaic solar plants in hot and cold climates

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ABSTRACT

Performance Ratio (PR) is one of the best performance metrics used to assess solar power plant performance. PR is also used for commercial acceptance of an installed PV power plants. If the PR is tested in different climatic conditions or seasons, there are bias errors, affecting the contractual acceptance testing. PR is often corrected to the Standard Test Conditions (STC), resulting in higher PR since modules usually operate at higher temperatures. This research work utilizes NREL's advanced methodology to determine weather corrected PR of PV power plants in six different geographical locations and climatic regions. The Solar PV plant performance is simulated to get the normal PR as per IEC 61724-1:2017. Percentage variation of Weather corrected PR with Normal PR is determined for all these six geographical regions and compared. The weather corrected PR of Montana (with the lowest annual average temperature of 1.58 °C.) PV power plant has a maximum variation of 7.64% from the normal PR during the summer and -8.61% variation in December during the winter. The weather corrected PR of Kuzhalmannam (with the highest annual average temperature of 27.28 °C) PV power plant has a maximum variation of only 1.16% from the normal PR during summer and a variation of -0.91% in July during the rainy season. It is concluded that the metric of weather-corrected PR gains paramount importance for colder areas, whereas it has minimal influence for tropical regions.

KEYWORDS

PV power plants; Performance ratio; Weather corrected performance ratio; Tropical regions; Solar radiation resource assessment

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