

Over-provision of Solar Panel

Study Overview

This study evaluates the performance of a 150% oversized solar photovoltaic (PV) system in Guangzhou for the full year of 2025, with peak output curtailment applied to cap the maximum solar radiation received at 1000 W/m². The core objective is to quantify the curtailment requirement and the net energy yield benefit of the oversizing strategy.

Key Study Results & Conclusions

1. Curtailment Performance

The final share of solar radiation curtailed over the full year is approximately 5. This validates the core conclusion of the study: **a 150% oversizing of solar PV modules, combined with peak output clipping control, only requires curtailment of around 5% of the total incoming solar radiation.**

2. Hourly Curtailment Characteristics

Curtailment is only required for 7.73% of the total annual hours, and these events are concentrated exclusively in the midday peak solar radiation periods during the summer months. For the vast majority of the year, the system can output the full 150% of the incoming solar radiation without any curtailment.

3. Significant Net Energy Yield Benefit

After the 50% oversizing of solar PV modules and the application of peak curtailment, the total annual solar radiation received reaches 2,274,243.53 Wh/m². Compared to the original total actual annual radiation of 1,595,904.11 Wh/m², this represents a ~42.5% increase in total energy yield, achieving the target of approximately 145% of the original maximum energy output.

The recommendation is to overprovide 150% of solar for any design to benefit from 45% increase in solar energy generated.

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