

Understanding Australia's renewable energy capacity in a changing climate

Solar photovoltaics (PV) have emerged as one of the rapidly growing renewable technologies worldwide and plays a crucial role in future decarbonization. The accelerated pace of climate change has become a critical concern with significant implications for PV systems due to its sensitivity to weather-induced variability. Variability in solar resources increases uncertainty and its intermittent nature imposes limitations on its reliability. On a daily scale, short-term weather events over a region can induce periods of no-to-minimum output during the day. Irregular cloud movements during the day cause abrupt fluctuations in PV power that lead to inaccuracies in the solar power forecast and introduce grid stability issues at higher penetration levels. On a longer timescale, estimating PV system performance and resource variability is essential for pre-feasibility site assessments, financial viability, and optimal system design.

Despite of the large-scale PV deployment worldwide, a comprehensive analysis of role of meteorology in PV system performance in Australia is lacking. With the increase in demand for solar electricity generation and integration in Australia, it is essential to understand solar resource intermittency and investigate options to stabilize energy generation. Hybrid solar and wind plants along with battery storage play an important role in ensuring grid stability and reducing the wholesale electricity prices.

This talk will focus on how climate models can be useful to understand these crucial problems to tackle intermittency and grid in-stability issues. This research helps in identifying regions in Australia where PV systems and wind plants are susceptible to climate change and provides recommendations to mitigate these risks.