

## EME International Seminar Series



# Optimal Capacity of Hybrid Power System for Grid-Connected Houses: An Australian Case Study

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### Abstract:

This presentation discusses the optimal capacities of hybrid power systems which may include either of solar photovoltaic (SPV), small wind turbine (SWT) and battery energy storage (BES) for a grid-connected household (GCH) with or without an electric vehicle (EV) to minimize the overall cost of electricity (COE). The real-time rule-based home energy management systems using actual annual data of solar insolation, ambient temperature, household electricity consumption, and electricity rates are used in the optimization process. The uncertainty analysis is implemented using ten years of real data to confirm the optimal results. The results of several sensitivity analyses of various system parameters are presented. A guideline is sought for the residential consumers in South Australia to select the optimal SPV/SWT/BES based on their daily average electricity demand and the available rooftop space for PV installation. It was found that the SPV/SWT can effectively decrease the COE of the household for both cases (with and without an EV). However, the current price of battery may not be in favour of further reducing the COE of the household.

Wednesday, 7, June 2023 15:00 – 16:00, 3E301 & Teams (onsite and online)

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