

Generation Capacity Addition and Dispatch Modelling

Tutorial-IB

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Abstract:

Over the last decade, renewable generation, mostly wind and solar, has displaced coal-based generation as the cheapest source of electricity in generation cost terms. It is also desirable to add as much renewables as the system can absorb, for local and global ecological reasons. Given this, and the strong policy push, the share of renewables in the Indian electricity grid has been increasing rapidly in recent years, with installed capacity of renewable power generation crossing 100GW.

Traditionally, power generation planning has been focussed on ensuring baseload capacity to meet demand in a reliable and cost-effective manner. This approach is increasingly insufficient to deal with the increased variability and intermittency of generation due to the high proportion of renewable generation in the power grid. Since solar and wind have no fuel costs, it is desirable to curtail them as little as possible, while ensuring system reliability. Battery storage costs have seen huge reductions in recent years and they are expected to continue to drop. This and the modular nature of battery storage, makes it an attractive option to manage diurnal variability and reduce curtailment of renewable generation. In addition, there are various initiatives such as the agriculture solar feeder scheme to shift load to times when generation cost is the lowest. With the advent of smart meters and ICT infrastructure, demand side management options such as time-of-day tariffs and demand response measures are becoming more feasible. Capacity planning and system operation need to consider all these aspects in order to arrive at a least-cost, reliable system.

The tutorial will present a modelling-based approach to optimise capacity addition and dispatch, while ensuring supply reliability. Case studies from the Indian power system will be discussed using results from models built in an open source power sector modelling platform named GridPath.

This tutorial would be of interest to industry and utility professionals, researchers, policy makers, regulators and planners.