

Generation Scheduling

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Generation scheduling is the analysis of the electric power system network operations and the economic dispatch of each power plant to optimise overall energy delivery under given constraints, such as carbon dioxide emissions or transmission stability limits. Scheduling tools support different planning horizons, such as hourly, daily, weekly, monthly and annually, as well as 10-year plans for long-term unit commitment and maintenance scheduling.

It involves the determination of start-ups and shut-downs, and production levels of all units in all hours of the optimisation period, considering unit characteristics and system restrictions. The unit characteristics and restrictions that are handled are Minimum and maximum production levels, fuel cost function, start-up costs, minimum uptime and minimum downtime. The system restrictions handled is the power balance (supply equal to demand in all hours). As the size of an electric power system grows, the economic significance of power generation scheduling becomes essential in terms of reliability and longer operational lives of the constituent units.

Important terms related to the subject are Actual Generation and Scheduled generation, hereafter referred to as AG and SG, Deviation, Penalty and Incentives, Deviation charges, Area clearing price (ACP), Fuel Costs, and Net Gain. The SG is the day-ahead data which is divided into blocks of 15 minutes each, i.e. 96 blocks in a day for a single power plant. Similarly, AG is the real-time generation from the power plant meter. The difference between the two, or (AG - SG) is the deviation.

The main purpose of Generation Scheduling is to minimise the deviation, or the SG must be equal to AG at all times. However, practically it is not possible. Depending upon the frequency and the sign of deviation (Overinjection in case of negative deviation and underinjection in the case of positive deviation), penalties or incentives for the powerplant are calculated.

Nowadays, SG is predicted through machine learning. The past values of AG are used as a database to train and test the model.