A Framework for Transmission Expansion Planning A Complex Problem Clouded by Uncertainty

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Abstract

Transmission Expansion Planning (TEP), a complex problem that is vital to ensure the proper functioning of restructured electricity markets, is clouded by uncertainties. Timely and cost-effective transmission expansion is necessary for providing secure and reliable electricity service to customers, enhancing competition, and ensuring market efficiency in electricity markets. Given the irreversibility and long lifetimes of transmission investments, TEP requires addressing uncertainties on future system conditions several years ahead. Because of these fundamental properties of transmission, the importance of developing tools and models to assist power system planning under uncertainty has long been recognized. As any decision under uncertainty is made before the uncertainty is revealed, addressing uncertainties allows hedging against risks caused by the outcomes of decisions taken under uncertainty..

Keywords

Power system planning, Power transmission, Investment, Load modeling, Mathematical model, Stochastic processes, Electricity supply industry, Power system reliability.