

Channarong Suksamanphanith 2014: Optimal Allocation of Operating Reserve in Electricity Markets with Bilateral Transactions. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Parnjit Damrongkulkamjorn, Ph.D. 66 pages.

This thesis proposes the study of optimally allocating the operating reserve in electricity markets that have both bilateral transactions and pool transactions. The additional reserve variables are included in the objective function along with the new constraints on regulation reserve, spinning and non-spinning reserves. The conditions on those reserves are based on parts of reserve regulation in existing electricity markets. The study applies the optimal power flow to determine the capacity of optimal generation dispatched and operating reserve capacity of generators, power flow in transmission lines, bus voltage magnitude and angle. The minimum total cost of system includes the cost of pool transactions and bilateral transactions and the cost of operating reserve.

The proposed algorithm is programmed in MATLAB and tested with a modified IEEE 30 bus system under certain NYISO and CAISO reserve regulations.

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