

A reactive power capacity market using annual auctions

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Abstract-

This paper presents a new approach to design reactive power capacity markets. Under this approach annual auctions to procure reactive power capacity are conducted by the system operator. Two products are defined, reactive power generation and absorption capacity, which can be supplied by different independent VAR sources, such as generators, SVCs, capacitor banks and shunt reactors. Reactive power capacity is allocated using an optimization algorithm that matches capacity bids and system reactive power needs, for peak and low demand hours. The reactive power requirements are calculated taking into account system contingencies and the dynamic performance of the VAR sources under these situations. Another key proposal of the paper is the distribution of costs of the reactive power capacity market to the agents responsible for contingencies according to the use of the service by each market participant. This remuneration approach provides fair and efficient economic signals to all market participants. The applicability of the approach is illustrated with two case studies.

Index Terms- Ancillary services, Aumann–Shapley value, capacity markets, reactive power pricing, voltage control

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