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Auction design in day-ahead electricity markets

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Abstract— Competition in day-ahead electricity markets has been established through auctions where generators and loads bid prices and quantities. Different approaches have been discussed regarding the market auction design. Multiround auctions, despite their implementation complexity, allow market participants to adapt their successive bids to market prices considering their operational and economic constraints. However, most of the day-ahead electricity market implementations use noniterative single-round auctions. This paper presents a market simulator to compare both auction models. Different auction alternatives-such as the Spanish single-round auction that takes into account special conditions included in the generator bids and multiround auctions with different stopping rules-are analyzed. The results and acquired experience in the simulation of the Spanish market, started in January 1998, are presented. Hourly market prices; average daily price; price/demand correlation; and several economic efficiency indicators, such as generator surplus, consumer surplus, and social welfare, are compared to derive conclusions regarding the performance of the auction altematives.

Index Terms— Electricity markets, auctions, bidding strategies, market clearing price.

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