Multi-Objective Optimal Bidding Approach for both Small & Large Customers in Competitive power Market

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Abstract:
In the present scenario of the electricity energy market, power generation firms seek to maximize revenue by optimizing the bid in the electricity market. In a competitive market, Strategic bidding allows each participant to improve his individual profit; however, this has a detrimental effect on public benefit. This study presents a mechanism for developing a strategic bid for electricity producers and users in a pool co-style energy market. The system is dispatched to maximize social welfare, with each supplier/large consumer bidding a linear supply/demand function. Price takers require a proper bidding structure to identify the best bidding tactics. As a result, the model must be thought of as a two-level optimization issue. Price takers submit strategic bids to the Independent System Operator (ISO) at the lower level, while the ISO Market Clearing Price (MCP) is used to maximize social welfare at the upper level in a day-ahead power market to maximize social welfare at the upper level using a pay-as-bid mechanism in a sealed auction in the competitive power market. On the IEEE-30 bus system, the proposed method's efficiency was tested. Four different evolutionary algorithms such as NSGA-II, NSGA-III, MOGWO, and MOPSO were used to address the problem from two separate perspectives for solving proposed multi-objective problems. The result section presents a comparative analysis of the total profit and market clearing price, showing that the NSGA-III algorithm offers superior results than other methods.

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Contents

Deregulation of the electricity system ushered in a rebellion that forever altered the appearance of the Electricity market. The entry of new competitors into the market resulted in a significant improvement in the reliability of the system. Consumers had the option of prefer their own operators; something will not do in a controlled market, thanks to the competition that was brought about by regulation. As a result of the market's incorporation of participants, they were able to use creative approaches to get them more cost-effective and consistent, with the goal of increasing profits. Several bodies, such as the independent system operator (ISO) and the power exchange, were created to ensure the efficient working of the power souk. The loosening of the power souk, open network access, and deregulated energy souks, among other things, began in the 1980s in the United Kingdom and a few other nations [3].