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FINANCIAL RISK-ORIENTED ANALYSES IN THE SCHEDULING OF MULTI-ENERGY MICROGRIDS

Abstract:

The present study investigates a multi-objective strategy for scheduling Multi-Energy Microgrids (MEMs) with Power to X (P2X) conversion technology in advance. The P2X technology serves as the fundamental framework for these microgrids, incorporating multiple energy conversion systems and diverse energy storage technologies to optimize efficiency. The primary objective is to reduce operational expenses, mitigate risks, and decrease carbon emissions. Two risk management tools, namely Conditional Value at Risk (CVaR) and a robust approach, are recommended to address the financial risks involved in MEM's scheduling. The study results for the considered microgrid imply that an operator's adoption of a risk-neutral approach necessitates procuring a substantial portion of power from the day-ahead electricity market. In addition, implementing a risk-averse strategy by a MEM operator results in diminished participation in the energy market through reduced bidding and an increased overall presence in the real-time market.

Keywords:

Multi Energy Grid, Energy storage, Multi-objective optimization, Cost-effective, P2X conversion