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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 primary objective is to reduce operational expenses, mitigate risks, and decrease CO2 emissions. To address the risks involved in MEM's scheduling, two risk management tools, namely Conditional Value at Risk (CVaR) and a robust approach, are recommended. These tools aim to mitigate risks from both economic and technical perspectives. The simulation findings indicate that if a risk-neutral unconservative risk approach is taken, the projected operating cost would amount to \$7,400, and the carbon emissions would reach 58 tCO2. Implementing a risk-averse strategy results in a 21% decrease in CVaR, leading to a 24% rise in operating expenses and a 20% decline in emissions. Furthermore, implementing a robust approach to regulation services leads to a 34 */day increase in operational expenses compared to the cautious and conservative strategy.

Keywords:

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