

Model Selection and Mechanism Design for Electricity Markets in Hydropower-Rich Regions: Adaptation Study

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Abstract

Most of the first eight pilot regions in China have entered the long-period continuous operation stage, and the second batch of six power spot pilots have started their simulation trial runs; however, the construction of power markets in the hydropower-rich regions of China (i.e., Sichuan and Yunnan) still faces multiple problems, including poor reliability of medium- and long-term power supplies, inefficient hydropower resource utilization and consumption scales, and unstable market prices. In this study, we establish a multi-scale joint clearing model for different market models (considering both long- and short-term operation strategies) and perform simulations of different market models at different time scales, to compare and analyze their optimization results and electricity price fluctuations. The model can stabilize the market price and reasonably reflect the true value of hydropower; it can also promote the consumption of clean energy and ensure the reliability of power supplies in the medium and long term. Finally, suggestions are made regarding the selection of electricity market models, the security of energy supplies, and the design of sustainable development mechanisms for hydropower in hydropower-rich regions, with a view to providing useful references for the development of China's electricity market.

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