Author(s): Puneet Chitkara, Kaiying Lin, Benjamin F. Hobbs, Jalal Kazempour

Organization(s): Johns Hopkins University

Email Address: puneetchitkara2903@gmail.com

Title: Efficiency of two-settlement electricity markets under uncertainty and varying risk perceptions

Abstract: Title: Efficiency of two-settlement electricity markets under uncertainty and varying risk perceptions

This study seeks to assess the efficacy of flexible resources, including demand response and financial participants (virtual bidders) in enhancing the efficiency of two-settlement electricity markets under alternative market designs and conducts of market players with different risk perceptions. The first stage of the two-settlement electricity market involves Day Ahead Scheduling based on the expected value of wind generation, while the second stage resolves real-time imbalances based on the actual realization of wind generation. The impact of virtual bidders on the efficiency of such markets is hypothesized to critically depend on their risk preferences. The paper attempts to simulate a large real-world power system using Alternative Directions Methods of Multipliers (ADMM). The work is an extension of the two settlement market models of Kazempour and Hobbs (2018) and Kazempour and Pinson (2016) in order to include virtual bidding, stochastic wind and demand, and possible risk aversion.

References:
[1] J. Kazempour and B. F. Hobbs, “Value of flexible resources, virtual bidding, and self-scheduling in two-settlement electricity markets with wind generation—part II: ISO models and application,” IEEE Transactions on Power Systems, vol. 33, no. 1, pp. 760–770, 2018.
[2] S. J. Kazempour and B. F. Hobbs, “Value of flexible resources, virtual bidding, and self-scheduling in two-settlement electricity markets with wind generation part I: Principles and competitive model,” IEEE Transactions on Power Systems, vol. 33, no. 1, pp. 749–759, 2018.
[3] S. J. Kazempour and P. Pinson, “Effects of risk aversion on market outcomes: A stochastic two-stage equilibrium model,” in 2016 International Conference on Probabilistic Methods Applied to Power

Systems (PMAPS), 2016, pp. 1–6.
[4] S. Boyd, N. Parikh, E. Chu, B. Peleato, J. Eckstein et al., “Distributed optimization and statistical learning via the alternating direction method of multipliers,” Foundations and Trends in Machine learning, vol. 3,no. 1, pp. 1–122, 2011.

Key words: Two Settlement Markets, Virtual Bidders, ADMM