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Title: Simulating Power Market Efficiency Benefits from Increased Electrification

Abstract: Last year at the 11th Transatlantic Infraday conference, we presented a paper on the implications of deep load-following and weekend on-off cycling of electric power plants which were designed for baseload operation with only limited cycling. Multi-state markets like PJM, MISO, and SPP do not factor in the physical and cost consequences of cycling baseload units. Our previous paper, through model simulations, presented scenarios in which measures to reduce the cycling that occurs under current market rules can lower the cost of electricity to the grid. We also presented mitigation approaches such as somehow reducing NGCC capacity expansion, which can displace baseload units, with gas peaking capacity which provides peak demand capacity while reducing baseload cycling.

The theme of the 12th Transatlantic Infraday conference is on electrification. In this paper we present some consequences for the efficiency of electric power markets from electrification which flattens electricity demand such as 24-hour industrial electricity use and electric vehicle nighttime battery charging.

Argonne's Electricity Supply and Investment Model (ESIM) dispatches individual electric generating units to meet seasonal load duration curves in US regions. Separate load curves are used for weekends to include on-off weekend cycling of baseload units.

Key words: Electricity markets, power plants, economic efficiency, electrification