

Workshop on Energy Flexibility in Smart Buildings and Smart Grids

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Energy Flexibility
Smart Grid & Buildings

Bidding Strategies in Local Energy Markets

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Type of talk: Invited talk

Abstract:

Local electricity markets are a promising idea to foster the efficiency and use of renewable energy at the distribution level. However, as such a new concept, how these local markets will be designed and integrated into existing market structures, and make the most profit from them, is still unclear. In this talk, we introduce a local market in which consumers, small producers, and prosumers are able to trade energy. Due to possible low liquidity in the local market, the mechanism assumes that end-users fulfill their energy demands through bilateral contracts with an aggregator/retailer with access to the wholesale market. Due to the complexity of the matter, and lack of perfect information of end-users, we advocate the use of evolutionary computation, a branch of artificial intelligence that has been successfully applied to a wide variety of optimization problems. Results show that the proposed market mechanism provides overall costs improvements to market players of around 30–40% regarding a baseline where no local market is considered. However, the shift to local markets in energy procurement can affect the conventional retailer/aggregator role. Taking this into account, we explore different extensions of the original model in view of innovative business models for the successful implementation of local markets in the future.

Related References:

- [1] Lezama, F., Soares, J., Faia, R., Vale, Z., Kilkki, O., Repo, S., & Segerstam, J. (2021). Bidding in local electricity markets with cascading wholesale market integration. *International Journal of Electrical Power & Energy Systems*, 131, 107045.
- [2] Lezama, F., Soares, J., Faia, R., Faria, P., & Vale, Z. (2021, September). Bidding in Local Energy Markets Considering Uncertainty from Renewables and Demand. In *2021 IEEE International Conference on Environment and Electrical Engineering and 2021 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe)* (pp. 1-6). IEEE.
- [3] Lezama, F., Soares, J., Hernandez-Leal, P., Kaisers, M., Pinto, T., & Vale, Z. (2018). Local energy markets: Paving the path toward fully transactive energy systems. *IEEE Transactions on Power Systems*, 34(5), 4081-4088.