

# 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.