Evaluating price-based demand response in practice – with application to the EcoGrid EU Experiment - DTU Orbit (19/08/2019)

Increased emphasis is placed today on various types of demand response, motivated by the integration of renewable energy generation and efficiency improvements in electricity markets. Some advocated for the development of price-based approaches, where the conditional dynamic elasticity of final users is exploited in the power system, e.g. for system balancing. However, very few real-world experiments have been carried out and price-based demand response has consistently been found difficult to assess and quantify. It is our aim here to describe an approach to do so, as motivated by the large-scale EcoGrid EU experiment. In this project, 1900 houses were equipped with smart meters and other automation devices in order to adapt consumption to real-time electricity prices every five minutes, while monitoring it with the same resolution. Our approach first relies on the clustering of residential load observations that behave similarly within a given experiment. Then, a clinical testing approach, based on a test and a control group, is adapted to assess whether price-responsive loads were actually responsive or not. Interestingly, in the deployment phase of the project, the results show that houses could be deemed price-responsive on some test days, while results were inconclusive on some others.

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