



Bilateral Contracting and Price-Based Demand Response in Multi-Agent Electricity Markets: A Study on Time-of-Use Tariffs

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Summary

This article is devoted to the agent-based models of Retailers and Consumers, focusing on the negotiation of bilateral contracts considering price-based demand response (DR) programs, using the following models: i) bilateral negotiation; ii) pricing strategies; iii) trading strategies; iv) demand response strategies. Specifically, it describes ongoing work that uses the potential of agent-based technology for supporting bilateral contracting in electricity markets with demand response. From the perspective of end-use customers, it investigates how foregoing and shifting affect the energy and monetary outcomes of consumers with three-rate time-of-use tariffs, applying demand response during the contract, and benefiting from it during the negotiation of new bilateral contracts. From the point of view of retailers, it investigates how retailers can attract consumers to respond to tariffs considering retailers load shape goals. The highlights comprise:

Highlights

- a model for bilateral negotiation of DR programs;
- a model for retailers able to plan DR programs, and to develop and propose strategical tariffs considering their load shape goals and the consumers' behavior (using the above model);
- a model of consumers able to respond to DR programs and the development of DR strategies to deal with different tariffs with the goal of minimizing costs.
- a case study to test the above models using an experimental evaluation that tests retailers and consumers' behaviors to DR programs. The goals are to verify the consumer's response to different time-of-use tariffs proposed by the retailer, and the retailer response to consumptions changes of the consumer.



The TradeRES project will develop and test innovative electricity market designs that can meet society's needs of a (near) 100% renewable power system. The market design will be tested in a sophisticated simulation environment in which real-world characteristics such as actors' limited foresight into the future and risk aversion are included.



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