TradeRES
New Markets Design & Models for 100% Renewable Power Systems

TradeRES Research Bulletin

Strategic Participation of active Citizen Energy Communities in spot Electricity Markets using Hybrid Forecast Methodologies

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Summary

This article is devoted to the agent model of Citizen Energy Communities (CECs), focusing on the strategic bidding process of CECs considering the following models: i) a risk management; ii) imbalance Settlement; iii) trading strategies; iv) bilateral trading; v) hybrid forecasts. Specifically, the theoretical work presented in the paper includes a description of the CEC agent model, designed for local resource management and bilateral and spot trading based on strategic bidding. Agent-based market CECs are equipped with trading strategies, utility functions, a bilateral trading model that enables them to propose and negotiate different types of bilateral contracts, and a strategic bidding model to submit bids to spot wholesale markets. The strategic bidding process uses two different hybrid forecast methodologies: a forced historical hourly comparison of consumption and a short-run trend considering the typical consumption behaviour of consumers. The second methodology is used in the day-ahead forecasts. The last methodology is used in the spot intraday forecasts. The highlights comprise:

Highlights

- A model that manages the resources of CEC agents, using risk management and trading strategies;
- The development of a strategic bidding process that aims at satisfying the energy needs of CECs, by submitting bids to wholesale markets with the goals of reducing the costs of their energy by reducing forecast errors, unbalances, and penalties;
- A model of the Portuguese balancing and Imbalance Settlement markets.
- A case study that tests the strategic bidding process and compares its results with non-risk retail tariffs. The case study involves a CEC composed of 312 Portuguese medium voltage consumers. The data from 2012 is extrapolated to 2019 and used to compute the market costs of CEC using data from the Iberian market of electricity in 2019.

Info

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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