



Management of Local Citizen Energy Communities and Bilateral Contracting in Multi-Agent Electricity Markets

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Summary

Over the last few decades, the electricity sector has experienced several changes, resulting in different electricity markets models and paradigms. In particular, liberalization has led to the establishment of a wholesale market for electricity generation and a retail market for electricity retailing. In competitive electricity markets, customers can do the following: freely choose their electricity suppliers; invest in variable renewable energy such as solar photovoltaic; become prosumers; or form local alliances such as Citizen Energy Communities. Trading of electricity can be done in spot and derivatives markets, or by bilateral contracts. This article focuses on communities of energy. Specifically, it presents how agent-based local consumers can form alliances as Citizen Energy Communities, manage their resources, and trade on electricity markets. It also presents a review of how agent-based systems can model and support the formation and interaction of alliances in the electricity sector. The community can trade electricity directly with sellers through private bilateral agreements. During the negotiation of private bilateral contracts, the community receives the prices and volumes of their members and according to its negotiation strategy, tries to satisfy the electricity demands of all members and reduce their costs for electricity.

Highlights

- A review of agent-based alliances in the electricity sector;
- The presentation and test of a model for the formation and management of Citizen Energy Communities;
- The presentation and test of a model for bilateral trading of electricity between communities and opponents (e.g., producers, retailers, etc.);
- The community reduces its member costs for electricity by 33%, and becomes carbon-neutral in relation to electricity consumption. The wind aggregator increases its remuneration by 16%, and passes the responsibility for imbalances to the community.



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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