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

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Ontologies to Enable Interoperability of Multi-Agent Electricity Markets Simulation and Decision Support

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Summary

This paper presents the AiD-EM Ontology, which provides a semantic representation of the concepts required to enable the interoperability between multi-agent-based decision support systems, namely AiD-EM, and the market agents that participate in electricity market simulations. Electricity markets' constant changes, brought about by the increasing necessity for adequate integration of renewable energy sources, make them complex and dynamic environments with very particular characteristics. Several modeling tools directed at the study and decision support in the scope of the restructured wholesale electricity markets have emerged. However, a common limitation is identified: the lack of interoperability between the various systems. This gap makes it impossible to exchange information and knowledge between them, test different market models, enable players from heterogeneous systems to interact in common market environments, and take full advantage of decision support tools. To overcome this gap, this paper presents the AiD-EM Ontology, which includes the necessary concepts related to the AiD-EM multi-agent decision support system, to enable interoperability with easier cooperation and adequate communication between AiD-EM and simulated market agents wishing to take advantage of this decision support tool.

Highlights

- Conception, development, and experimentation of a dedicated ontology to enable the interoperability between multi-agent electricity market simulators, smart grid simulators, and the *Adaptive Decision Support for Electricity Market Negotiations* (AiD-EM) decision support system.
- The AiD-EM ontology models AiD-EM's agent interactions (i.e, requests and responses) and the inputs, outputs and parameterizations of the available algorithms.
- AiD-EM ontology is publicly available for reuse and extension at http://www.mascem.gecad.isep.ipp.pt/ontologies/.

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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