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

TradeRES Research Bulletin

Risk-Sharing Contracts and risk management of bilateral contracting in electricity markets

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Summary

The article is devoted to the formal description and simulation of a new type of bilateral contract, the Risk-Sharing Contract (RSC), to reduce the price risk of bilateral contracting in multi-agent electricity markets, increasing the social welfare of different types of agents. Using RSCs can be important to hedge against long-term commodity speculation, e.g., in the case of political uncertainty that leads to rises/falls in the commodities prices. Furthermore, RSCs should be used in the case of power systems with majority penetrations of variable renewables, hedging against low/high market price volatility originated by the suddenly excess/scarcity of renewable generation. Specifically, the theoretical work presented in the paper includes a formal description of the RSC design for bilateral trading between different players. Agent-based market players are equipped with a risk management process, trading strategies, utility functions, and a bilateral trading model that enable them to propose and negotiate different types of bilateral contracts.

Highlights

- A risk management process where an agent can analyse the risk factors of different trading options, quantify them and then decide the best option;
- A new type of contract, the RSC, that can be beneficial to mitigate the risk of bilateral contracts and serve as a form of hedging against spot price volatility;
- The adaptation of the von Neumann-Morgenstern expected multi-objective utility function, to compute the utility of different electricity markets agents;
- The formalization of a new concession factor that can deal with the risk attitude of the agents, such as the shared risk of different items and their uncertainty.

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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