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

TradeRES Research Bulletin

# Electricity market and power flow services for dynamic market simulations

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## Summary

The share of renewable generation is growing worldwide, increasing the complexity of grids' operation to maintain its stability and balance, leading to an increased need for designing new electricity markets (EMs) suited to the new reality. Simulation tools are widely used to experiment and analyze the potential impacts of new solutions, such as novel EM designs and power flow analysis and validation. This work introduces two web services for EMs' simulation and study and power flow evaluation and validation, namely the Electricity Market Service (EMS) and Power Flow Service (PFS). EMS enables the simulation of two auction-based algorithms and the execution of three wholesale EMs. PFS provides the creation and evaluation of electrical grids from the transmission to distribution grids. Being published as web services facilitates their integration with other services, systems, or software agents. Combining them allows simulating EMs from wholesale to local markets and testing if the results are compatible with a specific grid. This paper presents a detailed description of how both systems work separately and in sync and how the connection to the external system can be accomplished. A case study involving the MIBEL market, using real players and offers data is presented.

## Highlights

- The Electricity Market Service (EMS) allows the simulation of a few European electricity markets, namely the Iberian electricity market (MIBEL), the European Power Exchange Spot market (EPEX Spot), and the Nord Pool Spot.
- The Power Flow Service (PFS) provides the evaluation and validation of the power flow of a given electrical grids.
- Both services are publicly available, documented, and accept JSON or Excel files as input and output for the available requests.

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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