



## Blockchain-based Local Electricity Market Solution

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### Summary

The growth of renewable energy sources usage at the local level contributes to decentralizing the power and energy systems. Nowadays, there is an increment of residential consumers becoming prosumers able to consume their generation or sell it to the public grid to reduce the electricity bill. This great penetration of electricity compromises the proper functioning of the system. Local electricity markets (LEM) are market platforms aimed at electricity end-users to be able to negotiate and transact it between them, thus becoming active players in the system, being a possible solution to balance local systems. Different approaches for LEM design and implementation are proposed in the literature, usually based on community markets and peer-to-peer. Despite their value, these solutions' scalability is compromised as these are centralized solutions, and processing can become very heavy. In this sense, this work proposes a blockchain-based distributed and decentralized optimal solution for implementing LEM.

### Highlights

- Distributed and decentralized optimal solution for the LEM's participation, using blockchain technology for secure and trustful transactions
  - It considers day-ahead markets where each player (represented by a software agent) runs his optimization to determine the amount of energy to buy or sell in each period, sending the results to the local market operator
  - The operator validates the results of all participating players to ensure the proper functioning of the grid, solving possible constraints and issues
  - Two-step process where each player finds the best possible solution for himself
  - After authorization from the operator, players trade electricity with their neighbors



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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