

# A Blockchain-based Platform for Exchange of Solar Energy: Laboratory-scale Implementation

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**Abstract—** Over the last decade, the increasing uptake of rooftop solar photovoltaics (PV) at the grid edge transforms residential houses into complex energy "prosumers". A house with rooftop solar PV can both consume and export electricity. Hence, it can participate in a "Transactive Energy" network involving peer-to-peer (P2P) exchange of excess electricity. The challenge is to keep track of these transactions and compensate buyers and sellers accordingly. Recently, blockchain has emerged as a distributed ledger technology which allows exchanges among participants without the need for a central market entity. There are several blockchain pilots in the energy sector, which focus on the business, legal and financial aspects, but without much details about how to implement a blockchain-based P2P trading platform. This paper addresses this issue by presenting laboratory-scale implementation of a blockchain network for exchange of solar electricity among participants using Hyperledger – an open-source collaborative effort. Participants, assets and transactions necessary to establish the blockchain-based network for keeping track of solar PV output exchanges are described, together with the smart contract, use cases and their implementation.

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