

Techno-economic assessment of peer to peer energy trading: an Egyptian case study

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Abstract-

Peer-to-peer (P2P) energy trading has emerged as an innovative approach for selling electricity from prosumer to consumer at the distribution level. This paper is the first to conduct a techno-economic assessment of P2P energy trading in Aswan, Egypt. Different scenarios under different electricity tariffs, which consider photovoltaic systems, energy storage systems, and electric vehicles deployment, are analyzed to assess the performance of P2P trading considering different distributed energy resources (DERs) installations. The variety of these scenarios enables a thorough analysis of P2P trading and a clear comprehension of how P2P trading impacts distribution networks. The study offers new perspectives on the impacts of implementing P2P trading on the distribution network since it uses a real demand profiles. Results show that P2P can reduce community electricity costs, improve self-consumption by reducing exports to distribution system operator, and rise self-sufficiency compared to home energy management system (HEMS). The distribution network operation limits are not violated in any of the studied scenarios and electricity tariffs. The impacts on the distribution network for P2P energy trading scenarios and equivalent HEMS are very similar for flat tariff. However, for ToU tariff, P2P energy trading scenarios with flexible devices result in higher impacts on the distribution network than the equivalent HEMS.

Index Terms- P2P energy trading, energy community, local electricity market, transactive energy, impacts on distribution networks.

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