

A Real-Time Transactive Energy System for Nanogrids

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Abstract: The grid is witnessing an increasing emergence of small distributed energy resources (DERs), along with a greater prevalence of storage systems. These participants have highly dynamic properties and thus introduce several transactional challenges. We propose a rapidly convergent, privacy preserving, real-time transactive energy (TE) system which uses a dynamic pay-as-bid double auction. We describe a prototype which simulates the behaviour of the auction system and its participants who negotiate prices with individual bidding strategies. The proposed system allows the participants to transact without seeking numerous quantity-price trading pairs, thereby protecting confidentiality of cost curves of each competing participant. A less information-rich input does introduce some element of higher price volatility as an outcome, which, in this context, can be tolerated as parties perform small-ticket transactions. Such a TE system can be a step forward in preparing for a future where large generating firms and smaller complementary DERs participate in the market on an equal footing.