

Economic, Reliability, and Resilience Considerations for Transactive Energy Systems

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This presentation discusses factors to consider for deployment of Transactive Energy Systems (TES) with a view to the values TE can create under varying grid conditions. In this context three broad categories of grid conditions are considered, namely, normal, at-risk, and emergency. The proposed valuation metrics include economic, reliability, and resilience benefits. The primary beneficiaries are considered to be the transacting parties, which may include prosumers in peer-to-peer exchanges, and prosumers and system operators in peer-to-market transactive exchanges.

The individual economic values are expressed in terms of tenders (bids and offers) in peer-to-peer or peer-to-market transactions.

The reliability values are expressed in terms of metrics related to service continuity and quality primarily for regular consumers not necessarily engaged in transactive exchanges (those involved in transactive exchanges express their individual valuation of service continuity through their bids and offers).

The resilience values are not yet universally established. The presentation will attempt to offer some metrics for consideration.

A large number of Transactive Energy use cases are available from prior DOE/GWAC, EPRI, SGIP, and other studies. Sample use cases are analyzed and discussed within the framework of grid conditions and TE valuation axes as schematically presented in the following table.

	Economic	Reliability	Resilience
Normal	Value is meeting market requirements.	Value is maintaining reliability.	Value is providing the ability to avoid disturbances.
At-Risk	Value is continuing to keep the market active and provide service to customers	Value is relieving stress and avoiding outages	Value is in anticipating and avoiding problems
Emergency	Value is avoiding market failure and loss of service to customers.	Value is reducing outage impact (duration and/or number of customers)	Value is responding quickly to anticipate problems in order to eliminate emergency conditions.