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## Distribution System Operator Models for Utility Stakeholders

### - DSO Organizational Models for a Digital, Distributed Modern Grid

The electricity wholesale market system has enabled utilities, Independent Power Producers (IPPs), and now “qualified” third-party aggregators to trade and make money in bulk energy and ancillary services markets. It is a closed market in which the Independent System Operator (ISO) determines who can play and who cannot.

The result of having wholesale markets and creating a competitive landscape has had numerous benefits, including lower energy costs to end consumers and more reliable energy delivery. But, the other, equally important effect is the innovation that has occurred due to having a market in which to compete. The results have manifested as more efficient and cleaner power plants, new software applications, better control systems, and new optimization solutions.

We have now reached a point where Distributed Energy Resources (DERs) can be purchased by businesses and homeowners at prices that have justifiable Returns on Investment (ROI). This is especially true as energy prices increase and the price of DERs decreases. Regulators, ISOs and utilities are studying the concept of creating a Distribution System Operator (DSO) that would animate new distribution markets and engage DER owners.

Establishing new DSO functions that include an open and transparent distribution market is the next evolutionary step required to create a “new energy economy” that empowers utilities, consumers, producers, third-party aggregators, technologists, and new business models to create more efficiencies, cleaner and cheaper power, better reliability and more resilience. The DSO functions and different models described in our document lay the foundation for considering how to enable this new energy economy ecosystem from an organizational standpoint based on your local politics, regulatory environment, grid constraints, and other local considerations.

Our paper introduces six DSO models based on current industry perspectives and provides explanations of the roles and responsibilities for each actor in the models. The models presented are meant to be representative of a spectrum of market and ownership types ranging from highly centralized wholesale markets to highly decentralized peer-to-peer markets – with some models in-between. They are not meant to be **the** models, but rather to provide starting points based on the one(s) closest to what is “viable” based on local conditions, politics, regulatory environments, grid situations, and other local considerations.

This is the next evolutionary step truly required to bring about lower electricity prices, greater efficiencies, and an abundance of clean energy. The societal and economic benefits of establishing new distribution energy markets will create an ecosystem ripe for research, innovation, and new businesses, while also making the grid more resilient, reliable, and safe. It will enable and complement electric transportation, renewable energy, and more efficient homes and businesses. Establishing a DSO in a thoughtful, practical, and tailored way is the next step necessary to jump start our next industrial revolution.