Title: Retail Market Mechanism to Provide Differentiated Reliable Service

Duration: 2013-present

Sponsor: N/A

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Description: This work focuses on delivering fair electricity pricing, based on reliability, for distribution utilities and their customers. Although different end-users might have different reliability preferences, the customers' preferences for service quality are not taken into account in the investment decision made by utility companies. New technologies, such as distribution automation, demand response (DR), and distributed generation (DG), could enable the utilities to provide differentiated reliable services. This provision could be done by supplying power to customers who are willing to pay for beyond minimally required service quality. An electric utility would deploy sectionalizing switches to reconfigure the networks such that switches operate in an optimal way to deliver power to priority customers. Moreover, if the power grid is disconnected from the main substation, a DG located in the grid could be utilized to supply power to customers corresponding to their adjusted energy demand during power outages. Besides, the application of this work could be used to manage long power outages in grids at value determined by the customers.

We are actively looking for real-world distribution networks to demonstrate such possible retail market mechanism. Experiments should be set to determine demand functions for reliability.