

Enabling Demand Response in Electricity Retail Markets with Energy Internet Technologies

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Abstract

With the development of smart technologies on customer sides, electricity end users become visible to the system operator. Through communication links, smart meters, energy internet and new information technologies, it is possible for a small customer to interact with the distribution operator. The operation structure of power industry is facing the largest change since AC system and centralized control was adopted in 1880s. Traditional power system control method is generation following load changes. With new technologies, it is possible for customers to change their demand patterns to follow the fluctuations in the generation side caused by high penetration of renewable energy generations. The real-time power balance can be implemented from both generation and customer sides. Demand response and new energy internet technologies enable the possibility for customers and their behaviors to be part of the power system control.

A flexible & dynamic electricity retail price will facilitate the integration of the large number of small energy consumers into system operation, and be part of the participants of energy market as well as providers of reserve and frequency control services. A retail market provides opportunities to consumers of various sizes to participate and influence the load profile. A well-designed retail market mechanism coordinating with energy internet and other smart technologies, is possible to adjust the system load profile to the shapes suitable for the most efficient and economic operation.

In this presentation, we will introduce the energy internet technologies and other new technologies used for customers to make them a smart customer in the system. Base on the available technologies, we will discuss how a retail market mechanism design can enable consumers to utilize the technologies in the distribution system to maximize their benefits while contribute to the system energy efficiency improvement.