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Improved Wholesale and Retail Market Performance through Efficient Pricing

Bernard Neenan
Technical Executive, EPRI
Knoxville, TN USA

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Abstract:

Electricity markets cannot make the most efficiency use of scarce societal resources without some degree of customer interaction—responding to exigent supply and demand conditions. While this is not a new revelation, the confluence of several factors has made this abundantly clear, and the amount of U.S. retail load available for curtailment now exceeds 8% of peak demand.

However, there is no consensus on how customer should influence electricity markets; how they participate and what they are paid or the benefit they should realize. This stems from the lack of a universally accepted means for determining what constitutes load response, and hence what is value of programs and electric services that intend to induce load changes. Nor is there agreement on how much of what kinds of price-responsive loads are needed under different market conditions. New technologies make it easier for consumers and businesses to modify electricity usage, even on very short notice. However, do these devices pay for themselves? Do they generate value that justifies someone offsetting the acquisition cost? How do they contribute to reliability, and what is that worth?

Customers are an essential part of an integrated grid. The question is: Are they part of the problem or part of the solution? If they are passive, then technology solutions will be required at every stage to accommodate the evolving purpose and operation of a highly integrated grid. If at least some consumers and businesses are willing to respond to exigent circumstances, then the IG investment requirements will be different, and perhaps lower.

This paper clarifies how to value price and demand response mechanisms so that market designers, utilities, load serving entities, technology developers and manufacturers, regulators, and other electricity market stakeholders can compare and contrast programs using a consistent measure of value. The framework proposed works equally well in centralized and integrated markets, with and without customer choice, and under any regulatory regime. It has an empirical analogue so monetary values can be estimated to guide program design and implementation, and measure performance.