

EVALUATING THE DEMAND AND ENERGY IMPACTS OF STATIC AND DYNAMIC TIME-BASED PRICING FOR RESIDENTIAL CUSTOMERS: THREE CASE STUDIES

Moderator: Steven Braithwait, Christensen Associates Energy Consulting

PAPERS:

Final Results from SMUD's SmartPricing Options Pilot

Dr. Stephen George, Nexant, Inc.

Nate Toyama, Sacramento Municipal Utility District

Analysis of Ontario's Full Scale Roll-out of TOU Rates

Dr. Ahmad Faruqui, The Brattle Group

Dr. Neil Lessem, The Brattle Group

Dr. Sanem Sergici, The Brattle Group

Dr. Dean Mountain, Mountain Economic Consulting and Associates, Inc.

Frank Denton, Mountain Economic Consulting and Associates, Inc.

Byron Spencer, Mountain Economic Consulting and Associates, Inc.

Baby, It's Cold Outside: 2014 PolarVortex Impacts on Residential Dynamic Electricity Pricing Programs

David Becker, Elevate Energy

SESSION SUMMARY:

This session provides some important findings from three different types of residential time-based pricing – a comprehensive and well-designed smart-pricing experiment at Sacramento Municipal Utility District (SMUD) in California; the full-scale roll-out of time-of-use (TOU) pricing in Ontario, Canada; and one of the few residential real-time pricing (RTP) plans in the U.S. These three papers are illustrative of the many experiments and real market experience with residential time-based pricing that have been evaluated over the past two decades.

The first paper, by George and Toyama, summarizes second-year results from one of the most comprehensive and well-designed pricing experiments that have been conducted to date in the industry, SMUD's SmartPricing Options pilot. Researchers applied strict rules of sound experimental design, including randomized control trial (RCT) design for some treatments, with recruit and delay for those chosen for the control group. The options tested included TOU rates and critical peak pricing (CPP), opt-in and default enrollment, and offers of in-home displays (IHD).

In addition to analyzing customer enrollment and load impacts, this paper summarizes the results from two surveys – a conjoint survey designed to examine the likely impact of changes in rate attributes (e.g., price ratios, the number of rate periods, the number of event days for CPP pricing plans, etc.) on customer enrollment for opt-in pricing plans, and an end-of-pilot survey to assess customer satisfaction, awareness of the attributes of each pricing plan, customer perceptions, reasons that customers stayed on the new pricing plans, IHD use and other topics of interest.

Among the key findings are that opt-in CPP participants reduced load on event days by about twice the amount as default participants, that participants who received the IHD offer reduced load by greater amounts than those that did not, and that load impacts varied substantially by level of usage, with much larger load impacts for the largest customers.

The second paper, by Faruqui, et al., reports on second-year results from a three-year evaluation of the impacts of Ontario's full-scale implementation of residential TOU rates. The study involved data from a few select local distribution companies (LDCs) in the province, all of which had installed smart meters and implemented TOU rates, and had sufficient amounts of pre-TOU metered load data. A unique aspect of the evaluation involves the estimation of the parameters of a flexible model of customer demand, the Addilog System, which allows estimation of elasticities of substitution, a common indicator of customers' degree of price responsiveness to time-varying prices.

Findings indicate that residential customers show relatively consistent patterns of load shifting behavior across study years, but little evidence of conservation. For the province as a whole, TOU customers reduced usage during the summer on-peak period by about 3 percent in the pre-2012 period, and 2.2 percent in 2012 and 2013, relative to what usage would have been in the absence of TOU. General Service class customers show mixed evidence of load shifting behaviors and are less responsive to the TOU prices than residential customers. However, general service customers show more conservation than the residential customers.

The third paper, by Becker, reviews findings from an unusual experience that certain residential customers in the Chicago area had with persistently high hourly energy prices in the winter of 2014. These customers participate in the Residential Real-Time Pricing (R RTP) program offered by Commonwealth Edison (ComEd), in which the energy portion of their bills is based on PJM real-time hourly market prices. Prices normally peak in summer months, but remain relatively low and stable in winter months. Customers can receive day-ahead and/or real-time price alerts, but prices are not capped. In the winter of 2014, hourly prices averaged approximately twice as high as in 2013, and they reached levels of nearly \$2 per kWh in a few hours during weeks immediately following the cold temperatures of the 2014 Polar Vortex. For the first time since the program launched in 2007, many R RTP participants saw annual bill increases in 2014 relative to what they would have paid on ComEd's fixed-price rate.

The paper examines the how participants responded to the high winter prices, and compares that response to previous findings for summer months. The findings indicate that participants did not seem to respond to specific high hourly prices by shifting loads, as they typically do during summer months. However, they did reduce overall usage immediately following the first price spikes in early January of 2014, continuing through March.