SESSION 16

SMART METERS, SMART CONSUMERS & SMART EVALUATIONS

Moderator: Harry Vreuls NL Agency

PAPERS:

Can Smart Meters Make Smarter Customers? Evaluating the Impact of Smart Meters on Customer Energy Efficiency Behaviors

Sharyn Barata, Itron,
Linda Warne, Itron,
Michael Messenger, Intron
Corrine Da Silva, LEVEL

Does Smart Metering Reduce Residential Electricity Demand? Results from a Field Trial in Austria

Joachim Schleich, Fraunhofer Institute for Systems and Innovation Research
Marian Klobasa, Fraunhofer Institute for Systems and Innovation Research

Impact, Process, and Technology Assessment for Smart-meter Enabled Demand Response

Stuart Schare, Navigant

OG&E Smart Study TOGETHER: Technology-Enabled Dynamic Pricing Impact Evaluation

Craig Williamson, *Global Energy Partners, an EnerNOC Company*
Katie Chiccarelli, *OG&E*

SESSION SUMMARY:

The future of the electricity system seems to be smart grid and smart meters. But will this result in energy saving and peak load savings as foreseen? Or is targeted communication with consumers necessary to get any savings at all? How can we ensure that the customers will also act in a "smart way" and what can we already learn from conducted evaluations? All these questions are dealt with in the four papers of this session.

In the first paper Sharyn Barata presents a smart meter impact evaluation examing customer's energy efficiency behaviors as linked to access to a smart meter. This paper explore various ways that smart meter technologies and feedback mechanisms are being deployed in North America, and how this is likely to impact the types of "new" energy efficiency programs and efforts to produce credible estimates of energy savings. In addition, the paper also describes how the pursuit of these new savings opportunities help support the business case for smart grid and is likely to transform the way that utilities design, implement and evaluate energy efficiency programs. Various examples of how utilities can use the smart grid platform to change the way customers use electricity are presented. Additional recent examples of how these programs are being evaluated across North America, including incorporation of newly established experimental design techniques, are discussed. The paper concludes that some user segments need a more nuanced understanding of their energy consumption: not only the usage per hour (of each device), but also what their total energy consumption is at any given point in time or is likely to be in the next monthly bill. Others want their network to manage their equipment use to a predetermined budget and provide alerts when this budget is likely to be exceeded. Providing devices that can meet the needs of a variety of customer segments will be a key challenge for energy service providers. There are also a number of threats to the success of endeavor. E.g. the quest for the "perfect" feedback device and the small, but vocal minority, that their data information can remain private.

Joachim Schleich presents the results from a field trial in Austria to reduce electricity demand in about 1500 households by installing smart meters and providing feedback. In this field trial households could get feedback by access to a web portal or written feedback by post. During a year (Dec. 2009-Nov. 2010) the electricity consumption of households in the pilot as well as in the control group was recorded on an hourly basis. Telephone interviews were used to gather information on household appliance stock and socio-demographic characteristics. The web portal provided users with options to compare their electricity use over time and by load pattern at any time. Feedback by post was provided on a monthly basis. Both offered recommendations on energy saving actions. The paper presents the result of two types of models: one for the impact of the feedback and one for the different two types of feedback. It concludes that feedback is statistically significant and effects are highest in absolute terms and as a share of electricity consumption for the 30^{th} to 70^{th} percentiles. But the electricity savings of 4.5%, or around 154 kWh, for the average household in the field trial is rather at the low end. But one needs to keep in mind that about half of the households did not respond to feedback on electricity consumption. Using a Heckman-type two stage model the results did not provide support for the hypothesis that there are differences in the impact of the two different types of feedback.

Stuart Schare examines impact, process, and technology assessment for smart-meter and demand response . The paper deals with the evaluation for the first phase of a smart grid pilot program in the Boston, Massachusetts region. This pilot program demonstrates the viability of using home-area networks and customers' broadband internet connections to enable dynamic pricing, two-way direct load control, and the provision of near real-time customer information. The evaluation approach is designed to accurately estimate the reductions in peak load and overall energy consumption, assess customer acceptance, and establish minimum functional requirements for the Smart Grid technologies. The initial feedback from customers participating in the pilot indicates a high level of acceptance and significant perceived value from access to information and technology. A preliminary technical assessment suggests that the pilot system architecture provides a viable solution to achieve the pilot's interval metering and customer information objectives without a full investment in smart meter infrastructure and capability. By the end of 2012, the pilot will have a year's worth of data for most of the roughly 3,000 participants, and NSTAR can begin to share more thorough findings with its regulators, other utilities, and the energy efficiency community.

In the final paper Craig Williamson assess the impact of multiple levels of enabling technology combined with different dynamic pricing rates on a customer's energy consumption. The ultimate goal is to determine if the demand reductions achieved through a combination of price response programs, in-home technology, and energy awareness will allow OG&E to delay capital investments in incremental generation resources. The first two summers (2010 and 2011) of the study are complete, with data collected and analyzed for a randomized sample of over 5,000 residential customers and over 700 small business customers in participant and control groups. All customers now have access to the Web Portal, allowing them to better understand their energy use to make further changes to save money. Results include demand reductions on weekdays ranging from 6% to 58% for some hours, and from 8% to 30% for the system peak hour. Notably, customers with response enabled by a programmable communicating thermostat (PCT) reduced load more than those with only web portal or in-home display information. With the PCTs, the customers chose how they responded to different prices – there was no direct utility control. As a result of this Pilot, OG&E is going forward with the implementation of the program and to recruit 37,500 customers, targeting a demand reduction of 72 MW.