An Econometric Approach for Evaluating the Impact of Smart Meters on Recorded Electricity Consumption

Brad Rogers, Navigant Consulting, Boulder, CO
Bill Provencher, Navigant Consulting, Madison, WI
Erik Gilbert, Navigant Consulting, Boulder, CO

The increasing replacement of traditional electro-mechanical metering systems by advanced meter infrastructure (AMI) gives rise to the need for a cost-effective approach to verify meter accuracy. However, pulling a statistically significant sample of meters from the field for laboratory testing is expensive. This poster presents the details of an econometric methodology that can be used to determine whether advanced meters affect recorded electricity consumption based on data typically collected by electric utilities.

Methodology for AMI Meter Evaluation

The methodology was developed during the course of a smart meter accuracy assessment project that evaluated data from almost 2 million meters—AMI meters and electro-mechanical meters. The methodology is applied to monthly consumption data to determine whether customers receiving AMI meters experienced different (i.e., higher) metered consumption on average than they would have experienced without an advanced meter.

The econometric analysis of historical electricity consumption compares changes in electric consumption prior to and following installation of AMI meters to consumption changes experienced by customers not receiving AMI meters (i.e., customers with traditional electro-mechanical meters) over the same period. Significant differences between these two groups over the same time period are regressed against potentially explanatory variables such as heating degree days and cooling degree days, differences in heating source (i.e., gas or electric), structure types (i.e., apartments, single family homes, etc.), macro-economic trends, and the presence of an advanced meter. Both Ordinary Least Squares (OLS) and Fixed-Effects Regression Models are used.

Results Can Be Cost Effectively Applied to AMI Deployments

Results indicate whether the replacement of a traditional meter by an advanced meter has statistical significance as an explanatory variable for broad consumption changes. This methodology can be cost-effectively applied to verify meter accuracy following AMI deployment and to help explain why customers' electricity bills may change over time. The full set of findings from the project will be available in time for inclusion in the paper.