Abstract #: 104
Author Name: Siddharth Patel
Author Company: Stanford University
Second Author's Name: Sam Borgeson, Stanford University
Abstract Title: Utility Program Response Modeling: A Three Stage Approach to Predicting Response to Pricing
Abstract Text:
In this presentation, we describe a three-stage approach for developing response models for utility energy programs, such as DR and pricing, using smart meter data. In the first stage, statistical and machine learning algorithms are used to extract relevant consumption behavior features from the data for predicting program responses. Features describe individual consumption profiles as well as profile attributes such as time of use, peak load, and thermal sensitivity. Once extracted, features are used to segment populations of customers based on hypotheses of how customers characterized by the features may respond to energy programs. These hypotheses are used to construct customer response models. In the second stage, a predictive response model postulates how various features may affect program response for individual customers or a segment. We present a model that estimates response to a utility pricing incentive program. In the third phase, actual response data together with baseline estimates are used to verify the predicted response and validate the postulated response models from the previous stages. The model is trained using quantified energy impacts from prior program evaluations and metrics of energy usage patterns prior to the pricing change. Since meter data from before and after the introduction of new rates are considered, it allows comparisons of impact estimates based on baseline usage models. Insights from these predictive tools can be applied to improve utility program design and targeting, and also provide statistically valid estimates of future program impacts for planners.