BEHAVIOR CHANGE IN HOMES, BUSINESSES AND SCHOOLS

Moderator: Edward Vine, LBNL and CIEE

Getting Energy Use Down to a (Social) Science: Combining Behavior Insights and Connected Technologies

Kira Ashby, Consortium for Energy Efficiency
Kimberly Conley, Pacific Gas & Electric
Lupe Jimenez, Sacramento Municipal Utility District
Amber Steeves, Sacramento Municipal Utility District

Energy Savings from Connected Thermostats: Issues, Challenges, and Results

Michael Blasnik, Nest Labs

Assessing the Potential of Social Networks as a Means for Information Diffusion: Weatherization Experiences

Erin Rose, Oak Ridge National Laboratory
Beth Hawkins, Oak Ridge National Laboratory
Bruce Tonn, Oak Ridge National Laboratory

Energy Impact from Gamification-Induced Behavior Change

Ingo Bensch, Evergreen Economics, Madison, WI
Ashleigh Keene, Seventhwave, Madison, WI

This session will focus on the evaluation of behavior change in homes, businesses and schools where behavior change programs use different interventions – social networking, two-way communication technologies web portals, energy reports, real-time feedback, social norms, and gamification.

The first paper by **Ashby et al.** explores the ways in which energy efficiency programs are leveraging new technologies and behavioral approaches to change electricity use behavior in the residential and small commercial sectors. Connected technologies, e.g., smart thermostats, web portals, and smart phone apps, can open up new opportunities to achieve behavior-based energy savings and can even assist in the evaluation of behavioral efforts.

Three pilots serve as examples of what this work looks like in practice and how it is evaluated: Focus on Energy's iCanConserve pilot, Pacific Gas and Electric's Home and Business Area Network Pilot, and the Sacramento Municipal Utility District's In-Home Display Pilot. These pilots have facilitated two-way interaction via different technologies including smart phone apps, web portals that provide detailed electricity use information, and near real-time feedback provided through displays in customers' homes or businesses. These pilots provide actionable information to energy users in a way informed by social science research in order to encourage customer engagement and reduce electricity consumption.

The second paper by **Blasnik** summarizes results from four impact evaluations of an internet-connected thermostat, the Nest Learning Thermostat, and explores some of the challenges for evaluators seeking to quantify impacts and generalize results for planning and policy purposes. The evaluations include two studies performed by utilities in Indiana, a study of heat pump homes by the Energy Trust of Oregon, and a study by Nest of customers who had enrolled in the MyEnergy service that helps track utility usage. The measured energy savings were quite consistent across studies. Heating savings ranged from 10% to 13% of heating use and electric savings ranged from 14%-18% of cooling use. This consistency was unexpected given the diversity of study populations and levels of customer engagement.

The studies with the least engaged participants actually had larger evaluated savings than the study with the most engaged participants. These results may make more sense considering that the potential for energy savings from automated features may be larger for customers who have little interest in micro-managing their set points.

In addition to prior behavior patterns, thermostat savings are expected to vary based on factors such as occupancy patterns, climate, HVAC type and house construction characteristics. Evaluations need to assess how well the study population represents the population of interest and be cautious about generalizing from pilot results to different populations.

The third paper by **Rose, Hawkins, and Tonn** presents a social network study that was part of a larger effort in Oak Ridge National Laboratory's evaluation of the U.S. Department of Energy's Weatherization Assistance Program (WAP). The social network study, called the Weatherization Experiences (WE) Project, explored linkages between individual households, weatherization staff and agencies as nodes within a multi-relational social system. The project goals were to: (1) explore impacts of communication from a trusted source on program participation, household energy consuming behavior and investment in energy efficiency measures; and (2) explore the feasibility of participatory research techniques through structured interviews administered by program recipients and weatherization staff. The interviews sought to answer five overarching questions: (1) who did you tell? (2) what did you say? (3) what did they hear? (4) what did they do? and (5) and why? This approach helps us understand if and what type of weatherization information is being shared (e.g., energy cost savings and health benefits), what core values are in place that might support or hinder adoption of new energy usage behaviors, and the motivating factors contributing to actions taken after information is received from a known, or trusted source. The WE Project sought to identify topics most communicated and to measure the impacts of these shared weatherization experiences on the actions of others. The primary goal of this study was to capture any energy and non-energy impacts resulting from shared communication through social networks as additional benefits attributable to the WAP. The study was fairly extensive with 85 interviewers completing 777 interviews.

The fourth paper by **Bensch and Keene** provides results from a behavior change intervention that use gamification. It suggests methodologies for studying the impact of behavioral interventions based on social dynamics and interventions among communities of people where randomized controlled trials are infeasible or impractical.

This paper is based on two assessments of Cool Choices sustainability games—one played by employees of a construction firm and one played by families of school-age children. In both cases, billing analyses showed plausible electricity savings in participating households, albeit with wide uncertainty ranges. While noisy consumption data and small sample sizes hinder precise estimates, the authors argue that a case can be built over time with a series of billing analyses to demonstrate the savings achieved from the game.

Furthermore, the authors found that the triangulation of multiple approaches to estimating energy savings increased their confidence in the results and yielded additional actionable insights that helped the program build on its achievements. Post-intervention participant interviews proved particularly insightful and yielded similar results as the billing analysis when used to estimate energy impacts.