Can I Get Credit for That? Fundamental Elements of Successful Behavioral and Instructional Programs

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ABSTRACT

Aggressive energy reduction goals are pushing utilities to take another look at the potential for real energy savings from behavioral and instructional programs. But how can utilities and other energy efficiency program operators (EPOs) convince regulators to recognize the value of behavior change in achieving energy efficiency and conservation goals? A few active programs are getting credit for energy savings acquired through instruction and energy-use feedback—rather than with the inducement of a financial incentive. Typically, energy savings obtained by these types of efforts have been considered "indirect" and not relevant in tracking progress towards energy savings goals. Examples of four utility programs that are measuring and claiming savings from non-incentive programs show that it is possible to claim deemed savings based on conservative interpretations of pilot results or evaluations of similar programs. Persistence of savings remains a concern and regulators will likely expect periodic verification of savings.

Moving Beyond Traditional Incentive Programs

Several energy utilities in the US and Canada are doing something that was virtually unheard of just a few years ago—getting credit for their investment in behavioral and educational programs thanks to regulatory approval of demonstrated energy savings. For years, utilities have offered an array of behavioral and instructional programs, including classroom presentations, facility audits, and energy conservation tips disseminated through outreach and marketing campaigns. But these efforts usually play a supporting role to traditional rebate and incentive programs that subsidize the purchase and installation of energy efficient equipment.

Under the traditional demand-side management (DSM) incentive program model, the participants and measures are known and the resulting savings are quantifiable through rigorous measurement and verification (M&V) studies that can include observation of equipment energy usage in test labs and in the field, analysis of building energy use, and inspection of installations. In contrast, it is difficult to measure impacts of behavioral and instructional programs because they often promote a wide array of actions and the implemented actions are usually not tracked. Furthermore, it may not be possible to either accurately estimate or directly measure the energy savings from recommended actions such as turning off lights or programming a thermostat. For these reasons, the savings accrued through behavioral programs are considered indirect, compared with direct savings from incentive programs for capital measures. While utilities and regulators may recognize the value of behavioral and educational initiatives, the majority of DSM resources are devoted to rebate programs because the resulting energy savings are more predictable, reliable, sustainable, and measurable.

Utilities are unlikely to invest substantial funds in behavioral programs if there is a risk that they will not be able to recover that investment. Generally, to recoup costs, either the utility must prove measurable energy savings, or bundle behavioral and instructional programs with a traditional incentive program. Not only is it difficult to measure the impacts of behavioral programs as avoided energy consumption, it is also problematic to definitively prove that the utility program caused the behavior change instead of some other program or influence.

Recently, a handful of utilities have overcome regulatory hurdles to get credit for their investments in these types of programs. The following are examples of behavioral and instructional programs for which the sponsoring utility is claiming savings and recovering costs:

- Sacramento Municipal Utility District's (SMUD) Home Electricity Reports
- Puget Sound Energy's Resource Conservation Manager Program
- Hydro One's Real-Time Monitoring energy feedback program
- Otter Tail Power's Building Operator Certification workshops

The behaviors and actions that these selected programs encourage range from unplugging a second refrigerator, to adjusting thermostat settings, or fixing economizers. In some cases, the action involves installation of equipment such as pipe insulation or occupancy sensors, so long as a rebate or incentive is not provided through another utility program.

Why Behavioral Programs?

It's getting harder for utilities and other energy efficiency program operators (EPOs) to meet their energy savings goals. Not only are savings targets escalating across the US and Canada, opportunities to capture energy savings from previously fruitful programs are fading as some energy saving technologies—such as compact flourescent lamps (CFLs) become mainstream. The historical focus on financial incentives to boost purchasing and installation of energy saving equipment may no longer be sufficient to meet aggressive load reduction goals. Moreover, market transformation towards an energy efficient economy and society—the underlying goal of all DSM efforts—cannot be achieved without behavior change.

Most utilities that offer equipment and retrofit incentives partner them with a variety of complementary behavioral, educational, and outreach efforts. Usually these activities are allocated budgets for implementation (to ensure that they are not ignored altogether), or they are treated as overhead for incentive programs. Even though studies of education, awareness, and feedback initiatives over the last 30 years indicate the potential for significant energy savings, they are usually not expected to produce direct energy savings.

The primary stumbling blocks are evaluation issues, including calculation of savings, causality, attribution and persistence. Does the utility have a defensible proposal that measurable energy savings will be realized? The measurement approach will need to prove that the program *caused* the energy savings, and ensure it is not double-counting effects of incentive or advanced metering (smart grid) programs. Even after demonstrating impacts in a pilot study, the issue of persistence remains. When forecasting program effects, should the utility assume energy savings will continue beyond the duration studied in the pilot?

In order to earn cost recovery and credit for energy savings from their behavioral programs, utilities need to overcome these hurdles in proving their case:

- Produce sufficiently accurate and valid measurements of savings.
- Isolate the impact of the behavioral initiative from other programs (particularly financial incentives for capital measures).

- Define the timeframe for persistence of savings during or after program participation.
- And, for deemed savings estimates, convince the regulators that the savings are likely to persist or be repeated in future implementations with different participants.

Evidence of Energy Savings

Many studies have shown that behavioral programs have the potential to reduce energy consumption by up to 20% (Carroll, Hatton & Brown 2009; Darby 2006; Drakos, Khawaja & West 2007; Faruqui, Sergici & Sharif 2009). Recently, evaluators have collected and analyzed data from a variety of behavioral initiatives, providing compelling evidence of energy savings (Table 1). Many of these are evaluations of mass-market energy-feedback mechanisms.

Table 1: Evidence of Energy Savings from Behavioral Pilots and Programs

Program Name and Source	Energy Savings	Evaluation Approach
The Energy Detective Pilot, Florida Solar Energy Center (Parker, Hoak & Cummings 2008)	Average 7% reduction in energy use	Measured energy use of 20 homes (self-selected participants, each provided a real-time in-home energy feedback device), controlling for weather-related influences, plus comparison with large control group.
Real-Time Monitoring Pilot, Hydro One (Mountain 2006)	Average 6.5% reduction in electricity use (kWh) across the study sample	Comparison of over 400 pilot participants (each provided a real-time in-home energy feedback device) and control group, over a 2.5 year period.
Home Electricity Reports, Sacramento Municipal Utility District (ADM Associates 2009)	Overall annual net reduction of 1.9% electricity use (213 kWh per household); 1.4% excluding rebated measures	Over a 24-month period, a treatment group of approximately 35,000 SMUD households received monthly and quarterly electricity use feedback via paper reports. A control group of 49,000 households did not receive the reports.
Building Operator Certification (RLW Analytics, 2005)	Annually for non-school facilities, 0.35 kWh per square foot per participant; 0.18 kWh per sq ft per participant, excluding rebated measures	Interviews with 94 enrollees identified measures implemented as a result of the certification course. Energy savings per measure were calculated based on engineering estimates and evidence from other evaluation and field studies.
California Statewide Education and Information Programs (ODC 2010)	Program savings range from 53 to 16,950 MWh	Energy savings calculated by applying results from secondary data sources to self-reported actions implemented.

Mechanisms for Behavioral Energy Savings

The program examples provided below primarily rely on three basic mechanisms to drive behavioral changes: feedback, norms, and instruction or customized recommendations. Table 2 lists the mechanisms featured in the programs highlighted in this paper. Other mechanisms that do not involve a financial component include prompts, commitment (pledges), and goals (McKenzie-Mohr and Smith 1999).

Feedback. Providing a customer with feedback on their current or past energy consumption can be a powerful motivator for behavior change. It can raise the customer's awareness of the cost of behaviors and choices that impact his or her energy use. This feedback can be immediate, such as via a device or website that shows customers their actual whole-building energy use in real time. Or it may be indirect, in the form of a monthly bill or an annual summary of energy consumption (Carroll 2009).

Norms. Psychological and social science research has shown that people will alter their behavior in response to social norms. One approach is to leverage an existing social norm or to use messaging to foster new norms. Although people may say they are primarily guided by environmental concerns or the desire to save money when they decide to reduce energy consumption, social norms can be a more powerful motivator. In other words, people want to behave within the boundaries of what is socially acceptable or admired. If they mimic behavior they perceive as prevalent, they are responding to a descriptive norm. An injunctive norm communicates whether a particular action or behavior is socially desirable (Schultz et al. 2007).

Instruction. Providing energy users with instructions, recommendations, and training is a conventional component of utility DSM programs. Unless social norms are invoked, this approach to encouraging behavior change tends to work best when targeted at a receptive audience that is already interested in or committed to reducing their energy usage. Other ways to improve uptake of recommended actions is to customize the instructions to the target audience or through face-to-face interaction.

Table 2. Mechanisms of Behavior Change and Program Examples

Utility	Program Name	Feedback	Norms	Instruction
Hydro One	Real-Time Monitoring (RTM)	x		
Otter Tail Power	Building Operator Certification (BOC)			x
Puget Sound Energy	Resource Conservation Manager (RCM)	x	x	x
Sacramento Municipal Utility District	Home Electricity Reports (HER)	x	x	x

Measuring Savings

Documentation of measurable and persistent results is essential to getting credit for energy savings from behavioral initiatives. The program examples reviewed below use three approaches to estimate savings, and these approaches may be used individually or combined.

Approach 1. Measure and compare before and after whole-building energy consumption for each participant.

Approach 2. Measure and compare whole-building energy consumption for treatment and control groups.

Approach 3. Identify the behavior changes or actions that the target customers implement—usually by self-report survey—and estimate total energy savings due to those measures.

To compare energy consumption over two consecutive time periods (Approach 1, above) requires that the evaluator normalize for the impacts of other factors that influence energy use, such as weather. This approach fits the "Option C" standards of the International Performance Measurement and Verification Protocol" (IPMVP, www.ipmvp.org). Preferably, the evaluator will use two complete annual cycles of data, to cover seasonal impacts. Other normalization factors can include changes in building configuration, use, or occupancy. Collecting these types of normalization data may be costly, but a lot can change over the course of two years, so the results will be less reliable without it. Evaluators frequently use this approach to analyze small participant samples. Puget Sound Energy uses this approach to estimate energy savings for participants in its Resource Conservation Manager program (Younger 2009). Florida Solar Energy Center (FSEC) also used this approach to evaluate a low-cost residential energy feedback system (Parker, Hoak & Cummings 2008). The study estimated energy savings in twenty case study homes over a two year pilot period (see Table 1).

In addition to the participant group year-over-year comparison, the FSEC study used measurement Approach 2 (above). The evaluators compared participant versus control group energy usage with a regression analysis. Hydro One used this measurement approach to test real-time in-home display energy feedback devices (Mountain 2006) and SMUD used it to measure avoided energy consumption for customers who received printed "home electricity reports" (ADM Associates 2009).

With Approach 2, it is possible to randomly select and assign participants to control or treatment groups, which is an experimental design approach used in the social sciences. Randomization ensures that treatment and control groups are exposed to similar marketing messages, such as in-store CFL promotions, which helps prove causality. Large sample sizes can provide statistically reliable results—although the FSEC control group (2 million homes) was larger than necessary. By selecting comparable samples, the evaluator can control for factors such as home size.

Approach 3 can be a low-cost option, depending on the scale of the program and the end uses evaluated. An evaluation of the Northeast Energy Efficiency Partnerships (NEEP) Building Operator Certification program (RLW Analytics 2005) used this approach. After completing the course, a sample of participants answered interview questions on what they learned and measures they implemented. For each measure, such as adjusting HVAC settings or fixing air compressor leaks, the evaluator estimated energy savings.

Typically, with Approach 3, the estimated savings for each measure will be based on a combination of engineering estimates and assumptions about how frequently the action is taken and the duration it is in effect. (This approach fits within IPMVP Option A.) Opinion Dynamics Corporation used similar estimation techniques in evaluations of several California educational and outreach initiatives (ODC 2010). It is also possible to collect evidence of implemented measures and savings through techniques other than self-report surveys, such as with participant diaries or even on-site inspection and data loggers. Surveys appear to be the favored approach, possibly due to concerns about cost and statistical validity.

One problem with all of the measurement approaches discussed above is that participants in a behavioral or instructional program may also take advantage of utility incentive programs. So, none of these measurement approaches on its own eliminates the problem of double-counting savings claimed by multiple utility programs. Puget Sound Energy addresses this problem by cross-checking program participation. SMUD's HER evaluation estimated the propensity for treatment or control groups to purchase equipment with utility subsidies.

Who Is Claiming Savings Now?

Even with improvements in measurement of energy savings from behavioral and instructional programs, and a growing pool of published results, it is still a rare event when an energy utility petitions its regulator to accept energy savings from behavioral programs – and receives approval.

Four examples of programs that are claiming energy savings for behavioral and instructional programs are summarized below. This is not a comprehensive list, but represents a variety of programs getting credit for behavioral energy savings. These examples were identified and researched through personal communications with program managers and regulatory filings.

Each example includes a description of the program, the mechanism of acquiring energy savings, the measurement approach, and the basis for claiming those savings with regulatory approval. The objective of this case study review is to identify features of these programs that made them more likely to be successful in producing energy savings, measuring results, and getting credit for savings claims.

Table 3. Energy Savings Claimed by Program (Ex Ante)

Utility, Program	Gross Energy Savings	Time Period	Participant Actions
Hydro One, RTM Pilot and Program	116,739 MWh; 23,348 MW	2005-2008	Residential customer behavior changes
Otter Tail Power, BOC	232,680 kWh; 52.74 kW	2009	Commercial building operational and maintenance improvements
Puget Sound Energy, RCM	26,000 MWh; 600,000 therms	2010-2011	Verifiable behavioral changes by commercial building occupants and maintenance staff
Sacramento Municipal Utility District, HER	6,550 MWh	April 2008 - March 2009	Non-rebated residential customer behavior changes

Sacramento Municipal Utility District – Home Electricity Reports

Beginning in the spring of 2008, Sacramento Municipal Utility District partnered with the vendor OPOWER (formerly Positive Energy) to deliver monthly and quarterly Home Electricity Reports (HER) by mail to approximately 35,000 SMUD households. The HERs graphically depict the recipient customer's electricity usage compared with the average for a group of similar neighbors and "efficient" neighbors. The graphics in the HER also inform the customer how they are doing compared with their own past performance.

This program relies on two mechanisms to encourage behavior change: feedback and norms. Through the feedback mechanism, a customer who sees their energy use is increasing over time may decide to take action to reduce their consumption. The HER also conveys a normative message by comparing the recipient's energy use to the top quartile of similar neighbors in terms of efficient energy consumption. In addition, the HER provides customized tips to reduce energy use and recommends SMUD rebates that may be relevant for the customer.

Savings are measured by comparing the energy use of HER recipients against that of a control group of homes which did not receive the reports (Ceniceros 2010). This is an example of M&V "Approach 2," described above. Homes of similar size and income level were assigned to control and treatment groups. Participants could opt out but could not opt in. Gross energy savings for the period averaged 1.9% for the entire group of customers receiving the HERs. This program's opt-out, quasi-experimental design excludes sample bias and provides continuous tracking of energy consumption changes in the treatment group.

Armed with evidence of calculated energy savings from large target and control populations, SMUD is currently claiming net savings corresponding to 1.4% of annual energy use for recipients of HERs delivered as printed letters. A follow-up telephone survey, asking participants about the actions they took to save energy, revealed that approximately 57% of their actions were behavioral. Based on the survey responses, SMUD subtracted energy savings that may be attributable to equipment installations and retrofits subsidized by utility incentive programs to arrive at the savings that could be claimed (ADM Associates 2009). This is a conservative approach because it is possible that some of the 0.5% attributed to financial incentive programs was actually a result of behavioral choices.

When SMUD re-launches the program, they will use deemed energy savings values for planning and cost recovery, based on the evaluation results (Ceniceros 2010). They plan to target more energy-intensive households and segments that respond to the HERs with larger reductions, such as participants in the utility's green energy program. This should enable SMUD to assume nearly double the savings previously claimed in kilowatt-hours per customer. (Deemed savings will refer to evaluation results for the targeted customer classes.) Pre- and post-treatment surveys will assist in pinpointing the behavior changes and measures driving the observed energy reductions.

Hydro One – Real-Time Monitoring

Hydro One's Real-Time Monitoring (RTM) program also acquires energy savings through a feedback mechanism, but without the addition of social norms, instructions (tips for energy savings), or referrals to incentive programs. The intent was to determine the impact of real-time feedback alone.

Hydro One tested the impact of a stand-alone real-time energy in-home display (IHD) in customer homes through a pilot that began in 2004. The utility gave more than 400 participating homes a Blue Line Innovations Power Cost Monitor and tracked the homes' energy use against a control group for 2.5 years (Mountain 2006). The pilot was conducted under fixed electricity rates. (A later Hydro One pilot tested the impact of the IHD in combination with a time-of-use rate and found that adding a TOU rate does slightly boost savings.)

The evaluators estimated energy savings by calculating the average change in energy use for each participating home over time, compared to the control group, and controlling for the impacts of weather and variations in appliances, house characteristics, and demographics. The study population was selected as a stratified random sample encompassing the utility's territory and including segmentation by usage patterns and demographic factors. Three surveys also collected information on home renovations, appliances, and participant feedback on the IHDs.

Overall, Hydro One found participants reduced their energy use by about 6.5%, but the savings varied widely depending on home characteristics, such as the use of electric heating or electric water heaters. Hydro One is recovering program costs and reporting 6.5% energy savings associated with its in-home display initiative, based on the results of their pilot study in their filings to the Ontario Energy Board for 2007-2008. Since 2008, they have recovered the program expenses through the Ontario Power Authority, paid by ratepayers via the wholesale commodity cost. Hydro One has not filed the program for lost revenue recovery or performance incentives. Their filings for cost recovery have not been contested (Rossini 2010).

Puget Sound Energy – Resource Conservation Manager Program

Puget Sound Energy subsidizes energy manager salaries for large customers through its Resource Conservation Manager (RCM) program. The program also assists with the hiring and training of RCMs, whose primary objectives are to generate energy savings from operational and behavioral measures. This program utilizes a variety of mechanisms to encourage energy savings. Clearly, the salary subsidy is a financial incentive, but the program also relies on feedback with energy bill and interval data analysis software; instruction via workshops, facility audits, and printed materials; and norms, by creating networking opportunities for RCMs to interact and share their experiences.

The RCM program pays a 25% subsidy for the first year of a conservation manager's salary for customers with multiple facilities within the utility's territory. Typically, that works out to be a $20,000 grant that covers the first three months of an RCM salary. Candidate organizations should have an annual budget of at least $2.5 million for all utilities—not just energy—to support a full-time RCM through utility savings. Organizations that accept the grant agree to continue participating in the program for three years, after which they may claim reimbursement from PSE if the conservation manager's salary exceeded the savings (Younger et al., 2008).

The utility purchases a license for an energy bill tracking and analysis software package for each participating organization, and this feature is the centerpiece of the RCM program. The software provides not only a mechanism for the utility to track energy savings at the customer's facilities; it also inspires the customer to take action by revealing which facilities are top or bottom performers. Typically at those facilities the RCM conducts an audit and identifies operational improvements such as changes to HVAC settings or lighting controls, and retrofit projects. Savings from utility-rebated equipment installations are subtracted from results reported for the RCM program. Participants can also receive interval meter data analysis software, to identify operational anomalies. The utility provides training and material—such as "Please turn off the lights!" stickers—to assist RCMs in launching energy awareness programs for staff.

The RCM program manager estimates that it costs the utility approximately $0.03 per kilowatt-hour (kWh) and $0.90 per therm saved, excluding savings attributed to PSE's retrofit incentive programs (Farnsworth 2008). For 2010-2011, PSE is targeting 26 GWh of electricity savings from the RCM program.

To measure savings, PSE tracks energy use for each participant facility over time and has developed a process to estimate whole-building energy savings using techniques described as "Approach 1," above (Younger 2009). Instead of comparing building energy use against a baseline, PSE compares year-over-year energy use for each facility to calculate annual incremental energy savings. Persistence of savings is assumed to be three years, based on analysis of RCM participant results and also comparison of energy usage after participants complete the 3-year program (Younger et al. 2008). Each year, PSE staff compare their own tracking of facility-level energy consumption against the participants' tracking data, normalizing for weather, building area, and occupancy changes.

In practice, the data cleaning and analysis is labor intensive and it is costly to update normalization factors for each facility. Therefore, PSE estimates ex ante energy savings based on a formula agreed with the regulatory authority. For example, in its regulatory filings, PSE claims at least 1% savings annually for participants that dutifully maintain their energy bill tracking databases. The utility claims annual incremental energy savings of 1 to 5% per customer for behavioral and operational measures which the customer reports implementing (Farnsworth 2008). These savings are later verified for a sample of participants. An evaluation of the program was conducted in 2007 but results are not publicly available.

Otter Tail Power – Building Operator Certification

In 2008, Otter Tail Power (OTP) filed for regulatory approval to claim savings attributable to behavioral and operational changes implemented by participants in their Building Operator Certification (BOC) program. BOC training consists of several intensive courses and project assignments the participant implements at his or her facility. Participants took courses such as "Efficient Lighting Fundamentals" and "HVAC Controls and Optimization." Those who successfully complete the required coursework earn certification.

In its filing, OTP argued for the validity of deemed energy savings, calculated per participant based on a published evaluation study conducted for NEEP (RLW Analytics 2005), which OTP interpreted to show an average of 10% first-year energy savings for building engineers who complete the course. To estimate energy consumption impacts, the NEEP evaluators conducted phone interviews with a sample of participants and calculated the potential impact of measures self-reported by interviewees. The evaluators noted that their chosen measurement approach has "limitations," while emphasizing that the "team sought to minimize these limitations through use of a rigorous phone survey that gathered all necessary inputs and a series of savings estimates per unit that was verified via previous O&M impact evaluation work."

Armed with the NEEP evaluation results, OTP expected an average of 0.35 kWh per square foot of building space operated by the trainee. However, that estimate assumes the participants in OTP's program would implement a similar set of measures as observed in the NEEP study and that the participating buildings are similar. Furthermore, NEEP's estimate of an average 0.35 kWh reduction in electricity usage included energy savings from rebated capital measures. In order to claim savings for an instructional program, the impact of rebated measures should be netted out of the gross estimated savings. This avoids double-counting of results due to separate programs. The NEEP evaluators estimated electricity savings of 0.18 kWh per square foot could be attributable to the non-rebated measures implemented by BOC trainees. The higher savings estimate is reasonable if the OTP program designers anticipate that some participants will implement capital measures without applying for available rebates and the evaluation subtracts savings due to rebated measures, or if rebates are not available.

The Minnesota regulatory board decided that OTP must measure or estimate actual savings rather than assume a deemed savings value without verification. OTP revised its proposal to calculate ex-post energy savings using the same methodology as for its custom grants program. This may entail measure-level energy data collection, estimated variables, engineering assumptions for measures reported by participants, and analysis of whole-building utility data. The latter approach may rely on Energy Star Portfolio Manager for building types covered by Energy Star's national rating system.

Since the regulatory board approved OTP's revised M&V plan in 2009, the utility was able to proceed with the training program while recovering costs, subject to review and possible rejection of claimed savings based on the results of a future evaluation study. Although the program design and M&V plan were clearly defensible (the regulators found them to be acceptable), few customers participated in the training program. The result is a small annual savings claim (232,680 kWh in 2009), and a verification study is being conducted in 2010. The BOC program can be of great value for participating customers and the sponsoring utility, but the burden of measuring and defending energy savings in regulatory proceedings could eliminate the program's cost effectiveness.

Overcoming Measurement and Regulatory Hurdles

There are now several examples of utilities leading the way as they claim energy savings from behavioral and instructional programs. In addition to the examples provided above, PSE and OTP are claiming savings for other non-incentive programs. Connexus Energy (Minnesota's largest electric cooperative) is claiming savings for its own OPOWER program, and British Columbia Hydro & Power is getting credit for its subsidized energy manager program and a new workplace conservation awareness initiative.

How were they able to do this, and are there features of these programs that make them more likely to be successful in driving energy savings, measuring results, and getting credit for savings claims? One major factor appears to be the regulatory setting and expectations. Although this research could not encompass a comparison of regulatory requirements, it appears that some jurisdictions are more welcoming of proposals to claim savings and recover costs these types of non-incentive programs. Some jurisdictions require more rigorous evidence of savings in pilot studies, evaluations, and verification of savings.

In terms of program features, a few aspects of these initiatives stand out, and may have enabled the sponsoring utilities to launch them as stand-alone programs, rather than simply to play a supporting role for traditional incentive programs.

- **Embed the ability to track savings in program design.** Whether it is monitoring of facility energy use, as in the Hydro One, SMUD and PSE examples, or maintaining a list of participants and recommended measures, as in the OTP example, evaluators can track savings by facility or estimate savings by measure. Baseline surveys will bolster the validity of ex-post survey results.

- **Ground program design in evidence or theory.** Many prior academic studies and evaluations pointed the program designers to mechanisms that are likely to produce savings.
- **Develop ex ante savings estimates from pilot studies.** Even if another entity evaluated a similar program, most utilities will need to test the program with their own customers.
- **Estimate energy savings conservatively.** SMUD excluded energy reductions that may be due to equipment the customer installed with a rebate. Moreover, SMUD assumes only monthly persistence of energy savings until further studies are completed.
- **Track energy savings regularly.** PSE calculates impacts periodically for a subset of participants, while SMUD and Hydro One track savings through continuous monitoring and comparison of whole-building energy use.
- **Use deemed savings for initial claims, but be prepared to verify savings.** Verification is costly, but most regulators will likely expect periodic verification for at least a sample of participants.

From these examples it is clear that measurement is key. Utilities that are claiming savings for behavioral and operational programs are attempting to contain the cost of M&V by relying on bill analysis, deemed savings and engineering calculations rather than direct measurement of savings. And they are using self-report surveys rather than on-site verification to identify individual measures implemented.

The cost of regular verification can overwhelm the measured benefits from a behavioral initiative, so the natural inclination for utilities is to assume deemed savings for this type of program. But because so many variables are in play—the array of actions customers can take and other factors that impact energy use—it is not yet clear whether deemed savings are relevant if any aspects of the program, participants, or external environment change. For most utilities that attempt to claim savings from behavioral and instructional programs, either continuous monitoring of savings or regular verification will be necessary.

One major success factor appears to be the regulatory setting and expectations. Although this research could not encompass a comparison of regulatory requirements, it appears that some jurisdictions are more welcoming of proposals to claim savings from and recover costs invested in behavioral and instructional programs.

We can expect to see more utilities seeking credit for the energy savings from programs like these. But utilities could end up limiting their efforts if they focus too much on tracking energy savings. Apart from measurable energy savings, these efforts can provide valuable benefits by pointing customers to incentive programs and broadly raising awareness of ways to save energy.

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