Behaving Ourselves: How Behavior Change Insights Are Being Applied to Energy Efficiency Programs

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ABSTRACT

While there is growing interest in applying behavior change to the energy efficiency context, there is often a great deal of uncertainty about how behavior strategies are incorporated, or could be incorporated, into efficiency programs and what tools may be useful in this work. The Consortium for Energy Efficiency (CEE) membership recognized the potential benefit of gathering information on behavior change in the context of ratepayer-funded energy efficiency. To this end, CEE and its members have developed an overview of behavior insights from across the social sciences that could be incorporated into efficiency efforts, with examples of programs applying those insights. A goal of this effort was to facilitate information exchange between program administrators and provide the necessary resources to those incorporating behavior approaches into their programs.

This paper will describe a wide variety of behavior insights potentially applicable to the energy efficiency program context, provide examples of efficiency programs that have already begun to apply these insights, and explore some untapped opportunities to achieve energy savings through behavior change. CEE members have already incorporated numerous behavior insights into their programs, such as social norms, feedback, public commitment, and goal setting. Yet other key insights, such as self-efficacy, cognitive dissonance, and loss aversion, have gone largely underutilized in energy efficiency up to this point. Future participation in and effectiveness of energy efficiency efforts would likely benefit from the application of these additional insights.

Introduction

Behavior Change and Energy Efficiency

There has been growing interest among energy efficiency program administrators in improving program effectiveness and capturing new program savings by changing human behavior. A variety of fields outside the energy efficiency industry—including psychology, sociology, and public health, among others—have conducted a great deal of research on human behavior and have accumulated a wealth of wisdom on the key factors that spur behavior change. Consequently, looking beyond the scope of the energy efficiency context may provide the most insight in determining what tools can be applied to efforts to incorporate behavior change principles into efficiency programs.

Current Project

The membership of the Consortium for Energy Efficiency (CEE), a consortium of ratepayer-funded efficiency program administrators from the United States and Canada, has increasingly recognized the potential benefit to energy efficiency programs of a concise overview of observations related to behavior change that could be applied to the energy efficiency context. CEE members have been particularly interested in exploring tools from a variety of disciplines that could be incorporated into efficiency efforts and how behavior change strategies are already being applied to energy efficiency programs. This knowledge is necessary in facilitating information exchange between program administrators and providing the necessary resources to those incorporating behavior approaches in their efficiency programs.

This paper will describe an array of the social science insights about behavior change that are currently being applied in energy efficiency programs, and discuss the variety of efficiency programs into which CEE members have told us they have begun to incorporate these insights. The paper will also describe other opportunities to achieve energy savings through behavior change that members have not yet reported tapping in their efficiency efforts. Throughout the paper, implications for program administrators interested in applying behavior change insights to their programs will be addressed and opportunities for further application of behavior knowledge to energy efficiency programs will be discussed.

Methods

In Fall 2009, CEE fielded a questionnaire to its membership to capture information on how CEE members have begun to incorporate behavioral approaches to achieve energy savings into their programs. The goal was to develop a Behavior Program Summary (CEE 2010) that would provide an overview of this work. The questionnaire was sent to all CEE members currently running energy efficiency programs (104 organizations at the time), of which 61 responded. All programs chosen for inclusion in the Program Summary were identified by program staff, and whether or not a program was considered to include a behavior change element—admittedly a very subjective categorization—was at the discretion of the questionnaire respondents. Additionally, the program details provided by CEE members and contained in this paper describe CEE member programs only and do not include all CEE member programs that might include a behavior change component. As a result of the methodology used in collecting this data, and the subjective determination as to whether a program was behavior-based, there are limitations to the conclusions that may be drawn. The results presented here are intended to be qualitative in nature and do not aim to represent the extent to which these approaches have been implemented across all ratepayer-funded energy efficiency programs.

A secondary effort has been the development of an overview of insights about behavior change and tools to facilitate change gleaned from a variety of disciplines outside of energy efficiency, with examples of current programs employing these insights. An abbreviated overview is included here; the complete “Behavior Insights and Tools” document is available to CEE members.

Overview of Behavior Approaches in Energy Efficiency Programs

The Behavior Program Summary documents a total of 160 programs that the respondents considered to be behavior change, and 90 related evaluations, underway at 61 organizations. While respondents were allowed to select multiple sectors for each program, 56 percent of the programs reported were residential sector-focused, while another 28 percent targeted the commercial sector and 11 percent focused on the industrial sector.[1] Perhaps most noteworthy in summarizing the Program Summary is that CEE members reported energy efficiency efforts that spanned a wide variety of strategies *(See Table 1)*. These distinct program strategy categories were created by back-coding open-ended questionnaire answers, but the extent to which each and every one of the strategies listed here could or should be considered "behavior change" is debatable. The results of this questionnaire only emphasized to us what a broad area some consider behavior change to encompass.

Table 1. Overview of Behavior Approaches Reported by CEE Member Programs in 2009

Program Approach	Number of Programs
Provide Information (without Feedback)	
Provide general or sector-targeted energy efficiency behavior information or marketing	58
Provide more targeted EE behavior information via community (e.g. community-based social marketing, leveraging social networks, etc.)	9
Provide Information (with Feedback)[2]	
Indirect Feedback: Enhanced Billing (household- or building-specific info, including leveraging social norms through social comparisons)	17
Indirect Feedback: Estimated Feedback (web-based audits, billing analysis)	9
Indirect Feedback: In-Person Energy Audits (of homes or businesses)	9
Indirect Feedback: Providing daily or weekly use data	N/A
Direct Feedback: Real-Time Feedback (energy display devices, pricing displays)	11
Direct Feedback: Real-Time Plus (real-time, appliance level monitoring or control, HAN)	N/A
Provide Training	
Integrate energy efficiency education into school curricula (K-12)	9
Provide energy efficiency training to installers or operators (i.e. EM, CEI)	15
Provide New Equipment, Measures, or Services	
Install new equipment or other efficiency measures	12
Provide retrofits or tune-ups for existing equipment	4
Provide Incentives	
Provide incentives (rebates, discounts, gifts, etc.) for reduced energy use or new equipment	29
Provide funding for local efficiency projects	2
Research	
Research: assess efficiency knowledge/attitudes	1
Evaluation Research: assess program efficacy	7
Evaluation Research: compare effectiveness of multiple approaches	3

Source: CEE 2010 Behavior Program Summary

The goals of the programs detailed in the Program Summary range from the purely energy-specific, such as peak load and base load reduction, to the more customer-focused, such as increasing customer satisfaction, saving customers money, and increasing participation in the

[1] As a result of the methods described in the previous section, these statistics are descriptive only, and are not intended to imply that similar rates would be found outside of this sample.
[2] These categories were based on the Neenan and Robinson (2009) feedback categorization.

utility's other programs. Behavior-specific goals included eliciting a specific conservation behavior and increasing uptake of energy efficient products or measures (both upstream and downstream). The goals of decreasing the utility's operating costs, providing training or education to the target audience, and evaluating program efficacy were also frequently mentioned.

Applying Insights from the Behavioral Sciences

Given the variety of behavior approaches and strategies that efficiency program administrators are implementing in their programs, it is helpful to consider common threads that may link together these distinct efforts. One potential commonality is the set of fundamental assumptions about what does (and does not) change human behavior that underlies these programs. The body of knowledge on changing behavior gathered by various social science disciplines over the years includes many insights that could potentially be incorporated into energy efficiency programs to improve overall program effectiveness. While CEE members have incorporated a number of these insights into their program approaches, there are also a number of behavior insights that the results of the Program Summary questionnaire suggest have been largely underutilized in energy efficiency program design to date.

Current Application of Behavioral Insights to Energy Efficiency Programs

A number of key behavior insights underlie these programs. In order to give more attention to each insight currently being applied, as well as the examples of member programs that incorporate the insight, only selected insights have been highlighted here. The particular insights described further in this paper were selected based on the insight's relevance to the energy efficiency context and the extent to which programs have applied the insight.

The examples provided for each insight were drawn from the information CEE members provided in the development of the Behavior Program Summary and in follow up conversations with program staff. While multiple utilities have incorporated certain insights (such as social norms) into their programs, the application of other behavior insights has been less common and, thus, few examples are included here. To the extent possible, we aim to provide examples of programs employing innovative approaches. However, many program approaches that are not as new contain behavior elements, and some program administrators identified these long-standing approaches in reporting on the behavioral components of their programs as well.

Social Norms

The strategy of leveraging the power of social norms to reduce energy consumption emerged as a particularly popular approach. The concept of social norms refers to how people are influenced by the actions and beliefs of their peers and others they respect (McKenzie-Mohr and Smith 1999). While people seldom admit to being influenced by others, research has consistently shown that people tend to make changes to bring their behavior closer to the norm when informed of the norm (Cialdini 2007a).

As of November 2009, at least 17 CEE members had implemented a program or pilot that leverages social norms to promote energy efficiency. While these specific programs differ somewhat in their approach, the majority have employed a similar enhanced-billing strategy:

partnering with a third party vendor, the utilities[3] send a monthly energy report to participating customers that details the household's energy use as well as information on how the household's use compares to that of their neighbors. The energy reports also provide energy saving tips tailored to each household's circumstances and energy consumption.

Evaluations of several of these programs have been conducted recently or are currently underway. Sacramento Municipal Utility District (SMUD), for instance, found 2% energy savings from their Home Energy Reports program. Other utilities currently employing this approach that responded to the questionnaire were CenterPoint Energy, Commonwealth Edison, Energy Trust of Oregon, Great River Energy, Los Angeles Department of Water & Power, Northeast Utilities, NV Energy, Puget Sound Energy, Seattle City Light, and Southern California Gas Company.

Feedback

In the energy efficiency context, providing feedback refers to providing individuals with information on their energy use or related costs, with the hope that they will reduce their energy use as a result. Feedback is generally the most effective the more frequently it is given (Abrahamse, Steg, Vlek, and Rothengatter 2005).

Feedback can take a variety of forms. The main categories of feedback that applied to CEE member programs were indirect feedback, including both enhanced billing and estimated feedback (such as online energy audits), and direct or real-time feedback (such as in-home energy displays). The CEE membership reported 17 programs that employed indirect feedback through enhanced billing (please see *Social Norms* section for additional information on these programs) and another 10 programs that took the approach of providing indirect feedback through estimated feedback. There were also 11 programs reported that provided customers with direct, real-time feedback.

One example of a utility exploring multiple forms of feedback is Pepco Holdings. Pepco runs a Home Performance with Energy Audits Program that uses an online energy audit tool that identifies energy-saving opportunities in customers' homes. The program also includes a Quick Home Energy Checkup (a home visit that provides information about priority efficiency home improvements) and a full home audit in which the resident is provided with a full list of potential efficiency improvements throughout the home (e.g. upgrading to more energy efficient appliances, improving weatherization, changing certain behaviors, etc.).

Salt River Project's SPATIA program is an example of providing direct, real-time feedback within the energy efficiency context. SPATIA Energy Information Services (EIS) gives commercial and industrial customers near-real-time energy usage information to provide an overview of power usage in facilities and improve energy management. The concept behind SPATIA is that providing energy usage and cost data in real-time for multiple company sites at once will help reduce energy consumption and related costs.

[3] All the programs implementing these types of enhanced billing programs were utilities. It is important to note here than non-utility program administrators would likely be unable to implement this type of program, given that they do not typically have access to individual households' utility bill information.

Status Quo Bias (Default Effects; Endowment Effect)

The status quo bias refers to people's tendency to prefer the default option whenever they are presented with more than one choice (Samuelson and Zeckhauser 1988). The status quo bias is a form of inertia; people are inclined to stay with the default choice simply because it's easier (Thaler and Sunstein 2008).

Knowledge of the status quo bias was applied to Seattle City Light's Customized Home Energy Reports program by setting the program up as an opt-out. Participants were notified of the program and asked to contact their utility only if they preferred not to participate. While some backlash from dissatisfied customers may be inevitable with this type of approach, just 57 of the 20,000 automatically enrolled participants—less than 0.3 percent—elected to opt-out.

External Barriers (Constraints on Choice)

The concept of external barriers refers to that fact that, regardless of an individual's knowledge and intent, factors beyond her control may impede her ability to act (Bandura 1989). For instance, someone cannot be expected to install an efficient appliance in his home if there is no accessible store that carries it or if he cannot afford the upfront price difference.

Public Service of New Hampshire's (PSNH) HEA Program addresses the external barrier of cost by providing energy saving measures for free to eligible households. Specific services provided through the program include insulation, weatherization, cost effective appliance and lighting upgrades, and appropriate health and safety measures. Program participants can receive up to $5,000 in energy efficiency services. While the HEA Program is a step in the right direction, additional programs that tackle other external barriers to behavior change, such as by improving access to energy efficiency measures, have the potential to benefit from energy savings as well.

Public Commitment

Public commitment is powerful in shaping whether people change their behavior. Several experiments (Burn and Oskamp 1986; Katzev and Johnson 1987) illustrate that committing publicly to a behavior increases follow-through. In one study, people who had signed a public commitment to conserve energy showed a lower rate of increase in both gas and electricity consumption than those in either the private commitment or the control groups (Pallak and Cummings 1976).

FortisBC's 20/20 Challenge program applies this insight about public commitment: when participants bring in old light bulbs to exchange them for CFLs, they are asked to pledge to reduce their energy use in at least one other way, such as by installing better insulation in their home or better managing the use of heat in their home. Given the power of public commitment, the very act of making this public commitment may make it more likely that these customers will follow through on the energy saving action they pledged to take.

Goal Setting

Goal setting, which entails having individuals or households set specific goals for reducing their energy consumption, has been demonstrated to be effective in achieving the set

goals. In one study, the effects of goal setting persisted at least until the follow up measurements were taken five months after the intervention ended (Abrahamse, Steg, Vlek, and Rothengatter 2007). Experiments have shown that commitments by utility customers to save energy can result in up to a 10 percent energy savings (Becker 1978; Katzev and Johnson 1983; Katzev and Johnson 1984; Pallak, Cook, and Sullivan 1980).

Wisconsin Focus on Energy's Practical Energy Management (PEM) program uses goal setting to achieve energy savings in the commercial and industrial context. At the start of the PEM program, participants set a goal for the percent energy savings they wish to achieve. Each business determines its own goal and then learns through the PEM classes how they can achieve that goal. Program participants learn what their baseline energy usage is, as well as how different systems within their company's buildings are contributing to that usage.

Single Action Bias

The single action bias is the term used to describe people's tendency to respond to the need to take action by making just one change, even if that single action is only the first step needed (Weber 1997). The first action taken will likely reduce the feeling of guilt or worry associated with not having done anything at all, making further action unlikely (Weber 1997). This bias may be particularly prevalent in the environmental arena, where multiple actions are necessary to make a difference, yet many people may feel they have done their part once they begin recycling or performing some other singular act.

FortisBC's 20/20 Challenge program, which was mentioned previously for applying public commitment to its program, is also an excellent example of an effort to avoid the single action bias. The 20/20 Challenge program reaches customers just as they are performing a key behavior change (trading their old incandescent bulbs for more efficient CFLs), which is precisely when these customers are the most vulnerable to the single action bias. By bringing in old light bulbs to exchange them for CFLs, people will likely feel they have satisfied their obligation to energy efficiency. Yet the 20/20 Challenge takes this opportunity to prompt customers to look ahead to what energy efficiency step they plan to take next, which may help counteract the single action bias.

Discounting the Future (Time Inconsistency)

Discounting the future is a term that refers to people's tendency to choose a lower cost option now, even if this results in a higher cost long-term (Hussen 2003). Put another way, people tend to undervalue long-term benefits and overvalue long-term costs (Wilson and Dowlatabadi 2007). Public Service Gas and Electric's Residential Whole House program applies this concept by paying the cost of energy efficiency improvements upfront and allowing customers to repay the utility over time without accruing any interest. Utility employees and utility sub-contractors provide energy audits, air sealing, and other energy saving measures. The utility pays the full cost of the efficiency measures upfront and customers pay it back over the course of a five year period at 0% interest. Depending on their household income, the customer repays either 20% or 50% of Tier III measures.

Anchor Bias

Anchor bias refers to how strongly influenced people are by the frame at their starting point (Thaler and Sunstein 2008). For example, the Manufacturer's Suggested Retail Price (MSRP) for new car sales is an anchor, because it's the first price a potential car buyer sees and, consequently, all other price offers the dealer makes will appear low in the context of that initial, higher price (Ariely 2008).

We Energies' Commercial and Industrial Benchmarking program has incorporated knowledge about the anchor bias. Through this program, We Energies conducts two hour interviews with key decision-makers within businesses and industrial facilities. The interview asks questions to get at how well managers educate their staff on efficiency and how well they manage energy within their facility and, based on the interviewees' responses, their energy management performance is ranked on a scale of 1 to 5 in terms of how their building's efficiency practices compare to others. This provides plant managers with a frame of reference for how the efficiency practices and approach to facility energy management culture within their building compare to others'.

Foot-in-the-Door Technique (Small Concessions)

The foot-in-the-door technique is based on the concept of small concessions, which refers to the fact that people are much more likely to agree to make a big change if they are first asked to make a series of smaller changes (Cialdini 2001). Making a small change can lead an individual to view herself differently and predispose her to making larger changes to keep her behavior in line with her new self perception (Aronson 1969). Energy Trust of Oregon applies the foot-in-the-door technique to recruitment for its Industrial Energy Improvement program by targeting companies who have already done Lean or other continuous improvement programs. Once companies have participated in one of these kinds of programs, they will be more predisposed to participate in others.

Untapped Opportunities to Incorporate Behavior Insights into Efficiency Programs

While a number of insights from the social sciences have been successfully applied to energy efficiency programs, there remains a great deal of knowledge about what changes human behavior that does not appear from CEE's research to be have been explicitly applied to its members' efficiency programs at this time. The following behavior change insights have the potential to be incorporated into energy efficiency programs or framing of program offerings. There may be significant energy savings to be achieved from further exploring these.

Self-Efficacy

Self efficacy refers to the degree to which individuals perceive a given behavior change to be possible for them and the perceived effectiveness of the behavior in achieving the desired goal (Bandura 1989). Behavior change of any kind is unlikely to happen without self efficacy, because people have to perceive that change is possible before they will be willing to try to

change. As a result, participation in energy efficiency programs may benefit from illustrating as explicitly as possible how an individual's small changes are both doable and will result in energy and monetary savings.

Bounded Rationality and the Paradox of Choice (Choice Overload)

Bounded rationality refers to the limits of people's ability to make decisions across many choices of varying attributes, costs, and benefits (Simon 1991). When this choice limit is reached, the Choice Paradox refers to people's tendency to become overwhelmed and be less likely to make any choice at all than they would be when presented with fewer choices (Schwartz 2004). In the context of energy efficiency, providing customers with a smaller number of ways in which they can reduce their energy consumption may make it more likely that the customer will choose one of the options than if a larger number were provided.

Cognitive Dissonance

Cognitive dissonance refers to the fact that people try to avoid clashes between their perceptions of themselves and their actions and will be likely to change their behavior when presented with evidence of a discrepancy between their beliefs and behavior (Thogersen 2004). People tend to align their personal perception with their actions more than the reverse (Bem 1972). As a result, an individual making a small change (such as installing a CFL) may increase his likelihood of making future energy efficient decisions because he will now view himself more as someone who saves energy.

Reciprocal Concessions (Door-in-the-Face Technique)

The concept of reciprocal concessions refers to people's tendency to cooperate and honor requests, provided requests are within reason. Simply put, it is in our nature to cooperate with others (Cialdini 2001; Cialdini 2007b). People are much more likely to accept a second request once they have rejected an initial offer both in the spirit of cooperation and also because the second request will appear to be more reasonable in comparison to the first request. Thus, if a customer declines participation in a particular energy efficiency program, the utility might consider making a "counteroffer" by offering participation in a second program that requires less commitment or effort on the part of the participant.

Reciprocity Rule (Gift Exchange)

The reciprocity rule explains people's strong tendency to reciprocate favors or gifts with a favor or gift of equal or greater value, regardless of whether the initial favor was solicited or not. This is because people tend to think of favors or gifts as debts that must be repaid (Cialdini 2001). As a result, strategies such as providing free samples in grocery stores increase the likelihood that customers will purchase that store's products (Cialdini 2007b). In energy efficiency, this means that a utility providing a gift or other reward *in advance* of a customer changing their behavior may be particularly effective in encouraging the desired action.

Loss Aversion

Loss aversion refers to people's tendency to try to avoid losses, even if doing so means they potentially forego much larger gains. Most people value a potential loss two or more times greater than a potential gain (Thaler and Sunstein 2008). Consequently, energy efficiency audits may be more effective if the recommendations are framed in terms of avoided energy and monetary losses rather than future savings (Yates 1982).

Priming (Implementation Intention)

Priming is the name for the phenomenon that merely asking people about their intention to perform a given behavior makes it more likely that they will perform the behavior (Bamberg 2002; Thaler and Sunstein 2008). This effect becomes even stronger when you ask people specifically what they intend to do and when and how they will do it (Bamberg 2002; Thaler and Sunstein 2008). Therefore, once a customer has indicated that he or she intends to reduce their energy use, inquiring when and how they plan to do so may increase the likelihood of follow through.

Barriers to Application of Behavior Insights

The fact that there is such a variety of behavior insights still awaiting application to the energy efficiency program context begs the question of why more of this knowledge has not yet been incorporated into efficiency programs. Perhaps the most obvious answer is that these behavior insights have been pulled from a number of different disciplines, many of which may be unfamiliar to efficiency program administrators. Many program administrators do not have access to the literature that details these insights and, even if they do, are unlikely to have the time to sort through it. Even when program administrators are familiar with these insights, they may be limited in how they can apply them due to the regulatory framework in which they operate.

It also may not be immediately apparent to program administrators or others exactly *how* these insights should be incorporated into efficiency programs. Some of the insights listed here may lend themselves to application more than others, and some would likely be challenging to apply in this industry. Other insights might be controversial in practical application, or may risk gaining energy savings at the expense of customer satisfaction. (For example, opt-out programs may help overcome the Status Quo Bias, but may generate a few vocal disgruntled customers.)

Conclusions

Applying insights about behavior change to energy efficiency efforts is still an emerging area, but there is no need to reinvent the wheel. Program administrators aiming to leverage knowledge about human behavior to improve their efficiency efforts can learn a great deal from the research that has already been conducted in the social sciences. CEE members have incorporated a number of these insights into their program approaches, and have particularly taken advantage of this knowledge to leverage social norms, public commitments, and energy-

use feedback. Yet there are still a number of behavior insights that appear to have been largely underutilized in energy efficiency program design to date, including self-efficacy, loss aversion, and cognitive dissonance.

This paper only scratches the surface of the behavior insights and tools that could be applied in the energy efficiency context. A more complete version of this overview, which includes additional insights and more program examples, is available to all CEE members. Recognizing that new behavior approaches and strategies are continually being applied to the energy efficiency context, both the CEE Behavior Program Summary and "Behavior Insights and Tools" overview will be maintained as living documents to capture new applications of these insights going forward. It is our goal that these resources will help facilitate communication between program administrators and provide valuable information to those incorporating behavior approaches into their programs. Throughout these ongoing efforts, the CEE Behavior Committee will continue to act as a forum for information-sharing and to foster collaboration among program administrators as they work to incorporate behavior change insights into efficiency programs.

Ultimately, program administrators experience the same cognitive tendencies and preferences as everyone else, and so encouraging the application of these behavior insights to efficiency programs faces many of the same challenges already described in this paper. There is no silver bullet and, as the social sciences teach us, merely making energy efficiency program staff aware of these insights will not necessarily enable them to apply them to their own work. That said, simply having these insights in mind as energy efficiency programs are designed and implemented is an important first step in the right direction. Beware the Single Action Bias.

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