

Integrating More Behavior Change Strategies Into a Portfolio¹

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ABSTRACT

When we consider energy usage behavior broadly -as in investment behaviors, operations and maintenance behaviors, and habitual behaviors - behavior change is the target of nearly every energy efficiency program operated by program administrators of ratepayer funds. Over the past 30 years, however, program administrators have concentrated on investment behavior change – that is getting their customers to install things like insulation, lighting systems, motors, etc. using various behavior change tools such as marketing, education, rebates, and technical assistance to support the investment behavior change. Today, as program administrators move to expand the range of behavior change strategies in their portfolios, it is often difficult to know where to begin.

The New York State Energy Research and Development Authority (NYSERDA) began by detailing the range of behavior change strategies in the existing portfolio and identifying strategic opportunities in the area of behavior change. NYSEDA is now working to identify which programs might be most appropriate for experimenting with less commonly used behavior intervention strategies, and what steps could be taken to integrate the approaches into its program portfolio.

Introduction

NYSERDA is considering expanding the range of behavior change interventions strategies used across its program portfolio. A first step is to assess the range of interventions that would result in behavior change. NYSEDA is particularly interested in working with a select set of interventions from behavioral economics and social and environmental psychology fields that are untested or only minimally tested in energy efficiency and clean energy program areas. The research project discussed in this paper was part of a facilitated effort among NYSEDA departments to make informed decisions about potential future studies and activities for encouraging energy efficiency investments or adoption of clean energy technologies among customers in New York State.

Given this effort, the project team at NYSEDA, which included the research team from Research Into Action, Inc., designed a study to assess the following research objectives:

¹ The views expressed in this paper are those of the authors and do not necessarily reflect the views of the New York State Energy Research and Development Authority.

1. Based on a review of the social science literature, develop a taxonomy of behavior intervention strategies that can be or have been used with energy efficiency and clean energy programs.
2. Inventory current NYSERDA program activities to identify the interventions currently being used in NYSERDA's portfolio of programs.
3. Identify opportunities for expanding behavior intervention strategies.

Methodology

To determine whether there are any strategic opportunities for NYSERDA for including new or enhanced behavior interventions, the project team first had to define the concept of behavior change intervention. Geller et.al. (1982 and 1990) provides a starting point with their comprehensive categorization of behavior change interventions. These researchers differentiate behavior change interventions by their time sequence relative to the behavior as either an “**antecedent**” or “**consequence**” intervention:

1. **Antecedent interventions or strategies** are those that *occur prior to a behavioral response to influence a response*. Providing prompts on how to save energy at home via a signal or verbal reminder are examples of this strategy.
2. **Consequence interventions or strategies** are those that *occur after a behavioral response to reinforce or discourage a behavior*. For example, giving daily or weekly feedback on energy use or related cost is a consequence strategy.

Several recent social science reviews of research on energy efficiency and/or conservation suggest that many antecedent and consequence strategies are effective in reducing electricity or natural gas usage among households and firms (Houde & Todd 2011, Ashby et.al. 2010, Willson & Dowlatabadi 2007, and Abrahamse et.al. 2005). The project team extracted 27 strategies with demonstrated effects on consumers' energy efficiency and/or conservation choices from this literature (see Table 1 in “Results” Section). We further organized the 27 strategies into ten distinct categories of intervention types:

1. **Commitment:** Includes strategies that encourage individuals or firms to commit to executing an action by a specific date. These can be either antecedent or consequence strategies.
2. **Feedback:** Includes strategies where energy use information is given to the customer frequently (e.g., more than once a month). These are consequence strategies.
3. **Follow-through:** Includes strategies that remind individuals or firms to follow through with the behavior intention or commitment. These are antecedent strategies.
4. **Framing:** Includes strategies that frame energy information in a manner that can bias choice in systematic and predictable ways. Generally, these are antecedent strategies.
5. **In-person Interaction:** Includes strategies that emphasize person-to-person interactions by someone who is trusted or respected in the community. These can be either antecedent or consequence strategies.
6. **Monetary Incentives:** Offer of financial incentives or rebates. These are consequence strategies.
7. **Gifts or Rewards:** Includes strategies using gives, offers of chance or competitions. These can be either antecedent or consequence strategies

8. **Social Norms:** Includes strategies that activate social norms with respect to energy efficiency and/or energy curtailment behavior. Social norms are commonly accepted ways of behaving in a group. When individuals learn what the norm is, they tend to align their behavior closer to the norm. Hence, individuals are more likely to do a behavior when they perceive others in a group are doing that behavior.
9. **Sunk Cost:** Includes strategies that minimize the sunk cost effect. The sunk cost effect refers to the notion that people become psychologically invested in money already spent. For example, it is hard for people to discard non-efficient goods such as old refrigerators that they already have paid for.
10. **Multipronged Strategy:** Includes complex strategies that use more than one type of intervention to affect behavior.

The project team used the categorization system to catalogue NYSERDA's behavior change activities. To identify current and planned programmatic behavior change activities at NYSERDA, the project team reviewed operating plans, various program evaluations, several program notices, and the NYSERDA website, and conducted in-depth interviews with 11 members of NYSERDA's staff in order to learn more about NYSERDA's effort to facilitate behavior change.

Results

As noted in the preceding section, the project team reviewed residential, commercial, and industrial programs and identified which behavior change strategies were used in each program. This effort resulted in identification of those behavior change strategies that are heavily, moderately, lightly used, or not used at all. As a first cut, at identifying promising opportunities for NYSERDA, the project team noted those strategies that are lightly used or not used at all. Subsequent research should examine each program in more depth to assess additional opportunities including reviewing specific strategies in use to see if those can be enhanced.

Of the 27 strategies in the classification system, 22 are currently being used in the residential and 15 are being used in the nonresidential sector (Table 1). Of the five strategies in the residential sector not currently being used, four strategies – framing energy information as preventing a loss rather than incurring a gain, using default options to encourage a desired behavior, using competitions to reward behavior, and using frequent energy use feedback – are promising opportunities for NYSERDA for the following reasons:

1. **Framing energy information as preventing a loss rather than incurring a gain** has a potential to influence individuals' decision-making. Classic experimental research from behavioral economics and cognitive psychology has shown that framing an action as a loss rather than a gain can substantially alter people's preferences for that action, as people focus on losses more than on gains (Kahneman & Tversky 1984, and Kahneman et al. 1991). Given this research, it seems valuable to test whether loss aversion messages such as "you are losing x amount of dollars every month because of poor insulation" are more motivating than current program messages that frame energy efficiency in positive terms such as "you would save x amount of dollars if you insulate." NYSERDA could design an experimental study to test whether a loss aversion message would more effectively motivate customers to invest in energy efficiency compared to the current focus on benefit messages.
2. **Setting default options for programs or products** also has the potential to result in significant energy savings. This strategy provides two types of opportunities that build on the same social science research. This research has shown that people generally

continue with the default option when presented with multiple options (Madrian & Shea 2001, Abadie & Gay 2006, and Pichert & Katsikopoulos 2008).

Given this insight, programs will likely have more participants using an opt-out rather than opt-in approach when feasible; and more energy efficiency will occur if program administrators focus on encouraging manufacturers and service providers to ensure that appliance or electronic goods default settings are the most energy-efficient.

In 2010, Sacramento Municipal Utility District (SMUD) achieved a 4% reduction in energy use among participants when they sent energy use reports to their customers and asked them to call the utility if they wanted to opt out of this program (Ashby et. al., 2010). Hittinger et. al. (2012) estimated potential household savings of \$30/-/\$100/year if the “1-h auto power down” Xbox setting were enabled. Frank et. al. (2012) estimated that optimizing TV brightness through a direct install approach, in which a service provider manually adjusts settings while in the user’s home, could save up to 42 GWh in Washington, Oregon, Idaho, and Montana in 2012-2014. Hence, NYSERDA should consider exploring default option strategies and assess which are feasible to implement and would result in cost-effective energy savings.

3. **Using competitions to reward behavior** is another promising strategy. This strategy has been used by NYSERDA in the past and is being explored for piloting by the Multifamily Performance Program team. For instance, in 2010-2011, residents of six Brooklyn neighborhoods who participated in a yearlong energy savings competition sponsored by NYSERDA, Con Edison, and New York City government reduced their electricity usage by 4% over the course of the competition compared to the previous year (NYSERDA, 2012). Furthermore, recent experimental work by Gneezy, Niederle, and Rustichini (2003) demonstrated that individuals are more motivated by rewards given to the top performers in a competition rather than by fixed rewards for just doing an action.
4. **Providing frequent energy use feedback such as with social comparison** is a multipronged behavior-based intervention that has shown savings in other jurisdictions. Research has shown that frequent (daily or weekly) energy use feedback results in notable electricity and/or natural gas savings among consumers who receive such feedback (Abrahamse et al. 2005). O-Power and C-3 are two organizations, among others, that have developed reports displaying energy use information with social comparison. The New York State Department of Public Service (DPS) is exploring the effect of O-Power reports on consumers in the state. These reports with social comparison occur once a month. However, feedback strategies that provide daily or weekly feedback on energy use or related costs, in particular, should be considered for the following reasons:
 - a. Research has shown that daily or weekly energy use feedback generally is effective in encouraging residential consumers to reduce their energy usage (Abrahamse et. al. 2005).
 - b. Some studies have demonstrated that energy curtailment behaviors persisted even after energy use feedback was discontinued (Abrahamse et. al. 2005).

Therefore, it would be valuable to test whether greater energy savings could be achieved when reports are provided bi-monthly, weekly, or via in-home displays or home area network devices. To study this, NYSERDA would have to collaborate with the distribution utilities to implement energy use feedback strategies using in-home displays or home area network devices. Because NYSERDA has experience with real-time-feedback-enabling technologies and the utilities have access to customers and their energy usage, NYSERDA could be seen as a valuable technical partner in such an experiment.

Of the 11 strategies not actively being pursued by NYSERDA in the nonresidential sector, three offer promising opportunities for the following reasons:

1. **Framing energy information as preventing a loss rather than incurring a gain** as in the residential sector has the potential to influence firms' decision-making. Although the research on loss aversion explored risk perceptions of individuals rather than firms, it might be useful in the nonresidential sector because decisions in a firm are made by key individuals who assess risks associated with capital expenditures, including those for energy efficiency. The challenge is to know what type of loss aversion messages to use in order to encourage a desired behavior among firms. Peters et. al. (2008) found that customized sector specific messages about energy efficiency investment from the Northwest Energy Efficiency Alliance (NEEA) gained traction within certain industries. For example, NEEA used the language of cash flow (“\$1 in energy savings equals \$50 to \$80 in increased sales revenue”) – for grocery stores, and the language of asset equity (“energy savings leads to increased net operating income, which leads to increased asset value”) for real estate firms (Peters et.al., 2008, p.7). These customized messages worked well in these markets because energy savings were translated into meaningful information for the end use customer, however they were framed largely as benefits, framing such business case messages to focus on losses, could be more effective.
2. **Setting default options for programs or products**, as noted for residential programs above, also has the potential to result in significant energy savings in the nonresidential sector. Program staff could encourage manufacturers to set default options for various products that are used in both the residential and C&I sectors (e.g. desktop computers) to be the most energy-efficient. Similarly, NYSERDA should explore promising “default setting” strategies and then consider integrating those with the largest energy savings potential into the Advanced Codes and Standards program at NYSERDA.
3. **Giving firms frequent feedback on their energy use or related cost** is a promising research opportunity for NYSERDA. In 2009, the Energy Trust of Oregon provided real-time energy use feedback to their industrial customers, as well as financial incentives for reduced energy use or new energy-efficient equipment (Ashby et al., 2012). This approach resulted in energy savings of 3-5% among participants. Research is underway at the University of California at Berkeley and National Renewable Energy Laboratory (NREL) on how to use feedback strategies to stimulate energy curtailment occupant behavior in commercial buildings. Ackerly and Brager (2012) provided “open” and “close” window signals to occupants in 10 buildings across the U.S. to assess if these signals would prompt occupants to open or close windows. In seven of the 10 buildings, a minority, between 10-20%, reported actively opening their windows when they saw the “open” signal, and 10-30% reported actively closing their windows when they saw the “closed” signal. NREL tested a feedback mechanism that provides occupants with a choice of four comfort settings, along with feedback on the cost and energy consumption associated with each setting in an office building (Schott et. al., 2012). This strategy resulted in a 10% reduction in energy use because most occupants chose the most energy-efficient setting. NYSERDA is in a good position to try these feedback approaches in the nonresidential sector because these internal building systems are independent of the distribution utility services. Further, NYSERDA's experience with real-time feedback enabling technologies and green building construction projects could facilitate this effort.
4. **Adjustments to multipronged strategies** present another opportunity. NYSERDA generally does not implement behavior change strategies in isolation; instead, NYSERDA commonly uses multiple strategies. The evidence suggests that such multi-pronged

approaches make sense. Yet, there has been limited research to understand which combinations of behavior change interventions are responsible for the largest energy –savings. This presents another opportunity for NYSERDA. For example, in many nonresidential programs, NYSERDA provides financial incentives and emphasizes energy efficiency benefits to end users. This is done to minimize customers’ sensitivity to initial cost and increase the appeal of energy efficiency benefits. NYSERDA might find a financial incentive strategy linked with framing energy efficiency as “preventing a loss,” along with education strategies, would further increase C&I customers’ uptake of energy efficiency investments.

In addition to limited use of default settings, framing using loss aversion, and frequent feedback in both sectors, the project team also found that commitment, follow-through, and sunk cost strategies, are used less frequently than other types of strategies (Table 1) and could be expanded across all program sectors.

Conclusions and Recommendations

The taxonomy of behavior change interventions developed for NYSERDA is grounded in social science research and builds on work conducted by others in energy efficiency. The review of the literature began with several other papers that sought to describe the types of behavior intervention strategies. We found that much of the terminology in social science is sometimes obscure or unfamiliar to program implementers, so we sought to use simple and clear categories that program staff and behavior researchers can use to discuss opportunities for inclusion of more behavior interventions into program design and implementation.

We recommend that this taxonomy be used by other program administrators as they explore the expansion of behavior interventions strategies in their portfolios.

Applying this taxonomy, we identified several behavior interventions opportunities for NYSERDA in the residential and nonresidential sectors. The most promising opportunities relate to exploring whether loss aversion, default settings, and energy use feedback strategies could be used directly in more programs to influence decision-making regarding energy use, and whether certain combinations of behavior change strategies would yield a larger energy savings potential than other combinations.

We recommend that program administrators consider these strategies and as noted above specifically look to combine strategies and test which combinations yield the greatest results.

Finally, this is not the end of the process. The linkage between the specific behaviors targeted by each program has yet to be identified. In some cases, there is clear evidence that a specific intervention strategy can influence a behavior, in other cases there is research remaining to identify the strategy or combination of strategies that can be most effective in influencing behavior change. This taxonomy and assessment of program activities, thus, is a first step in the much longer process of integrating behavior change strategies into energy efficiency and clean energy programs.

Table 1: Behavior Change Strategies Used in Residential and Commercial/Industrial (C&I) Programs

Effective Behavior Change Interventions Identified from the Literature Review	Defined as...	NYSERDA Programs Using These Strategies ²
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Category	Strategy Description	Ante- cedent	Conse- quence	Residential	C&I
1. COMMITMENT	1. Ask people to commit to one other person to do an energy-efficient action	✓		Some	NONE
	2. Help customers set energy-savings goals	✓		Some	Some
	3. Ask for a small commitment before a larger one	✓	✓	Some	NONE
2. FEEDBACK	4. Give customers frequent feedback on their energy use or related cost		✓	Some	NONE
3. FOLLOW- THROUGH	5. Provide prompts via signal or verbal communication to remind people to make a behavior change	✓		Some	Some
	6. Ask customers to create a plan for reducing their energy use	✓		Some	Some
4. FRAMING	7. Emphasize energy efficiency benefits	✓		MOST	MOST
	8. Minimize number of choices	✓		MOST	Some
	9. Frame costs or payback on investment as reasonable to encourage behavior	✓		Some	Some
	10. Frame energy-efficient behavior as a moderate, and/or recognizable choice	✓		Some	MOST
	11. Frame energy-efficient behavior to encourage status or self-image	✓		Some	Some
	12. Frame energy information as preventing a loss rather than incurring a gain	✓		NONE	NONE
	13. Switch a program from opt-in to opt-out, when feasible.	✓		NONE	NONE
5. IN-PERSON INTERACTIONS	14. Encourage program staff, manufacturers, or service providers to set energy-efficient default options on products	✓		Some	NONE
	15. Use interpersonal communication and a credible messenger to encourage the desired behavior	✓	✓	MOST	MOST
6. MONETARY INCENTIVE	16. Model desired behavior by someone with authority in the target community	✓		Some	Some
	17. Offer financial incentives/rebates to encourage energy efficiency investments		✓	MOST	MOST
7. REWARD	18. Offer gifts (e.g., FREE audits) to encourage energy-efficient behavior	✓	✓	Some	Some
	19. Offer a chance to win a larger reward (i.e., lottery)		✓	NONE	NONE
	20. Offer a chance to win a reward based on increased performance (i.e., competition)		✓	NONE	NONE
8. SOCIAL NORMS	21. Activate social norms by providing comparison relative to a group others could identify with via marketing or outreach messages, customized information, or visual cues	✓	✓	Some	NONE

Effective Behavior Change Interventions Identified from the Literature Review		Defined as...		NYSERDA Programs Using These Strategies ²	
Category	Strategy Description	Antecedent	Consequence	Residential	C&I
9. SUNK COST	22. Target upgrade investments at the time of replacement of an energy-using product	✓		Some	NONE
10. MULTIPRONGED STRATEGIES	23. Improve self-efficacy, which is the belief in one's/firm's abilities to complete tasks and achieve goals, via person-to-person interactions/modeling a desired behavior and positive feedback	✓		MOST	MOST
	24. Reset/frame the value of future benefits related to energy efficiency investments with monetary rewards and education/framing strategies	✓	✓	Some	Some
	25. Activate cognitive dissonance ¹ via commitment or prompt and modeling or hand-delivered feedback	✓		Some	NONE
	26. Provide frequent energy use feedback with reward		✓	Some	Some
	27. Provide frequent energy use feedback with social comparison		✓	NONE	NONE

¹ People tend to align their personal beliefs with their actions. If there is a discrepancy between people's *beliefs* and their *actions*, people experience 'cognitive dissonance.' Cognitive dissonance leads people to change, because they naturally want to align their beliefs and actions, if they can.² Legend: MOST= more than half of programs are using this strategy; Some= Less than half of programs are using this strategy; NONE= no programs are using this strategy

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