Title:
Persistence of Energy Efficiency Behaviors over Time: Evidence from a Community-Based Program

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Abstract:
Rather than providing incentives for the one-time purchase of technologies, behavior change programs rely on low- or no- cost actions to save energy and reduce demand. These actions must be sustained over time in order to be effective. Therefore, understanding the persistence of energy-saving actions is critical to incorporating behavior change programs into utility energy efficiency program portfolios. Unfortunately, there are few studies that have examined persistence of energy-saving actions over time.

This paper provides new results from an evaluation of a community-based energy efficiency program showing sustained energy efficiency behaviors over an 18-month time frame. Actions were sustained despite limited program follow-up and no financial incentives. The program, which is designed to encourage community members to commit to saving energy by signing a pledge form, uses a multi-pronged approach to reach out to as many community members as possible, and reinforces messages by relying on a variety of marketing efforts. These efforts include mass marketing, outreach at community events, and contests. Using a panel study with a random sample of pledgees, evaluators were able to ask pledgees about their energy-savings behaviors four times over the course of 18 months.

Results showed that participants conducted low-cost and no-cost actions, and they sustained these actions over time. Participants most commonly reported taking the following actions since pledging: switching off lights, switching off electronics, installing energy efficient lights, using computer power management, changing thermostat settings, and using a clothesline rather than

a clothes dryer. Respondents who could recall their pledge were more likely to conduct their pledged action(s) compared to those respondents who could not recall their pledge. Furthermore, “high recallers” completed a significantly greater proportion of pledged actions compared to “low recallers.”

This paper includes a description of the program model, detailed results related to sustained behaviors over time, and recommendations for encouraging persistence and implementing behavior change programs. The authors also offer recommendations for setting up tracking systems early in the program launch to facilitate a more detailed understanding of pathways to program participation and behavior change.

Persistence of Energy Efficiency Behaviors over Time: Evidence from a Community-Based Program

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ABSTRACT

Rather than providing incentives for the one-time purchase of technologies, behavior change programs rely on low- or no- cost actions to save energy and reduce demand. These actions must be sustained over time in order to be effective. Therefore, understanding the persistence of energy-saving actions is critical to incorporating behavior change programs into utility energy efficiency program portfolios. Unfortunately, there are few studies that have examined persistence of energy-saving actions over time.

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Introduction

In July 2010, We Energies initiated a community-based energy efficiency program, the Community Education Pilot (CEP) Program. The CEP Program is a marketing and outreach program that relies on community-based social marketing tools, such as pledges and competitions, to drive participants to save energy. It aims to 1) generate 1% energy savings annually within a defined community, Burlington, Wisconsin, and 2) collect 2,250 pledges to save energy from community

members by December 2013.[1] The program is implemented by ICF International and is expected to continue operating through December 2013.

To assess program results, We Energies contracted with Itron and Energy Market Innovations, Inc. to conduct an impact and process evaluation of the CEP Program. This paper presents select results from surveys with participants. A full report of process and impact evaluation results is forthcoming (Itron and Energy Market Innovations, 2013).

Program Overview

The CEP Program is branded "*Way to Save, Burlington!*" The pilot program was originally designed to operate for two years, but was extended to three and a half years, with a slated end in December 2013, in order to more fully understand program impacts. The CEP Program was designed to address the following barriers:

- Limited customer awareness of energy efficiency,
- Limited motivation to take energy efficiency actions, and
- Potential lack of trust of the government and/or the utility.

To address these barriers, CEP Program implementers developed a comprehensive marketing and outreach approach based on the following community-based social marketing tools: commitments, competitions, and community-focused messaging. Through various program activities, program implementers encouraged community members to sign a pledge to save energy. The logic is that such a commitment will increase the likelihood of community members practicing energy efficient behaviors and purchasing energy efficient equipment. Focusing on one community allowed implementers to pilot the effectiveness of these social marketing tools and determine whether they could be successfully disseminated to other communities or incorporated into other energy efficiency programs.

The CEP Program relies on an "Energy Ambassador," who is a staff member from the implementation team, to administer the program. While the Energy Ambassador depends on other staff and volunteers for support, he performs the majority of the implementation work. The Energy Ambassador provides a "face" to energy efficiency, designed to break down the perceived trust barrier and encourage more customers to participate in the program.

The Energy Ambassador relies on an Energy Task Force (ETF) to develop and vet marketing and outreach ideas. The ETF is composed of a group of volunteer community leaders who meet regularly (roughly every six weeks). By coordinating program efforts with the ETF, implementers hope to achieve increased community ownership of the program and a toolbox of techniques suited to Burlington.

To participate in the CEP Program, customers "pledged," or agreed to undertake their choice of up to five specific energy-saving actions, as shown in

Figure 1. There were various ways that customers could complete a pledge form, including:

- The Home Energy Makeover Contest: Residents signed up and submitted videos for why they should receive an energy makeover.
- The School Energy Competition: Students were asked to bring pledges home for parents and then serve as a Home Energy Manager.
- The Way to Save Burlington website: The website provides on-line presence and the ability for people to pledge online.
- Other: Customers filled out pledge forms at various community events, such as farmers

1 We Energies has 10,635 unique customers (9,906 unique residential accounts and 729 unique commercial accounts) in Burlington. Therefore, the goal of 2,250 pledges represents 21% of We Energies customers in Burlington. It should be noted that a) pledges are made by individuals and not by all members of a household/business, which is equivalent to a We Energies customer, and b) many pledges came from people living outside of the City of Burlington.

markets, home expos, energy fairs, etc.

Figure 1. Program Pledge Card

As of May 2013, 849 participants had pledged through the School Energy Competition, 34 participants pledged through the Home Energy Makeover Contest, 24 participants pledged online, and 591 participants filled out a pledge card that was submitted through another means.[2] The vast majority (96%) of pledgees were residential.

Study Objectives

The process evaluation conducted by EMI included in-depth interviews and surveys with program staff, as well as a longitudinal survey, or "panel study," with program participants. This paper focuses specifically on results of the panel study with respect to the following four topics:

- Program participation by pledge method
- Types of actions taken to fulfill pledges
- Number of actions taken over time
- Influence of pledge recall

Methodology

The panel study involved a series of four online surveys with program participants to track behaviors and attitudes over time. In the first survey, the evaluation team surveyed the population of community members who participated in the program from the program inception through October

2 Because the evaluation team did not assess program activities after May 2013, we did not access the implementer's database after this date. The CEP program database contained 1,641 pledges as of May 2013, however the evaluation team identified 132 duplicate records in the population file and therefore removed these pledges from the pledge count. The evaluation team identified duplicates using name and email address.

2011. The second survey was targeted both at participants who completed the first survey (to track their experiences over time) and at new participants who participated in the program between November 2011 and May 2012. A third survey was completed in November 2012, aimed at tracking all participants who completed the second survey. Finally, a fourth survey was completed in June 2013, following up with all participants who completed the third survey.

Table 1 shows these different sample groups. P1 refers to the phase 1 sample (who first took the survey in November 2011), and P2 refers to the phase 2 sample (who first took the survey in June 2012). T1 through T4 refers to the four time points for each of the four waves of the panel study.

Table 1. Participant Panel Study Sample Groups

Sample Group	Time 1 (Nov-11)	Time 2 (Jun-12)	Time 3 (Nov-12)	Time 4 (Jun-13)
Phase 1	P1T1 (1st participant sample, surveyed at time 1 (n = 59)	P1T2 (1st participant sample, surveyed at time 2 (n = 28)	P1T3 (1st participant sample, surveyed at time 3 (n = 21)	P1T4 (1st participant sample, surveyed at time 4 (n = 17)
Phase 2		P2T2 (2nd participant sample, surveyed at time 2 (n = 128)	P2T3 (2nd participant sample, surveyed at time 3 (n = 79)	P2T4 (2nd participant sample, surveyed at time 4 (n = 53)

Sample Description

The distribution of pledges among the sample of participants who completed the survey is very similar to that of the total population from which the sample was drawn. The new participant respondents from the second survey – the phase 2 sample, or P2 – mostly represented community members who pledged through the School Energy Competition, while the original participant respondents – the phase 1 sample, or P1 – tended to represent participants who signed a pledge card through a community event or the Home Energy Makeover Contest.

Results

This section summarizes key results of the panel study with respect to the types of actions taken by respondents, the number of actions taken, and the influence of pledge recall on the number of actions taken.

Types of Actions Taken

The most common energy-saving actions participant respondents reported taking at the time of their first survey were no- and low-cost actions. As shown in Figure 2, four of the top five actions reported by respondents were no-cost actions: switching lighting or electronics on/off, changing thermostat settings, and using a clothesline instead of a dryer.

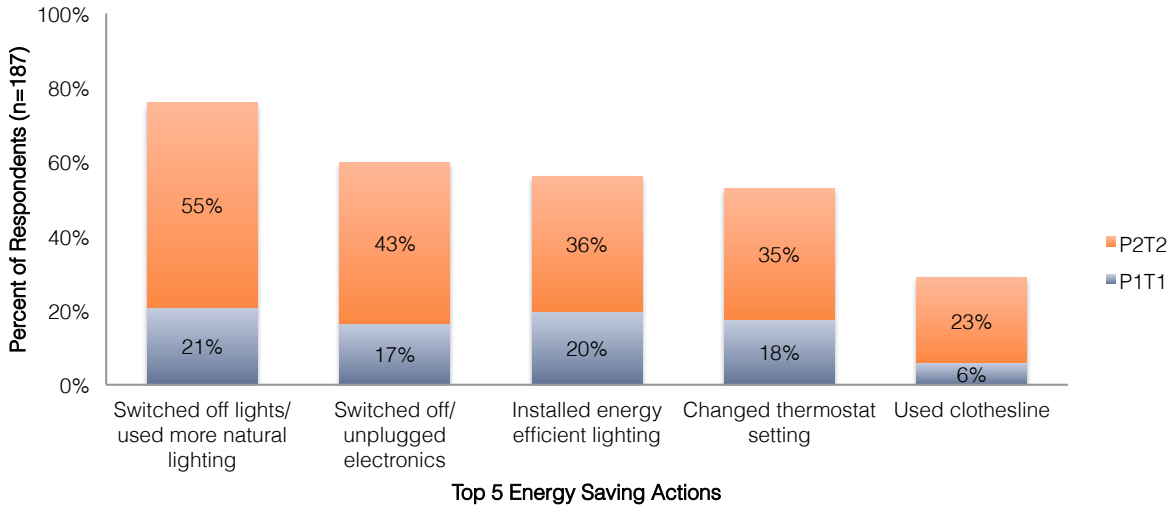

Figure 2. Most Common Energy-Saving Actions at the Time of the First Survey

Figure 3 shows the top energy-saving actions reported over time, for the P2 participant respondents who completed the survey at all three time points (the P1 sample ended up being too small to examine changes over time). The most common actions are very similar to those at the first survey, shown in Figure 2. However, unlike the first survey, the data at time 4 show that using computer power management was among the top actions completed.

The evaluation team tested whether the types of actions taken by participants changed over time and found two significant differences. The number of respondents reporting that they changed their thermostat settings to save energy increased significantly from 57% at time 2 to 80% at time 3 and 73% at time 4. The number of respondents who reported using sleep mode on their computer also increased significantly from 27% at time 2 to 44% at time 3 and 43% at time 4.[3] Respondents did not significantly change the frequency of any other energy-saving activities.

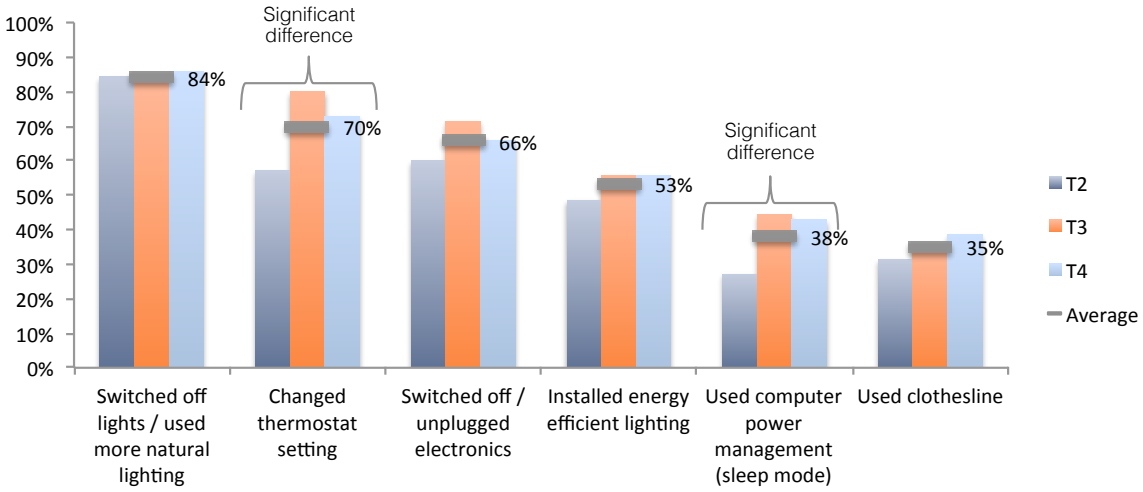

Figure 3. Top Energy-Saving Actions Over Time

3 A McNemar X^2 test showed that these changes from time 2 were statistically significant at $p < .05$.

Number of Actions Taken

The evaluation team examined the average number of actions taken by surveyed participants, and and found that those who recalled pledging to take action, on average, implemented more energy efficiency measures in their home or business than those who did not (see Figure 4), and this difference was statistically significant, $t(185) = 2.74$, $p < .01$.

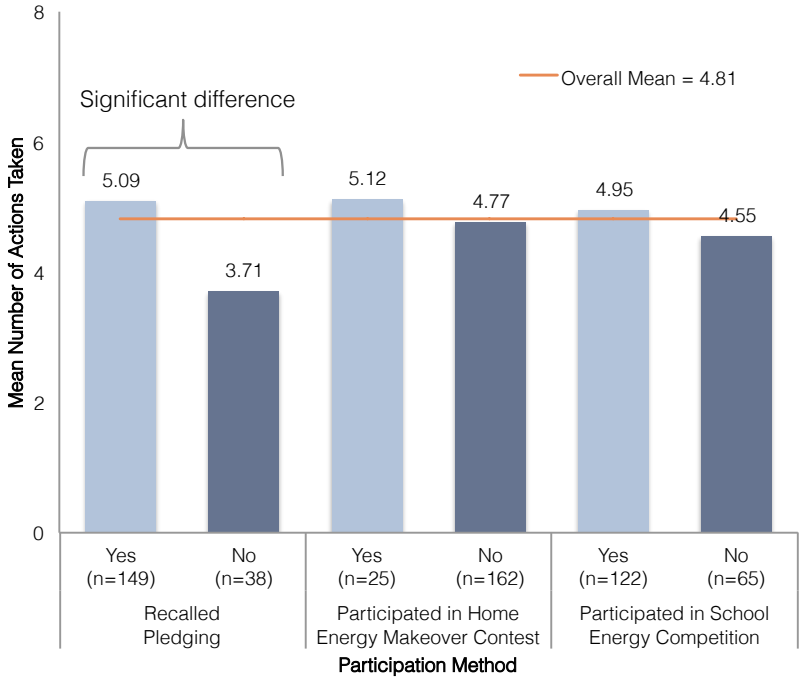

Figure 4. Mean Number of Energy-Saving Actions taken by Participation Method and Pledge Recall

The evaluation team assessed whether respondents sustained these actions over time. According to the According to the four surveys, participants increased the number of actions taken over time (see Figure 5). The first group of respondents (P1) reported nearly the same number of actions in the first six months following pledging (4.71 at time 1 and 4.76 at time 2), but had increased their mean number of actions by two (6.59 at time 4) one year later. However, the difference was not significant, and due to the small sample size, conclusions are limited.

The second group of respondents (P2), which consisted primarily of the respondents who pledged through the School Energy Competition, increased their actions by one (1.23) over the course of one year after pledging. A repeated measures ANOVA showed that these results were statistically significant ($F(2, 51) = 4.85$, $p < .05$), specifically for the increase between time 2 ($M = 5.19$) and time 4 ($M = 6.42$, $p < .01$).

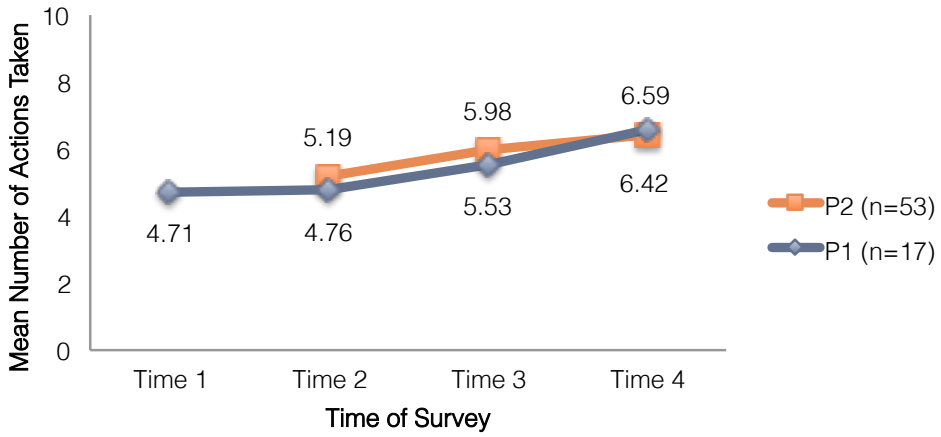

Figure 5. Mean Number of Actions taken Over Time

Influence of Pledge Recall

Participants in the CEP Program were not provided with a copy or reminder of their pledge. The evaluation team examined recall and then compared each respondent's ability to recall their with whether he or she had taken action on the pledge. The evaluation team found that a ability to recall their pledge positively influenced a respondent to take energy-saving actions. results showed a great deal of variation in respondents' ability to recall their pledge (see

Table 2); however, respondents most frequently (31%) recalled their pledge perfectly (1.00). Respondents were placed into a "High Recall" or "Low Recall" group based on the proportion of pledged actions that they recalled pledging. If they recalled 50% or less of their pledged actions, they were placed in the "Low Recall group; if they recalled more than 50% of their pledged actions, they were placed in the "High Recall" group.

Table 2. Proportion of Pledge Recalled Correctly

Proportion of Pledge Recalled Correctly			Percentage of Respondents (n = 103)
High Recall Group (n = 73)	(Perfect recall)	1.00	31%
		.80	19%
		.75	6%
		.67	1%
		.60	14%
Low Recall Group (n = 30)		.50	7%
		.40	4%
		.33	6%
		.20	1%
	(No recall)	0.00	12%

Note. Sample size for this question was based on P1T2 (n = 28) and P2T3 (n = 107), representing respondents' recall six-months after their initial survey for both P1 and P2 groups. Program data were missing pledge responses for four respondents, so these respondents were not included in this particular analysis.

Next, the evaluation team checked to see if respondents actually completed their pledged actions; the actions; the evaluation team examined the actions that respondents reported taking as a proportion of the actions that they had pledged to take. The evaluation team gave credit to respondents for completing an action at any point; in other words persistence of behaviors was not critical to this particular test, because some pledges were based on installing equipment and not long-term behavior changes.

Table 3 shows that by time 4, 41% of respondents indicated they took all of the actions they had pledged to take.

Table 3. Proportion of Pledged Actions Performed as of Time 4

Proportion of Pledged Actions Performed		Percentage of Respondents (n = 68)
(All pledged actions taken)	1.00	41%
	0.80	28%
	0.75	10%
	0.67	6%
	0.60	13%
	0.40	2%
(No pledged actions taken)	0.00	0%

Note. Sample size for this question was based on P2T4 respondents (n = 70). The program database was missing pledge responses for two respondents, and so these respondents were not included in this particular analysis.

Finally, the evaluation team compared the proportion of actions taken for the defined "Low Recall" and "High Recall" groups and found that the high recall respondents had a significantly higher proportion of pledged actions taken (0.80 compared to 0.67). This finding was statistically significant, $t(101) = 2.44$ $p < 0.05$. Based on these results, it is possible that more energy savings could be achieved if program implementers provided some type of pledge reminder. Despite these results, only a third (32%) of participants reported wanting to have some sort of reminder of their pledge. The most common requested reminders were email reminders and refrigerator magnet reminders (Table 4).

Table 4. Requested Format for Pledge Reminder

Formats of Pledge Reminder	Percentage of Respondents (n = 32)
Email reminder	47%
Refrigerator magnet	38%
Postcard reminder	6%
Poster to hang on the wall	6%
Paper copy of my pledge form	3%

Limitations

It is possible that pledge forms were only signed by customers who tend toward energy efficiency and/or hold attitudes aligning with energy efficient behaviors. This is supported by a general population survey conducted with residents of the city of Burlington, showing that, in comparison, participant respondents more often agreed that conserving energy is desirable and felt that they were capable of doing so. Additionally, the participant survey showed that over time, fewer participants agreed with the statement "If I can pay for it, I have the right to use as much energy as I want." Therefore, it seems possible that customers who were more aligned with energy efficiency were more likely to pledge, but that over time, they also felt an increasing responsibility to conserve energy. It is possible that participants who completed surveys were inherently different from those participants who opted out of the surveys; however, the evaluation team has no data to test this hypothesis.

It is also possible that respondents were subject to social desirability bias and that they falsely reported that the number of actions taken had increased over time. However, given that six months passed between each survey, it is unlikely that respondents could recall their responses from previous surveys. Furthermore, the general population survey, also based on self report, showed that energy efficient actions did not increase over time for the general population; increasing actions over time appears to be unique to pledgees.

Because the program logic assumed that the CEP Program would influence energy use in the city overall, and not just among pledgees, impact analyses compared energy use over time for the city of Burlington, compared to a control community, the city of Watertown. The analysis did not find significant differences in energy use between the two communities. An analysis comparing energy use of pledgees to that of non-pledging customers in Burlington was not conducted. This is perhaps due to the difficulty in identifying a valid "control" group – customers in Burlington with similar characteristics and attitudes who had not pledged. However, an analysis of program tracking data did show that customers in Burlington experienced a net increase in program savings, compared to customers in Watertown. This suggests that one outcome of the CEP Program was to increase the level of participation in energy efficiency programs among those who signed a pledge card.

Finally, the source of pledge cards was not tracked at the beginning of the CEP Program. Planning for evaluation from the outset would include establishing specific, measurable goals and then ensuring that data to evaluate progress toward these goals are available from the outset. Additionally, while the number of pledges provides a clear quantitative understanding of program success, it does not effectively measure the relative success of each type of outreach effort. For example, while workshops did not generate many pledges, they may have been very effective at increasing knowledge and/or promoting incentive programs. Without data and/or goals to track the success of these non-pledge impacts, understanding their success is limited.

Conclusions

This study provides evidence that pledge cards can be an effective means of increasing energy efficient behaviors among residential customers, especially for those who can recall their pledge. Because the pledge cards are not a large financial investment, they may be worth considering for other programs that wish to effect changes in residential customer behavior. All of the respondents reported that they were doing at least some of the energy efficient actions they had pledged to take, as noted in the program tracking data. Furthermore, participants of the CEP Program reported increasing energy-efficient actions over time, even 18+ months after pledging. When the evaluation team compared the self-reported pledge to the pledge in the program tracking data, we found that those who

could more accurately remember their pledge were even more likely to have performed the actions. Utilities or program implementers may want to consider building in a commitment component to other types of programs in the future, and providing a record of this commitment to participating customers as part of an existing or new marketing campaign. This could even be accomplished with an online pledge form that then gets mailed to the customer as a record of their pledge.

A separate pledge card should be used for residential customers and non-residential customers. The pledge card used by the CEP Program was designed for the residential setting and few actions were transferrable to the non-residential setting. Future programs can ensure that businesses are able to fully participate by developing a separate pledge card for non-residential customers. However, these pledges might need to be less prescriptive, as businesses tend to have more unique needs requiring custom initiatives.

It remains unclear how long energy efficient behaviors can be sustained, especially after the CEP Program ends. Without funding for a paid Energy Ambassador, the CEP program will cease to operate in its current form in December 2013. However, it is possible that program participation has made some lasting changes in behaviors (e.g., turning off lights) and/or instilled a greater emphasis on energy efficiency in future decision-making regarding the purchase of new equipment. While energy efficient attitudes among participants did not change much over time (see full report, forthcoming), participants were less likely to agree with the statement, "If I can pay for it, I have the right to use as much energy as I want" one year later (4%) compared to the time of their first survey (16%, $p < .05$). While a change in this specific attitude does not necessarily equate to a sustained behavior change, this possibility is compelling. Longer-term research is needed to address this question.

Similar programs should be designed with the evaluation in mind from the beginning. This includes establishing goals early in the program design phase, defining non-pledge metrics to track the success of outreach efforts, and making sure that tracking systems are set up to adequately track progress toward goals. In the case of the CEP Program, the source of pledge cards was not tracked at the beginning of the pilot. Establishing indicators and goals of the program early on and throughout the program cycle allows program staff to focus efforts on activities that are specifically designed to meet the barriers targeted by the program.

References

Itron and Energy Market Innovations, Inc . 2013 (forthcoming). "Final Evaluation Report for the We Energies Community Education Pilot Program." Accessed at http://psc.wi.gov/.