
MEMORANDUM

TO: Melissa Piper
FROM: Bob Baumgartner, Pam Rathbun
SUBJECT: Process Evaluation Findings for the National Grid Residential Building Practices and Demonstration Program
DATE: December 18, 2012

This memorandum presents findings from in-depth interviews with key program staff and a review of program documentation conducted by Tetra Tech as part of a process evaluation of the Residential Building Practices and Demonstration Program (the “Program”). At the time this memorandum was initially submitted in December 2011, the Program was concluding its first year in operation and was planning to continue through calendar year 2012.

The evaluation focus was specific to the Program’s savings goals and a review of how the design of the Program addresses those goals. Of additional interest to National Grid at this stage were Program indicators of customer interaction, such as direct feedback to National Grid and dropout rates; and the Program’s changes based on lessons learned from other Opower programs, including National Grid’s Massachusetts Program. This initial process evaluation is a precursor to a more comprehensive future Program evaluation.

Tetra Tech conducted the evaluation by reviewing the Program’s implementation plan and interviewing three key Program staff (one from National Grid and two staff interviews with the program’s implementation contractor, Opower). We also incorporated our experience from evaluations of other regional Opower programs to provide additional insights. In support of the process evaluation, Tetra Tech assessed the following aspects of the Program:

- Program goals
- Program design (household selection criteria, group placement, reports)
- Program implementation (notification, website option, opt-out rates, Opower savings reports)
- Program implementation metrics, customer dropout rates, energy savings
- Areas identified for program improvement.

Following brief discussions of the Program background and documentation of the data collection methodology, the remainder of this memorandum aligns key findings across the aspects outlined above, and concludes with a Program logic model. The logic model provides a summarized visual representation of Program relationships between resources, activities, and expected short- and long-term outcomes.

Program Background

In 2008, National Grid took interest in a program implemented by Opower in which selected residential households receive detailed Home Energy Reports, including detailed energy use feedback, usage comparisons with similar neighbors, and education tips on how to conserve energy. The Program expects energy savings (both electric and natural gas) for the group of households receiving the Home Energy Reports. Savings attributable to the Program are determined by comparing participating households' usage to a control group of households sharing similar energy use and demographic characteristics. The Program operations are based on a premise of behavior theory where energy usage comparisons amongst peers exert subtle normative pressures on households which encourage and promote energy conservation activity.

Opower uses an experimental design model for their programs. This model compares energy savings of a group of households receiving Home Energy Reports (treatment group) to households of similar characteristics (control group). Random assignment to the treatment and control groups ensures similar usage levels and characteristics for both groups. With efforts to control for factors affecting energy use, such as weather, household size, and primary heating type, the difference in energy savings of the two groups is attributed to the Program.

Opower also incorporates usage data for a "neighbor" group for each treatment group household. A group of 100 neighbor households with similar household size and in the same vicinity is selected for each treatment group household. Information from this group of 100 households with similar characteristics forms the basis of usage comparisons in the Home Energy Reports. Each report compares the treatment group household's monthly usage against the average usage of the neighbor group, as well as a subgroup of highly efficient neighbors, and assigns a rank to the household from one to 100 (100 as the least efficient).

The Program did not launch until May 2011, slightly over one year later than initially planned. The delay occurred because the New York regulatory guidelines did not allow release of confidential customer information to Opower without advance permission of the customer. The Program's "opt-out" design, i.e., where selected customers receive Home Energy Reports having not formally signed-up to the program, necessitated the release of customer billing information without their consent.

National Grid investigated the use of an "opt-in" design, where households sign-up to participate and agree to share energy use information, but ultimately decided to petition the New York Public Service Commission to waive the confidentiality guidelines for the Program. National Grid gained authorization to proceed with the original opt-out design on December 3, 2010. Selected New York households were mailed a tri-fold brochure introduction along with their first Home Energy Report in May 2011. The Program initially planned to mail bi-monthly Home Energy Reports; however, due to the mid-year start, households have received reports monthly, with the exception of two bi-monthly intervals.

Methodology

Tetra Tech's primary data collection effort consisted of three semi-structured in-depth interviews, one with a National Grid Program Manager and two with Opower staff directly involved with the New York Program. The interviews were conducted by conference call between October 26, 2011, and November 30, 2011. Each interview lasted approximately one hour in length. The interviews provided context and insights into the design and implementation methods used to achieve the Program's savings goals. For additional context, Tetra Tech also reviewed the January 21, 2011

Residential Building Practices and Demonstration Program Implementation Plan. No primary data were collected from treatment or control group households.

Key Findings

The following are key process findings identified.

- As of September 2011, the Program had met its 2011 electricity savings ex ante goal, but had not reached the natural gas savings goal. Because the program launch was delayed until May 2011, the Program missed natural gas savings opportunities in the months of January through March. In 2012, the Program will maintain the current treatment group of 130,000 households, and because Home Energy Reports will run from January, the Program expects to meet both electricity and natural gas savings goals.
- Opower and National Grid conducted several experiments within the Program designed to review implementation methods for optimal energy savings. Of these, a household selection based on neighbor comparison rankings (instead of usage level, which is standard) yielded significantly higher energy savings. In addition, a National Grid-revised Home Energy Report introduction brochure reduced opt-out rates.
- Customer engagement rates with the Program's website were low in 2011, with one percent of participants setting up online accounts. Opower's experience has been that additional Home Energy Report delivery via email increases website engagement, and this increased engagement heightens energy savings. National Grid has provided Opower with approximately 45,000 customer email addresses to-date.
- The rate of customers opting out to-date (0.05 percent) is in line with Opower's experience in other programs. Based on their experience with other programs, Opower expects this rate will likely increase to one to two percent across the life of the Program.
- Program staff identified participating customer engagement with the Program website as a key area for Program improvement. An additional key area for improvement noted by National Grid staff is to take account of the different energy needs of retirees, who are more likely to spend more time in their residence, use more medical equipment, and have higher thermostat settings, putting them at a 'disadvantage' in "neighbor" comparisons of household energy use.

Detailed Findings

Planned Program Goals

National Grid staff provided Tetra Tech a two-fold description of their Program goals: (1) to achieve annualized electricity and natural gas savings goals, and (2) to do so within budget. Opower staff concurred, stating that the Program is designed to meet the identified savings goals of their clients.

Prior to implementation, National Grid and Opower made two appreciable changes to the initial 2009 Program design in order to achieve the 2011 savings goals. These changes were precipitated because of lower than expected savings estimates from neighboring Massachusetts and the mid-year (May 2011) Program start which greatly condensed the time to achieve full calendar 2011 savings goals. As a result, the Program: (1) identified a larger group of households to achieve the targeted savings; and (2) frontloaded customers in 2011 by increasing the number of households to receive the Home Energy Reports from 60,000 to approximately 130,000 total households in 2011 – and carrying those same households through 2012. This varies from the original plan to have 60,000 households in year one and add 90,000 households in year two for a total of 150,000

households. Both of these changes were designed to increase the electricity and natural gas savings achieved in Program Year 2011.

National Grid reported that as of September, 2011, based on ex ante planning assumptions, electricity and natural gas savings exceeded 2011 goals.¹ National Grid staff reported that the measurement of savings against the goals are reported on an ex ante basis; that is, savings are measured using a rate estimated by Opower prior to the implementation. Based on a billing analyses conducted by Opower, they reported that actual program savings to-date exceeded the electricity goal, but had not yet reached its 2011 natural gas savings goal. This is primarily because the May start date means the Program missed opportunities for natural gas savings for the first three months, January through March, 2011.

For 2012, the Program will maintain the same number of participating households receiving Home Energy Reports. Opower typically expects a ten percent increase in savings achieved by treatment group households in the second year compared to the first year.

Program Design

The Home Energy Report content and communications, as well as the criteria to select households, purposely remains relatively consistent across Opower program applications to develop benchmarks and accurate estimates of savings that can be achieved. However, within programs, as with the National Grid Program, Opower sets up experiments of implementation processes, testing content and wording of Home Energy Reports or the use of introduction letters to determine if they produce statistically significant effects on energy savings. Below we report on three internal program implementation experiments conducted as part of the National Grid Program in 2011: (1) household selection criteria and placement; (2) Program introduction brochure; and (3) the Home Energy Reports.

Household Selection. The households available for program selection were from National Grid's dual fuel service territory, but also included households from the electric only customer territory. Households were then systematically excluded from the sample frame if accounts:

1. were less than a year old,
2. showed usage gaps in meter reads, or
3. were outlier accounts with either exceedingly high or low usage levels.

Households also have to meet an annual usage floor of at least 10,000 kWh, and if natural gas customers, 1,100 therms. Opower's expectation is that targeting households with higher than average usage yields higher energy savings. The selected households, primarily single family but not exclusively, are reviewed for internal homogeneity, and form the sample frame from which they are randomly placed in either a treatment or control groups. Opower reviews the treatment and control groups to assure they are comparable with respect to electricity and natural gas usage.

The selection of a sampling frame also chose customers based on both overall and relative usage. One-half of households were selected using relative usage (compared to other homes) and either randomly assigned to the treatment or control groups, or not selected for the Program at all. In this particular program, Opower has seen slightly better performance for households that were selected for relative energy usage.

¹Source: National Grid's EEPS Programs - October 2011 Scorecards

Opower's selection procedures identify higher than average energy usage households². Based on Opower's expectation that higher users achieve higher energy savings, the Program's future performance could be impacted by the usage levels of additional households if added to the program in the future should the Program expand.

Introduction Brochure. Opower mails a tri-fold "introduction" brochure with the first Home Energy Report. For the Program, Opower's standard introduction was tested against an introduction redesigned with input from National Grid staff. The latter was tested within a sub-section of the treatment group and found to have a significant reduction of opt-outs. This new introduction, with input from National Grid staff, has now been adopted as the standard for other Opower programs.

Home Energy Reports. The Home Energy Reports provide the customer with energy use analytics and energy saving tips specific to their household. Customers are provided with visual representations of: (1) their average monthly energy use compared against an average of 100 similar households (i.e., "neighbors"); (2) year over year comparison of their own usage; and (3) energy saving tips tailored to season and other available household-specific information³. The reports also rank household energy use against their "neighbor" group and highlight potential savings amounts in dollars. For dual fuel customers, Opower creates and displays an "Energy Index" which combines electricity and natural gas usage.

Based on experiences with program implementation in Massachusetts, the Program adapted an "auto commit" module on the reports. This module sets a percent savings target over one year, designed to increase households' motivation to reduce electricity and natural gas usage. Each report updates the household's achieved savings compared to the target. Results from Massachusetts indicated that the 'auto commits' were initially saving more energy; however, subsequent Opower programs have shown the module does not "move the dial" as much as expected over time.

Program Implementation

Treatment group households began receiving Home Energy Reports by mail beginning in May 2011. With the initial Home Energy Report, households received the introduction brochure explaining the Program and providing energy savings information. The Home Energy Report provides customers with options for increasing their engagement by asking questions by telephone⁴, or accessing a Program-dedicated website. Customers are able to use the same contact methods, though not explicitly encouraged, if they choose to disengage with the Program by opting out of the Home Energy Reports.

Website and Account Set up. The Program's website is available to all National Grid customers receiving the Home Energy Reports. It is viewed by Opower as a key component of customer engagement and increased energy savings. Customers can go to the website and access general energy saving information and tips. Further, they can set up an account for online access to their household's profile and specific Home Energy Report information. Few customers, 1,185 through September 2011 (about one percent), have set up an online account.

² The Program's treatment group has an average annual electricity use of 12,362 kWh (1,030 kWh/month); compared to the customer average annual electricity use of 6,480 kWh (540 kWh/month).

³ Opower acquires additional third party data on housing characteristics to customize further the Home Energy Report information.

⁴ National Grid staff manages written customer correspondence. Energy Federation Incorporated (EFI) as a subcontractor to field telephone inquiries from Program customers.

National Grid provided Opower with customer email addresses (approximately 45,000) as an additional Home Energy Report delivery method. This was a direct effort to increase customer website engagement. Evidence from other Opower programs show that customers are more likely to visit the Program website when they are “one click away” via a direct link, as compared to having to type in the website address by hand, transcribed from the Home Energy Report paper copy. For example, Opower’s experiences with Central Hudson, where all customers were emailed the Home Energy Report from the Program’s initiation, had twice the account set up rate compared to National Grid New York. Moreover, general website visits are five times higher. Given the size of the program in 2011, email was suspended.

Program “Opt-outs.” Customers have the option of opting out of the Home Energy Reports. The option is not explicitly advertised on the Program’s reports, and it has been Opower’s experience that providing specific information about how to opt-out has increased opt-out rates. Customers are able to opt-out by calling the provided telephone number or going to the Program’s website. Customers may also send a letter to National Grid Program staff. The Program’s current opt-out rate is about 0.05 percent (706 customers), and is expected to increase to between one to two percent over the life of the program. The volume of opt-outs tends to spike early and tail off over time. Opower oversamples households in expectation of this typical opt-out rate to achieve their savings goals.

Measured Savings and Reporting

Opower tracks energy usage with billing data provided by National Grid. They present energy savings results to National Grid staff on a quarterly basis, the last of which was in late October 2011. In addition to savings reporting, the quarterly updates are also used to discuss how to improve the effectiveness of the Program moving forward. National Grid then reports performance to the New York Public Service Commission via monthly Program Scorecard and reports.

Areas Identified for Program Improvement

This process evaluation identified three areas for Program improvement.

1. First, both National Grid and Opower staff identified website engagement as a key area for Program improvement. Increasing the use of Home Energy Reports delivered by email reduces customer barriers for visiting the website; one click on the email versus transcribing the website address into a browser. Evidence with the subset of approximately 45,000 emails used in 2011 suggests higher website engagement via email delivery.
2. National Grid staff is interested in reviewing how the Program design addresses retiree households. The concern for retirees is that their energy needs may typically be higher than households of similar size as a result of spending more time in residence, medical equipment necessities, and higher thermostat settings for comfort for example. This could place them at a disadvantage in their Home Energy Report “neighbor” comparison, and they are more likely to object or complain about the Program.
3. Finally, the Program may face design challenges if it is to be expanded to those households who may not directly pay their utility bills. The Program could provide more specific messaging to better address specific needs and opportunities for those who may have less incentive and interest in making changes and saving energy, such as renters, elderly, or retired customers.

Program Logic Model

Based on interviews with National Grid and Program staff, Tetra Tech developed the following Program logic model (Figure 1). This logic model articulates what the Program is designed to accomplish and through what means. It is a visual representation of the Program's theory that illustrate prerequisite resources across a set of interrelated program activities that combine to produce a variety of outputs that in turn lead to key short-and long-term outcomes.

Figure 1. Logic Model for the Residential Building Practices and Demonstration Program (Opower)

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| Inputs/ Resources | Regulatory approval of program implementation plan | Approved report design and introduction tri-fold brochure | Current household electric and natural gas usage data for treatment and control groups |
| | National Grid program investment and staff allocation | Operational customer website and trained customer service staff | Analytics from website engagement and customer service feedback; opt-out rates |
| | Implementation contractors (OPOWER), Energy Federation Incorporated (EFI) | Prior year's electric and natural gas usage for treatment and control groups Neighbor comparison analytics; selection of energy conservation tips | |
| Activities | Organize Team and Objectives | Customer Engagement (Home Energy Report) | Review and Track Savings |
| Outputs | Program designed to meet 2011/12 electric and natural gas savings requirements | Households in treatment group receive tri-fold brochure introduction and monthly Home Energy Reports | Meet with OPOWER staff at quarterly intervals for savings and implementation reports |
| | Channels of communications developed; responsibilities defined; mutual understanding of implementation plan and objectives | EFI and program staff response to customer queries; exclusion of Home Energy Reports to households deciding to opt-out | Review process evaluation findings |
| | Necessary data identified and available; transfer protocols and program tracking mechanism setup Households selected and randomly assigned to treatment and control groups; experimental tests designed | | Adjust plan based on electric and natural gas savings levels, experimental results, process findings |
| First Year Outcomes | National Grid and OPOWER data supports program tracking | Customers read Home Energy Reports | Tracked electric and natural gas savings meet expectations |
| | Program administrative functions ready for launch | Households motivated by report analytics and comparisons; engage in energy conservation activities | Low level of opt-outs; high level of involvement with program website Program in-line with initial budget |
| Long Term Outcomes | Not Applicable | Changed energy conservation behaviors | Changed energy conservation behaviors |
| | | Persistence of savings | Persistence of savings |