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July 18, 2018

Via Hand Delivery

Ms. Lora W. Johnson, CMC, LMMC
Clerk of Council
Council of the City of New Orleans
Room 1E09, City Hall
1300 Perdido Street
New Orleans, LA 70112

Re: Filing of Entergy New Orleans, LLC's Energy Smart Program Behavioral Pilot Evaluation, Measurement and Verification Report (Resolutions R-11-52, R-16-184, R-17-31, R-17-176, R-17-177, R-17-623; UD-08-02, UD-17-03)

Dear Ms. Johnson:

On March 19, 2016 the Council of the City of New Orleans ("Council") adopted Resolution R-16-184 approving the Application of Entergy New Orleans, LLC for Approval of a Behavioral Pilot Program for the Energy Smart Program.

Entergy New Orleans, LLC submits the enclosed original and three copies of the Energy Smart Program Behavioral Pilot Evaluation, Measurement and Verification Report for the period of February 1, 2017 to January 31, 2018. Should you have any questions regarding this filing, please contact my office at (504) 670-3680.

JUL 18 3 18

Thank you for your assistance with this matter.

Sincerely,

Gary E. Huntley

Enclosures
cc: Official Service List UD-08-02 *(via electronic mail)*
Official Service List UD-17-03 *(via electronic mail)*

RECEIVED
JUL 18 2018
BY:

Evaluation of 2017 Energy Smart Scorecard Program Pilot

Submitted to:

Entergy New Orleans

July 2018

ADM Associates, Inc.

Prepared by:
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1. Executive Summary

This measurement and verification ("M&V") report provides the impact and process evaluation of the Entergy New Orleans ("ENO") Behavioral Pilot ("Pilot") as part of the overall Energy Smart Scorecard Program ("Program"). The Program is intended to use social norming to leverage energy savings; this is a long-known behavioral science tenet that individuals desire to be at a similar or better level than their peers, and thus, the report drives high users to reduce their energy consumption.[1] The Pilot is designed to assess the potential for administering a full-scale Home Energy Report ("HER") program in the future. The Pilot originally included 1,493 participant dwelling units. After removing duplicate households, invalid values, and accounting for households with insufficient billing history to support analysis, the remaining 834 unique dwellings were used in the final analysis. Their savings, -699kWh per household, were extrapolated to the participant population. The treatment group was supplemented by a control group consisting of 6,672 households. The process ensured no double counting of savings resulting from separate energy savings programs. The process evaluation discusses program administration and participant attributes and attitudes.

1.1 Program Description

The Pilot provides tailored reports to residential households. These reports include:

- Comparisons of households' current energy use to their past use;
- Comparison of energy use to similar homes in the area; and
- Tips on how households can reduce their energy use as well as information on ENO's energy efficiency programs

1.2 Evaluation Objectives

The objectives of this evaluation are as follows:

- Validate kWh savings impacts for the 2017 Pilot program year;
- Obtain feedback from treatment group households as to their program experience; and
- Measure the effects of the program on knowledge of energy efficiency and other-program participation.

1.3 Verified Energy Savings

Table 1-1 summarizes the verified energy savings in the Pilot.

[1] Davis, Matt. 2011. *Behavior and Energy Savings: Evidence from a Series of Experimental Interventions.* Environmental Defense Fund.

Table 1-1 Savings

Variable	Value
Number of Treatment Households	1,493
Number of Treatment Households Analyzed	834
Number of Control Households	6,672
Percent Realized Savings	-2.45%
Average Daily Savings per Customer	-1.01[2]
Verified Net Savings Before Double Count Adjustment (MWh)	-552
Savings Counted in Other Energy Efficiency Programs (MWh)[3]	117
Final Verified Net Savings (MWh)	**-669**

Final results show that the average energy use in treatment homes is 669 kWh higher when compared with the control group, thus no kWh savings can be attributed to the Pilot. However, as discussed below, it is not possible to conclude based solely on this analysis that this increased usage is due to receipt of the home energy reports.

1.4 Key Findings

- **Statistically valid savings estimates accounted for -2.45% of annual use.** On average, Program participants did not save energy and used 370 kWh more per year as compared to the control group. This accounts for approximately -2.45% of total annual electricity use (with 90% confidence between -1.30% and -3.61% kWh annual savings).
- **Net Evaluated Savings resulted in a total -669 MWh savings for the Entergy New Orleans HER program opt-in households.** Double counting analysis resulted in a double counting savings of 117 MWh in the treatment group from the gross evaluated savings of -552 MWh. This results in a net overall savings of -669 MWh.
- **The negative savings in the Pilot may have resulted due to one or both of the following reasons:**
    - **The post-hoc control group does not satisfactorily match the customer behaviors of the program participants**. Although Propensity

[2] A negative number indicates *increased* usage.

[3] These amounts are used to adjust the realized savings to account for energy savings measure implemented through other residential energy efficiency programs. A negative value indicates less of an effect (decreased consumption) from these programs as compared to the control group and thus their savings is subtracted to account for the difference. A positive value means the opposite.

Score Matching allows the average kWh per day for each month in the pre-period, this matching method does not include any other customer characteristics as input. Therefore, the control and treatment groups may have different behaviors, but coincidentally match in average kWh per day. The matching process is likely selecting the highest users within the overall control group within the pre-period in order to match the 41 kWh per day treatment group, but the match does not extend into the post-period. These matched control customers could be using more energy in the pre-period than the unmatched control customers for a variety of reasons. These changes in household behavior cannot be explicitly controlled for using billing and measure data. The aggregate of these behavior changes leads the selected control group to match the average daily kWh usage of the treatment group in the pre-period, but not the behavior of the treatment group, and therefore, not the average daily kWh usage of the treatment group in the post-period.

- **The treatment group suffered from self-selection bias.** The type of households that opt in to an energy efficiency program may be the type of households that would have reduced their energy use even without the program. Survey responses indicated that the treatment group is largely composed of households which were extremely energy efficient before the program.

1.5 Conclusions

The Evaluators' conclusions are as follows:

- **Program staff and households provided positive feedback about the Scorecard program.** Program staff were optimistic about the program and excited to begin scaling up the program. Seventy-five percent of households were satisfied with the number of emails and 61% were satisfied with the information provided. Survey findings were generally positive with households who appear engaged and interested to learn more about energy efficiency.
- **The pilot phase of the program had lower than anticipated participation.** During the opt-in phase of the Scorecard program, there were approximately 1,400 participants, which was less than anticipated as discussed previously. Low program participation resulted in the program not achieving its estimated energy savings.
- **Program has transitioned from an opt-in to an opt-out model for PY8.** The Scorecard program recently scaled up with an opt-out approach – there is a treatment group of 25,000 residential households who will receive a monthly home energy report and 10,000 in a control group who will not receive any report. All other Entergy New Orleans residential households will still be able to sign up to participate in the program.

- **Households found the scorecards easy to understand and the recommendations useful.** Seventy-three percent of respondents indicated that the information was somewhat or very easy to understand and 68% reported that the tips were somewhat or very useful. Additionally, 51% of participants reported that they acted on one of the tips provided. A large portion of respondents were motivated to reduce electricity costs and usage.
- **Significant portion of survey respondents either did not believe or know if the energy usage information provided in a scorecard was accurate**. 21% of households believed that the information provided on the comparison homes was somewhat or very inaccurate. While the majority of survey participants found the information accurate, those who did not were four times less likely to act on an energy saving tip.

1.6 Recommendations

The Evaluators' recommendations for Entergy's Energy Smart Scorecard Program are summarized in the following categories:

- **For all future waves of the Home Energy Report Program, it is recommended that a randomized control trial (RCT) be created before the onset of the program.** This pre-created control group will allow more reliable analysis results due to significantly decreased self-selection bias. Selection bias is thought to have played a large part in the Pilot's unexpected negative savings result. This recommendation has already been implemented in PY8 and is expected to be continued throughout the Program cycles.

- **Send program participants energy-saving information for the upcoming month.** The Pilot program sent out home energy reports detailing ways to save energy for the month that had just passed, leaving participants with decreased potential for savings.

- **Develop a quality assurance (QA) process for monthly scorecard review.** As the program reaches more households, it will be advantageous to create a QA process to ensure content and data is accurate prior to sending monthly scorecards. A QA process could potentially mitigate the risk of households receiving inaccurate data or scorecards sent with content errors. Without a QA process, it is possible that households could receive scorecards with inaccurate information, which could in turn lead to customer disengagement with the program.

- **Track and monitor future marketing efforts.** By creating a system to track and monitoring marketing and outreach efforts, program staff will be able to determine what activities are most effective at reaching households and how to best use limited resources. If social media is used to market the program, explore gathering analytics (e.g., Facebook's Insights) to gauge engagement and consider paying to promote posts to reach a larger audience.

- **Create a system to monitor customer satisfaction with scorecards and track implementation of saving tips.** To achieve the highest energy savings potential, it is important that households are implementing monthly savings tips. The program could consider surveying program participants quarterly to gather feedback on the reports. Program staff could also embed a survey link in the portal system to gather ongoing customer feedback. Additionally, conducting focus groups to gain better insight into how households perceive Scorecards may lead to design improvements. Some households may not understand the contents of a report and a focus group or survey could lead to an improvement in the content and data provided to households. Additionally, allowing households to select tips in the portal that they will implement would allow households and program staff to track which tips are selected and of interest to households and reinforce the energy saving behavior.[4]

- **Provide a link to information on how home comparisons were developed.** Twenty-one percent of survey respondents believed that the comparison of their homes energy usage to other homes was very (4%) or somewhat inaccurate (17%). It might be beneficial to provide more detailed explanation of the Scorecard for households interested in how usage and comparisons are calculated.

- **Continue to build community awareness of the Energy Smart Scorecard program.** Program staff should continue efforts to build awareness of the program to encourage more residential households to participate. This could include additional marketing and outreach efforts, refer-a-friend campaign, and/or working with local leaders to increase buy-in.

- **Establish regularly scheduled meetings and reporting requirements.** Entergy and Accelerated Innovations ("AI") should consider a standing meeting to establish a regular cadence of communication as the program moves into the

[4] Individuals who commit to behaviors tend to engage in the behavior.
Cialdini, R. (2009). Influence: The psychology of persuasion. HarperCollins: New York, NY.

second and third year. In addition, it may be beneficial to create period reporting requirements for the implementing vendor (i.e., quarterly reports with enrollment and year-to-date energy saving estimates).

- **Consider using the report to strategically promote rebate programs or measures.** Although the rebate program savings would not be attributed to the behavioral program, the reports could be leveraged to promote underperforming programs or measures or for seasonal promotion of measures such as AC tune-ups in the spring and refrigerator rebates in advance of holiday weekends.

- **Develop strategies to increase the number of program participants who complete profile information about their homes to ensure accurate comparisons.** Staff noted that they encouraged households to complete profile information about their homes that would allow for comparisons to homes of similar size, but that a minority of homes took this step. The Evaluators suggest the following recommendations to address this: 1) Include a statement and link on the home energy reports of households who have not completed their profiles indicating that better information on their homes' energy use can be provided if they complete their profile; and 2) Explore the potential use of third-party data vendors such as Experian or Axciom as sources of data on customer characteristics such as household size.

- **Explore opportunities to engage households with their data and scorecard.** Some survey respondents were interested in more detailed information about their home energy usage data. It may be advantageous for program staff to explore platforms that provide customers an opportunity to engage more with data (i.e., moving from a PDF version of a report to an interactive website). Review of the PY8 scorecard provided in a planning document indicates that staff have made the scorecard more interactive.

- **Perform mid-year verification.** The Evaluators recommend performing a mid-year analysis of the Opt-out model in late August or September of 2018. The Opt-out program begins in January of 2018, and most HERS program savings typically occurs during heating and cooling month, so this analysis will capture a large portion of the savings timeframes. Doing so will allow program implementors and the utility to monitor results and make mid-year changes if necessary.

2. Program Background

The Energy Smart Scorecard Behavioral Pilot Program was administered by AI on behalf of ENO under the direction of the New Orleans City Council. The Pilot is designed to assess the potential for administering a full-scale behavioral program in future program years.

The Pilot was open to all ENO households who elected to participate. Households that elected to participate received an Energy Smart Score once a month. The score card provided information on the customer's home energy use and tips for saving energy and is designed to generate quantifiable behavioral savings that cannot be feasibly attained through standard energy efficiency efforts. The program differs from standard energy conservation marketing efforts in that it provides customized reports to households, comparing their billed energy use to homes in their area with similar energy consumption. The comparison is intended to leverage social norming effects; this is a long-known behavioral science tenet that individuals desire to be at a similar or better level than their peers, and thus, the report drives high users to reduce their energy consumption.[5] HERs were first introduced to ENO's households in February 2017.

The Pilot was originally designed as an opt-in program. In this experimental design, households could choose to opt-in to receiving home energy reports. Due to shortfalls in Pilot participant recruitment, it was concluded that the program could benefit from being changed to an opt-out design. In an opt-out design, the recipients of an educational home energy report (Treatment Group) are chosen at the outset of program implementation and are sent reports comparing their energy use to that of their neighbors. They will continue to receive reports unless they contact ENO to request discontinuation. This report analyzes the data collected while the program was still designed as an opt-in program.

[5] Davis, Matt. 2011. *Behavior and Energy Savings: Evidence from a Series of Experimental Interventions.* Environmental Defense Fund.

3. EM&V Methodology

3.1 Impact Evaluation

The impact evaluation approach for this program is as follows:

1) Energy savings are estimated via regression modeling; and
2) Excess savings from other-program-participation by the treatment group are accounted for and netted out of the program savings from the home energy Reports program.

3.1.1 Savings Calculation Methodologies

3.1.1.1 Data

The data used in this study was comprised of household monthly billing reads supplied by AI.

As part of the data cleaning, the following observations were removed to create the sample used in the regression analyses:

- Observations with fewer than 10 days or more than 90 days in the billing cycle; these observations were removed because long and short bills can be an indication of an issue in the recording of energy use. In past evaluations, the inclusion range was 20-40 days. The evaluators broadened this range as abnormal billing reads may not be randomly distributed; long billing cycles are more common among rural populations.
- Observations outside of the evaluation period: the 12-month pre-program period and the post-program period.
- Observations with less than 12 out of 12 valid pre-program period monthly billing data; these observations were removed because the assignment of a control group with Propensity Score Matching requires full data to match on.
- Observations with less than 9 out of 12 valid post- program period monthly billing data
- Outliers, which are defined as observations with a daily kWh usage higher 10 times the group median daily kWh usage; these observations were removed because very high observations of energy use can have an outsize impact on the regression results biasing the estimate of savings.

3.1.1.1.1 Participant Data

The dataset included monthly billing reads for 1,493 unique participating households. The raw participant dataset contained records spanning from February 1, 2016 to January 1, 2018. The analysis requires that all households have complete billing data

during the pre and post periods. Households with incomplete data were removed, leaving 834 households in the final analysis.

3.1.1.1.2 Control Group

The analysis was supplemented by use of a control group. AI provided a dataset of non-participant dwellings that were eligible for the Pilot, but did not opt in. The dataset included monthly billing reads for the controls across the pre- and post-reporting timeframe.

The Evaluators used Propensity Score Matching with the nearest matching method to build a post-hoc control group from the non-participant data. A propensity score is a numerical value assigned to each customer; it represents the probability that a customer with certain characteristics will be assigned to the treatment group as opposed to the control group. Therefore, in this analysis, the propensity score is used to assign the probability of treatment based on a customer's kWh/day value for each of the 12 pre-period months. The propensity score values are then matched to the k-nearest neighbors between each group. This post-hoc control group was matched at a ratio of eight control households for every one treatment customer. This method of matching can be used to reduce selection bias in our post-hoc control group, however, it is not as reliable as an RCT control group.

Reports were delivered over a twelve-month period from February 1, 2017 to January 31, 2018. The Evaluators matched 12 pre-installation months between the treatment and control households using Propensity Score Matching. The final matched post-hoc control group included 6,672 households. A summary of the treatment and control group before and after matching is shown in Appendix A.

A summary of data used in this analysis is provided in Table 3-1:

Table 3-1 Time Periods Data Summary

Data Point	***Data Interval***
Pre-installation Billing Data	February 1, 2016 – January 31, 2016
Post-installation Billing Data	February 1, 2017 – January 31, 2018

Table 3-2 summarizes the total number of households from the raw data provided and total number of households utilized in the analysis.

Table 3-2 Treatment and Control Group Totals

Group	***Treatment***	***Control***
Total Raw Participants	1,493	248,695
Analysis Participants	834	6,672

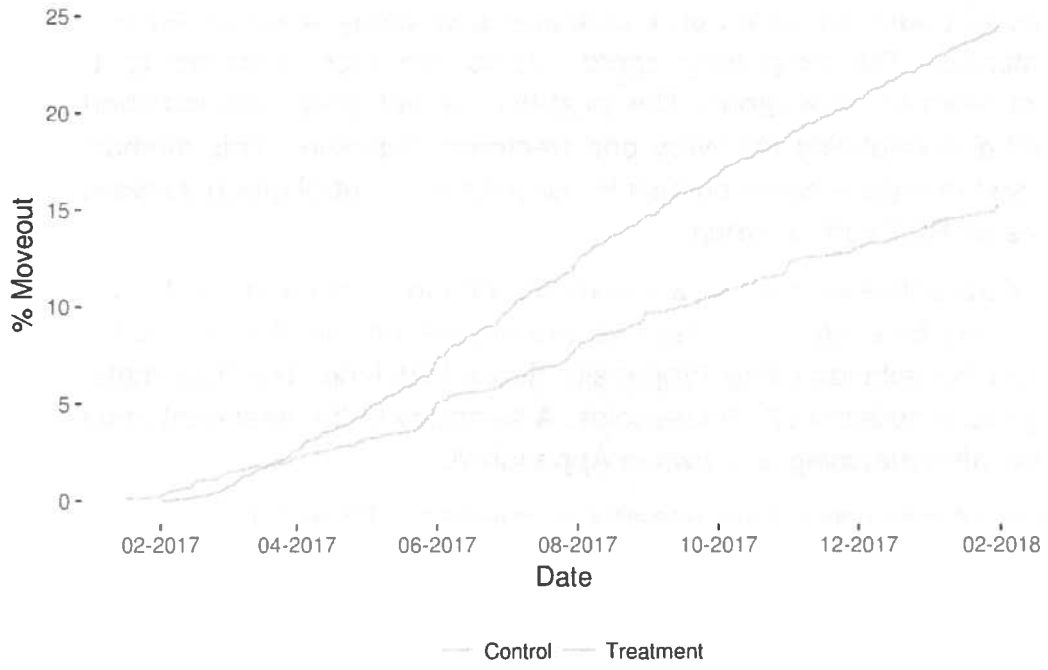
3.1.1.2 Decay

The tracking of treatment and control households can be affected by either move-outs or opt-outs (known collectively as 'decay').

3.1.1.2.1 Move-Outs

When an inhabitant moves, that household cannot be retained, as the inhabitant/address link has been broken. The evaluation timespan for that household ends on the move out date. If a household's final bill was before February 2018 it was considered a move out household. Figure 3-1 displays the cumulative level of both treatment and control move outs over the program life by month, wave and treatment/control status.

Figure 3-1 Pilot Move-Out Rate



From the Pilot's onset until February 2018, the Pilot experienced a 15.34% move out rate for treatment and 24.41% for the control group.

3.1.1.2.2 Opt-Ins

Households could opt-in to receive the mailings at any time. While treatment opt-ins are observed, it is not possible to determine who in the control group would have opted in to receiving reports had they been in the treatment group without a randomized control trial, and thus no equivalent modification can be made. The next most reliable way to create a post-hoc control group is with Propensity Score Matching, using daily kWh usage to match treatment households to non-opt-in households.

3.1.1.3 Difference-in-Differences Specification

The analysis was performed in R, an open-source statistics package. The regression method used for this analysis is a fixed effects "difference-in-differences" calculation and estimates the change in treatment group usage (pre- and post-retrofit), netting out the effects of any change observed in the post-hoc control group. This model specification is recommended in the National Renewable Energy Laboratory (NREL) Uniform Methods Project (UMP) [6].

The Evaluators used the data from the treatment and matched control group with a difference-in-differences regression model. This model incorporated controls for month, pre-post installation of the thermostat, and season-specific dummy variables. The model is formally specified below in Equation 3-1.

Equation 3-1 Difference-in-Differences Model

$$kWh_{i,m} = \mu_i + \phi_m + \gamma P_m + \alpha T_i + \delta P_m T_i + \varepsilon_{j,m}$$

Where,

$kWh_{i,m}$ = Average daily kWh consumption for site i and time interval m

μ_i = Unique intercept for site i

ϕ_m = $0/1$ dummy indicator for each time interval m

T_i = $0/1$ dummy indicator for whether site i is in the treatment group

P_m = $0/1$ dummy indicator for whether an observation in time interval m is in the post period

γ = Change in consumption in the post period across treatment and control group

α = Estimated difference in consumption between treatment and control group

δ = Estimated difference in consumption in treatment group alone

$\varepsilon_{j,m}$ = Residential eror term for site i and time interval m

3.1.2 Double Counting Analysis

Measurement of savings from behavioral programs needs to account for other program savings to ensure that ENO's residential portfolio is not double counting any savings.

The first step in this process is to cross-reference the account numbers and addresses for each treatment and control group customer with all other program participation in the study period. AI provided the Evaluators with all other program tracking data, and the datasets were cross-referenced by address. This resulted in a total "other program kWh" per-group.

[6] https://energy.gov/sites/prod/files/2015/02/f19/UMPChapter17-residential-behavior.pdf

It is important in this analysis to normalize the effects to the number of households in the group. In the Pilot, the control group is 8 times the size of the treatment group. As such, if one were to directly compare the other-program-kWh of the treatment and control group, it would overestimate the double count (a treatment group of 6,672 households is most assuredly going to show higher savings than a matched control group of 834 households). By comparing this on a per-household basis, we normalize to the reality of mismatched treatment and control group population sizes.

The final double count savings (calculated separately for each unique wave in each program year) is as follows:

Equation 3-2 Double Counting Specification

$$Double\ Counting = \left(\frac{OP\ kWh}{Household_{Treatment}} - \frac{OP\ kWh}{Household_{Control}}\right) \times \#\ Accounts_{Treatment}$$

Where,

$$\frac{OP\ kWh}{Household_{Treatment}} = Other\ program\ kWh\ per\ household\ in\ the\ treatment\ group$$

$$\frac{OP\ kWh}{Household_{Control}} = Other\ program\ kWh\ per\ household\ in\ the\ control\ group$$

$$\#\ Accounts_{Treatment} = Total\ accounts\ in\ the\ treatment\ group$$

Further discussion of the double counting analysis as well detailed results can be found in Appendix C: Double Counting Analysis.

3.2 Process Evaluation

The process of evaluation of the Energy Smart Scorecard Program included the following research activities collection activities:

- *Program Staff Interviews.* The Evaluators interviewed the Companies' Energy Smart Program manager and Accelerated Innovation's program manager. The purpose of the interviews was to gain insight into to program design, lessons learned during the pilot phase, and potential future challenges to provide recommendations and areas for improvement. the Evaluators developed interview guides for each program staff.
- *Participant Surveying.* The Evaluators surveyed a sample of program participants. The surveys were administered online, and participants were contacted by email. These surveys addressed issues including participant satisfaction with the program's scorecard (home energy report), demographics, and other contextual issues with engagement among the customer and report.

- *Review of the Energy Smart Scorecard and Other Program Material.* The Evaluators reviewed an example of the Energy Smart Scorecard (the May 2017 scorecard). the Evaluators also reviewed outreaching tracking spreadsheets provided by AI. In addition, one document submitted to ENO from AI titled "Energy Smart Scorecard: Period Years 8 and 9 Transition to Opt-Out approach" was reviewed for details on data collection and tracking.

The quantities completed are summarized in Table 3-3.

Table 3-3 Energy Smart Scorecard Process Evaluation – Summary of Data Collection

Activity	***Sample Size***
Program staff	2
Participant Survey	114

4. Impact Evaluation Results

4.1 Model Output

The output from the Post Program Regression model was used to report savings estimates for the program. The model had an adjusted R-squared value of 0.72. The main coefficient from the model is summarized in Table 4-1.

Table 4-1 Model Coefficient Summary

Regression Term	Term	Pilot	
		Coefficient	t-statistic
δ	Trmt1*Post1	1.01	4.17

The difference-in-differences model δ (1.01) coefficient summarizes the change in daily kWh usage between the control and treatment group in the post-period. To extrapolate a single customer's projected annual kWh savings, the Evaluators simply multiply this coefficient by 365 days per year. The sign of the coefficient (positive) means that the treatment group used, on average, 1.01 more kWh per day in the post-period than the control group in the post-period, having controlled for pre-period usage and weather. This means the treatment group used 370 kWh per year more than they would have if they had not opted-in to the program. The model predicts approximately 2.45% increased energy use from this energy efficiency program.

More details of the model output are provided in Appendix B: Regression Output.

4.1 Savings Summary Before Double Counting Analysis

Overall savings before adjusting for double counting are summarized in Table 4-2. Overall verified savings before accounting for energy saving measures from other programs was -1.01kWh per household per day, or -370kWh over the one-year period. That is, households in the treatment group used 1.01kWh more energy per day, 370kWh per year, than households in the control group.

Table 4-2 Overall Savings Summary

Variable	Value
Number of Treatment Households	1,493
Savings as a Percent of Annual Use	-2.45%
Average Daily Savings per Customer (kWh)	-1.01
Average Annual Savings per Customer (kWh)	-370
Verified Net Savings (MWh)	**-552**

4.2 Double Counting Findings

Savings estimates for HER must also consider savings resulting from other programs. the Evaluators examined program tracking data from ENO's Assisted Home Performance with ENERGY STAR (LIA&Wx), Home Performance with ENERGY STAR (HPwES), Multifamily (MF), and Residential Heating and Cooling (RHC) programs, and savings claimed by these programs was netted out of HER savings estimates to avoid double-counting of the same savings.

4.2.1 Double Counting Results

Table 4-3 summarizes the results of the double count analysis. Detailed results can be found in Appendix C: Double Counting Analysis.

Table 4-3 Double Count Results

Wave	Participants	Other-Program kWh per-Account		Double-Count (kWh)[7]
		Treatment	Control	
Pilot	1,493	102	24	117,282

The analysis showed that external programs were responsible for 78.5 additional kWh savings in treatment homes (as compared to the control group), thus this value was added to each home, resulting in overall verified MWh savings decreasing from -552 to -669.

4.3 Adjusted Final Savings

Table 4-4 summarizes the final verified net savings in the Pilot. The final verified net savings, after accounting for double count savings, is -669 MWh over the one-year period.

Table 4-4 Savings Summary Statistics

Variable	Pilot
Number of Treatment Households	1,493
Number of Control Households	6,440
Percent Savings	-2.45%
90% Confidence Interval	[-1.30%, -3.61%]
Average Daily Savings per Customer (kWh)	-1.01
Standard Error	0.08

[7] The sign on this value indicated whether the kWh value is added or subtracted from program savings.

90% Confidence Interval	[-0.53, -1.49]
Verified Net Savings Before Double Count Adjustment (MWh)	-552
90% Confidence Interval	[-293, -811]
Savings Double Count in Other Energy Efficiency Programs (MWh) [8]	117
Final Verified Net Savings (MWh)	**-669**

Final results show that energy use in treatment homes is 669kWh higher when compared with the control group. No kWh savings can be attributed to the Pilot.

4.4 Results Discussion

Although the coefficient is statistically significant, the results are unreliable, as this analysis used a post-hoc control group. Had an RCT been completed before the onset of the program, an unbiased, randomly selected, and more similarly behaved control group would have been available. The model tells us that there is a trend of increased usage in the treatment group in the post-period, compared to the control group. However, the model cannot define the cause of this increased usage to be due to the home energy reports. It is likely that there is another underlying cause creating this large change in post-period usage between the treatment and control households, such as behavior differences between the two groups, which could not be controlled for with the pre-period Propensity Score Matching process.

The Evaluators offer two possible non-mutually exclusive explanations for the results:

1. **The post-hoc control group does not satisfactorily match the customer behaviors of the program participants**. Although Propensity Score Matching allows the average kWh per day for each month in the pre-period, this matching method does not include any other customer characteristics as input. Therefore, the control and treatment groups may have different behaviors, but coincidentally matched in average kWh per day. The unmatched control group average daily kWh usage was 34, while the matched control group was 41. The matching process is likely selecting the highest users within the overall control group within the pre-period in order to match the 41 kWh per day treatment group, but the match does not extend into the post-period. These matched control customers could be using more energy in the pre-period than the unmatched control customers for a variety of reasons. For example, a portion of those matched

[8] These amounts are used to adjust the realized savings to account for energy savings measure implemented through other residential energy efficiency programs. A negative value indicates less of an effect (decreased consumption) from these programs as compared to the control group and thus their savings is subtracted to account for the difference. A positive value means the opposite.

customers may have had a larger number of people living in the household in the pre-period than in the post-period; the household may have had a person working from home in the pre-period, but not in the post-period; a household may have removed an extra, unused refrigerator in the post-period, or many other reasons. These changes in household behavior cannot be explicitly controlled for using billing and measure data. The aggregate of these behavior changes leads the selected control group to match the average daily kWh usage of the treatment group in the pre-period, but not the behavior of the treatment group, and therefore, not the average daily kWh usage of the treatment group in the post-period.

2. **The treatment group suffered from self-selection bias.** The type of households that opt in to an energy efficiency program may be the type of households that would have reduced their energy use even without the program. Survey results indicate unusually high levels of affluence and education in the treatment population, attributes which often indicate increased energy-use consciousness. This is confirmed in answer to several survey questions: Twenty five percent of participants state themselves as "very knowledgeable" about energy conservation and 44% state "somewhat knowledgeable" (see Figure 5-3 and Figure 5-4).Twenty-seven percent of survey respondents indicated they had done almost everything possible to save electricity in their home (see Figure 5-6). Finally, 65% percent of respondents indicated that they are motivated to save energy for conservation/environmental reasons (see Table 5-5). These response percentages are significantly higher than those found in other home energy report-type programs, indicating the treatment group is largely comprised of households which were extremely energy efficient before the program. Two common methods of mitigating this bias, recruit-and-delay and recruit-and-deny[9], were not used in this Pilot.

[9] https://www4.eere.energy.gov/seeaction/system/files/documents/emv_behaviorbased_eeprograms.pdf

5. Process Evaluation Findings

5.1 Data Collection Activities

The process of evaluation of the Energy Smart Scorecard Program included the following research activities collection activities:

- *Program Staff Interviews.* The Evaluators interviewed the Companies' Energy Smart Program manager and Accelerated Innovation's program manager. The purpose of the interviews was to gain insight into to program design, lessons learned during the pilot phase, and potential future challenges to provide recommendations and areas for improvement. the Evaluators developed interview guides for each program staff.
- *Participant Surveying.* The Evaluators surveyed a sample of program participants. The surveys were administered online, and participants were contacted by email. These surveys addressed issues including participant satisfaction with the program's scorecard (home energy report), demographics, and other contextual issues with engagement among the customer and report.
- *Review of the Energy Smart Scorecard and Other Program Material.* The Evaluators reviewed an example of the Energy Smart Scorecard (the May 2017 scorecard). the Evaluators also reviewed outreaching tracking spreadsheets provided by AI. In addition, one document submitted to ENO from AI titled "Energy Smart Scorecard: Period Years 8 and 9 Transition to Opt-Out approach" was reviewed for details on data collection and tracking.

The quantities completed are summarized in Table 5-1.

Table 5-1 Energy Smart Scorecard Process Evaluation – Summary of Data Collection

Activity	***Sample Size***
Program staff	2
Participant Survey	114

5.2 Program Overview

The Energy Smart Scorecard program is a digitally-based behavioral program that provides residential households with electronic versions of home energy reports – referred to as scorecards. The program seeks to change energy consumption behaviors of Entergy New Orleans residential households through education of their current usage, comparisons to neighbors and energy efficient homes, and recommendations/tips to reduce use. A pilot based on an opt-in model was completed

in 2017, which is transitioning to an opt-out model for the current program year. Additional details about the program are provided in Section 5.3.1.

5.3 Detailed Findings

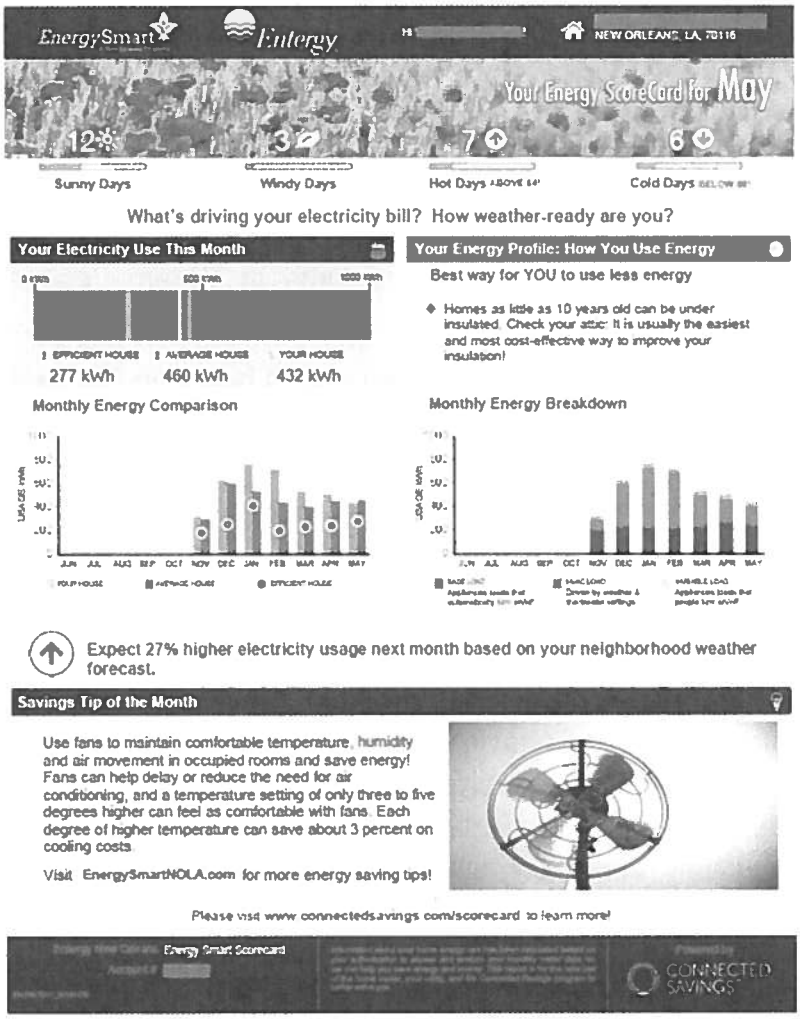
This chapter presents the results of the process evaluation of the Behavioral Program.

5.3.1 Energy Smart Score Card

The Energy Smart Scorecard was sent electronically to enrolled households on a monthly basis. The Energy Smart Scorecard template used during the pilot phase (PY7) was developed by a third party (WeatherBug). The elements of the home energy scorecard included: customer monthly usage, comparisons of average homes and energy efficient homes, a monthly breakdown of home energy use, weather forecasts for upcoming month, and energy saving tips.

Figure 5-1 is an example scorecard provided to households.

Figure 5-1 Energy Smart Pilot Scorecard Example



Review of the PY8 scorecard provided in a planning document indicates that staff have made the scorecard more interactive. An example of the new Scorecard is provided in Section 11, Appendix D.

5.3.1 Program Design, Operations, and Activities

This section summarizes the findings of interviews conducted with Accelerated Innovations ("AI") and ENO program staff for the purposes of gaining insight into program structure, identifying program objectives, and assessing the extent to which there are future opportunities for program improvement for the Energy Smart Scorecard program.

This section highlights the key points from interviews with the vice president of marketing at AI and the manager of the Demand Side Management department at ENO.

5.3.1.1 Program Staff Roles and Responsibilities

the Evaluators interviewed the Energy Smart Scorecard program managers from AI and ENO. Both program managers started their positions prior to the launch of this program and their responsibilities have not changed significantly over the past year.

The ENO program manager's role is to oversee the implementation of the pilot behavioral program (Energy Smart Scorecard) and other energy efficiency programs. The program manager's responsibilities in 2017 included implementation activities, recruitment of an implementing vendor, engaging community stakeholders and building awareness for the program. The ENO program manager also acts a liaison and coordinator between AI and various departments at Entergy connected to various aspects of the program.

AI is the implementing vendor for this program and is based in St. Paul, Minnesota with staff who work remotely in other locations. AI staff responsibilities include the organization of materials, communicating with Entergy and residential households, completing program deliverables within specified timeframes, drafting quarterly reports, developing program strategy (such as the original program design), implementing program activities, and acting as the key point of contact for Entergy.

5.3.1.2 Program Design

The Energy Smart Scorecard program (hereafter, Scorecard) was piloted as an opt-in design and is a digitally-based behavioral program that provides electronic versions of scorecards (also known as home energy reports). An opt-in model was chosen out of concern that an opt-out program that did not include affirmative consent to receive the reports would negatively affect customer attitudes toward the program. Initially the program was offered to all ENO residential households, however, while households in Algiers were offered the program, they were not counted towards any energy savings

because they were not technically within the service territory at the time. Program staff noted this difference was related to how program funding was established.

Prior to program launch, greater participation among the residential customer base was anticipated by program staff than was ultimately realized. Staff expected higher levels of participation because (1) a large proportion of households utilized their online account system and (2) a single sign-on system would allow households to elect to receive the reports when they accessed their accounts and staff believed this would facilitate participation by making the enrollment easy. However, a change made to the online account system around the time of program launch prevented the implementation of the single sign-on and may have restricted participation.

WeatherBug, a third-party subcontractor, developed the original scorecards that were sent to households. It was developed with an existing template, which was adapted to meet the needs of this program and included ENO branding. WeatherBug had a series of algorithms and weather stations in the New Orleans territory which provided weather forecasting data that were used to determine what tips were sent to households. Customer data and energy usage, along with the weather data, was utilized to examine households' home energy use and tips were programmed accordingly.

The scorecard does not significantly vary month-to-month; the changes are to the images to correspond to the season, savings tips, and the data provided to households. Customer energy use is displayed in comparison to average and efficient homes. For households that provided information on their homes square footage, the average and efficient home comparisons were based on homes of similar size. However, few households provided this information and as a result, the average and efficient home statistic displayed were based on all homes in the service territory.

At the onset of the program, WeatherBug had a mobile app where households could access their account. However, several months after the program was launched, WeatherBug was acquired by another company and the app was shut down. Currently there is not a mobile app and no plans to restart one. Households can access the interactive online customer portal through their email and scorecard.

During the pilot phase, scorecards were not sent to households until the end of the month. Because of the timing, households would receive them later than when the information would be less relevant and useful (e.g., a customer would receive a scorecard at the end of May with information pertinent for April). Staff noted that improving the delivery timing was a main lesson learned from the pilot phase. Staff believed that households would value more timely information and that it would help them implement tips provided on their scorecard.

In PY8, the Scorecard program will transition to a new scorecard that will be delivered in the same week as the households billing cycle. AI's goal is to speed up the process and

provide more timely information. That said, staff stated they did not get direct feedback from households stating the timing of the scorecards was an issue during PY7, as most of the correspondence they received is related to issues opening and receiving the scorecard.

5.3.1.3 Program Goals and Participation

During the opt-in phase of the Scorecard program, there were approximately 1,400 participants, which was less than anticipated as discussed previously. Low program participation resulted in the program not achieving its estimated energy saving.

AI staff noted challenges which contributed to the low participation (e.g., lack of awareness). These were important lessons learned from the pilot phase which acted as drivers to improve the Scorecard program in the new phase, such as change to an opt-out model and the development of a new scorecard.

Households who were enrolled in 2017, generally provided feedback about the program that was neutral to satisfied. This feedback gathered from email correspondence between households and the program manager. To date, there has not been a customer satisfaction survey.

5.3.1.4 Program Year 8 (PY8) Changes

In PY8, the Scorecard program is transitioning from an opt-in to an opt-out model while continuing to allow households not selected to receive the reports to elect to receive them. The goal of the opt-out approach is to increase participation among residential households. AI staff did not have any immediate concerns about transitioning to an opt-out approach and was enthusiastic about the transition. Program staff did not identify any major concerns among households for an opt-out model and they have created an unsubscribe function for households to opt-out of the program.

Program staff noted they will carefully monitor the open rates and customer engagement with the scorecard in PY8. Staff indicated it will be important to ensure residential households are provided with accurate and timely information on their scorecard, so they can effectively decide how to apply that information. Although an opt-out model will be used, opt-in participation will continue to be encouraged through building broader awareness of the service.

Since the implementation of the Scorecard program, AI has not formally measured customer satisfaction through a survey of participants. They do receive direct feedback via email correspondence with households who reach out with questions regarding their scorecard. There are plans to begin measuring customer satisfaction with the scorecard, and AI will work with Entergy marketing department before deploying any kind of evaluation to prevent survey fatigue among households.

Program staff was asked if they believe households understand the information presented to them on the scorecard. AI staff indicated this could be an area of improvement and future attention. They did state there have been continuous efforts to improve the scorecard since implementation (e.g., the way information was relayed, the lack of definitions for acronyms).

Currently the scorecard is only available in English and there have been conversations about translating the scorecard but noted this is challenging for a variety of reasons (e.g., ensuring correct translation and the associated cost). Program staff is working with local leaders in the New Orleans community to assist with translations and ensuring non-English speakers can understand and implement tips.

As the program transitions to an opt-out model, program staff noted it will be critical to monitor the number of unsubscribes within the treatment group. AI noted they will be carefully monitoring the unopened email rates and exploring ways to reach households whose scorecards may be directed to a "spam folder." Another potential challenge will be to ensure that households are engaging with the scorecard and implementing the tips. Currently, there are no incentives to encourage tips for households outside of reduced energy usage and lower utility bill through behavior change.

5.3.1.5 Marketing and Outreach

In 2017, the marketing budget was low, mainly relying on direct email campaigns and promotion at local events. AI partnered with Energy Wise, a field outreach partner, to assist with marketing and outreach to build community awareness of the Scorecard program. This included providing marketing materials at community events and including a program brochure in school kits.

AI is mainly responsible for marketing, and they work closely with ENO's marketing and the customer relations group to ensure the content is in sync with brand guideline. AI staff drafts all content and materials in house and send to ENO for approval.

Marketing activities in 2017 included:

- Twenty advertisements in cooperation with the Regional Transit Authority (RTA) that included posters on buses and other local transit in the New Orleans region for a 4-week period from February 18th through mid-March;
- Regular social media regular released (via ENO twitter feed and social media sites);
- Brochures are included in school kits;
- Automatic registration emails were sent to approximately 113,000 residential households; and

- Field outreach and promotion working with Energy Wise who displayed marketing materials (brochures, banners, posters, pens, can cozies, etc.) at the ENO customer care center and local events and festivals.

There were not any direct mailing campaigns or bill inserts in 2017. AI staff noted that bill inserts are difficult because of the 10-month advance needed. Program staff is coordinating with ENO marketing and customer service to get a bill insert for all the energy efficiency programs including the Scorecard program.

Program staff indicated they conducted mass email campaigns with automatic registration buttons in 2017. As previously discussed, there had been more promotion of the program through the online customer account portal anticipated than what was realized. In combination with the lack of adoption of households through the online account system, the low budget did not allow for the program to build awareness for broader adoption.

AI is not formally tracking marketing and outreach efforts to gauge what is most effective. Staff is tracking email open rates. They indicated they noticed increased enrollment because of automatic registration emails and the RTA advertisement campaign.

Outreach activities also included in-person customer sign ups at events using a tablet. This sign up process required households to know their account numbers, in the event they did not, staff would provide instructions on how to sign up later. AI staff provided a list of outreach events to the Evaluators. During 2017, the Scorecard program was promoted at over 85 local events, with over 18,000 attendees. There was also outreach at local schools with K-12 students. Staff noted that outreach at local events does not have the same impact as broader reaching marketing campaigns do.

There are no incentives to increase sign-ups (e.g., refer-a-friend campaigns). AI staff noted they are in a waiting period since they are close to releasing their first batch of Scorecards (expected on Friday, April 27th). AI wants to evaluate the open rate and then refocus on the gaps (spam filters). AI has tentative plans to conduct additional awareness campaigns with RTA in the warmer months as people become more cognizant of their cooling costs.

5.3.1.6 Communication

AI and ENO staff typically meet once a month or more in addition to weekly email and telephone communications. Discussion topics during the ad hoc meetings include upcoming approvals, programmatic changes, addressing questions from ENO, and reporting any customer communication.

The goals and objectives of communication has changed slightly over the past year. There are now formal monthly marketing meetings. In addition, they collaborate with the

broader Energy Smart team to have a more systematic communication with Entergy. Those meeting are typically with marketing and customer service department.

5.3.1.7 Data Management

The Scorecard program tracks various programmatic activity. Much of the data tracked is from the online portal, such as when households log in and are engaged with the scorecard. The previous scorecards were individual URLs in a PDF format, so the program manager could not effectively track data. The new scorecards will allow AI to better track customer views and engagement. The data that is collected is kept current enough to manage the Scorecard program. According to program materials provided to the Evaluators, performance metrics include:

- Page views;
- Email open rates;
- Opt-in registrations;
- Scorecard views;
- Profile completions;
- Support requests and communications alerts across each channel and engagement platform provides insights on participant segmentation;
- Targeted marketing effectiveness; and
- Customer activities.

AI has a dedicated development team for this program, who can access data in a more secure way than was possible when using the WeatherBug scorecards, and they are able to deliver information directly to households.

The portal used for the program is utilized to track and monitor data. There is a data collection and management function built into the portal, which has an administrative user face that AI can access along with Entergy. There is also a query function, which allows program staff to build reports.

Staff indicated that a planned enhancement to the data collected is the addition of tracking open rates and other data related to households engagement with the scorecards. This additional data will provide better insight into what works best to reach households.

ENO staff indicated they are not receiving periodic reports (e.g., bi-monthly, quarterly) from AI but as the program scales up, it would be ideal to begin receiving regular reports with information about enrollment. AI staff reviews reports at least monthly and after scorecard are sent out each month. Scorecards will be sent out more frequently in PY8. AI staff would also like more feedback from households and has plans to work

closely with ENO customer service and marketing to reach scorecard households specifically for their feedback. There are plans to develop a survey once the new scorecard rolls out.

5.3.1.8 QA/QC Procedures

AI staff indicated they recently had an SOC-2 audit (an information technology security assessment) conducted. AI was found to be compliant with SOC level 2 protocols.

No changes were made to the QA/QC procedures in the past year and there is not currently a QA process in place for reviewing scorecards prior to sending them out to households.

AI staff believe QA/QC procedures could be improved and are currently in development. They believe that with the new format, it will become easier to track information and develop comprehensive QA/QC procedures.

5.3.1.9 Lessons Learned and Challenges

One of the main lessons learned from the pilot phase that has been incorporated in PY8 is ensuring timeliness of the tips and data. AI stressed the importance of making the information in the scorecard relevant to households so that households can take actions that have an impact on their energy usage. Outreach and awareness have been a challenge, along with helping households understand them this program is designed to help them reduce energy costs and is free. AI staff noted hesitation and skepticism on the part of households but noted the opportunity to demonstrate results to assist in their acceptance and participation.

The one-click registrations emails were well received and boosted registration significantly each time they were sent out. When AI is in the field, they received positive feedback about the scorecard. "It's a matter of reaching people at the right time, in the right location, where they can access their information." Migrating away from WeatherBug Connected Savings Scorecard to their own will streamline the Scorecard program. The new process will allow the portal to send scorecards directly to households as opposed to AI staff sending to individual URL monthly to over 1,000 households.

AI staff noted they are working to accurately predict future savings for households by understanding the applications of riders in different sectors within the ENO territory. As AI improves their estimates through the application of riders, this will help more accurately estimate savings for residential households for the next bill.

5.3.2 Participant Survey Results

The Evaluators completed a survey of program participants to collect information regarding their experience with the Energy Smart Scorecard in New Orleans, LA. The

survey was administered by email only. The survey was open for 13 days and the Evaluators sent two emails to solicit customer participation.

A total of 1,133 households were contacted and asked to participate in the survey. In total, 151 households responded to the survey. Thirty-seven households were disqualified because they did not recall receiving the reports and 114 completed the survey. The overall response rate was 10% and the cooperation rate was 64%.

Table 5-2 Survey Response

Metric	Result
Number of survey invitations sent	1,133
Number of undeliverable emails	13
Number of refusals	0
Number disqualified	37
Number logged on without completing any item	63
Number of survey completions	114
Overall response rate	**10%**
Overall cooperation rate	**64%**

5.3.2.1 Customer Impression of Energy Smart Scorecards

Households recalled receiving an average of 6.2 emails. Most respondents (73%) found the information provided on their home energy use in the Scorecard as "very" or "somewhat easy" to understand (see Table 5-3).

Table 5-3 Information provided in the Energy Smart Scorecard

Response	Percentage of Respondents (n = 114)
Very difficult to understand	1%
Somewhat difficult to understand	6%
Neither difficult nor easy to understand	17%
Somewhat easy to understand	28%
Very easy to understand	45%
Don't know	4%

Many households found the comparison of their home energy usage to other homes as accurate, with 54% stating "very" or "somewhat accurate", 20% stating "very" or "somewhat inaccurate", and 26% indicated "don't know" (see Figure 5-2).

Figure 5-2 Accuracy of customer home energy report compared to other customer homes (self-report)

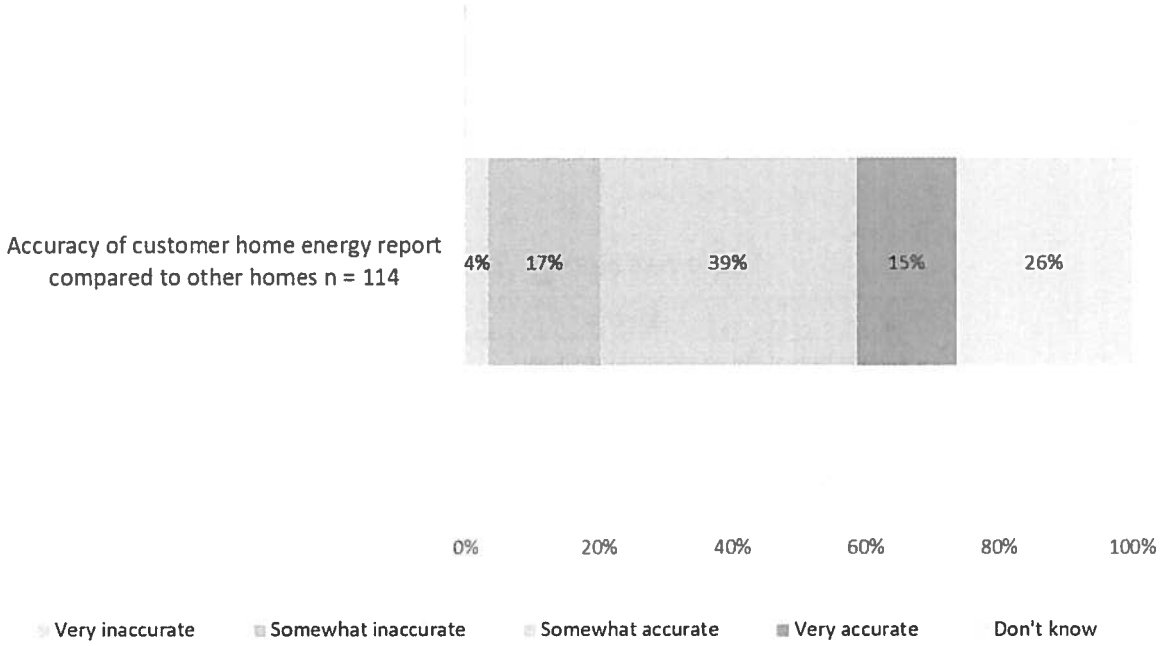


Table 5-4 provides a summary of open ended responses from households who indicated they found the reports either difficult to understand and/or inaccurate.

Table 5-4 Feedback from Households Related to Questions about Understanding the Scorecard and their Perceived Accuracy of Information Presented

Category (n)	***Difficult to Understand Example Comments***	***Inaccurate Information Example Comments***
Customer who believe they use less energy than reported on the scorecard (n = 7)	▪ Because I didn't understand why my energy use was higher than average. It doesn't take anything into account like the fact that I have solar panels and charge a car.	▪ I don't believe I use that much ▪ I don't feel my home is using more than 25% of other homes in my area. I have newly built (2012) home with super insulation plus 20 solar panels on roof. Only two people and a dog living in home. ▪ My Energy usage compared to other household households, I conserve at all times ▪ I think my home is more efficient than otherwise indicated on the report. ▪ We always seem to be way off the averages for usage in ways that don't make sense.
Energy use calculations need more explanation and detail	▪ Not descriptive enough of energy use categories, or how I contributed to them. ▪ Couldn't tell how	▪ Many other metrics, such as temperature data (e.g., "# of hot days in June"), seemed off or disconnected from New Orleans specifics. Additionally, there was no info provided in how other homes were "similar"—size, number of residents, age, etc.—and it seemed unlikely that the data was coming in from many other users

Category (n)	*Difficult to Understand Example Comments*	*Inaccurate Information Example Comments*
(n = 6)	they had gathered the information about my energy usage specifically.	given the generally low program participation in town and the user-unfriendly building info section of the application. ■ It doesn't take any of my circumstances into account. ■ I can't imagine that there is a house in New Orleans that isn't new construction that falls into the "Very efficient category." My 1830s house is nothing like a house built in 2017 so the comparison is useless to me.
Did not understand report (n = 2)	■ I never really understood exactly what I was supposed to be looking at. Also, we had just moved into our home after doing extensive renovations, so the comparisons were inapplicable to us. ■ Never really understood it.	
Customer has solar panels and/or made other home energy efficiency improvements that do not appear to be reflected in report (n = 5)		■ My solar panels should be helping me save more energy than this survey indicates. ■ Because I have solar power ■ With all of the energy-efficient updates that we've made, especially using solar panels, it's hard to believe that we use much more energy than others. ■ I installed a new 3 zone mini split system last year in my basement apartment that should be pretty efficient. ■ I am not sure if the comparison is to all houses or houses similar to mine. I have done a lot of energy efficient upgrades, but my house is quite large.
Size of home (n = 4)		■ The kWh of the average home in my neighborhood was wildly inaccurate. We have a 2200 sq ft ranch and do about 900 kWh on a slow month. Scorecard says our neighbors do 200 kWh. That's crazy. These are big, relatively suburban homes, and no one is putting up those kinds of numbers unless it's an apt or condo. ■ I don't think the scorecard takes into account the size of the home. ■ Report did not factor in our house's size, which I would guess falls towards the larger end of the spectrum. As such, it was difficult to gain any benefit from the comparison tool. ■ Unless sf of house and HVAC specs and occupancy etc. I

Category (n)	Difficult to Understand Example Comments	Inaccurate Information Example Comments
		don't know how it would be very accurate.

Survey participants self-reported their homes' energy efficiency compared to their neighbors, with 36% indicated their homes were either "very" or "somewhat energy efficient" (see Figure 5-4). Respondents also self-reported their energy usage compared to homes of similar size in their neighborhood, with 8% reporting their usage is "significantly higher" and 22% reporting "somewhat higher" (see Figure 5-3).

Figure 5-3 Customer energy usage compared to other homes of similar size in their neighborhood (self-report)

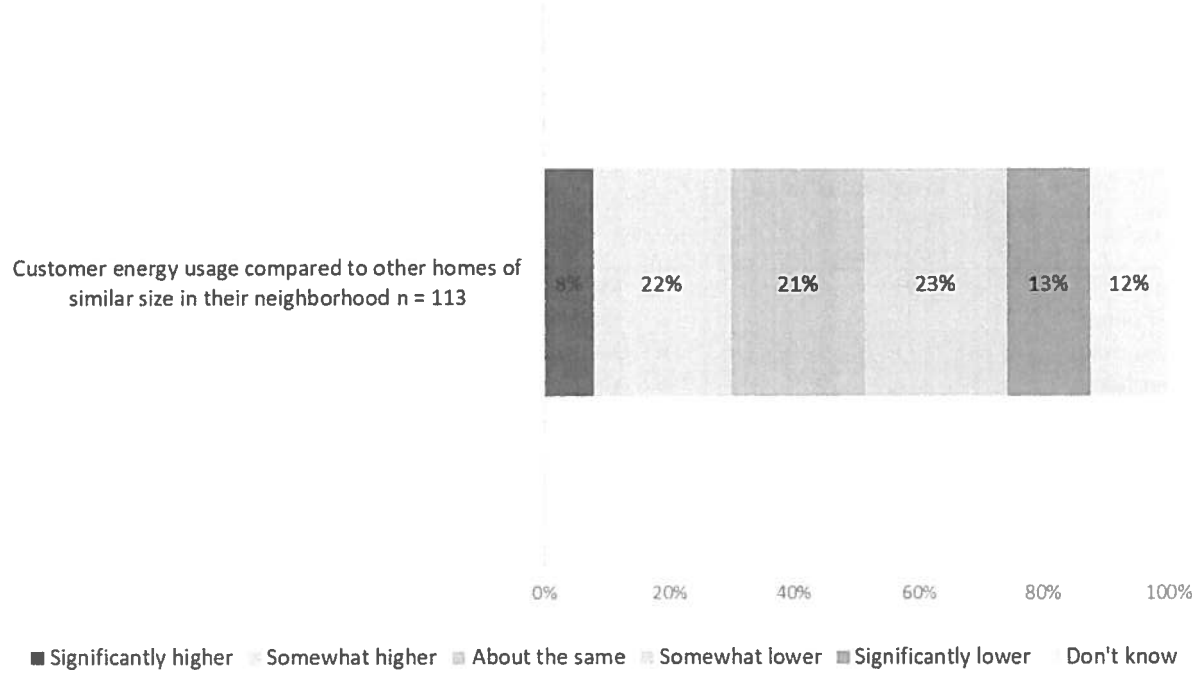
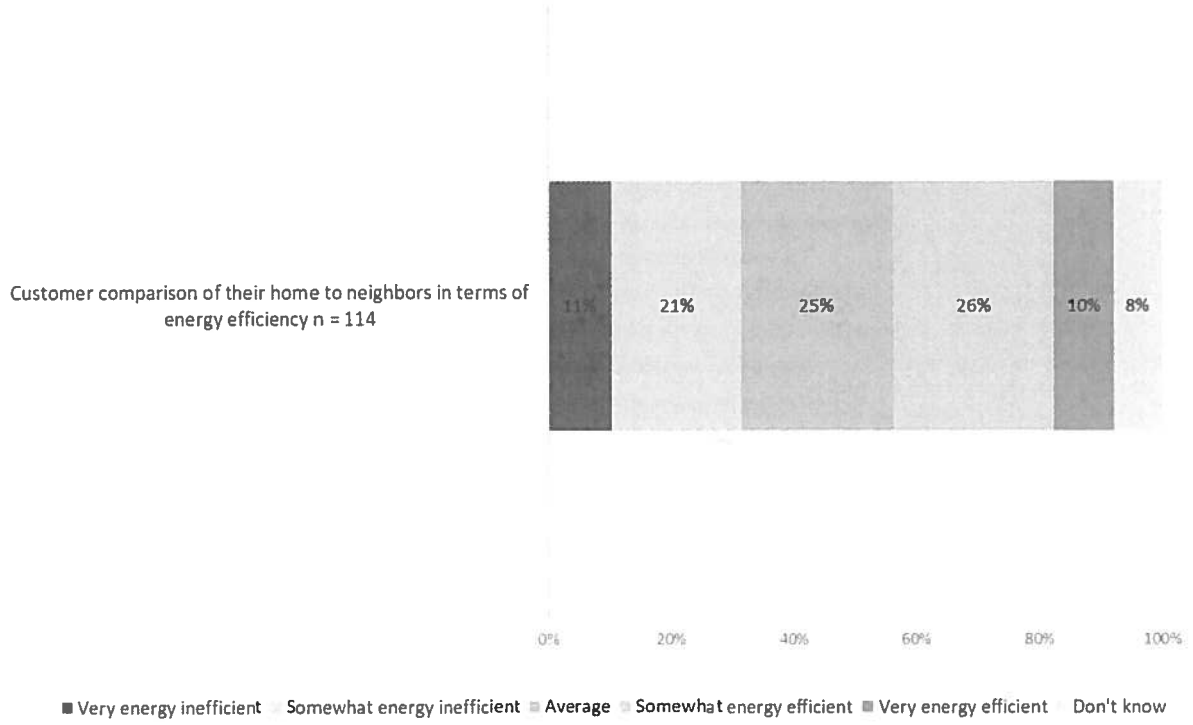


Figure 5-4 Households comparison to neighbors in terms of energy efficiency (self-report)



5.3.2.2 Energy Saving Tips

Eighty-one percent of survey respondents recalled viewing energy saving tips or recommendations that were provided in the Energy Smart Scorecard (n = 114). Among survey respondents who viewed the tips (n = 91), 68% found them either "very" or "somewhat useful". Fifty-one percent of households who viewed the tips, acted on the energy saving recommendation that was provided on the Scorecard, with 41% indicating they did not and 8% did not know. Further statistical analysis revealed that households who indicated they found the report very or somewhat accurate were four times10 more likely to act on the energy savings recommendations than households who found them very or somewhat inaccurate.

Among those households who made changes or implemented one or more tips, the most commonly acted upon tip was to turn up the thermostat in the summer to reduce air conditioner use, followed by turning down the thermostat in the winter and changing air conditioner filters (see Figure 5-5).

[10] The chi-square statistic is 5.85, p = .016. Odds ratio = 4.03 (CI: 1.26 - 12.96), z statistic = 2.342, p = 0.019.

Figure 5-5 Energy Smart Scorecard Actions Taken by Households

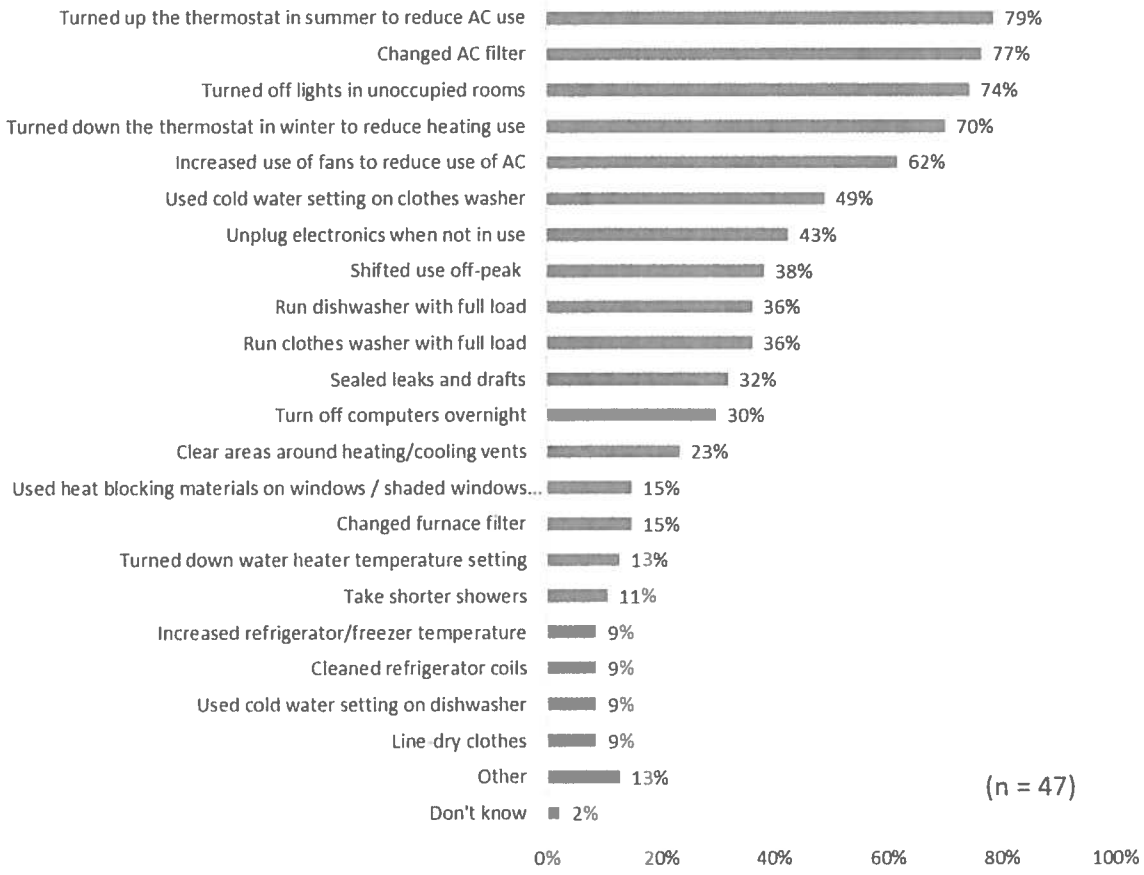


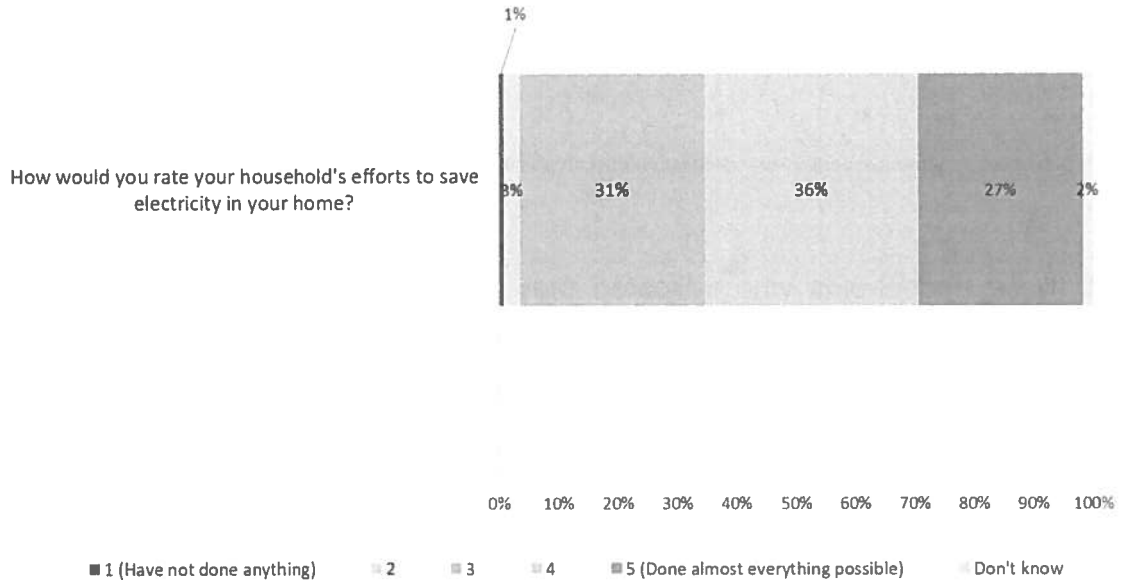
Table 5-5 summarizes the motivations for households to save energy in their home. Survey participants self-reported their knowledge on ways to save energy in their home. Twenty-five percent of respondents indicated they were very knowledgeable and 44% indicated they were somewhat knowledgeable. Twenty-seven percent of survey respondents indicated they had done almost everything possible to save electricity in their home (see Figure 5-6).

*Table 5-5 Customer Motivation to Save Electricity***

Response	Percentage of Respondents (n = 106)
Reduce electricity costs / reduce electric bill	96%
Conservation / good for environment	65%
Make my usage more similar to my neighbors	0%
Other	3%
Don't know	0%

**Survey respondents could select multiple options; therefore, the sum is greater than 100%.

Figure 5-6 Customer Efforts to Reduce Household Electricity Usage

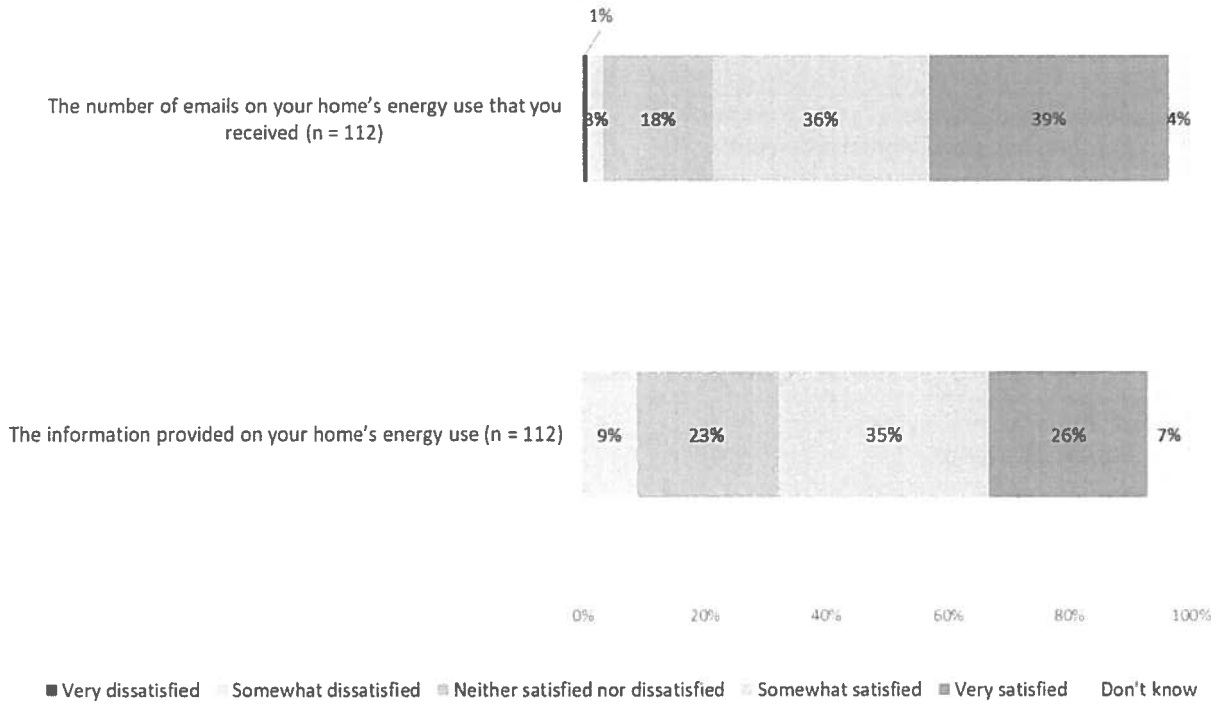


5.3.2.3 Satisfaction

The satisfaction of ENO's Energy Smart Scorecard Program was assessed among survey participants using a scale from 1 (very dissatisfied) to 5 (very satisfied). Participants rated the information provided on their home's energy use and the number of emails on the home's energy use that were received (see Figure 5-7). Sixty-one percent of survey respondents indicated they were either "very" or "somewhat satisfied"

with the information provided on the Scorecard and 75% were "very" or "somewhat satisfied" with the number of Scorecards received via email.

Figure 5-7 Satisfaction among Entergy Households Related to Energy Smart Scorecard



Among those households who indicated they were not satisfied with aspects of the Scorecard, below are their responses when asked to explain any dissatisfaction:

- "Emails aren't pertinent to my home, which is over 100 years old"
- "Thanks to our lack of advanced metering infrastructure, Scorecard couldn't provide me with new, useful, or adequately frequent data on my usage. Since Scorecard only received the same monthly meter readings that I did, and I already knew what the weather was for the last month, this outdated usage data served practically no purpose to change or inform my behavior."
- "Data was meaningless without the ability to compare our home's energy usage with the energy usage of similar size homes in our neighborhood/the greater New Orleans area."
- "It didn't seem like an accurate comparison to my neighbors and I couldn't get past that. It seems to me that there is not much explanation of what the calculations are based on and whether or not the security lights, solar panels, and car charging is taken into account. But maybe Entergy has no knowledge of

this. "

- "I wanted more detailed information"
- "The usage is thrown off by the electricity used to charge my car every day."
- "No effort to understand variables in the home that increase or decrease energy usage"
- "I may be confused about my own electrical usage which my cloud my judgement."
- "I'm not sure how accurate it is."

Fifty-two percent of respondents indicated they were either "very" or "somewhat satisfied" with Entergy as an electricity service provider (see Table 5-6).

Table 5-6 Satisfaction of Entergy as an Electricity Service Provider

Response	***Percentage of Respondents (n = 112)***
Very dissatisfied	4%
Somewhat dissatisfied	13%
Neither satisfied nor dissatisfied	29%
Somewhat satisfied	28%
Very satisfied	24%
Don't know	2%

5.3.2.4 Demographics/Firmographics

Eighty percent of survey participants indicated they owned their home, 14% indicated they rent and 3% indicated they own and rent to someone else (n = 112). Forty-seven percent of survey respondents indicated that natural gas was the main source of heating, 42% reported electricity, 5% reported combination of types, and 1% something else. When asked about what the main fuel source is for heating water, 49% indicated natural gas, 39% indicated electricity, and 6% a combination of types.

Income levels ranged, with less than half (27%) reported less than $25,000 to $50,000 and 32% reported marking between $51,000 to $100,000 or more (see Table 5-7).

Table 5-7 Household income level

Response	***Percentage of Respondents (n = 111)***
Less than $25,000	8%
$25,00 to less than $50,000	19%
$51,000 to less than $75,000	17%
$76,000 to less than $100,000	15%
Greater than $100,000 or more	33%

Don't know	7%

On average, there were 2.1 people who lived in the home, ranging from 1 to 5 or more people.

- 33 respondents (30%) reported one person currently living in the home;
- 51 respondents (46%) reported two people currently living in the home;
- 9 respondents (8%) reported three people currently living in the home;
- 11 respondents (10%) reported four people currently living in the home; and
- 5 respondents (5%) reported five people currently living in the home.

Forty-six percent of survey respondents reported having an advanced degree (e.g., PhD or master's level), 31% reported a four-year degree (see Table 5-8).

Table 5-8 Education Level

Response	***Percentage of Respondents (n = 109)***
Did not graduate high school	1%
High school graduate	5%
Associates degree, vocational/technical school or some college	17%
Four-year college degree	31%
Graduate or professional degree	46%
Don't know	1%

6. Effective Measure Life and Lifetime Savings

This section discusses methods used in determining measure life as well as program lifetime savings.

6.1 Methodology

The lifetime savings were calculated based on the convergence of savings based on the degradation and attrition rates. The formula for this is:

Equation 6-1 Lifetime Savings

$$Lifetime\ MWh = 1st\ yr\ MWh + \sum_{t=2}^{\infty} 1st\ yr\ MWh \times (1-\theta)^{t-1} \times (1-\lambda)^{t-1}$$

Where,

$t = Year\ t$

$\theta = Savings\ degredation\ rate\ 6.0\%$[11].

$\lambda = Program\ attrition\ rate$

This series converges at:

$$Lifetime\ MWh = \frac{1st\ yr\ MWh}{\theta + \lambda - (\theta \times \lambda)}$$

Effective Useful Life is the median length of time (in years) that an energy efficiency measure is functional. Effective Useful Life (EUL) is calculated as:

Equation 6-2 EUL

Lifetime MWH / First-year MWh

The calculation of this requires first-year savings, attrition rate and degradation rate, which are discussed in the following section.

6.2 Inputs

6.2.1 Realized Savings

The final realized MWh savings after adjusting for double counting is -669kWh. That is, energy use in treatment homes is 669kWh higher when compared with the control group. Therefore, no energy savings that can be attributed to the Pilot.

[11] 2012-2014 average annual attrition from Home Energy Report Program sponsored by CenterPoint Energy Arkansas.

6.2.2 Attrition Rates

The attrition rate, discussed in section 3.1.1.2 Decay, is 15.34%.

6.3 Results

The home energy report lifetime savings, for 2017 is presented in Table 6-1.

Table 6-1 Lifetime Savings and Effective Useful Life (EUL)

	Pilot
Degradation Rate	6.0%
Attrition Rate	15.34%
First-year MWh	0
Effective Useful Life	0
Lifetime MWh	**0**

Since the Pilot did not produce any energy savings, the effective useful life is zero and there are no lifetime savings.

7. Key Findings and Recommendations

7.1 Key Findings

- **Statistically valid savings estimates accounted for -2.45% of annual use.** Program participants did not save energy. On average, participants used 370 kWh more per year as compared to the control group. This accounts for approximately -2.45% of total annual electricity use (with 90% confidence between -1.30% and -3.61% kWh annual savings).
- **Net Evaluated Savings resulted in -669 MWh savings for the Entergy New Orleans HER program opt-in households.** Double counting analysis resulted in a double counting savings of 117 MWh in the treatment group from the gross evaluated savings of -552 MWh. This results in a net overall savings of -669 MWh.
- **Four households in the treatment group were found to be multifamily residences.** Multifamily housing was supposed to be ineligible for program participation.
- **The negative savings in the Pilot may have resulted due to one or both of the following reasons:**
    - **The post-hoc control group does not satisfactorily match the customer behaviors of the program participants**. Although Propensity Score Matching allows the average kWh per day for each month in the pre-period, this matching method does not include any other customer characteristics as input. Therefore, the control and treatment groups may have different behaviors, but coincidentally matched in average kWh per day. The unmatched control group average daily kWh usage was 34, while the matched control group was 41. The matching process is likely selecting the highest users within the overall control group within the pre-period in order to match the 41 kWh per day treatment group, but the match does not extend into the post-period. These matched control customers could be using more energy in the pre-period than the unmatched control customers for a variety of reasons. For example, a portion of those matched customers may have had a larger number of people living in the household in the pre-period than in the post-period; the household may have had a person working from home in the pre-period, but not in the post-period; a household may have removed an extra, unused refrigerator in the post-period, or many other reasons. These changes in household behavior cannot be explicitly controlled for using billing and measure data. The aggregate of these behavior changes leads the selected control group to match the average daily kWh usage of the treatment group in the pre-period, but not the behavior of the treatment

group, and therefore, not the average daily kWh usage of the treatment group in the post-period.

- **The treatment group suffered from self-selection bias.** The type of households that opt in to an energy efficiency program may be the type of households that would have reduced their energy use even without the program. Survey results indicate unusually high levels of affluence and education in the treatment population, attributes which often indicate increased energy-use consciousness. This is confirmed in answer to several survey questions: Twenty five percent of participants state themselves as "very knowledgeable" about energy conservation and 44% state "somewhat knowledgeable" (see Figure 5-3 and Figure 5-4).Twenty-seven percent of survey respondents indicated they had done almost everything possible to save electricity in their home (see Figure 5-6). Finally, 65% percent of respondents indicated that they are motivated to save energy for conservation/environmental reasons (see Table 5-5). These response percentages are significantly higher than those found in other home energy report-type programs, indicating the treatment group is largely comprised of households which were extremely energy efficient before the program. Two common methods of mitigating this bias, recruit-and-delay and recruit-and-deny[12], were not used in this Pilot.

7.2 Conclusions

The Evaluators' conclusions are as follows:

- **Program staff and households provided positive feedback about the Scorecard program.** Program staff were optimistic about the program and excited to begin scaling up the program. Seventy-five percent of households were satisfied with the number of emails and 61% were satisfied with the information provided. Survey findings were generally positive with households who appear engaged and interested to learn more about energy efficiency.
- **The pilot phase of the ENO Smart Scorecard program had lower than anticipated participation.** During the opt-in phase of the Scorecard program, there were approximately 1,400 participants, which was less than anticipated as discussed previously. Low program participation resulted in the program not achieving its estimated energy saving.
- **Program has transitioned from an opt-in to an opt-out model for PY8.** The Scorecard program recently scaled up with an opt-out approach – there is a

[12] https://www4.eere.energy.gov/seeaction/system/files/documents/emv_behaviorbased_eeprograms.pdf

treatment group of 25,000 residential households who will receive a monthly home energy report and 10,000 in a control group who will not receive any report. All other Entergy New Orleans residential households will still be able to sign up to participate in the program.

- **Households found the scorecards easy to understand and the recommendations useful.** Seventy-three percent of respondents indicated that the information was somewhat or very easy to understand and 68% reported that the tips were somewhat or very useful. Additionally, 51% of participants reported that they acted on one of the tips provided. A large portion of respondents were motivated to reduce electricity costs and usage.
- **Significant portion of survey respondents either did not believe or know if the energy usage information provided in a scorecard was accurate**. A finding from the evaluation of the 2017 program was that 21% of households believed that the information provided on the comparison homes was somewhat or very inaccurate. While the majority of survey participants found the information accurate, those who did not were four times less likely to act on an energy saving tip.

7.3 Recommendations

The Evaluators' recommendations for ENO's Energy Smart Scorecard Program are summarized in the following categories:

- **For all future waves of the Home Energy Report Program, it is recommended that a randomized control trial (RCT) be created before the onset of the program.** This pre-created control group will allow more reliable analysis results due to significantly decreased self-selection bias. Selection bias is thought to have played a large part in the Pilot's unexpected negative savings result.

- **Send program participants energy-saving information for the upcoming month.** The Pilot of this program had sent out home energy reports detailing ways to save energy for the month that had just passed, leaving participants with decreased potential for savings.

- **Develop a quality assurance (QA) process for monthly scorecard review.** As the program reaches more households, it will be advantageous to create a QA process to ensure content and data is accurate prior to sending monthly scorecards. A QA process could potentially mitigate the risk of households receiving inaccurate data or scorecards sent with content errors. Without a QA

process, it is possible that if households receive scorecards they find inaccurate or filled with errors, which could lead to disengagement with the reports.

- **Track and monitor future marketing efforts.** By creating a system to track and monitoring marketing and outreach efforts, program staff will be able to determine what activities are most effective at reaching households and how to best use limited resources. If social media is used to market the program, explore gathering analytics (e.g., Facebook's Insights) to gauge engagement and consider paying to promote posts to reach a larger audience.

- **Create a system to monitor customer satisfaction with scorecards and track implementation of saving tips.** To achieve the highest energy savings potential, it is important that households are implementing monthly savings tips. The program could consider surveying program participants quarterly to gather feedback on the reports. Program staff could also embed a survey link in the portal system to gather ongoing customer feedback. Additionally, conducting focus groups to gain better insight into how households perceive Scorecards may lead to design improvements. Some households may not understand the contents of a report and a focus group or survey may lend information to improve content and data provided to households. Additionally, allowing households to select tips in the portal that they will implement would allow households and program staff to track which tips are selected and of interest to households and reinforce the energy saving behavior.[13]

- **Provide a link to information on how home comparisons were developed.** Twenty-one percent of survey respondents believed that the comparison of their homes energy usage to other homes was very (4%) or somewhat inaccurate (17%). It might be beneficial to provide more detailed explanation of the Scorecard for households interested in how usage and comparisons are calculated.

- **Continue to build community awareness of the Energy Smart Scorecard program.** Program staff should continue efforts to build awareness of the program to encourage more residential households to participate. This could include additional marketing and outreach efforts, refer-a-friend campaign, and/or working with local leaders to increase buy-in.

[13] Individuals who commit to behaviors tend to engage in the behavior.
Cialdini, R. (2009). Influence: The psychology of persuasion. HarperCollins: New York, NY.

- **Establish regularly scheduled meetings and reporting requirements.** Entergy and AI should consider a standing meeting to establish a regular cadence of communication as the program moves into the second and third year. In addition, it may be beneficial to create period reporting requirements for the implementing vendor (i.e., quarterly reports with enrollment and year-to-date energy saving estimates).

- **Consider using the report to strategically promote rebate programs or measures.** Although the rebate program savings would not be attributed to the behavioral program, the reports could be leveraged to promote underperforming programs or measures or for seasonal promotion of measures such as AC tune-ups in the spring and refrigerator rebates in advance of holiday weekends.

- **Develop strategies to increase the number of program participants who complete profile information about their homes to ensure accurate comparisons.** Staff noted that they encouraged households to complete profile information about their homes that would allow for comparisons to homes of similar size, but that a minority of homes took this step. the Evaluators suggests the following recommendations to address this: 1) Include a statement and link on the home energy reports of households who have not completed their profiles indicating that better information on their homes' energy use can be provided if they complete their profile; and 2) Explore the potential use of third-party data vendors such as Experian or Axciom as sources of data on customer characteristics such as household size.

- **Explore opportunities to engage households with their data and scorecard.** Some survey respondents were interested in more detailed information about their home energy usage data. It may be advantageous for program staff to explore platforms that provide customer an opportunity to engage more with data (i.e., moving from a PDF version of a report to an interactive website). Review of the PY8 scorecard provided in a planning document indicates that staff have made the scorecard more interactive.

8. Appendix A: Propensity Score Matching

Figure 8-1 Unmatched Groups Histogram

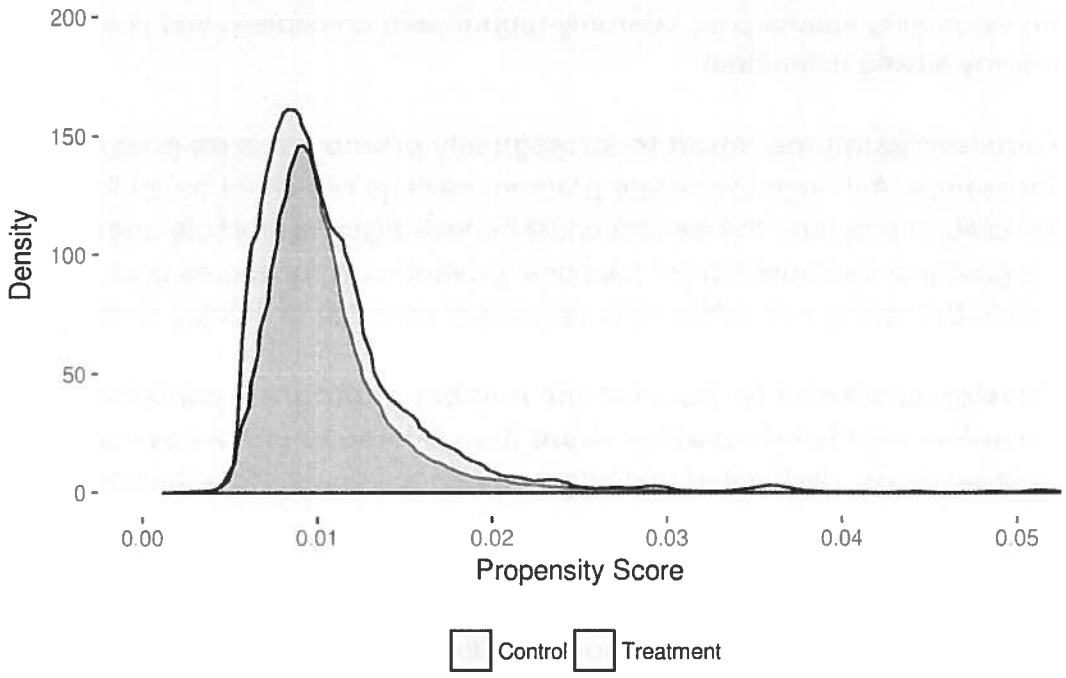


Figure 8-2 Matched Groups Histogram

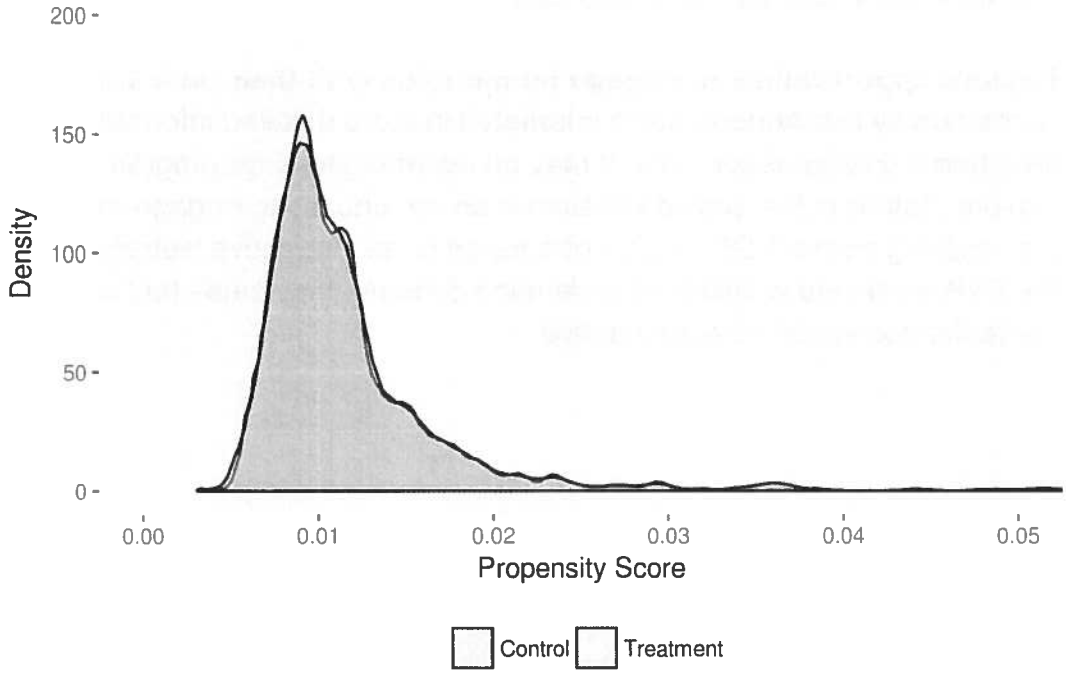


Table 8-1 Average kWh/day After Propensity Score Matching

Billing Month	Treatment Mean kWh/day Usage	Before Matching		After Matching	
		Control Mean kWh/day Usage	Mean Difference in kWh/day Usage	Control Mean kWh/day Usage	Mean Difference in kWh/day Usage
Total Number of Households	**834**	**80,612**		**6,672**	
February 2016	31.70	27.09	4.61	31.40	0.3
March 2016	26.85	22.59	4.26	26.63	0.22
April 2016	28.28	23.57	4.71	28.23	0.05
May 2016	40.59	33.24	7.35	40.52	0.07
June 2016	56.60	45.84	10.76	56.68	-0.08
July 2016	60.47	49.38	11.09	60.51	-0.04
August 2016	57.65	46.70	10.95	57.63	0.02
September 2016	55.14	44.80	10.34	55.06	0.08
October 2016	41.02	33.29	7.73	40.90	0.12
November 2016	28.39	23.66	4.73	28.18	0.21
December 2016	35.48	28.90	6.58	35.13	0.35
January 2017	32.23	26.70	5.53	31.96	0.27

9. Appendix B: Regression Output

Table 9-1 Difference-in-Differences Parameter Estimates

Variable	Pilot	
	Coefficient	t-statistic
Month2	-9.83	-52.41
Month3	-11.54	-61.74
Month4	-9.14	-48.91
Month5	0.49	2.63
Month6	13.47	72.07
Month7	18.63	99.7
Month8	17.4	93.14
Month9	11.99	64.16
Month10	0.73	3.92
Month11	-11.14	-59.59
Month12	-1.5	-8.05
Post1	-0.06	-0.72
Trmt1*Post1	1.01	4.17

Due to the unexpected and unlikely model output, the Evaluators included another difference-in-differences model, including weather effects represented by daily CDD and daily HDD. This model showed that there was savings for the treatment group, without adding in any savings or losses due to weather (CDD and HDD). Once weather effects are added in, however, the savings estimate becomes negative. This means the treatment group has become more sensitive to heating and cooling degree days in the post-period than the control group in the post-period. The difference-in-differences model with weather effects displays the inherent behavior differences between the two groups, related to weather.

This difference in sensitivity to heating and cooling degree days between the treatment and control group could be indication of an unsuccessful behavior match between the treatment group and the post-hoc control group. Figure 9-1 displays the unmatched control group and the matched control group. The unmatched control group had an average daily kWh usage of 34 and the matched control group had an average of 41. The post-hoc control group consisted of the highest 50% energy users within the unmatched control group. Therefore, the control group likely had coincidental high usage in the pre-period, for some temporary behavior change, and switched back to their normal, lower usage behavior in the post-period. A visual representation can be seen in Figure 9-2.

Figure 9-1 Daily kWh Pre- and Post-Period, Matched and Unmatched Post-Hoc Control Group

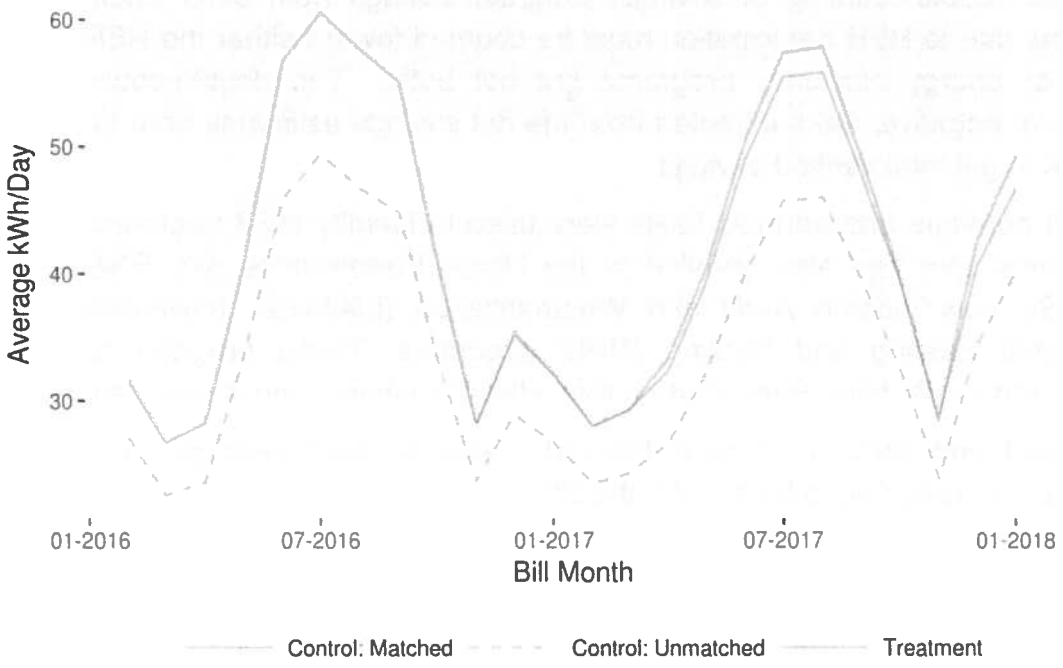
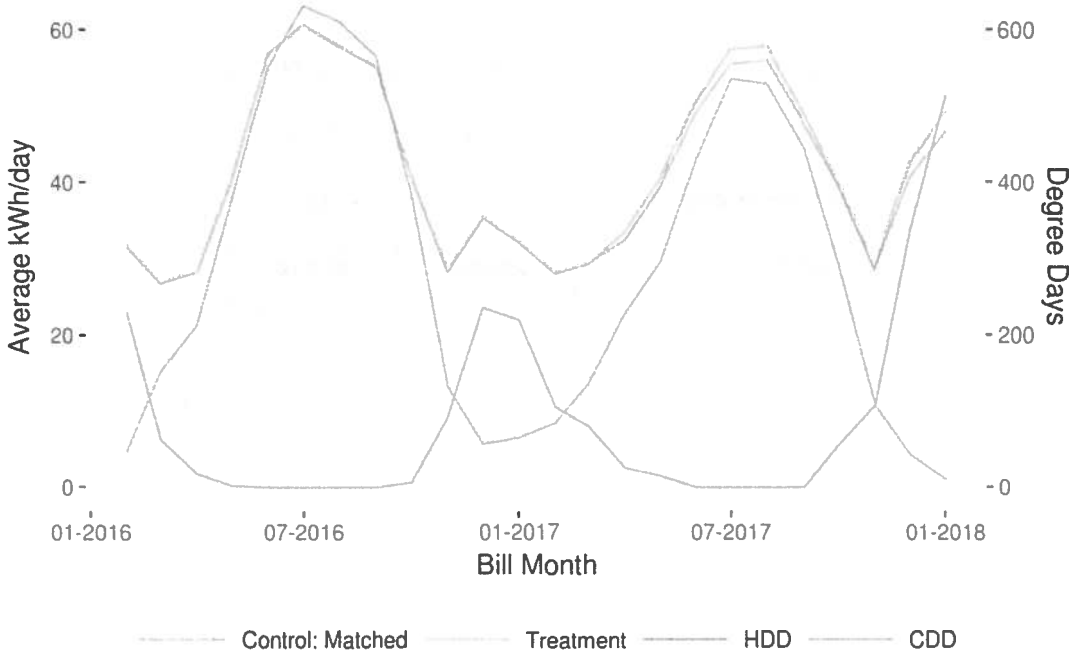


Figure 9-2 Average Daily kWh Between Groups with Weather Data



10. Appendix C: Double Counting Analysis

To avoid double-counting of savings, program savings from other energy efficiency programs due to HER participation must be counted toward either the HER program or the other energy efficiency programs but not both. The double-counted savings, positive or negative, are subtracted from the net savings estimates from the regression analysis to get total verified savings.

Account numbers and address fields were used to identify HER treatment and control participants who had also enrolled in the Home Performance with ENERGY STAR (HPwES), Low Income Audit and Weatherization (LIA&Wx), Multifamily (MF) and Residential Heating and Cooling (RHC) programs. These program savings were categorized as: Building Shell, Energy Kits, HVAC, Lighting, and Water Heating.

Table 10-1 and Table 10-2 detail the 2017 other program savings. In 2017, HVAC aggregated savings were highest for the Pilot.

Table 10-1 2017 Other Program Savings (kWh) by Wave and Treatment Status

Measurement Type	***Pilot***	
	Control	***Treatment***
Building Shell	18,357	16,554
Energy Kits	1,751	3,898
HVAC	119,024	56,109
Lighting	19,978	8,728
Water Heating	101	127
Total	**159,210**	**85,416**

By participation, HVAC had the most treatment and control households as detailed in Table 10-2.

Table 10-2 2017 Other Program Participants by Treatment Status

Measurement Type	Pilot	
	Control	Treatment
Building Shell	6	4
Energy Kits	6	8
HVAC	34	19
Lighting	29	18
Water Heating	1	1

Table 10-3 details the double count calculations.

Table 10-3 Regression Double Count Calculation

Wave		Total Double Count	# Accounts	Avg. Double Count	kWh	MWh
Pilot	Control	159,210	6,672	24		
	Treatment	85,416	834	102	117,282	117

Table 10-4 details the Pilot other program savings. The 2017 data were aggregated by program type and parent program.

Table 10-4 2017 Other Program Savings (kWh) by Treatment Status

Measurement Type	Pilot	
	Control	Treatment
Building Shell (LIA&Wx)	15,233	13,134
Energy Kits (LIA&Wx)	523	1,307
HVAC (LIA&Wx)	39,319	6,635
Lighting (LIA&Wx)	10,655	2,637
Water Heating (LIA&Wx)	101	127
Building Shell (HPwES)	3,124	1,871
Energy Kits (HPwES)	408	1,528

HVAC (HPwEaS)	12,235	13,135
Lighting (HPwES)	5,572	4,298
Building Shell (MF)	-	1,549
Energy Kits (MF)	820	1,063
HVAC (MF)	701	5,526
Lighting (MF)	3,751	1,794
HVAC (RHC)	66,768	30,812
Total	159,210	85,416

By participation, HVAC (Residential Heating and Cooling) had the most treatment and control households across the Pilot as detailed in Table 10-5.

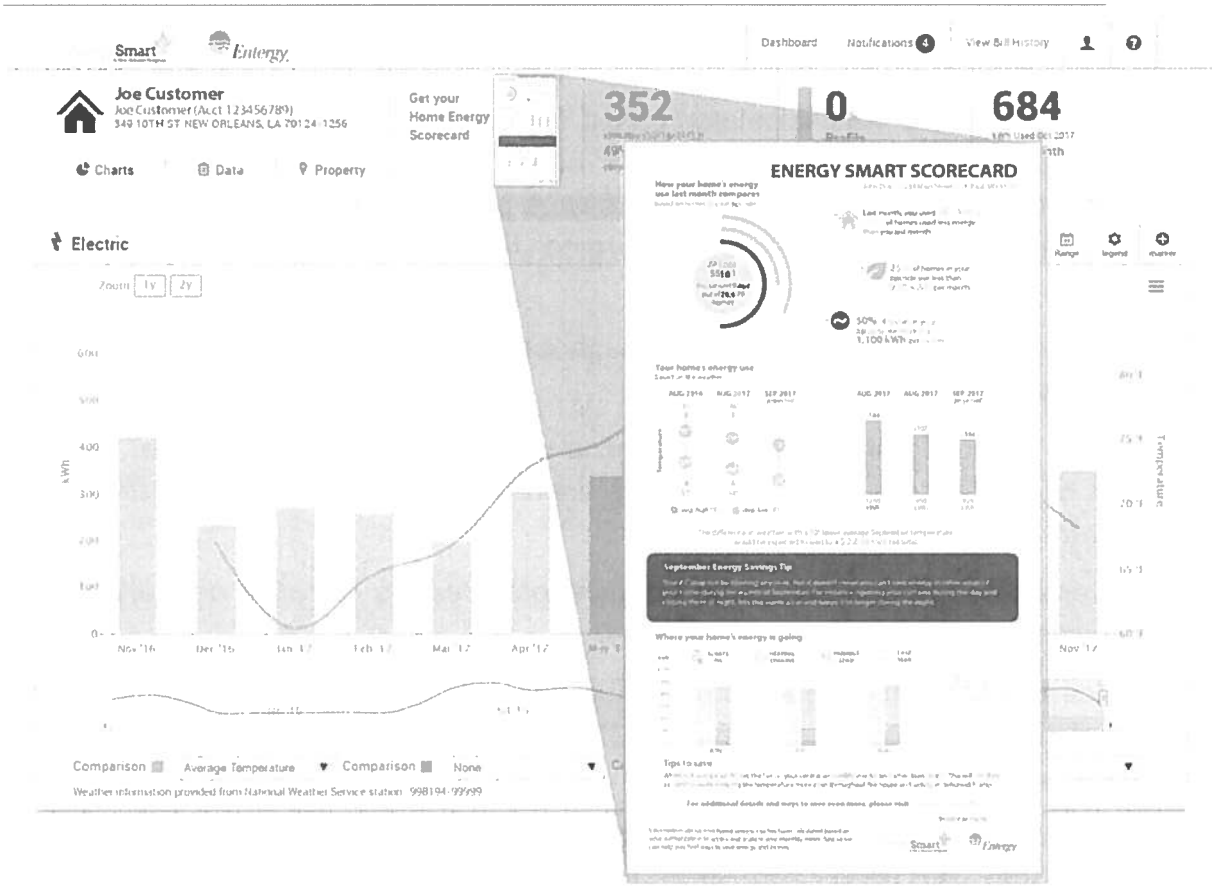
Table 10-5 Other Program Participants by Treatment Status

Measurement Type	***Pilot***	
	Control	***Treatment***
Building Shell (LIA&Wx)	4	2
Energy Kits (LIA&Wx)	2	2
HVAC (LIA&Wx)	10	3
Lighting (LIA&Wx)	14	4
Water Heating (LIA&Wx)	1	1
Building Shell (HPwES)	2	1
Energy Kits (HPwES)	1	3
HVAC (HPwES)	5	6
Lighting (HPwES)	8	9
Building Shell (MF)	0	1
Energy Kits (MF)	3	3
HVAC (MF)	1	3
Lighting (MF)	7	5
HVAC (RHC)	19	7

11. Appendix D: Updated Scorecard

For the PY8 Program the Energy Smart Scorecard format was updated to be more interactive. Below, *Figure 11-1* shows a screenshot of the newer, more interactive Scorecard.

Figure 11-1 Energy Smart Program Scorecard Example



12. Appendix E: Cost Benefit Testing

This appendix provides an overview of each programs' participation, verified reduction in peak load, verified kWh savings, annual admin costs, total program costs, as well as a summary of the cost effectiveness analysis.

12.1 Cost Effectiveness Summary

This appendix covers all verified electricity and peak demand savings, and associated program costs incurred in the implementation of the Energy Smart Scorecard Behavioral Pilot.

The cost-effectiveness was calculated based on reported total spending, verified energy savings, and verified demand reduction for each of the energy efficiency and demand response programs. All spending estimates were provided by Aptim. The methods used to calculate cost-effectiveness are informed by the California Standard Practice Manual.[14]

The energy savings (kWh) presented throughout this appendix represent savings at the generator by adjusting for line losses.

In order to calculate the cost-effectiveness of each program, measure lives were assigned on a measure-by-measure basis. Incremental costs were taken directly from the program filing documents.

Avoided energy and transmission/distribution costs used to calculate cost-effectiveness were provided by the Utility.

The tables below each program included in this analysis, along with the final verified savings estimates, total expenditures, Utility Cost Test (UCT)[15] results, and Total Resource Cost Test (TRC) results.

In addition to UCT and TRC results, results from the Ratepayer Impact Measure (RIM), Participant Cost Test (PCT) and Societal Cost Test (SCT) are included in the body of this appendix.

12.1 Energy Efficiency Program Results

Pilot spending equaled $164,519 in total.

[7]California Standard Practice Manuel: Economic Analysis of Demand Side Management Programs, October 2001. Available at: http://www.cpuc.ca.gov/NR/rdonlyres/004ABF9D-027C-4BE1-9AE1-CE56ADF8DADC/0/CPUC_STANDARD_PRACTICE_MANUAL.pdf

[8]The UCT is also referred to as the Program Administrator Cost Test (PACT).

Table 12-1 Energy Smart Scorecard Behavioral Pilot Benefit/Cost Tests

Metric	*Utility Cost Test*	*Total Resource Cost Test*	*Ratepayer Impact Measure*	*Societal Cost Test*	*Participant Cost Test*
Benefit/Cost Ratio	0.00	0.00	0.00	0.00	N/A
Total Benefits	$0	$0	$0	$0	$0
Total Costs	$164,519	$164,519	$164,519	$164,519	$0