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EXECUTIVE SUMMARY

This document summarizes the 2017 evaluation of AEP Ohio’s Home Energy Report (HER) Program. The program has been operating since August 2010, making 2017 the seventh full year in which the program has been in operation. This annual evaluation of the program includes estimates of electric energy and demand savings, a process evaluation including a customer survey, as well as recommendations based on the evaluation.

ES.1 Program Overview

The HER Program helps residential participants reduce electricity usage by encouraging them to alter their habits of electricity use by providing positive reinforcement behavior modification. Through 2017, participants are enrolled on an opt-out basis in the energy efficiency service operated and delivered by the program implementation contractor. Program participants were randomly selected for program enrollment from three AEP Ohio customer groups, including:

- Higher-than-average electricity users (abbreviated as HU for high use customers). HU program participants include the original group of customers enrolled in 2010, as well as additional cohorts enrolled in 2011, 2013, 2014, 2016, and 2017.
- Low-income households enrolled in a State of Ohio program called Percentage of Income Payment Plan (PIPP). PIPP program participants include a single group of customers enrolled in 2010.
- Customer residences equipped with Advanced Metering Infrastructure (AMI). AMI program participants include the original group of customers enrolled in 2010, as well as additional cohorts enrolled in 2011, 2013, 2014, 2015, 2016, and 2017.

The program provides participants with a mailed or electronic report that is received separately from their normal utility bills. The mailed report (included in Appendix C) consists of a single page (front and back) containing:

- A bar chart comparing last month’s electricity costs for the participant with two groups of similar homes
- A line graph comparing monthly electric use for each of the previous 12 months for the participant, and for two groups of similar homes
- A bar chart showing the participant whether they are using more or less electricity than during the comparable season last year
- Bulleted lists of simple actions the participant can take to reduce electricity usage
- An estimate of savings the customer may see on the electricity bill if a specific action is taken

Access to participant information and more tailored tips is also available through an Internet web portal available to the participant even after opting-out of the mailed reports.¹

¹ https://aepo.opower.com/
ES.2 Evaluation Objectives

This evaluation addresses the following objectives:

- Quantify energy and peak demand savings attributable to the HER Program
- Calculate the energy and peak demand savings attributable to each participant subgroup
- Estimate the increased rate of participation in other AEP Ohio energy efficiency/peak demand reduction (EE/PDR) programs due to participation in the HER Program
- Estimate program cost effectiveness

ES.3 Evaluation Methods

ES.3.1 Impact Evaluation

For the impact evaluation, Navigant used a linear fixed-effects regression (LFER) model to estimate program savings. The LFER model combines both cross-sectional and time series data in a panel dataset. The data consists of electric billing data both before program enrollment and for 2017, for both treatment (program) households receiving the Home Energy Reports and control households that do not receive the reports. The program evaluation utilizes a randomized controlled trial (RCT) experimental design, with households randomly allocated to the control and treatment groups. The RCT design eliminates the issue of selection bias that complicates the evaluation of many behavioral programs. The basic LFER model casts the average daily electricity use as a function of a household-specific constant term, a variable indicating whether the observation is in the pre- or post-program period, and a variable indicating whether the household is a treatment household or a control household. Navigant also utilized a Lagged Dependent Variable (LDV) model as a robustness check on the savings results.

ES.3.2 Process Evaluation

Navigant used in-depth interviews and online customer surveys to complete the HER program process evaluation for program year 2017.

Table ES-1 summarizes the data used during the 2017 evaluation of the HER Program.

<table>
<thead>
<tr>
<th>Data Collection Type</th>
<th>Targeted Population</th>
<th>Sample Design</th>
<th>Sample Size</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Tracking Data</td>
<td>Participant and control customers</td>
<td>NA</td>
<td>Attempted program census</td>
<td>Feb 2018 – Mar 2018</td>
</tr>
<tr>
<td>Billing Data</td>
<td>Participant and control customers</td>
<td>NA</td>
<td>Attempted program census</td>
<td>Feb 2018 – Mar 2018</td>
</tr>
<tr>
<td>Customer Surveys</td>
<td>Participant customers</td>
<td>90/10(^2)</td>
<td>400</td>
<td>November 2017 – January 2018</td>
</tr>
</tbody>
</table>

\(^2\) Survey was designed to achieve 90 percent confidence and 10 percent precision on customer satisfaction
| In-depth Telephone Interviews | Program manager and implementer | NA | 2 | Feb 2018 – Mar 2018 |
ES.4 Key Evaluation Findings and Recommendations

ES.4.1 Evaluation Findings

The HER Program reported *ex ante* 76,229 MWh of energy savings and 9,909 kW of demand savings in 2017. The verified (*ex post*) energy and demand savings for 2017 for all HU and PIPP customers combined were 72,958 MWh and 9,512 kW respectively. A comparison of *ex ante* and *ex post* HER Program savings are shown in Table ES-2.

### Table ES-2. 2017 Overall Evaluation Results

<table>
<thead>
<tr>
<th></th>
<th>2017 Program Goals (a)</th>
<th>Ex Ante Savings (b)</th>
<th>Ex Post Savings (c)</th>
<th>Realization Rate RR = (c) / (b)</th>
<th>Percent of Goal = (c) / (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Savings (MWh)</td>
<td>75,000</td>
<td>76,229</td>
<td>72,958</td>
<td>0.96</td>
<td>97%</td>
</tr>
<tr>
<td>Demand Savings (MW)</td>
<td>3.750</td>
<td>9.909</td>
<td>9.512</td>
<td>0.96</td>
<td>254%</td>
</tr>
</tbody>
</table>


Savings from AMI customers are not included in the above *ex ante* and *ex post* calculations because these savings are not counted toward the HER Program savings goals. Navigant estimated AMI customers provided an additional 4,217 MWh of energy savings and 550 kW of peak demand savings.

A summary of the savings from each customer group includes:

- All HU customers accounted for a total of 70,391 MWh of energy savings, corresponding to 9,178 kW of peak demand savings. HU customers represent 91 percent of the total savings.

- Low-income customers accounted for 2,566 MWh of energy savings, corresponding to 335 kW of peak demand savings, and represent approximately 3 percent of total savings.

- AMI customers accounted for 4,217 MWh of energy savings, corresponding to 550 kW of peak demand savings, representing 5 percent of total savings.
Detailed impact results for each customer group participating in the HER Program are provided in Table ES-2 and Table ES-3. In the tables, customers are divided into cohorts based upon when they initially enrolled in the HER Program.

Table ES-3. Estimated Program Savings by Participant Type

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Active Participants (start of 2017 or cohort)</td>
<td>84,790</td>
<td>14,517</td>
<td>77,675</td>
<td>57,128</td>
<td>28,674</td>
<td>54,696</td>
<td>191,469</td>
<td>31,369</td>
<td>9,114</td>
<td>549,432</td>
</tr>
<tr>
<td>2017 Move-outs</td>
<td>4,141</td>
<td>787</td>
<td>5,878</td>
<td>4,790</td>
<td>3,709</td>
<td>10,081</td>
<td>31,144</td>
<td>4,172</td>
<td>913</td>
<td>65,615</td>
</tr>
<tr>
<td>2017 Opt-outs±</td>
<td>32</td>
<td>9</td>
<td>25</td>
<td>15</td>
<td>8</td>
<td>36</td>
<td>59</td>
<td>6</td>
<td>2</td>
<td>192</td>
</tr>
<tr>
<td>Average Daily Household kWh Used</td>
<td>44,0</td>
<td>57,5</td>
<td>40,0</td>
<td>34,2</td>
<td>35,8</td>
<td>40,3</td>
<td>26,5</td>
<td>36,4</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Estimated Daily kWh Savings per participant (standard error)</td>
<td>0.87</td>
<td>0.86</td>
<td>0.59</td>
<td>0.41</td>
<td>0.42</td>
<td>0.27</td>
<td>0.13</td>
<td>-0.15</td>
<td>0.80</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Annual kWh Savings per participant (standard error)</td>
<td>316</td>
<td>314</td>
<td>216</td>
<td>151</td>
<td>153</td>
<td>100</td>
<td>46</td>
<td>-55</td>
<td>291</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Percentage Savings</td>
<td>1.93%</td>
<td>1.48%</td>
<td>1.46%</td>
<td>1.19%</td>
<td>1.16%</td>
<td>0.68%</td>
<td>0.48%</td>
<td>-0.42%</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Total MWh Savings* (a)</td>
<td>26,760</td>
<td>4,515</td>
<td>15,631</td>
<td>8,284</td>
<td>4,116</td>
<td>4,929</td>
<td>6,900</td>
<td>-</td>
<td>2,540</td>
<td>73,675</td>
</tr>
<tr>
<td>Savings Counted in Other Programs (b)</td>
<td>84</td>
<td>49</td>
<td>214</td>
<td>48</td>
<td>-25</td>
<td>73</td>
<td>300</td>
<td>87</td>
<td>-26</td>
<td>804</td>
</tr>
<tr>
<td>Total Savings (MWh) = (a) - (b)</td>
<td>26,676</td>
<td>4,466</td>
<td>15,416</td>
<td>8,236</td>
<td>4,141</td>
<td>4,855</td>
<td>6,600</td>
<td>-</td>
<td>2,566</td>
<td>72,958</td>
</tr>
<tr>
<td>Total Savings (kWh)†</td>
<td>3,478</td>
<td>582</td>
<td>2,010</td>
<td>1,074</td>
<td>540</td>
<td>633</td>
<td>861</td>
<td>-</td>
<td>335</td>
<td>9,512</td>
</tr>
</tbody>
</table>

Source: Navigant analysis of customer billing data provided by AEP Ohio.
Note: All savings values are statistically significant at the 95% confidence level.
* Aggregate savings values have been adjusted to account for customer move-outs throughout the program year.
† The analysis of the September 2017 HU cohort of participants produced a negative estimate of savings. Therefore, the total savings from this cohort has been assumed to be zero, since it is unlikely that the program produced an increase in average household energy usage.
‡ The billing analysis model described in this report cannot be directly utilized for the estimation of demand savings. In order to properly determine demand savings using this method, intraday customer billing data would be needed. In the absence of such data, Navigant applied the ratio of kW to MWh savings from the program plan to the estimate of energy savings produced by the program analysis.
± Opt-outs are not removed from the analysis.
^ AEP Ohio reported 550,209 active participants for the 2017 program year. Navigant removed the duplicate customers split across waves and the opt outs at the start of 2017 and/or cohort start which is the driver of the different participant values for ex ante and ex post.
Table ES-4 presents the estimated savings for the AMI cohorts enrolled in the HER Program. Savings for these customers were also adjusted to account for double counted savings and participants that moved out of their households during 2017.

### Table ES-4. Estimated Program Savings by AMI Participant Group Using Equations 1 and 2

<table>
<thead>
<tr>
<th>Source: Navigant Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: All values are statistically significant at the 95% confidence level except for the 2013 cohort.</td>
</tr>
<tr>
<td>* Aggregate savings values have been adjusted to account for customer move-outs throughout the program year.</td>
</tr>
<tr>
<td>‡ The analysis of the 2013 and 2017 AMI cohorts of participants produced a negative estimate of savings. Therefore, the total savings from these cohorts has been assumed to be zero, since it is unlikely that the program produced an increase in average household energy usage.</td>
</tr>
<tr>
<td>† The billing analysis model described in this report cannot be directly utilized for the estimation of demand savings. In order to properly determine demand savings using this method, intraday customer billing data would be needed. In the absence of such data, Navigant applied the ratio of kW to MWh savings from the program plan to the estimate of energy savings produced by the program analysis.</td>
</tr>
<tr>
<td>± Opt-outs are not removed from the analysis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Active Participants (start of 2017 or cohort)</th>
<th>2010/11 AMI</th>
<th>2013 AMI‡</th>
<th>2014 AMI</th>
<th>2015 AMI</th>
<th>2016 AMI</th>
<th>2017 AMI‡</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 Move-outs</td>
<td>30,144</td>
<td>3,535</td>
<td>6,886</td>
<td>7,921</td>
<td>7,107</td>
<td>2,488</td>
<td>58,081</td>
</tr>
<tr>
<td>2017 Opt-outs‡</td>
<td>2,519</td>
<td>580</td>
<td>837</td>
<td>1,795</td>
<td>2,013</td>
<td>2</td>
<td>7,746</td>
</tr>
<tr>
<td>Average Daily Household kWh Used</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Estimated Daily kWh Savings per participant (standard error)</td>
<td>27.1</td>
<td>26.5</td>
<td>28.7</td>
<td>23.3</td>
<td>25.5</td>
<td>19.4</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Annual kWh Savings per participant (standard error)</td>
<td>0.25</td>
<td>-0.38</td>
<td>0.36</td>
<td>0.30</td>
<td>0.00</td>
<td>0.05</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Percentage Savings</td>
<td>92</td>
<td>-137</td>
<td>133</td>
<td>109</td>
<td>1</td>
<td>18</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Total MWh Savings* (a)</td>
<td>0.92%</td>
<td>0.00%</td>
<td>1.25%</td>
<td>1.26%</td>
<td>0.01%</td>
<td>0.26%</td>
<td>N/A</td>
</tr>
<tr>
<td>Savings Counted in Other Programs (b)</td>
<td>2,688</td>
<td>-</td>
<td>852</td>
<td>748</td>
<td>8</td>
<td>-</td>
<td>4,297</td>
</tr>
<tr>
<td>Total Savings (MWh) = (a)</td>
<td>72</td>
<td>-18</td>
<td>28</td>
<td>-29</td>
<td>8</td>
<td>11</td>
<td>73</td>
</tr>
<tr>
<td>Total Savings (kW)†</td>
<td>351</td>
<td>-</td>
<td>111</td>
<td>98</td>
<td>1</td>
<td>-</td>
<td>560</td>
</tr>
</tbody>
</table>

As shown in Table ES-3 and Table ES-4, Navigant found savings varied significantly by customer group: HU participants in the earlier cohorts are estimated to have saved more energy than other customer groups on an absolute basis. This is partly due to their higher average daily energy use as compared to other participant cohorts. On a relative basis, the savings from the earlier cohorts enrolled in 2010 through 2015 all exceed one percent of daily energy usage.

A meaningful result from the cohort-level findings is the relatively low rate of savings from the later cohorts compared to the earlier cohorts. The five cohorts enrolled during 2016 and 2017 are estimated to have generated under one percent savings. Prior experience has shown once customers begin receiving
HERs, it can take up to 18 months for savings to fully materialize after a customer is enrolled in the program. This “ramp-up” phase may be impacting the savings estimate for the 2017 HU both February and September) and AMI cohorts, as well as the 2016 HU and AMI cohorts. However, the 2016 AMI cohort generated almost no savings, despite having been deployed for 17 months by the end of 2017. This cohort may not be savings-generating in the coming program years.

In 2017, overall program savings were reduced by the savings generated by the increase in participation by HER Program customers in other AEP Ohio EE/PDR programs compared to control customers. Navigant used a Post-Only-Difference (POD) calculation to determine if any program savings should be subtracted to account for the HER Program participant energy savings attributable to other AEP Ohio programs. The approach ensures energy savings from another AEP Ohio EE/PDR programs are not double counted in the HER Program. The results of this program uptake analysis are shown in Table ES-5.

Table ES-5. Estimate of Energy Savings Attributable to Participation in Other Programs

<table>
<thead>
<tr>
<th>Source: Navigant analysis</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Metric</th>
<th>Appliance Recycling</th>
<th>Community Assistance Program</th>
<th>Efficient Products Rebates</th>
<th>In-Home Component of Efficient Products</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Post-Only Difference (POD) Statistic</td>
<td>0.09%</td>
<td>0.01%</td>
<td>0.03%</td>
<td>0.01%</td>
<td>N/A</td>
</tr>
<tr>
<td>Change in Program Participation due to HER Program (# of Participants)</td>
<td>509</td>
<td>57</td>
<td>168</td>
<td>48</td>
<td>783</td>
</tr>
<tr>
<td>Median Savings per Program Participant (kWh)</td>
<td>1,376</td>
<td>1,442</td>
<td>162</td>
<td>168</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Savings (MWh)</td>
<td>701</td>
<td>77</td>
<td>27</td>
<td>-1</td>
<td>804</td>
</tr>
</tbody>
</table>

Due to increased participation, the analysis determined an estimated 804 MWh of the evaluated savings from the HER Program were double counted in other AEP EE/PDR programs.

**ES.4.2 Satisfaction Findings**

Navigant measured customers’ satisfaction with AEP Ohio by asking customers to rate their satisfaction on a scale of 0 to 10, where 10 is highly satisfied. Navigant categorized “overall satisfaction” as any rating above a 5, while “highly satisfied” is any score above an 8, as shown in Table ES-6.

Table ES-6. Satisfaction with AEP Ohio - Summary

<table>
<thead>
<tr>
<th>Metric</th>
<th>2017 Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Satisfaction Score</td>
<td>7.9</td>
</tr>
<tr>
<td>Overall Satisfied (score 6-10)</td>
<td>86%</td>
</tr>
<tr>
<td>Highly Satisfied (score 9-10)</td>
<td>48%</td>
</tr>
</tbody>
</table>

Source: Navigant analysis
ES.4.2 Recommendations

1. Navigant’s analysis shows recent participant cohorts have a lower average daily energy usage and, relatedly, a lower average electricity savings. Evidence from this analysis also suggests some of the more recent cohorts may have a lower relative level of electric savings beyond the initial ramp-up period. Navigant suggests AEP Ohio continue the HER Program as long as regularly reported electric savings remain cost-effective, but also monitor the incremental cost and savings of each new cohort introduced to ensure individual cohorts contribute to the cost-effectiveness of the program as a whole.

2. Further investigation into the construction of the 2013 AMI cohort may be warranted to determine if there are customer characteristics that are adversely impacting participant savings. AEP Ohio should also carefully watch the 2016 AMI cohort, as savings were almost non-existent in 2017. If savings continue to lag for this wave, additional investigation may be warranted.

3. The results of the customer survey suggest both satisfaction and engagement with the reports are high. AEP Ohio should continue to track customer satisfaction in subsequent program years as year-over-year comparisons will serve as a benchmark for the efficacy of the reports, and could explain any future changes in electricity savings that may occur.
1. INTRODUCTION

1.1 Program Description

The purpose of the HER Program is to provide feedback to residential participants that will encourage them to change energy use habits to save energy. Customers are encouraged to do this through the use of a personalized report delivered to participating households either quarterly or bi-annually via mail. Customers with an email address in the system are delivered an electronic report each month. The information included in the report shows the energy use pattern of the household relative to peers and offers actions a participant can take to reduce their household's metered electricity usage. To implement this program, AEP Ohio contracted with an implementation contractor, Oracle, to develop and distribute the reports.

The HER Program provides recipients with the following items:

- A bar chart comparison of last month’s electricity costs for the recipient and for two groups of similar homes.
- A line graph comparing monthly electric use for each of the previous 12 months for the recipient vs. two groups of about 100 similar homes.
- A bar chart showing the recipient whether it is using more or less electricity than during the comparable season last year.
- A short bullet list of simple actions the household could take to reduce electricity usage.
- An estimate of the savings the customer may see on the electricity bill if a specific action is taken.

The goal of the HER Program is to generate electric energy and demand savings by providing customers with information on their energy usage along with methods to manage usage. This is performed through behavioral changes and through influencing household purchasing decisions. Relevant energy habits include turning off appliances and lights when not in use, purchasing and installing low-cost energy efficiency measures, and participating in other AEP Ohio EE/PDR programs.

The program was launched in August 2010 with an initial mailing of the HERs to more than 200,000 residential customers selected as participants. Additional participants (and corresponding control households used for evaluation purposes) were added in 2011, 2013, 2014, 2015, 2016, and 2017 to increase the overall program savings, and/or to compensate for original participants that had opted-out of the program or moved out of AEP Ohio’s service territory. The program provides participants with ongoing comparisons, tips, and encouragement that can produce energy savings, lower energy bills, and improve participant satisfaction.

Participants were randomly selected for program enrollment from three AEP Ohio customer groups, including:

- Higher-than-average electricity users (abbreviated as HU for high use customer), living in single-family homes. A total of eight cohorts of HU customers have been enrolled in the program. In 2010, the implementation contractor randomly selected 125,002 households for enrollment among customers that consume more than 21,000 kWh annually. Approximately 21,750 additional households that met the same criterion were enrolled in 2011. In 2013, the annual usage threshold for consideration as a high use customer was lowered to 16,000 kWh annually. Using this new criterion, 125,968 additional households were enrolled in the HER Program in 2013, 143,430 in two cohorts in 2014, 62,338 in 2016, and 223,565 in two cohorts in 2017.
Lower-income households, enrolled in a State of Ohio program called Percentage of Income Payment Plan (PIPP). To stay enrolled, all households must have a verified annual income at or below 150 percent of the Federal Poverty Level (FPL). The PIPP helps customers arrange affordable long-term payment agreements. The PIPP group enrolled in 2010 was initially 25,000 participants. No additional cohorts of PIPP customers have been added to the HER Program.

Customers utilizing Advanced Metering Infrastructure (AMI), all of which were located within the footprint of AEP Ohio’s Smart Grid Demonstration Project. The AMI group originally contained 62,027 participants enrolled in 2010. AEP Ohio later added additional treatment households to this group, including 9,980 households in 2011, 12,677 in 2013, 15,000 in 2014, 12,278 in 2015, 9,317 in 2016, and 2,488 in 2017.

Additionally, AEP Ohio attempted to expand the program to include an opt-in component. Approximately 250,000 households were provided with marketing material regarding the HER Program and encouraged to opt-in to the program if interested in participating. While this endeavor resulted in 4,088 additional program participants, the result was significantly below the number targeted by AEP Ohio. The majority of the households remaining in the marketing endeavor were subsequently enrolled in the 2013 HU cohort of standard, opt-out participants.

As time passes, the number of active customers in each program cohort declines as a portion of the households opt out of the program, move from the enrolled home, or otherwise discontinue service at the household enrolled in the HER Program. Table 1-1 shows the number of active treatment and control households in each program subgroup and cohort as of the beginning of the 2017 program year, or at the time of enrollment for the 2017 cohorts.
Table 1-1. Number of Program Participants and Non-Participants

<table>
<thead>
<tr>
<th>Customer Subgroup</th>
<th>Participants</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>HU Customers</td>
<td>544,170</td>
<td>153,569</td>
</tr>
<tr>
<td>August 2010 Cohort</td>
<td>86,708</td>
<td>41,718</td>
</tr>
<tr>
<td>November 2011 Cohort</td>
<td>14,738</td>
<td>7,000</td>
</tr>
<tr>
<td>February 2013 Cohort</td>
<td>78,274</td>
<td>31,270</td>
</tr>
<tr>
<td>January 2014 Cohort</td>
<td>57,382</td>
<td>13,598</td>
</tr>
<tr>
<td>August 2014 Cohort</td>
<td>28,797</td>
<td>5,754</td>
</tr>
<tr>
<td>August 2016 Cohort</td>
<td>54,706</td>
<td>17,238</td>
</tr>
<tr>
<td>February 2017 Cohort</td>
<td>191,567</td>
<td>24,993</td>
</tr>
<tr>
<td>September 2017 Cohort</td>
<td>31,998</td>
<td>11,998</td>
</tr>
<tr>
<td>AMI Customers</td>
<td>58,495</td>
<td>26,645</td>
</tr>
<tr>
<td>August 2010/11 Cohort</td>
<td>30,513</td>
<td>9,274</td>
</tr>
<tr>
<td>February 2013 Cohort</td>
<td>3,552</td>
<td>2,861</td>
</tr>
<tr>
<td>February 2014 Cohort</td>
<td>6,912</td>
<td>5,171</td>
</tr>
<tr>
<td>November 2015 Cohort</td>
<td>7,923</td>
<td>6,570</td>
</tr>
<tr>
<td>July 2016 Cohort</td>
<td>7,107</td>
<td>2,417</td>
</tr>
<tr>
<td>October 2017 Cohort</td>
<td>2,488</td>
<td>352</td>
</tr>
<tr>
<td>Low-income Customers</td>
<td>9,213</td>
<td>8,388</td>
</tr>
<tr>
<td>August 2010 Cohort</td>
<td>9,213</td>
<td>8,388</td>
</tr>
<tr>
<td>Total</td>
<td>611,878</td>
<td>188,602</td>
</tr>
</tbody>
</table>

Source: Navigant Analysis
Note: Participant and control counts in this table to not exclude opt-outs. Control customers cannot opt-out, therefore Participant opt-outs are not excluded from the analysis. Opt-outs are excluded from the "active" participant count.
1.2 Evaluation Overview

This evaluation report presents the findings from the impact evaluation of the AEP Ohio HER Program for 2017. The primary goal of the impact evaluation is to quantify electric energy and demand savings attributable to the HER Program. A secondary goal of the impact analysis is to compare the savings generated among the various participant subgroups and cohorts. The primary goal for the process evaluation is to understand customer opinions of and experience with the HER Program.
2. EVALUATION METHODOLOGY

The following section provides a detailed description of the evaluation methodologies and data used in the impact and process evaluations of AEP Ohio’s HER Program.

2.1 Description of the Data

2.1.1 Data Used in the Impact Evaluation

The impact analysis follows an attempted census approach, using data from all treatment and control households to estimate program savings. Navigant used monthly billing data from AEP Ohio’s customer information system, spanning the period from December 2008 to December 2017. The billing data included a unique customer account ID, the start and end dates of each bill cycle, and the quantity of energy consumed during the bill cycle. Navigant also received participant data from AEP Ohio, including information about when the customer first received an HER, the participant group the customer is in, and a list of customers participating in other AEP Ohio energy efficiency programs to account for double counted savings.

Participants choosing to opt-out of the HER Program during 2017 were included in the analysis, as recipients of HER reports continue to generate savings even after opting out. Figure 2-1 shows the number of program participants that opted-out in each month of the 2017 program year. By the end of December 2017, 210 households had opted-out of the HER Program during the program year, including some households that also moved out of AEP Ohio service territory during the year. Opt-outs represents 0.03 percent of 2017 participant households, which is low relative to what behavioral programs usually experience, and what AEP Ohio’s HER Program has experienced in prior program years. For example, the opt-out rate was 0.34 percent in 2014 and 0.12 percent in 2015. The downward trend in opt-outs is likely due to the maturity of AEP Ohio’s HER program.
Navigant also included households that moved out of the premise enrolled in the HER program during 2017 as shown in Figure 2-2. These households were included in the analysis up to the date participants' accounts at the enrolled premise became inactive. In total, these participants represent over 73,000 AEP Ohio customers, or around 12 percent of the number of program participants at the start of 2017. This move out rate is higher compared to 2016 (7.6 percent), but comparable the move out rate in 2015 and 2014 (11 percent and 12 percent, respectively). AEP Ohio’s move out rate is almost double that of other Midwest utilities³.

2.2 Comparability of Treatment and Control Group

When customers are enrolled in the HER Program, a randomized control trial (RCT) is utilized to assign perspective participants into treatment and control groups. In principle, this methodology of assignment results in comparable control and treatment groups, where the energy use of the control group can be used as a counterfactual to estimate the program savings of the participant group.

Navigant analyzed characteristics of treatment and control households within each customer group and cohort to determine whether they are balanced in the factors affecting energy use. For this comparison, two primary characteristics were reviewed to ascertain the comparability of the control households:

- The geographic distribution of customers within AEP Ohio service territory as indicated by the weather station assigned to each customer.
- Distribution of energy use within each month in the 12-month period prior to the enrollment of the participant households in the HER Program. Monthly levels of energy use were compared using the mean, 5th percentile, 25th percentile, Mean, 75th percentile, and 95th percentile.

Navigant's position is that a comparison on the last item – the distribution of past energy use – subsumes all other relevant comparisons, because structural differences between a treatment and control group will be revealed by past energy use. Still, comparisons in other dimensions can be a useful check on the balance of the samples. Navigant performed this analysis on all cohorts included in the 2017 evaluation during prior years. Graphs referencing the results of these prior analyses are provided in Appendix A. The analysis of the AMI and HU cohorts enrolled during 2017 is summarized in Section 3.1.3.

2.3 Analytical Methods

This section describes the analytical methods used as part of the impact and process evaluations. In general, the methodologies utilized are in accordance with recommendations from the SEE Action
The Network Working Group for evaluating behavior-based energy efficiency programs. Two different models are utilized in the impact evaluation to confirm the robustness of the estimated savings impacts.

### 2.3.1 Impact Evaluation Methods

The main methodological issue for the impact evaluation is to estimate the counterfactual energy use by households participating in the HER Program — that is, the energy that households would have used in the absence of the program. The program utilized a RCT experimental design, meaning households were randomly allocated to the control and treatment groups. This eliminates the issue of selection bias that complicates the evaluation of many behavioral programs. The random assignment of households to the treatment and control groups means the control group should serve as a robust baseline against which the energy use of the treatment households can be compared to estimate savings from enrollment in the HER Program.

Navigant estimated the HER program impacts using two approaches applied to monthly billing data: (1) a lagged dependent variable (LDV) regression analysis with lagged controls, and (2) a linear fixed-effects regression (LFER) analysis. Navigant uses the LDV results for reporting total program savings, but runs both models as a robustness check. Although the two models are structurally very different, assuming the randomized controlled trial (RCT) is well balanced with respect to the drivers of energy use, in a single sample the two approaches generate very similar estimates of program savings.

Navigant prefers to report out the LDV model for two reasons. One, the implementer is also using a post-only model for evaluation. Two, although both the LFER and LDV models generate unbiased estimates of program savings, as an empirical matter—based on our past analyses and those in the academic literature—estimated savings from the LDV model tend to have lower standard errors than those from the LFER model, though the differences are usually very small.

The LDV model combines both cross-sectional and time-series data in a panel format. It controls for non-treatment differences in energy use between treatment and control customers using lagged energy use as an explanatory variable. In particular, the model frames energy use in calendar month $t$ of the post-program period as a function of both the treatment variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between control and treatment customers will be reflected in differences in their past energy use, which is highly correlated with their current energy use. The lagged energy use term is similar to the customer fixed effect included in the LFER model explained below. Formally, the model is shown in Equation 1.

---

Equation 1. Lagged Dependent Variable Model

\[ ADU_{kt} = \beta_1 Treatment_k + \sum_j \beta_{2j} Month_{jt} + \sum_j \beta_{3j} Month_{jt} \cdot ADU_{lag} + \varepsilon_{kt} \]

Where:
- \( ADU_{kt} \) is average daily consumption of kWh by household \( k \) in bill period \( t \)
- \( Treatment_k \) is a binary variable taking a value of 0 if household \( k \) is assigned to the control group, and 1 if assigned to the treatment group
- \( Month_{jt} \) is a binary variable taking a value of 1 when \( j = t \) and 0 otherwise\(^5\)
- \( ADU_{lag} \) is household \( k \)'s energy use in the same calendar month of the pre-program year as the calendar month of month \( t \)
- \( \varepsilon_{kt} \) is the cluster-robust error term for household \( k \) during billing cycle \( t \); cluster-robust errors account for heteroskedasticity and autocorrelation at the household level.\(^6\)

The coefficient \( \beta_1 \) is the estimate of average daily kWh energy savings due to the program.

As with the LDV model, the LFER model combines both cross-sectional and time-series data in a panel format. The regression essentially compares pre- and post-program billing data for participants and controls to identify the program's effect. The customer-specific fixed effect is a key feature of the LFER analysis and captures all customer-specific factors affecting electricity usage that do not change over time, including those that are unobservable. Examples include the square footage of a residence or the home’s physical location. The fixed effect represents an attempt to control for small, systematic differences between treatment and control customers that might occur due to chance.

The LFER model used by Navigant is one in which average daily consumption of kWh by household \( k \) in bill period \( t \), denoted by \( ADU_{kt} \), is a function of the following three terms:

1. The binary variable \( Treatment_k \).
2. The binary variable \( Post_t \), taking a value of 0 if month \( t \) is in the pre-treatment period, and 1 if in the post-treatment period.
3. The interaction between these variables, \( Treatment_k \cdot Post_t \).

Formally, the LFER model is shown in Equation 2.

Equation 2. Linear Fixed Effects Regression Model

\[ ADU_{kt} = \alpha_{0k} + \alpha_1 Post_t + \alpha_2 Treatment_k \cdot Post_t + \varepsilon_{kt} \]

Three observations about this specification deserve comment. First, the coefficient \( \alpha_{0k} \) captures all household-specific effects on energy use that do not change over time, including those that are

---

\(^5\) In other words, if there are \( T \) post-program months, there are \( T \) monthly dummy variables in the model, with the dummy variable \( Month_{t} \) the only one to take a value of 1 at time \( t \). These are, in other words, monthly fixed effects.

\(^6\) Ordinary Least Squares (OLS) regression models assume that the data are homoskedastic and not autocorrelated. If either of these assumptions is violated, the resulting standard errors of the parameter estimates are incorrect (usually underestimated). A random variable is heteroskedastic when the variance is not constant. A random variable is autocorrelated when the error term in one period is correlated with the error terms in at least some of the previous periods.
unobservable. Second, $\alpha 1$ captures the average effect across all households of being in the post-treatment period. Third, the effect of being both in the treatment group and in the post period, i.e., the effect directly attributable to the program, is captured by the coefficient $\alpha 2$. In other words, whereas the coefficient $\alpha 1$ captures the change in average daily kWh use across the pre- and post-treatment for the control group, the sum $\alpha 1 + \alpha 2$ captures this change for the treatment group, and so $\alpha 2$ is the estimate of average daily kWh energy savings due to the program.

In prior evaluation years, Navigant found the 2010 AMI treatment group is not statistically comparable to the corresponding control group. Navigant found statistically significant differences in the energy use of control and treatment households in seven out of the 12 months preceding the enrollment of AMI participants. The months where differences were found were all during the heating season, from October 2009 until April of 2010 (as shown in Figure A-4 in Appendix A). After consultation with the program implementer, Navigant determined these deviations are due to different proportions of customers with electric heat in the treatment and control groups. As a result, data regarding the heating type of customers in the AMI treatment and control groups was provided by the program implementer and incorporated into the analysis. After controlling for customers with electric heat, there is no month in the 12 months before the program begins in which the average energy use for the two groups is statistically significant different at the 90 percent confidence level.

The finding of differences in the rate of customers with electric heat in the 2010-11 AMI treatment and control groups requires a modification to the impact evaluation methodology for this cohort. Navigant incorporated two additional terms into the regression equation to account for the differing prevalence of electric heat. Equation 3 formally presents the equation for this model.

Equation 3. Lagged Dependent Variable Model (2010-11 AMI Customer Group)

$$ADU_{kt} = \beta_1 ElectricHeat_k + \beta_2 Treatment_k + \beta_3 Treatment_k \cdot ElectricHeat_k + \sum \beta_{4j} Month_{jt} + \sum \beta_{5j} Month_{jt} \cdot ADUlag_{kt} + \epsilon_{kt}$$

Where,

$$ElectricHeat_k = \begin{cases} 1 & \text{if household } k \text{ utilizes electric heat} \\ 0 & \text{otherwise} \end{cases}$$

The LFER model is also augmented to account for customer heating type, and presented in Equation 4.

Equation 4. Linear Fixed Effects Regression Model (2010-11 AMI Customer Group)

$$ADC_{kt} = \alpha_0 + \alpha_1 Post_t + \alpha_2 Participant_k \cdot Post_t + \alpha_3 ElectricHeat_k \cdot Post_t + \alpha_4 Participant_k \cdot ElectricHeat_k \cdot Post_t + \epsilon_{kt}$$

All participants and non-participants that moved out of the program household during 2016 were included in the analysis up to the bill month preceding their departure. Move-out dates were provided to Navigant by AEP Ohio.

One of the ways in which the HER Program encourage participants to reduce energy consumption is by channeling them into other energy efficiency programs offered by AEP Ohio, notably the Appliance Recycling, Community Assistance, and Efficient Products Rebate Programs. Navigant investigated the
effect of the HER Program on increasing participation in these three programs in order to account for the possibility of double counted savings. For each customer group and cohort, Navigant compared the difference in the rate of participation between the treatment group and the control group in the 2017 program year via the Post-Only-Differences (POD) statistic:

$$POD = \frac{(\text{Treatment: # of participants as } \% \text{ of total HER participants})}{(\text{Control: # of participants as } \% \text{ of total control households})}$$

Navigant then multiplied the POD statistic by the number of treatment households to get the change in uptake for each of the three other AEP Ohio programs due to the HER Program. The change in participation in the other programs was then multiplied by the average participant savings for each program to estimate the total savings already accounted for in the savings estimates for the other AEP Ohio programs.

### 2.3.2 Customer Surveys

To understand customer perspectives and experiences with the program, Navigant completed surveys with HER Program participants. The survey goal was to complete 400 surveys, with 100 in each of the four customer segments: AMI 2010-2014, AMI 2015+, EE 2010-2014, and EE 2015+. Navigant reached out to a sample of customers in November 2017 through January 2018 with an invitation to take an online survey. The survey took approximately 10 minutes to complete.

The process evaluation sought to investigate the following primary research questions:

1. Are customers aware of receiving HERs in the mail or by email? If so, have they read the report and are they aware of its contents?
2. Are customers aware they can get HERs electronically? Are they aware they can view their usage history online?
3. What aspects of the HERs do the participants find memorable and/or meaningful for their household?
4. For participant and control households, how many light bulbs are present in the room in which residents spend the majority of their evening hours (family room)? How many of these bulbs are CFLs or LEDs? How many lights are currently turned on?
5. For participant and control households, what temperature is the thermostat set at currently? During the winter? During the summer?
6. Is the level of household engagement related to their confidence in the information presented in the Home Energy Report?
7. Is the level of household engagement related to other household characteristics, such as average energy use, customer group, or their tenure in the HER Program?
8. Has the household participated in any other AEP Ohio EE/PDR programs?
9. Are there key barriers to understanding and/or responding to the information in the reports?
10. How satisfied is the respondent with AEP Ohio and the efforts of their utility to reduce their customers’ energy costs?
2.3.3 In-Depth Staff Interviews

Navigant conducted in-depth interviews in February - March 2018, as summarized in Table 2-1. The purpose of these interviews was to understand changes in program design and implementation, collect feedback on research priorities, and understand stakeholders’ experiences with the program.

Table 2-1. Summary of In-Depth Interviews

<table>
<thead>
<tr>
<th>Data Collection Type</th>
<th>Targeted Population</th>
<th>Sample Frame</th>
<th>Sample Target</th>
<th>Sample Size</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-depth Telephone Interviews</td>
<td>AEP Ohio Program Staff</td>
<td>Contacts from AEP Ohio</td>
<td>HER Program Coordinator</td>
<td>1</td>
<td>February 2018</td>
</tr>
<tr>
<td>Implementation Contractor Program Staff</td>
<td>Contacts from AEP Ohio</td>
<td>AEP Ohio Client Success Manager</td>
<td>1</td>
<td>March 2018</td>
<td></td>
</tr>
</tbody>
</table>
3. DETAILED EVALUATION RESULTS

3.1 Impact Evaluation Results

The HER Program reported \textit{ex ante} 76,229 MWh of energy savings and 9,909 kW of demand savings in 2017. The verified \textit{(ex post)} energy and demand savings for 2017 for all HU and PIPP customers combined were 72,958 MWh and 9,512 kW respectively. A comparison of \textit{ex ante} and \textit{ex post} HER Program savings are shown in Table 3-1.

Table 3-1. 2017 Overall Evaluation Results

<table>
<thead>
<tr>
<th></th>
<th>2017 Program Goals</th>
<th>\textit{Ex Ante} Savings</th>
<th>\textit{Ex Post} Savings</th>
<th>Realization Rate</th>
<th>Percent of Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Savings (MWh)</td>
<td>75,000</td>
<td>76,229</td>
<td>72,958</td>
<td>0.96</td>
<td>97%</td>
</tr>
<tr>
<td>Demand Savings (MW)</td>
<td>3.750</td>
<td>9.909</td>
<td>9.512</td>
<td>0.96</td>
<td>254%</td>
</tr>
</tbody>
</table>


Savings from AMI customers are not included in the above \textit{ex ante} and \textit{ex post} calculations because these savings are not claimed by AEP Ohio as part of meeting annual EE/PDR portfolio goals. Navigant estimated these customer groups provided an additional 4,217 MWh of energy savings and 550 kW of peak demand savings.

The total savings estimate pro-rates savings for customers who moved out or otherwise became inactive during the program year. This adjustment is performed using a participant-day metric that estimates the total numbers of days each household participates in the HER Program in 2017.

3.1.1 Results by Participant Type

Table 3-2 presents the estimated program savings using the fixed effects model described in Equation 1 for each of the participant cohorts for which AEP Ohio claimed savings. The number of participants at the beginning of the program year is shown along with the savings estimates and average daily energy use for customers in each wave. Final savings estimates for each wave are adjusted to account for double counted savings and participants that moved out of their households during 2017.
### Table 3-2. Estimated Program Savings by HU and PIPP Participant Group Using Equation 1

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Active Participants (start of 2017 or cohort)</td>
<td>84,790</td>
<td>14,517</td>
<td>77,675</td>
<td>57,128</td>
<td>28,674</td>
<td>54,696</td>
<td>191,469</td>
<td>31,369</td>
<td>9,114</td>
<td>549,432</td>
</tr>
<tr>
<td>2017 Move-outs</td>
<td>4,141</td>
<td>787</td>
<td>5,878</td>
<td>4,790</td>
<td>3,709</td>
<td>10,081</td>
<td>31,144</td>
<td>4,172</td>
<td>913</td>
<td>65,615</td>
</tr>
<tr>
<td>2017 Opt-outs±</td>
<td>32</td>
<td>9</td>
<td>25</td>
<td>15</td>
<td>8</td>
<td>36</td>
<td>59</td>
<td>6</td>
<td>2</td>
<td>192</td>
</tr>
<tr>
<td>Average Daily Household kWh Used</td>
<td>44.0</td>
<td>57.5</td>
<td>40.0</td>
<td>34.2</td>
<td>35.8</td>
<td>40.3</td>
<td>26.5</td>
<td>36.4</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Daily kWh Savings per participant (standard error)</td>
<td>0.87</td>
<td>0.86</td>
<td>0.59</td>
<td>0.41</td>
<td>0.42</td>
<td>0.27</td>
<td>0.13</td>
<td>-0.15</td>
<td>0.80</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Annual kWh Savings per participant (standard error)</td>
<td>316</td>
<td>314</td>
<td>216</td>
<td>151</td>
<td>153</td>
<td>100</td>
<td>46</td>
<td>-55</td>
<td>291</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Percentage Savings</td>
<td>1.93%</td>
<td>1.48%</td>
<td>1.46%</td>
<td>1.19%</td>
<td>1.16%</td>
<td>0.68%</td>
<td>0.48%</td>
<td>-0.42%</td>
<td>2.10%</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Total MWh Savings* (a)</td>
<td>26,760</td>
<td>4,515</td>
<td>15,631</td>
<td>8,284</td>
<td>4,116</td>
<td>4,929</td>
<td>6,900</td>
<td>-</td>
<td>2,540</td>
<td>73,675</td>
</tr>
<tr>
<td>Savings Counted in Other Programs (b)</td>
<td>84</td>
<td>49</td>
<td>214</td>
<td>48</td>
<td>-25</td>
<td>73</td>
<td>300</td>
<td>87</td>
<td>-26</td>
<td>804</td>
</tr>
<tr>
<td>Total Savings (MWh) = (a) - (b)</td>
<td>26,676</td>
<td>4,466</td>
<td>15,416</td>
<td>8,236</td>
<td>4,141</td>
<td>4,855</td>
<td>6,600</td>
<td>-</td>
<td>2,566</td>
<td>72,958</td>
</tr>
<tr>
<td>Total Savings (kW)†</td>
<td>3,478</td>
<td>582</td>
<td>2,010</td>
<td>1,074</td>
<td>540</td>
<td>633</td>
<td>861</td>
<td>-</td>
<td>335</td>
<td>9,512</td>
</tr>
</tbody>
</table>

Source: Navigant Analysis

* Aggregate savings values have been adjusted to account for customer move-outs throughout the program year.

Note: All values are statistically significant at the 95% confidence level.

‡ The analysis of the September 2017 HU cohort of participants produced a negative estimate of savings. Therefore, the total savings from this cohort has been assumed to be zero, since it is unlikely that the program produced an increase in average household energy usage.

† The billing analysis model described in this report cannot be directly utilized for the estimation of demand savings. In order to properly determine demand savings using this method, intraday customer billing data would be needed. In the absence of such data, Navigant applied the ratio of kW to MWh savings from the program plan to the estimate of energy savings produced by the program analysis.

± Opt-outs are not removed from the analysis.
Table 3-3 presents the estimated savings for the AMI cohorts enrolled in the HER Program. Savings for these customers were also adjusted to account for double counted savings and participants moved out of their households during 2017.

Table 3-3. Estimated Program Savings by AMI Participant Group Using Equations 1 and 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Active Participants (start of 2017 or cohort)</td>
<td>30,144</td>
<td>3,535</td>
<td>6,886</td>
<td>7,921</td>
<td>7,107</td>
<td>2,488</td>
<td>58,081</td>
</tr>
<tr>
<td>2017 Move-outs</td>
<td>2,519</td>
<td>580</td>
<td>837</td>
<td>1,795</td>
<td>2,013</td>
<td>2</td>
<td>7,746</td>
</tr>
<tr>
<td>2017 Opt-outs‡</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Average Daily Household kWh Used</td>
<td>27.1</td>
<td>26.5</td>
<td>28.7</td>
<td>23.3</td>
<td>25.5</td>
<td>19.4</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Daily kWh Savings per participant (standard error)</td>
<td>0.25</td>
<td>-0.38</td>
<td>0.36</td>
<td>0.30</td>
<td>0.00</td>
<td>0.05</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>(0.16)</td>
<td>(0.23)</td>
<td>(0.16)</td>
<td>(0.12)</td>
<td>(0.16)</td>
<td>(0.47)</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Annual kWh Savings per participant (standard error)</td>
<td>92</td>
<td>-137</td>
<td>133</td>
<td>109</td>
<td>1</td>
<td>18</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>(58)</td>
<td>(85)</td>
<td>(57)</td>
<td>(42)</td>
<td>(57)</td>
<td>(173)</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Percentage Savings</td>
<td>0.92%</td>
<td>0.00%</td>
<td>1.25%</td>
<td>1.26%</td>
<td>0.01%</td>
<td>0.26%</td>
<td>N/A</td>
</tr>
<tr>
<td>Estimated Total MWh Savings* (a)</td>
<td>2,688</td>
<td>-</td>
<td>852</td>
<td>748</td>
<td>8</td>
<td>-</td>
<td>4,297</td>
</tr>
<tr>
<td>Savings Counted in Other Programs (b)</td>
<td>72</td>
<td>-18</td>
<td>28</td>
<td>-29</td>
<td>8</td>
<td>11</td>
<td>73</td>
</tr>
<tr>
<td>Total Savings (MWh) = (a)</td>
<td>2,688</td>
<td>-</td>
<td>852</td>
<td>748</td>
<td>8</td>
<td>-</td>
<td>4,297</td>
</tr>
<tr>
<td>Total Savings (KW)‡</td>
<td>351</td>
<td>-</td>
<td>111</td>
<td>98</td>
<td>1</td>
<td>-</td>
<td>560</td>
</tr>
</tbody>
</table>

Source: Navigant Analysis
Note: All values are statistically significant at the 95% confidence level except for the 2013 cohort.
* Aggregate savings values have been adjusted to account for customer move-outs throughout the program year.
‡ The analysis of the 2013 and 2017 AMI cohorts of participants produced a negative estimate of savings. Therefore, the total savings from these cohorts has been assumed to be zero, since it is unlikely that the program produced an increase in average household energy usage.
† The billing analysis model described in this report cannot be directly utilized for the estimation of demand savings. In order to properly determine demand savings using this method, intraday customer billing data would be needed. In the absence of such data, Navigant applied the ratio of KW to MWh savings from the program plan to the estimate of energy savings produced by the program analysis.
± Opt-outs are not removed from the analysis.

As shown in Table 3-2 and Table 3-3, Navigant found savings varied significantly by customer group: HU participants in the earlier cohorts are estimated to have saved more energy than other customer groups on an absolute basis. This is partly due to their higher average daily energy use as compared to other participant cohorts. On a relative basis, the savings from the earlier cohorts enrolled in 2010 through 2015 all exceed one percent of daily energy usage.

A meaningful result from the cohort-level findings is the relatively low rate of savings from the later cohorts compared to the earlier cohorts. The five cohorts enrolled during 2016 and 2017 are estimated to have generated under one percent savings. Prior experience has shown once customers begin receiving
HERs, it can take up to 18 months for savings to fully materialize after a customer is enrolled in the program. This “ramp-up” phase may be impacting the savings estimate for the 2017 HU and AMI cohorts, as well as the 2016 HU and AMI cohorts. However, the 2016 AMI cohort generated almost no savings, despite having been deployed for 17 months by the end of 2017. This cohort may not be savings-generating in the coming program years.

Additionally, the 2013 AMI cohort has been in the HER Program for up to 47 months by the beginning of the 2017 program year. This cohort has demonstrated little to no savings relative to what would normally be expected by this point in time. Further investigation into the construction of the 2013 AMI cohort may be warranted to determine if there are customer characteristics that are adversely impacting participant savings.

It is important to note savings differences among the groups are not necessarily due to the identifiers defining group membership. For instance, it cannot be concluded that receipt of an AMI meter causes HER Program savings to be low; factors correlated with group membership, such as levels of pre-enrollment energy use or other household characteristics, might explain the relationship.

### 3.1.2 Enrollment in Other AEP Ohio Programs

Navigant utilized the POD statistic to estimate the savings captured in the billing analysis for the HER Program that is already accounted for in the savings estimate for four other AEP Ohio programs: Appliance Recycling, Community Assistance Program, and Efficient Products. In essence, the POD statistic represents the change in participation in other EE programs beyond that would have occurred in the absence of the HER Program (as measured by control households). This calculation was performed separately for each of these three programs and for each cohort of participant households in the HER Program. The resulting change in program participation due to the HER Program is multiplied by the average claimed savings per HER Household participating in the Appliance Recycling, Community Assistance, and Efficient Products Programs to estimate the total amount of savings that is double counted. Table 3-4 shows the results of this calculation across all HER Program cohorts combined for each AEP Ohio EE/PDR program.

Due to increased participation, the analysis determined an estimated 804 MWh of the evaluated savings for HU and PIPP cohorts from the HER Program was double counted in other AEP EE/PDR programs.

<table>
<thead>
<tr>
<th>Source: Navigant Analysis</th>
</tr>
</thead>
</table>

**Table 3-4. Estimate of Energy Savings Attributable to Participation in Other Programs**

<table>
<thead>
<tr>
<th></th>
<th>Appliance Recycling</th>
<th>Community Assistance Program</th>
<th>Efficient Products Rebates</th>
<th>In-Home Component of Efficient Products</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Post-Only Difference (POD) Statistic</strong></td>
<td>0.09%</td>
<td>0.01%</td>
<td>0.03%</td>
<td>0.01%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Change in Program Participation due to HER Program (# of Participants)</strong></td>
<td>509</td>
<td>57</td>
<td>168</td>
<td>48</td>
<td>783</td>
</tr>
<tr>
<td><strong>Median Savings per Program Participant (kWh)</strong></td>
<td>1,376</td>
<td>1,442</td>
<td>162</td>
<td>168</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total Savings (MWh)</strong></td>
<td>701</td>
<td>77</td>
<td>27</td>
<td>-1</td>
<td>804</td>
</tr>
</tbody>
</table>
3.1.3 Comparability of Treatment and Control Groups

Navigant compared characteristics of treatment and control households in the AMI and HU cohorts initiated during the 2017 program year to confirm the control households were randomly selected and are suitable for the purposes of the estimating program savings. Figure 3-1 through Figure 3-3 below depict the average energy usage for treatment and control households for the 12 months prior to the start of the program. The solid green line indicates the average energy usage for the control group and the grey dashed line indicates the average energy usage for the treatment group. The two lines are essentially identical for the February 2017 and September 2017 HU cohorts, indicating no difference in average usage patterns for the treatment and control groups. The visual difference in group usage for the October 2017 cohort is likely attributable to the small sample size.

The primary comparison Navigant performed to assess the reasonableness of the control groups is to compare the energy used by households in the 12 months preceding enrollment of participating households in the HER Program. Navigant conducted a statistical test on the difference in the mean energy usage for the two groups in each of the 12 pre-treatment months being tested and found the difference to be statistically insignificant at the 90% confidence level for all 12 months. Navigant also conducted a standard ordinary least squares (OLS) regression analysis for the same 12-month period comparing the average energy usage of treatment and control households, with a dummy variable included to indicate which households were classified as treatment. If the energy usage of the treatment and control households were comparable, the coefficient on the treatment dummy variable should not be statistically different from zero. Navigant's analysis found that the treatment dummy was, in fact, not statistically different from zero at the 90% confidence level for all three 2017 cohorts. Therefore, Navigant concludes that the allocation of program households across the treatment and control groups is consistent with an RCT design. In prior years, Navigant compared the distribution of energy use in each month for treatment and control households. Graphs showing the results of this comparison for 2016 and older cohorts performed in previous evaluation years are presented in Appendix A.
Figure 3-1. Average Daily Treatment/Control Household Energy Use by Month in February 2017 HU Cohort

Source: Navigant Analysis
Figure 3-2. Average Daily Treatment/Control Household Energy Use by Month in September 2017 HU Cohort

Source: Navigant Analysis
As the preceding graphs and the graphs in Appendix A demonstrate, Navigant found the average energy use and the distribution of energy use by month for control households in the pre-treatment period to be comparable to treatment households for all customer groups and cohorts, except the initial 2010 AMI cohort, as described previously, and the 2017 AMI cohort, launched in October 2017. However, due to the rolling nature of this latter cohort, the initial treatment and control groups are quite small. This small sample size is likely the primary cause of the imbalance seen in Figure 3-3. Navigant will test this cohort again during the 2018 evaluation once more customers are enrolled.

Navigant also performed t-tests on the difference in mean energy usage between treatment and control households in each month during the year preceding enrollment of participating households for the 2017 cohorts. For all t-tests performed on these monthly comparisons for the 2017 HU cohorts, Navigant determined the treatment and control households were not statistically different at the 90 percent confidence level. This further corroborates the conclusion that the control groups were constructed appropriately.
3.2 Customer Surveys

Navigant fielded two rounds of the online HER customer survey in November 2017 through January 2018. 530 respondents started the survey, and 443 customers completed the survey. The target was 400 completed surveys. The following section presents the results of this survey analysis.

3.2.1 Demographics

Navigant targeted four customer segments, aiming to reach a minimum of 100 customers per stratum. The response rate for each stratum is show below in Figure 3-4. Cohorts were segmented into early (2010-2014) vs. late (2015+) and AMI vs. EE, as surveying each cohort would have been cost prohibitive.

![Figure 3-4. Customer Survey Completes by Strata](image)

<table>
<thead>
<tr>
<th>Strata</th>
<th>Number of Completes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI - 2010-2014</td>
<td>139</td>
</tr>
<tr>
<td>EE - 2010-2014</td>
<td>133</td>
</tr>
<tr>
<td>AMI - 2015+</td>
<td>135</td>
</tr>
<tr>
<td>EE - 2015+</td>
<td>123</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>530</strong></td>
</tr>
</tbody>
</table>

Source: Navigant analysis

Of the customers who completed the surveys, the majority are homeowners and reside in a single-family house, as shown in Figure 3-5.

![Figure 3-5. Home Characteristics](image)
Survey respondents’ home ages ranged from less than 10 years old, to over 100. More than half of the homes were built pre-1980, as shown in Figure 3-6.

**Figure 3-6. Home Age (n=382)**

![Home Age Chart](image)

Source: Navigant analysis

### 3.2.2 AEP Ohio Satisfaction

Navigant measured customers’ satisfaction with AEP Ohio by asking customers to rate their satisfaction on a scale of 0 to 10, where 10 is highly satisfied. Navigant categorized “overall satisfaction” as any rating above a 5, while “highly satisfied” is any score above an 8, as shown in Table 3-5

**Table 3-5. Satisfaction with AEP Ohio - Summary**

<table>
<thead>
<tr>
<th>Metric</th>
<th>2017 Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Satisfaction Score</td>
<td>7.9</td>
</tr>
<tr>
<td>Overall Satisfied (score 6-10)</td>
<td>86%</td>
</tr>
<tr>
<td>Highly Satisfied (score 9-10)</td>
<td>48%</td>
</tr>
</tbody>
</table>

Source: Navigant analysis

Satisfaction with AEP Ohio was statistically different between strata, with the EE 2010-2014 group showing lower satisfaction, as shown in Figure 3-7.
3.2.3 HER Engagement

The customer survey asks HER recipients a range of questions to capture their experience with and opinions of the report. The following section presents the results from that survey section.

The vast majority of customers read their HER, as shown in Figure 3-8, but most people read the report for fewer than 6 minutes (Figure 3-9).

![Figure 3-7. Satisfaction with AEP Ohio, by Strata (n=500)](image)

![Figure 3-8. Who Reads Report (n=439)](image)
The core component of the HER is the comparison of the recipient's home to other similar nearby homes. Nearly all of survey respondents (96%) recall seeing the comparison of their home to others, as shown in Appendix A. However, this feature of the report is also somewhat contentious. Less than half of survey respondents reported having confidence in the report's comparisons.

When asked why they have low confidence in the report's comparison, customers often cite specific end uses or details about the occupancy of their home that makes them different from their neighbors.
The HERs also feature specific energy-saving suggestions for the customer. These suggestions are intended to help customers identify energy-saving actions to implement in their homes. Seventy percent of customers recall the report’s suggestions, while nearly a third of customers do not (Figure 3-11). Of those who do recall the suggestions, 64 percent find the suggestions relevant to their household.

**Figure 3-11. Suggestion Recall and Relevance**

Survey respondents do find the reports useful, with more than two thirds of respondents stating they find the information very or somewhat useful (Figure 3-12).

**Figure 3-12. Usefulness of Report**

Customers also report finding the comparisons to other homes and to their own home’s historical use to be useful and interesting, as shown in Figure 3-13. This result is surprising given the low confidence respondents said they had in the report’s comparisons.
Figure 3-13. Most Interesting Feature

![Bar Chart]

Which parts of the report do you find most useful or interesting?

- The comparison of my home’s energy use to similar homes: 229
- The comparison of my home’s energy use to my home in previous years: 202
- The energy saving tips: 156
- The customer testimonials: 12
- It’s all useful: 72
- Other: 25
- I don’t know: 20

Source: Navigant analysis

Figure 3-14 shows that less than half of customers have noticed any energy savings on their electric bills since they started receiving the HERs. This is to be expected, since the percent savings are so low, they are likely not noticeable to most customers.

Figure 3-14. Impacts on Energy Bill

![Bar Chart]

Have you noticed any energy savings on your electric bill since you started receiving the Home Energy Reports? (n=411)

- Yes: 131
- No: 207
- I don’t know: 73

Source: Navigant analysis

3.2.4 Energy Awareness

The Navigant customer survey asks HER recipients a series of questions about their thoughts and feelings about energy use. This section of the survey is intended to measure trends in customer opinions, and allow AEP Ohio to tailor messaging and marketing to customers. Figure 3-15 displays the
results of this survey section. It is interesting to note that customers most strongly agree with the statement "I understand how actions taken by me and others in my household result in higher or lower energy use," and yet the statement that the fewest customers strongly agree with is "my energy bill is noticeably lower when I make an extra effort to conserve." This may indicate customers have a general understanding of how to conserve energy, but aren’t sure of the exact steps to take to really impact their monthly bills.

Figure 3-15. HER Customer Energy Awareness

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Neither Agree or Disagree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
<th>I don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand how actions taken by me and others in my household result</td>
<td>263</td>
<td>98</td>
<td>12</td>
<td>40</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>in higher or lower energy use.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often worry that the cost of energy for my home will increase.</td>
<td>205</td>
<td>116</td>
<td>40</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to conserve electricity in my home this year.</td>
<td>199</td>
<td>124</td>
<td>49</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving my home’s energy efficiency is a worthwhile investment.</td>
<td>193</td>
<td>140</td>
<td>33</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It would make me proud to have one of the most energy efficient houses</td>
<td>168</td>
<td>97</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in my neighborhood.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am very concerned about how energy use affects the environment.</td>
<td>159</td>
<td>132</td>
<td>60</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am already doing everything I can to save energy in my home.</td>
<td>137</td>
<td>135</td>
<td>58</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I pay closer attention to my energy costs now than I did before receiving</td>
<td>93</td>
<td>129</td>
<td>98</td>
<td>35</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Home Energy Reports.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know about other things I could be doing to save energy, beyond what I</td>
<td>74</td>
<td>166</td>
<td>71</td>
<td>44</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>’m already doing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel guilty if I use too much energy.</td>
<td>73</td>
<td>109</td>
<td>112</td>
<td>44</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>My energy bill is noticeably lower when I make an extra effort to</td>
<td>72</td>
<td>113</td>
<td>108</td>
<td>48</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>conserve.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Navigant analysis

3.3 Staff and Contractor Interviews
This section presents findings resulting from in-depth interviews with program staff and implementation contractors affiliated with the program. With the help of interview guides, the evaluation team completed conversations with program stakeholders to assess program benefits and barriers, and understand satisfaction with program administration, delivery, and marketing.
3.3.1 Program Coordinator Interview

The AEP Ohio Program Coordinator manages the HER program and is responsible for maintaining effective communication between AEP Ohio and the implementation contractor. In-person meetings with the implementation contractor occur on a quarterly basis. The Program Coordinator also regularly reviews savings reports, decides the cadence of reports, aids in the design of promotional modules, and facilitates customer opt-outs. The current Program Coordinator took over management of the HER program in early 2017.

Since the program inception in 2010, the program has shifted towards email reports due to their lower per-participant cost. Email click-through metrics are provided on a monthly basis by the implementation contractor. Program participants without email addresses are still sent paper reports, the cadence of which depends on the average usage of the participants. High users can receive up to four reports a year, while low users may receive only one.

3.3.2 Implementation Contractor Interview

The HER implementation contractor client success manager (CSM) was interviewed in March 2017. The current CSM took over the AEP Ohio HER account in early 2017. The CSM's responsibilities include ensuring smooth implementation of the program, creating promotional modules, designing refills and expansions. Goals include achieving reliable and cost-effective savings, increasing digital engagement and program promotion, and increasing customer satisfaction.

The HER CSM noted that while the HER program targets high energy users, the definition of high user is different for each HER wave. Earlier waves targeted the highest energy users in the AEP Ohio customer base. Subsequent waves still targeted high users, but the metric for high users was lower.

3.4 Cost Effectiveness Review

This section addresses the cost effectiveness of the 2017 HER Program. Cost effectiveness is assessed using the Total Resource Cost (TRC) test. The cost-effectiveness analysis does not include the impacts of the AMI participants. The AMI component is administered and charged to another internal organization. Table 3-6 summarizes the unique inputs used in the TRC test.
Table 3-6. Inputs to Cost-Effectiveness Model for AEP HER Program

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Life</td>
<td>1</td>
</tr>
<tr>
<td>Participants</td>
<td>553,383</td>
</tr>
<tr>
<td>Annual Energy Savings (kWh)</td>
<td>72,957,517</td>
</tr>
<tr>
<td>Coincident Peak Savings (kW)</td>
<td>9,512</td>
</tr>
<tr>
<td>Third Party Implementation Costs</td>
<td>$1,177,781</td>
</tr>
<tr>
<td>Utility Administration Costs</td>
<td>$178,053</td>
</tr>
<tr>
<td>Utility Incentive Costs</td>
<td>$0</td>
</tr>
<tr>
<td>Participant Contribution to Incremental Measure Costs</td>
<td>$0</td>
</tr>
</tbody>
</table>

Based on these inputs, the TRC ratio for the AEP Ohio HER Program is 2.1, and the program is cost-effective. Table 7 summarizes the results of the cost-effectiveness tests. Results are presented for the Participant test, the TRC test, the Ratepayer Impact Measure test, and the Utility Cost test.
Table 3-7. Cost-Effectiveness Results for the HER Program

<table>
<thead>
<tr>
<th>Benefit-Cost Test</th>
<th>Cost Test Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Resource Cost</td>
<td>2.1</td>
</tr>
<tr>
<td>Participant Cost Test</td>
<td>N/A</td>
</tr>
<tr>
<td>Ratepayer Impact Measure</td>
<td>0.3</td>
</tr>
<tr>
<td>Utility Cost Test</td>
<td>2.1</td>
</tr>
</tbody>
</table>

At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.
4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Impact Evaluation

Navigant utilized methodologies in accordance with recommendations from the SEE Action Network Working Group for evaluating behavior-based energy efficiency programs in order to estimates HER Program savings. Two different models were utilized in the impact evaluation to confirm the robustness of the estimated savings impacts.

4.1.1 Key Impact Evaluation Findings

The HER Program reported ex ante 76,229 MWh of energy savings and 9,909 kW of demand savings in 2017. The verified (ex post) energy and demand savings for 2017 for all HU and PIPP customers combined were 72,958 MWh and 9,512 kW respectively, for a realization rate of 96 percent on energy savings and 96 percent on peak demand savings. Savings from AMI customers are not included in the above ex ante and ex post calculations because these savings are not counted toward the HER Program savings goals. Navigant estimated these customer groups provided an additional 4,217 MWh of energy savings and 550 kW of peak demand savings. Across all customer groups, Navigant estimates the HER Program saved 77,175 MWh and 10,062 kW during the 2017 program year.

Navigant found savings varied significantly by customer group. HU participants in the earlier cohorts are estimated to have saved more energy than other customer groups on an absolute basis. This is partly due to their higher average daily energy use as compared to other participant cohorts. On a relative basis, the savings from the earlier cohorts enrolled in 2010 through 2015 all exceed one percent of daily energy usage.

A meaningful result from the cohort-level findings is the relatively low rate of savings from the later cohorts compared to the earlier cohorts. The five cohorts enrolled during 2016 and 2017 are estimated to have generated under one percent savings. Prior experience has shown once customers begin receiving HERs, it can take up to 18 months for savings to fully materialize after a customer is enrolled in the program. This “ramp-up” phase may be impacting the savings estimate for the 2017 HU and AMI cohorts, as well as the 2016 HU and AMI cohorts. However, the 2016 AMI cohort generated almost no savings, despite having been deployed for 17 months by the end of 2017. This cohort may not be savings-generating in the coming program years.

Navigant’s estimates of verified program savings were reduced from double counted savings, as Navigant found an increase in participation among HER Program customers in other AEP Ohio EE/PDR programs as compared to control customers. Navigant used a Post-Only-Difference (POD) analysis to determine 804 MWh of estimated savings are likely already counted in other AEP Ohio programs. The total savings estimate pro-rated savings for customers that moved-out during the program year.

Navigant measured customers’ satisfaction with AEP Ohio by asking customers to rate their satisfaction on a scale of 0 to 10, where 10 is highly satisfied. Navigant categorized “overall satisfaction” as any rating above a 5, while “highly satisfied” is any score above an 8. The average satisfaction score from

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respondents was 7.9, with 86 percent of respondents falling within the “overall satisfaction” category and 48 percent of respondents in the “highly satisfied” category.

4.1.2 Recommendations

1. Navigant’s analysis shows recent participant cohorts have a lower average daily energy usage and, relatedly, a lower average electricity savings. Evidence from this analysis also suggests some of the more recent cohorts may have a lower relative level of electric savings beyond the initial ramp-up period. Navigant suggests AEP Ohio continue the HER Program as long as regularly reported electric savings remain cost-effective, but also monitor the incremental cost and savings of each new cohort introduced to ensure individual cohorts contribute to the cost-effectiveness of the program as a whole.

2. Further investigation into the construction of the 2013 AMI cohort may be warranted to determine if there are customer characteristics that are adversely impacting participant savings. AEP Ohio should also carefully watch the 2016 AMI cohort, as savings were almost non-existent in 2017. If savings continue to lag for this wave, additional investigation may be warranted.

3. The results of the customer survey suggest both satisfaction and engagement with the reports are high. AEP Ohio should continue to track customer satisfaction in subsequent program years as year-over-year comparisons will serve as a benchmark for the efficacy of the reports, and could explain any future changes in electricity savings that may occur.
APPENDIX A. VERIFICATION OF CONTROL GROUPS

The following graphs present the distribution of energy use in the pre-program period for treatment and control households in each customer group and cohort. In the graphs, the diamonds represent the average monthly electricity use of households in each customer group, the bars represent the range of energy use between the 25th and 75th percentile of households, and the lines (whiskers) show the range between the 5th and 95th percentile of households.

Figure A-4-1. Average Daily Treatment/Control Household Energy Use by Month in 2010 HU Cohort

Source: Navigant Analysis
Figure A-4-2. Average Daily Treatment/Control Household Energy Use by Month in 2011 HU Cohort

Source: Navigant Analysis

Figure A-4-3. Average Daily Treatment/Control Household Energy Use by Month in 2013 HU Cohort

Source: Navigant Analysis
Figure A-4-4. Average Daily Treatment/Control Household Energy Use by Month in January 2014 HU Cohort

Source: Navigant Analysis
Figure A-4-5. Average Daily Treatment/Control Household Energy Use by Month in August 2014 HU Cohort

Source: Navigant Analysis

Figure A-4-6. Average Daily Treatment/Control Household Energy Use by Month in 2010 PIPP Cohort

Source: Navigant Analysis
Figure A-4-7. Average Daily Treatment/Control Household Energy Use by Month in 2010 AMI Cohort

Source: Navigant Analysis

Figure A-4-8. Average Daily Treatment/Control Household Energy Use by Month in 2014 AMI Cohort

Source: Navigant Analysis
Figure A-4-9. Average Daily Treatment/Control Household Energy Use by Month in 2015 AMI Cohort

Source: Navigant Analysis

Figure A-4-10. Average Daily Treatment/Control Household Energy Use by Month in July 2016 AMI Cohort

Source: Navigant Analysis
Figure A-4-11. Average Daily Treatment/Control Household Energy Use by Month in August 2016 HU Cohort

Source: Navigant Analysis
APPENDIX B. PER PARTICIPANT REGRESSION RESULTS

Table B-4-1 presents the key outputs of the post program regression and fixed-effects analyses. These values are per participant daily savings estimates in terms of kWh.

Table B-4-1. Per Participant Coefficients and Standard Errors by Program Cohort

<table>
<thead>
<tr>
<th>Program Cohort</th>
<th>LDV Coefficient</th>
<th>LDV Clustered Standard Error</th>
<th>FE Coefficient</th>
<th>FE Clustered Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 HU</td>
<td>-0.8660</td>
<td>0.0810</td>
<td>-0.8329</td>
<td>0.0867</td>
</tr>
<tr>
<td>2011 HU</td>
<td>-0.8616</td>
<td>0.2402</td>
<td>-0.8319</td>
<td>0.2501</td>
</tr>
<tr>
<td>2013 HU</td>
<td>-0.5925</td>
<td>0.0803</td>
<td>-0.5795</td>
<td>0.0796</td>
</tr>
<tr>
<td>Jan 2014 HU</td>
<td>-0.4133</td>
<td>0.0935</td>
<td>-0.3782</td>
<td>0.0974</td>
</tr>
<tr>
<td>Aug 2014 HU</td>
<td>-0.4199</td>
<td>0.1671</td>
<td>-0.3805</td>
<td>0.1810</td>
</tr>
<tr>
<td>2016 HU</td>
<td>-0.2747</td>
<td>0.0847</td>
<td>-0.2322</td>
<td>0.0823</td>
</tr>
<tr>
<td>Feb 2017 HU</td>
<td>-0.1268</td>
<td>0.0403</td>
<td>-0.1273</td>
<td>0.0371</td>
</tr>
<tr>
<td>Sept 2017 HU</td>
<td>0.1511</td>
<td>0.1520</td>
<td>-0.0250</td>
<td>0.1024</td>
</tr>
<tr>
<td>PIPP</td>
<td>-0.7959</td>
<td>0.2300</td>
<td>-0.5329</td>
<td>0.2354</td>
</tr>
<tr>
<td>2010/11 AMI</td>
<td>-0.2522</td>
<td>0.1590</td>
<td>-0.3518</td>
<td>0.1786</td>
</tr>
<tr>
<td>2013 AMI</td>
<td>0.3766</td>
<td>0.2335</td>
<td>0.5334</td>
<td>0.2435</td>
</tr>
<tr>
<td>2014 AMI</td>
<td>-0.3638</td>
<td>0.1571</td>
<td>-0.4138</td>
<td>0.1664</td>
</tr>
<tr>
<td>2015 AMI</td>
<td>-0.2979</td>
<td>0.1164</td>
<td>-0.2281</td>
<td>0.1244</td>
</tr>
<tr>
<td>2016 AMI</td>
<td>-0.0037</td>
<td>0.1572</td>
<td>-0.1938</td>
<td>0.1624</td>
</tr>
<tr>
<td>2017 AMI</td>
<td>-0.0500</td>
<td>0.4737</td>
<td>-0.2423</td>
<td>0.3713</td>
</tr>
</tbody>
</table>

Source: Navigant Analysis
Home Energy Report
Account number: 04/01/11 - 05/31/11
Report period: 04/01/11 - 05/31/11

We are pleased to provide you periodic, personalized Home Energy Reports as part of an AEP Ohio gridSMART® initiative. These reports are designed to provide you more information to make informed energy choices to help you save energy and money.

If you have any questions about these reports or would like to no longer receive them, you can contact us at (800) 277-2177 or gridSMARTOhioReports@aep.com.

Update your home information at:
gridSMARTOhio.com/go/reports

Last 2 Months Household Comparison

<table>
<thead>
<tr>
<th>YOUR HOME</th>
<th>Efficient Similar Homes</th>
<th>Similar homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>858 kWh</td>
<td>935</td>
<td>1,304</td>
</tr>
</tbody>
</table>

How you’re doing:

*Great* ☺️
Good ☻️
More than average

*KWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.

Similar Homes: Approximately 100
Efficient Similar Homes: The most efficient 10 percent of similar homes

Is your home compared correctly?
Tell us more about your home:
gridSMARTOhio.com/go/reports

Last 12 Months Household Comparison

You used **50% LESS** electricity than similar homes. This saves you about **$591** per year.
An Average Day Last Month

On average, you used the most from 10 pm – 12 am. Think about what uses electricity during this time.

Do you use more on weekdays or weekends? Visit gridSMARTOhio.com/go/reports to find out.

Action Steps | Personalized tips chosen for you based on your energy use and housing profile

Quick Fix
Something you can do right now

☐ Raise your thermostat setting
By setting your thermostat appropriately in the summer, you can stay cool and save energy. You can save 3-5% on cooling costs for each degree you increase the temperature.

Set the thermostat to 78°F or higher when you are awake and home, and use fans to stay comfortable.

When you leave home, change the thermostat to an energy saving level — a 10°F adjustment is a good rule of thumb.

SAVE UP TO $120 PER YEAR

Quick Fix
Something you can do right now

☐ Keep out the sun’s heat
Sunlight passing through windows can heat up your home and make your air conditioner work extra hard. Keep blinds or draperies closed on sunny days to block this heat. You can also purchase and install shade screens, which are another affordable and effective way to keep out the sun’s heat.

Blocking sunlight from entering your home will help you stay comfortable and save on cooling costs.

SAVE UP TO $10 PER YEAR

Great Investment
A big idea for big savings

☐ Choose an efficient room air conditioner
In the summer, air conditioning can account for a significant portion of your home’s energy bill.

When you decide to replace your old room air conditioner, invest in an efficient, ENERGY STAR® qualified unit to lower your cooling costs.

We’re offering a $25 mail-in rebate when you recycle your old, working room air conditioner and purchase an ENERGY STAR® qualified model May 1, 2011 through August 31, 2011.

SAVE UP TO $20 PER YEAR

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APPENDIX D. AEP OHIO HER CUSTOMER SURVEY

AEP Ohio
Home Energy Report Participant Survey 2017

D.1 Program Overview

The Home Energy Report program provides residential customers with Home Energy Reports (HERs). The reports provide selected households with helpful information about the ways they use energy. HERs also use social norms to compare the customer’s energy use to the average energy use of other households similar to them so customers have a better sense of whether their energy use patterns fall above or below the norm. Finally, these reports provide targeted recommendations or tips to customers that suggest actions they can take to reduce consumption. The reports are sent to a targeted subset of customers on an opt-out basis. Currently the reports are being provided to more than 512,000 AEP Ohio customers. The purpose of the reports is to enhance customers understanding of their energy use, encourage them to reduce their consumption through the use of targeted tips and social norms, and to enhance customer engagement and satisfaction.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of purpose</td>
<td>To assess customer satisfaction with the HERs, email reports, web portal and AEP Ohio, as well as to assess the effectiveness of the reports on customers’ understanding of their energy usage and their behaviors.</td>
</tr>
<tr>
<td>Qualified respondent</td>
<td>Residential sector participant in the program treatment group who is familiar with the reports.</td>
</tr>
<tr>
<td>Target number of completes</td>
<td>400 participants</td>
</tr>
<tr>
<td>Estimated survey length</td>
<td>5 – 10 minutes</td>
</tr>
<tr>
<td>Survey timeline</td>
<td>November 15 to December 20, 2017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survey Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HER Participant in the treatment group w/email</td>
<td>Participates in the treatment group of the residential Home Energy Report Program</td>
</tr>
<tr>
<td>Implementer Data</td>
<td></td>
</tr>
<tr>
<td>Wave of participation (Wave_Part)</td>
<td>The participant cohort or wave during which the participant joined the program, including which type of home energy report the customer receives (Email, Paper, or Both)</td>
</tr>
<tr>
<td>Implementer Data</td>
<td></td>
</tr>
</tbody>
</table>
D.2 Sample

This table outlines Navigant’s sampling techniques.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>How many completes will you need to reach a relative precision of [±10% at the 90%] confidence level</td>
<td>400 completed surveys from HER report participants in the treatment group</td>
</tr>
<tr>
<td>Stratification</td>
<td>How complex is the sample? Do you need to stratify?</td>
<td>We will stratify based on participant wave/cohort</td>
</tr>
<tr>
<td>Unique attributes</td>
<td>What is the ability level of the population? Are there language barriers? Do you need to consider literacy rates? Do you need to specialize the training of your surveyors?</td>
<td>None known</td>
</tr>
<tr>
<td>Incentives</td>
<td>Any incentives or persuasion techniques?</td>
<td>None planned</td>
</tr>
</tbody>
</table>

D.3 Survey Overview

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Survey Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess participants’ satisfaction with AEP Ohio</td>
<td>SAT1-SAT1a</td>
</tr>
<tr>
<td>Assess participants’ engagement with the home energy reports and collect feedback on their usefulness</td>
<td>HER1-HER24</td>
</tr>
<tr>
<td>Assess participants’ awareness and opinions on energy efficiency</td>
<td>EA1-EA4</td>
</tr>
<tr>
<td>Identify participants’ energy efficiency actions and purchases</td>
<td>EA5-EA6a</td>
</tr>
<tr>
<td>Collect demographic information on the participants</td>
<td>D1-D6</td>
</tr>
</tbody>
</table>
D.4 Initial Email Invitation

Subject Line: Tell Us What You Think about AEP Ohio’s Home Energy Reports
Sender: AEP Ohio

Dear [CUSTOMER_NAME]:

Thank you for your participation in AEP Ohio’s Home Energy Report program!

We value your candid feedback so that we can continue to improve our energy programs to better serve our customers. We invite you to share your experience and feedback through a brief on-line survey.

Please click on the link below to take this short survey:

[SURVEY LINK, IN BUTTON FORM]

The survey will take approximately 5 to 10 minutes to complete. If you cannot complete the survey all at one time or you accidentally exit the survey mid-course, you can resume the survey where you left off by clicking on the link from this email or hitting the back button.

Thank you in advance for completing the survey and for participating in AEP Ohio’s energy efficiency programs!

Sincerely,

[AEP OHIO EE PROGRAM STAFF]
Thank you in advance for taking a few minutes to answer these questions about AEP Ohio’s Home Energy Report program. Your feedback is important and will help us improve the program to better serve customers like you. We expect the survey to take no longer than 10 minutes to complete. Your responses will be kept confidential, shared only with the research team. In reporting results, no comments will be attributed to specific individuals. Thank you for participating in this important survey!
D.6 AEP Ohio Satisfaction

SAT1. On a scale from 1-10, how would you rate your overall satisfaction with AEP Ohio, your electric utility?

<table>
<thead>
<tr>
<th>Extremely Dissatisfied</th>
<th>Extremely Satisfied</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

SAT1a. Why did you give that rating?

[LARGE OPEN END BOX]

D.7 Home Energy Report Engagement

HER1. Do you recall whether your household receives a report by email from AEP Ohio that describes your home’s energy use? (The reports are different from your utility bill and include charts and graphs about your energy use.)

1. Yes
2. No, we do not receive the reports
98. I don’t know

[IF HER1=2, TERMINATE SURVEY]
Thank you for taking this survey.

HER2. Does anyone in your household read the reports?

1. Yes, I read them
2. Yes, I read them and others in my household read them
3. I do not read them, but others in my household do
4. No one reads them; we discard them
97. Other [SPECIFY AND SKIP TO HER4]
98. I don’t know [TERMINATE SURVEY]

[IF HER2=3]
Thank you for taking this survey. Please forward the survey link to the person in your household who reads the Home Energy Reports. We would like to hear their opinions.
[IF HER2=98]
Thank you for taking this survey.

[IF HER2 = 4]
HER3. Could you explain why no one in your household reads the reports?
[OPEN END]

[IF HER2=4, TERMINATE]
Thank you for taking this survey.

HER4. On average, roughly how much time do you spend reviewing the report?
   1  <2 minutes
   2  2-5 minutes
   3  6-10 minutes
   4  >10 minutes
   97. Other [OPEN END]
   98. I don't know

HER5. The Home Energy Reports suggest actions you can take to save energy. Do you recall any specific suggestions from your reports?
   1. Yes
   2. No [SKIP TO HER8]

[ONLY SHOW IF HER5=1]
HER5a. What suggestions do you remember seeing?
[LARGE OPEN END BOX]

HER6. On average, do you find the suggestions relevant to you and your household?
   1. Yes
   2. No
   97. Other [OPEN ENDED BOX]

[ASK IF HER6 = 2/No]
HER7. Why do you feel the suggestions are not relevant to you and your household? [OPEN ENDED BOX]
HER8. The Home Energy Report provides information about how your home’s electricity use compared to a group of homes similar in size and energy usage to yours. Do you recall this section of the Home Energy Report?
   1. Yes
   2. No
   3. I don’t know

[IF HER8 = Yes/1]
HER9. Do you have confidence in the report’s comparisons—in other words, do you believe that your household is being accurately compared with similar homes?
   1. Yes
   2. No
   97. Other [OPEN ENDED BOX]
   98. I don’t know

[IF HER9 = No/2]
HER10. Why do you think your household is not being accurately compared with similar homes? [LARGE OPEN END BOX]

HER11. Are you aware the information used in the household comparison can be updated to give you a more accurate comparison?
   1. Yes
   2. No
   98. I don’t know

HER12. How useful have you found the information provided in the reports to be?
   1. Very useful
   2. Somewhat useful
   3. Only slightly useful
   4. Not useful at all
   98. I don’t know

[IF HER12=4]
HER13. Why do you not find the information provided in the reports useful? [OPEN END]

HER14. What part of the Home Energy Report do you find most useful or interesting? (Select all that apply)
The customer testimonials (i.e. success stories about other people saving energy by acting on the tips provided in the reports)
4. The energy saving tips
5. It's all useful
97. Other [SPECIFY]
98. I don't know

HER15. Have you noticed any energy savings on your electric bill since you started receiving the Home Energy Reports?
1. Yes
2. No
98. I don't know

HER16. AEP Ohio offers a website that gives more details on your personalized Home Energy Report. This website is not the same as AEP Ohio’s general website. It offers you online tools to complement the Home Energy Reports. Were you aware of this energy report website before this survey?
1. Yes
2. No [SKIP TO D1]
98. I don't know [SKIP TO D1]

HER17. How did you first learn about the Home Energy Report website?
[OPEN END]

HER18. Have you or someone else in your household visited the Home Energy Report website?
1. Yes
2. No [SKIP TO EA1]
98. I don't know [SKIP TO EA1]

HER19. On a scale of 1-10, how satisfied are you with the Home Energy Report website?

<table>
<thead>
<tr>
<th>Extremely Dissatisfied</th>
<th>Extremely Satisfied</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

[IF HER19 < 7]
HER20. Why did you give that rating?
[ASK IF Wave_Part=Both, ELSE SKIP TO EA1]

HER21. Since you receive both online and paper versions of the Home Energy Reports, which type do you prefer? {SINGLE CHOICE}

1 Online
2 Paper
3 I like getting both
4 Neither
98 I don’t know

D.8 Energy Awareness

EA1. Are you familiar with the ENERGY STAR label for appliances, such as televisions, dishwashers, and clothes washers and dryers that meet federal energy efficiency standards?

1 Yes
2 No
98 Don’t know
99 Refused

EA2. Please select how much you agree or disagree with these statements.

EA2a. I am very concerned about how energy use affects the environment.
EA2b. I often worry that the cost of energy for my home will increase.
EA2c. I intend to conserve electricity in my home this year.
EA2d. I am already doing everything I can to save energy in my home.
EA2e. I understand how actions taken by me and others in my household result in higher or lower energy use.
EA2f. It would make me proud to have one of the most energy efficient houses in my neighborhood.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

EA3. Please select how much you agree or disagree with these statements.
EA3a. I pay closer attention to my energy costs now than I did before receiving Home Energy Reports.

EA3b. I feel guilty if I use too much energy.

ER3c. I know about other things I could be doing to save energy, beyond what I’m already doing.

EA3d. Improving my home’s energy efficiency is a worthwhile investment.

EA3e. My energy bill is noticeably lower when I make an extra effort to conserve.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

D.9 Demographics

D1. How many people live in your household year-round?
[**NUMERIC, 1-50**]

D2. Which of the following best describes your home/residence?
1. Single-family home
2. Factory-built modular home (that is put together at the home site)
3. Mobile home (delivered via truck and has a chassis)
4. Row house
5. Two or three family attached residence
6. Apartment (4+ residences)
7. Condominium
97. Other *(Specify)*

D3. Do you own or rent your home?
1. Own *[SKIP TO D5]*
2. Rent

*[ASK IF D3=1, ELSE SKIP TO D5]*

D4. Do you pay your own electric bill or is it included in your rent?
1. I pay the electric bills
2. Included in rent
D5. Approximately when was your home constructed?
   1. Before 1960
   2. 1960-1969
   3. 1970-1979
   4. 1980-1989
   5. 1990-1999
   6. 2000-2005
   7. 2006 or later
   98. I don't know

D6. How many years have you lived at your current residence?
   [NUMERIC 1-100]
Thank you for completing the survey. Your responses will help AEP Ohio make improvements to its energy programs to better serve customers like you.
D.11 First Follow Up Reminder

Subject Line: REMINDER: Feedback on AEP Ohio’s Home Energy Reports
Sender: AEP Ohio

Dear [CUSTOMER_NAME]:

Thank you for participating in AEP Ohio’s Home Energy Report program!

Recently, we invited you to share your experience with the Home Energy Report program through a brief online survey. Your feedback is very important and will help AEP Ohio improve its programs to better serve customers like you. **Don't miss out on this chance to share your experience!**

Please click on the link below to take this short survey:

[SURVEY LINK, IN BUTTON FORM]

The survey will take approximately 5 to 10 minutes to complete. If you cannot complete the survey all at one time or you accidentally exit the survey mid-course, you can resume the survey where you left off by clicking on the link from this email or hitting the back button.

Thank you in advance for completing the survey and for participating in AEP Ohio’s energy efficiency programs!

Sincerely,

[AEP OHIO EE PROGRAM STAFF]
D.12 Final Follow Up Reminder

Subject Line: REMINDER: Feedback on AEP Ohio’s Home Energy Reports
Sender: AEP Ohio

Dear [CUSTOMER_NAME]:

Thank you for participating in AEP Ohio’s Home Energy Report program!

Within the last couple weeks, we invited you to share your experience with the Home Energy Report program through a brief online survey. **This survey is closing soon. Don’t miss out on this chance to share your experience!**

I hope you will take a few minutes to complete the survey as your participation is of great importance. **Your feedback will guide program changes that will enable the program to better serve the needs of customers like you.**

Please click on the link below to take this short survey:

[SURVEY LINK]

Thank you in advance for completing the survey and for your participation in AEP Ohio's energy efficiency programs!

Sincerely,

[AEP OHIO EE PROGRAM STAFF]
APPENDIX E. AEP OHIO PROGRAM MANAGER INTERVIEW GUIDE

AEP Ohio: HER PY2017 Evaluation
Program Staff In-Depth Interview Guide

Name of Interviewee: ___________________________________ Date: ____________
Title: ___________________________________ Company: ________________________________

[Note to Reviewer] The Interview Guide is a tool to guide process evaluation interviews with utility staff. The guide helps to ensure the interviews include questions concerning the most important issues being investigated in this study. Follow-up questions are a normal part of these types of interviews. Therefore, there will be sets of questions that will be more fully explored with some individuals than with others. The depth of the exploration with any particular respondent will be guided by the role that individual played in the program’s design and operation, i.e., where they have significant experiences for meaningful responses.

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>Topic Objective</th>
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<tbody>
<tr>
<td>Roles and Responsibilities</td>
<td>Understand internal staff structure and identify key staff</td>
</tr>
<tr>
<td>Program Goals, Objectives, and Structure</td>
<td>Understand the program goals, detailed objectives and operational structure; identify any changes the program has implemented since the pilot phase; identify details about program for incorporation into the program theory and logic model</td>
</tr>
<tr>
<td>Data Tracking</td>
<td>Understand data QA/QC procedures</td>
</tr>
<tr>
<td>Other</td>
<td>Miscellaneous and wrap-up questions</td>
</tr>
</tbody>
</table>

Roles and Responsibilities

Objective: Understand staff structure and identify key staff.

1. Please briefly summarize your role in the program.
   [Probe for main responsibilities, length of time with program, and percent of time dedicated to program.]

2. Who are the key staff involved in the program’s implementation?
   [Probe for an understanding of each person’s role.]

3. What activities does each individual complete on a day-to-day basis?

4. Who is your main contact at the implementation contractor firm (Opower)?
   [Probe for an understanding of this person’s role.]

5. Besides funding and staff resources, are there other resources invested in the program?
   (Including in-kind marketing, volunteer time, etc.)
Program Goals, Objectives & Structure
Objective: Understand the program goals, detailed objectives and operational structure. Identify any changes to the program since the pilot phase to increase the likelihood of achieving goals.

6. Please describe the main components of the program.
   
   [Confirm current understanding of the program components. Probe for as many details as possible regarding mailed reports, email reports and online web portal as necessary.]

7. What is the status of each of the program components?
   
   [Confirm current understanding of status. Is each component up and running, in development, or upcoming?] 

8. What are the overall goals of the program?
   
   [Confirm current understanding of the program goals. Probe for details about specific energy savings, number of participants, impact on other programs, etc.] 

9. What are the goals for each specific component of the program?
   
   [Confirm current understanding of each program component's goals. Probe for details about mailed reports, email reports, and online web portal as necessary.]

10. What type of customer does the program target (i.e., high energy users, low income customers)?
   
   [Confirm current understanding of program target customer.]

11. What market barriers does the program address (i.e., why aren't people already doing what the program intends to accomplish)?

12. What specific actions are you hoping to encourage with the program; what do you want participants to do?
   
   [Within the program (i.e., recall the reports, read the reports, etc.), and as a result of the program (i.e., make changes to energy use behavior, sign up for other programs, etc.).]

13. When are you expecting these actions to be taken, and for how long?
14. How successful is the program so far in achieving these goals (ask about each individual goal)?

[Probe for details about mailed reports, email reports, and online web portal as necessary.]

15. Do you emphasize any specific tips or other AEP Ohio programs in the HERs?

[Probe for details about specific tips or programs.]

16. Are there any external factors beyond your control that affect the program or the program’s expected results?

17. Are there changes in program design, structure, and/or operations that might make the program more effective in reaching these goals?

[Probe for things the program is missing, current challenges in implementation, participation, etc.]

18. What is working well?

[Probe for why they think these things are working well.]

19. What are the future plans for the program?

[Probe for details about specific components of the program, changes to implementation, or goals.]

Data Tracking
Objective: understand data QA/QC procedures (both on the utility side and the implementer side).

20. What data do you provide to the implementer?

[i.e., customer data for treatment and control group customers]

21. How often do you provide this data to the implementer?

[e.g., weekly, monthly, quarterly]

22. How does this data flow from AEP Ohio to the implementer?

[Probe for an understanding of how the data gets from the utility to the implementer.]
23. What data quality assurance and control procedures do you implement prior to sending data to the implementer to ensure the data is accurate?  
[Probe for whether these are consistently implemented.]

24. What sort of performance metrics do you track for each component of the program?  
[Probe for details about specific components of the program, and how the information is used to manage the program.]

25. How often do you receive this performance data from the implementer?  
[Probe for whether the format is actionable, effective, or needs improvement.]

Other
Miscellaneous and wrap-up questions.

26. What questions are most important for you to answer through our evaluation?

27. Is there anything I didn't ask about that you would like to add?

Thank you very much for taking the time to talk with me. Your contribution is a very important part of the process.

Do you mind if we follow-up with you by phone later, if additional questions arise?
APPENDIX F. AEP OHIO IMPLEMENTER INTERVIEW GUIDE

AEP Ohio: HER PY2017 Evaluation
Implementer In-Depth Interview Guide

Name of Interviewee: ______________________ Date: __________
Title: __________________________ Company: __________________________

[Note to Reviewer] The Interview Guide is a tool to guide process evaluation interviews with the program implementer. The guide helps to ensure the interviews include questions concerning the most important issues being investigated in this study. Follow-up questions are a normal part of these types of interviews. Therefore, there will be sets of questions that will be more fully explored with some individuals than with others. The depth of the exploration with any particular respondent will be guided by the role that individual played in the program’s design and operation, i.e., where they have significant experiences for meaningful responses.

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</tbody>
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Roles and Responsibilities

Objective: Understand staff structure and identify key staff.

28. Please briefly summarize your role in the program.
   [Probe for main responsibilities, length of time with program, and percent of time dedicated to program.]

29. Who are the key staff involved in the program’s implementation?
   [Probe for an understanding of each person’s role.]

30. What activities does each individual complete on a day-to-day basis?
   [Probe for an understanding of this person’s role.]
31. Who is your main contact at the utility?  
   [Probe for an understanding of this person’s role.]

Program Goals, Objectives & Structure
Objective: Understand the program goals, detailed objectives and operational structure. Identify any changes to the program since the pilot phase to increase the likelihood of achieving goals.

32. Please describe the main components of the program.  
   [Confirm current understanding of the program components. Probe for as many details as possible regarding mailed reports, email reports and online web portal as necessary.]

33. What is the status of each of the program components?  
   [Confirm current understanding of status. Is each component up and running, in development, or upcoming?]

34. What are the overall goals of the program?  
   [Confirm current understanding of the program goals. Probe for details about specific energy savings, number of participants, impact on other programs, etc.]

35. What are the goals for each specific component of the program?  
   [Confirm current understanding of each program component’s goals. Probe for details about mailed reports, email reports, and online web portal as necessary.]

36. What type of customer does the program target (i.e., high energy users, low income customers)?  
   [Confirm current understanding of program target customer.]

37. What market barriers does the program address (i.e., why aren't people already doing what the program intends to accomplish)?

38. What specific actions are you hoping to encourage with the program; what do you want participants to do?  
   [Within the program (i.e., recall the reports, read the reports, etc.), and as a result of the program (i.e., make changes to energy use behavior, sign up for other programs, etc.).]

39. When are you expecting these actions to be taken, and for how long?
40. How successful is the program so far in achieving these goals (ask about each individual
goal)?

[Probe for details about mailed reports, email reports, and online web portal as necessary.]

41. Do you emphasize any specific tips or other AEP Ohio programs in the HERs?

[Probe for details about specific tips or programs.]

42. Are there any external factors beyond your control that affect the program or the program’s
expected results?

43. Are there changes in program design, structure, and/or operations that might make the
program more effective in reaching these goals?

[Probe for things the program is missing, current challenges in implementation, participation,
etc.]

44. What is working well?

[Probe for why they think these things are working well.]

45. What are the future plans for the program?

[Probe for details about specific components of the program, changes to implementation, or
goals.]

46. In your opinion, how successful is the program so far, compared to similar programs
delivered around the country?

[Probe for details about specific components of the program, goals, or approaches to
implementation.]

47. How is this program different from other programs delivered around the country?

[Probe for why they are different or causes of the differences.]

48. In your opinion, what are the most innovative programs currently operating?

[Probe for why they think these are innovative, including goals, implementation differences,
or accomplishments.]
Data Tracking

Objective: understand data QA/QC procedures (both on the utility side and the implementer side).

49. What data do you receive from AEP Ohio?
   [i.e., customer data for treatment and control group customers]

50. How often do you receive this data from AEP Ohio?
   [e.g., weekly, monthly, quarterly]

51. How does this data flow from AEP Ohio to your team?
   [Probe for an understanding of how the data gets from the utility to the implementer, and how the implementer handles the data when they receive it.]

52. What data quality assurance and control procedures do you implement upon receipt of the data to ensure the data is accurate?
   [Probe for whether these are consistently implemented.]

53. What sort of performance metrics do you track for each component of the program?
   [Probe for details about specific components of the program, and how the information is used to manage the program.]

54. How often do you provide this data to AEP Ohio?
   [Probe for whether the format is actionable, effective, or needs improvement.]

Other

Miscellaneous and wrap-up questions.

55. What questions are most important for you to answer through our evaluation?

56. Is there anything I didn't ask about that you would like to add?

Thank you very much for taking the time to talk with me. Your contribution is a very important part of the process.
Do you mind if we follow-up with you by phone later, if additional questions arise?