



Memorandum

To: Vince Gutierrez and Michelle Ackmann; ComEd
From: Will Sierzchula and Carly Olig; Navigant
Date: October 24, 2016
Re: ComEd PY8 Results for the C3 Home Energy Reports Program

This memo summarizes the impact evaluation findings from the C3 Home Energy Report (HER) program in ComEd Program Year 8 (PY8).¹

1. KEY FINDINGS

Table 1 summarizes PY8 electric savings from the C3 HER program. Total savings prior to uplift were 1,945 MWh, which translates to per customer savings of 26.21 kWh or 0.36 percent annually. After adjusting for uplift from other energy efficiency programs, total savings were 1,885 MWh.² Complete impact results are included in Section 4.

Table 1. PY8 Total Program Electric Savings

Savings Category	Energy Savings (MWh)
Ex-Ante Savings†	-
Verified Savings, Prior to Uplift Adjustment	1,945
<i>Standard Error</i>	<i>948.0</i>
PY8 Uplift Adjustment‡	59.95
Legacy Uplift Adjustment‡	0
Final Verified Savings, After Uplift Adjustment	1,885
Final Verified Realization Rate§	-

Source: ComEd tracking data and Navigant analysis.

† Navigant did not receive an estimate of ex-ante savings for this program.

‡ No adjustment was made to total savings for negative uplift, i.e. cases where the HER program decreased participation in other programs.

§ The realization rate for this program could not be calculated as there is no estimate of ex-ante savings.

¹ The PY8 program year began June 1, 2015 and ended May 31, 2016. The program's period of operations in PY8 was June 2015 through December 2015.

² An increase in savings after adjusting for uplift indicates that the program caused fewer customers to join ComEd's other energy efficiency programs.

2. PROGRAM DESCRIPTION

The C3 HER program was designed to generate energy savings by providing residential customers with sets of information about energy use and energy conservation. Program participants received quarterly home energy reports that included various types of information, including the following:

- Assessment of how the participant's recent energy use compared to energy use in the past
- Tips on how to reduce energy consumption, some of which were tailored to the participant's circumstances.
- Information on how the participant's energy use compared to that of neighbors with similar homes.

In addition to mailed reports, participants had access to an online portal to help them understand and analyze their energy use, identify ways to save, and track progress on their energy savings. Participants earned points for saving energy and the rewards tab of the online portal helped users track their rewards points balance, review available gift card options, and redeem points for gift cards.

The program was implemented as a randomized control trial (RCT) where customers were randomly split between a treatment group who received reports and had access to the portal and a control group who did not.

The program implementer sent four reports in PY8 between June and November 2015. The program's period of operations in PY8 was June 2015 through December 2015.

3. EVALUATION APPROACH

The evaluation approach used in this report is consistent with the evaluation used for other implementers in the HER program and with the PY7 evaluation,³ and relied on statistical analysis appropriate for RCTs. Navigant estimated program impacts using two approaches: a post-program regression (PPR) with lagged controls and a linear fixed-effects regression (LFER) applied to monthly billing data.

3.1 Statistical Models

The PPR model combines both cross-sectional and time-series data in a panel format. It uses post-program data as the dependent variable, with lagged energy use from the same calendar month of the pre-program period serving as a control for any small, systematic differences between the treatment and control customers. The lagged energy use term is similar to the customer fixed effect included in the LFER model explained below.

As with the PPR 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

³ Navigant. 2016. *Home Energy Report C3 Energy Program PY7 Evaluation Report*. Presented to Commonwealth Edison Company.
<http://ilsagfiles.org/SAG_files/Evaluation_Documents/ComEd/ComEd_EPY7_Evaluation_Reports/ComEd_HER_C3_PY7_Evaluation_Report_2016-04-14_Final.pdf>

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.

More complete details on these models can be found in the PY7 report.⁴

3.2 Accounting for Uplift in PY8

The home energy reports sent to participating households include energy-saving tips, some of which encourage participants to enroll in other ComEd energy efficiency (EE) programs. If participation rates in other EE programs are the same for HER treatment and control groups, the savings estimates from the regression analyses are already “net” of savings from other programs, as this indicates the HER program does not increase or decrease participation in other EE programs. However, if the HER program affects participation rates in other EE programs, then savings across all programs are lower than indicated by the simple summation of savings in the HER and EE programs. For instance, if the HER program increases participation in other EE programs, the increase in savings may be allocated to either the HER program or the EE program, but cannot be allocated to both programs simultaneously.⁵ Note that when the HER program decreases participation in other programs there is no issue of double-counting and thus no adjustment to the savings total is made.

Navigant uses a difference-in-difference (DID) statistic to estimate uplift in other EE programs. To calculate the DID statistic, the change in the participation rate in another EE program between PY8 and the pre-program year for the control group is subtracted from the same change for the treatment group. For instance, if the rate of participation in an EE program during PY8 is five percent for the treatment group and three percent for the control group, and the rate of participation during the year before the start of the HER program is two percent for the treatment group and one percent for the control group, then the rate of uplift due to the HER program is one percent, as reflected in Equation 1.

Equation 1. DID Statistic Calculation

$$\begin{aligned} & (PY8 \text{ treatment group participation} - \text{prePY treatment group participation}) \\ & - (PY8 \text{ control group participation} - \text{prePY control group participation}) \\ & = \text{DID statistic} \\ & (5\% - 2\%) - (3\% - 1\%) = 1\% \end{aligned}$$

The DID statistic generates an unbiased estimate of uplift when the baseline average rate of participation is the same for the treatment and control groups, or when they are different due only to differences between the two groups in time-invariant factors, such as the residence's square footage.

Navigant examined the uplift associated with four EE programs: the Fridge and Freezer Recycling (FFR) program, the Home Energy Assessment (HEA) program, the Home Energy Rebates (Rebate) program, and the Multi-family Energy Savings Program (MESP). The FFR program achieves energy savings through retirement and recycling of older, inefficient refrigerators, freezers, and room air conditioners. The HEA program is offered jointly with the local gas utilities and achieves savings by providing direct installation of low-cost efficiency measures for single family homes, such as CFLs and low-flow

⁴ Ibid.

⁵ It is not possible to avoid double counting of savings generated by programs for which tracking data are not available, such as upstream lighting programs.

showerheads. The Rebate program offers weatherization and incentives to residential customers to encourage customer purchases of higher efficiency heating, ventilating, and air-conditioning (HVAC) equipment. The MESP offers direct installation of low-cost efficiency measures, such as water efficiency measures and CFLs at eligible multifamily residences.

3.3 Accounting for Legacy Uplift

The uplift adjustment methodology described in Section 3.2 only accounts for uplift which occurs in the current program year because EE program tracking files in any given program year only capture the new measures installed in that year, regardless of the expected measure life.⁶ However, for other EE programs with multi-year measure lives, HER program savings capture the portion of their savings due to uplift in each year of that program's measure life. For instance, a measure with a ten-year measure life that was installed in PY2 would generate savings captured in the HER program savings not just in PY2, but in PY3 through PY11 as well.

Consider the following example. A household receiving home energy reports through the HER program enrolls in the FFR program in PY6. The uplift adjustment subtracts FFR PY6 program savings to avoid double counting. In PY7 this household still receives savings from the FFR program because it has an eight-year measure life. However, the PY7 HER uplift adjustment does not remove these savings because the PY7 adjustment only accounts for measure installed in PY7, the initial year that the household entered a program. Thus, when only relying on the uplift adjustment described in Section 3.2, FFR second year savings would be included in the PY7 HER program's savings, which is inconsistent with Illinois's practice of only crediting utilities with first-year EE program savings. Legacy uplift removes double counted energy saving from programs with a multiple-year measure life.

Navigant accounts for legacy uplift by subtracting the double counted savings from previous years, adjusted for the average annual move-out rate, from PY8 HER savings through the measure lives of other EE programs.⁷ The legacy uplift adjustment is shown in Equation 2.

Equation 2. Legacy Uplift Calculation

$$\text{HER Savings}_{PY}^{\text{Adjusted}} = \text{HER Savings}_{PY}^{\text{Unadjusted}} - \text{Uplift Savings}_{PY} - \sum_{i=1}^{PY-1} \text{"Live" Legacy Uplift Savings}_i \cdot (1 - \text{MOR})^{PY-i}$$

where "Live" Legacy Uplift Savings" refers to uplift savings where the other EE programs' measure lives have not yet run out (i.e., where measure life exceeds the difference between *PY* and *i*) and MOR refers to the move out rate.

⁶ Tracking data files are set-up this way because, in conformity the Illinois Technical Reference Manual Section 3.2, savings are first-year savings, not lifetime savings.

⁷ Since HER program participants are dropped from that program when they move, other EE programs' savings are no longer captured in the HER program savings from that point forward.

4. IMPACT RESULTS

Table 2 summarizes estimated program savings. The number of participants (in the first row) represents the number of customers receiving reports, while the sample size – treatment (in the second row) indicates the number of customers with sufficient data for inclusion in regression analysis. Annual customer savings were 26.21 kWh or 0.36 percent. Total program savings, after adjusting for uplift from other energy efficiency programs, were 1,885 MWh.

Table 2. PY8 HER Program Results

Type of Statistic	Result
Number of Participants	200,000
Sample Size – Treatment	161,172
Sample Size - Control	24,214
Percentage Savings	0.36%
<i>Standard Error</i>	<i>0.18%</i>
Annualized kWh Savings Per Customer	26.21
<i>Standard Error</i>	<i>12.78</i>
Verified Net Savings, Prior to Uplift Adjustment, MWh†	1,945
<i>Standard Error</i>	<i>948.0</i>
Savings Uplift in Other EE Programs in PY8, MWh	59.95
Legacy Uplift in Other EE Programs‡	0
Verified Net Savings, After Uplift Adjustment, MWh§	1,885

Source: Navigant analysis

† Total savings were pro-rated for participants that closed their accounts during PY8.

‡ No adjustment was made to total savings for negative uplift, i.e. cases where the HER program decreased participation in other programs.

§ Net savings adjusted for savings uplift are equal to net savings less the uplift of savings in other EE programs.