



ComEd

Appliance Rebates Program Evaluation Report

FINAL

**Energy Efficiency / Demand Response Plan:
Plan Year 8 (PY8)
(6/1/2015-5/31/2016)**

**Presented to
Commonwealth Edison Company**

December 9, 2016

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E. Executive Summary

This report presents a summary of the findings and results from the impact and process evaluation of the PY8¹ Appliance Rebates program. The Appliance Rebates program is designed to increase the market share of ENERGY STAR® appliances sold through retail (in-store or online) sales channels by providing rebates to decrease customer costs, as well as information and education to increase customer awareness and acceptance of energy efficient appliances.

E.1. Program Savings

Table E-1 summarizes the electricity savings from the Appliance Rebates program.

Table E-1. PY8 Total Program Electric Savings

| Savings Category | Energy Savings (MWh) | Demand Savings (MW) | Peak Demand Savings (MW) |
|------------------------|----------------------|---------------------|--------------------------|
| Ex Ante Gross Savings | 5,525 | N/A | 0.935 |
| Verified Gross Savings | 5,580 | 3.494 | 0.897 |
| Verified Net Savings | 4,446 | 2.546 | 0.761 |

Source: ComEd tracking data and Navigant team analysis.

E.2. Program Savings by Measure

Table E-2. PY8 Program Results by Measure

| Research Category | Ex Ante Gross Savings (MWh) | Ex Ante Gross Peak Demand Reduction (MW) | Verified Gross Savings (MWh) | Verified Gross Peak Demand Reduction (MW) | Verified Gross Realization Rate | NTGR ‡ | Verified Net Savings (MWh) | Verified Net Peak Demand Reduction (MW) |
|------------------------|-----------------------------|--|------------------------------|---|---------------------------------|--------|----------------------------|---|
| Air Purifier | 2,315 | 0.264 | 2,316 | 0.264 | 100% | 0.78 | 1,806 | 0.206 |
| Clothes Washer | 624 | 0.076 | 627 | 0.081 | 100% | 0.68 | 426 | 0.055 |
| Electric Clothes Dryer | 143 | 0.020 | 143 | 0.019 | 100% | 0.68 | 97 | 0.013 |
| Freezer | 31 | 0.005 | 31 | 0.005 | 100% | 0.86 | 27 | 0.004 |
| Heat Pump Water Heater | 118 | 0.006 | 121 | 0.006 | 103% | 0.86 | 104 | 0.005 |
| Pool Pump | 360 | 0.319 | 409 | 0.271 | 114% | 1.00§ | 409 | 0.271 |
| Refrigerator | 854 | 0.122 | 854 | 0.129 | 100% | 0.86 | 735 | 0.111 |
| Retail Air Purifier | 1,079 | 0.123 | 1,079 | 0.123 | 100% | 0.78 | 842 | 0.096 |
| Total | 5,525† | 0.935 | 5,580 | 0.897* | 101% | | 4,446 | 0.761* |

Source: ComEd tracking data and Navigant team analysis.

*Numbers do not sum exactly due to rounding.

‡ A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

§ Based on evaluation research findings.

¹ The PY8 program year began June 1, 2015 and ended May 31, 2016.

E.3. Program Volumetric Detail

The program rebated 40,740 measures in PY8 as shown in the following table.

Table E-3. PY8 Volumetric Findings Detail

| Measure | Quantity |
|------------------------|---------------|
| Air Purifier | 4,221 |
| Clothes Washer | 19,812 |
| Electric Clothes Dryer | 883 |
| Freezer | 628 |
| Heat Pump Water Heater | 59 |
| Pool Pump | 213 |
| Refrigerator | 13,302 |
| Retail Air Purifier | 1,622 |
| Total | 40,740 |

Source: ComEd tracking data and Navigant team analysis.

E.4. Results Summary

The following table summarizes the key metrics from PY8.

Table E-4. PY8 Results Summary

| Participation | Units | PY8 |
|--------------------------------------|-------|--------|
| Verified Net Savings | MWh | 4,446 |
| Verified Net Peak Demand Reduction | MW | 0.761 |
| Verified Gross Savings | MWh | 5,580 |
| Verified Gross Peak Demand Reduction | MW | 0.897 |
| Program Realization Rate | % | 101% |
| Program NTG Ratio † | # | 0.80 |
| Measures Incented | # | 40,740 |

Source: ComEd tracking data and Navigant team analysis.

† Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

E.5. Findings and Recommendations

The following provides insight into key program findings and recommendations. The full set of findings and recommendations is in Section 6.²

Tracking Database

Finding 1. The tracking database contained all the inputs needed to develop the savings estimates. In those cases where using the inputs provided in the tracking database differ from the implementer workpapers, it is difficult for Navigant to determine the source of the discrepancy.

Recommendation 1. The implementer should provide actual inputs for a sample of projects for each measure in order to reduce the potential for misunderstanding in verification process

Finding 2. The tracking database does not track overall demand savings.

Recommendation 2. The implementer should include overall demand savings in the database. The Implementer has added demand savings to the database for PY9.

Finding 3. There were some discrepancies between the ex ante and ex post peak demand savings due to rounding.

Recommendation 3. Navigant recommends ComEd use unrounded demand savings values in their database and round only the totaled savings for each measure.

Net Savings Estimates

Finding 5. The program achieved overall net savings of 4,446 MWh and peak demand savings of 0.761 MW. This is approximately 60 percent of the programs net savings target of 7,407 MWh. This may be due to the fact that the program was in its first year, and not all measures were included until later in the program year.

Process Evaluation.

Finding 6. Program participants are generally satisfied with the program and the application process. However, through review of the participant surveys, Navigant found several improvements that could be made to the survey application portal that would improve the participant experience and satisfaction.

Recommendation 4. Navigant recommends that the following improvements be made to the Appliance Rebate Program application portal:

- 1 Ensure that sufficient technological resources, such as computing bandwidth, are dedicated to the on-line application portal to minimize delays and system errors.
- 2 Ensure that a check list of the information that participants will need to complete their application before they begin the application process is highly visible.
- 3 Ensure that an estimate of when participants can expect to receive their rebate is highly visible to participants.
- 4 Ensure that the resource that customers can use to receive technical assistance with the application process is easy to find.
- 5 Add clarifying information to the application to explain the following:
 - a. What information participants who purchased their units from web-based retailers should provide for the store location.
 - b. What participants who are unable to find their exact appliance model number should do in that instance, and what that means for their application and rebate.

² This is a subset of our findings and recommendations. Numbering on the findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report for ease of reference between each section.

1. INTRODUCTION

1.1 Program Description

The Appliance Rebates program is designed to increase the market share of ENERGY STAR® appliances sold through retail (in-store or online) sales channels by providing rebates to decrease customer costs, as well as information and education to increase customer awareness and acceptance of energy efficient appliances. The program targets residential customers who purchase new or replacement ENERGY STAR® appliances including air purifiers, clothes washers, electric dryers, freezers, heat pump water heaters, refrigerators, and, as of April 1, 2016, variable speed pool pumps.

The program was implemented by CLEARresult, and the PY8 program net savings target was 7,407 MWh.

1.2 Evaluation Objectives

The Evaluation Team identified the following key researchable questions for PY8.

1.2.1 Impact Questions

1. What are the program's verified gross savings?
2. What are the program's verified net savings?
3. What is the researched value for the net-to-gross (NTG) ratio?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

1.2.2 Process Questions

1. How did customers become aware of the program? How effective have ComEd's marketing strategies been and what improvements could be made?
2. What opportunities exist for program improvement?

2. EVALUATION APPROACH

The primary objectives of the evaluation of the ComEd Appliance Rebates (AR) program are to: (1) determine gross and net program savings and (2) examine the effectiveness of program processes in achieving savings.

2.1 Overview of Data Collection Activities

The core data collection activities included consist of a “desk review” of the program tracking database to determine the program’s net and gross savings using the results of previous net-to-gross evaluation efforts and real-time participant surveys intended to calculate NTG values for the program to be applied prospectively in future years. The full set of data collection activities is shown in the following tables. Participants who filled in an on-line rebate application were invited on the last page of the application to go to the evaluation’s on-line survey and over 8,000 applicants finished the online survey.

Table 2-1. Primary Data Collection Activities

| What | Who | Target Completes | Completes Achieved | When |
|---------------------------|-----------------------------------|------------------|--------------------|-------------------------|
| Program Tracking Database | Participants | Census | Census | August - September 2016 |
| In Depth Interviews | Program Manager/Implementer Staff | 2 | 2 | April 2016 |
| On-Line Survey | Participants | 120 | 8,680 | June 2015 – June 2016 |

Table 2-2. Additional Resources

| Reference Source | Author | Application | Gross Impacts | Process |
|-------------------------------------|--------|-------------|---------------|---------|
| Illinois Technical Reference Manual | | | X | |

2.2 Verified Savings Parameters

Navigant calculated verified gross and net program impacts for eight types of measures: Air Purifier, Clothes Washer, Electric Clothes Dryer, Freezer, Heat Pump Water Heater, Pool Pump, Refrigerator, and Retail Air Purifier. These measures account for all quantifiable PY8 electric savings.

2.2.1 Verified Gross Program Savings Analysis Approach

Unit savings are calculated using the algorithms from the Illinois TRM v4.0. The Illinois TRM deems most of the savings algorithms for the Appliance Rebates program (for detailed description of engineering algorithms and inputs used, see Section 4).

The following table presents the deemed input parameter source that Navigant used by measure. The Illinois TRM v4.0 allows for custom or actual values to be used for some of the input parameters. Navigant based these values on the program tracking database when available.

Table 2-3. Verified Savings Parameter Data Sources

| Gross Savings Input Parameters | Deemed Input Data Source |
|--------------------------------|--|
| Air Purifier | Illinois TRM v4.0 – Section 5.1.1 |
| Clothes Washer | Illinois TRM v4.0 – Section 5.1.2 |
| Electric Clothes Dryer | Illinois TRM v4.0 – Section 5.1.10 |
| Freezer | Illinois TRM v4.0 – Section 5.1.5 |
| Heat Pump Water Heater | Illinois TRM v4.0 – Section 5.4.3 |
| Pool Pump | Custom Calculation |
| Refrigerator | Illinois TRM v4.0 – Section 5.1.6 |
| Retail Air Purifier | Custom Calculation using Illinois TRM v4.0 – Section 5.1.1 |

2.2.2 Verified Net Program Savings Analysis Approach

Verified net energy and demand (coincident peak and overall) savings were calculated by multiplying the verified gross savings estimates by a net-to-gross ratio (NTGR). In PY8, the NTGR estimates used to calculate the net verified savings were defined by SAG as documented in a spreadsheet.³

2.3 Process Evaluation

The process evaluation consisted of the real-time participant internet-based survey, and focused on two areas: program awareness and overall program satisfaction. In the survey, participants were asked questions about how they first became aware of the program, and if they had any comments on the program or suggestions for improvement.

³ Source: A deemed value. ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

3. GROSS IMPACT EVALUATION

Navigant’s review of the ex ante calculations for the ComEd PY8 Appliance Rebates program resulted in verified gross savings of 5,580 MWh and demand savings of 0.897 MW. The verified gross realization rate for energy savings is 101 percent. The verified gross realization rate for peak demand savings is 95 percent.

3.1 Tracking System Review

CLEAResult’s tracking system and savings documentation for PY8 consisted of (1) a spreadsheet containing measure type, quantity, energy and demand savings and (2) a text document containing the algorithms and methodologies used to calculate savings.

Key findings include:

1. Overall, Navigant received all applicable data needed in order to conduct the gross impact analysis.
2. There were small discrepancies in the inputs Navigant and CLEAResult used for calculating savings. Notably there were differences in the heat pump water heater and commercial air purifier measure (discussed in more detail below).
3. It was sometimes difficult for Navigant to find the source of the discrepancies because the actual savings calculations are embedded in the CLEAResult database; this database is not accessible to Navigant.

3.2 Program Volumetric Findings

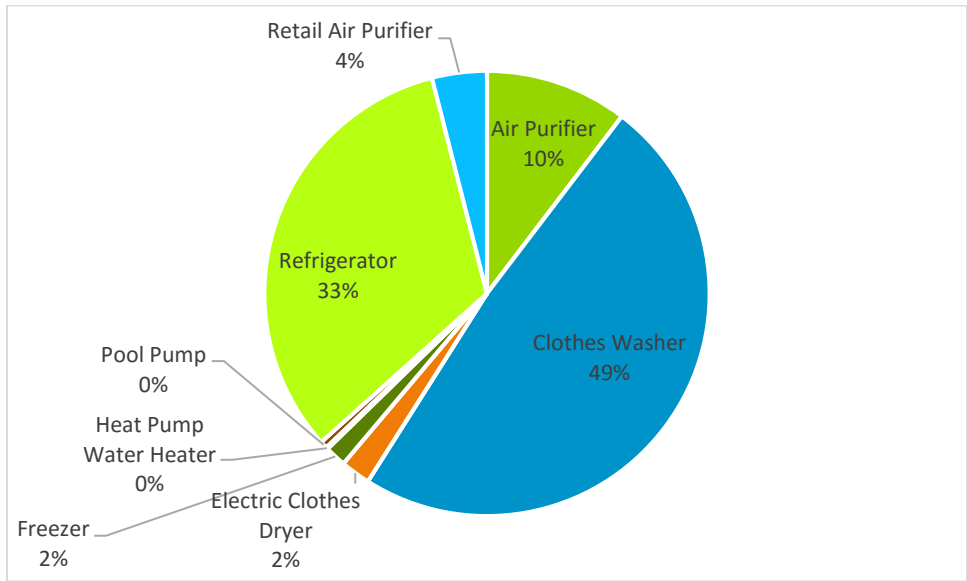
The program incented 40,740 measures in PY8. The volumetric findings are detailed in Table 3-1 and presented visually in Figure 3-1.

Table 3-1. PY8 Volumetric Findings Detail

| Measure | Quantity |
|------------------------|----------|
| Air Purifier | 4,221 |
| Clothes Washer | 19,812 |
| Electric Clothes Dryer | 883 |
| Freezer | 628 |
| Heat Pump Water Heater | 59 |
| Pool Pump | 213 |
| Refrigerator | 13,302 |
| Retail Air Purifier | 1,622 |
| Grand Total | 40,740 |

Source: ComEd tracking data and Navigant team analysis.

Figure 3-1. Number of Measures Incented by Type



Source: Evaluation Analysis

3.3 Gross Program Impact Parameter Estimates

As described in Section 2, energy and demand savings are estimated using TRM v4.0. The EM&V team conducted research to validate the parameters that were not specified in the TRM. The savings parameters are shown in the following table.

Table 3-2. Verified Gross Savings Parameters

| Gross Savings Input Parameters | Deemed† or Evaluated? |
|---|-----------------------|
| Quantity | Evaluated |
| Measure Type and Eligibility | Evaluated |
| Gross Savings per Unit, Sampled Deemed Measures | Deemed |
| Gross Savings per Unit, Sampled Non-Deemed Measures | Evaluated |

† State of Illinois Technical Reference Manual version 4.0 from <http://www.ilsag.info/technical-reference-manual.html>.

The differences between the ex-ante and ex-post savings estimates are discussed by measure below.

3.3.1 Air Purifier/Retail Air Purifier

For this measure, Navigant and the implementer used the measure level inputs deemed by the IL TRM v4.0⁴ to calculate energy savings. The realization rate for these measures is 100 percent. There is a

⁴ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0 Final. <http://www.ilsag.info/technical-reference-manual.html>

minor difference in energy savings due to one project. The ex ante savings for this project are 437 kWh, however, the Clean Air Delivery Rate (CADR) for this purifier is 210. The TRM provides a deemed savings value for this CADR of 902 kWh.

There was also a small (< one percent) difference in demand savings. Navigant believes this difference is due to rounding. The implementer rounded to the thousand place in the database; however, because the demand savings are small for any individual measure, this resulted in some evaluation adjustments.

3.3.2 Clothes Washer

For this measure, Navigant and the implementer used the measure level inputs deemed by the IL TRM v4.0 to calculate energy savings for these measures. The realization rate for this measure is 100 percent. There are some minor (< 0.5 percent) differences in the energy savings, specifically on those measures which dryer fuel is marked as “other”. Navigant used the following inputs to calculate the energy savings (1) type of washer (ENERGY STAR or ENERGY STAR most efficient), (2) type of hot water fuel (electric, natural gas, or other), and (3) clothes dryer fuel (electric, natural gas, or other).

There were also small (approximately seven percent) differences in demand savings. Navigant believes these differences are due to the adjustments made to the energy savings and due to rounding. The implementer rounded to the thousand place in the database; however, because the demand savings are small for this measure, this resulted in some evaluation adjustments.

3.3.3 Electric Clothes Dryer

For this measure, Navigant and the implementer used the measure level inputs deemed by the IL TRM v4.0 to calculate energy savings for these measures. The realization rate for these measures is 100 percent. There is a minor difference in energy and demand savings due to rounding.

3.3.4 Freezer

For this measure, Navigant and the implementer used the measure level inputs deemed by the IL TRM v4.0 to calculate energy savings for this measure. The realization rate for this measure is 100 percent. There is a minor difference in energy savings due to one project. Navigant found the baseline energy usage for this measure was less than in the efficient case based on the product specifications.

There was also a small (< one percent) difference in demand savings. Navigant believes this difference is due to rounding. The implementer rounded to the thousand place in the database; however, because the demand savings are small for this measure, this resulted in some evaluation adjustments.

3.3.5 Refrigerator

For this measure, Navigant and the implementer used the measure level inputs deemed by the IL TRM v4.0 to calculate energy savings for this measure. The realization rate for this measure is 100 percent. The minor difference in energy savings is because Navigant found slightly different energy savings compared to the ex ante for three refrigerator models based on the product specifications.

Navigant believes the demand savings difference is due to rounding. The implementer rounded to the thousand place in the database; however, because the demand savings are small for any individual measure, this resulted in some evaluation adjustments to the demand savings.

3.3.6 Heat Pump Water Heater

Navigant used the measure level inputs deemed by the TRM v4.0 to calculate energy savings for this measure. There is a small (two percent) difference in the energy savings as well as a small (three percent) difference in the demand savings. This is due the implementer using a deemed heating penalty while Navigant used the actual Energy Factor (EF) input to calculate the heating penalty, resulting in a slight upwards adjustment.

The TRM defines the following algorithm and inputs for this measure:

ΔkWh

$$= (((1/EFBASE - 1/EFEFFICIENT) * GPD * Household * 365.25 * \gamma_{Water} * (TOUT - TIN) * 1.0) / 3412) + kWh_{cooling} - kWh_{heating}$$

Where,

EFBASE = Energy Factor (efficiency) of standard electric water heater according to federal standards

EFEFFICIENT = Energy Factor (efficiency) of Heat Pump water heater

GPD = Gallons Per Day of hot water use per person

Household = Average number of people per household

365.25 = Days per year

γ_{Water} = Specific weight of water

TOUT = Tank temperature

TIN = Incoming water temperature from well or municipal system

1.0 = Heat Capacity of water (1 Btu/lb*°F)

3412 = Conversion from Btu to kWh

kWh_cooling = Cooling savings from conversion of heat in home to water heat

$$= (((((GPD * Household * 365.25 * \gamma_{Water} * (TOUT - TIN) * 1.0) / 3412) - ((1/EFNEW * GPD * Household * 365.25 * \gamma_{Water} * (TOUT - TIN) * 1.0) / 3412)) * LF * 27%) / COPCOOL) * LM$$

Variables as defined above and where,

LF = Location Factor

27% = Portion of reduced waste heat that results in cooling savings

COPCOOL = COP of central air conditioning

LM = Latent multiplier to account for latent cooling demand

kWh_heating = Heating cost from conversion of heat in home to water heat (dependent on heating fuel)

$$= (((((GPD * Household * 365.25 * \gamma_{Water} * (TOUT - TIN) * 1.0) / 3412) - ((1/EFNEW * GPD * Household * 365.25 * \gamma_{Water} * (TOUT - TIN) * 1.0) / 3412)) * LF * 49%) / COPHEAT$$

Variables as defined above and where,

49% = Portion of reduced waste heat that results in increased heating load

COPHEAT = COP of electric heating system

3.3.7 Pool Pump

The TRM v4.0 does not define savings for the pool pump measure. Navigant and the implementer used savings calculated from the ENERGY STAR pool pump calculator; the calculator uses the following equation:

$$\text{kWh variable speed} = (((\text{Hrs/Day}_{\text{base}} * \text{GPM}_{\text{base}} * 60)/\text{EF}_{\text{base}}) - (((\text{Hrs/Day}_{\text{vsh}} * \text{GPM}_{\text{vsh}} * 60)/\text{EF}_{\text{vsh}} + ((\text{Hrs/Day}_{\text{vsl}} * \text{GPM}_{\text{vsl}} * 60)/\text{EF}_{\text{vsl}}))))/1000 * \text{Days}$$

Navigant used the numbers submitted by CLEAResult for v6.0 of the TRM, which differ slightly from CLEAResult's original calculations, resulting in an upwards evaluation adjustment.

3.4 Verified Gross Program Impact Results

The resulting total program verified gross savings is 5,580 MWh and 0.897 MW as shown in the following table.

Table 3-3. PY8 Verified Gross Impact Savings Estimates by Measure Type

| Research Category | Ex Ante Gross Savings (MWh) | Ex-Ante Gross Peak Demand Reduction (MW) | Verified Gross Savings (MWh) | Verified Gross Peak Demand Reduction (MW) | Verified Gross Realization Rate | Verified Gross Peak Demand Realization Rate |
|------------------------|-----------------------------|--|------------------------------|---|---------------------------------|---|
| Air Purifier | 2,315 | 0.264 | 2,316 | 0.264 | 100% | 100% |
| Clothes Washer | 624 | 0.076 | 627 | 0.081 | 100% | 107% |
| Electric Clothes Dryer | 143 | 0.020 | 143 | 0.019 | 100% | 98% |
| Freezer | 31 | 0.005 | 31 | 0.005 | 100% | 105% |
| Heat Pump Water Heater | 118 | 0.006 | 121 | 0.006 | 103% | 103% |
| Pool Pump | 360 | 0.319 | 409 | 0.271 | 114% | 85% |
| Refrigerator | 854 | 0.122 | 854 | 0.129 | 100% | 105% |
| Retail Air Purifier | 1,079 | 0.123 | 1,079 | 0.123 | 100% | 100% |
| Total | 5,525† | 0.935 | 5,580 | 0.897† | 101% | 96% |

Source: Evaluation Team analysis.

†Numbers do not sum exactly due to rounding.

4. NET IMPACT EVALUATION

SAG determined⁵ that the NTG values for this program should be deemed prospectively and used to calculate verified net savings. The table below shows the deemed NTG values and the PY8 verified net savings.

Table 4-1. PY8 Verified Net Impact Savings Estimates by Measure Type

| Research Category | Ex Ante Gross Savings (MWh) | Ex-Ante Gross Peak Demand Reduction (MW) | Verified Gross Savings (MWh) | Verified Gross Peak Demand Reduction (MW) | Verified Gross Realization Rate | NTGR ‡ | Verified Net Savings (MWh) | Verified Net Peak Demand Reduction (MW) |
|------------------------|-----------------------------|--|------------------------------|---|---------------------------------|--------|----------------------------|---|
| Air Purifier | 2,315 | 0.264 | 2,316 | 0.264 | 100% | 0.78 | 1,806 | 0.206 |
| Clothes Washer | 624 | 0.076 | 627 | 0.081 | 100% | 0.68 | 426 | 0.055 |
| Electric Clothes Dryer | 143 | 0.020 | 143 | 0.019 | 100% | 0.68 | 97 | 0.013 |
| Freezer | 31 | 0.005 | 31 | 0.005 | 100% | 0.86 | 27 | 0.004 |
| Heat Pump Water Heater | 118 | 0.006 | 121 | 0.006 | 103% | 0.86 | 104 | 0.005 |
| Pool Pump | 360 | 0.319 | 409 | 0.271 | 114% | 1.00§ | 409 | 0.271 |
| Refrigerator | 854 | 0.122 | 854 | 0.129 | 100% | 0.86 | 735 | 0.111 |
| Retail Air Purifier | 1,079 | 0.123 | 1,079 | 0.123 | 100% | 0.78 | 842 | 0.096 |
| Grand Total | 5,525† | 0.935 | 5,580 | 0.897* | 101% | | 4,446 | 0.761* |

Source: Evaluation Team analysis.

†Numbers do not sum exactly due to rounding.

‡ A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

§ Based on evaluation research findings.

⁵Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

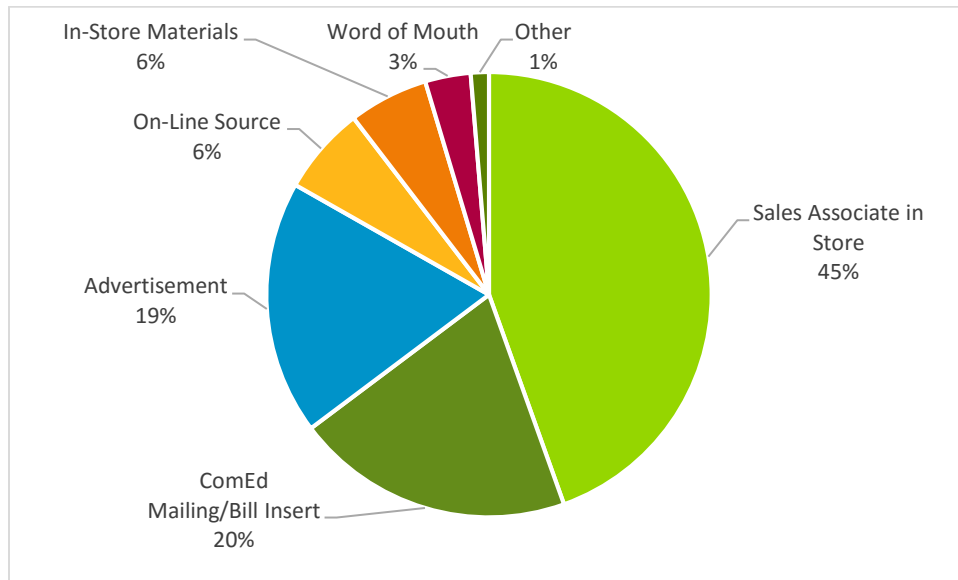
5. PROCESS EVALUATION

The process evaluation consisted of the real-time participant internet-based survey, and focused on two areas: program awareness and overall program satisfaction. Participants were asked questions about how they first became aware of the program, and if they had any comments on the program or suggestions for improvement.

5.1 Program Awareness

The survey participants were asked to name the method by which they first became aware of the Appliance Rebates program. The most common response given was that the participant first learned about the program from the sales associate in the store, which is consistent with the program implementation team’s program plans. The next most common method of learning about the program was through a ComEd mailing or bill insert. This is consistent with the program plan, and demonstrates that the program staff is implementing their marketing plan effectively. The methods of program awareness are presented in Figure 5-1. “Other” methods of learning about the program included emails from ComEd; contractors, such as HVAC technicians; and other ComEd outreach, such as community events and emails. There were also nine participants who reported learning about the program through a Home Energy Assessment, and one participant who reported learning about the program through their Home Energy Report.

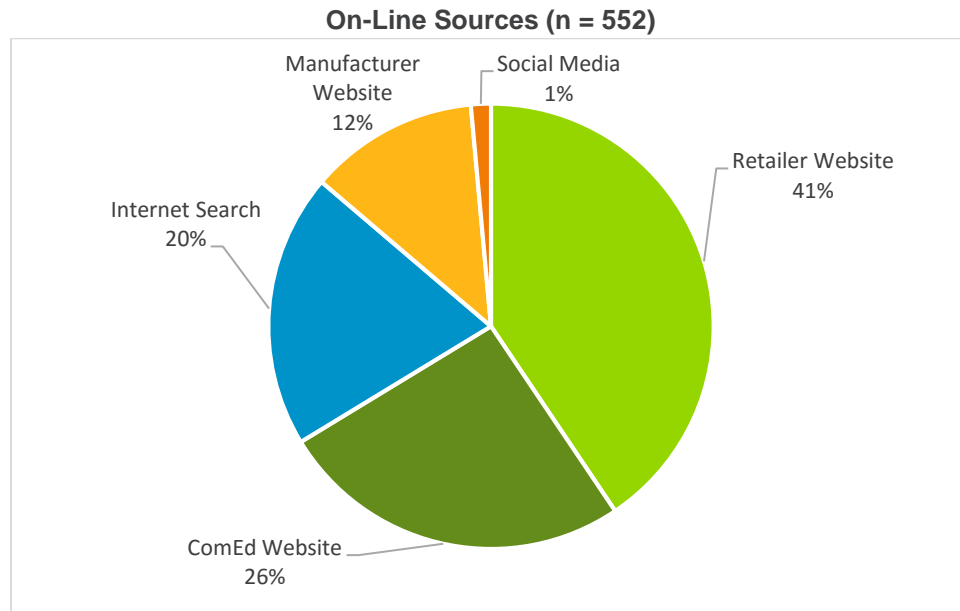
Figure 5-1. How did you first learn about the program? (n = 8,648)



One source of program awareness was through on-line internet sources. Figure 5-2 presents the different types of on-line sources that participants used to become aware of the program. The most common on-line sources were retailer websites. In most cases this is the on-line retailer that the participant purchased their appliance from, but in some case the participants reported that they were conducting on-line research at retailer websites, and learned about the program on those websites, even though they did not purchase their rebated appliance from an on-line source. The second most common on-line source was the ComEd website. This included participants who went to the ComEd website specifically to learn about the availability of rebates, and participants who mentioned that they were on the ComEd website for

another purpose, such as paying their electric bill, and happened to notice that ComEd was offering rebates for appliances. Only a small number of participants reported that they learned about the program through social media, such as Facebook. This suggests that social media may be an awareness channel with potential to reach additional customers, given the undoubtedly large number of ComEd customers who likely have social media accounts.

Figure 5-2. How did you first learn about the program?



5.2 Program Satisfaction

Overall, the program participants reported a positive experience with their participation in the program at the time of the web-based survey. Because the survey was intended to collect “real time” free-ridership information, participants were invited to take the survey after they had submitted their application using the ComEd on-line portal. Therefore, the participants were only able to speak to their experience at this point.

Overall, the participants were generally very pleased with the program, and with the opportunity to receive a rebate for their energy efficient appliance. In general, the participants were also pleased with the opportunity to submit their program application using the on-line portal, although there were participants who complained that the website was “slow” at times. Also, several participants mentioned that they had to interrupt their application process to gather the information needed to complete the application process, such as their ComEd account number; their appliance type, manufacturer, and model number; information about the store where it was purchased; or to obtain a digital copy of the receipt.

Several participants also complained about the process to upload their receipts, stating that they had difficulty understanding the process and that they needed to make multiple attempts to upload the scanned receipts before they were successful. Several participants also mentioned that they had difficulty scanning their receipts because the receipts were quite long, and contained additional superfluous information from the retail store. A few participants mentioned that they called the phone number provided for questions about the program, but were unable to receive help for the technical issues with the

application process. Navigant suggests that CLEAResult should provide a resource for participants to contact with technical questions.

Another minor issue that was mentioned by a few participants who purchased their unit on-line was that they were confused about what information to enter when asked about the store location. Participants who purchased their appliance on-line are unlikely to know the store location and were unsure of how to complete the form.

Some participants reported that they were unable to find their appliance model number from the list given in the application process, and were unsure of what to do in that case. Some reported that they chose a model number close to the unit that they purchased. Others wrote that because they were unable to select their model number, they were unsure as to whether or not their unit qualified for the program.

Lastly, several participants mentioned that they would like to be given an estimated time frame in which they could expect to receive their rebate. Navigant thinks that this is a reasonable request and suggests that ComEd provide a time frame to participants to increase their overall satisfaction with the program.

Navigant has the following suggestions for improving the customer on-line application experience:

1. Ensure that sufficient technological resources, such as computing bandwidth, are dedicated to the on-line application portal to minimize delays and system errors.
2. Ensure that a check list of the information that participants will need to complete their application before they begin the application process is highly visible.
3. Ensure that an estimate of when participants can expect to receive their rebate is highly visible to participants.
4. Ensure that the resource that customers can use to receive technical assistance with the application process is easy to find.
5. Add clarifying information to the application to explain the following:
 - What information participants who purchased their units from web-based retailers should provide for the store location.
 - What participants who are unable to find their exact appliance model number should do in that instance, and what that means for their application and rebate.

These changes to the application process will increase participant satisfaction with the application process, and will increase participant satisfaction overall.

6. FINDINGS AND RECOMMENDATIONS

This section summarizes the key impact and process findings and recommendations.

Tracking Database

Finding 1. The tracking database contained all the inputs needed to develop the savings estimates. In those cases where using the inputs provided in the tracking database differ from the implementer workpapers, it is difficult for Navigant to determine the source of the discrepancy.

Recommendation 1. The implementer should provide actual inputs for a sample of projects for each measure in order to reduce the potential for misunderstanding in verification process.

Finding 2. The tracking database does not track overall demand savings.

Recommendation 2. The implementer should include overall demand savings in the database. Demand savings have been added to the database for PY9.

Finding 3. There were some discrepancies between the ex ante and ex post peak demand savings due to rounding.

Recommendation 3. Navigant recommends ComEd use unrounded demand savings values in their database and round only the totaled savings for each measure.

Gross Savings Estimates

Finding 4. The program achieved overall gross savings of 5,580 MWh and peak demand savings of 0.897 MW.

Net Savings Estimates

Finding 5. The program achieved overall net savings of 4,446 MWh and peak demand savings of 0.761 MW. This is approximately 60% of the programs net savings goals of 7,407 MWh. This may be due to the fact that the program was in its first year, and not all measures were included until later in the program year.

Process Evaluation.

Finding 6. Program participants are generally satisfied with the program and the application process. However, through review of the participant surveys, Navigant found several improvements that could be made to the survey application portal that would improve the participant experience and satisfaction.

Recommendation 4. Navigant recommends that the following improvements be made to the Appliance Rebate Program application portal:

- 1 Ensure that sufficient technological resources, such as computing bandwidth, are dedicated to the on-line application portal to minimize delays and system errors.
- 2 Ensure that a check list of the information that participants will need to complete their application before they begin the application process is highly visible.
- 3 Ensure that an estimate of when participants can expect to receive their rebate is highly visible to participants.
- 4 Ensure that the resource that customers can use to receive technical assistance with the application process is easy to find.
- 5 Add clarifying information to the application to explain the following:

- a. What information participants who purchased their units from web-based retailers should provide for the store location.
- b. What participants who are unable to find their exact appliance model number should do in that instance, and what that means for their application and rebate.

Finding 7. Program participants are primarily becoming aware of the Appliance Rebates program through in-store sales associates, followed by ComEd mailing and bill inserts, and traditional advertisement outlets. More participants became aware of the program through on-line sources than word-of-mouth. Only a small portion of participants learned about the program through social media, possibly representing an opportunity for an additional marketing channel.

Recommendation 5. Navigant recommends that ComEd research the viability of increased program promotion using social media outlets.

Program Volumetric Findings

Finding 8. The program incented 40,740 measures in PY8.

7. APPENDICES

7.1 NTG Research

To: Vincent Gutierrez, ComEd

CC: Jennifer H. Morris, ICC, Randy Gunn, Jeff Erickson, Josh Arnold, Patricia Plympton, Chelsea Lamar, Navigant

From: Katherine Wolf, Navigant

Date: October 31, 2016

Re: ComEd PY8 Appliance Rebates Program NTG Results

Introduction

One of the primary evaluation objectives of the ComEd Appliance Rebates (AR) program is estimating a net-to-gross ratio (NTG) for the program’s measures.

The AR program increases the market share of ENERGY STAR® appliances sold through retail (in-store or online) sales channels by providing rebates to decrease customer costs. The AR program also provides information and education to increase customer awareness and acceptance of energy efficient appliances. The program targets residential customers who purchase new or replacement ENERGY STAR® appliances including clothes washers, refrigerators, air purifiers, freezers, heat pump water heaters, electric clothes dryers, variable speed pool pumps, ventilation fans, water dispensers, room air conditioners, and self-install smart thermostats.

Data Collection, Methods, and Sample Sizes

Table 1 below summarizes data collection methods, data sources, timing, and achieved sample sizes that were used to calculate the net-to-gross values presented in this document. The completed surveys were collected from an online survey Navigant created. Respondents were directed to the survey by a link on the ComEd appliance rebate application portal.

Table 2. Core Data Collection Activities and Sample

| PY | What | Who | Target Completes PY8 | Achieved Completes PY8 | When | Comments |
|----|-----------------|-------------------------|----------------------|------------------------|-----------------------|--------------|
| 8 | Internet Survey | Participating Customers | 120 | 5,763 | June 2015 – June 2016 | NTG Analysis |

The primary data collection activities consisted of participant surveys conducted during PY8. The participant survey was conducted using on-line surveys, and collected real-time net-to-gross results. Spillover information will not be collected at this time, because it is unlikely that participants would have had time to purchase and install any additional measures. Spillover information may be collected during PY9 participant end-of-year phone surveys, if desired. All program participants who applied for their

rebate on-line received information about participating in the real-time surveys when completing their program application.

Free-Ridership

The method looks at three elements of free-ridership for participants: Program Influence, Timing and Efficiency. The free-ridership methodology was based on the methodology previous used to evaluation the ComEd Elementary Energy Education program. The IL TRM methodology was not used because at the time of the survey development and fielding the IL TRM working group had not yet begun meeting, and not begun to develop the TRM free-ridership methodology. The program influence element considers the level of influence that the program, including the rebate offered by the program, had on the participants' decision to purchase the rebated appliance. Participants were asked to rate the level of influence from "not at all influential" to "very influential".

The participants were also asked what they would have done in the absence of the program. They were asked if they would have purchased a unit with the same efficiency, and if they would have purchased the unit at the same time in the absence of the program. These participant responses determine the efficiency and timing scores, respectively.

The individual free-ridership values were calculated using the following formula:

$$Free - Ridership = Average\left(\frac{Timing + Efficiency}{2}, Influence\right)$$

The net-to-gross ratios will be estimated using the following formula:

$$NTG = 1 - FR + SO$$

Spillover

Spillover information was not collected during the participant surveys. Because the surveys were done at the time that participants were completing their rebate application, it is unlikely that they would have had time to purchase and install any additional energy saving measures. Spillover information may be collected during PY9 participant end-of-year phone surveys.

Net-to-Gross Results

The average free-ridership estimate is presented by measure in Table 2.

Table 3. Free-Ridership Values for Appliance Rebates

| Measure | Free-Ridership Values | N |
|------------------------|-----------------------|-------|
| Clothes Washer | 0.42 | 2,889 |
| Refrigerator | 0.43 | 1,963 |
| Air Purifier | 0.26 | 763 |
| Freezer | 0.46 | 67 |
| Heat Pump Water Heater | 0.26 | 24 |
| Clothes Dryer | 0.38 | 57 |

Source: Navigant Analysis

The net-to-gross ratios will be estimated using the following formula:

$$NTG = 1 - FR + SO$$

Table 3 presents the net-to-gross values for the AR program by measure. The final net-to-gross values will be estimated after Navigant receives the final program tracking database.

Table 4. Net-to-Gross Values for Appliance Rebates

| Measure | NTG Values | N |
|------------------------|------------|-------|
| Clothes Washer | 0.58 | 2,889 |
| Refrigerator | 0.57 | 1,963 |
| Air Purifier | 0.74 | 763 |
| Freezer | 0.54 | 67 |
| Heat Pump Water Heater | 0.74 | 24 |
| Clothes Dryer | 0.62 | 57 |

Source: Navigant Analysis

The program-level NTG values are calculated by creating a weighted average using the verified gross savings for each measure.

Table 5. Verified Gross Savings for Appliance Rebates

| Measure | Verified Gross Savings (Therms) |
|------------------------|---------------------------------|
| Clothes Washer | 627 |
| Refrigerator | 854 |
| Air Purifier | 2,316 |
| Freezer | 31 |
| Heat Pump Water Heater | 121 |
| Clothes Dryer | 143 |

Source: Navigant Analysis

The PY8 program-level results are presented in the following table.\

Table 6. Program-Level NTG Values for Appliance Rebates

| | Free-Ridership Values | NTG Values |
|------------------------------|-----------------------|------------|
| PY8 Appliance Rebate Program | 0.33 | 0.67 |