

To: Vince Gutierrez, ComEd
CC: Jennifer Morris, ICC; Randy Gunn, Jeff Erickson, Nishant Mehta, Laura Agapay-Read, Cherlyn Seruto, Navigant
From: PJ Vigilante, Navigant Consulting
Date: August 20, 2019
Re: ComEd CY2018 Heating and Cooling Rebate Program Free Ridership Research Results

EXECUTIVE SUMMARY

This memo presents the results of free ridership research¹ conducted by Navigant from April 2019 through May 2019 with participating CY2018² residential customers. Navigant designed the survey instrument in accordance with Illinois Technical Reference Manual version 7.0 (TRM) protocol 4.4, Prescriptive Rebate (with no audit). While the CY2018 program included participation for eight measures³, the survey targeted the following three measures based on their contribution to total program savings: central air conditioner, furnace blower motor, and ductless mini split heat pump.

These results will inform Navigant's September 2019 recommendations to the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) of net-to-gross (NTG) values to be used for this program in CY2020.

Table 1. Free Ridership Research Results of Heating and Cooling CY2018

Measure	Free Ridership
Central Air Conditioners	0.25
Furnace Blower Motors	0.30
Ductless Mini Split Heat Pumps	0.45

Source: Navigant Research CY2018

FREE RIDERSHIP SURVEY DISPOSITION

Navigant offered the survey to a random sample of CY2018 participants. The team set survey quotas at 70 per measure to meet a 90% confidence interval and fielded the survey from April 2019 through May 2019. Of the 178 measure-level responses, the team removed 11 responses in data cleaning due to missing information. This resulted in 159 analytically viable completes. To increase the number of completes for ductless mini split heat pumps, we expanded the available participant records to include a census of participants from first quarter of 2019 (in addition to a census of 2018 participants).

Table 2. Free Ridership Decision Maker Survey Disposition

Measure	Target Completes	Actual Completes	Analyzed Completes
Central Air Conditioning	70	70	63
ECM - Furnace Blower Motor	70	70	60
Ductless Mini Split Heat Pumps	70	38	36

Source: Navigant Research CY2018

¹ Outbound participant CATI surveys conducted by Blackstone Group

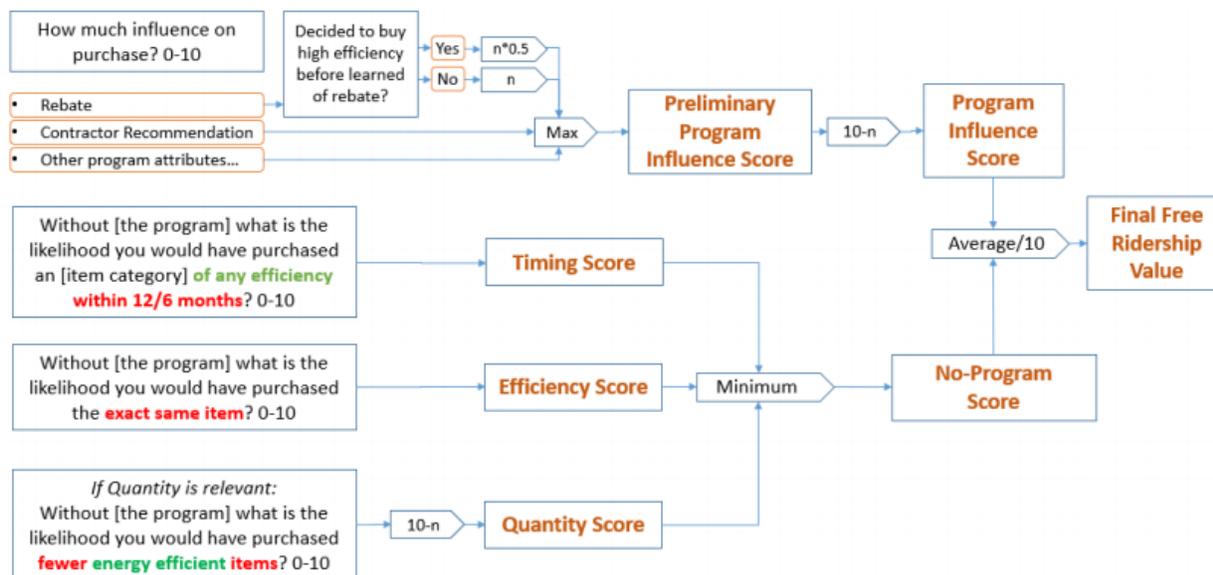
² CY2018 covers January 1, 2018 through December 31, 2018.

³ In order of quantity of CY2018 rebates distributed: ECM Furnace Motor – Factory Installed, Central Air Conditioning, Advanced Thermostat, Ductless Heat Pump, Air Source Heat Pump, ECM Furnace Motor – Retrofit, Ground Source Heat Pump, and Heat Pump Water Heaters.

FREE RIDERSHIP PROTOCOL

The evaluation team conducted the research according to free ridership protocol 4.4, Prescriptive Rebate (with no audit) from the TRM.

Figure 1. Residential Prescriptive Rebate (With No Audit) Free Ridership



Source: IL TRM 7.0 Figure 4-6

DETAILED NET TO GROSS RESULTS

Free Ridership Consistency Check Analysis

Of the 69 completes that triggered a consistency check, Navigant analyzed 61. The analytical process included two (or more) independent reviews. The reviewers assessed component scores and open-ended responses to consistency check questions and recommended one of the following adjustments based on the consistency of these components:

- 1) Omit the record because the scores are not consistent with consistency check verbatim or consistency check verbatim is not related to a description of program influence,
- 2) Remove one or more component sub-scores due to inconsistency, or
- 3) Do not change the approach for this record, verbatim reflects the duality that triggered the consistency check.

Due to missing information in the consistency check questions, Navigant excluded eight responses as shown in Table 4 below.

Table 3. Free Ridership Consistency Check Disposition for Direct Install Measures

Measure Response Disposition	Central Air Conditioner	ECM - Furnace Blower Motor	Ductless Mini- Split Heat Pump	Total
Measure installations covered by interviews	70	70	38	178
Excluded: Non-response	3	8		11
Excluded: Triggered and Failed Consistency Check	4	2	2	8
Total of Excluded Responses	7	10	2	19
Analyzed Sample	63	60	36	159
Evaluated to Require No Change	6	8	6	20
Evaluated to Exclude NP Score	15	9	5	29
Evaluated to Exclude PC Score	1	4	7	12

Source: Navigant analysis of data from CATI surveys conducted with CY2018 ComEd Heating and Cooling Program participants.

Spillover Estimation

In 2017, Navigant conducted the most recent spillover research for the Heating and Cooling Program with PY8 participants. The research found a program-level spillover rate of 0.08. We recommend the program use this spillover rate in CY2020 and until Navigant conducts new spillover research.

Free Ridership and Spillover to Create Program Net-to-Gross Ratio

Table 4. Free Ridership, Participant Spillover, and NTG for Heating and Cooling Program Measures

Measure	Free Ridership	Participant Spillover*	NTG
Advanced Thermostat [†]	N/A	N/A	N/A
Air Source Heat Pump [‡]	N/A	N/A	0.57
Central Air Conditioning	0.25 [§]	0.08	0.83
Ductless Mini Split Heat Pumps	0.45 [§]	0.08	0.63
ECM - Furnace Blower Motor	0.30 [§]	0.08	0.78
Ground Source Heat Pump [‡]	N/A	N/A	0.59

*Results from PY8 ComEd Heating and Cooling Program participants.

The TRM specifies a net savings value for Advanced Thermostats.

[‡]SAG Consensus Value

[§] Navigant analysis of data from CATI surveys conducted with CY2018 ComEd Heating and Cooling Program participants.

APPENDIX: HEATING AND COOLING NTG HISTORY

COMPLETE SYSTEM REPLACEMENT (HEER)																					
EPY1	CSR program not offered in EPY1																				
EPY2	CSR program not offered in EPY1																				
EPY3	CSR program not offered in EPY1																				
EPY4	Retroactive application of NTG of 59% Free-Ridership: 41% Spillover: 0% Method: Customer self-report.																				
EPY5	SAG consensus: Retrospective evaluation																				
EPY6	SAG consensus: <ul style="list-style-type: none"> • 0.59 																				
EPY7	<p>NTG: 0.99</p> <p>Free Ridership: Participant 0.41; Trade ally 0.25; Average = 0.33 (EPY4 participant survey and EPY5 participating trade ally surveys) Participant Spillover: 0.12 from participating trade ally survey Nonparticipant Spillover: 0.20 from nonparticipant trade ally survey.</p> <p>Ameren HVAC. Very similar values for spillover. (0.1 and 0.22). Free-Ridership varies from 44% to 69%.</p> <p>The overall program NTG was calculated by averaging the EPY4 participant and the EPY5 trade ally Free-Ridership rates, and then adding the EPY4 participant spillover, and EPY5 participating trade ally and non-participating trade ally spillover, as follows:</p> $NTG_{Program} = 1 - \frac{(FR_{part.} + FR_{TA})}{2} + SO_{part.} + SO_{part.TA} + SO_{Non-Part.TA}$ <p>Where NTGProgram = Program NTG FRPart. = Participant Free-Ridership FR_{TA} = Trade Ally Free-Ridership SO_{Part.} = Participant Spillover SO_{PartTA} = Participating TA Spillover SO_{Non-PartTA} = Non-Participating TA Spillover</p> <p><u>Finding:</u> The NTG rate found in this evaluation is 99% combining participant free ridership (0.41), trade ally free ridership (0.25), and spillover (0.12 participating trade ally and 0.20 nonparticipating trade ally).</p> <p style="text-align: center;">Participating Trade Ally Free Ridership and Spillover</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Sales Weighted Free-Ridership</th> <th style="text-align: center;">Sales Weighted Spillover</th> <th style="text-align: center;">N</th> </tr> </thead> <tbody> <tr> <td>Highest Volume Trade Allies</td> <td style="text-align: center;">0.21</td> <td style="text-align: center;">0.12</td> <td style="text-align: center;">13</td> </tr> <tr> <td>Medium Volume Trade Allies</td> <td style="text-align: center;">0.34</td> <td style="text-align: center;">0.10</td> <td style="text-align: center;">18</td> </tr> <tr> <td>Lowest Volume Trade Allies</td> <td style="text-align: center;">0.35</td> <td style="text-align: center;">0.20</td> <td style="text-align: center;">18</td> </tr> <tr> <td>All Participating Trade Allies</td> <td style="text-align: center;">0.25</td> <td style="text-align: center;">0.12</td> <td style="text-align: center;">49</td> </tr> </tbody> </table> <p style="text-align: center;">Source: Evaluation Team analysis.</p>		Sales Weighted Free-Ridership	Sales Weighted Spillover	N	Highest Volume Trade Allies	0.21	0.12	13	Medium Volume Trade Allies	0.34	0.10	18	Lowest Volume Trade Allies	0.35	0.20	18	All Participating Trade Allies	0.25	0.12	49
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	COMPLETE SYSTEM REPLACEMENT (HEER)						
	Non-Participant Trade Ally Spillover						
	<table border="1"> <thead> <tr> <th style="background-color: #808080; color: white;">Non-Part TA SO Savings (kWh)</th> <th style="background-color: #808080; color: white;">Program Savings</th> <th style="background-color: #808080; color: white;">Non-Part TA SO Rate</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">598,288</td> <td style="text-align: center;">3,011,855</td> <td style="text-align: center;">0.20</td> </tr> </tbody> </table>	Non-Part TA SO Savings (kWh)	Program Savings	Non-Part TA SO Rate	598,288	3,011,855	0.20
Non-Part TA SO Savings (kWh)	Program Savings	Non-Part TA SO Rate					
598,288	3,011,855	0.20					
EPY8	<p>Recommendation (based upon PY7 NTG recommended values): NTG: 0.99 Free-Ridership with Gas Participant: 0.41 Free-Ridership with Gas TA: 0.25 TA Spillover (Participant): 0.12 TA Spillover (Non-Participant): 0.20</p> <p>There was no additional NTG research conducted for EPY6. The recommended value is the same as the PY7 recommendation.</p>						
EPY9	<p>NTG: 0.99 Free-Ridership with Gas Participant: 0.41 Free-Ridership with Gas TA: 0.25 TA Spillover (Participant): 0.12 TA Spillover (Non-Participant): 0.20</p> <p>NTG Source: PY7 SAG consensus value (no new research)</p>						
EPY10	Converted to calendar year 2018, Program replaced in PY7 with Heating, Cooling, and Weatherization Rebates						

	Heating, Cooling and Weatherization Rebates
CY2018	<p>Heating and Cooling NTG Central AC: 0.69 Free-Ridership Central AC: 0.43 TA Spillover (Participant) Central AC: 0.12</p> <p>NTG Source for Central AC: Free-Ridership: PY8 participant self-report survey TA Spillover (Participant): PY7 SAG consensus value for CSR</p> <p>PY7 SAG consensus value for non-participant spillover for CSR is not applicable here because those savings are likely now captured by the new stand-alone CAC program. Navigant interviewed participating trade allies as part of the CSR evaluation and found the non-participant spillover was from ComEd customers who needed and got a new high efficiency CAC but did not need or get a new furnace, thus they did not do a “complete system replacement” and were not eligible for the incentive. The trade allies reported a substantial share of sales in high efficiency CAC that did not get an incentive because the customer did not do a CSR. We counted that as spillover. Now, however, with the Heating, Cooling, and Weatherization Program, ComEd customers can get an incentive when they replace just the</p>

	Heating, Cooling and Weatherization Rebates
	<p>CAC, and thus the NPSO we found for the old CSR program is probably being captured by the new program.</p> <p>NTG Advanced Thermostat: NA The savings value in the IL TRM is based on regression analysis on consumption data and thus is a net savings number.</p> <p>NTG Air Source Heat Pump: 0.57, based upon 2013 Navigant research for Duke. NTG Ductless Mini-Split: 0.68, based upon average for 5 utilities cited in 2016 study for Wisconsin Focus on Energy. NTG ECM Furnace Motor – with Furnace Upgrade: 0.68, based upon GPY5 Navigant research for Nicor Gas NTG ECM Furnace Motor – without Furnace Upgrade: 0.80, default value NTG Geothermal Heat Pump: 0.59, based upon 2013 Ameren IL Study, Res Home Rebate Program NTG Heat Pump Water Heater: 0.76, based upon 2013 Navigant research for Duke</p> <p>"2013 EM&V Report for the Home Energy Improvement Program" Duke Energy, July 2015. http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=b94770a2-2d4a-427d-9c50-b09fd11096ed</p> <p>"Ductless Mini-Split Heat Pump Market Assessment and Savings Review Report" for Wisconsin Focus on Energy, December 30, 2016. https://focusonenergy.com/sites/default/files/research/Focus%20EERD%20DMSHP%20Final%20Report_30Dec2016.pdf</p> <p>Weatherization NTG: 1.01 Free-Ridership: 0.10 Participant Spillover: 0.11 NTG Source: Free-Ridership: PY7 SAG consensus value for the Home Energy Assessments program, which was based on participant surveys in EPY4 and EPY5 and trade ally surveys in EPY5.</p>

	Heating, Cooling and Weatherization Rebates
CY2019	<p>Heating and Cooling NTG Central AC: 0.65 Free-Ridership Central AC: 0.43 Participant Central AC: 0.08</p> <p>NTG Source for Central AC: Free-Ridership: PY8 participant self-report survey Spillover: PY8 participant self-report survey</p> <p>NTG Advanced Thermostat: NA The savings value in the IL TRM is based on regression analysis on consumption data and thus is a net savings number.</p> <p>NTG Air Source Heat Pump: 0.57, based upon SAG consensus value. NTG Ductless Mini-Split: 0.68, based upon SAG consensus value. NTG ECM Furnace Motor – with Furnace Upgrade: 0.68, based upon SAG consensus value. NTG ECM Furnace Motor – without Furnace Upgrade: 0.80, based upon SAG consensus value. NTG Geothermal Heat Pump: 0.59, based upon SAG consensus value. NTG Heat Pump Water Heater: 0.76, based upon SAG consensus value.</p> <p>"2013 EM&V Report for the Home Energy Improvement Program" for Duke Energy, July 2015. http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=b94770a2-2d4a-427d-9c50-b09fd11096ed</p> <p>"Ductless Mini-Split Heat Pump Market Assessment and Savings Review Report" for Wisconsin Focus on Energy, December 30, 2016. https://focusonenergy.com/sites/default/files/research/Focus%20EERD%20DMSHP%20Final%20Report_30Dec2016.pdf</p> <p>Weatherization NTG: 1.01 Free-Ridership: 0.10 Participant Spillover: 0.11 Attic insulation and Air Sealing Only NTG: N/A NTG Source: Free-Ridership: PY7 SAG consensus value for the Home Energy Assessments program, which was based on participant surveys in EPY4 and EPY5 and trade ally surveys in EPY5. Spillover: SAG consensus value</p>

Source:

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Corrected_NTG_Values/ComEd_NTG_History_and_CY2019_Recommendations_Aerator_and_Showerhead_Correction_2019-04-12.pdf