

To: Vincent Gutierrez, ComEd  
 CC: Jennifer Morris, ICC Staff; Randy Gunn, Jeff Erickson, Nishant Mehta  
 From: Laura Agapay-Read, Peter Vigilante  
 Date: August 27, 2018  
 Re: Spillover Research Results from PY9 for the ComEd HVAC Rebate Program

## INTRODUCTION

This memo presents our spillover research results for the PY9 ComEd Heating and Cooling (HVAC) Rebates Program using the Illinois TRM version 6.0 methodologies.<sup>1</sup> The evaluation team conducted spillover research in Spring 2018 with a random selection of PY9 participants.

Table 1 below provides a summary of the HVAC Rebate Program PY9 participant spillover savings research findings. Overall 100 participant telephone surveys were completed. Navigant determined a spillover rate of 0.08 for the 100 respondents. Because the random sample is representative of the population, the spillover rate is 0.08 for the population of PY9 program participants.

**Table 1. Participant Spillover Results (PY9 Participants)**

Program Path	Participant Spillover kWh	Participant Spillover kW	Sample (n)
<b>HVAC Population Roll-Up</b>	<b>5,160.71</b>	<b>0.34</b>	<b>100</b>

*Source: Navigant analysis of data from a telephone survey with PY9 HVAC Rebate Program participants.*

## Spillover Comparison

For context, the deemed value for the 2018 HVAC Rebates Program for Participant Spillover is 0.12 for Central AC from PY7 evaluation research.

## PY9 SPILLOVER RESEARCH DATA COLLECTION

The evaluation team conducted PY9 spillover research using a customer self-report approach through a telephone survey with PY9 participants from a randomized sample of 991 participants with unique account names. The survey achieved the target number of completes with 100 actual completes.

## Participant Spillover Estimation

The telephone survey asked respondents if they had installed additional electricity savings measures to reduce energy consumption since participating in the Heating and Cooling Rebates Program. Navigant included questions to identify spillover candidates and estimate savings, paraphrased below:

<sup>1</sup> Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 6.0, Volume 4: Cross-Cutting Measures and Attachments, effective January 1<sup>st</sup>, 2018.

1. Since participating in the program, did you make additional energy efficiency improvements that were not rebated by a utility program?
2. How much influence did your participation in the program have on your making additional energy efficiency improvements?
  - a. On a zero to ten scale, where zero is not at all important and ten is extremely important, how important was your participation in the Rebates program on your decision to purchase these additional electricity saving services or equipment? [Attribution Score 1.]
  - b. If you had not participated in the Rebates program, how likely is that you would have purchased the additional electricity services or equipment? Please use a zero to ten scale, where zero means that you definitely would not have purchased them and ten means that you definitely would have purchased them? [Attribution Score 2.]
3. What were the details of the energy efficiency improvements (equipment, efficiency level, quantity, etc.)?

The evaluation attributed spillover to the Heating and Cooling Rebates Program if the following condition is met: the average of Attribution Score 1 and (10 minus Attribution Score 2) must exceed 5.0.

Of the 100 survey respondents, 39 respondents reported that they installed additional energy efficient equipment not incented by the program, and 32 of them indicated that participating in the program influenced them to make these additional purchases. Navigant determined that 15 out of the 32 potential spillover candidates had averaged attribution scores greater than five, and six of them installed equipment with quantifiable electricity savings. The table below lists these respondents' improvements and electricity savings:

**Table 2. PY9 HVAC Rebate Spillover Research Results by Measure**

End-use Measure	kWh	kW	Quantity
Windows	3,369.14	0.0008	3
Refrigerator	696.10	0.1049	1
LED Light Bulbs	341.71	0.0427	29
Clothes Washer	325.54	0.0839	2
Clothes Dryer	160.44	0.0215	1
Smart Thermostat	160.03	0.0768	1
Freezer	46.90	0.0076	1
Showerheads	41.26	0.0038	1
Dish Washer	19.60	0.0020	1
<b>Total</b>	<b>5,160.71</b>	<b>0.3441</b>	<b>40</b>

Source: Navigant analysis of data from a telephone survey with PY9 HVAC Rebate Program participants.

Table 3 shows the distribution of electric spillover savings among the five respondents. Over 70% of the energy savings was achieved by the installation of windows and LED lighting; the remainder was achieved by the installation of high efficiency appliances.

**Table 3. PY9 HVAC Rebate Spillover Research Results by Respondent**

Participant	Measure(s) Installed	Spillover kWh	Proportion of Total kWh Spillover	Spillover kW	Proportion of Total kW Spillover
Respondent 1	LEDs, Windows	1,405.84	27%	0.04	10%
Respondent 2	Windows	1,123.05	22%	0.0003	0.1%
Respondent 3	Windows	1,123.05	22%	0.0003	0.1%
Respondent 4	Dish Washer, Refrigerator, Freezer	762.60	15%	0.11	33%
Respondent 5	Clothes Washer, Clothes Dryer, LEDs, Showerheads	423.38	8%	0.07	22%
Respondent 6	Clothes Washer	162.77	3%	0.04	12%
Respondent 7	Smart Thermostat	160.03	3%	0.08	22%
<b>Total</b>	-	<b>5,160.71</b>	-	<b>0.3441</b>	-

Source: Navigant analysis of data from a telephone survey with PY9 HVAC Rebate Program participants.

The energy savings from these improvements amount to 8% of program savings for the 100 respondents. Because the 100 were selected as a simple random sample, their spillover savings rate is representative of the population of PY9 program participants.

**Table 4. Spillover Calculations**

Spillover	kWh		Spillover	kW	
	Ex Post	Spillover Rate		Ex Post	Spillover Rate
5,160.7	68,176.85	<b>0.08</b>	0.34	24.58	<b>0.01</b>

Source: Navigant analysis of data from a telephone survey with PY9 HVAC Rebate Program participants and PY9 program tracking data.

## APPENDIX: COMED HVAC REBATE PROGRAM NTG HISTORY

	Heating, Cooling and Weatherization Rebates
PY 10	<p><b>Heating and Cooling</b>                      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 CAC, and thus the NPSO we found for the old CSR program is probably being captured by the new program.</p> <p>NTG Smart 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><b>"2013 EM&amp;V Report for the Home Energy Improvement Program" Duke Energy, July 2015.</b>  <a href="http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=b94770a2-2d4a-427d-9c50-b09fd11096ed">http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=b94770a2-2d4a-427d-9c50-b09fd11096ed</a></p> <p><b>"Ductless Mini-Split Heat Pump Market Assessment and Savings Review Report" for Wisconsin Focus on Energy, December 30, 2016.</b>  <a href="https://focusonenergy.com/sites/default/files/research/Focus%20EERD%20DMSHP%20Final%20Report_30Dec2016.pdf">https://focusonenergy.com/sites/default/files/research/Focus%20EERD%20DMSHP%20Fi                      nal%20Report_30Dec2016.pdf</a></p>

	<b>Heating, Cooling and Weatherization Rebates</b>
	<p><b>Weatherization</b>                  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>

Source: [http://ilsagfiles.org/SAG\\_files/NTG/2017\\_NTG\\_Meetings/Final/ComEd\\_NTG\\_History\\_and\\_PY10\\_Recommendations\\_2017-03-01.pdf](http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.pdf)

	<b>Complete System Replacement (HEER)</b>
PY1	CSR program not offered in EPY1
PY2	CSR program not offered in EPY1
PY3	CSR program not offered in EPY1
PY4	Retroactive application of NTG of 59% Free-Ridership: 41% Spillover: 0% Method: Customer self-report.
PY5	SAG consensus: Retrospective evaluation
PY6	SAG consensus: <ul style="list-style-type: none"> <li>• 0.59</li> </ul>
PY7	<p><b>NTG: 0.99</b></p> <p><b>Free Ridership: Participant 0.41; Trade ally 0.25; Average = 0.33</b>                  (EPY4 participant survey and EPY5 participating trade ally surveys)  <b>Participant Spillover: 0.12</b> from participating trade ally survey  <b>Nonparticipant Spillover: 0.20</b> from nonparticipant trade ally survey.</p> <p><b>Ameren HVAC.</b> 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<sub>TA</sub> = Trade Ally Free-Ridership                  SO<sub>Part.</sub> = Participant Spillover                  SO<sub>PartTA</sub> = Participating TA Spillover                  SO<sub>Non-PartTA</sub> = Non-Participating TA Spillover</p>

<b>Complete System Replacement (HEER)</b>																											
	<p><b>Finding:</b> 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;"><b>Participating Trade Ally Free Ridership and Spillover</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 20%;">Sales Weighted Free-Ridership</th> <th style="width: 20%;">Sales Weighted Spillover</th> <th style="width: 10%;">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><b>All Participating Trade Allies</b></td> <td style="text-align: center;"><b>0.25</b></td> <td style="text-align: center;"><b>0.12</b></td> <td style="text-align: center;"><b>49</b></td> </tr> </tbody> </table> <p style="margin-left: 40px;">Source: Evaluation Team analysis.</p> <p style="text-align: center;"><b>Non-Participant Trade Ally Spillover</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Non-Part TA SO Savings (kWh)</th> <th style="width: 33%;">Program Savings</th> <th style="width: 33%;">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>		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	<b>All Participating Trade Allies</b>	<b>0.25</b>	<b>0.12</b>	<b>49</b>	Non-Part TA SO Savings (kWh)	Program Savings	Non-Part TA SO Rate	598,288	3,011,855	0.20
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PY8	<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>																										
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