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From: Sharon Mullen, Charles Ampong, Kevin Grabner, Navigant

CC: Randy Gunn, Rob Neumann, Jeff Erickson, Navigant

Date: May 26, 2017

Re: Net-to-Gross Research Results from GPY6 for the Peoples Gas and North Shore Gas Home Energy Rebate Program

This memo presents our free ridership and spillover research results for the GPY6 Peoples Gas (PGL) and North Shore Gas (NSG) Home Energy Rebate Program using the Illinois TRM version 6.0 methodologies.<sup>1</sup> The net-to-gross (NTG) research was conducted in April and May 2017 to augment the GPY5 research findings through additional data collection and surveys completed with GPY6 participants and trade allies. The focus of the GPY6 research was capturing a representative sample of insulation, air sealing, and duct sealing (“weatherization”) participants that had little representation in the GPY5 research. The GPY6 participant free ridership and spillover results and the trade ally spillover results provide new findings that were not available during GPY7 NTG deeming discussions that were held in February 2017.<sup>2</sup>

Table 1 below provides a summary of the Home Energy Rebate Program GPY6 participant free ridership and spillover research findings. The estimations at the end-use level are rolled up to the population level by program path, using a ratio estimation method based on the therms weight of the end-use categories. Overall, 160 participant interview were completed, including 86 weatherization and 74 HVAC equipment respondents. Navigant completed 60 trade ally interviews – six weatherization and 54 HVAC – and determined a spillover rate of 0.01 when rolled up to the trade ally (TA) population for the program.

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<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.

<sup>2</sup> The final GPY7 deemed values for PGL and NSG from March 1, 2017 contain the following note added during the SAG discussions: “The GPY5 research did not have a representative mix of duct sealing, air sealing and insulation measures, which contribute significant portions of the PGL & NSG program savings. Navigant concludes the GPY5 overall Home Energy Rebate Program NTG (0.64) is not reasonable for duct sealing, air sealing, and insulation. Duct sealing, air sealing, and insulation FR and PSO research is planned for the first half of 2017. Navigant may recommend updated free ridership and spillover values using data from the PGL & NSG Home Energy Rebate Program survey planned for the first half of 2017 if results are final prior to May 30, 2017.” The March 1, 2017 GPY7 NTG values are available at: [http://www.ilsag.info/ntg\\_2017.html](http://www.ilsag.info/ntg_2017.html)

**Table 1. Participant Free Ridership and Spillover Results (GPY6 Participants)**

Program Path	End-use	Participant FR, (Weighted)	Participant SO††	Sample (n)	Relative Precision @90% CI
Weatherization					
	Air Sealing & Insulation	0.28		53	8%
	Duct Sealing	0.23		33	7%
	<b>Population Roll-up</b>	<b>0.26</b>	<b>0.00</b>	<b>86</b>	<b>6%</b>
HVAC/Other Equipment					
	Boiler	†		9	36%
	Furnace (>95% AFUE)	0.48		36	13%
	Water Heater	†		11	23%
	Programmable Thermostat	0.49		18	17%
	<b>Population Roll-up</b>	<b>0.49</b>	<b>0.00</b>	<b>74</b>	<b>9%</b>

Source: Navigant analysis of data from a telephone survey conducted by Navigant with GPY6 Home Energy Rebate Program participants.

† Free ridership results are not statistically significant due to the small number of responses.

†† Navigant estimated 0.002 participant spillover at the population level, reported as 0.00.

FR = Free Ridership; SO = Spillover

### Free Ridership Comparison

For comparison, the free ridership results we reported December 30, 2016 using GPY5 program participants and the draft TRM version 6.0 methodologies are presented below.

**Table 2. Participant Free Ridership Estimates (GPY5 Participants)**

Measure Category	Average FR	Responses
Furnace >95 AFUE ††	0.48	67
Boiler	†	1
Programmable Thermostat‡	0.64	38
Tankless Water Heater	†	9
Weatherization	†	4
Overall Home Energy Rebate Program	0.49	119

Source: Navigant analysis of data from an on-line survey conducted by Navigant with GPY5 Home Energy Rebate Program participants.

† Free ridership results are not statistically significant due to the small number of responses.

†† The GPY5 PG and NSG program offered rebates for one category of furnaces that are 95.0% AFUE and above.

‡ Programmable thermostats include basic programmable types.

For context, the deemed NTG ratio (NTGR) and component values for the GPY6 Home Energy Rebate Program are NTGR (0.81); Free ridership (0.30, from GPY1 research); Participant Spillover (0.00, from GPY1 research); and Non-Participant Spillover (0.11, from GPY2 research).

### GPY6 Free Ridership and Spillover Research Data Collection

The GPY6 free ridership and spillover research was conducted following a customer self-report approach through a telephone (CATI) survey with 160 GPY6 participants (86 participants with weatherization projects and 74 with HVAC/Other Equipment projects) from a randomized sample of 3,276 participants with unique account names. The counts for the completed participant interviews and sample design are outlined in Table 3.

In addition, Navigant completed telephone interviews with 60 program trade allies, including 54 HVAC trade allies and 6 weatherization trade allies. The counts for the completed trade ally interviews and sample design are outlined in Table 4.

**Table 3. Free Ridership and Spillover Research Decision Maker Survey Disposition**

Program Path	End-use	Unique Contacts	Target Completes	Actual Completes	FR Sample (n)
Weatherization					
	Air Sealing & Insulation	668	70	53	60*
	Duct Sealing	479	55	33	33
	<b>Weatherization Contacts</b>	<b>1,147</b>	<b>125</b>	<b>86</b>	<b>93</b>
HVAC/Other Equipment					
	Boiler	44	14	9	9
	Furnace (>95% AFUE)	1,928	36	36	36
	Water Heater	67	14	11	11
	Programmable Thermostat	90	15	18	18
	<b>HVAC Contacts</b>	<b>2,129</b>	<b>79</b>	<b>74</b>	<b>74</b>
<b>Overall Population</b>		<b>3,276</b>	<b>204</b>	<b>160</b>	<b>167</b>

Source: Home Energy Rebate Program GPY6 Tracking Data and evaluation analysis

\* Includes 7 respondents who indicated that prior to learning about the program, they planned to install only insulation, but the requirement to install air sealing to receive the insulation rebate influenced their decision to add the air sealing. These respondents were treated as having zero free ridership for the air sealing, but potential free ridership as determined for the insulation part.

**Table 4. Trade Ally Spillover Interview Disposition**

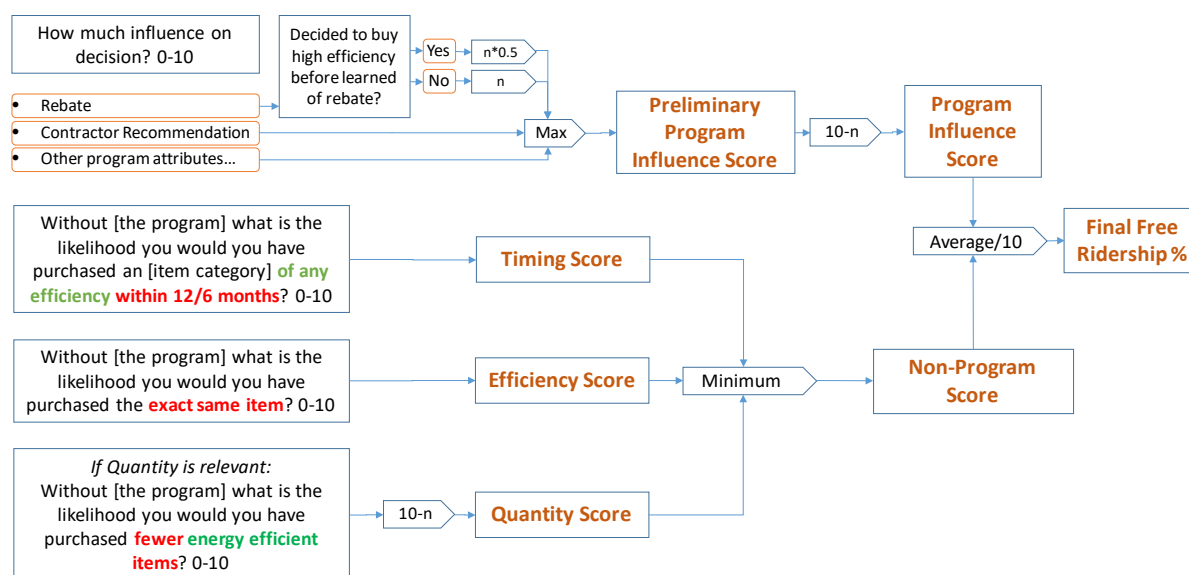
Program Path	Project Count	TA Unique Contacts	Targets Complete	Actual Completes
Weatherization	1,166	15	Census	6
HVAC	2,198	443	43	54
<b>Total Contacts</b>	<b>3,364</b>	<b>458</b>		<b>60</b>

Source: Home Energy Rebate Program GPY6 Tracking Data and evaluation analysis

### Free Ridership Estimates Using Algorithms in the TRM Version 6.0

The following diagram describes the TRM free ridership algorithms for residential rebate programs.

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



Source: Illinois TRM Version 6, Volume 4. Cross-Cutting Measures and Attachments, final February 8, 2017, effective January 1st, 2018.

Navigant applied the algorithm indicated by the TRM version 6.0 flow diagram to the data we collected from 160 GPY6 Home Energy Rebate Program participants. The TRM protocol allows the free ridership analysis to be conducted using two approaches based on whether the respondent decided to buy high-efficiency *before* learning of the rebate: option one (FR1) with no adjustment to the program rebate influence score if the respondent answered the question “No”, they had not decided to buy high efficiency before learning of the rebate; and option two (FR2) adjusting the rebate influence score by 0.5 for those answering the question “yes”, they had already decided to buy high efficiency prior to learning of the rebate.

Navigant found that free ridership was not affected or was higher for those respondents where the rebate influence score was adjusted, but the impact was minimal because the final free ridership score is not affected when program influence factors other than the rebate (e.g., the contractor recommendation) have higher influence than the rebate (or the rebate influence score times 0.5). This level of contractor

influence is expected given the program's reliance on trade allies to drive participation, and participants select weatherization contractors from a pre-approved list.

For weatherization, only 5 of the 86 participant free ridership scores were adjusted higher because of the rebate influence score adjustment. The overall difference was an increase in the air sealing and insulation free ridership from 0.28 to 0.29, but the duct sealing free ridership was unchanged at 0.23, and the impact on the combined weatherization free ridership was negligible, remaining unchanged at 0.26. The increase to the HVAC equipment free ridership was small but not negligible, going from 0.49 to 0.50, because 15 of 74 respondent free ridership scores were adjusted slightly higher.

Navigant recommends using the free ridership estimates without the 0.5 adjustment to the rebate influence score. The impact of the adjustment is minimal, and Navigant's GPY5 research and sensitivity analysis on the rebate influence adjustment found that many participants that decide to buy high efficiency before learning of the rebate tend to score rebate influence lower, making the additional 0.5 adjustment redundant.

### Participant Spillover Estimation

The respondents were asked if they have installed any additional natural gas savings measures to reduce the energy consumption at their property, since participating in the Home Energy Rebate Program. Navigant included questions to identify spillover candidates and measures, paraphrased below:

1. Since participating in the Home Energy Rebate Program, have you purchased and installed any additional gas saving measures that you did not receive any rebate for?
2. Did participating in the Home Energy Rebate Program influence you in any way to make these additional purchases?
3. 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 Rebate program on your decision to purchase these additional gas saving services or equipment? [Attribution Score 1.]
4. If you had not participated in the Rebate program, how likely is that you would have purchased the additional gas 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.]

Spillover was considered to be attributable to the Home Energy Rebate Program if the following condition is met: the average of Attribution Score 1 and (10 minus Attribution Score 2) must exceed 5.0. The evaluation identified 24 respondents from the 160 survey respondents who installed additional energy efficient equipment, but only six candidates indicated that participating in the Home Energy Rebate Program influenced them to make these additional purchases. Navigant determined that only two of the six potential spillover candidates had spillover averaged attribution scores greater than 5, and installed equipment with quantifiable gas savings (programmable thermostats).

Navigant estimated a 0.002 spillover rate for the two candidates in the sample, and the sample spillover rate when rolled to the population does not make a significant impact, and therefore the participant spillover attributed to the program should be reported as zero.

### Trade Ally Spillover Estimation

From interviews with the 60 trade allies, Navigant identified 16 who responded with a percentage of their sales that were potential spillover. To determine whether the sales were spillover, Navigant analyzed responses from additional questions including:

- Approximately what quantity or percentage of trade ally's total sales of EE equipment qualified for a Home Energy Rebate Program rebate,

- Approximately what percentage of customers or EE equipment did not receive a rebate through the program?
- Can you tell me why some customers did not receive a rebate through the program (open ended)?

Upon review of the TA responses and comparison with the open-ended reasons for customers not receiving rebates, Navigant determined that eight of the 16 identified TAs had potential spillover attribution, while the remaining eight indicated they either received rebates through Nicor Gas programs or the equipment did not actually qualify for the Home Energy Rebate Program.

Navigant calculated the percentages of the customers' savings attributed to the TA without rebates from the program and determined the spillover rate (0.01) when rolled up to the TA population. The TA spillover rate from the GPY6 TA interviews is recommended to be applied to the Home Energy Rebate Program NTG for future use.

### NTG Results

The NTG research results for Weatherization and HVAC/Other Equipment are summarized in Table 5.

**Table 5. Summary of Free Ridership, Spillover and NTGR Research Results for the Home Energy Rebate Program**

Program Path	End-use	FR†	PSO†	TSO†	NPSO††	NTGR
Weatherization						
	Air Sealing & Insulation	0.28		0.01	0.00	0.73
	Duct Sealing	0.23		0.01	0.00	0.78
	<b>Population Roll-up</b>	<b>0.26</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.75</b>
HVAC/Other Equipment						
	<b>Population Roll-up</b>	<b>0.49</b>	<b>0.00</b>	<b>0.01</b>	<b>0.11</b>	<b>0.63</b>

*Sources:*

† Navigant analysis of data from telephone surveys conducted by Navigant with GPY6 Home Energy Rebate Program participants and Trade Allies.

†† NPSO value for HVAC based on GPY2 Home Energy Rebate Program research. NPSO was not researched for weatherization.

FR = Participant Free Ridership; PSO = Participant Spillover; TSO = Trade Ally Spillover; NPSO = Non-Participant Spillover

$NTGR = 1 - FR + PSO + TSO + NPSO$

For context, the deemed NTG ratio (NTGR) and component values for the GPY7 Home Energy Rebate Program for HVAC and Other Equipment are NTGR (0.64); Free ridership (0.49, based on GPY5 participant research); Participant Spillover (0.02, based on GPY5 participant research from Nicor Gas); and Non-Participant Spillover (0.11, from GPY2 non-participating trade ally research).

The deemed NTG ratio (NTGR) and component values for the GPY7 Home Energy Rebate Program for Weatherization are NTGR (0.90); Free ridership (0.10); Participant Spillover (0.00); and Non-Participant Spillover (0.00). The free ridership was taken from the "Home Energy Savings Program GPY2/EPY5 Evaluation Report" prepared for Nicor Gas and ComEd (Navigant, 3/25/2014). Results for Nicor Gas for the weatherization component were: FR=0.10. No recommendation was made for deemed spillover.