



To: Peoples Gas and North Shore Gas

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Re: Peoples Gas and North Shore Gas Residential Nonparticipant Spillover Final 2023 Research Results - Final

1. Executive Summary

The objective of this research was to estimate residential nonparticipant spillover (NPSO) for Peoples Gas and North Shore Gas (PGL-NSG) using Illinois TRM version 11 Attachment A, Section 4.1.3 *Nonparticipant Spillover Measured from Customers*¹. The study was not a joint effort with other utilities, and the scope was limited to PGL-NSG. Guidehouse fielded the NPSO survey in July 2023 through an online survey sent to 49,895 randomly selected nonparticipants identified by analysis of PGL NSG tracking data. These results will inform Guidehouse’s September 2023 recommendations to the IL Stakeholder Advisory Group (SAG) about NTG values to be used for 2024.² Table 1 summarizes the NPSO research findings.

Table 1. Net-to-Gross Research Results for Residential NPSO

Population Sector	NPSO Savings per Nonparticipant (Therms)	Residential Nonparticipant Population (Customers)	Total NPSO Therms	Total Evaluated Net Therms from 2021 Program Participants	NPSO Rate
Residential, Income-Ineligible	0.719	478,500	344,028	4,130,366	0.083

Source: Guidehouse 2023 residential NPSO research

¹ Available on the SAG web site: [IL Statewide Technical Reference Manual Version 11.0 - Illinois Energy Efficiency Stakeholder Advisory Group](https://ilsag.info) Illinois Energy Efficiency Stakeholder Advisory Group (ilsag.info)

² Per Illinois Energy Efficiency Policy Manual Version 2.1, Section 7.4, Free Ridership and Spillover, “a sector or Portfolio-level Spillover analysis should be considered by each utility at least once every Plan period when it is feasible and considered viable by evaluation.”

2. Survey Methodology

The study approach follows Illinois TRM version 11 Attachment A, Section 4.1.3 *Nonparticipant Spillover Measured from Customers*³.

1. The survey was conducted online with a large, randomly selected sample of residential customers who have not participated in any PGL-NSG residential energy efficiency programs, including behavioral or energy-saving kit programs, within the past three years, from the period January 1, 2020, to December 31, 2022. The residential nonparticipant population was identified by removing participants from the past three years, identified by account ID, from PGL-NSG residential customer account data. A random sample of 49,895 customers was selected from approximately 620,000 residential nonparticipants.
2. An invitation with a link to the survey was sent in two waves, 499 during the soft launch and 49,396 during the full launch, with a quota of 400 survey-confirmed nonparticipant responses. A \$10 incentive gift card was offered to survey-confirmed respondents to complete the survey.
3. The survey asked respondents about their participant status regarding energy efficiency rebate programs, kit offerings, the Home Energy Reports behavioral program, and elementary energy education kits brought home from schools. The survey screened-out customers who reported program participation.
4. The survey followed the TRM protocol to identify candidates for NPSO by confirming awareness of PGL-NSG energy efficiency programs and marketing messages.
5. NPSO candidates were asked whether they had undertaken any energy efficiency improvements within the past twelve months that save natural gas. A list of measures (including Water Heater, Faucet Aerators, Low Flow Showerheads, Water Heater Temperature Setback, Water Heater Pipe Insulation, Reduce Water Temperature for Clothes Washer and Dishwasher, ENERGY Star Clothes Washer, ENERGY Star Dishwasher, High Efficiency Gas Furnace, High Efficiency Gas Boiler, Programmable/Smart Thermostat, Furnace Tune-up, Duct Sealing, Duct Insulation, Air Sealing, Wall/Attic Insulation, Weatherstripping, and respondent-specified "other") was presented for selection. An additional screen ensured the respondent's measures did not receive rebates or were free products from PGL-NSG.
6. For each selected measure, NPSO candidates were asked the two-factor TRM attribution scoring (zero to 10 scale) for influence (attribution score 1) and a counterfactual likelihood (attribution score 2). Influence was presented in four scenarios:
 - Information from a contractor or retailer about the PGL-NSG Energy Efficiency Program's offerings
 - Information that PGL-NSG provided through print, email, or online about saving energy

³ Available on the SAG web site: <https://www.ilsag.info/technical-reference-manual/il-statewide-technical-reference-manual-version-10-0/>

- Information from a friend or family member who participated in the PGL-NSG Energy Efficiency Program
 - Personal experience previously participating in the PGL-NSG Energy Efficiency Program
7. NPSO candidates with a spillover score passing the attribution threshold proceeded to a measure savings estimation battery for each measure passing the attribution scoring. The formula to determine the Spillover Score (per the TRM v11) is:

$$\text{Spillover Score} = (\text{Attribution Score 1} + (10 - \text{Attribution Score 2})) / 2$$

The TRM v11 defines Attribution Score 1 as “The influence level (on a scale of 0 to 10, where 10 is extremely influential and 0 is not at all influential) the Program Administrator had on the decision to purchase the measure.” Attribution Score 2 is “the likelihood (on a scale of 0 to 10, where 10 is highly likely and 0 is not at all likely) that the customer would have installed the measure had they not been influenced by the program.” To have savings attributed to PGL-NSG, a respondent’s Spillover Score must be greater than 5.0.

8. For each measure passing the attribution scoring threshold, respondents were asked the questions needed to quantify measure savings using TRM v11. The measure questions establish quantities and efficiency characteristics.
9. After completing the TRM measure questions, respondents were asked three demographic questions: type of home, number of people living in the home year round, and household income.

The survey disposition and analysis of the responses are described below.

3. Survey Disposition

Table 2 presents the survey disposition.

Table 2. Survey Disposition for Residential NPSO Survey

Disposition	PG	NSG	Total
Completed survey ⁴	899	198	1,097
Ineligible survey ⁵	1,149	233	1,382
Incomplete survey ⁶	233	49	282
Not Started/Not Delivered	40,901	6,233	47,134
Total Participants Invited	43,182	6,713	49,895

Source: Guidehouse 2023 residential NPSO research

⁴ A completed survey is a survey response from a confirmed, non-income-eligible, nonparticipant in a PGL-NSG efficiency program, regardless of their program awareness or if they implemented SO measures.

⁵ An ineligible survey is a survey response from a self-reported participant in PGL-NSG program. A substantial number of these respondents (910) reported being either a Home Energy Reports recipient, an EEE school kit recipient, or a rebate recipient. Guidehouse interprets these as likely recipients of ComEd Home Energy reports, which the survey did not distinguish in the screening. The EEE program does not collect customer information from recipients, and it was necessary to screen them out as a part of the survey.

⁶ Started, but did not finish the survey through completion.

It was necessary to remove nonparticipants who were eligible for income-eligible programs from the 1,180 nonparticipants.⁷ Guidehouse made its best efforts to identify those who qualify for income-eligible programs (<80% of area median income, AMI) versus those who do not. The survey asked for income in ranges, and Guidehouse received responses from 334 of the 1,180 respondents. Assuming respondents income is the midpoint of the income range they indicated (e.g., if the range is \$50,000 to \$100,000, the assumed income is \$75,000), 98 (29%) of the 334 respondents were in the income-eligible population. Guidehouse did not include any spillover from the 98 respondents who met the income eligible definition.

4. NPSO Analysis

The evaluation team applied the approach described in TRM v11 to estimate NPSO savings, using respondent data, PGL-NSG customer account data, and 2022 impact evaluation results.

4.1 NPSO Measure Savings from Survey Respondents

For each measure with a passing spillover threshold score, respondents provided information through the online survey to quantify measure savings using TRM v11. The measure questions established quantities and efficiency characteristics. Table 4-2 in the TRM residential NPSO section (Figure 1) shows how gas savings per surveyed customer is calculated. Column F shows the average savings per surveyed customer, determined by dividing the total allocated savings (sum of column E) by the number of completed surveys by income-ineligible nonparticipants.

Figure 1. Table 4-2 from TRM v11

The table shows how kWh NPSO savings would be calculated; calculations of therm or demand savings would be accomplished in the same manner.

Table 4-2. Estimation of Respondents' NPSO Savings

A	B	C	D	E	F
Spillover Measure	Spillover Score	Measure Savings (kWh)	Allocated Savings	Total kWh Savings	Average kWh Per Surveyed Customer
Measure1	Scale of 0 to 10	Savings1	100% if [B] > 5.0	[C] x [D]	N/A
Measure2	Scale of 0 to 10	Savings2		[C] x [D]	
MeasureN	Scale of 0 to 10	SavingsN	0% if [B] ≤ 5.0	[C] x [D]	
				Sum of column E = Total kWh Savings	Total kWh Savings ÷ Number of Completed Surveys

Of the 1,082 income-ineligible residential nonparticipant respondents, 46 passed all spillover screening criteria to qualify for NPSO with one or more measures.⁸ Evaluation team engineers quantified gross therm savings for each measure using TRM v11 and engineering judgement where participants included open-ended descriptions. Once measure savings were estimated, it

⁷ Per the Illinois Energy Efficiency Policy Manual Version 2.1: "There has been general consensus among Illinois stakeholders that the NTG Ratio for most Income-Eligible Programs is not likely to be significantly different from 1.0, particularly where the person making the participation decision is the Low Income Customer. Therefore, Evaluators will not perform NTG research for Income-Eligible Programs unless the SAG and Income Qualified Advisory Committees consensus concludes that there is value in performing the NTG research."

⁸ A total of 74 respondents passed the NPSO screening criteria and all provided income information. 32 respondents were income eligible, while 42 were not.

was necessary to review each measure to ensure spillover is not double counted with other program NTG estimates⁹. The evaluation team concluded that high-efficiency furnaces and boiler measures identified in the residential NPSO survey would be double counted with nonparticipant inactive trade ally spillover from the Home Energy Rebates Program. Based on our residential NPSO survey findings, one energy-efficient furnace and one energy efficiency boiler was present in the qualifying survey responses, so Guidehouse removed both measures from the final SO savings to avoid double counting.

Table 3 and Table 4, based on Table 4-2 in the TRM residential NPSO section, show how gas savings per surveyed customer is calculated for PGL and NSG, respectively. Columns A, B, and C describe the spillover measure, the spillover score for the specific measure, and the therm savings, respectively. All measures shown in Table 3 passed the spillover threshold and 100% of therms for each measure were allocated to the total therms saved. Column F shows the average savings per surveyed customer, determined by dividing the total allocated savings (sum of column E) by the number of completed surveys.

Table 3. Estimation of Respondents’ NPSO Savings – PGL

A	B	C	D	E	F	
Spillover Measure	Spillover Score	Measure Savings (therms)	Allocated Savings	Total Therms Saved	Average Therms per Survey Customer	
Water Heater	6.8	64	100%	64		
Faucet Aerators	6.9	38	100%	38		
Low Flow Showerheads	5.7	51	100%	51		
Water Heater Temperature Setback	6.9	14	100%	14		
Water Heater Pipe Insulation	7.8	20	100%	20		
Reduce Water Temperature for Clothes Washer and Dishwasher	6.8	18	100%	18	899 Surveyed Nonparticipants	
ENERGY Star Clothes Washer	5.5	8	100%	8		
ENERGY Star Dishwasher	6.5	1	100%	1		
Programmable/Smart Thermostat	6.3	135	100%	135		
Furnace Tune-up	6.8	107	100%	107		
Duct Sealing	6.6	3	100%	3		
Air Sealing	5.5	4	100%	4		
			TOTAL	519		0.58

⁹ For PGL NSG, the Home Energy Rebates Program has a 11% nonparticipant trade ally spillover adder from primary research, consisting of high efficiency boilers and furnaces.

Source: Guidehouse 2023 residential NPSO research

Table 4. Estimation of Respondents' NPSO Savings – NSG

A	B	C	D	E	F
Spillover Measure	Spillover Score	Measure Savings (therms)	Allocated Savings	Total Therms Saved	Average Therms per Survey Customer
Faucet Aerators	7.5	11	100%	11	199 Surveyed Nonparticipants
Reduce Water Temperature for Clothes Washer and Dishwasher	6.0	3	100%	3	
Programmable/Smart Thermostat	8.0	214	100%	214	
Furnace Tune-up	6.0	42	100%	42	
TOTAL				270	1.36

Source: Guidehouse 2023 residential NPSO research

4.2 NPSO Population Analysis

The TRM describes the procedure for estimating total NPSO generated by the Program Administrator (PGL-NSG) during the program year in Table 4-3 of the NPSO section (Figure 2). The savings attributed from the survey population is extrapolated to the income-ineligible, non-participating residential customer population to determine the overall NPSO savings. Then NPSO energy savings is converted into a rate using the total evaluated therm savings for the program year.

Figure 2. Table 4-3 from TRM v11

Table 4-3 shows the process for estimating total NPSO generated by the Program Administrator during the program year (for electric savings). The savings attributed from the survey population will be extrapolated to the nonparticipating residential customer population to determine the overall NPSO savings. Then NPSO energy savings will be converted into a percentage using the total evaluated electric savings for the program year. A similar process would apply for calculating therm or demand NPSO.

Table 4-3. Calculation of Total NPSO Generated

Variable	Description	Source/Calculation
F	Average kWh Energy Savings per Surveyed Customer	Survey data and Savings Calculation
J	Total Nonparticipating Residential Population	Customer database
K	NPSO MWh Energy Savings Extrapolated to Nonparticipating Population	$[F \times J] \div 1,000 \text{ kWh/MWh}$
S	Total Evaluated MWh Savings	Residential Portfolio Savings
G	NPSO Spillover Rate	$K \div S$

The evaluation team estimated the total non-participating residential population through several steps. PGL-NSG provided residential population account information for customers using

Service Classification No. 1.¹⁰ This service classification includes individually metered single-family households including owners and renters, plus individually metered multi-family customers. Of 853,585 residential accounts, PGL-NSG provided account data (account ID, first name, last name) for 623,458 customers (73% of residential accounts based on account IDs) that had not participated in a PGL-NSG energy efficiency offering in the previous three years, from January 1, 2020, through December 31, 2022.

The nonparticipant account population included income-eligible customers, defined as customers with a pre-tax household income less than 80% of Area Median Income, that needed to be removed from the sample. PGL-NSG estimates that 21%¹¹ of their residential accounts are income eligible under this definition. The evaluation team assumed income-eligible accounts were uniformly distributed between participants and nonparticipants. Therefore, the team reduced the 623,458, nonparticipant population by 130,926 (21%) accounts, leaving 492,532 income-ineligible, nonparticipant accounts (based on account ID).

The 623,458 customer nonparticipant count did not remove any of the 42,142 total participants from 2020 through 2022 in the Elementary Energy Education (EEE) program. This program did not collect customer identifying information, and prior to 2022, assumed that EEE participation was uniformly distributed among participants and nonparticipants. Beginning in 2022, the program implementer identified schools as primarily serving income-eligible participants, thus there is an estimate for the number of kits distributed to income-eligible customers. Guidehouse assumed that EEE participants were split between income-eligible and income-ineligible in the same proportion as the total residential population for 2020 and 2021, resulting in 4,245 income eligible (21%) and 15,965 income-ineligible EEE participants. During 2022, there were an additional 18,686 income-eligible EEE participants and 3,246 income-ineligible participants. In total, there were 19,211 income-ineligible EEE participants from 2020 to 2022.

Guidehouse assumed the income-ineligible EEE participants were uniformly distributed between the participants (meaning they participated in EEE and other programs) and nonparticipants. Therefore, Guidehouse removed 14,032 (73% of 19,211) accounts from the nonparticipant population under the assumption that they received an EEE kit. Removing 14,032 accounts from 492,532 accounts left a total non-participating residential population of 478,500 income-ineligible residential accounts.

The “Total Nonparticipating Residential Population”, which is Variable J from TRM Table 4-3 (See Figure 2), is 478,500 accounts. The calculations described above are presented in Table 5.

¹⁰ Guidehouse examined data comprehensive account data from PGL/NSG. The total number of unique premise numbers was 1,093,743, with 853,585 of those under rates PGL 1 or NSG 1.

¹¹ The proportion of non-income-eligible residential accounts for the study period was based on information provided by PGL/NSG from their Energy Efficiency Plan 4.0 filing. For the PGL/NSG residential market: 886,588 total households/accounts, 186,426 income-eligible accounts under 80% of AMI, which is 21% (186,426 / 886,588).

Table 5. Total Non-Participating Residential Population Calculation Summary

Population Category	Total Residential Population Account IDs	Account ID Participation Ratio	Estimated Income Eligible Population	Not Income Eligible Population Account IDs	2020-2022 Income Ineligible EEE	Not Income Eligible Population
Nonparticipants	623,458	73%	130,926	492,532	14,032	478,500
Participants	230,127	27%	48,327	181,800	5,179	
Total Residential Population	853,585		179,253	674,332	19,211	

Source: Guidehouse 2023 residential NPSO research

Table 6, based on Table 4-3 in the TRM residential NPSO section, shows how the gas savings per surveyed customer were extrapolated to the total nonparticipant residential population and expressed as an NPSO rate. The 0.083 NPSO rate is a multiplier on residential net savings and is not additive to individual program-level NTG values (e.g., a HER program NTG of 0.84 does not become 0.923). Each year, the NPSO rate of 0.083 will be multiplied by the program portfolio total residential net therms saved, and the resulting NPSO therms will be added to the portfolio total net therms.

Table 6. Estimation of Respondents' NPSO Savings

Variable	Description	Calculation
	Average Therm Energy Savings per Surveyed Customer	PG - 0.58 NSG - 1.36
	Number of Surveyed Nonparticipants	PG - 899 NSG - 199
F	Average Therm Energy Savings per Surveyed Customer - Combined ¹²	0.719
J	Total Non-participating Residential Population	478,500
K	NPSO Therm Savings Extrapolated to the Non-participating Population	344,028
S	Total Evaluated Net Therm Savings, Residential 2022 Programs ¹³	4,130,366
G	NPSO Rate (K / S)	0.083

Source: Guidehouse 2022 NPSO Research

By comparison, a 2021 residential sector study for Nicor Gas found savings of 0.52 therms per customer, for an NPSO rate of 0.046 on residential net Therm savings.

¹² Combined therms per participant was calculated as the weighted average of PGL and NSG values, weighted by number of respondents.

¹³ During CY2021, PGL achieved 3,190,225 net therms and NSG achieved 940,141 net therms for the residential sector.