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|  | C&I and Public Custom Impact Evaluation ReportEnergy Efficiency Plan: Program Year 2024 (1/1/2024-12/31/2024) |
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Table of Contents

[3. Introduction 1](#_Toc196745990)

[4. Program Description 1](#_Toc196745991)

[5. Program Savings Detail 2](#_Toc196745992)

[6. Program Savings by Measure 3](#_Toc196745993)

[7. Impact Analysis Findings and Recommendations 5](#_Toc196745994)

[7.1 Impact Parameter Estimates 5](#_Toc196745995)

[7.2 Findings and Recommendations 5](#_Toc196745996)

[Appendix A. Appendix A. Impact Analysis Methodology A-1](#_Toc196745997)

[Appendix B. Appendix B. Program Specific Inputs for the Illinois TRC B-1](#_Toc196745998)

List of Tables, Figures, and Equations

[Table 1. 2024 Volumetric Summary for PGL 1](#_Toc196746096)

[Table 2. 2024 Volumetric Summary for NSG 2](#_Toc196746097)

[Table 3. 2024 Annual Energy Savings Summary for PGL 2](#_Toc196746098)

[Table 4. 2024 Annual Energy Savings Summary for NSG 2](#_Toc196746099)

[Table 5. 2024 Annual Energy Savings by Measure for PGL 3](#_Toc196746100)

[Table 6. 2024 Annual Energy Savings by Measure for NSG 4](#_Toc196746101)

[Table 7. Verified Gross Savings Parameters 5](#_Toc196746102)

[Table A‑1. Profile of Gross Impact Sample for Custom Projects A-1](#_Toc196745984)

[Table A‑2. Gross Realization Rates and Relative Precision at 90% Confidence Level A-2](#_Toc196745985)

[Table A‑3. PGL and NSG 2024 Summary of Sample M&V Results A-2](#_Toc196745986)

[Table B‑1. Verified Cost Effectiveness Inputs – PGL B-1](#_Toc196745987)

[Table B‑2. Verified Cost Effectiveness Inputs – NSG B-2](#_Toc196745988)

# Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2024 Custom programs. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. Program year 2024 covers January 1, 2024 through December 31, 2024.

# Program Description

The Custom program provides PGL and NSG private sector commercial and industrial (C&I) and public sector (PS) customers with rebates on a custom basis; these are applications for measures not covered under the Prescriptive Rebate path. Typical market sectors for this program include larger customers in light and heavy manufacturing, hospitals, hotels, public sector facilities, and other process heating intensive businesses.

Custom rebates are on a dollar per therm basis, subject to payback and project cost limitations. PGL and NSG may revise eligible measures and incentives as driven by current market conditions, changes to codes and standards, technology, evaluation results, and program management knowledge.

The PGL Custom program had 19 participants in 2024 and completed 27 projects as shown in the following table.

Table 1. 2024 Volumetric Summary for PGL

|  |  |  |  |
| --- | --- | --- | --- |
| **Participation** | **Private** | **Public** | **Total** |
| Participants \* | 12 | 7 | 19 |
| Installed Projects † | 19 | 8 | 27 |
| Measure Types Installed ‡ | 5 | 4 | 6 |

\* Participants are defined as unique work order IDs

† Installed Projects are defined as unique retrofit for each participant

‡ Total Measure Types Installed is less than the sum of individual sector Measure Types Installed due to same Measure Types in different building sectors.

Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

The NSG program had 4 participants in 2024 and completed 5 projects as shown in the following table.

Table 2. 2024 Volumetric Summary for NSG

|  |  |  |  |
| --- | --- | --- | --- |
| **Participation** | **Private** | **Public** | **Total** |
| Participants \* | 2 | 2 | 4 |
| Installed Projects † | 3 | 2 | 5 |
| Measure Types Installed  | 2 | 1 | 3 |

\* Participants are defined as unique work order IDs

† Installed Projects are defined as unique retrofit for each participant

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

# Program Savings Detail

Table 3 summarizes the energy savings the PGL Custom program achieved in 2024.

Table 3. 2024 Annual Energy Savings Summary for PGL

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Program Category** |  **Ex Ante Gross Savings (Therms)**  | **Verified Gross RR\*** |  **Verified Gross Savings (Therms)**  |  **NTG†**  |  **Verified Net Savings (Therms)**  |
| Private, Non-Disadvantaged Communities |  200,683  | 99% |  199,454  |  0.74  |  147,596  |
| Private, Disadvantaged Communities |  97,967  | 97% |  95,202  |  1.00  |  95,202  |
| Public, Non-Disadvantaged Communities |  21,058  | 95% |  20,044  |  0.92  |  18,440  |
| Public, Disadvantaged Communities |  127,049  | 101% |  127,786  |  1.00  |  127,786  |
| **Total or Weighted Average** |  **446,756**  | **99%** |  **442,486**  |  |  **389,024**  |

\* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† NTG, Net to Gross is the deemed value available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>. Based on SAG Policy, participants in disadvantaged communities (DAC) based on their census tract and with consumption under 35,000 Therms are assigned a NTG of 1.00.

Source: Evaluation team analysis.

Table 4 summarizes the energy savings the NSG Custom Program achieved by path in 2024.

Table 4. 2024 Annual Energy Savings Summary for NSG

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Program Category** |  **Ex Ante Gross Savings (Therms)**  | **Verified Gross RR\*** |  **Verified Gross Savings (Therms)**  |  **NTG†**  |  **Verified Net Savings (Therms)**  |
| Private, Non-Disadvantaged Communities |  15,109  | 94% |  14,252  |  0.74  |  10,547  |
| Private, Disadvantaged Communities |  7,084  | 94% |  6,682  |  1.00  |  6,682  |
| Public, Non-Disadvantaged Communities |  274  | 99% |  271  |  0.92  |  249  |
| Public, Disadvantaged Communities |  543  | 99% |  536  |  1.00  |  536  |
| **Total or Weighted Average** |  **23,010**  | **94%** |  **21,742**  |  |  **18,014**  |

\* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† NTG, Net to Gross is the deemed value available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>. Based on SAG Policy, participants in disadvantaged communities (DAC) based on their census tract and with consumption under 35,000 Therms are assigned a NTG of 1.00.

*Source: Evaluation team analysis.*

# Program Savings by Measure

The Custom Program does not offer prescribed measures. The measures included in Table 5 and Table 6 are the custom measures processed through the Custom Program in PY2024. The realization rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of the Custom program projects. Realization rate findings for individual sampled projects are provided in Appendix A.

The PGL program includes 5 measures as shown in the following table. The Insulation and Boiler Condensate Recovery measures contributed the most savings.

Table 5. 2024 Annual Energy Savings by Measure for PGL

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Program Category** | **Savings Category** | **Ex Ante Gross Savings (Therms)** | **Verified Gross RR\*** | **Verified Gross Savings (Therms)** | **NTG†** | **Verified Net Savings (Therms)** |
| Private, Non-Disadvantaged Communities |  Insulation |  140,982  | 100% |  140,820  | 0.74 |  104,207  |
|  Waste Heat Recovery  |  34,714  | 101% |  35,064  | 0.74 |  25,948  |
|  Other  |  24,987  | 94% |  23,570  | 0.74 |  17,442  |
| ***Private, Non-DAC Subtotal*** |  |  ***200,683***  | ***99%*** |  ***199,454***  | ***0.74*** |  ***147,596***  |
| Private, Disadvantaged Communities |  Boiler Condensate Recovery  |  17,971  | 94% |  16,952  | 1.00 |  16,952  |
|  Insulation |  56,478  | 99% |  56,066  | 1.00 |  56,066  |
|  Boiler Combustion Controls  |  23,517  | 94% |  22,184  | 1.00 |  22,184  |
| ***Private, Non-DAC Subtotal*** |  |  ***97,967***  | ***97%*** |  ***95,202***  | ***1.00*** |  ***95,202***  |
| Public, Non-Disadvantaged Communities |  Boiler Condensate Recovery  |  6,949  | 95% |  6,571  | 0.92 |  6,046  |
|  Insulation |  5,334  | 95% |  5,086  | 0.92 |  4,679  |
|  Other  |  2,420  | 99% |  2,391  | 0.92 |  2,200  |
|  Space Conditioning Controls  |  6,356  | 94% |  5,995  | 0.92 |  5,516  |
| ***Public, Non-DAC Subtotal*** |  |  ***21,058***  | ***95%*** |  ***20,044***  | ***0.92*** |  ***18,440***  |
| Public, Disadvantaged Communities |  Boiler Condensate Recovery  |  127,049  | 101% |  127,786  | 1.00 |  127,786  |
| ***Public, DAC Subtotal*** |  |  ***127,049***  | ***101%*** |  ***127,786***  | ***1.00*** |  ***127,786***  |
| **Total**  |  **446,756**  | **99%** |  **442,486**  |  |  **389,024**  |

\* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† NTG, Net to Gross is the deemed value available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>. Based on SAG Policy, participants in disadvantaged communities (DAC) based on their census tract and with consumption under 35,000 Therms are assigned a NTG of 1.00.

Source: Evaluation team analysis.

The NSG program includes 3 measures as shown in the following table. The Insulation measure contributed the most savings.

Table 6. 2024 Annual Energy Savings by Measure for NSG

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Program Category** | **Savings Category** | **Ex Ante Gross Savings (Therms)** | **Verified Gross RR\*** | **Verified Gross Savings (Therms)** | **NTG†** | **Verified Net Savings (Therms)** |
| Private, Non-Disadvantaged Communities |  Insulation |  15,109  | 94% |  14,252  | 0.74 |  10,547  |
| ***Private, Non-DAC Subtotal*** |  |  ***15,109***  | ***94%*** |  ***14,252***  | ***0.74*** |  ***10,547***  |
| Private, Disadvantaged Communities |  Other  |  7,084  | 94% |  6,682  | 1.00 |  6,682  |
| ***Private, Non-DAC Subtotal*** |  |  ***7,084***  | ***94%*** |  ***6,682***  | ***1.00*** |  ***6,682***  |
| Public, Non-Disadvantaged Communities |  Boiler Economizer  |  274  | 99% |  271  | 0.92 |  249  |
| ***Public, Non-DAC Subtotal*** |  |  ***274***  | ***99%*** |  ***271***  | ***0.92*** |  ***249***  |
| Public, Disadvantaged Communities |  Boiler Economizer  |  543  | 99% |  536  | 1.00 |  536  |
| ***Public, DAC Subtotal*** |  |  ***543***  | ***99%*** |  ***536***  | ***1.00*** |  ***536***  |
| **Total**  |  **23,010**  | **94%** |  **21,742**  |  |  **18,014**  |

\* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† NTG, Net to Gross is the deemed value available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2024/>. Based on SAG Policy, participants in disadvantaged communities (DAC) based on their census tract and with consumption under 35,000 Therms are assigned a NTG of 1.00.

Source: Evaluation team analysis

# Impact Analysis Findings and Recommendations

## Impact Parameter Estimates

Table 7 shows realization rate and data source from our review. The realization rate is the ratio of the verified savings to the ex ante savings. Following the table, we provide findings and recommendations, including discussion of measures with realization rates above or below 100 percent. Appendix A provides a description of the impact analysis methodology.

Table 7. Verified Gross Savings Parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure** | **Unit Basis** | **Ex Ante Gross (therms/unit)** | **Verified Gross (therms/unit)** | **Realization Rate** | **Data Source(s)** |
| PGL Custom | Project | Vary | Vary | 99% | PGL Program Tracking Data (PTD\*), Illinois Technical Reference Manual (IL-TRM) v12.0†, Project File, Utility Data, Site Specific Verification‡ |
| NSG Custom | Project | Vary | Vary | 94% | NSG Program Tracking Data (PTD\*), Illinois Technical Reference Manual (IL-TRM) v12.0†, Project File, Utility Data, Site Specific Verification‡ |

\* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas; extract dated January 30, 2025.

† State of Illinois Technical Reference Manual version 12.0 from http://www.ilsag.info/technical-reference-manual.html.

‡ Project files and monthly billing data provided by Peoples Gas and North Shore Gas. When conducted, on-site and telephone interview data collected by Guidehouse.

## Findings and Recommendations

General findings and recommendations are presented below. The detailed realization rates and evaluation findings for individual sampled projects are provided in Appendix A.

**Finding 1a.** The evaluation team reviewed Boiler Combustion Controls project WO-5257647 and found the post installation boiler efficiency had no supporting documentation. Upon request, the implementation team provided contractor combustion analysis testing results, which the evaluator used to update the verified savings. The gross realization rate for this project is 79%.

**Finding 1b.** For Commercial Dishwasher project WO-5099912, the evaluator communicated with the site contact to confirm the operating conditions of the dishwashers. We verified that the dishwashers operate 345 days per year instead of 306 days of operation used in the ex-ante calculation. The verified gross savings realization rate for this project is 109%.

**Finding 1c.** Project WO-4297942 is a Boiler Condensate Recovery project, which had a key input of city make-up water temperature. Ex ante project file uses a temperature of 55F for this input but has no reference file to support this input. Evaluation team found available deemed temperature of 50.7F and enthalpy of 18.8 Btu/lbm in Illinois Technical Reference Manual (IL-TRM) Section 4.4.57 for Condensate Recovery System. With this adjustment, the project verified savings is 104% of the ex ante savings.

**Recommendation 1.** Collect documentation including equipment spec sheet, mechanical schedules, performance testing results, customer feedback, trend data, and/or contractor invoices to support key inputs and assumptions used in custom project calculations. Submit the documentation along with the project application and calculator for evaluation.

**Finding 2.**  Project WO-5732120 included tank insulation and pipe insulation scopes. IL-TRM algorithm was used in the ex ante calculation to quantify the tank insulation savings. Evaluation identified a Load Factor of 70% was missing in the algorithm, which will reduce the savings for the project. In addition, the pipe insulation calculation claims a Thermal Regain Factor (TRF) of 0.84. Due to the installation area being the boiler room, the TRF should be updated to 0.7. With these findings corrected, the realization rate for this project is 82%.

**Recommendation 2.** When utilizing IL-TRM as the reference for calculation algorithm and key inputs, conduct review to ensure the algorithm is applied in full consistently with the IL-TRM and the correct key inputs are selected for use based on project installation and operation details.

**Finding 3.** For Pipe Insulation projects WO-4325118 and WO-4982193, Tank Insulation project WO-5732120, and Boiler Condensate Recovery project WO-4297942, evaluation team found one of the following two scenarios relevant to the boiler efficiencies used in the calculators: (1) no reference documentation provided to support the boiler efficiency in the ex ante calculations, and (2) the boiler efficiency in the ex ante calculations was not consistent with available documentation. Evaluation team updated the boiler efficiency according to either available project documentation or Illinois Technical Reference Manual (IL-TRM) in the verified savings calculation, resulting in realization rates ranging from 99% to 104%.

**Recommendation 3.** For custom heating projects including but not limited to Pipe Insulation, Tank Insulation and Boiler Condensate Recovery projects, provide the references and/or data sources for boiler efficiency to better support the calculation.

**Finding 4a.** For Insulation project WO-6654154, the ambient temperature of 75F was not consistent with the project energy survey file provided by the installation contractor documentation, which was 70F. The evaluation adjustment resulted in verified gross realization rate of 102%.

**Finding 4b.** For Insulation project WO-4648111, evaluation found a portion of the affected areas are indoor semi-conditioned areas. A Thermal Regain Factor (TRF) of 0.84 was used for these areas in the ex ante calculator and should be 0.7 based on the area type according to IL-TRM Section 4.4.14 for Pipe Insulation measure. The evaluator updated the TRF and the operating hours.

**Recommendation 4.** Through review and quality check of the savings calculators, ensure the key inputs and parameters utilized are consistent with provided project supporting file, data analysis results, and reference documentation.

##### Appendix A. Impact Analysis Methodology

Twelve out of 23 projects were randomly selected through a stratified sample design at the tracking record level using the population gross therm savings determined from program tracking data. Strata were defined by project size, based on gross energy savings boundaries that placed about one‐third of program‐level savings into each stratum. Table A‑1 shows a profile of the sample selection.

Table A‑1. Profile of Gross Impact Sample for Custom Projects

|  |  |  |
| --- | --- | --- |
|  | **Population Summary** | **Sample Summary** |
| **Program** | **Sampling Strata** | **Number of Projects (N)** | **Ex Ante Gross Savings** | **N** | **Ex Ante Gross Savings** | **Sampled % of Population** |
|  **(Therms)** |  **(Therms)** |  **(% Therms)** |
| PGL NSG Custom | 1 | 2 |  197,549  | 2 |  197,549  | 100% |
| 2 | 3 |  126,368  | 3 |  126,368  | 100% |
| 3 | 12 |  138,938  | 7 |  76,671  | 55% |
| 4 | 6 |  6,910  | 0 |  -  | 0% |
| **TOTAL** | **23** |  **469,765**  | **12** |  **400,588**  | **85%** |

Source: Evaluation team analysis.

**Engineering Review of Project Files**

For each selected project, an in-depth application review is performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, engineers estimated verified gross savings based on their review of documentation and engineering analysis. During the 2024 evaluation, we completed on-site visits for three of the twelve sampled projects.

The implementation contractor provided project documentation in electronic format for each sampled project. Documentation included application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), pre-inspection reports and photos, post inspection reports and photos, calculation spreadsheets, and utility history data. Some project documentation were not sufficient as mentioned in the findings and recommendations section of this report.

Table A‑2 shows the sample and the roll up gross realization rates and the mean precision estimates at a 90% confidence level.

Table A‑2. Gross Realization Rates and Relative Precision at 90% Confidence Level

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Program** | **Strata** | **Relative Precision** | **Mean RR** | **Standard Error** |
|  **+ or -%** |
| PGL NSG Custom | 1 | 0% | 101% | 0.00 |
| 2 | 0% | 101% | 0.00 |
| 3 | 8% | 94% | 0.04 |
| 4 | NA | NA | NA |
| **Custom Total RR (90/10)** |  | **2%** | **99%** | **0.01** |

*Source: Evaluation team analysis*

Table A‑3 provides a summary of verification results and adjustments for the PGL and NSG sampled Custom projects.

Table A‑3. PGL and NSG 2024 Summary of Sample M&V Results

| **Project ID** | **Measure**  | **Program** | **Realization Rate** | **Comments** |
| --- | --- | --- | --- | --- |
| WO-4297350 | Boiler Condensate Recovery  | PG Public Custom | 100% | - |
| WO-6654154 | Insulation | PG C&I Custom | 102% | Ambient temperature updated from 75F to 70F; annual hours updated from 8760 to 8766 hours per year |
| WO-4325118 | Insulation | PG C&I Custom | 102% | Heating efficiency updated from 81.7% to 80.7%; annual hours updated from 8760 to 8766 hours per year |
| WO-4982193 | Insulation | PG C&I Custom | 101% | Heating efficiency updated from 85% to 84.24%; annual hours updated from 8760 to 8766 hours per year |
| WO-5072971 | Waste Heat Recovery  | PG C&I Custom | 100% | - |
| WO-5257647 | Boiler Combustion Controls  | PG C&I Custom | 79% | Post installation combustion efficiency updated using combustion readings from contractor conducted tests.  |
| WO-4297942 | Boiler Condensate Recovery  | PG C&I Custom | 104% | City make-up water temperature updated from 55F to 50.7F; heating efficiency updated from 85% to 84.24%.  |
| WO-4298209 | Insulation | PG C&I Custom | 99% | Annual hours updated from 8760 to 8766 hours per year. 3E Plus used in evaluation to calculate savings.  |
| WO-5099912 | Other  | NSG C&I Custom | 109% | Installed units annual operating days per year updated from 306 to 344.7 based on customer feedback; dishwasher racks washed per day updated to 1,708 based on data analysis. |
| WO-6111812 | Insulation | PG C&I Custom | 100% | - |
| WO-4648111 | Insulation | PG Public Custom | 105% | Updated indoor semi-conditioned areas Thermal Regain Factor (TRF) from 0.84 to 0.7.  |
| WO-5732120 | Insulation | PG C&I Custom | 82% | Tank insulation measure heating efficiency updated from 80.7% to 79%; added a load factor of 70% for tank insulation measure; pipe insulation measure Thermal Regain Factor (TRF) updated from 0.84 to 0.7. |

*Source: Guidehouse evaluation team analysis*

##### Appendix B. Program Specific Inputs for the Illinois TRC

Table B‑1 and Table B‑2 show the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to the evaluation team later. Guidehouse will include annual and lifetime water savings and greenhouse gas reductions in the end of year summary report.

Table B‑1. Verified Cost Effectiveness Inputs – PGL

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Program Category** | **Savings Category** | **DAC Project** | **Units** | **Quantity**  |  **Effective Useful Life**  | **Early Replacement Flag†** |  **Ex Ante Gross Savings (Therms)**  |  **Verified Gross Savings (Therms)**  |  **Verified Net Savings (Therms)**  |
| Private |  Insulation | FALSE | Project |  6  |  15.0  | NO |  140,982  |  140,820  |  104,207  |
| Private |  Waste Heat Recovery  | FALSE | Project |  1  |  15.0  | NO |  34,714  |  35,064  |  25,948  |
| Private |  Other  | FALSE | Project |  1  |  15.0  | NO |  24,987  |  23,570  |  17,442  |
| Private |  Boiler Condensate Recovery  | TRUE | Project |  1  |  15.0  | NO |  17,971  |  16,952  |  16,952  |
| Private |  Insulation | TRUE | Project |  2  |  15.0  | NO |  56,478  |  56,066  |  56,066  |
| Private |  Boiler Combustion Controls  | TRUE | Project |  1  |  20.0  | NO |  23,517  |  22,184  |  22,184  |
| Public |  Boiler Condensate Recovery  | FALSE | Project |  2  |  15.0  | NO |  6,949  |  6,571  |  6,046  |
| Public |  Insulation | FALSE | Project |  2  |  15.0  | NO |  5,334  |  5,086  |  4,679  |
| Public |  Other  | FALSE | Project |  1  |  15.0  | NO |  2,420  |  2,391  |  2,200  |
| Public |  Space Conditioning Controls  | FALSE | Project |  1  |  15.0  | NO |  6,356  |  5,995  |  5,516  |
| Public |  Boiler Condensate Recovery  | TRUE | Project |  1  |  15.0  | NO |  127,049  |  127,786  |  127,786  |
| **Total or Weighted Average** |  |  |  |  **15.3**  |  |  **446,756**  |  **442,486**  |  **389,024**  |

*Source: Evaluation team analysis.*

Table B‑2. Verified Cost Effectiveness Inputs – NSG

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Program Category** | **Savings Category** | **DAC Project** | **Units** | **Quantity**  |  **Effective Useful Life**  | **Early Replacement Flag†** |  **Ex Ante Gross Savings (Therms)**  |  **Verified Gross Savings (Therms)**  |  **Verified Net Savings (Therms)**  |
| Private | Insulation | FALSE | Project |  1  |  15.0  | NO |  15,109  |  14,252  |  10,547  |
| Private | Other | TRUE | Project |  1  |  15.0  | NO |  7,084  |  6,682  |  6,682  |
| Public |  Boiler Economizer  | FALSE | Project |  1  |  15.0  | NO |  274  |  271  |  249  |
| Public |  Boiler Economizer  | TRUE | Project |  1  |  15.0  | NO |  543  |  536  |  536  |
| **Total or Weighted Average** |  |  |  |  **15.0**  |  |  **23,010**  |  **21,742**  |  **18,014**  |

*Source: Evaluation team analysis.*