EVERGREEN ECONOMICS

Evaluation of the 2019 New Mexico Gas Company Energy Efficiency Programs

Final Report

June 14, 2020

ECOMETRIC

RESEARCH & POLLING INC

NMGCO#4020405

Table of Contents

Executive Summary

This report presents the independent evaluation results for the New Mexico Gas Company (NMGC) energy efficiency programs for program year 2019 (PY2019).

The NMGC programs and evaluation requirements were first established in 2005 by the New Mexico legislature's passage of the 2005 Efficient Use of Energy Act (EUEA).[1] The EUEA requires public utilities in New Mexico, in collaboration with other parties, to develop cost-effective programs that reduce energy consumption. Utilities are required to submit their proposed portfolio of programs to the New Mexico Public Regulation Commission (NMPRC) for approval. As a part of its approval process, the NMPRC must find that the program portfolio is cost effective based on the Utility Cost Test (UCT).

An additional requirement of the EUEA is that each program must be evaluated at least once every three years. As part of the evaluation requirement, NMGC must submit to the NMPRC a comprehensive evaluation report prepared by an independent program evaluator. As part of the reporting process, the evaluator must measure and verify energy savings, determine program cost effectiveness, assess how well the programs are being implemented, and provide recommendations for program improvements as needed.

To conduct the independent program evaluations, the Evergreen evaluation team was chosen to be the independent evaluator for NMGC in May 2017, and a project initiation meeting was held with NMGC staff for the PY2019 evaluation on August 28, 2019. The Evergreen evaluation team consisted of the following firms:

- **Evergreen Economics** was the prime contractor and managed all evaluation tasks and deliverables;
- **EcoMetric** provided engineering capabilities and conducted the desk reviews; and
- **Research & Polling** fielded all the phone surveys.

For PY2019, the following NMGC programs were evaluated:

- Efficient Buildings
- Income Qualified

[1] NMSA §§ 62-17-1 *et seq* (SB 644). Per the New Mexico Public Regulation Commission Rule[1]Pursuant to the requirements of the EUEA, the NMPRC issued its most recent *Energy Efficiency Rule* (*17.7.2 NMAC*) effective September 26, 2017, that sets forth the NMPRC's policy and requirements for energy efficiency and load management programs. This Rule can be found online at http://164.64.110.134/parts/title17/17.007.0002.html

- Multi-Family

For each of the evaluated programs, the evaluation team estimated realized gross and net therm impacts and calculated program cost effectiveness using the UCT. A brief process evaluation was also conducted for the Efficient Buildings program.

The analysis methods used for the evaluated PY2019 programs are summarized as follows:

Efficient Buildings. The measures eligible for the Efficient Buildings program include a variety of end uses that are installed in prescriptive, custom, and direct install projects. In PY2019, custom projects made up the majority of savings, and direct install projects made up the largest number of projects.

Income Qualified. This program provides weatherization and other efficiency improvements at no cost or low cost to low-income households. Measures include insulation, duct sealing, water heating, and space heating. The majority of projects in PY2019 were custom in nature with savings based on customized home energy audits.

Multi-Family. The Multi-Family program provides turnkey services to install efficiency measures at a reduced cost to both market rate and low-income multi-family properties. In PY2019, the vast majority of projects were completed low-income housing units. Measures include boiler and furnace upgrades, programmable thermostats, ceiling insulation, pipe insulation, water heater tank insulation, and water conservation measures.

Table 1 summarizes the PY2019 evaluation methods used for these programs.

Table 1: Summary of PY2019 Evaluation Methods by Program

Program	Deemed Savings Review	Phone Verification	Engineering Desk Reviews	Site Visits
Efficient Buildings	◆	◆	◆	
Income Qualified	◆		◆	
Multi-Family	◆		◆	

The results of the PY2019 impact evaluation are shown in Table 2.

Table 2: PY2019 Savings Summary – Therms

Program	# of Projects	Expected Gross Therm Savings	Engineering Adjustment Factor	Realized Gross Therm Savings	NTG Ratio	Realized Net Therm Savings
Efficient Buildings	201	779,753	0.9974	777,729	0.9370	728,732
Income Qualified	661	169,946	0.9927	168,709	1.0000	168,709
Multi-Family Low Income	1,322	176,414	0.9764	172,244	1.0000	172,244
Multi-Family Market Rate	542	36,235	0.9764	35,378	0.8500	30,072
ThermSmart New Homes	841	296,068	1.0000	296,068	0.8000	236,854
Water Heating	5,552	196,018	1.0000	196,018	0.6164	120,825
Space Heating	1,211	125,365	1.0000	125,365	0.6186	77,551
Total	**10,330**	**1,779,799**		**1,771,511**		**1,534,987**

Lifetime therm savings are shown in Table 3 by program and for the portfolio overall. This includes expected gross, realized gross, and realized net lifetime savings.

Table 3: PY2019 Lifetime Savings Summary – Therms

Program	Expected Gross Lifetime Savings (therms)	Realized Gross Lifetime Savings (therms)	Realized Net Lifetime Savings (therms)
Efficient Buildings	8,758,398	8,735,661	8,185,314
Income Qualified	2,899,494	2,878,396	2,878,396
Multi-Family	3,145,607	3,071,251	3,000,019
ThermSmart New Homes	7,401,700	7,401,700	5,921,360
Water Heating	2,754,987	2,754,987	1,698,174
Space Heating	2,716,906	2,716,906	1,680,678
Total	**27,677,091**	**27,558,901**	**23,363,941**

Using net realized savings from this evaluation and cost information provided by NMGC, the evaluation team calculated the ratio of benefits to costs for each of NMGC's programs and for the portfolio overall. The evaluation team calculated cost effectiveness using the UCT, which compares the benefits and costs to the utility or program administrator implementing the program.[2] The evaluation team conducted this test in a manner consistent with the California Energy Efficiency Policy Manual.[3] The results of the UCT are shown below in Table 4. All programs had a UCT of greater than 1.00, and the portfolio overall was found to have a UCT ratio of 2.14.

Table 4: PY2019 Cost Effectiveness

Program	Utility Cost Test (UCT)
Efficient Buildings	2.78
Income Qualified	1.47
Multi-Family	2.22
ThermSmart New Homes	2.61
Water Heating	1.82
Space Heating	1.51
Overall Portfolio	**2.14**

Based on the data collection and analysis conducted for this evaluation, the evaluation team found that, overall, NMGC is operating high quality programs that are achieving significant energy savings and producing satisfied participants.

The impact evaluation—which included engineering desk reviews for a sample of Efficient Buildings, Income Qualified, Multi-Family projects—resulted in very high realized gross savings. Adjustments to savings based on the desk reviews were typically due a lack of documentation that necessitated the evaluation team creating its own estimates of savings for a few projects using the algorithms from the 2018 New Mexico TRM. A number of recommendations were made to improve savings values that include calculating savings

[2] The Utility Cost Test is sometimes referred to as the Program Administrator Cost Test, or PACT.

[3] http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPolicyManualV5forPDF.pdf

specific to the installed equipment, documenting adjustments to project savings, and other minor consistency improvements.

1 Evaluation Methods

The analysis methods used for the evaluated PY2019 programs are summarized as follows:

Efficient Buildings. The measures eligible for the Efficient Buildings program include a variety of end uses that are installed in prescriptive, custom, and direct install projects. Gross impacts were estimated based on engineering desk reviews of a statistically representative sample of projects covering a range of major measure types. A phone survey was used to verify installation and to collect information needed for a self-report analysis of free ridership to determine net impacts. Due to concerns about COVID-19, no site visits were conducted this year.

Income Qualified. This program provides weatherization and other efficiency improvements at no cost or low cost to low-income households. Measures include insulation, duct sealing, water heating, and space heating. Gross impacts were estimated based on a review of the deemed savings values combined with engineering desk reviews of a statistically representative sample of projects.

Multi-Family. The Multi-Family program provides turnkey services to install efficiency measures at a reduced cost to both market rate and low-income multi-family properties. Measures include boiler and furnace upgrades, programmable thermostats, ceiling insulation, pipe insulation, water heater tank insulation, and water conservation measures. Gross impacts were estimated based on an engineering desk review of a representative sample of projects covering both the direct install and deep retrofit program components. We attempted to conduct interviews with the building owners as part of the process evaluation but were unsuccessful in getting any responses from the small sample of participants.

1.1 Phone Surveys

Participant phone surveys were fielded in spring 2020 for participants in the Efficient Buildings program. The surveys averaged about 20 minutes in length and covered the following topics:

- Verification of measures included in NMGC's program tracking database;
- Satisfaction with the program experience;
- Survey responses for use in the free ridership calculations;
- Participation drivers and barriers; and
- Customer characteristics.

The original goal was to complete 50 phone surveys for the Efficient Buildings program split across both the direct install and non-direct install customers. Given the relatively small number of participants, we attempted to contact a census of participants for the survey to try to reach our goal of 50 completes. Ultimately, 37 phone surveys were completed for this program, with basically an even split between the direct install and non-direct install customers. Table 5 shows the distribution of completed surveys.

Table 5: NMGC Phone Survey Summary

Program	Customers with Valid Contact Info	Target # of Survey Completes	Completed Surveys
Efficient Buildings - Direct Install	69	--	19
Efficient Buildings - Non-Direct Install	48	--	18
Total	**117**	**50**	**37**

The final survey instrument for the Efficient Buildings program is included as Appendix A.

1.2 Engineering Desk Reviews

To verify gross savings estimates, the evaluation team conducted engineering desk reviews for a sample of projects in the Efficient Buildings, Multi-Family, and Income Qualified programs. The goal of the desk reviews was to verify equipment installation, operational parameters, and estimated savings.

Both prescriptive and custom projects received desk reviews that included the following:

- Review of project description, documentation, specifications, and tracking system data.
- Confirmation of installation using invoices and/or post-installation reports.
- Review of post-installation reports detailing differences between installed equipment and documentation, and subsequent adjustments made by the program implementer.

For projects in the Multi-Family and Income Qualified programs, NMGC calculated savings using multiple prescriptive measure approaches that were provided to the evaluation team for review. Program implementers used the New Mexico TRM to calculate savings for several measures. These approaches were determined to follow the

New Mexico TRM in most cases. Program implementers also used custom analysis tools and measure specific workpapers to determine savings. The evaluation team reviewed these calculations to ensure they were accurate and appropriate. The evaluation team adjusted the inputs to align with the values specified in the TRM or engineering best practices, as explained in subsequent sections in this report.

For the custom projects included in all of these programs, the engineering desk reviews included the following:

- Review of engineering analyses for technical soundness, proper baselines, and appropriate approaches for the specific applications.
- Review of input data for appropriate baseline specifications and variables such as weather data, bin hours, and total annual hours to determine if they are consistent with facility operation.
- Consideration and review for interactive effects between affected systems.

A sub-sample of five projects were selected for verification by phone interviews from an engineer. For each of these projects, the reviewing engineer confirmed that incentivized equipment was installed and operating as expected. Relevant operational data were also gathered to compare with the savings calculations. The operating hours obtained through phone interviews with site representatives were used by the evaluation team to determine appropriate deemed savings values for prescriptive projects.

Normally we would collect additional information if needed through on-site visits, but due to COVID-19 restrictions there were no on-sites completed for the PY2019 evaluation.

1.3 Net Impact Analysis

1.3.1 Self-Report Approach

The evaluation team estimated net impacts for the Efficient Buildings, Water Heating, and Space Heating programs using the self-report approach. This method uses responses to a series of carefully constructed survey questions to learn what participants would have done in the absence of the utility's program. The goal is to ask enough questions to paint an adequate picture of the influence of the program activities (rebates and other program assistance) within the confines of what can reasonably be asked during a phone survey.

With the self-report approach, specific questions that are explored include the following:

- What were the circumstances under which the customer decided to implement the project (i.e., new construction, retrofit/early replacement, replace-on-burnout)?
- To what extent did the program accelerate installation of high efficiency measures?

- What were the primary influences on the customer's decision to purchase and install the high efficiency equipment?
- How important was the program rebate on the decision to choose high efficiency equipment?
- How would the project have changed if the rebate had not been available (e.g., would less efficient equipment have been installed, would the project have been delayed)?
- Were there other program or utility interactions that affected the decision to choose high efficiency equipment (e.g., was there an energy audit done, has the customer participated before, is there an established relationship with a utility account representative, was the installation contractor trained by the program)?

The method used for estimating free ridership (and ultimately the NTG ratio) using the self-report approach is based on the 2017 Illinois Statewide Technical Reference Manual (TRM).[4] For the NMGC programs, questions regarding free ridership were divided into several primary components:

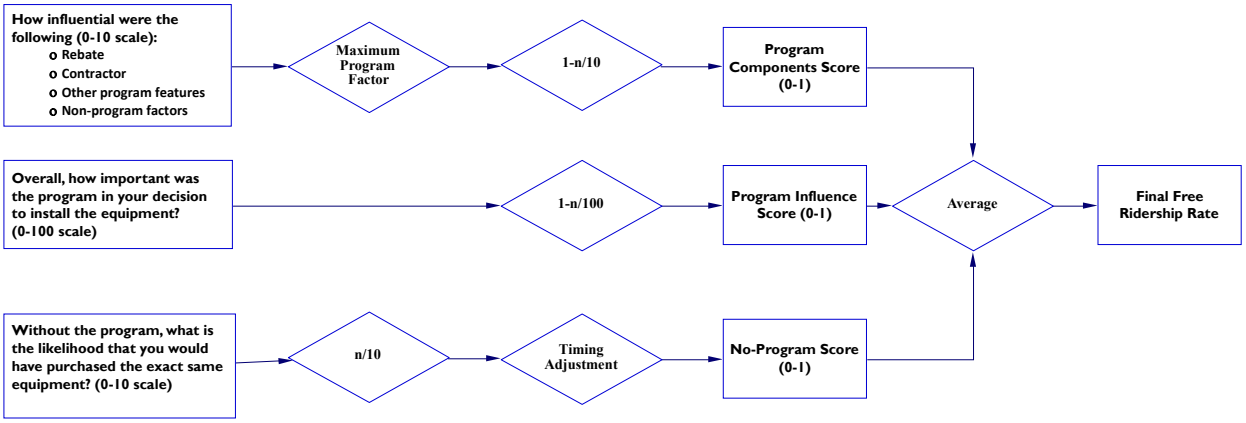
- A ***Program Component*** series of questions that asked about the influence of specific program activities (rebate, customer account rep, contractor recommendations, other assistance offered) on the decision to install energy efficient equipment;
- A ***Program Influence*** question, where the respondent was asked directly to provide a rating of how influential the overall program was on their decision to install high efficiency equipment; and
- A ***No-Program Component*** series of questions, based on the participant's intention to carry out the energy-efficient project without program funds or due to influences outside of the program.

Each component was assessed using survey responses that rated the influence of various factors on the respondent's equipment choice. Since opposing biases potentially affect the main components, the *No-Program* component typically indicates higher free ridership than the *Program Component/Influence* questions. Therefore, combining these opposing influences helps mitigate the potential biases. This framework also relies on multiple questions that are crosschecked with other questions for consistency. This prevents any single survey question from having an excessive influence on the overall free ridership score. It also allows the evaluation team to review all of the responses together and check for consistency in responses, and to make adjustments to the final free ridership estimate if needed.

[4] The full Illinois TRM can be found at http://www.ilsag.info/il_trm_version_6.html

Figure 1 provides a simplified version of the scoring algorithm. In some cases, multiple questions were asked to assess the levels of efficiency and purchase timing in absence of the program. For each of the scoring components, the question responses were scored so that they were consistent and resulted in values between 0 and 1. Once this was accomplished, the three question components were averaged to obtain the final free ridership score.

Figure 1: Self-Report Free Ridership Scoring Algorithm



Source: Adapted by Evergreen Economics from the 2017 Illinois TRM.

More detail on each of the three question tracks is provided below.

Program Component Questions

The ***Program Component*** battery of questions was designed to capture the influence of the program on the equipment choice. These questions were also designed to be as comprehensive as possible so that all possible channels through which the program is attempting to reach the customer were included.

The type of questions included in the Program Component question battery included the following:

- How influential were the following on your decision to purchase your energy efficient equipment?
  - Rebate amount
  - Contractor recommendation
  - Utility advertising/promotions
  - Technical assistance from the utility (e.g., energy audit)
  - Recommendation from utility customer representative (or program implementer)
  - Previous participation in a utility efficiency program

As shown at the top of Figure 1, the question with the highest value response (i.e., the program factor that had the greatest influence on the decision to install a high efficiency measure) was the one that was used in the scoring algorithm as the Program Component score.

Program Influence Question

A separate ***Program Influence*** question asked the respondent directly to rate the combined influence of the various program activities on their decision to install energy efficient equipment. This question allowed the respondent to consider the program as a whole and incorporated other forms of assistance (if applicable) in addition to the rebate. Respondents were also asked about potential non-program factors (condition of existing equipment, corporate policies, maintenance schedule, etc.) to put the program in context with other potential influences.

The Program Influence question also provided a consistency check so that the stated importance of various program factors could be compared across questions. If there appeared to be inconsistent answers across questions (rebate was listed as very important in response to one question but not important in response to a different question, for example), then the interviewer asked follow-up questions to confirm responses. The verbatim responses were recorded and were reviewed by the evaluation team as an additional check on the free ridership results.

No-Program Questions

A separate battery of ***No-Program*** component questions was designed to understand what the customer might have done if the NMGC rebate program had not been available. With these questions, the evaluation team attempted to measure how much of the decision to purchase the energy efficient equipment was due to factors that were unrelated to the rebate program or other forms of assistance offered by NMGC.

The types of questions asked for the No-Program component included the following:

- If the program had not existed, would you have
  - Purchased the exact same equipment?
  - Chosen the same energy efficiency level?
  - Delayed your equipment purchase?
- Did you become aware of the utility rebate program before or after you chose your energy efficient equipment?

The question regarding the timing of awareness of the rebate was used in conjunction with the importance rating the respondent provided in response to the earlier questions. If the respondent had already selected the high efficiency equipment prior to learning about the

rebate **and** said that the rebate was the most important factor, then a downward adjustment was made on the influence of the rebate in calculating the Program Component score.

The responses from the No-Program questions were analyzed and combined with a timing adjustment to calculate the No-Program score, as shown in Figure 1. The timing adjustment was made based on whether or not the respondent would have delayed their equipment purchase if the rebate had not been available. If the purchase would have been delayed by one year or more, then the No-Program score was set to zero, thereby minimizing the level of free ridership for this algorithm component only.

Free Ridership and NTG Calculation

The values from the Program Component score, the Program Influence score, and the No-Program score were averaged in the final free ridership calculation; the averaging helped reduce potential biases from any particular set of responses. The fact that each component relied on multiple questions (instead of a single question) also reduced the risk of response bias. As discussed above, additional survey questions were asked about the relative importance of the program and non-program factors. These responses were used as a consistency check, which further minimized potential bias. In some cases, adjustments to the free ridership rate may be made during the evaluation if responses regarding program influence are inconsistent across the survey components.

Once the self-report algorithm was used to calculate free ridership, the total NTG ratio was calculated using the following formula:

$$Net\text{-}to\text{-}Gross\ Ratio = (1 - Free\ Ridership\ Rate)$$

1.4 Gross and Net Realized Savings Calculations

The final step in the impact evaluation process is to calculate the realized gross and net savings, based on the program-level analysis described above. The **Gross Realized Savings** are calculated by taking the original *ex ante* savings values from the participant tracking databases and adjusting them using an **Installation Adjustment** factor (based on the count of installed measures verified through the phone surveys) and an **Engineering Adjustment** factor (based on the engineering analysis, desk reviews, etc.):

Gross Realized Savings =

(*Ex Ante* Savings)*(Installation Adjustment)*(Engineering Adjustment Factor)

Net Realized Savings are then determined by multiplying the Gross Realized Savings by the net-to-gross ratio:

Net Realized Savings = (Net-to-Gross Ratio)*(Gross Realized Savings)

1.5 Cost Effectiveness

The cost effectiveness of NMGC's programs was tested using the Utility Cost Test (UCT). In the UCT, the benefits of a program are the present value of the net energy saved, and the costs are the present value of the program's administrative costs plus incentives paid to customers. To perform the cost effectiveness analysis, the evaluation team requested the following from NMGC:

- Program costs (all expenditures associated with program delivery);
- Avoided cost of energy (costs per therm over a 20-year time horizon);
- Discount rate (percentage used to calculate the net-present value of future savings);
- Distribution loss factor (percentage used to adjust avoided cost for distribution losses);
- Proportions of programs that are targeted at low-income customers; and
- Any additional (i.e., non-low-income) assumed non-energy benefits, expressed in monetary terms or as a percentage of savings for each measure or program.

In response to the request for these data, NMGC provided its annual average avoided costs, discount rate, and program administrative costs. The avoided costs provided were in 2017 dollars, and so an inflation rate and a discount rate provided by NMGC were applied to analyze avoided costs in terms of 2019 dollars. This approach is consistent with previous years. NMGC does not quantify the distribution loss factor separate from the avoided cost of energy.

The evaluation team obtained the program savings and effective useful life values from the final PY2019 tracking data submitted by NMGC. The final net energy savings values estimated from the PY2019 impact evaluation were used in the final cost effectiveness calculations.

Additionally, Section 17.7.2.9.B(4) of the New Mexico Energy Efficiency Rule allows utilities to claim utility system economic benefits for low-income programs equal to 20 percent of the calculated energy benefits. The evaluation team applied this 20 percent adder to the benefits calculated for the Income Qualified program and the low-income projects in the Multi-Family program.

The evaluation team input the savings and cost data into a cost effectiveness model that calculated the benefits, costs, and benefit-cost ratio for each measure, project, or program entered, and rolled up the data into program-level UCT values.

2 Impact Evaluation Results

The results of the PY2019 impact evaluation are shown in Table 6. As noted previously, each program is required to be evaluated a minimum of once every three years. For 2019, the evaluated programs covered 63 percent of the *ex ante* therm savings.

Table 6: PY2019 Savings Summary – Therms

Program	# of Projects	Expected Gross Therm Savings	Engineering Adjustment Factor	Realized Gross Therm Savings	NTG Ratio	Realized Net Therm Savings
Efficient Buildings	201	779,753	0.9974	777,729	0.9370	728,732
Income Qualified	661	169,946	0.9927	168,709	1.0000	168,709
Multi-Family Low Income	1,322	176,414	0.9764	172,244	1.0000	172,244
Multi-Family Market Rate	542	36,235	0.9764	35,378	0.8500	30,072
ThermSmart New Homes	841	296,068	1.0000	296,068	0.8000	236,854
Water Heating	5,552	196,018	1.0000	196,018	0.6164	120,825
Space Heating	1,211	125,365	1.0000	125,365	0.6186	77,551
Total	**10,330**	**1,779,799**		**1,771,511**		**1,534,987**

Lifetime therm savings are shown in Table 7 by program and for the portfolio overall. This includes expected gross, realized gross, and realized net lifetime savings.

Table 7: PY2019 Lifetime Savings Summary – Therms

Program	Expected Gross Lifetime Savings (therms)	Realized Gross Lifetime Savings (therms)	Realized Net Lifetime Savings (therms)
Efficient Buildings	8,758,398	8,735,661	8,185,314
Income Qualified	2,899,494	2,878,396	2,878,396
Multi-Family	3,145,607	3,071,251	3,000,019
ThermSmart New Homes	7,401,700	7,401,700	5,921,360
Water Heating	2,754,987	2,754,987	1,698,174
Space Heating	2,716,906	2,716,906	1,680,678
Total	**27,677,091**	**27,558,901**	**23,363,941**

Details on the individual program impacts are summarized below, with additional details on the analysis methods and results for some programs included as appendices where noted.

2.1 Efficient Buildings Program

2.1.1 Efficient Buildings Gross Impacts

The *ex ante* PY2019 impacts are summarized in Table 8 for the Efficient Buildings program. In total, the Efficient Buildings program accounted for 44 percent of energy impacts in NMGC's overall portfolio for PY2019.

Table 8: Efficient Buildings Program Savings Summary

Measure Category	# of Projects	Expected Gross Therm Savings
Custom	23	690,168
Prescriptive	62	36,081
Direct Install	116	53,504
Total	**201**	**779,753**

The majority of the gross impact evaluation activities were devoted to engineering desk reviews of a sample of projects. For the desk reviews, the sample frame included projects

across the prescriptive, custom, and direct install categories. The sample was stratified to cover a range of different measure types so that no single measure would dominate the desk reviews. The sample was also stratified based on total energy savings within each measure group. In some cases, very large projects were assigned to a "certainty" stratum and were automatically added to the sample (rather than randomly assigned). This allowed for the largest projects to be included in the desk reviews and maximized the amount of savings covered in the sample. Overall, the sampling strategy ensured that a mix of projects in terms of both project size and measure type would be included in the desk reviews.

The final sample design is shown in Table 9. The resulting sample achieved a relative precision of 90/2.9 for the program overall.

Table 9: Efficient Buildings Program Desk Review Sample

Measure Group	Stratum	Count	Average Therms	Total Therms	% of Savings	Final Sample
Custom	Certainty	6	96,603	508,977	65%	6
	1	17	10,658	181,191	23%	2
Prescriptive Kitchen Appliance	Certainty	2	3,426	6,852	<1%	2
	1	9	1,048	9,436	1%	2
	2	22	366	8,046	1%	2
	3	19	134	2,540	<1%	2
Prescriptive Water Heating	Certainty	2	2,252	4,504	<1%	2
	1	3	978	2,933	<1%	2
	2	5	354	1,770	<1%	2
Water Conservation	Certainty	2	1,339	2,677	<1%	2
	1	4	506	2,022	<1%	3
	2	15	70	1,048	<1%	3
Weather stripping	1	6	2,561	15,366	2%	2
	2	14	1,150	16,101	2%	2
	3	75	217	16,291	2%	2
Total		**201**	**8,111**	**779,753**	**100%**	**36**

As discussed in the *Evaluation Methods* chapter, gross realized impacts for the Efficient Buildings program were determined by performing engineering desk reviews on the sample of projects.

For prescriptive projects in the Efficient Buildings program, the majority of measure savings were calculated using algorithms and assumptions contained in the New Mexico TRM. For projects where these types of measures were installed, the evaluation team reviewed project-specific inputs and project documentation to confirm that the proper TRM algorithms and associated input values were used.

Savings for prescriptive weather stripping and commercial cooking equipment measures in the Efficient Buildings program were calculated using algorithms and assumptions documented in workpapers prepared by the program implementer, CLEAResult, for NMGC. The evaluation team reviewed the general assumptions and methodologies contained in the workpapers for accuracy and appropriateness. For projects where these measures were installed, the evaluation team reviewed project-specific inputs and project documentation to confirm that the proper input values were used.

Custom projects in the Efficient Buildings program quantified savings using a variety of spreadsheet-based methods. For these projects, the evaluation team reviewed the submitted analyses to ensure the soundness of the calculation approaches used and use of proper inputs based on submitted supporting documentation. When applicable, approaches and assumptions used in custom analyses were compared to those contained in the TRM.

Table 10 shows the result of the desk reviews and how the resulting engineering adjustment factor was used to calculate realized savings. For the Efficient Buildings program overall, these adjustments resulted in an engineering adjustment factor of 0.9974.

Table 10: PY2019 Efficient Buildings Program Gross Impact Summary

Program	# of Projects	Expected Gross Therm Savings	Engineering Adjustment Factor	Realized Gross Therm Savings
Efficient Buildings	201	779,753	0.9974	777,729

Engineering adjustment factors that varied from 1.0 for individual projects were due to the following reasons:

- There were two water heater projects where we were unable to replicate the original *ex ante* savings estimates. Savings for these projects were estimated in the evaluation suing the savings methodology described in the 2018 New Mexico TRM.
- There were five projects in the sample which installed commercial kitchen equipment: gas fryers and gas conveyor ovens. The evaluation team used the savings documented in the "V3" CLEAResult workpapers for these measures, which do not match the savings originally reported by NMGC.
- There were four projects in the sample that included weather-stripping measures, and the evaluation team calculated savings by multiplying the installed linear feet listed on the application by the per-linear foot savings listed on the application. This resulted in savings which differed from the claimed savings, but there was no additional documentation so it was unclear what caused the discrepancy.
- For one custom boiler project, the savings calculations provided in the project documentation did not match the savings value listed in the tracking data for this project. The savings calculation that was provided in the project documentation was consistent with the prescriptive savings methodology in the 2018 TRM and so this value was used for the impact evaluation.

Recommendations based on these desk review adjustments are provided in the final section of this report, and a summary of the individual desk review findings for each of the 36 projects is included in Appendix B.

2.1.2 Efficient Buildings Net Impacts

Net impacts for the Efficient Buildings program were calculated using an NTG ratio that was developed using the self-report method described in the *Evaluation Methods* chapter using participant phone survey data. For all direct install projects and a steam project included in the survey sample, a NTG ratio of 1.00 was applied.[5] The resulting NTG ratio for the Efficient Buildings program overall is 0.9370 This is a weighted average of the NTG ratio for custom and prescriptive projects from the participant survey and the assumed NTG ratio of 1.00 for direct install projects.

Table 11 summarizes the PY2019 net impacts for the Efficient Buildings program using the NTG ratios described above. Net realized savings for the program overall are 728,732 therms.

[5] NMGC currently has an *ex ante* NTG ratio of 1.00 for direct install projects, and the evaluation team agrees this is appropriate, as the targeted customers are very unlikely to complete these projects on their own. This is analogous to assigning an NTG ratio of 1.00 to low income programs, which is typically done for the same reason.

Table 11: PY2019 Efficient Buildings Program Net Impact Summary

Program	# of Projects	Realized Gross Therm Savings	NTG Ratio	Realized Net Therm Savings
Efficient Buildings	201	777,729	0.9370	728,732

2.2 Income Qualified Program

The Income Qualified program provides energy efficiency upgrades at no cost or low cost to low-income customers. Measures include insulation, duct sealing, water heating, and space heating. The majority of savings in this program come from measures with custom savings calculations based on an energy audit of the participant's home. To evaluate the impacts of the Income Qualified program, the evaluation team conducted engineering desk reviews on a statistically representative sample of custom measures and a deemed savings review of the prescriptive measures offered through the program.

A stratified random sample was used to select the custom projects for review, as shown in Table 12. A total of 25 projects were reviewed, which was a sufficient sample to achieve a 90/1.5 level of relative precision.

Table 12: Income Qualified Program Desk Review Sample*

Program	Stratum	Count	Average Therms	Total Therms	% of Savings	Final Sample
Income Qualified	1	44	1,064	46,794	31%	7
	2	71	585	41,501	27%	6
	3	116	329	38,158	25%	6
	4	383	69	26,610	17%	6
Total		**614**	**512**	**153,063**	**100%**	**25**

*Note that this sample only includes Income Qualified projects with custom savings calculations. Savings for prescriptive projects were reviewed separately.

Savings for Income Qualified projects that received an energy audit were quantified using the Weatherization Assistant energy analysis software, developed by Oak Ridge National Laboratory for the U.S. Department of Energy. For these projects, the evaluation team compared software inputs to the available supporting project documentation, which included invoices, pre-retrofit photographs, and post-retrofit photographs.

Based on the engineering reviews, the evaluation team made adjustments to savings for several projects, most of which were due to calculation methods that were not documented or the availability of better assumptions regarding climate zones. Specific adjustments include the following:

- The supplied WAP NEAT Recommended Measures reports for 10 projects did not list any savings for the installation of faucet aerators, and there was no additional documentation available that would confirm that these aerators were installed. Consequently, the savings for these aerators were excluded from the final evaluated savings numbers. This adjustment resulted in a small reduction in savings.
- For one project in the sample, the evaluation team found that the savings for high efficiency furnace differed between the tracking data and the projects' NEAT report. The evaluation team based the verified savings on the NEAT reports, which increased the savings for this measure.
- For one project in the sample, the savings for a door replacement differed between the tracking data and the projects' NEAT report generated by the WAP software. The evaluation team based the verified savings on the NEAT reports, which decreased the savings for this measure.

The resulting engineering adjustment factor for the Income Qualified program overall is 0.9927. A summary of the individual desk review findings for each of the 25 projects is included in Appendix C.

In addition to desk reviews for custom measures, the evaluation team conducted a deemed savings review for the relatively small portion of prescriptive measures installed through the program. In the deemed savings review, the evaluation team attempted to verify and replicate the per unit savings values used by NMGC based on the assumptions in the New Mexico TRM. For the prescriptive measures in the program, the evaluation team found that the deemed savings values were within a reasonable range of the TRM values and were being correctly applied to the individual measures.

For net impacts, the NTG ratio for the Income Qualified program is stipulated at 1.00 because the program serves only low-income customers. As a result, the net realized savings are equal to the gross verified savings. The final realized gross and net savings in therms are shown in Table 13.

Table 13: Income Qualified Program PY2019 Impact Summary

Program	# of Projects	Expected Gross Therm Savings	Engineering Adjustment Factor	Realized Gross Therm Savings	NTG Ratio	Realized Net Therm Savings
Income Qualified	661	169,946	0.9927	168,709	1.0000	168,709

2.3 Multi-Family Program

The Multi-Family program is implemented by International Center for Appropriate and Sustainable Technology (ICAST) as a turnkey program for multi-family buildings, including both market rate and low-income properties. Efficiency upgrades are available for individual tenant units as well as for common areas at a reduced project cost that reflects the incentive offered by NMGC. In PY2019, projects consisted of low-income direct installs, market rate direct installs, and market rate deep retrofits.

For the Multi-Family program, the gross impact analysis consisted of an engineering desk review of a statistically representative sample of projects. A stratified random sample was used to select the projects for review, as shown in Table 14. A total of 10 projects were reviewed, which was a sufficient sample to achieve a 90/4.5 level of relative precision.

Table 14: Multi-Family Program Desk Review Sample

Program	Stratum	Count	Average Therms	Total Therms	% of Savings	Final Sample
Multi-Family	Certainty	4	25,905	103,621	49%	4
	1	7	8,196	57,372	27%	3
	2	14	3,690	51,655	24%	3
Total		**25**	**12,597**	**212,649**	**100%**	**10**

Savings for measures in the Multi-Family program were quantified using algorithms and assumptions contained in the program's Technical Resource Library (TRL). Most of the algorithms in the TRL are taken from the New Mexico TRM, with others taken from sources such as the Texas TRM. The evaluation team reviewed the approaches from the New Mexico TRM to ensure that they were being applied correctly and reviewed the approaches from other sources to determine if any adjustments or alternative methods were appropriate.

Based on this review, the evaluation team made adjustments to project savings for the following reasons:

- The evaluation team adjusted the savings for six of the sampled projects that included the installation of low-flow faucet aerators. The evaluated savings was calculated using the methodology in the 2018 TRM and the corresponding flow rates found in the tracking data.
- The evaluation team adjusted the savings for two of the sampled projects that included the installation of low-flow faucet aerators to be consistent with the climate zone water temperatures. The evaluation team calculated the savings for each of the projects using the water temperatures and savings methodology in the 2018 TRM.
- There were five projects that included the installation of DHW pipe insulation, and the *ex ante* calculations appear to use the savings methodology and algorithm from the 2018 TRM. Although no additional calculations were available for review, it appears that the Albuquerque specific algorithm inputs ($T_{Ambient}$) were used to calculate the savings for two projects that installed insulation in different climate zones. Additionally, the evaluation team adjusted the savings for three of the five projects to align with the with the 2018 TRM methodology for the installation of pipe insulation in an unconditioned space in the Santa Fe climate zone.
- The evaluation team adjusted the savings for one of the sampled projects that included the installation of a kitchen aerator. Based on the *ex ante* savings value, it appears the savings for this measure may have been custom calculated using the methodology in the 2018 TRM and a *FlowPost* value of 1.0 gpm. The TRM lists a *FlowPost* value of 1.5 gpm for kitchen aerators, and no additional supporting documentation was available. Therefore, the evaluation team defaulted to the 1.5 gpm *FlowPost* value listed in the TRM for this measure.
- There were 10 sampled projects that included the installation of programmable and smart thermostats where the savings were adjusted as part of the evaluation review. The engineering adjustments range from 0.84 to 1.20 depending on the climate zone where the measure is installed. The savings assumptions appear to use consistent unit efficiencies, ages, and capacities for every thermostat installation, when there may be notable differences between buildings. The evaluation team utilized the savings methodology and default algorithm inputs listed in the 2018 TRM to calculate the *ex post* savings.
- For one project involving a high efficiency furnace, the *ex ante* savings did not appropriately account the AFUE of the installed furnace. This adjustment slightly increased the *ex ante* savings for the project.
- The baseline efficiencies for all of the high efficiency furnace measures were de-rated using the DOE's Building America Performance Analysis Procedures for

Existing Homes. The procedure de-rated the baseline AFUE from 80% to 67% for all of the projects, which assumes all of the furnaces at each facility are approximately 18 years old. While the evaluation team agrees with the derating approach, the approach should be supported with equipment specific information from the facilities to verify this assumption.

The resulting engineering adjustment factor for the Multi-Family program is 0.9764. A summary of the individual desk review findings for each of the sampled projects is included in Appendix D.

For net impacts, the NTG ratio for low-income properties is assumed to be 1.00. For market rate deep retrofits, the evaluation team applied the *ex ante* value of 0.85. The overall weighted average NTG for the Multi-Family program is 0.9514 for PY2019.

The final realized gross and net savings in therms are shown in Table 15.

Table 15: Multi-Family Program PY2019 Impact Summary

Program	# of Projects	Expected Gross Therm Savings	Engineering Adjustment Factor	Realized Gross Therm Savings	NTG Ratio	Realized Net Therm Savings
Multi-Family Low Income	1,322	176,414	0.9764	172,244	1.0000	172,244
Multi-Family Market Rate	542	36,235	0.9764	35,378	0.8500	30,072
Total	**1,864**	**212,649**		**207,622**	**0.9514**	**202,316**

3 Cost Effectiveness Results

The evaluation team calculated cost effectiveness using the Utility Cost Test (UCT) for each individual NMGC energy efficiency program, as well as the cost effectiveness of the entire portfolio of programs.[6] The evaluation team conducted these tests in a manner consistent with the California Energy Efficiency Policy Manual.[7]

Cost effectiveness tests compare relative benefits and costs from different perspectives. The specific cost effectiveness test used in this evaluation, the UCT, compares the benefits and costs to the utility or program administrator implementing the program. The UCT explicitly accounts for the benefits and costs shown in Table 16.

Table 16: Utility Cost Test Benefits and Costs

Benefits	Costs
• Utility avoided energy-related costs • Utility avoided capacity-related costs, including generation, transmission, and distribution	• Program overhead/administrative costs • Utility incentive costs • Utility installation costs

Using net realized savings from this evaluation and cost information provided by NMGC, the evaluation team calculated the ratio of benefits to costs for each of NMGC's programs and for the portfolio overall. The results of the UCT are shown below in Table 17. All programs had a UCT of greater than 1.00, and the portfolio overall was found to have a UCT ratio of 2.14.

[6] The Utility Cost Test is sometimes referred to as the Program Administrator Cost Test, or PACT.

[7] http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPolicyManualV5forPDF.pdf

Table 17: PY2019 Cost Effectiveness

Program	Utility Cost Test (UCT)
Efficient Buildings	2.78
Income Qualified	1.47
Multi-Family	2.22
ThermSmart New Homes	2.61
Water Heating	1.82
Space Heating	1.51
Overall Portfolio	**2.14**

4 Process Evaluation Results

This chapter summarizes key methods and findings from the PY2019 process evaluation of the NMGC Efficient Buildings program. These findings, along with findings from the impact evaluation, inform the conclusions and recommendations presented in the following chapter.

4.1 Efficient Buildings Participant Surveys

The evaluation team conducted phone surveys with representatives from 37 participating companies (19 direct install and 18 non-direct install) that received rebates through the NMGC Efficient Buildings program. These surveys were completed in May 2020 and ranged from 15 to 20 minutes in length.

The participant survey was designed to cover the following topics:

- Verifying the installation of measures included in the program tracking database;
- Collecting information on participants' satisfaction with the program experience;
- Survey responses for use in the free ridership calculations;
- Baseline data on energy use and/or equipment holdings;
- Participant drivers and barriers; and
- Additional process evaluation topics.

NMGC provided program data on the Efficient Buildings participant projects, which allowed us to select a sample for surveys. The evaluation team randomly selected and recruited program participants from the population of Efficient Buildings program participants that had valid contact information.

Figure 2 and Figure 3 present the variety of projects completed through the Efficient Buildings program for direct install and non-direct install participants respectively. Approximately half (55 percent) of direct install participants installed weather stripping equipment, while a majority of non-direct install participants had installed insulation equipment.

Figure 2: Direct Install Participant Measures

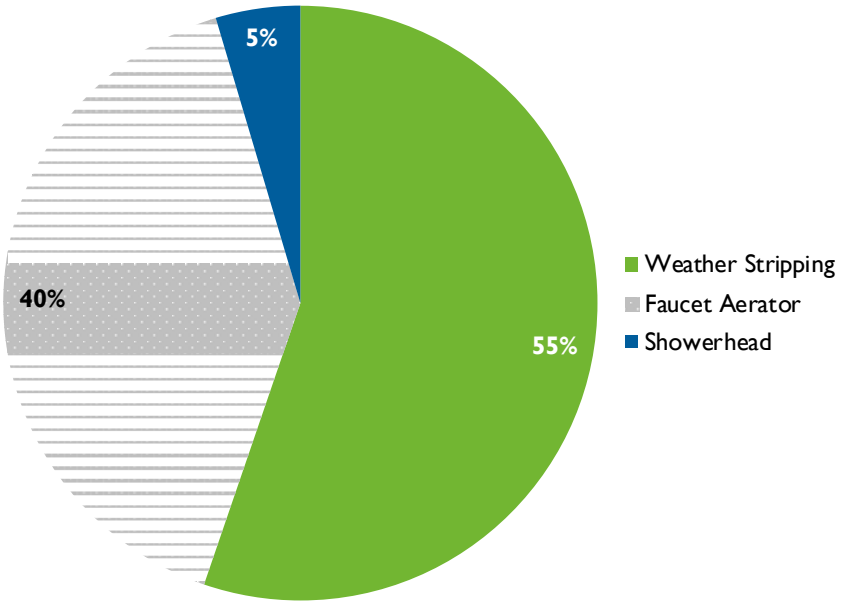
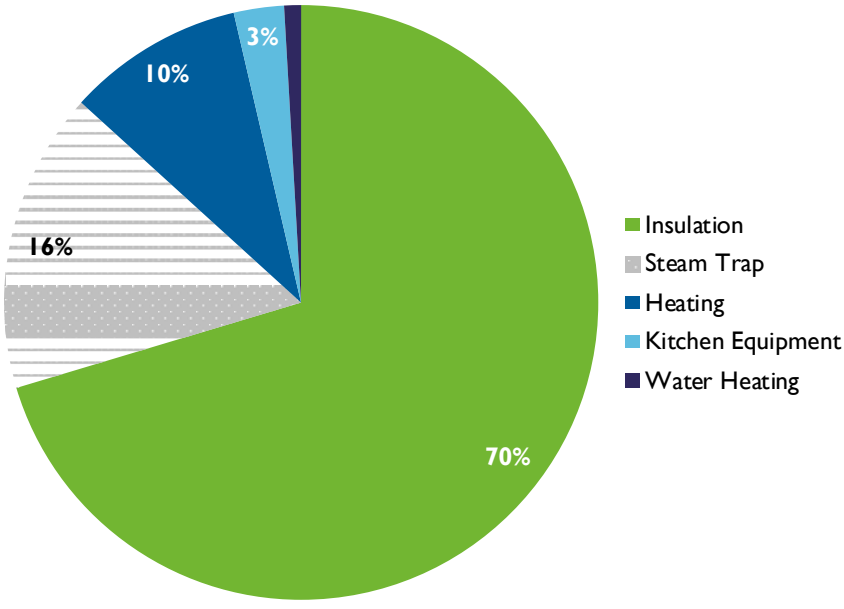


Figure 3: Non-Direct Install Participant Measures



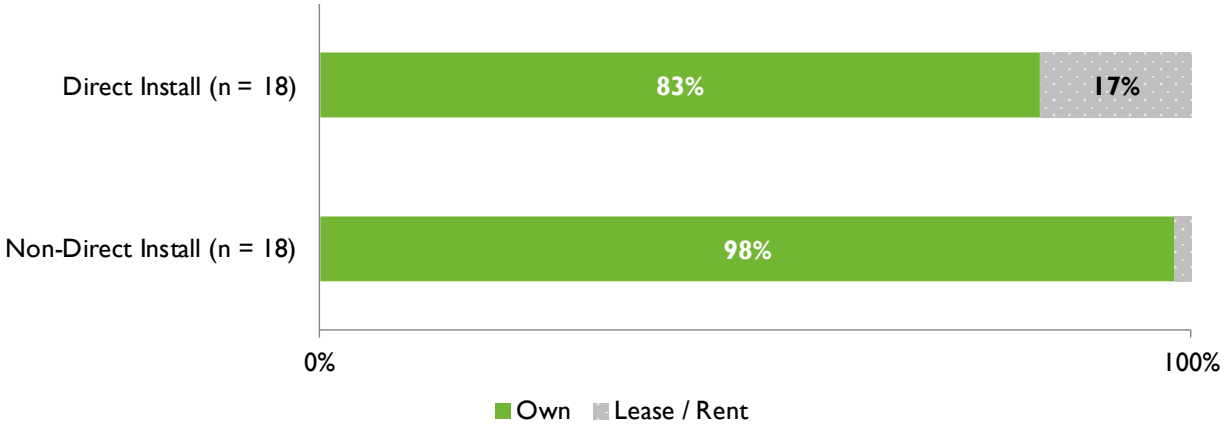
The following sections present results on company demographics, sources of program awareness, motivations for participation, and program satisfaction.

Throughout the analysis described here, the evaluation team presents the survey results as weighted percentages based on the proportion of savings represented by survey respondents relative to the total savings of all program participants.

4.1.1 Company Demographics

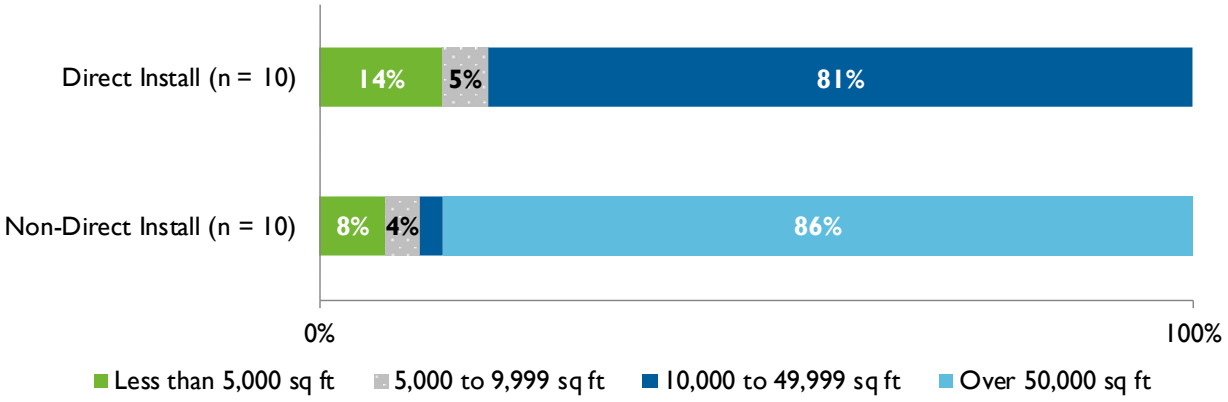
Participants were first asked whether they owned or leased the building where the project was completed. Figure 4 shows that 83 percent of direct install participants owned their buildings, while 98 percent of non-direct install participants reported owning their buildings.

Figure 4: Participant Building Ownership



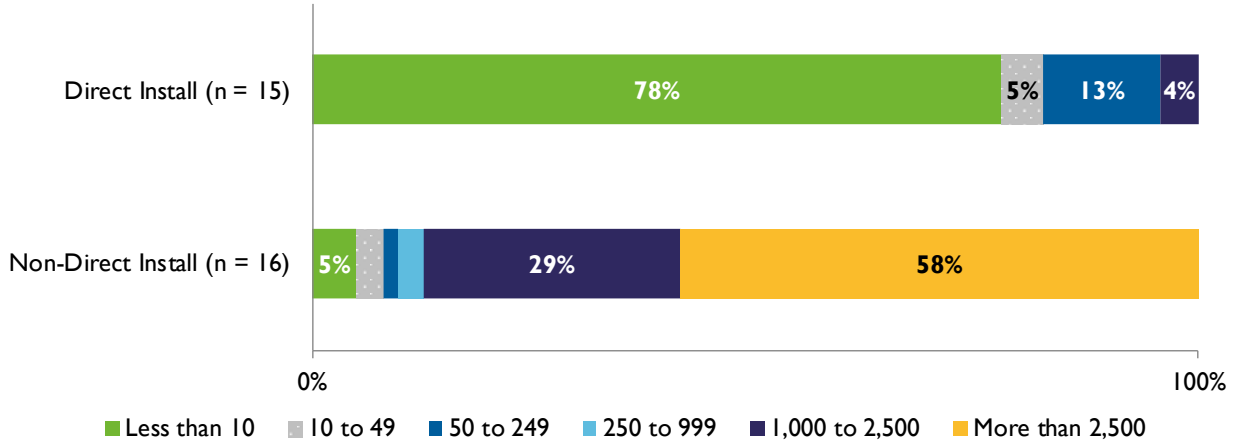
Participants were also asked to estimate the size of their building, the number of full-time employees that worked at their company, as well as the age of their building. While most direct install participants worked in buildings that ranged between 10,000 and 49,000 square feet (81 percent), most non-direct install participants worked in buildings that were larger than 50,000 square feet (86 percent; Figure 5).

Figure 5: Participant Building Square Footage



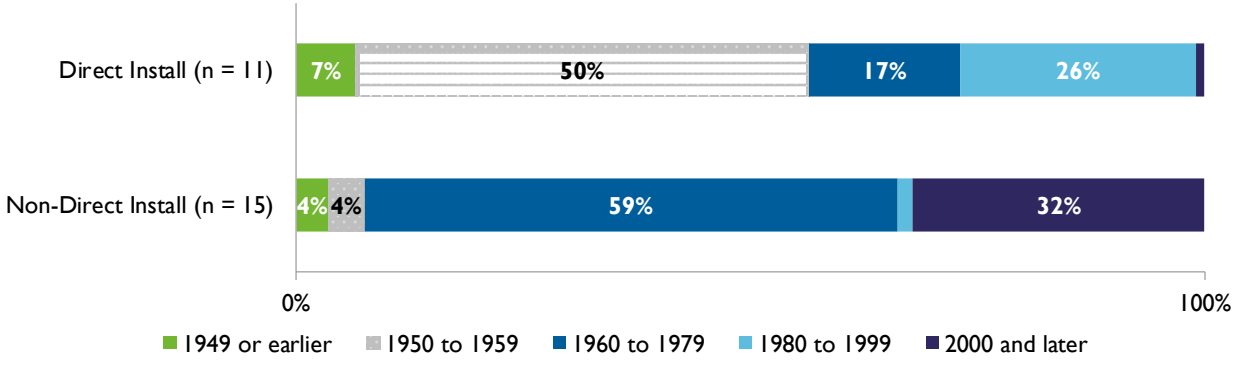
Direct install participants were more likely to report having less than 10 employees (78 percent versus five percent of non-direct install participants), while non-direct install participants were more likely to report having more than 2,500 employees (58 percent; Figure 6). As non-direct install participants are more likely to own larger building spaces, they may also be more likely to have larger numbers of employees to fill the building space.

Figure 6: Participant Number of Full-Time Employees



When estimating the year that their building was built, 50 percent of direct install participants stated that their buildings were built between 1950 and 1959. Relatedly, non-direct install participants were most likely to state that their buildings were built between 1960 and 1979 (59 percent; Figure 7).

Figure 7: Participant Building Age

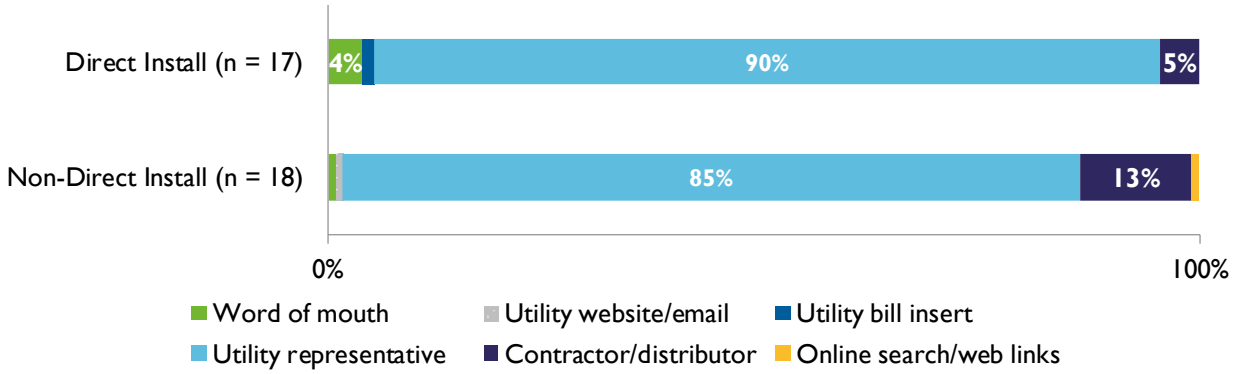


4.1.2 Sources of Awareness

Efficient Buildings program participants became aware of the program rebates and assistance through a variety of sources, including word of mouth, the NMGC website or NMGC emails, utility bill inserts, NMGC representatives, contractors or distributors, and

online web searches. Both direct install participants (90 percent) and non-direct install participants (85 percent) reported first learning about the program through a utility representative (Figure 8).

Figure 8: Initial Source of Awareness

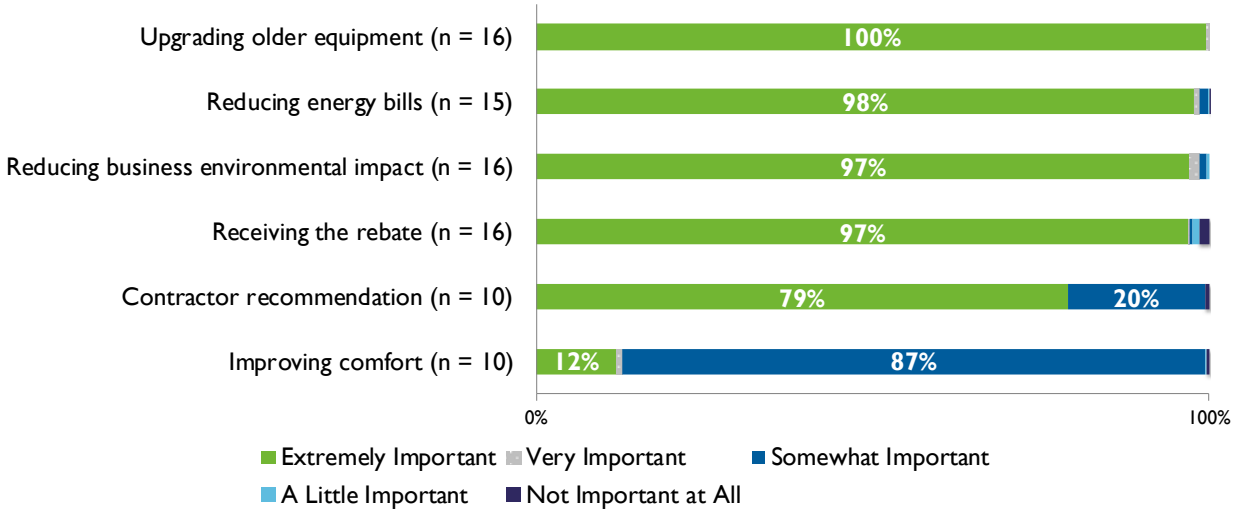


Finally, two participants mentioned that they had heard about the Efficient Buildings program through multiple sources. Both identified their interactions with utility representatives as the most useful factor in deciding to participate in the program.

4.1.3 Motivations for Participation

Non-direct install participants were asked to identify their motivations for participating in the Efficient Buildings program (Figure 9). Participants were most likely to cite upgrading older equipment (100 percent) and reducing energy bills (98 percent) as extremely important factors that influenced their decision. In contrast, improving comfort was ranked the lowest, with only 12 percent of participants considering it an extremely important factor and 87 percent considering it only somewhat important.

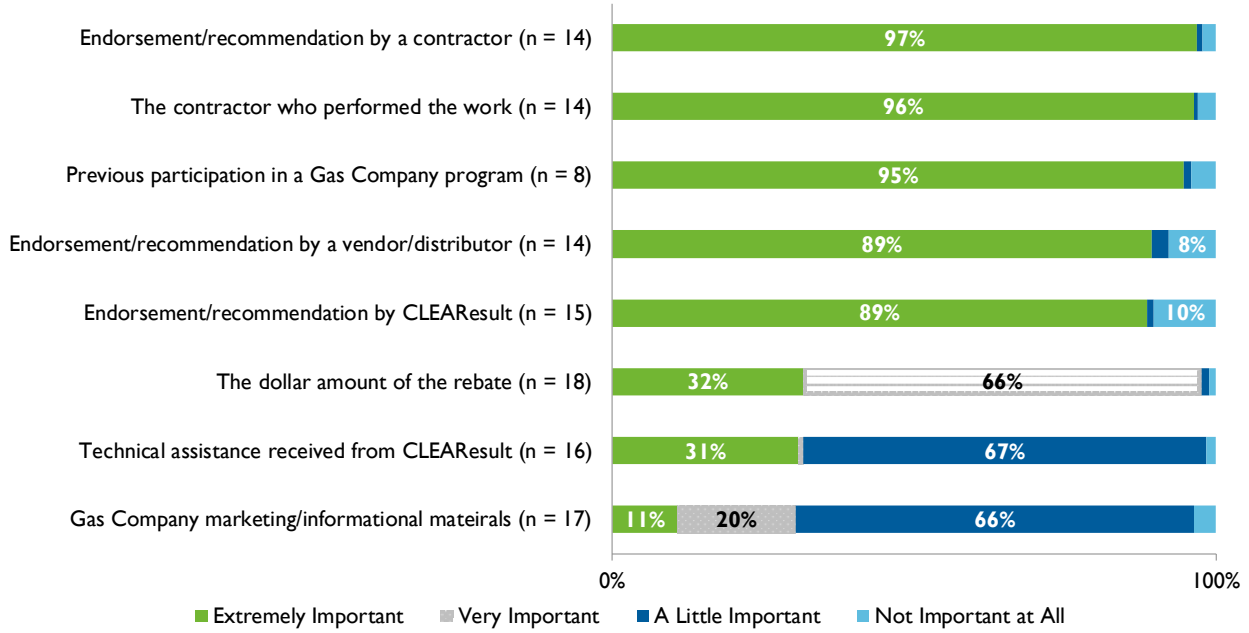
Figure 9: Motivations for Participation



These non-direct install participants were also asked to rate a list of potential program and non-program factors that may have influenced their decision to install energy efficient equipment. Participants were asked to rate these factors on a scale of 0 to 10, with 0 being "not at all important" and 10 being "extremely important."

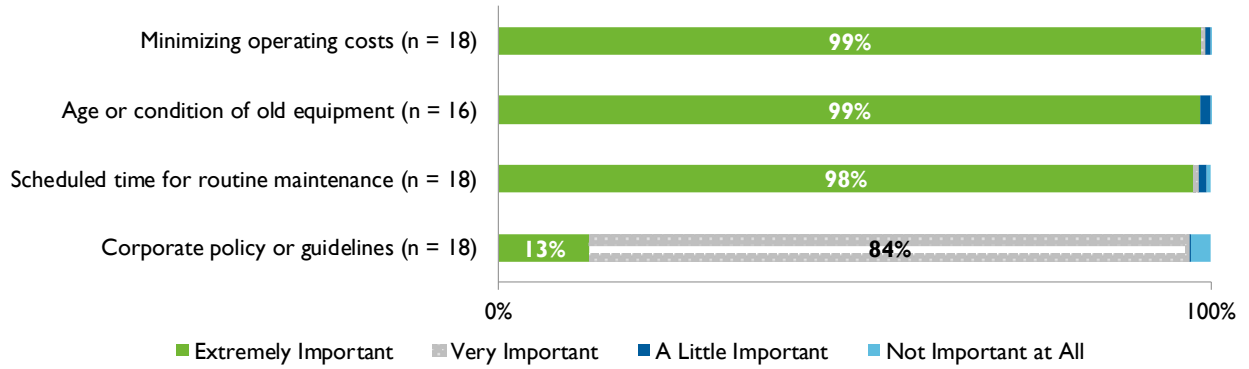
Figure 10 presents the program factors that may have played a role in participants' decisions to complete the energy efficient upgrade. Participants were most likely to identify recommendations from a contractor (97 percent), the contractor themselves (96 percent), and previous participation in a NMGC program (95 percent) as the most important program factors influencing their decision. In contrast, technical assistance from CLEAResult and marketing materials from NMGC were ranked the lowest, with majority of participants considering these factors to only be a little important.

Figure 10: Importance of Program Factors



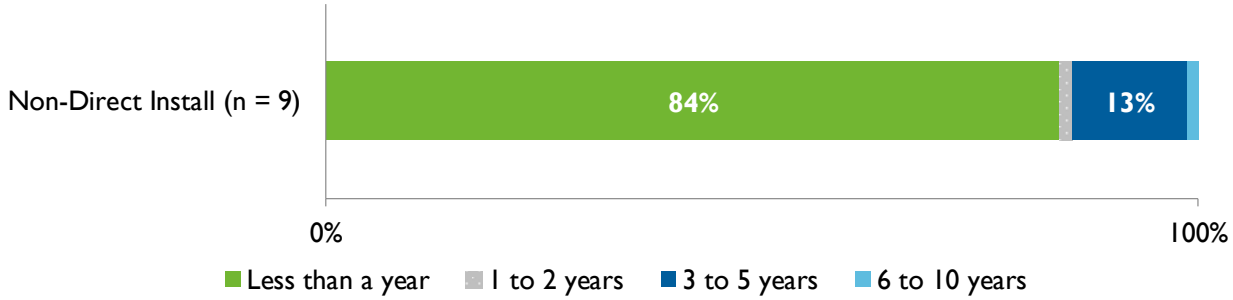
Similarly, participants ranked the non-program factors that may have played a role in their decision to complete an energy efficient upgrade (Figure 11). Minimizing operating costs, the age or condition of old equipment, as well as scheduled time for routine maintenance were all considered to be extremely important factors. While only 13 percent of participants considered corporate policy and guidelines to be extremely important, 84 percent of participants still considered it to be very important in their decision making.

Figure 11: Importance of Non-Program Factors



To get a sense of the condition of their existing equipment, participants were asked to estimate how much longer their equipment would have lasted if it had not been replaced. Of the nine participants who answered this question, 84 percent believed that their equipment would have lasted less than a year (Figure 12).

Figure 12: Condition of Existing Equipment



4.1.4 Participant Satisfaction

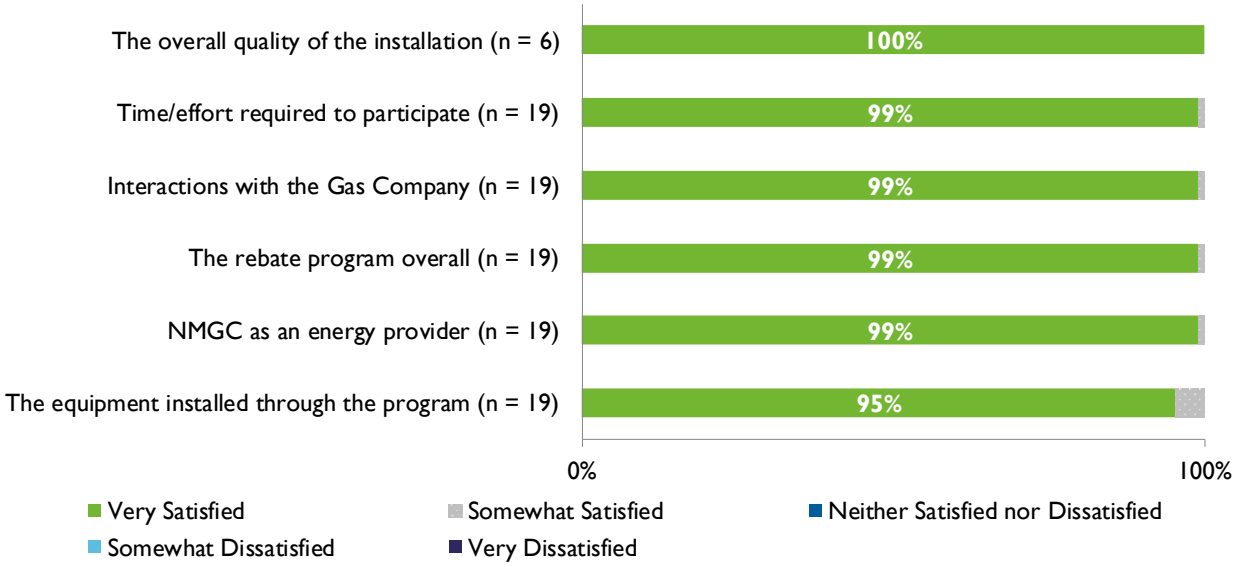
Finally, both direct install and non-direct install participants were asked to evaluate their satisfaction with the Efficient Buildings program. The individual components that participants were asked to rank included:

- NMGC as an energy provider
- The rebate program overall
- The equipment installed through the program
- The contractor who installed the equipment
- Overall quality of the equipment installation
- The time it took to receive the rebate
- The dollar amount of the rebate
- Interactions with NMGC
- The overall value of the equipment for the price they paid
- The time and effort required to participate
- The project application process

Figure 13 and

Figure 14 summarize the satisfaction levels for direct install and non-direct install participants respectively. Overall, direct install participants (Figure 13) were very satisfied with all aspects of the program, with 100 percent of participants indicating that they were either somewhat satisfied or very satisfied with every factor.

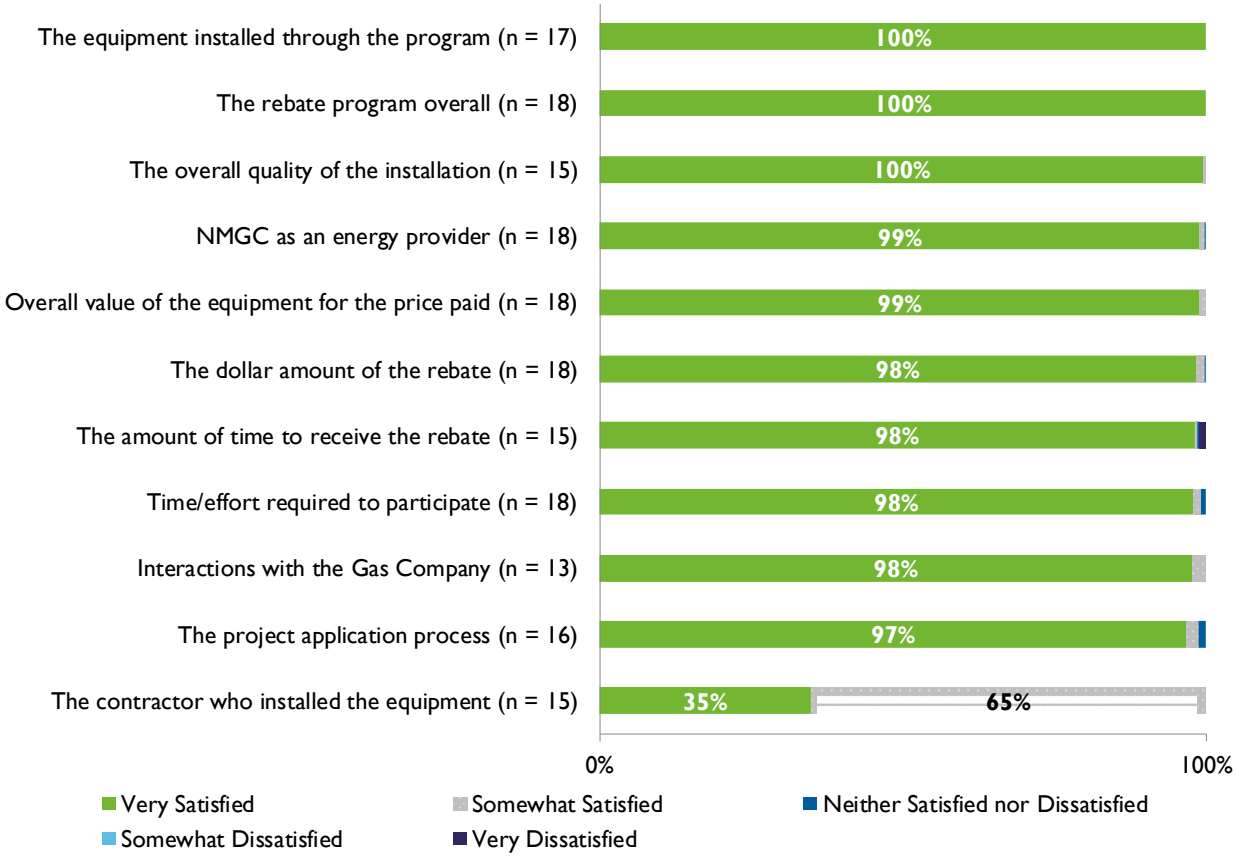
Figure 13: Direct Install Participant Program Satisfaction



In general, non-direct install participants also tended to report satisfaction with all aspects of the program (

Figure 14). However, some participants expressed dissatisfaction with a few aspects of the program. One participant who reported that they were neither satisfied nor dissatisfied mentioned that the project application process took longer than they had expected, while another participant who was dissatisfied with the time and effort it took to participate stated that they did not hear any updates about their rebate status until they called six months later to ask about it.

Figure 14: Non-Direct Install Participant Program Satisfaction



5 Conclusions and Recommendations

Based on the results from the data collection and analysis methods described in the previous chapters, the evaluation team has developed a number of conclusions and associated recommendations to improve NMGC's programs. These are organized below by program.

5.1 Efficient Buildings Program

Impact evaluation activities for the Efficient Buildings program included engineering desk reviews for a sample of projects. Based on these desk reviews, an overall engineering adjustment factor of 0.9974 was found for therm savings.

Conclusions and recommendations resulting from these reviews are discussed below. As noted below, many of these issues and recommendations were also discussed during the PY208 evaluation of this program.

- The evaluation team adjusted the savings for two projects which installed efficient water heaters. The evaluation team was not able to recreate *ex ante* savings based on the documentation included in the project files. Therefore, the evaluation team used the savings methodology in the 2018 TRM to calculate the savings for the installation of water heaters in fast food facilities.
    - **Recommendation:** For hot water measures, use deemed savings values from the TRM corresponding to the specific building type in which the measures are being installed. A similar recommendation was made in 2018 for hot water measures.
- The evaluation team adjusted the savings for the five projects in the sample which installed commercial kitchen equipment: gas fryers and gas conveyor ovens. The evaluation team used the savings documented in the "V3" CLEAResult workpapers for these measures, which do not match the savings reported by NMGC. No additional calculations were available for the evaluation team's review, so the source of these discrepancies is unknown. This was also an issue in 2018 for some of the cooking equipment installed through this program.
    - **Recommendation:** Ensure that cooking equipment savings are being accurately claimed, consistent with documented measure work papers.
    - **Recommendation:** Provide clear references to the current documents used to determine claimed savings so that savings can be traced back to the original sources.
- The evaluation team adjusted the savings for the four projects in the sample which installed weather-stripping measures. The evaluation team calculated savings by multiplying the installed linear feet listed on the application by the per-linear foot

savings listed on the application. This resulted in savings which differed from the claimed savings. This was also an issue in 2018 for some weather stripping projects.

  - **Recommendation:** Ensure that weather-stripping savings are being accurately claimed, consistent with application documents.

- The evaluation-adjusted the savings for custom project RBT-2361591, which installed a high-efficiency boiler. The savings calculations provided in the project documentation did not match the savings value listed in the tracking data for this project. The savings calculation that was provided in the project documentation was consistent with the prescriptive savings methodology in the 2018 New Mexico TRM. No additional calculations were provided, so the evaluation team used the prescriptive savings methodology from the 2018 New Mexico TRM. This adjustment increased the savings for the project. A similar issue was found for several boiler projects in the PY2018 evaluation.
  - **Recommendation:** Ensure the savings calculations provided to the evaluation team match the savings values listed in the tracking data.

5.2 Income Qualified Program

The impact evaluation activities for the Income Qualified program included engineering desk reviews of a sample of program projects. These desk reviews yielded a very slight downward adjustment in savings with an engineering adjustment factor of 0.9927. The NTG ratio for the Income Qualified program is stipulated at 1.00, and as a result, the net realized savings are equal to the gross verified savings of 168,709 therms.

The following findings and recommendations resulted from the engineering desk reviews:

- The supplied WAP NEAT Recommended Measures reports for 10 projects did not list any savings for the installation of faucet aerators. The evaluation team did not receive project documentation that would aid in verifying the installation of the faucet aerators. Therefore, the evaluation team did not include savings for the installation of faucet aerators in the verified savings for these 10 projects. This adjustment slightly reduced the savings.
  - **Recommendation:** Provide documentation to verify the installation of equipment if the measure is not included in the NEAT Recommended Measures report.
- For one project in the sample, the evaluation team found that the savings for high efficiency furnace differed between the tracking data and the projects' NEAT report. The evaluation team based the verified savings on the NEAT reports, which increased the savings for this measure.
  - **Recommendation:** Ensure consistency between savings shown in analysis reports and claimed savings as reflected in the program tracking data.

- For one project in the sample, the evaluation team found that the savings for a door replacement differed between the tracking data and the projects' NEAT report. The evaluation team based the verified savings on the NEAT reports, which decreased the savings for this measure.
    - **Recommendation:** Ensure consistency between savings shown in analysis reports and claimed savings as reflected in the program tracking data.

5.3 Multi-Family Program

Desk reviews were conducted for a sample of the Multi-Family program projects, and these produced an engineering adjustment factor of 0.9764. The NTG ratio for low-income and direct install projects in the Multi-Family program was assigned to be 1.00, and for market rate retrofit projects the *ex ante* value of 0.85 was applied. The resulting overall NTG ratio for the program was calculated to be 0.9514. As a result, the net realized savings for the Multi-Family program were found to be 202,316 therms.

Specific findings from the engineering desk reviews are described below.

- The evaluation team adjusted the savings for six of the sampled projects that included the installation of low-flow faucet aerators; these adjustments made the savings numbers consistent with the 2018 TRM, and the corresponding flow rates found in the tracking data.
    - **Recommendation:** Update program assumptions for low-flow faucet bathroom aerators to align with the 2018 TRM
- Similarly, savings were adjusted for two of the sampled projects that included the installation of low-flow faucet aerators to be consistent with the climate zone water temperatures. The savings were recalculated using the water temperatures and savings methodology in the 2018 TRM.
    - **Recommendation:** Ensure aerator inputs are consistent with New Mexico climate zones where measures are installed
- The evaluation team adjusted the savings for five projects that included the installation of DHW pipe insulation. The *ex ante* calculations appear to use the savings methodology and algorithm from the 2018 TRM. Although no additional calculations were available for the evaluation team's review, it appears that the Albuquerque specific algorithm inputs ($T_{Ambient}$) were used to calculate the savings for two projects that installed insulation in different climate zones. Additionally, the evaluation team adjusted the savings for three of the five projects to align with the with the 2018 TRM methodology for the installation of pipe insulation in an unconditioned space in the Santa Fe climate zone.
    - **Recommendation:** Update program assumptions for DHW pipe insulation accordingly to align with the TRM for conditioned and unconditioned spaces

- **Recommendation:** Ensure pipe insulation savings inputs are consistent with New Mexico climate zones where measures are installed

- The evaluation team adjusted the savings for one of the sampled projects that included the installation of a kitchen aerator. Based on the *ex ante* savings value, it appears the savings for this measure may have been custom calculated using the methodology in the 2018 TRM and a *FlowPost* value of 1.0 gpm. The TRM lists a *FlowPost* value of 1.5 gpm for kitchen aerators, and no additional supporting documentation was available. Therefore, the evaluation team defaulted to the 1.5 gpm *FlowPost* value listed in the TRM for this measure.
  - **Recommendation:** Update program assumptions for the installation of kitchen aerators to align with the TRM
  - **Recommendation:** Provide additional supporting documentation, such as specification or photos, for measures which differ from typical measure assumptions, or input assumptions in the TRM
- The evaluation team adjusted the savings for ten of the sampled projects that included the installation of programmable and smart thermostats. The engineering adjustments range from 0.84 to 1.20 depending on the climate zone where the measure is installed. The savings assumptions appear to use consistent unit efficiencies, ages, and capacities for every thermostat installation, when there may be notable differences between buildings. The evaluation team utilized the savings methodology and default algorithm inputs listed in the 2018 TRM to calculate the *ex post* savings.
  - **Recommendation:** Utilize the actual climate zone information from the TRM to determine savings for programmable and smart thermostat measures
  - **Recommendation:** Consider collecting the age, capacity, and efficiency of the existing unit(s) to use in the New Mexico TRM savings algorithms for programmable and smart thermostats to ensure as accurate a representation of savings as possible.
- The evaluation team adjusted the savings for one of the five sample projects that included the installation of a high efficiency furnace. The *ex ante* savings did not appropriately account the AFUE of the installed furnace. This adjustment slightly increased the *ex ante* savings for the project.
  - **Recommendation:** Ensure the savings calculations use the correct furnace efficiency when the value is known
- The baseline efficiencies for all of the high efficiency furnace measures were de-rated using the DOE's Building America Performance Analysis Procedures for Existing Homes. The procedure de-rated the baseline AFUE from 80% to 67% for all of the projects, which assumes all of the furnaces at each facility are approximately 18 years old. While the evaluation team agrees with the derating approach, the

approach should be supported with equipment specific information from the facilities to verify this assumption.

- **Recommendation:** Consider collecting the age of the existing furnaces to more accurately adjust the baseline efficiency.