Evaluation of the 2022 Public Service Company of New Mexico Energy Efficiency and Demand Response Programs

Final Report

Submitted by Evergreen Economics

April 4, 2023

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Executive Summary

This report presents the independent evaluation results for Public Service Company of New Mexico (PNM) energy efficiency and demand response programs for program year 2022 (PY2022).

The PNM 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 demand and 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, PNM 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 and demand savings, determine program cost effectiveness, assess how well the programs are being implemented, and provide recommendations for program improvements as needed.

For PY2022, the following PNM programs were evaluated:

1. Commercial Comprehensive
2. Residential Lighting
3. Residential Comprehensive
4. Home Energy Reports
5. Commercial Strategic Energy Management (SEM)
6. Peak Saver (Residential & Small Commercial)
7. Power Saver (Large Commercial & Industrial)

For each of the evaluated programs, the evaluation team estimated realized gross and net impacts (kWh and kW) and calculated program cost effectiveness using the UCT.[2] Brief process evaluations

[1] NMSA §§ 62-17-1 *et seq* (SB 644). Per the New Mexico Public Regulation Commission Rule 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

[2] The evaluation team consists of Evergreen Economics, EcoMetric, Demand Side Analytics, and Research & Polling.

were also conducted for the Commercial Comprehensive and Residential Comprehensive programs.

The remaining programs that were not evaluated in 2022 are still summarized in this report. The accomplishments for the non-evaluated programs are reported using the following parameters:

- Gross impacts (kWh, kW) were calculated using PNM's *ex ante* values for annual savings;
- Net impacts were calculated from the gross impacts using the existing *ex ante* net-to-gross (NTG) ratio; and
- Cost effectiveness calculations were calculated using the *ex ante* net impact values and cost data as reported by PNM.

The analysis methods used for the evaluated PY2022 programs are summarized as follows:

Commercial Comprehensive. The majority of projects in the Commercial Comprehensive program are prescriptive in nature, and as such the evaluation of this program centered on a deemed savings review, phone survey verification, and project desk reviews. Custom projects were evaluated by a desk review and participant phone survey. The deemed savings review for prescriptive measures focused on verifying that the appropriate savings values were applied based on the equipment installed and per the referenced source of savings, whether that is the New Mexico TRM or another source. The phone survey was used to verify that program-rebated measures are still installed and functional as well as gather information to calculate a free ridership rate, as described in more detail in the *Net Impacts* section below. Additionally, desk reviews conducted by engineers examined the savings assumptions and calculations specific to each project that is selected for review. Finally, on-site visits were conducted to verify measures in a sample of the larger projects.

Residential Lighting Program. As a prescriptive measure program, the evaluation of the Residential Lighting program focused on a deemed savings review and elasticity model to estimate net impacts. Since LED incentives are provided upstream, participant data are not available and a participating customer phone survey to verify the purchase and installation of bulbs is not possible. Instead, we reviewed the savings values in the tracking database and those documented in the TRM to verify that the correct savings values are being applied and that rebated bulbs are program qualifying. The elasticity model was used to determine net impacts is described in more detail below.

Residential Comprehensive. This is a prescriptive program serving PNM's residential customers and is made up of three sub-programs: Home Energy Checkup (including low-income households), Residential Cooling, and Refrigerator Recycling. The Home Energy Checkup sub-program includes a home energy assessment and the installation of low-cost measures in addition to available equipment rebates. The impact evaluation for the Residential Comprehensive program centered on a deemed savings review and participant survey. For the process evaluation, the participant survey and contractor interviews were used to assess how well the program is operating.

Home Energy Reports. This program provides participating customers with information on their energy consumption by providing a comparison with a matched set of similar households. The feedback on energy use, combined with tips for reducing energy use, is designed to create sustained reductions in consumption. Net impacts were estimated using a billing regression and consumption data from both the participants and control group customers.

Commercial Strategic Energy Management (SEM). The Commercial SEM program helps business customers reduce their energy use by providing organizational training, technical support for operations and maintenance (O&M) improvements, and energy monitoring and report tools that help track and manage facilities energy costs. Savings were calculated based on desk review of the individual projects that included a review of the billing regression results from the program implementer.

Power Saver and Peak Saver. PNM had two demand response programs in PY2022. The Power Saver program focuses on single-family, multifamily, and small and medium commercial customers. For all Power Saver customers, the five-minute interval load data were analyzed during event periods and compared to load shapes from a control group. The Peak Saver program is for larger customers that typically have unique load shapes, which makes finding a matched control group difficult. For these customers, savings were estimated based on the differences in load shapes between event and non-event weekdays for the same customer.

Table 1 summarizes the PY2022 evaluation methods.

Table 1: Summary of PY2022 Evaluation Methods by Program

Program	Deemed Savings Review	Participant Survey / Interviews	Engineering Desk Reviews	Site Visits	Elasticity Model	Billing Regression
Commercial Comprehensive	◆	◆	◆	◆		
Residential Lighting	◆				◆	
Residential Comprehensive	◆	◆				
Home Energy Reports	◆					◆
Commercial SEM	◆		◆			
Power Saver (Res & Small/Med Commercial)						◆
Peak Saver (Large Commercial & Industrial)						◆

The results of the PY2022 impact evaluation are shown in Table 2 (kWh) and Table 3 (kW), with the programs evaluated in 2022 highlighted in blue. For the non-evaluated programs, the totals are based on the *ex ante* savings and NTG values from the PNM tracking data.

Table 2: PY2022 Savings Summary – kWh

Program	# of Projects	Expected Gross kWh Savings	Engineering Adjustment Factor	Realized Gross kWh Savings	NTG Ratio	Realized Net kWh Savings
Commercial Comprehensive						
Retrofit Rebate	145	18,717,132	0.9982	18,682,518	0.842	15,730,680
New Construction	50	11,905,492	0.9126	10,865,318	0.842	9,148,598
Quick Saver	198	6,609,173	1.1367	7,512,915	1.000	7,512,915
Multifamily	55	3,412,404	0.8318	2,838,292	0.842	2,389,842
Building Tune-Up	7	428,970	1.0000	428,970	0.842	361,193
Midstream	4	310,494	1.6213	503,406	0.842	423,868
Residential Lighting	1,426,905	41,513,817	1.0000	41,513,817	0.680	28,229,395
Residential Products	167,020	15,686,115	1.0000	15,686,115	0.680	10,666,558
Home Works	13,926	3,817,037	1.0000	3,817,037	1.000	3,817,037
Energy Smart	300	1,248,219	1.0000	1,248,219	1.000	1,248,219
Residential Comprehensive						
Home Energy Checkup - LI	1,099	1,708,426	1.0000	1,708,426	0.980	1,674,257
Home Energy Checkup	1,333	1,835,567	0.9944	1,825,288	0.980	1,788,782
Refrigerator Recycling	6,880	7,444,920	1.0000	7,444,920	0.549	4,087,261
Cooling	665	555,122	1.0020	556,232	0.663	368,782
Easy Savings	4,672	2,685,739	1.0000	2,685,739	1.000	2,685,739
New Home Construction	1,402	1,625,284	1.0000	1,625,284	0.730	1,186,457
Residential Behavioral HER	219,518	5,303,515	0.5497	2,915,218	1.000	2,915,218
Commercial Behavioral SEM	5	1,890,070	0.7155	1,352,397	1.000	1,352,397
Peak Saver	157	233,765	0.6670	155,922	1.000	155,922
Power Saver	60,716	518,110	0.7065	366,031	1.000	366,031
Total	**1,905,057**	**127,449,371**		**123,732,063**		**96,109,150**

Table 3: PY2022 Savings Summary - kW

Program	# of Projects	Expected Gross kW Savings	Engineering Adjustment Factor	Realized Gross kW Savings	NTG Ratio	Realized Net kW Savings
Commercial Comprehensive						
Retrofit Rebate	145	2,596	0.9813	2,547	0.842	2,145
New Construction	50	1,417	1.1847	1,679	0.842	1,413
Quick Saver	198	1,315	0.8293	1,090	1.000	1,090
Multifamily	55	387	0.7260	281	0.842	237
Building Tune-Up	7		1.0000		0.842	
Midstream	4	32	2.0335	65	0.842	55
Residential Lighting	1,426,905	7,963	1.0000	7,963	0.680	5,415
Residential Products	167,020	2,891	1.0000	2,891	0.680	1,966
Home Works	13,926	161	1.0000	161	1.000	161
Energy Smart	300	64	1.0000	64	1.000	64
Residential Comprehensive						
Home Energy Checkup – LI	1,099	198	1.0000	198	0.980	194
Home Energy Checkup	1,333	180	0.9707	175	0.980	171
Refrigerator Recycling	6,880	1,728	1.0000	1,728	0.549	949
Cooling	665	245	1.0148	249	0.663	165
Easy Savings	4,672	244	1.0000	244	1.000	244
New Home Construction	1,402	435	1.0000	435	0.730	318
Residential Behavioral HER	219,518				1.000	
Commercial Behavioral SEM	5				1.000	
Peak Saver	157	26,831	0.5758	15,449	1.000	15,449
Power Saver	60,716	49,480	0.7326	36,250	1.000	36,250
Total	**1,905,057**	**96,167**		**71,470**		**66,286**

Beginning in 2021, the impact evaluation moved to applying new NTG ratios prospectively in future years, rather than retrospectively as had been done in prior years. For the PY2021 evaluation, the only updates to the NTG ratios occurred with the Commercial Comprehensive program, and these new ratios are being applied to the PY2022 results. For that program, the ratios changed from 0.861 to 0.842 for all sub-programs except the direct install Quick Saver, which will continue to use an NTG ratio of 1.000. Additionally, for PY2022, the Residential Lighting NTG is being applied to the Residential Products portion of the program. The Residential Products portion of the program will be evaluated in PY2023 and a new NTG ratio will be calculated.

Table 4 summarizes the updates to the NTG ratios for PY2023, with the updated values shaded in green.

Table 4: Net-to-Gross Ratio Updates for PY2023

Program	PY2022 NTG Ratio	PY2023 NTG Ratio
Commercial Comprehensive		
Retrofit Rebate	0.842	0.626
New Construction	0.842	0.763
Quick Saver	1.000	1.000
Multifamily	0.842	0.763
Building Tune-Up	0.842	0.763
Midstream	0.842	0.763
Residential Lighting	0.680	0.510
Residential Products	0.680	TBD
Home Works	1.000	1.000
Energy Smart	1.000	1.000
Residential Comprehensive		
Home Energy Checkup	0.980	0.978
Refrigerator Recycling	0.549	0.630
Cooling	0.663	0.626
Easy Savings	1.000	1.000
New Home Construction	0.730	0.730

Residential Behavioral HER	1.000	1.000
Commercial Behavioral SEM	1.000	1.000
Peak Saver	1.000	1.000
Power Saver	1.000	1.000

Lifetime kWh savings are shown in Table 5 by program and for the portfolio overall. This includes expected gross, realized gross, and realized net kWh lifetime savings. Based on the data collection and analysis conducted for this evaluation, the evaluation team found that, overall, PNM is operating high-quality programs that are achieving significant energy and demand savings and producing satisfied participants.

Table 5: PY2022 Savings Summary – Lifetime kWh

Program	Expected Gross kWh Lifetime Savings	Realized Gross kWh Lifetime Savings	Realized Net kWh Lifetime Savings
Commercial Comprehensive			
Retrofit Rebate	198,401,599	198,034,687	166,745,207
New Construction	126,198,215	115,172,374	96,975,139
Quick Saver	70,057,234	79,636,894	79,636,894
Multifamily	36,171,482	30,085,897	25,332,325
Building Tune-Up	4,547,082	4,547,082	3,828,643
Midstream	3,291,236	5,336,101	4,492,997
Residential Lighting	830,276,332	830,276,332	564,587,906
Residential Products	207,948,693	207,948,693	141,405,111
Home Works	42,640,998	42,640,998	42,640,998
Energy Smart	20,159,473	20,159,473	20,159,473
Residential Comprehensive			
Home Energy Checkup – LI	15,290,413	15,290,413	14,984,604
Home Energy Checkup	16,428,325	16,336,326	16,009,600
Refrigerator Recycling	36,606,964	36,606,964	20,097,223
Cooling	8,287,707	8,304,283	5,505,739

Easy Savings	35,451,755	35,451,755	35,451,755
New Home Construction	28,120,252	28,120,252	20,527,784
Residential Behavioral HER	5,303,515	2,915,218	2,915,218
Commercial Behavioral SEM	5,670,210	4,057,191	4,057,191
Peak Saver	233,765	155,921	155,921
Power Saver	518,110	366,031	366,031
Total	**1,691,603,361**	**1,681,442,885**	**1,265,875,759**

Using net realized savings from this evaluation and cost information provided by PNM, the evaluation team calculated the ratio of benefits to costs for each of PNM'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.[3] The evaluation team conducted this test in a manner consistent with the California Energy Efficiency Policy Manual.[4]

The results of the UCT are shown below in Table 6. Overall, the portfolio had a UCT of 1.77 for PY2022 and therefore was cost effective.

Table 6: PY2022 Cost Effectiveness

Program	Utility Cost Test (UCT)
Res Comp – Refrigerator Recycling	0.62
Res Comp – Home Energy Checkup	0.41
Res Comp – Home Energy Checkup LI	0.46
Res Comp – Residential Cooling	0.47
Residential Behavioral HER	0.06
Residential Lighting	5.35
Residential Products	3.58
Commercial Comprehensive	1.45

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

[4] California Public Utilities Commission. 2013. *Energy Efficiency Policy Manual, Version 5*. http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPolicyManualV5forPDF.pdf

Commercial Comprehensive - Multifamily	0.67
Easy Savings	2.66
Energy Smart (MFA)	0.74
New Home Construction	1.34
PNM Home Works	1.28
Commercial Behavioral SEM	0.17
PNM Power Saver	1.08
PNM Peak Saver	1.09
Overall Portfolio	**1.77**

The impact evaluation—which included engineering desk reviews and site visits for a sample of Commercial Comprehensive projects, a review of deemed savings values for the other programs — resulted in engineering adjustment factor rates greater than 1.000 for realized gross savings, particularly for kWh. Adjustments to savings based on the Commercial Comprehensive desk reviews were primarily due to several factors: incomplete project documentation where savings calculations did not match up with the NM TRM, adjustments to operating hour and interactive effects factor assumptions for lighting projects and differences in HVAC baseline parameters.

The process evaluation activities included customer surveys and a small number of interviews with contractors for both the Residential Comprehensive and Commercial Comprehensive programs. Across all these surveys and interviews, we found very high levels of satisfaction with PNM's PY2022 programs.

1 Commercial Comprehensive Program

1.1 Commercial Comprehensive Gross Impacts

To verify gross savings estimates, the evaluation team conducted engineering desk reviews for a sample of the projects in the Commercial Comprehensive program completed in 2022. 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:

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

For projects in the Commercial Comprehensive program that used deemed savings values for prescriptive measures, the engineering desk reviews included the following:

- Review of measures available in the New Mexico TRM and the PNM work papers to determine the most appropriate algorithms which apply to the installed measure;
- Recreation of savings calculations using TRM/work paper algorithms and inputs as documented by submitted specifications, invoices, and post-installation inspection reports; and
- Review of TRM/work paper algorithms to identify candidates for future updates and improvements.

For the custom projects included in the Commercial Comprehensive program, the engineering desk reviews included the following:

1. Review of engineering analyses for technical soundness, proper baselines, and appropriate approaches for the specific applications;
2. Review of methods of determining demand (capacity) savings to ensure they are consistent with program and/or utility methods for determining peak load/savings;
3. 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; and
4. Consideration and review for interactive effects between affected systems.

In support of the engineering desk reviews, primary data were collected for select projects through on-site verification. The evaluation team visited sites to confirm the installation of efficiency measures and operational parameters. Reviewing engineers contacted selected participants by phone and email to schedule appointments to come on-site and confirm installation of incentivized equipment and verify operational parameters integral to the calculation of estimated savings. The evaluation team also performed verification by requesting additional project-specific information from PNM and its implementers when clarification was needed and performing internet searches to confirm calculation parameters (e.g., operating hours). A total of eight site visits were completed for high impact and high uncertainty projects, and no major issues were identified during these visits. Moreover, positive feedback was provided by the participants in regard to the performance of the incentivized equipment and the program as a whole.

The *ex ante* 2022 impacts are summarized in Table 7 for each Commercial Comprehensive sub-program, with the Retrofit Rebate and New Construction sub-programs accounting for most of the savings. In total, the Retrofit Rebate sub-program accounted for 15 percent of the energy impacts in PNM's overall portfolio.

Table 7: Commercial Comprehensive Savings Summary

Sub-Program	# of Projects	Expected Gross kWh Savings	Expected Gross kW Savings
Retrofit Rebate	145	18,717,132	2,596
New Construction	50	11,905,492	1,417
Quick Saver	198	6,609,173	1,315
Multifamily	55	3,412,404	387
Building Tune-Up	7	428,970	-
Midstream	4	310,494	32
Total	**459**	**41,383,665**	**5,746**

The majority of the gross impact evaluation activities were devoted to engineering desk reviews for a sample of projects. For the desk reviews, the sample frame included projects in the Commercial Comprehensive program. The evaluation team reviewed projects in the Retrofit Rebate, Multifamily, New Construction, Direct Install (Quick Saver), Building Tune-Up, and Midstream sub-programs. The sample for the Retrofit Rebate sub-program was stratified to cover a range of different measure types so that no single measure (often lighting) would dominate the desk reviews. The sample was also stratified based on total energy savings within each sub-program. 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 8. The resulting sample achieved a relative precision of 90/3.3 for the Commercial Comprehensive program overall, with precision ranging from 80/<1 to 80/22 for the individual sub-programs.

Table 8: Commercial Comprehensive Desk Review Sample

Sub-Program	Measure Group	Stratum	Count	Average kWh	Total kWh Savings	% of Savings	Current Sample
Retrofit Rebate	Custom	Certainty	2	928,982	1,857,963	4%	2
		1	3	328,426	985,279	2%	2
		2	7	104,811	733,674	2%	4
	HVAC	Certainty	1	367,045	367,045	1%	1
		1	4	74,782	299,127	1%	3
		2	13	14,501	188,511	<1%	2
	Lighting	Certainty	3	1,400,559	4,201,678	10%	3
		1	8	410,979	3,287,829	8%	2
		2	31	126,289	3,914,961	9%	2
		3	65	29,273	1,902,725	5%	2
	Other	Certainty	1	27,390	27,390	<1%	1
Quick Saver		1	4	319,205	1,276,821	3%	3
		2	22	107,275	2,360,055	6%	6
		3	48	36,977	1,774,915	4%	4
		4	124	9,656	1,197,390	3%	3
Building Tune-Up		Certainty	1	950,950	950,950	2%	1
		1	7	61,281	428,970	1%	3
Midstream		Certainty	4	77,624	310,495	1%	4
Multifamily		1	3	375,000	1,125,000	3%	2

Sub-Program	Measure Group	Stratum	Count	Average kWh	Total kWh Savings	% of Savings	Current Sample
		2	5	188,513	942,564	2%	2
		3	13	70,919	921,951	2%	5
		4	29	14,582	422,891	1%	3
New Construction		Certainty	5	1,762,767	8,813,835	21%	5
		1	45	68,703	3,091,656	7%	7
Total			**448**	**327,354**	**41,383,675**	**100%**	**72**

The gross realized impacts for the Commercial Comprehensive program were determined by performing engineering desk reviews and site visits on the sample of projects. For prescriptive projects, the evaluation team found multiple measures that existed in both the New Mexico TRM and the PNM Workpapers, and the savings calculation approaches sometimes differed across sources. In these cases, we examined both sources but defaulted to the methodology and algorithm inputs in the NM TRM and ASHRAE 90.1-2016. Some of the other incentivized measures existed only in the PNM Workpapers, and in these cases, the algorithms were reviewed for accuracy and adjusted as necessary to calculate realized energy and demand savings. We also deferred to non-prescriptive values (e.g., custom lighting hours of use) assumed in the project files when possible, checking the values for reasonableness by corroborating with sources such as the TRM and posted business hours.

For custom projects, the *ex ante* savings calculations were recreated when possible (i.e., simple spreadsheet calculations). For more complex analyses (whole building energy simulations), the evaluation team audited the approaches taken and inputs used. When applicable, approaches and assumptions used in custom analyses were compared to those contained in the TRM.

Table 9 and Table 10 show the results of the desk reviews and how the resulting engineering adjustments were used to calculated realized savings. For the Commercial Comprehensive program overall, these adjustments resulted in an engineering adjustment factor of 0.9867 for kWh and 0.9855 for kW.

Table 9: PY2022 Commercial Comprehensive Gross kWh Impact Summary

Sub-Program	# of Projects	Expected Gross kWh Savings	Engineering Adjustment Factor	Realized Gross kWh Savings
Retrofit Rebate	145	18,717,132	0.9982	18,682,518
New Construction	50	11,905,492	0.9126	10,865,318
Quick Saver	198	6,609,173	1.1367	7,512,915
Multifamily	55	3,412,404	0.8318	2,838,292
Building Tune-Up	7	428,970	1.0000	428,970
Midstream	4	310,494	1.6213	503,406
Total	**459**	**41,383,665**	**0.9867**	**40,831,418**

Table 10: PY2022 Commercial Comprehensive Gross kW Impact Summary

Sub-Program	# of Projects	Expected Gross kW Savings	Engineering Adjustment Factor	Realized Gross kW Savings
Retrofit Rebate	145	2,596	0.9813	2,547
New Construction	50	1,417	1.1847	1,679
Quick Saver	198	1,315	0.8293	1,090
Multifamily	55	387	0.7260	281
Building Tune-Up	7	-	1.0000	
Midstream	4	32	2.0335	65
Total	**459**	**5,746**	**0.9855**	**5,663**

A summary of the individual desk review findings for each of the 72 projects is included in Appendix H.

1.2 Commercial Comprehensive Net Impacts

The evaluation team estimated net impacts for some 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:

1. What were the circumstances under which the customer decided to implement the project (i.e., new construction, retrofit/early replacement, replace-on-burnout)?
2. To what extent did the program accelerate installation of high efficiency measures?
3. What were the primary influences on the customer's decision to purchase and install the high efficiency equipment?
4. How important was the program rebate on the decision to choose high efficiency equipment?
5. 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)?
6. 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 net-to-gross [NTG] ratio) using the self-report approach is based on the 2017 Illinois Statewide Technical Reference Manual (TRM).[5] For the PNM 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.

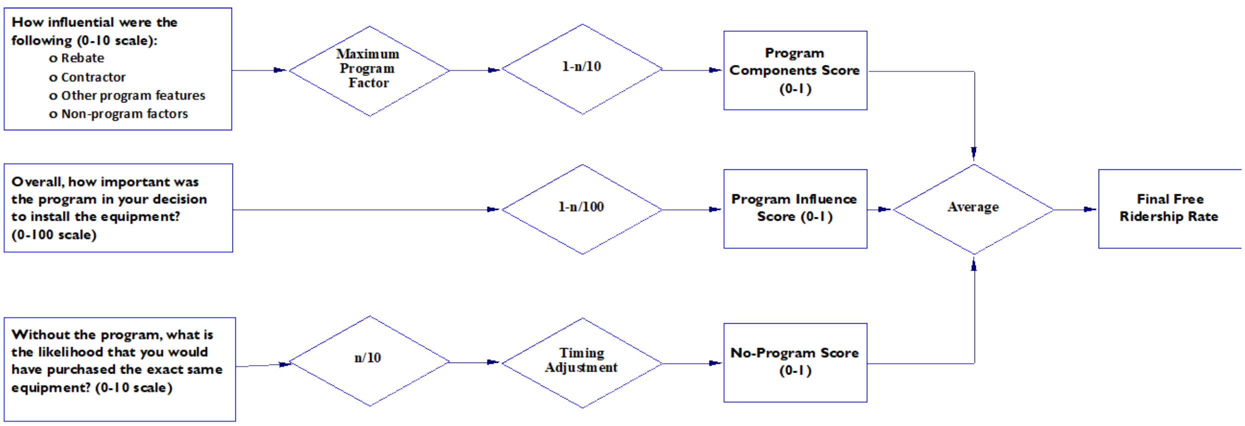
Each component was assessed using survey responses that rated the influence of various factors on the respondent's equipment choice. Since opposing biases potentially affect the main components, the No-Program Component typically indicates higher free ridership than the Program Component/Influence questions. Therefore, combining these opposing influences helps mitigate the potential biases. This framework also relies on multiple questions that are

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

crosschecked with other questions for consistency. This prevents any single survey question from having an excessive influence on the overall free ridership score.

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)

- o Recommendation from utility customer representative (or program implementer)
- o 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 Component Questions

A separate battery of ***No-Program Component*** questions was designed to understand what the customer might have done if the PNM rebate program had not been available. With these questions, we 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 PNM.

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

- If the program had not existed, would you have
- o Purchased the exact same equipment?
- o Chosen the same energy efficiency level?
- o 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 Component 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 Component 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 Component 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.

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

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

Beginning in 2021, any updates to program NTG ratios will be applied prospectively. As a result, the new NTG ratios for Commercial Comprehensive developed in the PY2022 evaluation will be used beginning in PY2023. The realized net impacts discussed below are calculated using the existing NTG ratios from PY2021.

1.3 Realized Gross and Net Impacts

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.):

$$\text{Gross Realized Savings} = \\ (\textit{Ex Ante}\ \text{Savings})*(\text{Installation Adjustment})*(\text{Engineering Adjustment Factor})$$

Net Realized Savings are then determined by multiplying the Gross Realized Savings by the NTG ratio:

$$\text{Net Realized Savings} = (\text{Net-to-Gross Ratio})*(\text{Gross Realized Savings})$$

Net impacts for the Commercial Comprehensive program were calculated using NTG ratios from the participant phone survey or *ex ante* values, depending on the sub-program. For the Retrofit Rebate sub-program, the NTG ratio was developed using the self-report method and participant phone survey data from the PY2021 evaluation.

The resulting NTG ratio is 0.842. While the survey sample was mostly Retrofit Rebate customers, there were also a few customers from the New Construction and Multifamily sub-programs, and so the same NTG ratio was applied to these programs, as well as to the Building Tune-Up sub-program. This resulted in an increase in the NTG ratio for these latter three sub-programs relative to their original *ex ante* values. For the Quick Saver sub-program, an NTG ratio of 1.00 was applied, due to the direct install design of this sub-program.

Table 11 and Table 12 summarize the PY2022 net impacts for the Commercial Comprehensive program using the existing NTG ratios from PY2021. Net realized savings for the program overall are 35,567,095 kWh, and net realized demand savings are 4,940 kW.

Table 11: PY2022 Commercial Comprehensive Net kWh Impact Summary

Sub-Program	# of Projects	Realized Gross kWh Savings	NTG Ratio	Realized Net kWh Savings
Retrofit Rebate	145	18,682,518	0.842	15,730,680
New Construction	50	10,865,318	0.842	9,148,598
Quick Saver	198	7,512,915	1.000	7,512,915
Multifamily	55	2,838,292	0.842	2,389,842
Building Tune-Up	7	428,970	0.842	361,193
Midstream	4	503,406	0.842	423,868
Total	**459**	**40,831,418**		**35,567,095**

Table 12: PY2022 Commercial Comprehensive Net kW Impact Summary

Sub-Program	# of Projects	Realized Gross kW Savings	NTG Ratio	Realized Net kW Savings
Retrofit Rebate	145	2,547	0.842	2,145
New Construction	50	1,679	0.842	1,413
Quick Saver	198	1,090	1.000	1,090
Multifamily	55	281	0.842	237
Building Tune-Up	7		0.842	
Midstream	4	65	0.842	55
Total	**459**	**5,663**		**4,940**

Table 13 shows how the Commercial Comprehensive NTG ratios will be updated for PY2023 based on the PY2022 evaluation results. The decrease in the PY2023 NTG ratios is due to a few large customers who would have installed the measures without the program (i.e., free riders). To reduce the impact of these large free riders, the evaluation team took an average of the PY2022 and PY2023 NTG ratios, resulting in a NTG ratio of 0.626 for Retrofit Rebates and 0.763 for the remaining sub-programs. The Quick Saver sub-program is direct install and gets an NTG ratio of 1.000.

Table 13: NTG Ratio Updates for PY2023

Sub-Program	PY2022 NTG Ratio	PY2023 NTG Ratio
Retrofit Rebate	0.842	0.626
New Construction	0.842	0.763
Quick Saver	1.000	1.000
Multifamily	0.842	0.763
Building Tune-Up	0.842	0.763
Midstream	0.842	0.763

1.4 Commercial Comprehensive Cost Effectiveness

The evaluation team calculated cost effectiveness using the Utility Cost Test (UCT) for the Commercial Comprehensive program, with the test calculations based on those prescribed in the California Energy Efficiency Policy Manual.[6]

In the UCT, the benefits of a program are considered to be 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 obtained the following from PNM:

- Avoided cost of energy for Energy Efficiency and Demand Response (costs per kWh over a 20+ year time horizon);
- Avoided cost of capacity for Energy Efficiency and Demand Response (estimated cost of adding a kW/year of generation, transmission, and distribution to the system);
- Avoided cost of CO2 (estimated monetary cost of CO2 per kWh generated);
- Avoided transmission and distribution costs;
- Discount rate;
- Line loss factor; and
- Program costs (all expenditures associated with program delivery).

For the Commercial Comprehensive program, the program-weighted average effective useful life values were provided by PNM, calculated by dividing lifetime savings by annual savings. The evaluation team performed a spot check of measure-specific effective useful life values to confirm reasonableness and alignment with the TRM when applicable. The final net energy savings values estimated from the PY2022 impact evaluation for Commercial Comprehensive were used in the final cost effectiveness calculations.

For the 2022 Commercial Comprehensive program, the UCT value was 1.36.

1.5 Quick Saver and Retrofit Rebate Participant Surveys

A respondent phone survey was fielded in early 2023 for participants in the Retrofit Rebate and Quick Saver sub-programs of the Commercial Comprehensive program.

Table 14 shows the distribution of completed surveys for the two sub-programs.

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[6] California Public Utilities Commission. 2013. *Energy Efficiency Policy Manual, Version 5*. http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPolicyManualV5forPDF.pdf

Table 14: Commercial Comprehensive Phone Survey Sample

Sub-Program	Count of Customers with Valid Contact Info	Target # of Completes	Completed Surveys
Quick Saver	125	50	50
Retrofit Rebate	146	50	51
Total	**271**	**100**	**101**

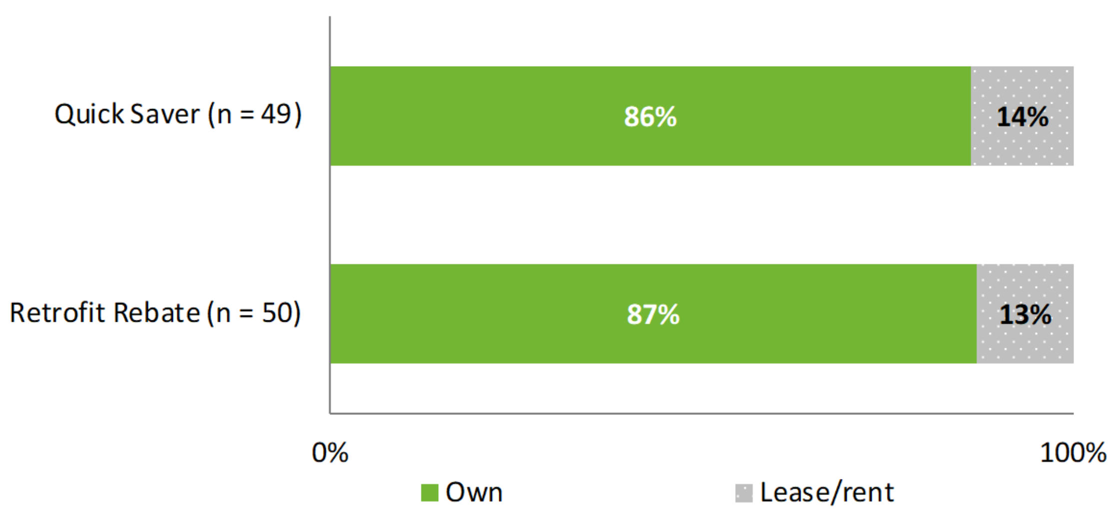
The following sections report results on company demographics, sources of program awareness, motivations for participation, and program satisfaction.

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

1.5.1 Company Demographics

We asked survey respondents whether their company owns or leases the building where the project was completed. Figure 2 shows that 86 percent of Quick Saver sub-program respondents and 87 percent of Retrofit Rebate sub-program respondents owned their building.

Figure 2: Quick Saver and Retrofit Rebate Respondent Own or Rent



The following two figures summarize the survey respondents' building and employee size by whether they participated in the Quick Saver or Retrofit Rebate sub-programs.

Figure 3 and Figure 4 show that respondents participating in the Quick Saver sub-program tend to report small to midsized building sizes and small number of employees. Most respondents (86%) participating in the Quick Saver sub-program had buildings that were smaller than 50,000 square feet, while 88 percent of them had less than 100 full-time employees. Comparatively, the respondents participating in the Retrofit Rebate sub-program reported similarly sized buildings, with well over half of the respondent firms (61%) occupying buildings that were smaller than 50,000 square feet. In addition, 51 percent of Retrofit Rebate respondents reported having more than 100 full-time employees.

Figure 3: Quick Saver and Retrofit Rebate Respondent Building Size

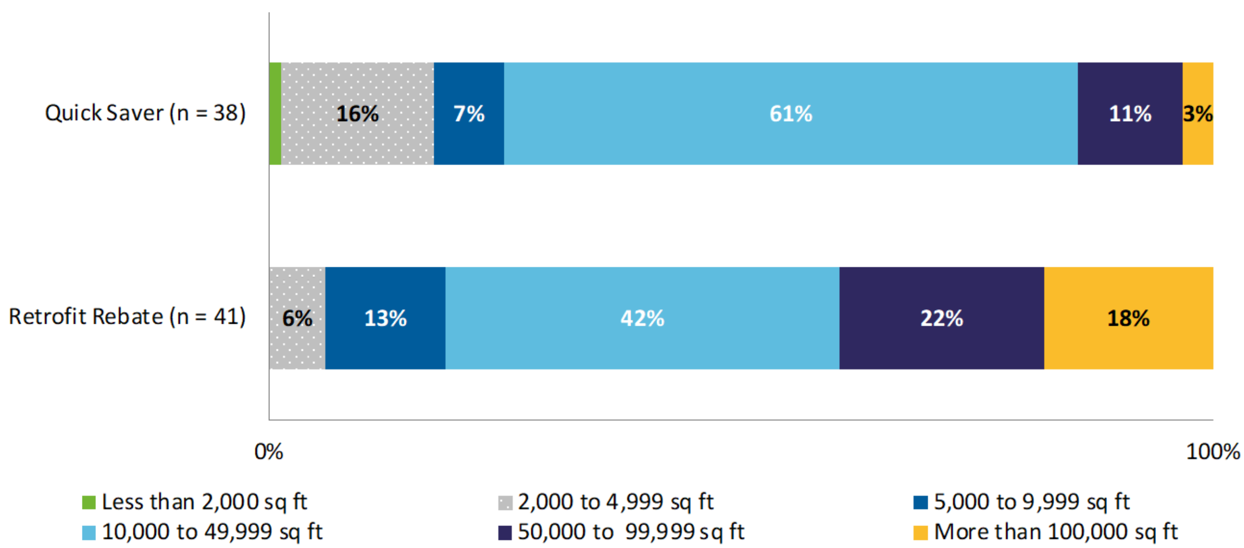


Figure 4: Quick Saver and Retrofit Rebate Respondent Number of Employees

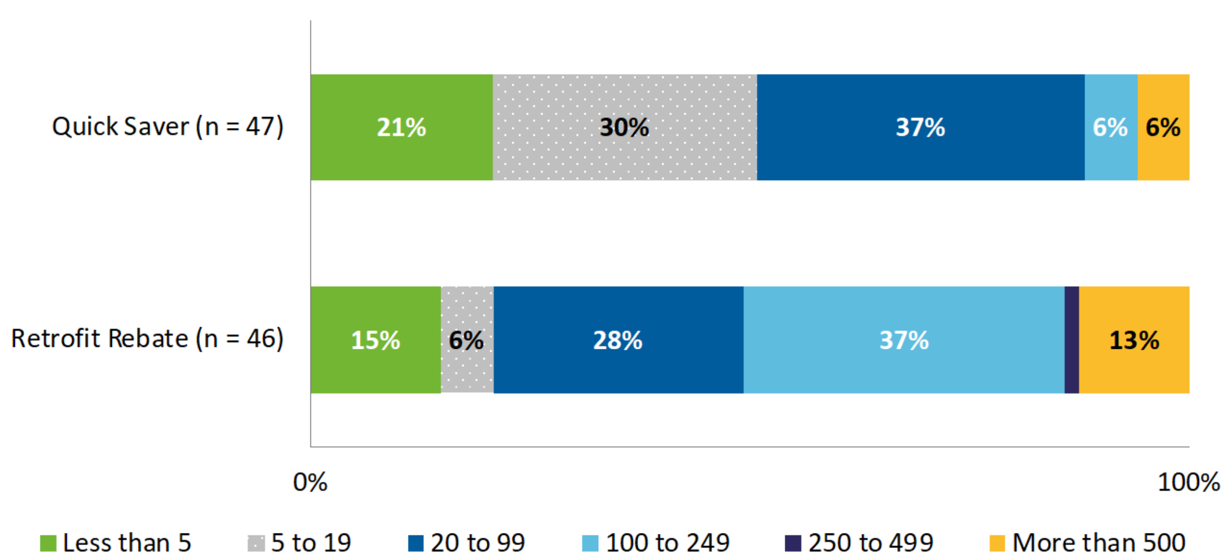
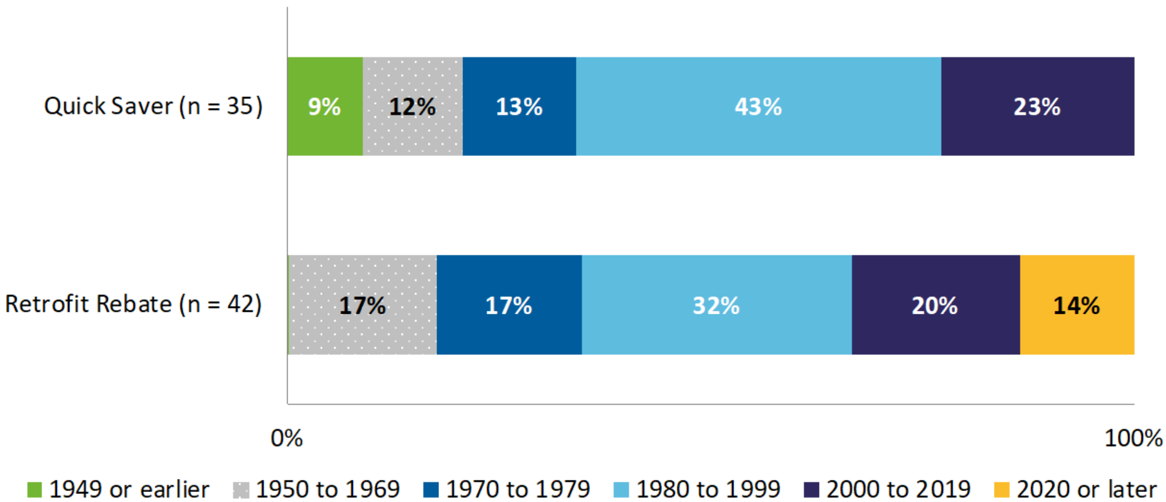


Figure 5 shows that respondent buildings of the Quick Saver sub-program tend to be older than those of the Retrofit Rebate sub-program. Quick Saver respondents reported about a quarter (23%) with buildings built in 2000 or later, while Retrofit Rebate respondents reported that a third (34%) were built in 2000 or later.

Figure 5: Quick Saver and Retrofit Respondent Building Age

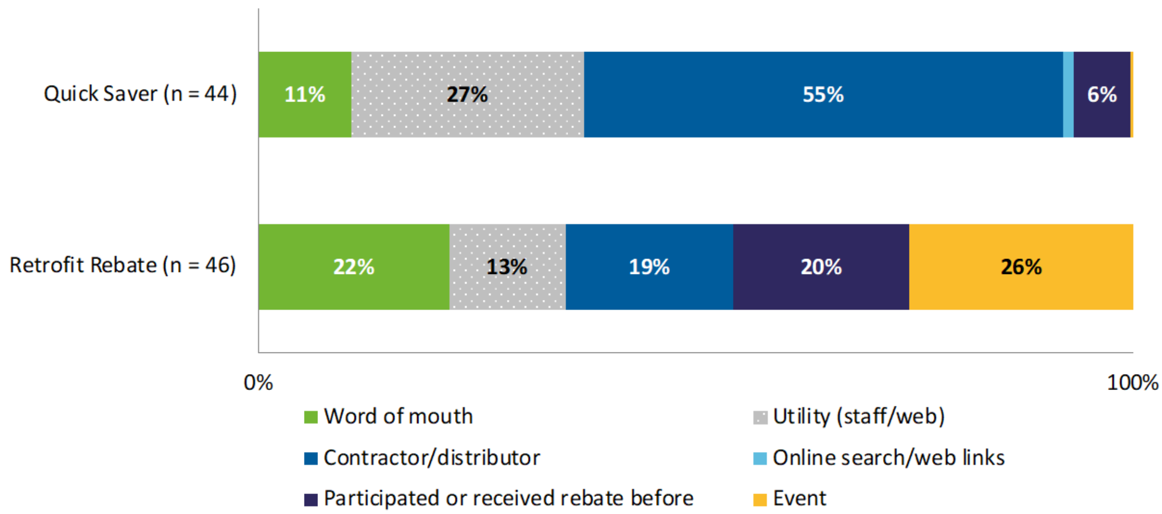


1.5.2 Sources of Awareness

Both Quick Saver and Retrofit Rebate sub-program respondents became aware of the program rebates/assistance through a variety of ways, such as from contractors/distributors, online web searches, and previous participation in a PNM rebate program.

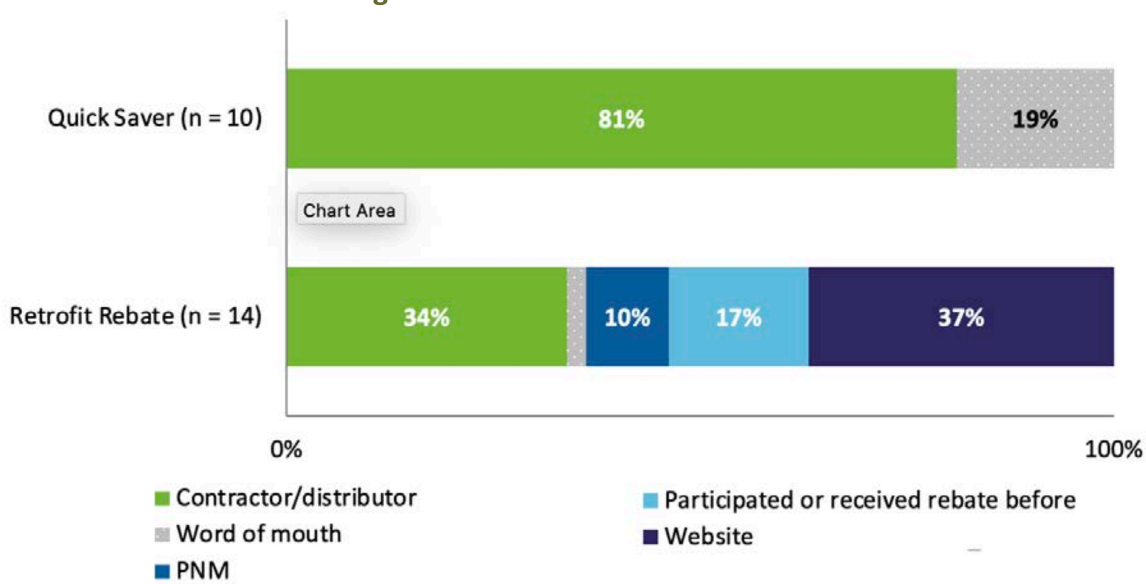
As shown in Figure 6, the majority of Quick Saver sub-program respondents initially learned of the program through contractors or distributors (55%), while the most frequently reported Retrofit Rebate source was learning about the program at an event (26%). Event sources included conferences, seminars, or workshops.

Figure 6: Initial Source of Awareness



Respondents were then asked to identify the most helpful source in helping them to decide whether to participate in the program (Figure 7). The majority of the Quick Saver sub-program respondents found their contractor/distributor to be the most helpful source (81%). Retrofit Rebate sub-program respondents found the website to be the most helpful source (37%), with their contractor/distributor also influencing about a third (34%) of respondents.

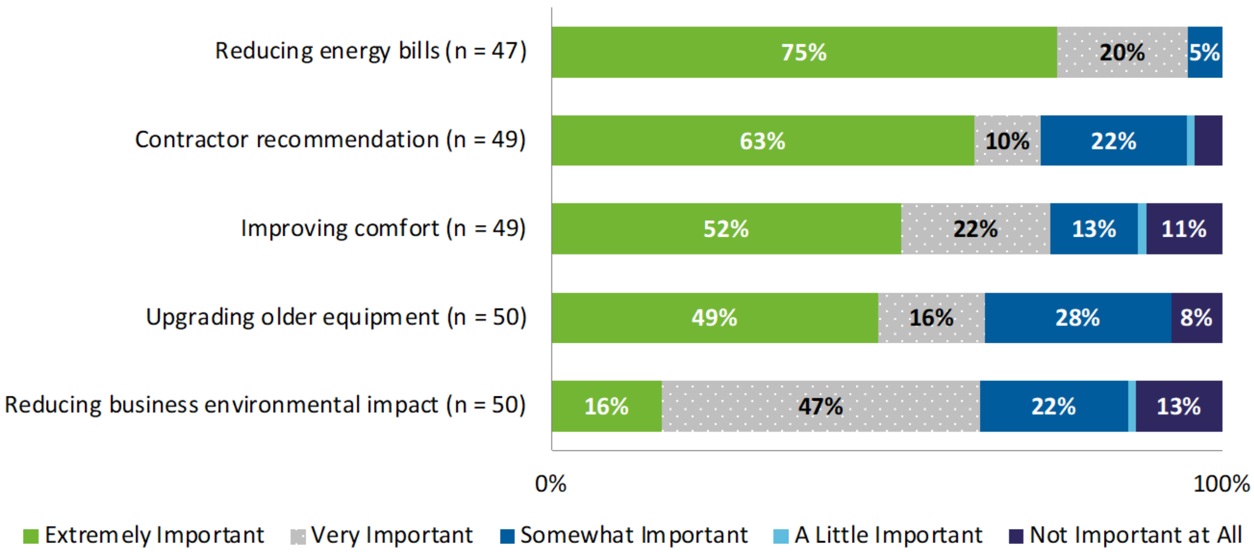
Figure 7: Most Useful Source of Awareness



1.5.3 Motivations for Participation

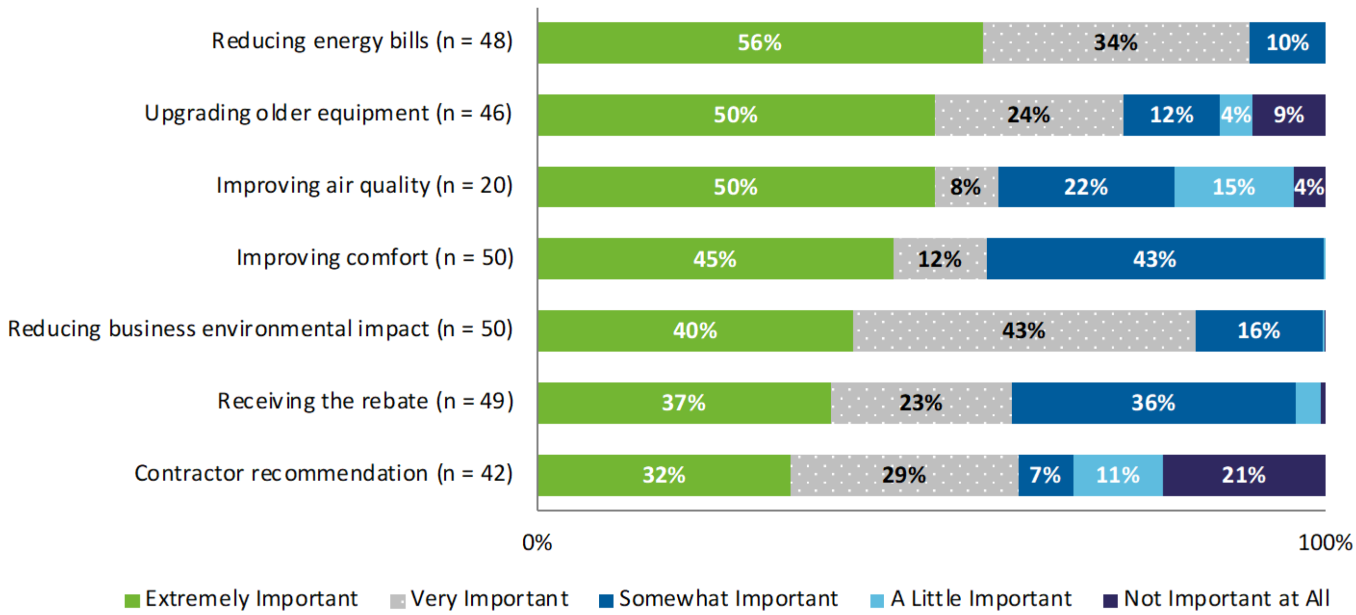
Figure 8 and Figure 9 show the level of importance placed on a variety of factors that might be influencing participation. For Quick Saver respondents, reducing energy bills was the most influential factor, with three-quarters (75%) of individuals indicating it was extremely important in their decision to participate. Other motivating factors were contractor recommendation (63%) and improving comfort of the business (52%).

Figure 8: Quick Saver Motivations for Participation



Retrofit Rebate sub-program respondents reported that reducing energy bills, upgrading older equipment, and improving air quality were most important for determining participation in the program, with 56 percent, 50 percent, and 50 percent of respondents selecting the factors as extremely important, respectively.

Figure 9: Retrofit Rebate Motivations for Participation



In addition to motivations for purchasing, Retrofit Rebate sub-program respondents were given a list of potential program and non-program factors that may have influenced their decision about how energy efficient their equipment would be. They were then asked to rate each factor's importance on a 1 to 10-point scale.[7] As shown in Figure 10, recommendation from a contractor and the contractor who performed the work were rated as most important, with 72 percent and 53 percent reported as extremely important, respectively.

[7] On the 0- to 10-point scale, 0 indicated "not at all important" and 10 indicated "extremely important".

Figure 10: Retrofit Rebate Importance of Program Factors

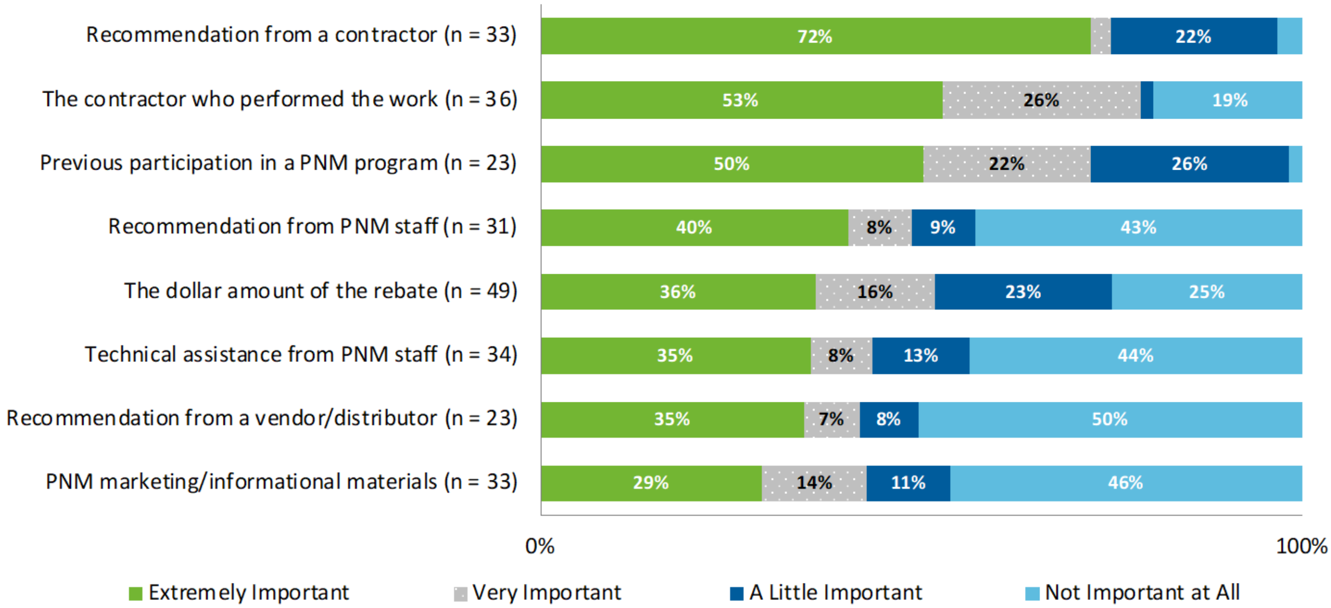
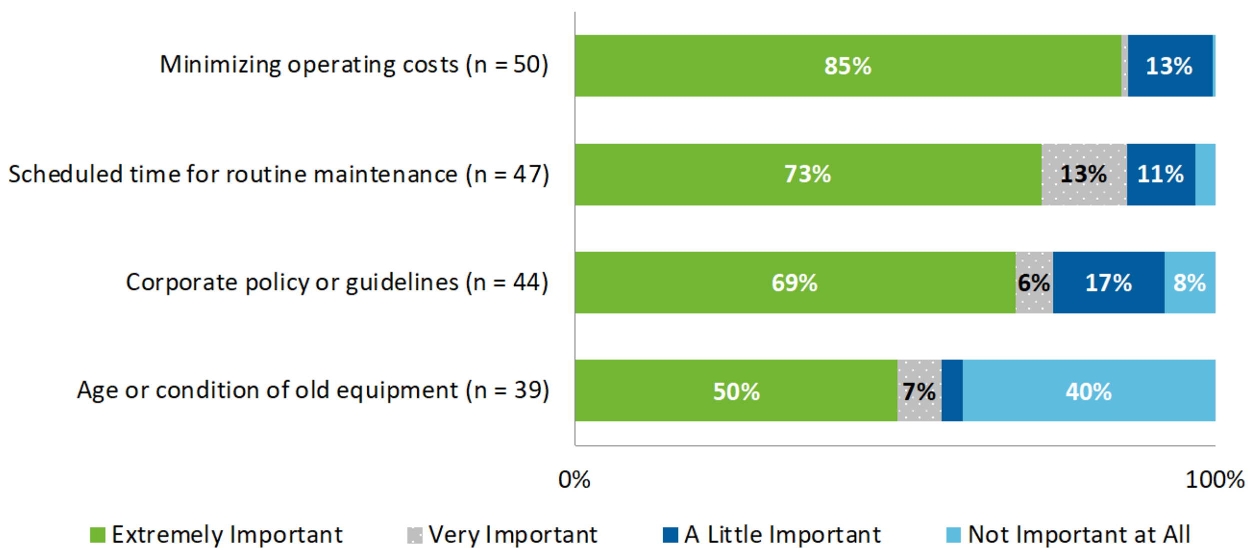


Figure 11 shows that most Retrofit Rebate sub-program respondents rated minimizing operating costs and scheduled time for routine maintenance as the most influential non-program factors in the decision regarding efficiency level of the equipment, with 85 percent and 73 percent of respondents reporting extremely important, respectively. The age or condition of old equipment was reported as the least influential non-program factor, with 40 percent of respondents reporting that it was not important at all.

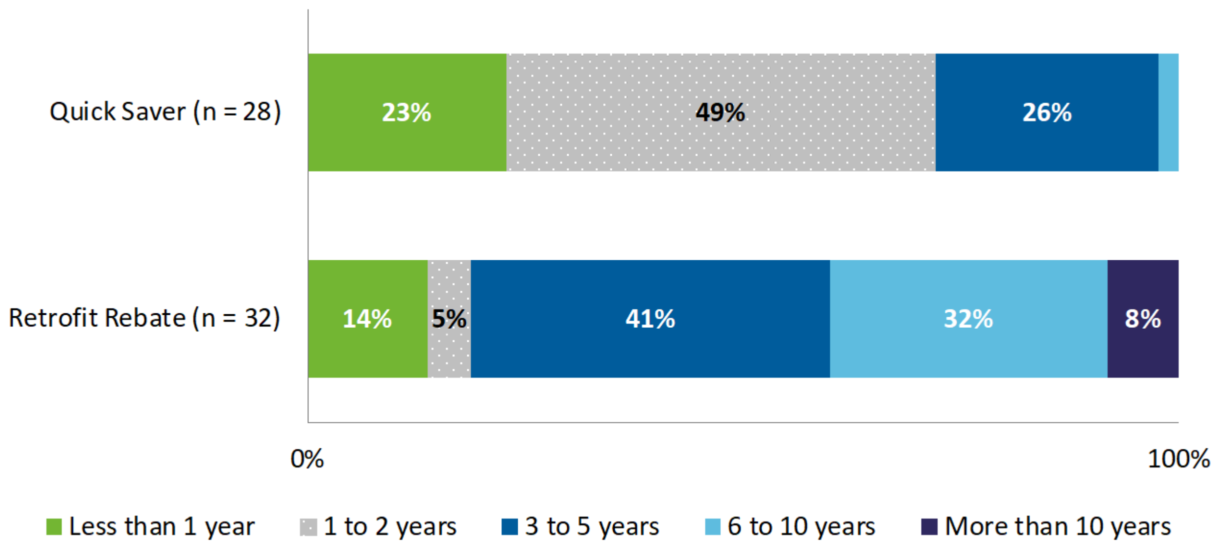
Figure 11: Retrofit Rebate Importance of Non-Program Factors



Respondents were asked approximately how much longer their equipment would have lasted if it had not been replaced.

Figure 12 shows that most Quick Saver sub-program respondents reported that their equipment would last two years or less without needing replacement (72%). The program may be targeting customers with dysfunctional equipment, who may be planning to replace their equipment soon (i.e., free riders). Conversely, most Retrofit Rebate respondents estimated that their equipment would last at least three or more years without needing replacement (81%). This suggests that the Retrofit Rebate sub-program is doing a good job at targeting customers with functioning equipment, rather than those whose equipment is not working (potential free riders).

Figure 12: Remaining Life of Equipment



1.5.4 Respondent Satisfaction

The respondents evaluated their satisfaction with various components of the Quick Saver and Retrofit Rebate sub-programs on the following scale: very satisfied, somewhat satisfied, neither satisfied nor dissatisfied, somewhat dissatisfied, and very dissatisfied. The individual components that respondents were asked to rank their satisfaction with included:

- PNM 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 PNM
- The overall value of the equipment for the price they paid
- The time and effort required to participate
- The project application process

As seen in Figure 13 and Figure 14, respondents from both the Quick Saver sub-program and Retrofit Rebate sub-program generally expressed high levels of satisfaction, with well over two-thirds of respondents reporting that they were very satisfied with each factor.

Quick Saver respondents reported being most satisfied with the overall value of the equipment for the price paid and the equipment installed through the program (94% and 87% reported being very satisfied, respectively). Retrofit Rebate respondents were most satisfied with the rebate program overall and the overall value of the equipment for the price paid, (97% and 96% reported being very satisfied, respectively).

Figure 13: Quick Saver Sub-Program Satisfaction

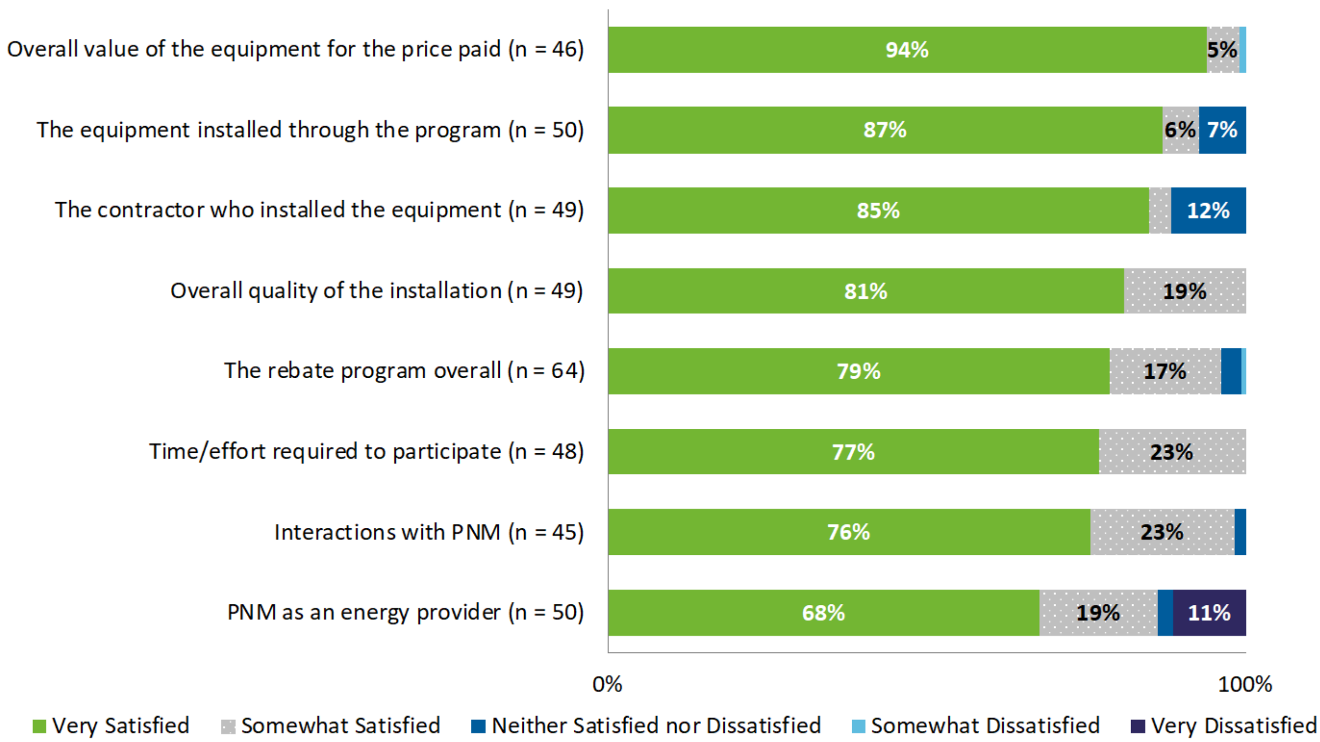
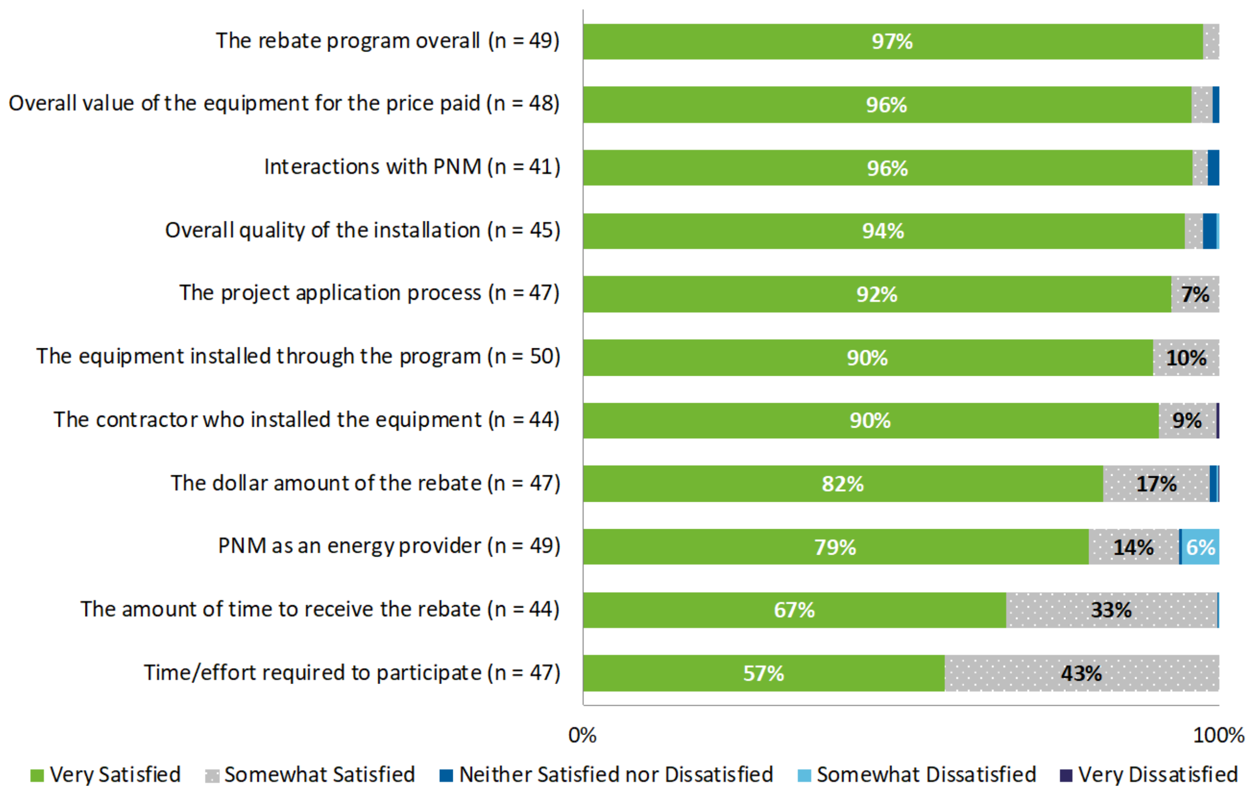


Figure 14: Retrofit Rebate Sub-Program Satisfaction



Overall respondent satisfaction for the Quick Saver sub-program is lower in PY2022 than it was in PY2021. While 95 percent of Quick Saver sub-program respondents reported being very satisfied in PY2021 across all factors, in PY2022, the average percent of those who reported being very satisfied across all factors was 81 percent. Notably, in PY2021, 98 percent of Quick Saver sub-program respondents reported that they were very satisfied with interactions with PNM, while in PY2022, 76 percent reported being very satisfied with this factor.

This pattern of decreased satisfaction is seen among the Retrofit Rebate sub-program respondents as well. While 95 percent of Retrofit Rebate sub-program respondents reported being very satisfied in PY2021 across all factors, in PY2022, the average percent of those who reported being very satisfied across all factors was 85 percent. In particular, in PY2021, 98 percent of Retrofit Rebate respondents reported that they were very satisfied with the amount of time and effort required to participate, while in PY2022, only 57 percent reported being very satisfied with this factor.

1.6 Commercial Comprehensive Contractor Interviews

The evaluation team conducted seven interviews with contractors who participated in the Commercial Comprehensive program in PY2022. The interviews lasted for about 25 minutes. The following topics were discussed:

- Contractor background and program involvement,
- Role and influence of the PNM program in the market, and
- Program satisfaction.

Due to the low number of interviews and depth of discussion, this section presents results qualitatively to show the range of perceptions and responses.

1.6.1 Contractor Background and Program Involvement

The interviewed participants varied regarding the scope of their work and geographic reach of their businesses. Most respondents were contractors from small, self-started companies, while some shared that their companies and clientele were more established. Though they noted different specialties and niches, overall, the contractors shared that their primary services were electrical with a focus on commercial service work.

Most contractors were familiar with utility energy efficiency programs prior to the 2022 program year. Respondents were asked to share when they first learned about and got involved with the commercial rebate program. A few of the participants were involved in the program from its inception. Others learned about the program from friends, family, or past employers. One participant realized that the program was applicable to their work and clientele on their own.

The contractors' overall knowledge of the rebate process across respondents suggests that the PNM region has an established community of contractors who share opportunities with one another.

1.6.2 PNM Program Reach

Many of the interviewed contractors reported that the majority of their customers who apply within PNM territory end up qualifying for a rebate. Some contractors attribute this high rate to selection bias—the contractors are familiar enough with the rebate process to only recommend potentially qualifying jobs to apply. This is indicative of contractors understanding the market and how and when the PNM Commercial Comprehensive program can meet client needs. Of the customers who reported lower rates of projects qualifying for rebates, the reason is that the PNM program is not yet central to their work; the rebate program and applicable jobs make up a smaller proportion of their work. This is due to the contractors being new to the program or servicing more residential than commercial projects.

Some contractors felt that PNM could market the program to commercial businesses to expand opportunities for contractors. Other contractors advocated for the opposite, sharing concerns that marketing could draw too many contractors to the program and inadvertently result in lower quality rebate services in the area.

Contractors identified certain customer segments that are not reached as well as others. One contractor stated that property managers (such as those that oversee strip malls) could be reached more effectively which, in turn, would benefit their residents and bring them cost savings. For example, the contractor explained that property managers of commercial strip malls were not as incentivized to make energy efficient upgrades since electricity is often sub-metered at such locations. Relatedly, other contractors expressed slower adoption among chain restaurants. Another contractor recognized that smaller businesses have lower staffing and slower responses to outreach and would need more personalized or word of mouth marketing to learn about the program. Lastly, one contractor expressed an interest in finding a way to install energy efficient measures at school districts, especially after seeing the cost savings and satisfaction levels of charter schools that recently made upgrades.

1.6.3 PNM Program Influence

To better understand the program influence on the market, the evaluation team explored how and when contractors communicate about the PNM rebates with customers and what role they place in contractors’ and customers’ ultimate choices. The responses suggested that the contractors were proactive with their promotion of the program—most contractors have established a practice of introducing the program as soon as possible during potentially qualifying jobs. All contractors identified themselves as the ones who inform customers of the efficiency opportunities.

Contractors noted that the rebate program greatly influenced customer decision making, especially for customers who perceive cost as a large barrier to upgrading their equipment. Contractors shared that they perceived the overall market demand for energy efficient equipment increasing because of this program; they see energy efficiency upgrades as a market necessity that this program supports. The contractors noted that customers outside of PNM territory are less likely to install efficiency measures as those within PNM territory. They said that this may be attributable to the fact that incentives outside of PNM’s service territory are not as attractive as the PNM rebate program. Contractors also said that PNM’s paperwork process was more accessible to contractors in comparison to other programs, which may be another reason for less energy efficiency measures outside of the PNM territory.

Most of the contractors shared that the program has influenced what equipment they suggest to a customer, implying that the rebate program encourages more efficient and higher quality products into the market.

1.6.4 PNM Program Satisfaction

Contractors themselves tended to rate the Commercial Comprehensive program relatively highly. Interviewed contractors rated the program a 4 or 5 (five responses) on a 5-point scale.[8]

Contractors identified areas of potential improvement or ideas that they hoped PNM would consider. These included:

- ***Establishing direct customer service contacts*** – Contractors expressed a desire for more customer service support. One contractor felt that their lack of a direct customer service contact was the main barrier to more involvement with the program. A different interviewee wished that PNM customer service provided contractors with more leads or information about the market.
- ***Updating or reassessing the contractor Quick Saver Portal*** – We received conflicting feedback on the contractor portal/software aspect of the rebate process. For example, one contractor shared that the portal process has been easy to navigate. Another contractor shared that the inventory software should be more streamlined.
- ***Increasing contractor accountability*** – One contractor felt strongly that PNM ought to hold other contractor work to higher standards. They recommended that PNM consider merit-based models to reward high-performing trade allies. Another contractor echoed this, noting a specific incident where they reviewed a client's Quick Saver upgrades and realized that the contractor who had administered the rebate for the customer in the first place had not installed the most energy efficient products available.
- ***Considering new methods for contractor compensation*** – A couple of the contractors communicated a desire for quicker payments. They both suggested direct deposit payments as opposed to the current processes.

To summarize, most of the contractors were familiar with the program prior to the 2022 program year. Contractors appreciated the reach and influence of the program on the market, noting the impact of incentives on customer behavior and decision making. The contractors had mixed feelings on where to best market the program. Overall, contractors expressed satisfaction with the Commercial Comprehensive program. The contractors shared ideas to improve the program, including a desire for increased customer support.

[8] The evaluation team asked contractors to rate the Commercial Comprehensive program overall on a 5-point scale that ranged from 1 ('very dissatisfied') to 5 ('very satisfied'). A 3 was defined as 'neither satisfied nor dissatisfied', while a 4 indicated the contractor was 'somewhat satisfied'.

1.7 Conclusions and Recommendations

Impact evaluation activities for the Commercial Comprehensive program included engineering desk reviews and site visits for a sample of the Retrofit Rebate, Multifamily, New Construction, Direct Install (Quick Saver), Building Tune-Up, Midstream, and AC Tune-Up sub-programs. Based on these desk reviews, an engineering adjustment factor of 1.0025 was found for kWh savings, and 0.9896 was found for kW savings. Conclusions and recommendations resulting from these reviews are discussed below:

Project-specific *ex ante* calculation steps for prescriptive projects and custom Multifamily projects were not always documented in the files available for the evaluation team's review.

- Using inputs from the provided project documents and algorithms from the 2021 PNM Workpapers and the New Mexico TRM resulted in savings different (both higher and lower) than those reported by PNM for multiple projects.
- Without additional documentation of the project-specific calculations performed by PNM, the reasons for differences between *ex ante* and *ex post* savings were not always clear to the evaluation team.
- **Recommendation 1:** Provide documentation of calculation steps made for each project, ensuring that submitted project documentation can be followed to reproduce the reported savings estimates.

The supplied information for the Midstream sub-program did not include any application files, *ex ante* savings calculations, or other documentation. All the program data were supplied in an Excel workbook.

- All Midstream projects were included in a single Excel workbook summary table, where each row represents a different measure. The summary table shows only values (no formulas) for a limited number of parameters related to the facility location, installed equipment, and energy savings.
- **Recommendation 2**: Provide copies of invoices, savings calculations (or an explanation of how the savings values in the Excel summary table are generated), and any other documentation related to equipment involved in the measures for the evaluation teams' review.

The evaluation team was not able to replicate the *ex ante* HVAC savings for several projects throughout the evaluated sub-programs using the supplied project documentation and PNM workpapers.

- Using assumptions, algorithms, baseline values provided in the New Mexico TRM, ASHRAE 90.1 2016, and AHRI documentation on installed HVAC units, the evaluation team calculated *ex post* HVAC savings, which were different (both higher and lower) than those reported by PNM.

- The evaluation team observed the use of Commercial, General as the building type for coincidence factor (CF) selection.
- **Recommendation 3:** Provide algorithm inputs that were used to calculate the *ex ante* savings for the HVAC projects throughout the sub-programs.
- **Recommendation 4:** Utilize the appropriate building type (when it is available) from the New Mexico TRM or PNM workpapers to select CF.

The evaluation team used HVAC interactive factors and coincidence factors for multiple Direct Install (Quick Saver) projects to align with the listed building type for interior light fixtures. The implementation team confirmed that they use a standardized assumption of 1.0 for both the energy and demand interactive efforts factors for Quick Saver projects which deviates from the methodology listed in the NM TRM. This assumption does not account for the interactive effects associated with efficient light fixtures installed in conditioned spaces.

- **Recommendation 5:** Utilize HVAC interactive factors and coincidence factors for interior fixtures to ensure the energy and peak demand savings are accurately calculated, provided the factors are appropriate for the building type when cross-checked with the PNM Workpaper and the NM TRM.

The evaluation team found Direct Install (Quick Saver) projects and Multifamily projects that claimed peak demand savings for exterior light fixtures. These fixtures were installed in unconditioned spaces (exterior) so, the evaluation team set the demand savings for these fixtures to zero.

- **Recommendation 6:** Zero out peak demand savings for exterior light fixtures.

The evaluation team adjusted the baseline fixture wattage for multiple fixtures in various Direct Install (Quick Saver) projects to align with the PNM Workpaper Fixture List.

- **Recommendation 7**: If possible, utilize the baseline fixture nomenclature per the PNM Workpaper Fixture List.

The evaluation team was not able to replicate the *ex ante* savings for the custom LED signage for the Direct Install (Quick Saver) project 19704.

- **Recommendation 8**: Provide *ex ante* calculations for custom projects when the input parameters may deviate from the PNM Workpapers and NM TRM.

The evaluation team modified savings for several projects in the evaluation sample for the New Construction sub-program.

- Several fixtures were either (1) not DLC or Energy Star Certified and/or (2) “not approved” in project submittals. These fixtures were removed from the analysis, which decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. The removal of ineligible and/or unapproved fixtures coupled with the reduction in square footage decreased savings. The NM TRM allows for fixtures not listed on a qualified products list (QPL) to receive approval if results of independent lab testing show the projects comply with the requirements in the most current version of the DLC Technical Requirements.

- **Recommendation 9:** In addition to Interior/Exterior Lighting COMcheck Certificates for all New Construction lighting projects, provide DLC or Energy Star certificates for each fixture. Ensure the DLC or Energy Star reported wattages are used for proposed LPD calculations. Additionally, ensure fixtures that are "not approved" in project submittals are updated accordingly when calculating proposed LPD.
- **Recommendation 10:** For fixtures that are not listed on a QPL but generate savings in projects completed through program, the implementation team should provide independent lab testing results to show that the fixtures comply with the requirements in the most current version of the DLC Technical Requirements.

The evaluation team modified savings for projects containing dehumidifier measures.

- In PNM-22-04638, savings for dehumidifiers were affected by two modifications. The first concerned the Energy Factor$_{EE}$ (EF) for the Quest 225 unit. The algorithm was sourced from *FES- A22 Dehumidification for Indoor Horticultural Facilities*, which requires the EF to be in L/kWh. The *ex ante* calculation used 6.1, which corresponds to the units pints/kWh. Specifications were not provided for this model in the project documentation and as such, manufacturer specifications were sourced online from the Quest website. The Quest specifications stated the EF for a water removal of 225 pints/day is 2.9 L/kWh, which was used in the *ex post* calculation. Second, a CF was applied twice in the *ex ante* calculation. It was first factored into the algorithm from the source *FES- A22 Dehumidification for Indoor Horticultural Facilities*. A second coincidence factor (with the building type "warehouse") was applied in the UCT calculation document. The CF was only applied one time in the *ex post* calculation.
- No *ex ante* calculations were provided for PNM-22-04817 and the evaluation team was not able to replicate savings. As such, the discrepancy in savings cannot be determined.
- **Recommendation 11:** Ensure the correct units are used when calculating savings. Additionally, provide manufacturer specifications for each dehumidifier model.
- **Recommendation 12:** Ensure CFs are not applied more than once.

The evaluation team used HVAC interactive factors for projects containing both LED grow lights and HVAC measures.

- HVAC interactive factors were not considered in any of the LED grow light measures. This assumption is valid when there is no heating or cooling present. The evaluation team was able to ascertain the presence of cooling in projects that also contained HVAC measures.

- **Recommendation 13:** Ensure HVAC interactive factors are used when there is a presence of heating or cooling.

2 Residential Comprehensive

PNM's Residential Comprehensive program is made up of three sub-programs: Home Energy Checkup, Residential Cooling, and Refrigerator Recycling. The Home Energy Checkup sub-program includes a home energy assessment and the installation of low-cost measures in addition to available equipment rebates.

The impact evaluation for the Residential Comprehensive program included a deemed savings review and participant survey. The participant survey was also used for the process evaluation that assessed how well the program is operating.

2.1 Residential Comprehensive Gross Impacts

The *ex ante* 2022 impacts are summarized in Table 15 for each Residential Comprehensive sub-program. In total, the Residential Comprehensive program accounted for nine percent of energy impacts in PNM's overall portfolio.

Table 15: Residential Comprehensive Savings Summary

Sub-Program	# of Projects	Expected Gross kWh Savings	Expected Gross kW Savings
Home Energy Checkup - LI	1,099	1,708,426	198
Home Energy Checkup	1,333	1,835,567	180
Refrigerator Recycling	6,880	7,444,920	1,728
Cooling	665	555,122	245
Total	**9,977**	**11,544,035**	**2,351**

The gross impact evaluation of the Residential Comprehensive program consisted of a deemed savings review of per-unit savings values for each of the three-subprograms. We compared PNM documentation on the source, calculations, and input assumptions of savings values to determine whether they were correct and appropriate.

For the Refrigerator Recycling sub-program, we were able to confirm the source of savings, calculation, and input assumptions for all measures. The engineering adjustment for the Refrigerator Recycling sub-program is 1.00.

For the Home Energy Checkup sub-program, we were able to confirm the source of savings, calculations, and input assumptions for the majority of measures. For measures where we did not have enough information on the input assumptions to replicate the calculations, we confirmed that the per-unit values were within a reasonable range for the type of measure. A slight engineering adjustment was made to account for an adjustment to the air filter with whistle measure kWh and kW savings. The resulting engineering adjustment for the Home Energy Checkup sub-program is 0.9944 for kWh and 0.9707 for kW.

The evaluation team was able to replicate calculations and input assumptions for the majority of the Residential Cooling sub-program measures but in a handful of cases the savings did not line up with the baseline assumptions used. This resulted in an engineering adjustment of 1.0020 for kWh and 1.0148 for kW.

Table 16 and Table 17 show the results of the deemed savings reviews and how the resulting engineering adjustments were used to calculate realized savings. For the Residential Comprehensive program overall, these adjustments resulted in an engineering adjustment factor of 0.9992 for kWh and 0.9996 for kW.

Table 16: PY2022 Residential Comprehensive Gross kWh Impact Summary

Sub-Program	# of Projects	Expected Gross kWh Savings	Engineering Adjustment Factor	Realized Gross kWh Savings
Home Energy Checkup - LI	1,099	1,708,426	1.0000	1,708,426
Home Energy Checkup	1,333	1,835,567	0.9944	1,825,288
Refrigerator Recycling	6,880	7,444,920	1.0000	7,444,920
Cooling	665	555,122	1.0020	556,232
Total	**9,977**	**11,544,035**	**0.9992**	**11,534,866**

Table 17: PY2022 Residential Comprehensive Gross kW Impact Summary

Sub-Program	# of Projects	Expected Gross kW Savings	Engineering Adjustment Factor	Realized Gross kW Savings
Home Energy Checkup - LI	1,099	198	1.0000	198
Home Energy Checkup	1,333	180	0.9707	175
Refrigerator Recycling	6,880	1,728	1.0000	1,728
Cooling	665	245	1.0148	249
Total	**9,977**	**2,351**	**0.9996**	**2,350**

2.2 Residential Comprehensive Realized Gross and Net Impacts

Net impacts for the Residential Comprehensive program were calculated using NTG ratios from the participant phone survey, using a similar self-report approach algorithm described above for the Commercial Comprehensive program. Table 18 and Table 19 summarize the PY2022 net impacts for the Residential Comprehensive program using the existing NTG ratios from PY2021. Net realized savings for the program overall are 7,919,082 kWh, and net realized demand savings are 1,479 kW.

Table 18: PY2022 Residential Comprehensive Net kWh Impact Summary

Sub-Program	# of Projects	Realized Gross kWh Savings	NTG Ratio	Realized Net kWh Savings
Home Energy Checkup - LI	1,099	1,708,426	0.9800	1,674,257
Home Energy Checkup	1,333	1,825,288	0.9800	1,788,782
Refrigerator Recycling	6,880	7,444,920	0.5490	4,087,261
Cooling	665	556,232	0.6630	368,782
Total	**9,977**	**11,534,866**		**7,919,082**

Table 19: PY2022 Residential Comprehensive Net kW Impact Summary

Sub-Program	# of Projects	Realized Gross kW Savings	NTG Ratio	Realized Net kW Savings
Home Energy Checkup - LI	1,099	198	0.9800	194
Home Energy Checkup	1,333	175	0.9800	171
Refrigerator Recycling	6,880	1,728	0.5490	949
Cooling	665	249	0.6630	165
Total	**9,977**	**2,350**		**1,479**

Additionally, using the PY2022 program data provided by PNM, energy savings values were calculated for refrigerators and freezers recycled through the PNM Refrigerator Recycling program from 1955 to 2021. Figure 15 shows the average savings associated with recycled refrigerators and freezers, by year manufactured. The greatest savings are for refrigerators and freezers manufactured in 1990 or earlier. The largest decrease in savings for both refrigerators and freezers occurs between the '1990 or earlier' and '1991-2000' bins, and there is a subsequent leveling out of savings across the remaining year manufactured bins. Overall, savings tend to decrease as the manufactured year increases.

Figure 15: Average kWh Savings for Refrigerators and Freezers by Year Manufactured

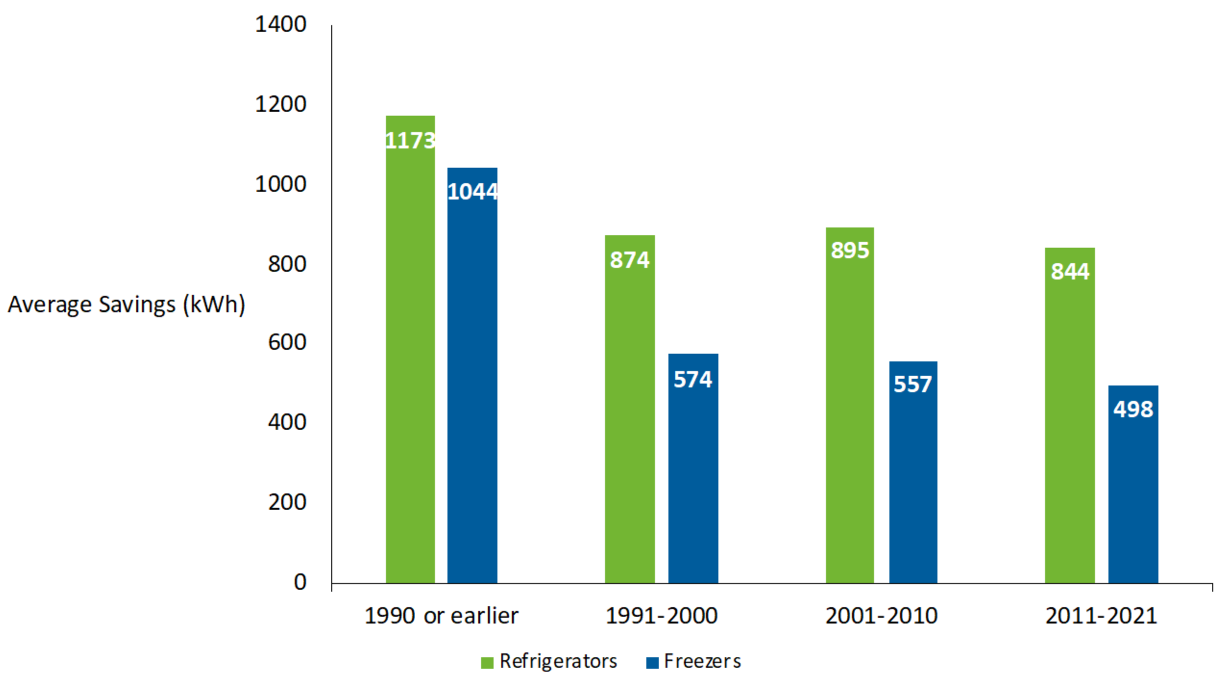


Figure 16 shows the percent of refrigerators and freezers in manufactured year bins. Most of the recycled refrigerators were relatively new, with 61 percent in the 2000 to 2014 time frame. The age distribution for freezers is more widely dispersed.

Figure 16: Refrigerator and Freezer Frequency by Year Manufactured

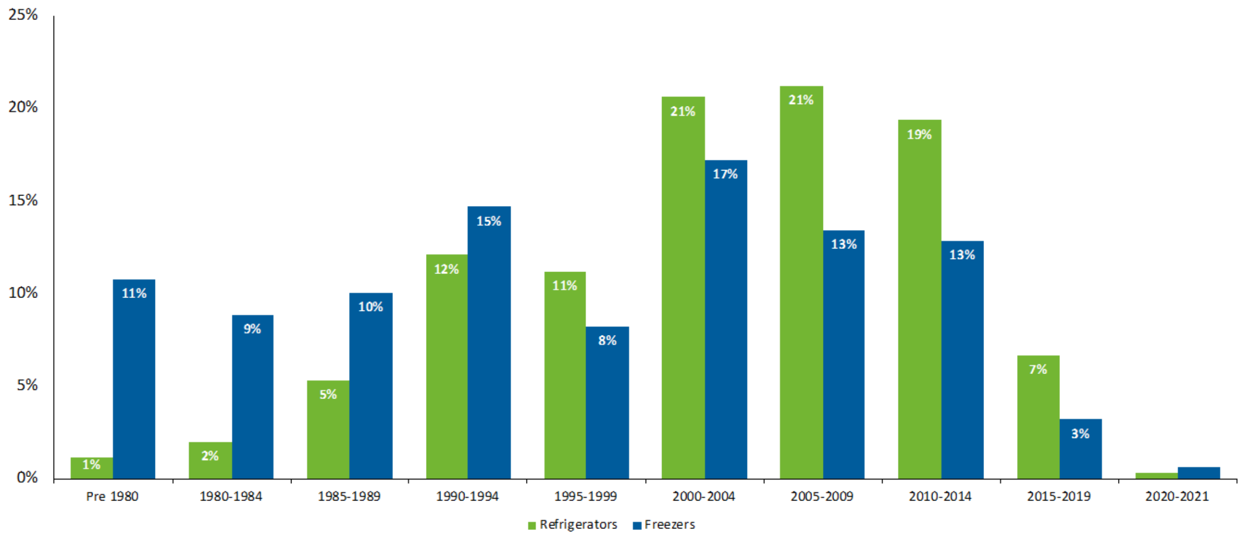


Table 20 shows how the Residential Comprehensive NTG ratios will be updated for PY2023 based on the PY2022 evaluation results.

Table 20: NTG Ratio Update for PY2023

Sub-Program	PY2022 NTG Ratio	PY2023 NTG Ratio
Home Energy Checkup	0.980	0.978
Cooling	0.663	0.626
Refrigerator Recycling	0.549	0.630

2.3 Residential Comprehensive Cost Effectiveness

The evaluation team calculated cost effectiveness using the Utility Cost Test (UCT) for the Residential Comprehensive program, with the test calculations based on those prescribed in the California Energy Efficiency Policy Manual.[9]

[9] California Public Utilities Commission. 2013. *Energy Efficiency Policy Manual, Version 5*. http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPolicyManualV5forPDF.pdf

In the UCT, the benefits of a program are considered to be 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 obtained the following from PNM:

- Avoided cost of energy for Energy Efficiency and Demand Response (costs per kWh over a 20+ year time horizon);
- Avoided cost of capacity for Energy Efficiency and Demand Response (estimated cost of adding a kW/year of generation, transmission, and distribution to the system);
- Avoided cost of CO2 (estimated monetary cost of CO2 per kWh generated);
- Avoided transmission and distribution costs;
- Discount rate;
- Line loss factor; and
- Program costs (all expenditures associated with program delivery).

For the Residential Comprehensive program, the program-weighted average effective useful life values were provided by PNM, calculated by dividing lifetime savings by annual savings. The evaluation team performed a spot check of measure-specific effective useful life values to confirm reasonableness and alignment with the TRM when applicable. The final net energy savings values estimated from the PY2022 impact evaluation for Residential Comprehensive were used in the final cost effectiveness calculations.

2.4 Residential Comprehensive Participant Phone Surveys

As part of the process evaluation, the evaluation team conducted telephone surveys with residential customers who received rebates through the three PNM Residential Comprehensive sub-programs. The surveys were completed in January 2023 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 their program experience;
- Survey responses for use in the free ridership calculations;
- Baseline data on energy use and/or equipment holdings;
- Participant drivers/barriers; and
- Additional process evaluation topics.

PNM provided program participation data on the Residential Comprehensive participant projects, which allowed us to select a sample for surveys. The evaluation team randomly selected and recruited program participants based on whether they had valid contact information and received a rebate through the Residential Comprehensive sub-programs.

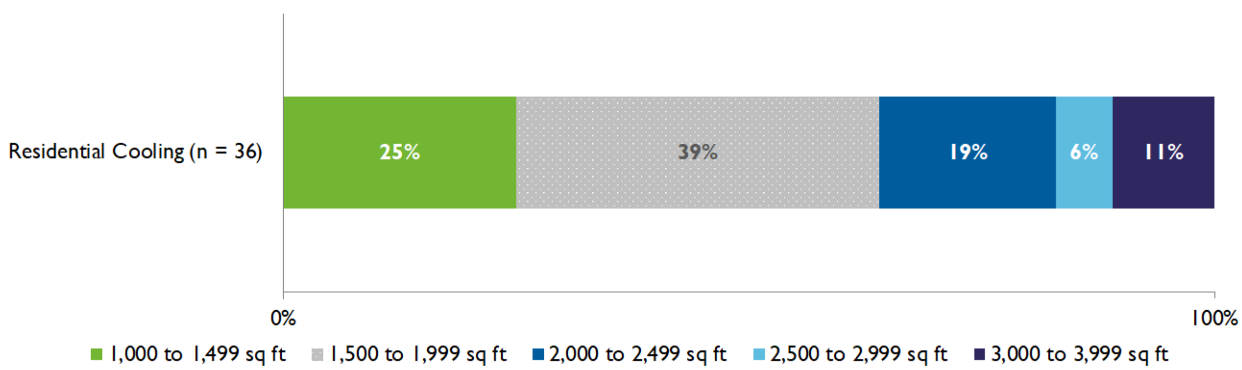
Table 21: Residential Comprehensive Phone Survey Sample

Sub-Program	Count of Customers with Valid Contact Info	Target # of Completes	Completed Surveys
Cooling	440	40	40
Refrigerator Recycling	4,791	110	110
Home Energy Checkup	1,727	75	75
Total	**6,958**	**225**	**225**

2.4.1 Residential Cooling Survey Results

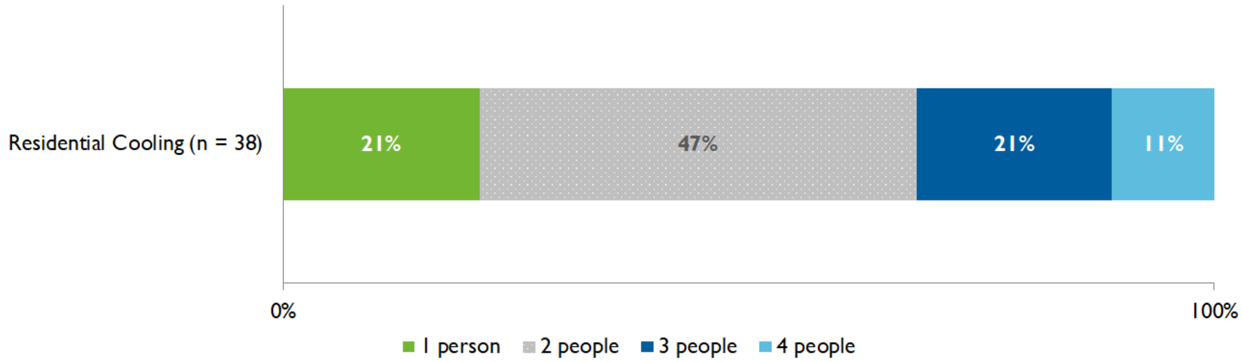
Thirty-nine of the 40 respondents reported owning the homes in which their cooling equipment were installed. The home sizes of respondents tended to be on the smaller side out of the size options provided; as shown in Figure 17, 64 percent of respondents reported home sizes between 1,000 to 1,999 square feet, while 36 percent of respondents reported home sizes between 2,000 to 3,999 square feet.

Figure 17: Residential Cooling Respondent Home Size (n=36)



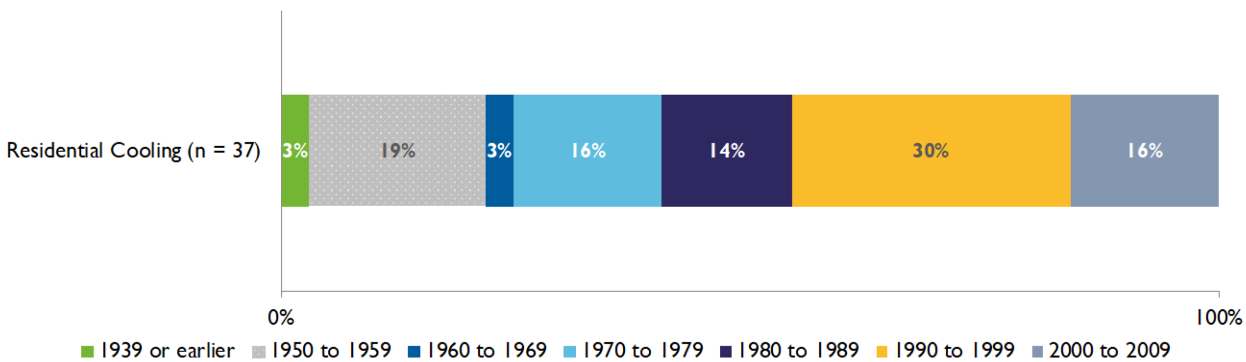
Similarly, a majority of respondents (68%) reported smaller household sizes of one or two people, as shown in Figure 18, while 32 percent of respondents reported household sizes of three or four people. There were no households with more than four members.

Figure 18: Residential Cooling Respondent Household Size (n=38)



As shown in Figure 19, a majority of participants (55%) reported that their home was built sometime before 1989. This suggests that the program is doing a good job at targeting older homes, where the potential for significant energy savings is the greatest. However, there is still strong representation from more recently built homes, with the largest percentage of homes built between 1990 to 1999 (30%).

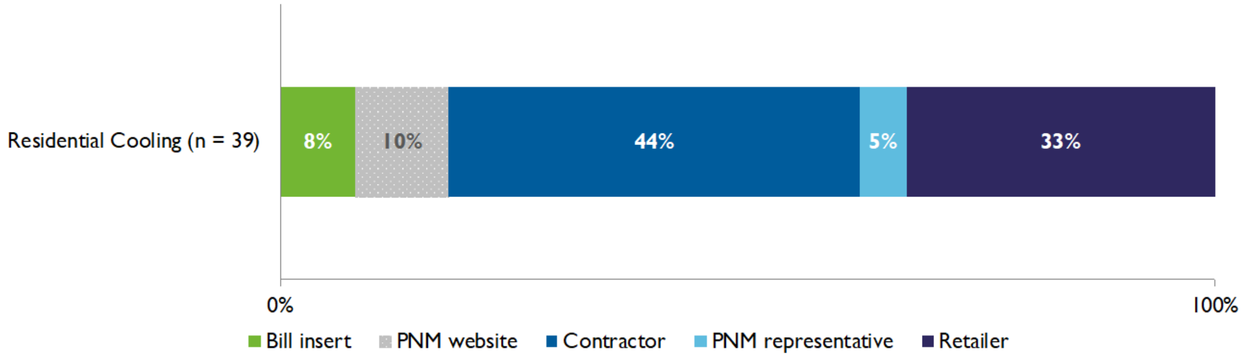
Figure 19: Residential Cooling Participant Home Age (n=37)



Source of Awareness

Respondents became aware of the program rebates/assistance through a variety of channels, including retailers, contractors, the PNM website, PNM representatives, and bill inserts. As shown in Figure 20, 44 percent of respondents initially became aware of the program through a contractor. The next most common methods of discovering the rebate program were through a retailer (33%) or through the PNM website (10%).

Figure 20: Residential Cooling Initial Sources of Awareness (n=39)

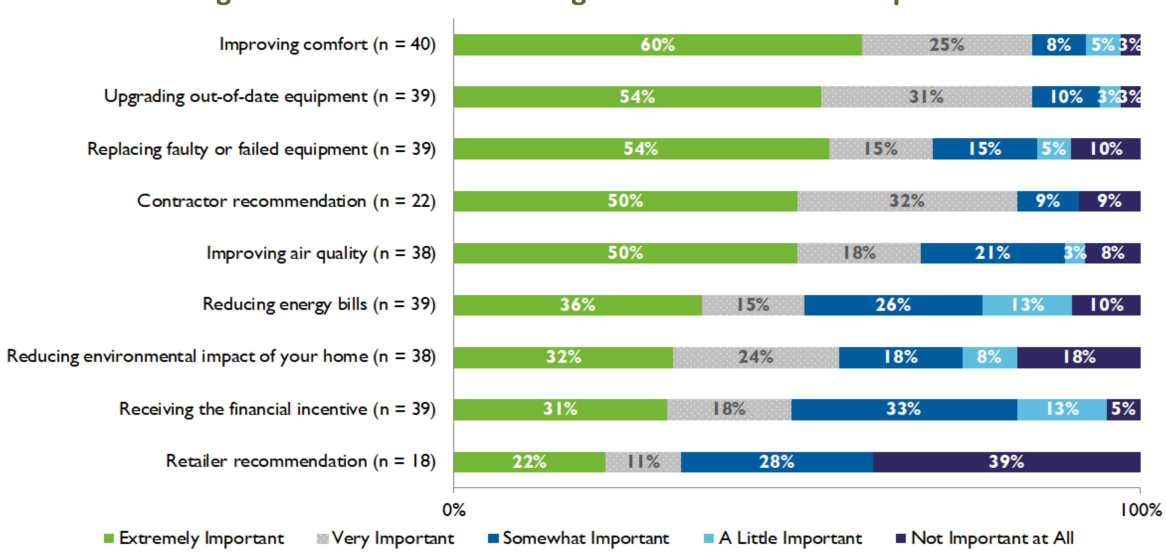


Motivations for Participation

Respondents were then asked to rate a variety of factors that might have influenced their decision to participate in the incentive program (Figure 21). Out of the factors presented to Cooling participants, respondents selected the need or desire to upgrade out-of-date equipment or replace faulty or failed equipment as the most important factors in their decision to participate in the rebate program (54% of respondents ranked each of these factors as extremely important).

Additionally, Cooling participants indicated that comfort in their home was an extremely important factor in their decision to participate in the program (60%). Finally, out of the participants who used a contractor to install the measure (n = 22), 82 percent indicated that the contractor recommendation was a very important or extremely important factor in their decision to participate in the program.

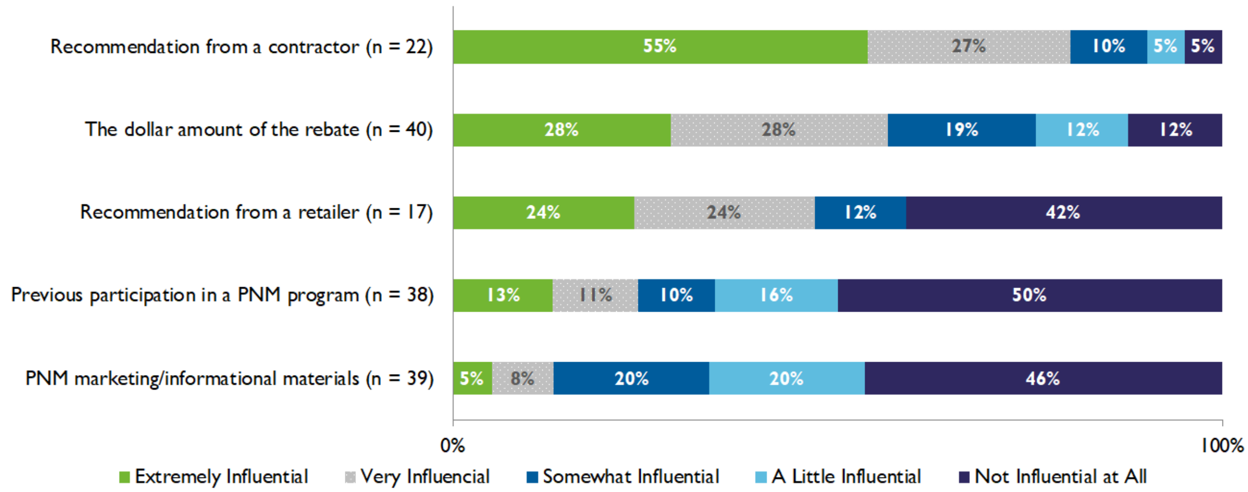
Figure 21: Residential Cooling Motivations for Participation



In addition to motivations for participating, survey respondents were given a list of potential program factors that may have influenced their decision to make an upgrade and were then asked to rate their influence on a 0 to 10 scale.[10]

As shown in Figure 22, a majority of participants (55%) rated the contractor recommendation as extremely influential (ratings of 9 to 10) in their decision to make the efficiency upgrade, followed by the dollar amount of the rebate (28%) and recommendations from a retailer (24%).

Figure 22: Residential Cooling Influence of Program Factors



Participant Satisfaction

Survey respondents evaluated their satisfaction with various components of the Cooling sub-program, and more broadly PNM as an energy provider, on the following scale: very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied, and very satisfied. The individual components that participants were asked to rank their satisfaction with included:

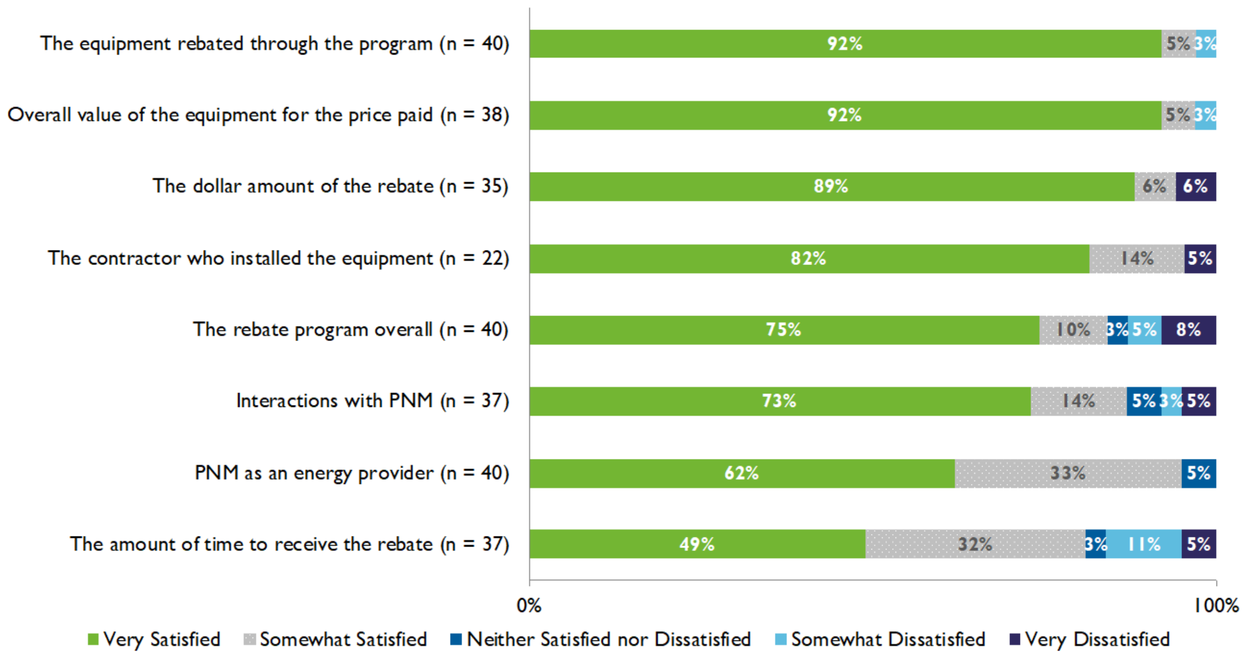
- The installation contractor
- The rebated equipment
- The dollar amount of the rebate
- The overall value of the equipment for the price they paid
- The rebate program overall
- PNM as an energy provider
- Interactions with PNM

[10] On the 0 to 10-point scale, 0 indicated 'Not influential at all' and 10 indicated 'Extremely influential.'

- The time it took to receive the rebate

Figure 23 summarizes the satisfaction levels for Cooling respondents. Overall, surveyed program participants expressed high levels of satisfaction with all Cooling sub-program components, with the majority being very satisfied. Respondents were most satisfied with the equipment rebated through the program (92%), the overall value of the equipment for the price paid (92%), and the dollar amount of the rebate (89%). Finally, respondents who gave a low rating to the amount of time taken to receive their rebate stated that they had either not received their rebate yet or it took longer than expected.

Figure 23: Cooling Participant Program Satisfaction



It is worth noting that while a majority of respondents reported being very satisfied with the rebate program overall (75%), 15 percent reported being either very dissatisfied, somewhat dissatisfied, or neither satisfied nor dissatisfied. When these respondents were asked why they gave such a rating, several noted that they had not received the rebate, one commented that one unit was not rebated even though they were told it would be, and another said they were generally confused. When asked about recommendations for improving the PNM program, several respondents mentioned difficulties with the "website," although they didn't elaborate on which website they were referring to, and many mentioned a need for more communication of program information and timeline.

2.4.2 Refrigerator Recycling Survey Results

The same phone survey was administered to a sample of 110 customers who participated in PNM's Refrigerator Recycling program, and the following charts present highlights of their responses.

Throughout the analysis, we present the survey results as weighted percentages based on the proportion of survey respondents' savings relative to the savings of all program participants.

Household Demographics

There was a fairly even distribution of home sizes, with the most common range being 1,500 to 1,999 square feet (32%, shown in Figure 24). The majority of respondents (64%) reported household sizes of one or two people, as shown in Figure 25, and no households had more than seven members.

Figure 24: Refrigerator Recycling Respondent Home Size (n = 86)

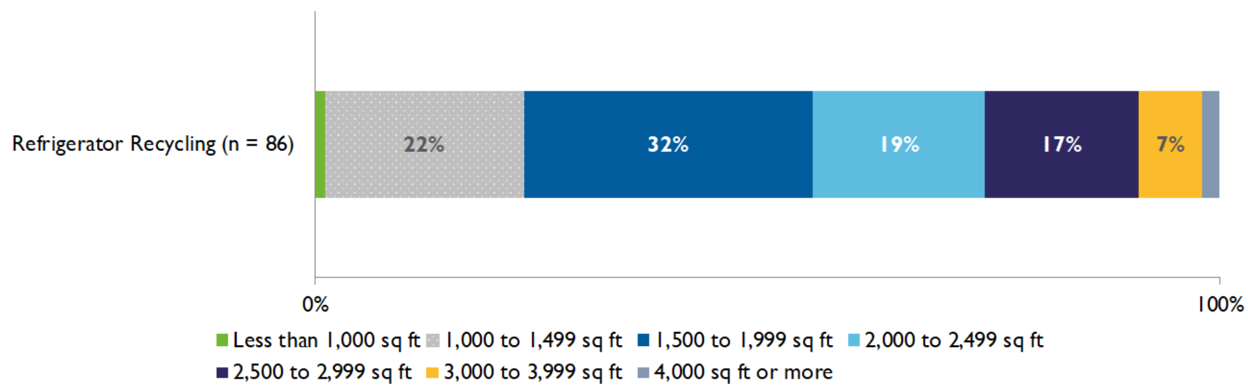
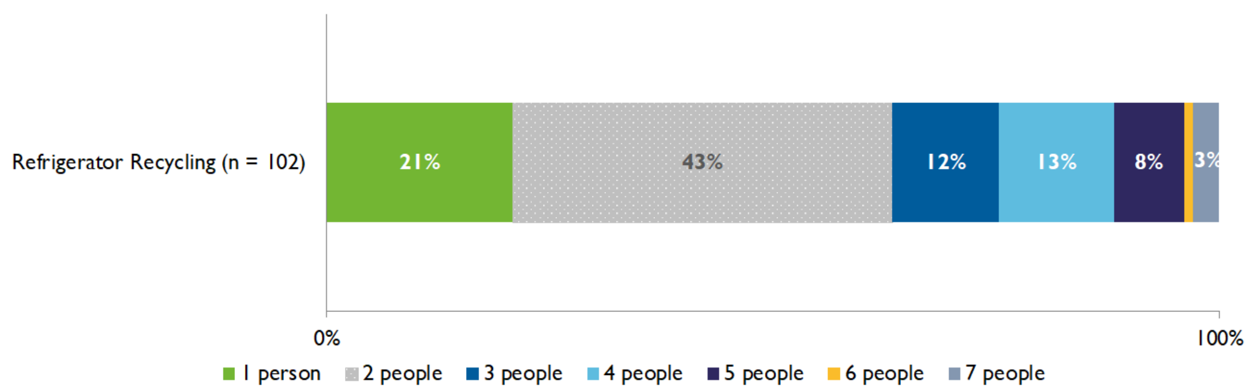
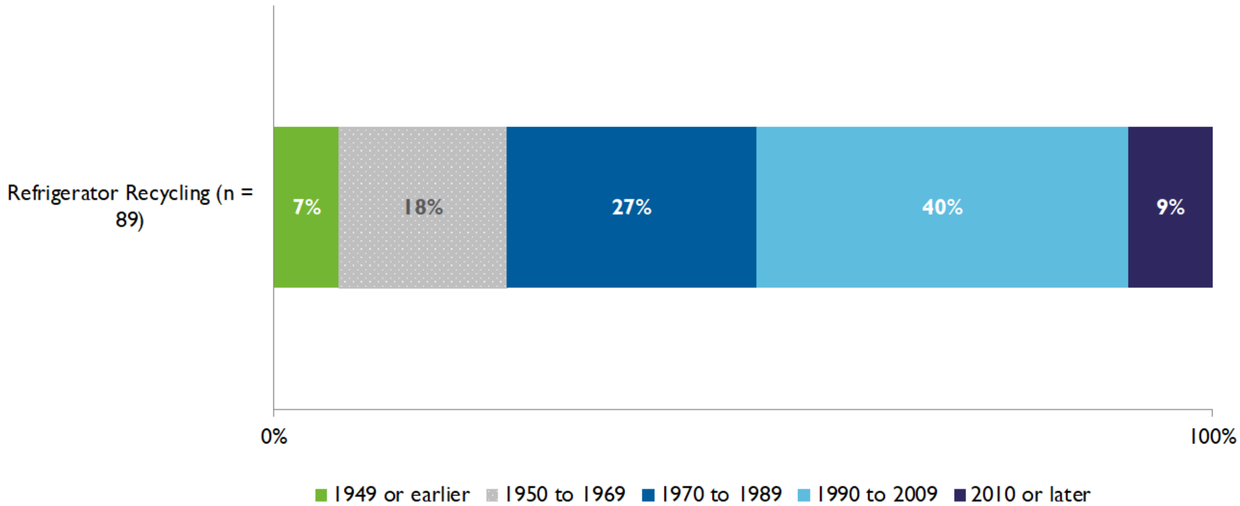


Figure 25: Refrigerator Recycling Respondent Household Size (n = 102)



As seen in Figure 26, the most common home vintage ranges were 1990 to 2009 (40%) followed by 1970 to 1989 (27%), with 52 percent of homes built prior to 1990. Similar to the Cooling participants, the vast majority of the Refrigerator Recycling participants (94%) own their home.

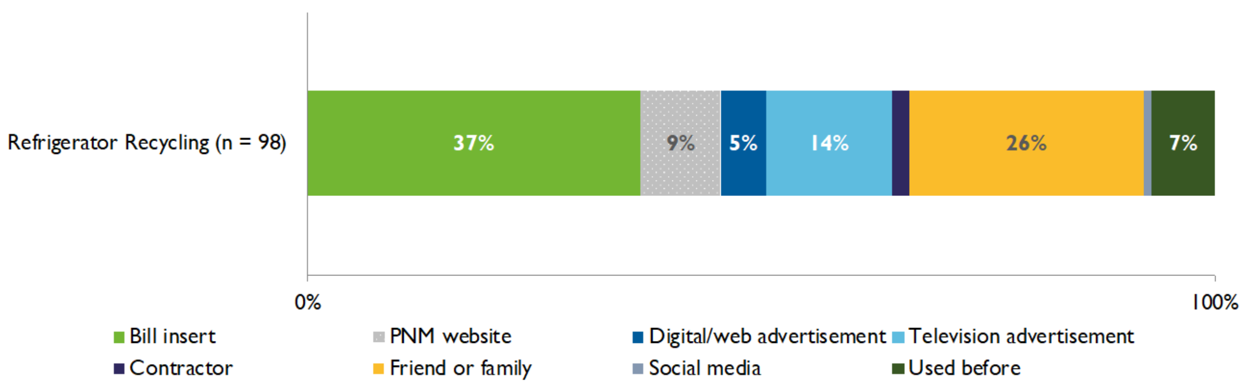
Figure 26: Refrigerator Recycling Respondent Home Age (n = 89)



Source of Awareness

For customers looking to recycle their refrigerator, the PNM bill insert was the most common source of awareness (37%, shown in Figure 27) followed by friends or family (26%). This differs from the Cooling program, for which 44 percent of participants cited their contractor as the primary source of awareness.

Figure 27: Refrigerator Recycling Initial Sources of Awareness (n = 98)



Motivations for Participation

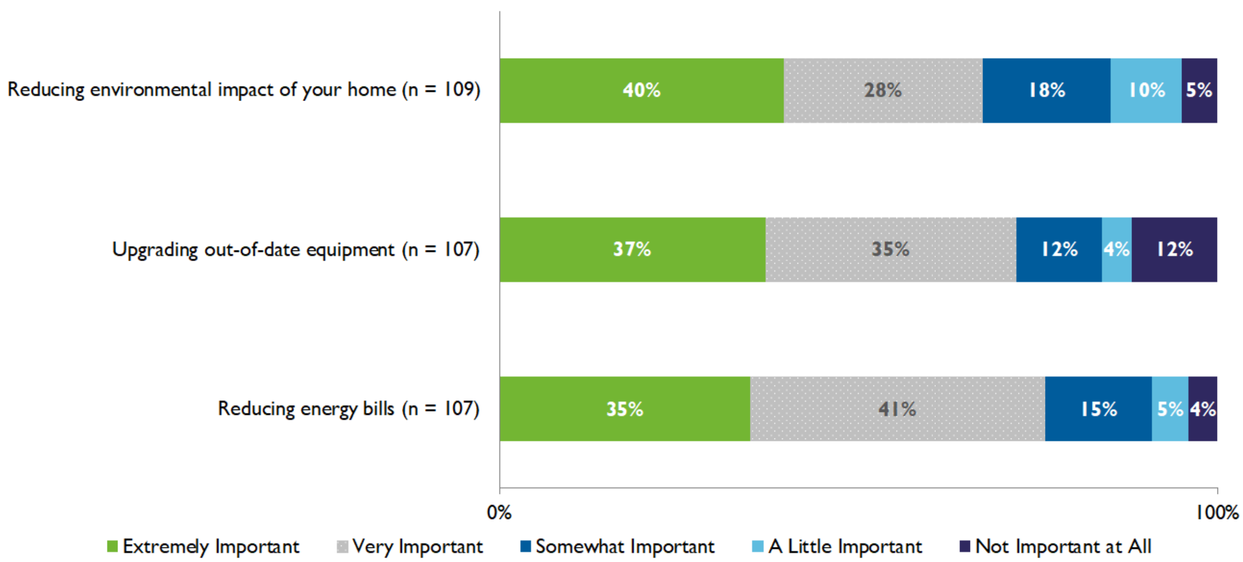
Participants were asked to rank the importance of three potential reasons for recycling their refrigerator:

- reducing environmental impact of their home,
- upgrading out-of-date equipment, and
- reducing energy bill amounts.

As seen in Figure 28, when considering 'extremely important' and 'very important' ratings combined, reducing energy bills and upgrading out-of-date equipment have higher values (76% and 72%, respectively) compared to reducing environmental impact (68%), suggesting slightly greater importance. Still, reducing environmental impact is clearly an important motivating factor, as it has the highest percentage of extremely important ratings (40%).

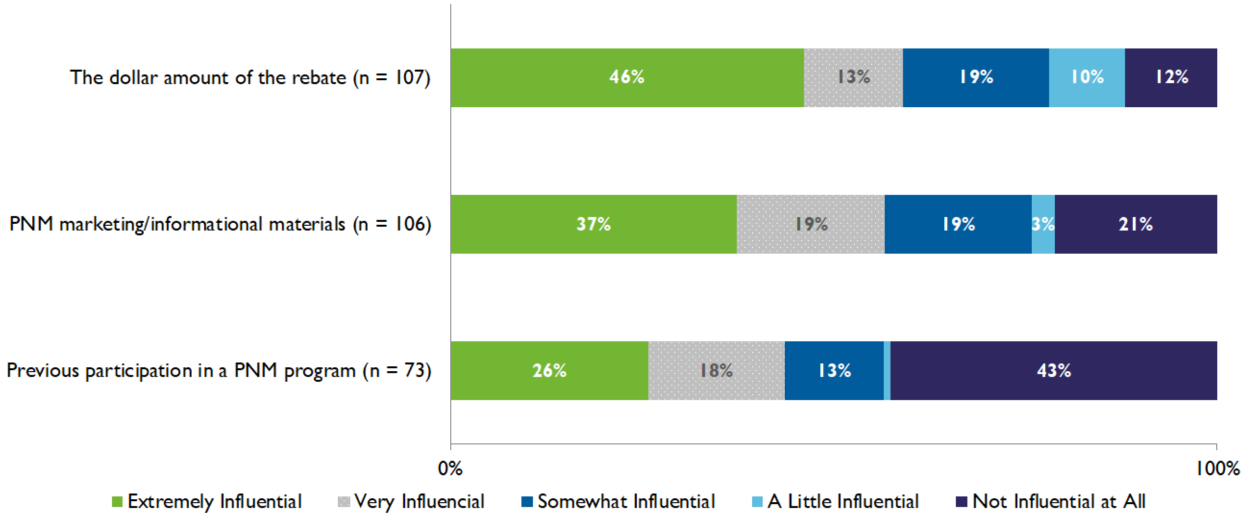
Participants were also asked if there were any other reasons for recycling that were more important than the three options provided. While the vast majority of participants indicated that there were no other reasons, six respondents (5%) noted that they didn't want the refrigerator to end up in a landfill.

Figure 28: Refrigerator Recycling Motivations for Participation



Participants were asked about other influences on their decision to recycle. As shown in Figure 29, the dollar amount of the rebate was the most influential factor (46% of participants ranked it as extremely influential), followed by PNM marketing/informational materials (37% 'extremely influential') and previous participation in a PNM program (26% 'extremely influential'). Notably, 43 percent of respondents ranked previous participation in a PNM program as not influential at all.

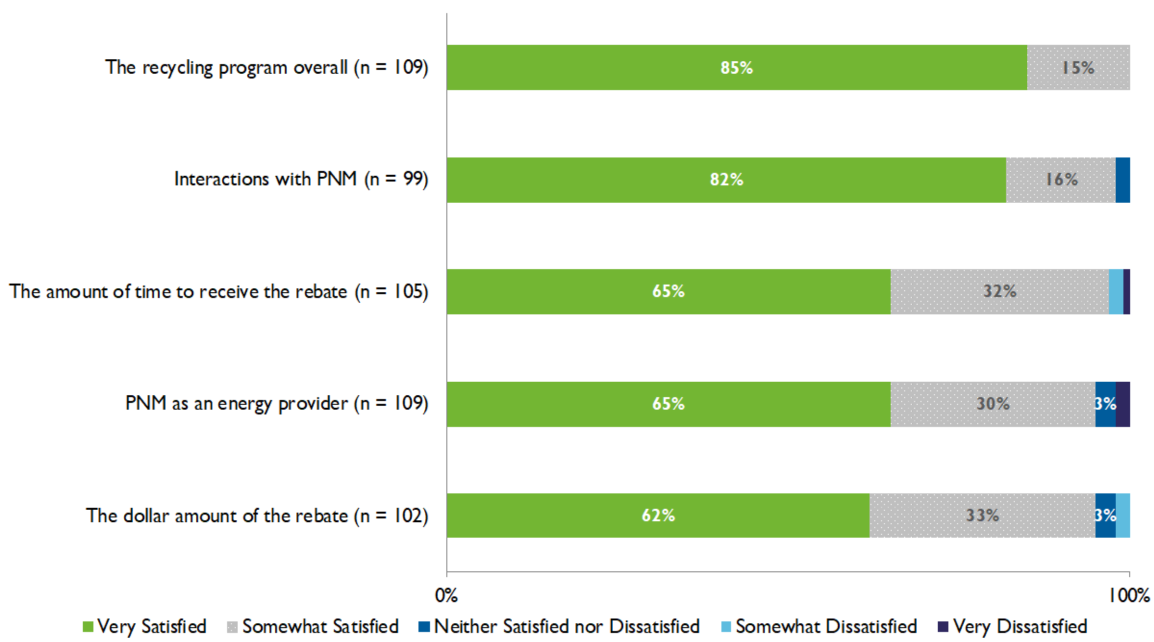
Figure 29: Refrigerator Recycling Influence of Program Factors



Participant Satisfaction

Participants in the Refrigerator Recycling program were generally very satisfied with their participation experience, with 85 percent reporting that they were very satisfied with the program overall (Figure 30). Unlike the Cooling program, all respondents reported being somewhat satisfied or very satisfied with the program overall, and across all satisfaction-related questions there were minimal ratings of dissatisfaction.

Figure 30: Refrigerator Recycling Participant Program Satisfaction



Likelihood of Recycling without Program

The final three questions relate to what customers would have done if the Refrigerator Recycling program had not been available.

While a sizeable percentage of respondents reported that they would have been not at all likely to recycle their refrigerator in the absence of the program (26%, seen in Figure 31), most of the participants (61%) reported that they would have been very likely or extremely likely to recycle without the program. Similar percentages of participants reported that they would have recycled their refrigerator within 12 months of when they recycled through the program (Figure 32), indicating that the program is not significantly accelerating the timing of recycling.

Figure 31: Likelihood of Recycling Same Equipment if PNM Rebate Program Not Available (n = 106)

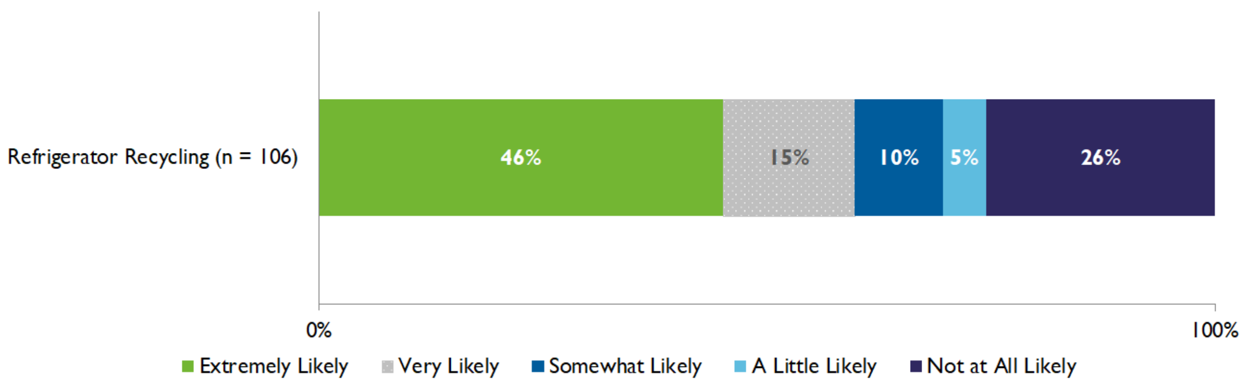


Figure 32: Likelihood of Recycling within 12 Months if the PNM Rebate Program Not Available (n = 106)

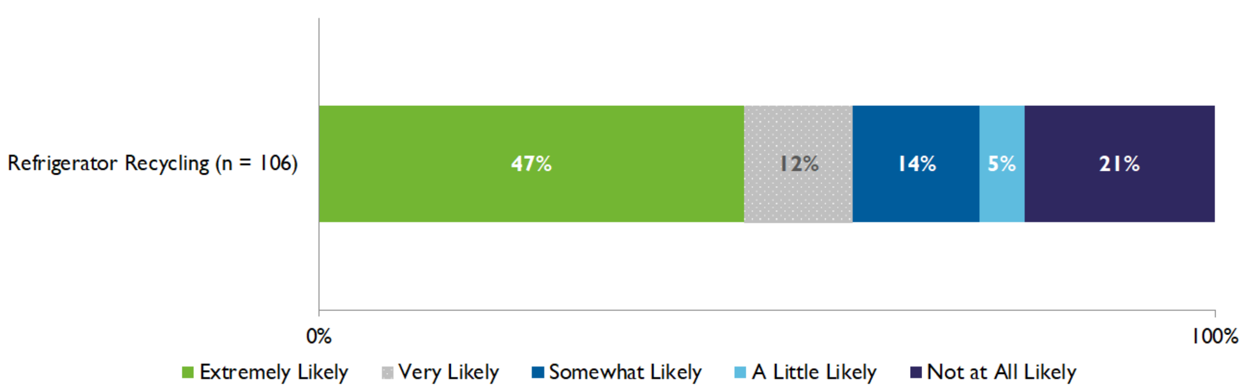
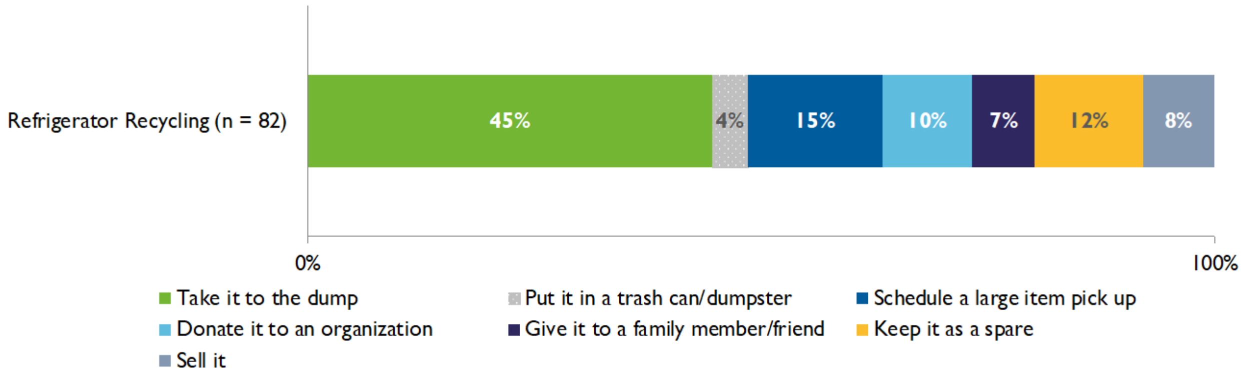


Figure 33 shows what respondents say they would have done with their refrigerator had they not been able to recycle it through the program. The largest share of respondents reported that they would have taken the refrigerator to the dump (45%), followed by scheduling a large item pick up (15%) or keeping it as a spare (12%). The large share of respondents who reported that they would take the refrigerator to the dump seems to contradict the similarly large share of respondents who reported that they were extremely likely to recycle their refrigerator in the absence of the program.

Figure 33: Plan for Refrigerator if not Recycled through Program



2.4.3 Home Energy Checkup Survey Results

Finally, the same phone survey was used for a sample of 75 participants from the Home Energy Checkup program.

Throughout the analysis, we present the survey results as weighted percentages based on the proportion of survey respondents' savings relative to the savings of all program participants.

Household Demographics

Participants' home sizes varied, with the greatest percentage of homes within the 1,000 to 1,499 square foot and 3,000 to 3,999 square foot ranges (24% each, Figure 34). Similar to the other sub-programs, the majority of participants (59%) reported household sizes of one or two people (Figure 35), and no household had more than six members.

Figure 34: Home Energy Checkup Respondent Home Size (n = 67)

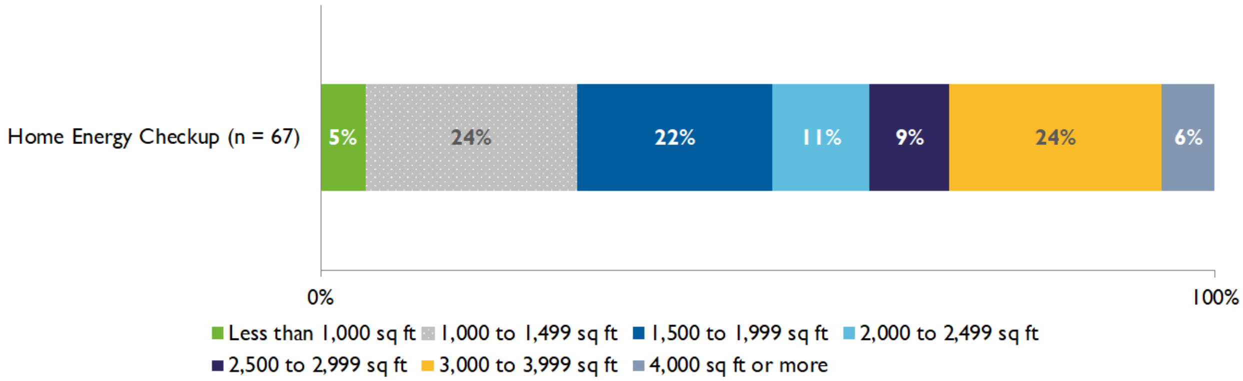
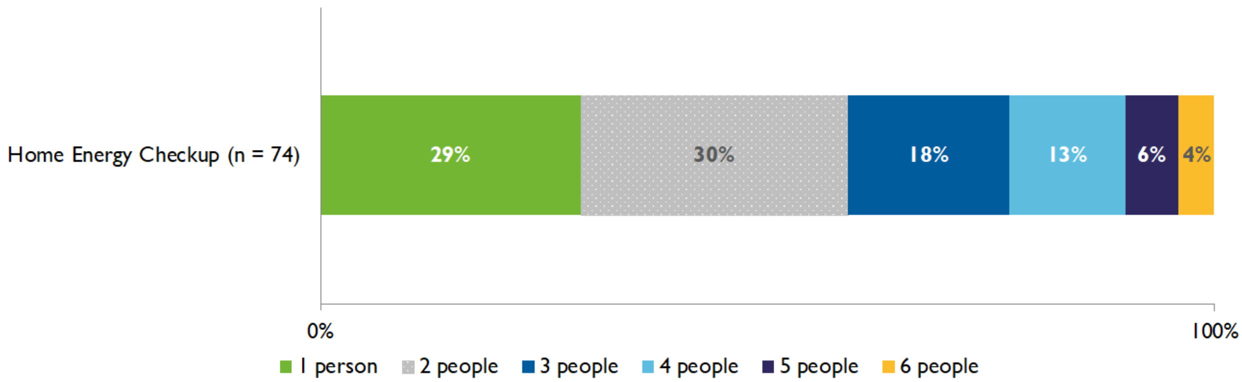
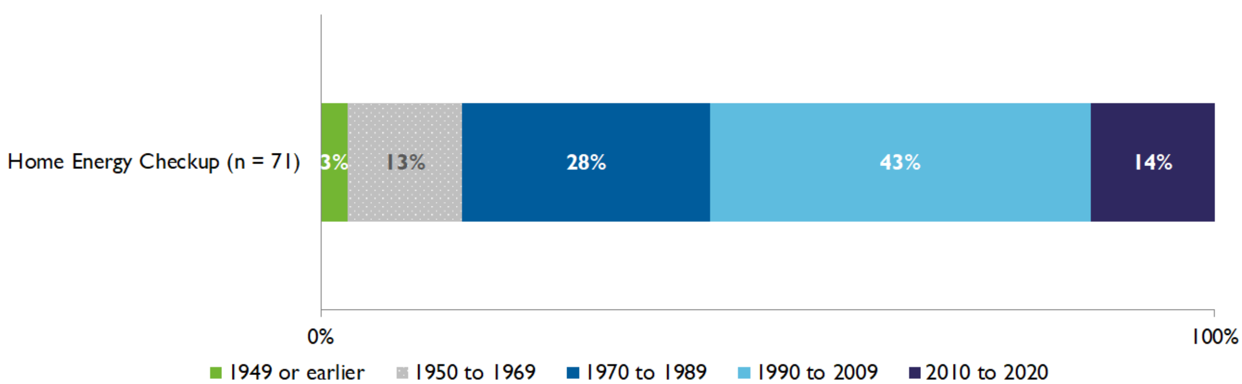


Figure 35: Home Energy Checkup Respondent Household Size (n = 74)



As seen in Figure 36, participants' homes tend to be newer, with 43 percent built between 1990 to 2009, and 57 percent built in 1990 or later.

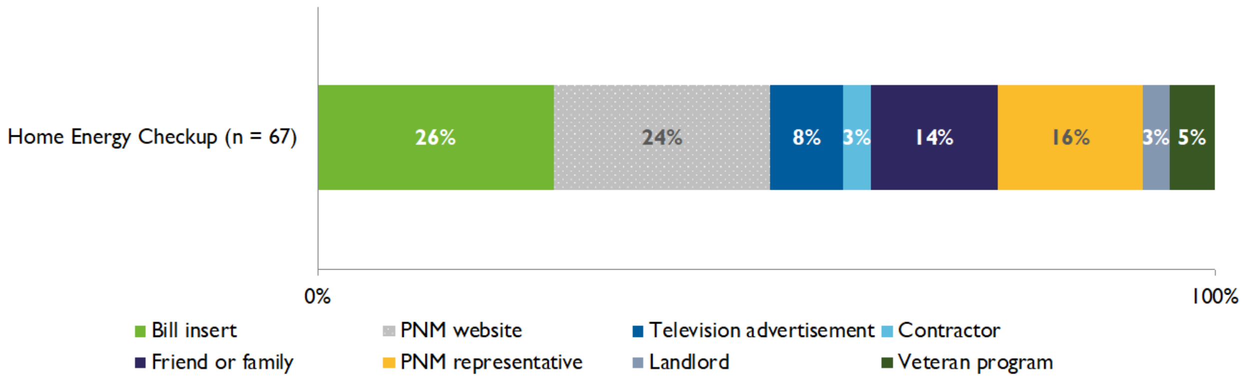
Figure 36: Home Energy Checkup Respondent Home Age (n = 71)



Source of Awareness

Sources of awareness for the Home Energy Checkup program were varied, with bill inserts (26%) and the PNM website (24%) listed as the most common sources (Figure 37). Notable other sources include PNM representative (16%), friend or family (14%), and television advertisement (8%).

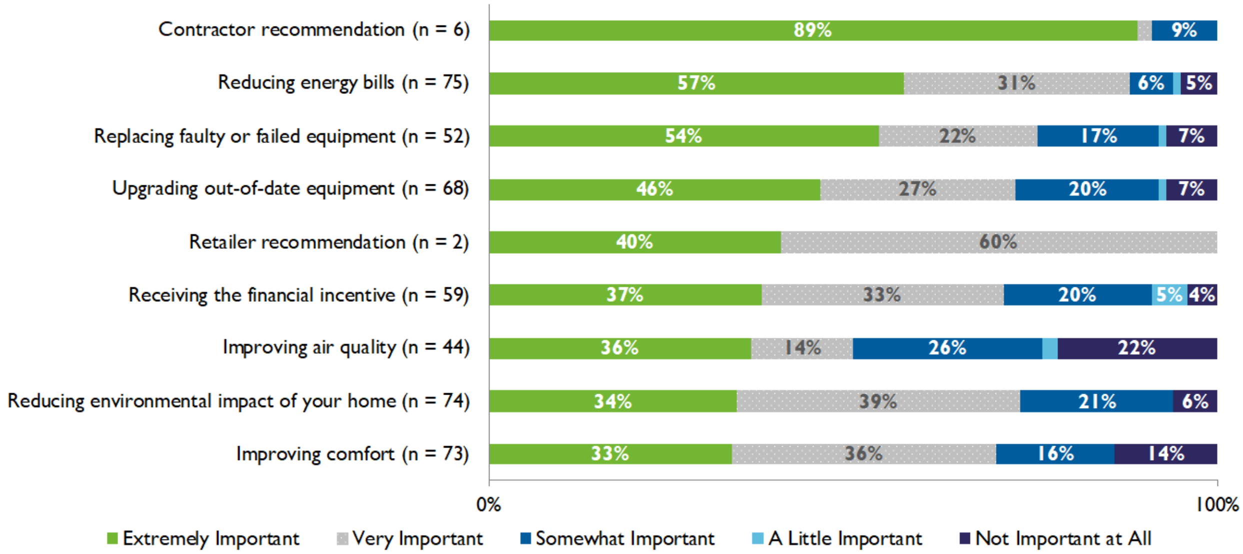
Figure 37: Participant Source of Awareness (n = 67)



Motivations for Participation

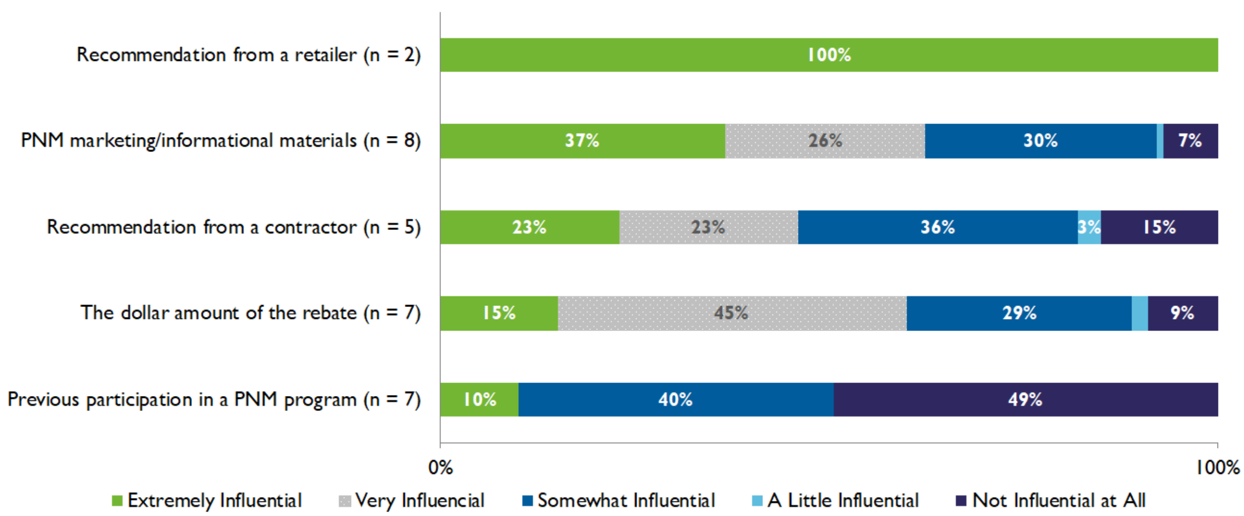
As shown in Figure 38, the biggest driver of participation was a contractor recommendation, with 89 percent of participants rating it as extremely important, although the sample was small (n = 6). The next largest drivers of participation were reducing energy bills (57% 'extremely important') and replacing faulty or failed equipment (54% 'extremely important'). Most factors were rated as very important or extremely important, and improving air quality was the least favorably rated (only 50 percent 'extremely important' and 'very important' combined).

Figure 38: Home Energy Checkup Motivations for Participation



A small fraction of participants responded to survey questions about other influences on their decision to participate in the program. As seen in Figure 39, a recommendation from a retailer was the most influential factor, with 100 percent of respondents indicating that it was extremely influential, although the sample was small (n = 2). Responses were mixed for the other factors, with 37 percent of respondents rating the next most influential factor of PNM marketing/informational materials as extremely influential. A recommendation from a contractor and previous participation in a PNM program do not seem to have considerably influenced decisions to participate.

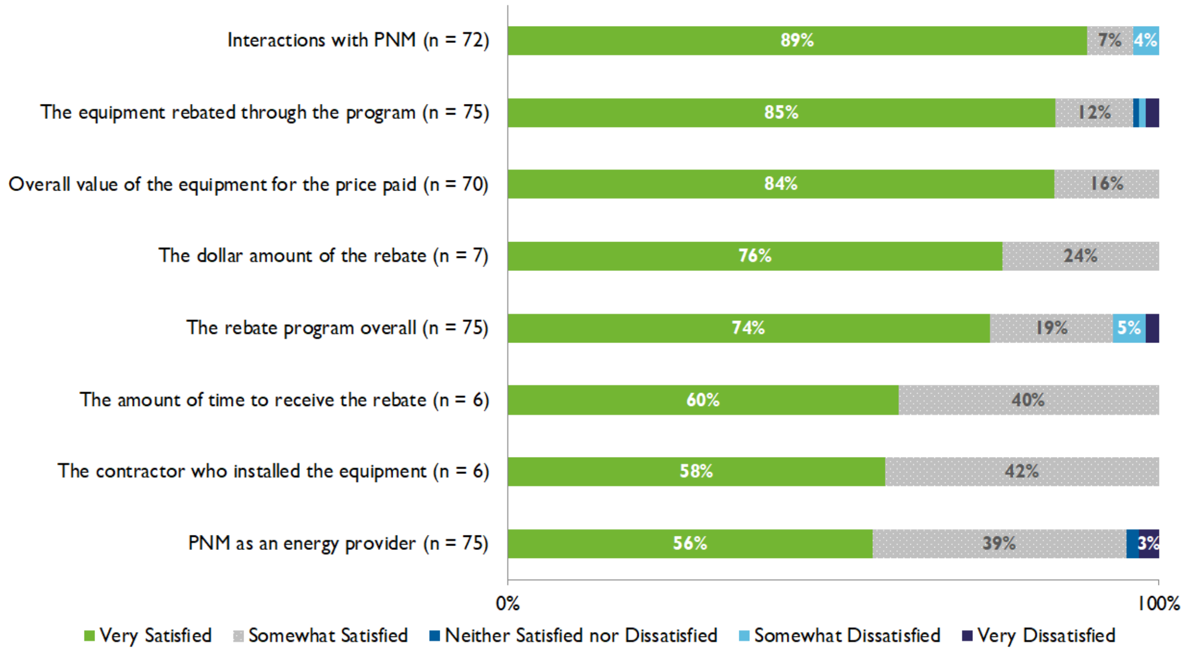
Figure 39: Home Energy Checkup Influence of Program Factors



Participant Satisfaction

Similar to the other sub-programs, participants in the Home Energy Checkup program reported very high levels of satisfaction, with 93 percent reporting that they were very satisfied or somewhat satisfied with the rebate program overall. Across all satisfaction-related questions there were very few ratings of dissatisfaction.

Figure 40: Home Energy Checkup Participant Program Satisfaction



2.5 Cooling Contractor Interviews

The evaluation team completed two interviews with contractors who installed equipment in the PY2022 Residential Comprehensive program. For this evaluation round, the team focused on the Residential Cooling sub-program. The interviews covered the following topics:

- Contractor background and program involvement;
- Role and influence of the PNM program in the market; and
- Program satisfaction.

Due to the low number of interviews and the depth of discussion, this section presents results qualitatively to show the range of perceptions and responses.

2.5.1 Contractor Background and Involvement

The interviewed contractors were from small to mid-sized businesses with a local focus. The interviewees shared that their firms offered full-service plumbing, heating, and cooling. The contractors shared different initial experiences with PNM involvement. One contractor stated that they had been involved with energy efficiency programs for many years and learned of the PNM program through an email from PNM. They stated that joining the program was an easy process, but they recognize that the investment in specialized tools to join may be a barrier to participation for some contractors. The other contractor shared that they learned of the PNM program through word-of-mouth. The contractor spent about a year learning about the program before they made the decision to join. This contractor explained that they wanted to fully understand the program's components before making a commitment to involvement.

Both contractors mentioned that they understood the entirety of their firm's involvement with the program. One contractor mentioned that the training for the sub-program was helpful. Both contractors shared that they do not currently have direct correspondence with PNM, but PNM did promote the program well through marketing.

2.5.2 PNM Program Influence

To better understand the program influence on the market, the evaluation team explored how and when contractors communicate about the PNM rebates with customers and what role they play in the contractors' and customers' ultimate choices.

The contractors shared that customers were usually very interested in the opportunity and sought contractor services on their own after seeing PNM marketing material. The contractors felt that the program would grow organically through word-of-mouth, especially given the already high demand for the program, as well as rising inflation rates. Notably, one contractor hypothesized that when the program launched, their firm could have had their employees on these projects all summer long. To further emphasize program reach and popularity, the other contractor estimated that 95 percent of residential projects that applied for the program within PNM territory would end up receiving the service. The other five percent of their estimate would compose of customers who did not quite understand the program. Interviewees felt that the program did help with promoting energy efficiency.

One contractor did note that the program could be expanded to rural communities in the region but caveated that this would not be logistically viable for most firms to service.

Participating contractors emphasized the program's reach in the market and popularity.

2.5.3 Program Satisfaction

The interviewed contractors expressed neutral satisfaction with the Cooling sub-program, rating it a 3 on average on a 1 to 5-point scale.[11]

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[11] 1 being not at all satisfied, 2 somewhat dissatisfied, 3 neither satisfied nor dissatisfied, 4 somewhat satisfied and 5 very satisfied.

Contractors felt that the program information and processes were relatively clear to contractors. Contractors did identify areas of potential improvement or ideas they wish PNM would consider. These included:

- ***Administering more intentional marketing –*** the contractors both raised points about PNM marketing. One contractor mentioned that PNM marketing did not align with the number of contractors participating in the program. They experienced an overload of customer inquiries. The contractor said that customers were frustrated when their firm did not have bandwidth to service additional ACs. The other contractor felt that some customers misinterpreted the marketed information. This meant that some customers thought that their cooling equipment would be replaced or repaired, as opposed to receiving an AC tune up. Other customers also thought that spring/summer cooling equipment could be assessed in fall/winter, which is not the case. One contractor recommended that PNM form a direct customer service email or phone line so that contractors can send customers to a PNM contact for this type of confusion.
- ***Estimating contractor service time more accurately –*** one contractor stated that PNM estimated AC tune ups would require 1-1.5 hours of contractor time. In actuality, the contractor said that when including for the data collection processes of the program, the tune up required up to 4 hours of work. This meant that the sub-program was not as economically beneficial to their firm as expected; the contractor said that they had to turn many customers away because of this.

These results are based on a small number of interviews, however, and should be seen as informing the utility's understanding of how the program influences the market and not how much. It would take more research to determine how widespread these dynamics are or to measure market effect quantitatively.

2.6 Conclusions and Recommendations

The gross impact evaluation of the Residential Comprehensive program consisted of a deemed savings review of per-unit savings values for each of the three sub-programs. We compared PNM documentation on the source, calculations, and input assumptions of savings values to determine whether they were correct and appropriate. Based on our review, the deemed savings values used by PNM are generally in line with those recommended in the New Mexico TRM.

For the Refrigerator Recycling sub-program, we confirmed the source of deemed savings values and found the per-unit values to be within a reasonable range for the refrigerator and freezer recycling measures.

For the Home Energy Checkup sub-program, we were able to confirm the source of savings, calculations, and input assumptions for all measures. For measures where we did not have enough information on the input assumptions to replicate the calculations, we confirmed that the per-unit values were within a reasonable range for the type of measure. However, specific details on the calculations or exact source of savings would be preferred. A slight engineering adjustment was made to account for an adjustment to the air filter with whistle measure kWh and kW savings.

- **Recommendation:** Clearly and consistently document the source of deemed savings, formulas used to calculate deemed savings, and all input assumptions for those calculations in order to facilitate evaluator review of savings values.

The realization rate for the Residential Comprehensive Cooling sub-program is not equal to 1.00 due to the lack of baseline efficiency information in the program tracking data. The evaluation team instead used a baseline assumption based on the heating and cooling capacity of the units. This resulted in slight adjustment to the original gross impact values. If the baseline efficiency rating was included in the program tracking data, the sub-program realization rate would likely be equal to 100 percent.

- **Recommendation:** Include information on baseline efficiency assumptions in the savings calculations for measures in the Residential Comprehensive Cooling sub-program.

3 Residential Lighting Program

The residential lighting market in the U.S. has experienced significant change since the Energy Independence and Security Act of 2007 (EISA) was signed into law in December 2007. Since passage of EISA, which led to the phase-out of incandescent bulbs, consumers have become more aware of LEDs, and the purchase price of LEDs has become increasingly affordable. PNM's Residential Lighting program promotes adoption of LED lighting by providing incentives to customers to replace less efficient light bulbs with LED bulbs through in-store rebates and coupons at participating retailers in PNM's service territory. Table 22 shows total bulb sales for program year 2022 by warehouse and non-warehouse stores, and giveaway events.

Table 22: Sales of Bulbs Through the PNM Residential Lighting Program, 2022 Program Year (October 1, 2021 – January 1, 2023)

Retailer Type	Standard LED	Specialty LED	Total	Percent of Total
Warehouse	296,201	154,636	450,837	31.6%
Non-Warehouse	627,310	273,782	901,092	63.2%
Giveaway Events*	74,976	0	74,976	5.3%
Total	**998,487**	**428,418**	**1,426,905**	**100.0%**

Source: Analysis by Evergreen Economics of data provided by PNM.
* Regarded as "non-retail" for purposes of our analysis and for this report.

While 15 retailers participated in the Residential Lighting program over the period analyzed, five participating mass market and warehouse retailers dominated bulb sales. Combined, these three retailers accounted for 89 percent of incentivized sales through the program.

3.1 Residential Lighting Gross Impacts

For the Residential Lighting program measures, the gross impact analysis consisted of reviewing the calculations of per-unit savings values used for all the individual lighting measures covered by the program and then comparing those calculations to the algorithms and assumptions in the New Mexico TRM. In general, the evaluation team found that the formula used to calculate bulb savings was being applied correctly. Table 23 shows the gross impact results for PY2022.

Table 23: Residential Lighting Gross Impacts

Residential Lighting	Expected Gross Savings	Engineering Adjustment Factor	Realized Gross Savings
kWh Savings	41,513,817	1.00	41,513,817
kW Savings	7,963	1.00	7,963

Source: Analysis by Evergreen Economics of data provided by PNM.

3.2 Residential Lighting Net Impacts

The evaluation team used a Poisson regression model to estimate free ridership and the net-to-gross (NTG) ratio for PNM's upstream Residential Lighting program.[12] The Poisson regression modeling approach utilizes (incentivized) price and quantity sales data on bulbs purchased through the upstream Residential Lighting program to estimate the impact that rebates provided by PNM have on the demand for LED bulbs.[13] The impact is measured as a marginal effect, which is an estimate of the percent change in bulbs demanded associated with a one dollar decrease in the rebated price paid by customers.

The purpose of the Poisson regression model is to estimate the price sensitivity of retail demand for LED bulbs incentivized through PNM's upstream Residential Lighting program. Using the output of the regression model, we calculated the marginal price effect for LED bulbs, which is an estimate of how much demand for bulbs change with a one-unit (e.g., $1.00) increase or decrease in price. Once this relationship is established, we can estimate how much the program is influencing overall LED lighting sales through the point-of-sale rebate.

The model specifications we used for the analysis is as follows:[14]

$$ln(bulbs_{i,t,s}) = \alpha + \beta_1 price_{i,t,s} + \beta_2 watts_i + \beta_3 lumens_i$$

$$bulbs_{i,t,s} = Number\ of\ bulb\ type\ i\ sold\ \ in\ period\ t\ by\ store\ s$$

$$price_{i,t,s} = Rebated\ price\ of\ bulb\ type\ i\ sold\ \ in\ period\ t\ by\ store\ s$$

$$watts_i = Wattage\ of\ bulb\ type\ i$$

$$lumens_i = Lumens\ of\ bulb\ type\ i$$

[12] For programs with an upstream incentive, the rebate is provided to the retailer and then passed along to the customer as a rebate at the point of sale.

[13] This is in contrast to alternative net impact methods that rely on surveys or interviews (e.g., in-store intercept surveys) of a sample of customers that ask them how important the incentive was in their decision to purchase the light bulbs.

[14] Prior to model estimation, bulb sales data were normalized to a consistent 30-day sales period.

We estimated separate models for warehouse and non-warehouse retailers for standard and specialty LED bulbs (four models in total). Warehouse and non-warehouse retailers differed significantly with respect to the average number of bulbs sold per store per day: 81 standard and 42 specialty LED bulbs per day for warehouse stores; 8 standard and 4 specialty LED bulbs per day for non-warehouse stores. Warehouse stores typically sell bulbs in larger packs than non-warehouse retailers but carry a narrower selection.

Once the Poisson regression model was estimated, the model coefficients were used to estimate net program bulb sales using the following steps:

1. The total number of bulbs sold through the program was totaled from the program sales data (**Gross Program Sales**).
2. The average price per bulb ***with*** the rebate and ***without*** the rebate was calculated from the sales data.
3. The coefficients from the models were used to compute ***estimated bulb sales with the rebate*** and ***estimated bulb sales without the rebate***. The difference between these two estimates represents the **Net Program Sales**—i.e., bulb sales that are attributable to PNM's upstream Residential Lighting program.
4. The free ridership rate and NTG ratio were calculated using the following equation:

$$Free\ Ridership\ Rate = \frac{Estimated\ Bulb\ Sales\ without\ Rebate}{Estimated\ Bulb\ Sales\ with\ Rebate}$$

$$\textit{Net-to-Gross Ratio} \ = 1 - Free\ Ridership\ Rate$$

The evaluation team utilized the Poisson regression model and the analytical approach described above to estimate the net impacts of PNM's upstream Residential Lighting program. The quantity of bulbs sold is inversely related to price, as illustrated by the sales and price data shown in Table 24. About 75 percent of bulbs sold through PNM's Residential Lighting program were $2.00 or less, and another 17 percent were between $2.01 and $4.00. Relatively few bulbs sold through the program had a incentivized cost greater than $4.00.

Table 24: Bulb Sales by Incentivized Price of Bulb*

Rebated Price Per Bulb	Standard LED: Average Pre-Rebate Price Per Bulb	Standard LED: Average Rebated Price Per Bulb	Specialty LED: Average Pre-Rebate Price Per Bulb	Specialty LED: Average Rebated Price Per Bulb	Proportion of Bulbs Sold
$2.00 or less	$2.51	$1.39	$3.25	$1.87	75.2%
$2.01 - $4.00	$4.04	$1.34	$4.87	$1.99	17.3%
$4.01 - $6.00	$7.13	$2.20	$7.50	$2.49	5.1%
$6.01 - $8.00	$8.81	$1.79	$9.41	$2.45	1.2%
$8.01 - $10.00	$10.62	$1.68	$12.71	$3.39	0.5%
More than $10.00	$19.05	$2.35	$23.20	$3.86	0.7%

Source: Analysis by Evergreen Economics of data provided by PNM.
* Data includes only those bulbs sold and rebated through a retail outlet.

Table 25 shows estimates of price elasticity of demand for each LED bulb type and type of retailer and for the program overall. The price elasticity of demand is a measure of the change in the demand for a good or service when the price of that good or service increases by 1.0 percent. Price elasticities are assumed to be negative—that is, as price goes up, demand for the good or service goes down; it is the magnitude of the elasticity (i.e., responsiveness) that is of primary interest.[15]

As Table 25 shows, the evaluation team found that the demand for standard and specialty LED bulbs is price elastic for both standard and specialty LED bulbs sold by warehouse and non-warehouse retailers. For standard LED bulbs, we estimate that a 10 percent increase in price would reduce demand by 11.1 percent at non-warehouse retailers and 19.8 percent at warehouse stores.[16] For specialty LED bulbs, we estimate that a 10 percent increase in price would reduce demand by 10.7 percent at non-warehouse stores and by 12.8 percent at warehouse stores. Overall, when weighting by all LED bulb sales from all retailers, the evaluation team estimates that a 10 percent increase in the price of LED bulbs would lead to a 13.1 percent reduction in demand, holding all else constant.

[15] If the price elasticity for a good is greater than 1.0 in absolute value, demand for that good is referred to as elastic (more responsive). Similarly, when the price elasticity is less than 1.0 in absolute value, demand for that good is referred to as inelastic.
[16] A price elasticity is generally expressed based on either a 1 percent or a 10 percent change in price; for LED bulbs, we believe it is more illuminating to consider a 10 percent change in price, which is derived by simply multiplying the estimated elasticity by 10.

Table 25: Estimates of Price Elasticity of Demand for LED Bulbs and NTG Ratio

LED Bulb Type and Retailer	Elasticity at Mean Rebated Price*	NTG Ratio at Mean Rebated Price
Standard Warehouse	-1.98	0.65
Standard Non-Warehouse	-1.11	0.41
Specialty Warehouse	-1.28	0.73
Specialty Non-Warehouse	-1.07	0.43
Residential Lighting Program	**-1.31**	**0.51**

Source: Analysis by Evergreen Economics of data provided by PNM.
* Elasticity estimates based on a one percent increase in price.

Table 25 also shows estimates of the NTG ratio for PNM's Residential Lighting program using the Poisson regression model. The estimates of the NTG ratio also vary by bulb type and retailer. The estimated NTG ratios for standard LED bulbs were 0.65 and 0.41, respectively, for warehouse and non-warehouse retailers. The highest NTG ratio estimate was for specialty bulbs sold by warehouse retailers (0.73) and the lowest estimated NTG ratio was for standard bulbs sold at non-warehouse stores (0.41). The estimated NTG ratios for specialty bulbs were 0.73 for warehouse stores and 0.43 for non-warehouse retailers.

Figure 41 shows how expected rates of free ridership and NTG ratios vary by bulb type and retailer. As the rebated price of LEDs drop, the proportion of purchasers that free ride decreases and the NTG ratio increases. The trajectories differ for each combination of bulb type and retailer because the types and prices of bulbs differ. It is also likely that the characteristics of customers who shop at warehouse and non-warehouse retailers differ.

The upper panel of Figure 41 shows free ridership rate by bulb price. The free ridership rate represents the proportion of bulbs sold by rebated price that would have sold even without the rebate. As the rebated price decreases (moving from right to left along the horizontal axis), more and more consumers—who otherwise would not purchase LED bulbs—are motivated to purchase bulbs, resulting in a decreasing proportion of purchasers that are free riders.

The purpose of the incentives is to encourage those consumers who would not otherwise purchase an LED to make the purchase. However, since the rebate is available to all purchasers of the LED bulbs, even those who would have purchased the bulbs without the rebate receive the rebate. The larger the incentive, the greater the number of consumers who will purchase LED bulbs, leading to a lower rate of free ridership and a higher NTG ratio (lower panel of Figure 41).

Figure 41: Estimated Free Ridership and NTG Ratio by Bulb Type and Retailer Type

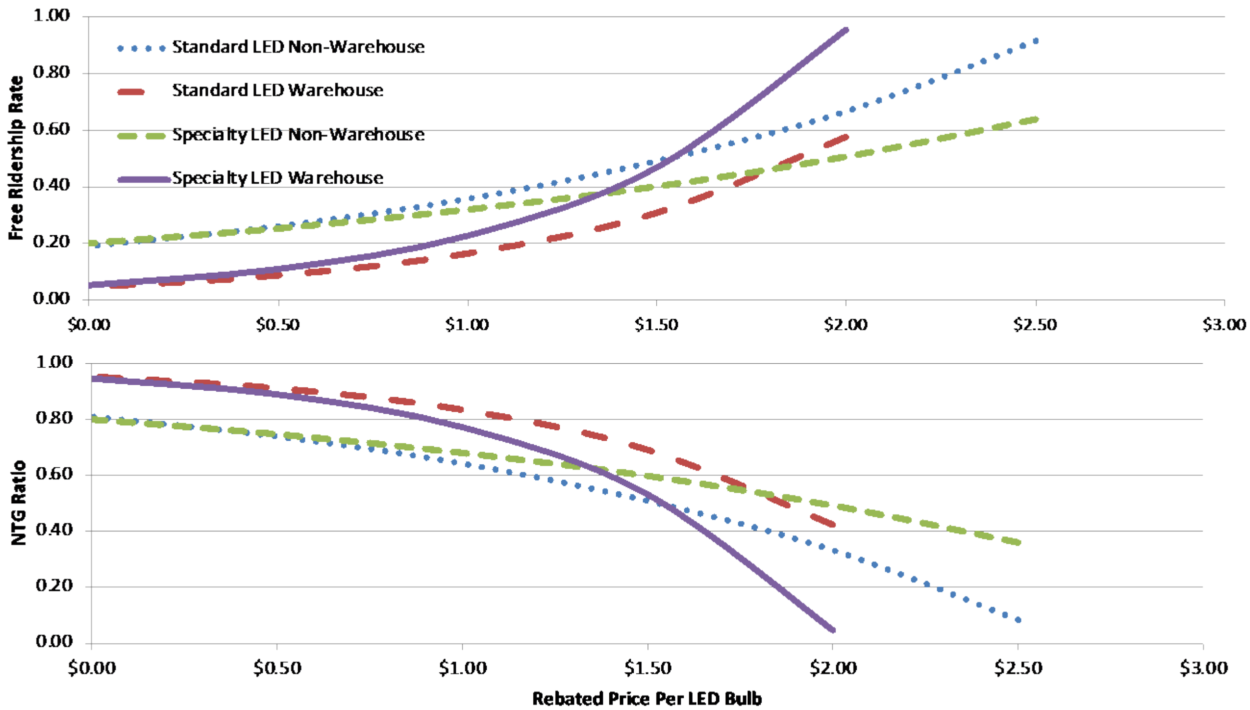


Table 26 summarizes the final gross and net impacts for the Residential Lighting program using the NTG ratio derived from the Poisson regression model. Using the overall NTG ratio of 0.6800 from the PY2021 evaluation, the PY2022 net realized impacts for the Residential Lighting program are 28,229,395 kWh and 5,415 kW. The NTG ratio of 0.51 calculated in PY2022 will be applied to the Residential Lighting program beginning in PY2023.

Table 26: Residential Lighting PY2022 Impact Summary

Residential Lighting	Expected Gross Savings	Engineering Adjustment Factor	Realized Gross Savings	NTG Ratio	Realized Net Savings
kWh Savings	41,513,817	1.00	41,513,817	0.680	28,229,395
kW Savings	7,963	1.00	7,963	0.680	5,415

4 Home Energy Reports

The PNM Home Energy Reports (HER) program provides customers with information on their energy consumption that includes a comparison with a matched set of similar households. As part of this design, the program implementer Bidgely randomly assigns customers to a treatment group that receives the HER that provides tips on how to reduce energy consumption. Those customers not in the treatment group are randomly assigned to the control group and do not receive the report.

The PNM 2022 HERs program was launched with new and previously untreated customers in July of 2021. The program design is focused on maximizing treatment and savings cost-effectively in a shorter 2021 treatment period.

Wave 1 of the program launched later than expected (July instead of January of 2021) with a limited number of customers meeting the program selection criteria. The program was unable to target high consumption users in either Wave 1 or the subsequent Wave 2, which is likely limiting the ability to detect savings for both of these groups. Wave 3 involved a paper HER, instead of the email report used for Wave 1 and Wave 2 and was also able to target higher consumption users.

4.1 Home Energy Reports Methods

Bidgley Replication Model

To calculate program savings, we first estimate a billing regression model that utilizes monthly billing data for customers in both the treatment and control groups. As a first step, we use these data to replicate the billing regression model Bidgely uses to estimate energy savings, shown below:

$$ADC_{it} = \sum_{j} \beta_{1j} Month_{jt} + \sum_{j} \beta_{2j} Month_{jt} * ADClag_{it} + \beta_3 Treatment_i + \varepsilon_{it}$$

Where,

ADC_{kt} = The average daily consumption in kWh for customer i during billing month t in the post-period;

$Month_{jt}$ = A binary variable taking a value of 1 when j = t and 0 otherwise;

$ADClag_{it}$= Customer i’s energy use in the same calendar month of the pre-program year as the calendar month of month t;

$Treatment_i$= A binary variable indicating whether customer i is in the treatment group (taking a value of 1) or in the control group (taking a value of 0);

ε_{it}= The error term for customer i during month t

In the Bidgely model specification, the coefficient on the treatment variable, β_3, provides an estimate of average daily energy savings due to the program. The product of the average daily savings and the total number of participant days provides an estimate of the annual program savings.

Evergreen Recommended Model

The Bidgely post-only model provides an estimate of the linear relationship between pre and post kWh usage. The non-interacted coefficient on treatment used in the Bidgely model shifts the overall level of daily kWh by treatment but does not allow for savings to vary by consumption levels. Furthermore, the shift estimated by the coefficient on the non-interacted treatment is uniform across all customers and months regardless of previous energy usage patterns.

To address this issue, we explored an alternative model specification that interacts the treatment and usage variables, which allows savings to vary with consumption levels. Interacting treatment with pre-usage allows us to estimate the change in treatment usage dependent on pre-usage for each month. This should improve the model accuracy and increase the likelihood of being able to detect savings that are expected to be quite small (i.e., less than 1 percent of annual consumption). The exact model specification for our recommended model is shown below:

$$ADC_{it} = \alpha + \sum_j \beta_{1j} Month_{jt} * ADClag_{it} + \sum_j \beta_{2j} Month_{jt} * Treatment_i * ADClag_{it} + \sum_j \beta_{3j} Month_{jt} + \varepsilon_{it}$$

Where,

ADC_{it} = The average daily consumption in kWh for customer i during billing month t in the post-period;

$Month_{jt}$ = A binary variable taking a value of 1 when j = t and 0 otherwise;

$Treatment_i$= A binary variable indicating whether customer i is in the treatment group (taking a value of 1) or in the control group (taking a value of 0);

$ADClag_{it}$= Customer i's energy use in the same calendar month of the pre-program year as the calendar month of month t;

ε_{it}= The error term for customer i during month t

In this model, β_{2j} represents the impact of participation that is dependent on pre-period kWh usage for month j. Monthly savings for month j is equal to the product of β_{2j}, mean pre-period usage in month j, and the number of days in month j. The average yearly savings per customer is the sum of monthly savings. Program savings is the product of average yearly savings and the total number of customers. We estimate standard errors and confidence intervals using the delta method.[17]

We use this specification to estimate savings for each wave of the HER reports.

Data Screening

We use the following data screens in our analysis:

- Positive usage and billing coverage filter
    - Filter out months of data with 0 or missing values[18];
- Median filter
    - Filter usage data points with usage less than 0.1 times median and greater than 10 times the median[19];
- Monthly filters
    - Match each month of pre-data to a month of post-data
    - Filter out customers in all waves with fewer than 12 months of post data;

Customers that opted-out after receiving their first HER are left in the analysis and used to calculate program savings.

Table 27 shows the number of accounts by wave and treatment status removed by each filter. Bidgely provided the account numbers of treatment customers by month for who was included in their analysis. The counts of each treatment customers that were included in every month of Bidgely data are also displayed in Table 27.

[17] Program savings is a transformation of the model estimated in Equation 2, meaning that standard errors calculated from the model also need to be transformed. The delta method approximates the standard errors of transformed equations using a first-order Taylor approximation.

[18] For months with missing days of data, we require that at least 60 percent of the days each month are present and filter out months with less than 60 percent bill coverage.

[19] This median is the overall median energy usage (kWh) across all bills included in the analysis period. Bidgley also uses this data screen.

Table 27: Data Screens for Accounts by Wave

Filter			Wave 1: 2021 Email Treatment	Wave 1: 2021 Email Control	Wave 2: 2021 Email Expansion Treatment	Wave 2: 2021 Email Expansion Control	Wave 3: 2021 Paper Treatment	Wave 3: 2021 Paper Control
Total Number of Customers Received			**164,698**	**20,321**	**22,148**	**9,862**	**32,672**	**14,253**
Monthly Filters	Match each month of pre-data to a month of post data	Accounts Removed	9,329	1,272	1,195	528	702	297
	Wave Month Requirement	Accounts Removed	40,335	5,060	8,970	4,068	7,404	3,132
Final Number of Accounts in Analysis - Evergreen			**115,034**	**13,989**	**11,983**	**5,266**	**24,566**	**10,824**
Final Number of Accounts in Analysis - Bidgely			**138,101**	**-**	**16,907**	**-**	**28,139**	**-**

Table 28 shows the number of months by wave and treatment status removed by each filter.

Table 28: Data Screens for Months by Wave

Filter		Wave 1: 2021 Email Treatment	Wave 1: 2021 Email Control	Wave 2: 2021 Email Expansion Treatment	Wave 2: 2021 Email Expansion Control	Wave 3: 2021 Paper Treatment	Wave 3: 2021 Paper Control
Total Number of Months Received		**5,412,106**	**664,352**	**662,682**	**294,863**	**1,101,807**	**482,610**
Positive Usage and Billing Coverage Filter	Months Removed	291,678	35,997	37,984	17,127	58,614	25,467
Median Filter	Months Removed	1,039	111	226	144	69	29

Monthly Filters	Match each month of pre-data to a month of post data	Months Removed	1,688,463	208,790	189,338	84,430	325,424	141,768
	Wave Month Requirement	Months Removed	670,110	83,718	147,542	66,778	128,116	55,570
Final Number of Months in Analysis - Evergreen			**2,760,816**	**335,736**	**287,592**	**126,384**	**589,584**	**259,776**

Table 29 displays the treatment start dates and evaluation periods for each of the three waves.

Table 29: Treatment Start Dates and Evaluation Period

Wave	Treatment Start	Evaluation Period
Wave 1: Email	July 2021	January - December 2022
Wave 2: Email Expansion	December 2021	January - December 2022
Wave 3: Paper	June 2021	January - December 2022

4.2 Home Energy Reports Findings

Table 30 presents the 2022 savings with 90 percent confidence intervals for the three waves for the Bidgely replication model and the Evergreen recommended model. Both models are run with the same data filters, with the number of accounts specified in Table 27. For both models, we do not exclude program opt-outs from savings calculations until 12 months of opt-out.

Table 30: Savings for Bidgley and Evergreen Recommended Model by Wave

Model	Wave	N Participants	Savings Per Customer	Percent
Bidgely Replication Model	Wave 1: Email[20]	164,698	-6.8 ± 12.5	-0.08% ± 0.15%
	Wave 2: Email Expansion	22,148	-21.4* ± 20.5	-0.29%* ± 0.28%
	Wave 3: Paper	32,672	96.1* ± 16.8	0.95%* ± 0.17%

[20] Not statistically significant.

Evergreen Recommended	Wave 1: Email	164,698	-18.9* ± 10.7	-0.22%* ± 0.13%
	Wave 2: Email Expansion	22,148	-38.6* ± 17.4	-0.52%* ± 0.24%
	Wave 3: Paper	32,672	89.2* ± 15.4	0.88%* ± 0.15%

*Significant at 10 percent

Table 31 shows the annual net savings for the first year of treatment for each wave for the Bidgely replication model, the Evergreen recommended model, and the savings reported by Bidgely. For the Evergreen recommended and Bidgely replication models, Wave 1 and Wave 2 did not have statistically significant model results (or else showed an increase in consumption rather than savings) and therefore the savings for those waves have been set to zero. For Wave 3, 2022 net savings calculated from the Bidgely replication model and the Evergreen recommended model equate to about 3.1 million kWh and 2.9 million kWh, respectively. Comparatively, Bidgely reports 2022 net savings to be about 3.1 million kWh, with significant savings in both Wave 2 and Wave 3.

Table 31: 2022 Net Savings by Wave

Wave	Reported Bidgley Net kWh Savings	Bidgley Replication Model Net kWh Savings	Evergreen Net kWh Savings
Wave 1: Email	0	0	0
Wave 2: Email Expansion	388,355	0	0
Wave 3: Paper	2,702,562	3,140,931	2,915,218
Total	**3,090,917**	**3,140,931**	**2,915,218**

5 Commercial Strategic Energy Management

5.1 Commercial Strategic Energy Management Gross Impacts

The evaluation team reviewed a census of SEM projects, spanning the 2021 and 2022 calendar years. During the PY2021 evaluation, the evaluation team did not verify the claimed savings as they were received just before the final evaluation report was delivered. As such, no verification activities could be conducted for the PY2021 claimed savings. However, the evaluation team stated that the SEM program would be evaluated in PY2022. Therefore, the evaluation team included any savings adjustments from PY2021 in the verified savings for PY2022 to true-up the total savings for this program.

The PNM Commercial Strategic Energy Management (SEM) program enrolled five participants in 2021. Four of the five program participants were still onboarding between April and October 2021 with one participant dropping out of the program during PY2022. The reported PY2021 savings were partial year savings, with the analysis files showing data from two months for some projects to 12 months for other projects. The evaluation team verified the PY2021 savings as part of our efforts during PY2022 evaluation. To calculate the PY2022 savings, the evaluation team calculated the net savings over the course of the projects (2021-2022). For any projects that warranted an adjustment, the PY2022 savings were adjusted from the previous reported PY2021 savings values for each project. Table 32 shows the reported *ex ante* PY2021 and PY2022 savings for each of the five participants.

Table 32: PY2021 and PY2022 SEM Energy Savings

Project Number	PY2021 Expected Gross kWh Savings	PY2022 Expected Gross kWh Savings
SEM 2022 - 1	1,329,580	899,820
SEM 2022 - 2	49,343	77,305
SEM 2022 - 3	-75,898	442,616
SEM 2022 - 4	-12,905	228,652
SEM 2022 - 5	30,142	241,677
Total	**1,320,262**	**1,890,070**

The reported *ex ante* program savings were estimated using the measured difference between forecasted energy use and actual metered energy data during the program performance period. Measure installation and building operational changes occur throughout the program performance period after a participant was fully onboarded. The program implementation contractor created site-specific baseline forecast models for each facility. The model methods ranged between simple average energy production models to multivariate linear regression methods.

The detailed review of the SEM projects focused on the key modeling assumptions to determine their reasonableness and if they were consistent with the program & industry guidelines. The evaluation approach included the following:

- Review participant model and measure implementation plan documentation;
- Assess baseline model input data adequacy including weather and other site-specific variables such as occupancy measures;
- Determine if the participant's baseline model approach is reasonable based on the available data & the site-specific energy profile;
- Rerun submitted models and confirm correct energy savings calculations;
- Run alternate models with different weather or other temporal variables (e.g. degree day combinations, month, weekday, or holiday indicators). Assess potential savings impacts resulting from one or more modeling changes. For simple mean energy models verify that regression models were not a viable option; and
- If needed, recalculate final verified energy savings due to corrections or model reruns.

Table 33 shows the realized gross kWh impacts for the PY2021 Commercial SEM program. The evaluation team set the savings to zero for any project where the implementation team's savings workbooks showed negative savings. It was not clear based on the supplied project documentation that measures implemented through the program caused the negative savings. Additionally, facilities with negative savings experienced non-routine events or production changes which contributed to the increased energy usage (negative savings). This adjustment had the largest impact on the realized gross kWh savings for PY2021 projects.

Table 33: PY2021 Commercial SEM Gross kWh Impact Summary

Project Number	Expected Gross kWh Savings	Realized Gross kWh Savings
SEM 2022 - 1	1,329,580	1,373,630
SEM 2022 - 2	49,343	336,825
SEM 2022 - 3	-75,898	11,842
SEM 2022 - 4	-12,905	80,646
SEM 2022 - 5	30,142	175,747
Total	**1,320,262**	**1,978,690**

Table 34 shows the realized gross kWh impacts for the PY2022 Commercial SEM program. The realized gross savings are incremental to the realized savings calculated for PY2021 and occurred during PY2022. To calculate the incremental savings, the evaluation team included any adjustments (positive or negative) from the PY2021 savings and applied them to the savings for each project as part of the PY2022 realized savings.

Table 34: PY2022 Commercial SEM Gross kWh Impact Summary

Project Number	Expected Gross kWh Savings	Realized Gross kWh Savings
SEM 2022 - 1	899,820	44,050
SEM 2022 - 2	77,305	287,482
SEM 2022 - 3	442,616	87,740
SEM 2022 - 4	228,652	344,899
SEM 2022 - 5	241,677	588,226
Total	**1,890,070**	**1,352,397**

5.2 Conclusions and Recommendations

Impact evaluation activities for the Commercial SEM program included engineering desk reviews of the supplied regression models. Conclusions and recommendations resulting from these reviews are discussed below.

The evaluation team reviewed the PNM SEM 2022 participant savings tracking sheet and the project specific calculation workbooks. This review showed that the savings listed in the PNM SEM participant savings report did not match the savings the determined in each of the project calculation workbooks. Table 35 shows a comparison of the saving values listed in the supplied documentation. Based on prior discussions with the implementation team, the savings summary report is a forecast of savings, instead of a record of achieved savings.

Table 35: Comparison of 2022 Reported Savings vs 2022 Workbook Savings

Project Number	2022 Expected Gross kWh Savings	2022 Workbook kWh Savings
SEM 2022 - 1	899,820	-975,460

SEM 2022 - 2	77,305	0
SEM 2022 - 3	442,616	-64,357
SEM 2022 - 4	228,652	331,994
SEM 2022 - 5	241,677	106,492
Total	**1,890,070**	**-601,331**

- **Recommendation 1**: Ensure the SEM program savings report is updated with actual monthly results based on the completed models. The implementation team should keep this savings summary up to date throughout the year, making revisions if model updates are made.

The program reported negative savings for multiple projects in PY2021 and PY2022. While the program may claim negative savings values for measures completed through the program, this should be done only when the increase in usage is a direct cause of the program interaction. Changes to production or non-routine events can and do increase facility energy use but should not penalize the SEM program.

- **Recommendation 2**: Ensure that changes to production and non-routine events are properly accounted for in savings models. If the billing regression savings analysis for a project results in negative savings as a result of production changes or non-routine events, consider setting the savings to zero instead of claiming negative savings.

The evaluation team found that significant facility usage deviations from the baseline period can result from non-routine energy events at the facility. Non-routine events may change energy usage unrelated to efficiency projects for a short or sustained period.

- **Recommendation 3**: Conduct regular check-ins to help capture data early. This may explain detected or undetected energy use changes that may impact program savings. Program check-ins with participants including data transfers should be frequent enough to catch unexpected changes in energy usage.

During PY2021 and PY2022, there were no peak demand savings claimed by the SEM program. Targeting and quantifying measures that generate peak demand savings may be an added benefit for the participant and the program.

- **Recommendation 4**: The PNM SEM team should consider increased program emphasis around peak demand reductions. Making hourly meter data available whenever possible can facilitate data driven peak demand estimates.

The evaluation observed that monthly indicators are often better to capture seasonal savings measures (e.g. HVAC) by reducing model error in peak usage months. For example, the evaluation team added additional monthly indicator variables to a regression model (SEM 2022 – 5) which reduced the model error by 19%.

- **Recommendation 5**: For SEM participants with daily or hourly baseline energy models, the PNM SEM team should consider adding temporal or seasonal indicator variables to models.

The evaluation team believes it may be helpful to estimate the preliminary energy savings potential for the planned measure lists (Opportunity Register) during onsite visits. A range-based estimate may aid in managing both participant and program team expectations. If energy conservation measure savings estimates are falling short of a 5-10% baseline energy usage, the savings may not be detectable during the program year using a usage regression, and secondary engineering calculations may be a better fit.

- **Recommendation 6**: The program team should consider estimating savings amounts for planned measures or activities. If this is currently being done by the program team, those values should be included in the Opportunity Register.

6 Power Saver Program

Power Saver is a direct load control program offered to residential, small commercial (< 50 kW), and medium commercial (50 kW – 150 kW) Public Service New Mexico (PNM) customers. To facilitate load control in the DCU program components, participants must have a device attached to the exterior of their air conditioning unit. This device is capable of receiving a radio signal that will turn off the unit's compressor for an interval of time. For the smart thermostat components, load curtailment is achieved via communication with the WiFi-enabled thermostat. Residential and small commercial participants receive an annual $25 incentive for their participation. Medium commercial participants receive an annual incentive of $9 per ton of refrigerated air conditioning.

There were four Power Saver events during the summer 2022 demand response (DR) season, which began May 15th and ended September 30th. Table 36 provides some information on the 2022 events. During the first two events, all five program components were dispatched. For the latter two events, only the Residential DCU and Small Commercial DCU components were dispatched. For all segments other than Residential BYOT, each event used an adaptive 50% cycling strategy where curtailment is based on the runtime in the previous hour. For the BYOT component, thermostat devices are curtailed using a 50% cycling strategy performed by the thermostat manufacturer.

The realized gross energy savings is 366,031 kWh and the realized gross demand savings is 36,250 kW.

Table 36: 2022 Power Saver Event Summary

Date	Day of Week	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
6/10/2022	Friday	3:00 PM	7:00 PM	100
7/11/2022	Monday	3:00 PM	7:00 PM	96
7/18/2022	Monday	3:00 PM	7:00 PM	98
7/19/2022	Tuesday	3:00 PM	7:00 PM	101

After the conclusion of the summer 2022 season, Itron provided the Evergreen team with a series of datasets for the evaluation. These files included:

- For Residential DCU and Small Commercial sites, 5-minute load data from 6/1/2022 to 9/30/2022

- For Medium Commercial DCU sites, 5-minute load data from 6/1/2022 to 9/30/2022
- For Residential DCU and Small Commercial sites, an M&V list that provided the location type (residential or commercial), the group (control or curtailment), and/or the dates each load control device was active
- For Medium Commercial sites, an M&V list that provided the dates each load control device was active
- For the Two-Way Smart Thermostat and BYOT groups, 5-minute runtime data from 6/1/2022 to 9/30/2022

The Evergreen team also received Itron's Power Saver impact evaluation report, which detailed the methods Itron employed in calculating customer baselines (CBLs) for the five different DR program components. A CBL is an estimate of what participant loads would have been absent the DR event dispatch. For each DR program component, the report also showed the load impact, which is the difference between the CBL and the metered load, for each 5-minute interval of each curtailment day. The key steps in the Evergreen verified savings analysis were:

1) For each DR program component, reproduce the performance estimates calculated by Itron using the contractually-agreed upon CBL method.
2) Modify the CBL methodology and produce ex post estimates of what the per-device impact was during the 2022 DR season.
3) Where possible, leverage additional historical data from 2015 through 2022 to produce ex ante estimates of what the per-device impact at peaking conditions (5-6 PM at 100°F) will be in future summers.
4) Scale the per-device estimates by the number of active program devices to calculate the aggregate load reduction capability (MW) of the Power Saver program.

Table 37 and Table 38 summarize our findings for residential and commercial segments, respectively. The main driver in the difference between Itron and Evergreen load reduction estimates is that Itron commonly summarized impacts with the maximum (e.g., the largest 5-minute impact in a one-hour interval is the impact for that hour), whereas the Evergreen team summarized impacts with an average. Multiplying our per-device reduction estimates by the number of devices in each class leads to a 2022 average total estimated load reduction of approximately 33.69 MW, 1.11 MW, 0.54 MW, 2.48 MW, and 1.28 MW for the Residential DCU, Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Commercial segments respectively. In aggregate, the average 2022 performance prior to making offline and operability adjustments is 39.10 MW. This is approximately 69% of Itron's pre-adjustment estimate for the 2022 season (56.80 MW). After making an online adjustment for the thermostat groups of (82% for Two-Way Smart Thermostats and 85% for BYOT) and an operability adjustment for the three DCU segments (87%), the aggregate Evergreen-calculated impact for 2022 is 33.95 MW (compared to 49.48 MW from Itron after adjustment).

The Evergreen team used Power Saver results from 2015 to 2022 to estimate the load relief capability under extreme conditions. At 100% operability, we estimate the program is capable of delivering 41.77 MW of load reduction under planning conditions of 100°F between 5:00 PM and 6:00 PM MDT. Of the estimated 41.77 MW of load reduction capability, 35.81 MW comes from the Residential DCU segment, 1.32 MW comes from the Two-Way Smart Thermostat segment, 0.59 MW comes from the BYOT segment, and 2.66 MW and 1.39 MW come from the Small and Medium Commercial segments, respectively. Factoring in the operability/online adjustments, the aggregate program can provide 36.25 MW of load relief.

Table 37: Residential Results

		Unit	Residential DCU		Two-Way Smart Thermostats		BYOT Smart Thermostats	
			Measured	Adjusted	Measured	Adjusted	Measured	Adjusted
Number of Devices		#	49,589	49,589	759	759	775	775
Itron	2022 Load Reduction Estimate	kW / device[21]	0.90	0.78	1.58	1.30	1.95	1.66
		Total MW	44.46	38.68	1.20	0.99	1.51	1.29
Evergreen	2022 Load Reduction Estimate	kW / device	0.68	0.59	1.46	1.20	0.70	0.60
		Total MW	33.69	29.31	1.11	0.91	0.54	0.46
	Ex Ante Load Reduction Estimate[22]	kW / device	0.72	0.63	1.74	1.42	0.76	0.64
		Total MW	35.81	31.15	1.32	1.08	0.59	0.50
	2022 Energy Savings	kWh / device	1.84	1.60	4.52	3.70	2.63	2.24
		Total MWh	365.21	317.73	6.86	5.62	4.08	3.47

[21] An operability adjustment of 87% is applied to the 2022 kW factors for Residential DCU, Small Commercial DCU, and Medium Commercial DCU. An online adjustment of 82% is applied to Residential Two-Way Smart Thermostats, and an online adjustment of 85% is applied to Residential BYOT.

[22] Ex ante program capability is reported in the 5 PM – 6 PM MDT hour at 100°F.

Table 38: Commercial Results

		Unit	Small Commercial Measured	Small Commercial Adjusted	Medium Commercial Measured	Medium Commercial Adjusted
Number of Devices (Number of Locations)		#	5,464	5,464	3,209 (439)	3,209 (439)
Itron	2022 Load Reduction Estimate	kW / device	1.09	0.95	1.19	1.04
		Total MW	5.97	5.19	3.83	3.34
Evergreen	2022 Load Reduction Estimate	kW / device	0.45	0.39	2.91	2.53
		Total MW	2.48	2.15	1.28	1.11
	Ex Ante Load Reduction Estimate	kW / device	0.49	0.42	3.16	2.75
		Total MW	2.66	2.31	1.39	1.21
	2022 Energy Savings	kWh / device	1.72	1.50	1.16	1.01
		Total MWh	37.60	32.71	7.47	6.50

7 Peak Saver Program

PNM offers the Peak Saver program to non-residential customers with peak load contributions of at least 50 kW. The program compensates participants for reducing electric load upon dispatch during periods of high system load. Enbala implemented the Peak Saver program in 2022, handling the enrollment, dispatch, and settlement with participating customers. During the 2022 demand response season, there were 159 participating facilities and three demand response events. These events are summarized in Table 39.

Table 39: 2022 Peak Saver Event Summary

Date	Weekday	Participants	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
06/10/2022	Friday	159	3:00 PM	7:00 PM	100
07/11/2022	Monday	159	2:00 PM	6:00 PM	95
09/02/2022	Friday	159	5:00 PM	7:00 PM	93

After the 2022 demand response (DR) season concluded, Enbala provided the Evergreen team with one-minute interval load data and end-of-season summary information on performance metrics for each site/event combination. The interval data spanned from May 19th to September 4th and included load impacts calculated using a customer baseline (CBL) method outlined in the PNM-Enbala contract. A CBL is an estimate of participant loads absent the DR event dispatch, and load impacts are the difference between CBL and the metered load during the event. The relevant CBLs were also included in the one-minute load data.

Using these data sources, the Evergreen team completed our verified savings analysis. The three key steps in the analysis were:

1. Reproducing the performance estimates calculated by Enbala using the contractually-agreed upon CBL method;
2. Assessing the accuracy of the contract CBL method by examining its ability to predict loads on non-event weekdays; and
3. Modifying the CBL methodology to reduce bias and calculate verified impacts for each event.

7.1 Validation of Settlement Calculations

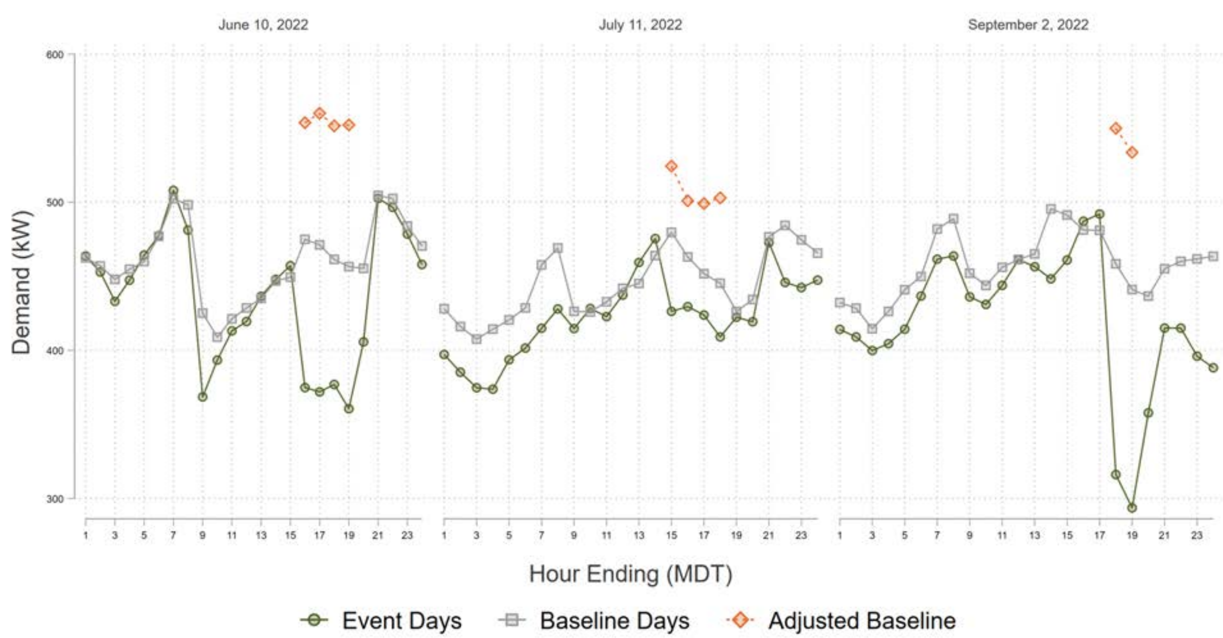
The settlement calculations called for a "high 3-of-5" baseline with an uncapped, asymmetric day-of adjustment. To determine the high 3-of-5 days, the following process was used:

- Select the five non-holiday, non-event weekdays that immediately precede the event; and
- Out of those five days, pick the three days with the highest average demand during the hours in which the event occurred. In the case of a tie, the baseline day chosen was the one closest to the event day.

Our team was successful in replicating almost all of the settlement baselines. Enbala's average settlement baseline for all sites and event hours was 532.85 kW, while our team's average settlement baseline was 532.86 kW. Any variances between the settlement baseline and our team's baseline were minimal, with differences typically less than 0.01 percent. The baseline calculations adhered to a highly consistent rule set, with the exception of one participant with solar and negative loads during daytime hours.

Figure 42 shows the average hourly event day loads for the full population, the average hourly loads on the high 3-of-5 baseline days, and the average hourly baselines for the event intervals. Note dispatch hours varied across events days (3:00 PM to 7:00 PM on June 10th, 2:00 PM to 6:00 PM on July 11th, and 5:00 PM to 7:00 PM on September 2nd).

Figure 42: Peak Saver Loads and Baselines



Once we validated that the baselines were calculated according to the contract methods, our team proceeded to the performance metric calculations. The performance metrics are defined as follows:

- **10-Minute Participant Capacity Performance** – The difference between the CBL and the lowest actual electrical demand measured by a one-minute interval reading between eight and ten minutes after the start of an event.
- **Average Participant Capacity Performance** – The average difference between the CBL and the participant's actual electric demand beginning ten minutes after the initiation of the event.
- **Participant Event Capacity Performance** – Weighted average of 10-Minute Participant Capacity Performance (40% weight) and Average Participant Capacity Performance (60% weight).
- **Energy Delivered** – The difference (in kWh) between the adjusted CBL and the metered load summed across all DR event hours.

Using the settlement baselines, all performance calculations were replicated without problem. Table 40 shows portfolio performance metrics by date.

Table 40: Peak Saver Performance Metrics by Date – Contract Settlement Method

Date	10-Minute Participant Capacity (kW)	Average Participant Capacity (kW)	Participant Event Capacity Performance (kW)	Energy Delivered (kWh)
06/10/2022	29,543	27,456	28,882	111,137
07/11/2022	17,476	11,761	14,578	50,955
09/02/2022	37,736	36,316	37,032	71,673
Average	**28,252**	**25,178**	**26,831**	**77,922**

7.2 Peak Saver Conclusions and Recommendations

After our review of the 2022 Peak Saver program, the Evergreen team offers the following recommendations:

- Make the multiplicative adjustment symmetric rather than asymmetric. As discussed in the assessment of CBL accuracy presented in Section 2.1, using an asymmetric adjustment results in an upwards bias in the baseline. Biasing the baseline inherently biases the performance metrics. The bias is greatly reduced when using a symmetric adjustment.
- Set a cap for the multiplicative adjustment factor to prevent unrealistic baselines.
- Examine load data for solar patterns or pre-pumping/pre-cooling on event days. Pre-pumping/pre-cooling on event days is fine, but sites that do so should not receive the adjustment factor (or the adjustment factor should be based on weather rather than load). For sites with solar, consider using a smaller adjustment factor cap, using an additive adjustment, or removing the adjustment factor altogether.

- Compare DR nominations with the average demand on typical summer afternoons. If any nominations seem too high, update them. (We'll note that nominations for some sites do change throughout the summer.)
- PNM should also consider collecting all meter channels for sites with solar PV. This would allow the CBL to fully capture the load shape of sites that are net exporters during key times of day. It's possible that these sites reduced load and thus became larger exporters than they would have been on a non-event day, but the available data doesn't allow for a measurement. Also, an additive adjustment may work better than a multiplicative one for sites whose load can cross zero during the event period or adjustment window.
- Set DR performance equal to the battery discharge to measure the performance of solar + storage sites provided that the battery system records telemetry, the site does not discharge their battery on non-event days and does not engage in other curtailment activities within the facility.

8 Load Management as a Resource

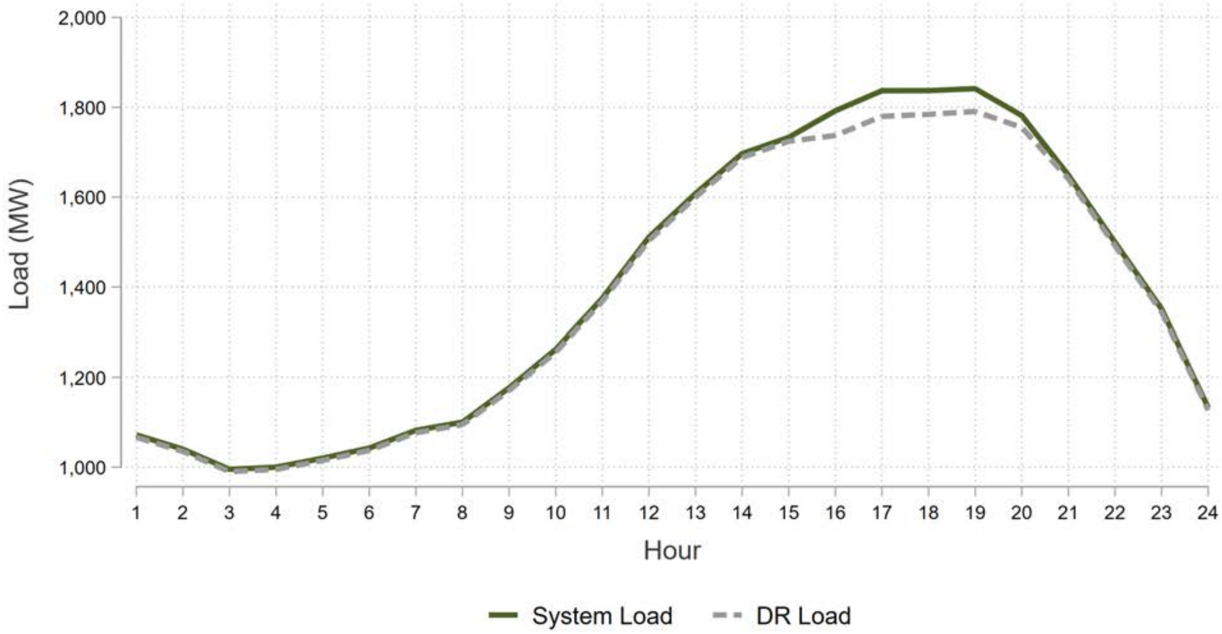
On January 31, 2018, the New Mexico Public Regulation Commission (NMPRC) issued a final order in PNM's 2017 energy efficiency case that directs Evergreen Economics, as independent program evaluator for PNM's energy efficiency and load management (LM) programs, to do the following:

In PNM's future M&V reports, the independent evaluator shall verify that load reductions from deployment of PNM's LM programs avoided or offset the need for or use of additional peaking units or power purchases or shifted demand from peak to off peak period.

The evaluation team concludes that PNM's demand response (DR) programs, Power Saver and Peak Saver, were highly effective reducing peak demand during the summer of 2022 when PNM faced tight supply conditions. The LM programs achieved their intended objective of helping to fulfill PNM's reserve margin and responding quickly to operational needs. Both functions offset the need for construction or purchase of traditional peak capacity resources.

The LM programs made a significant contribution during on-peak hours, as demonstrated by Figure 43. This figure shows the actual system load with DR in place and the counterfactual load without DR on June 10th. Both Peak Saver and Power Saver were activated on this day due to a resource constraint brought on by the unexpected loss of a generation resource. During the four-hour event, which was dispatched between 3:00 PM and 7:00 PM, an average of 45.2 MW of load was reduced on PNM's system. Figure 45 shows that PNM system load would have peaked at the hour ending 7:00 PM at approximately 1842 MW absent dispatch of the LM programs. Dispatching DR lowered the net peak for the day by almost 2.5 percent.

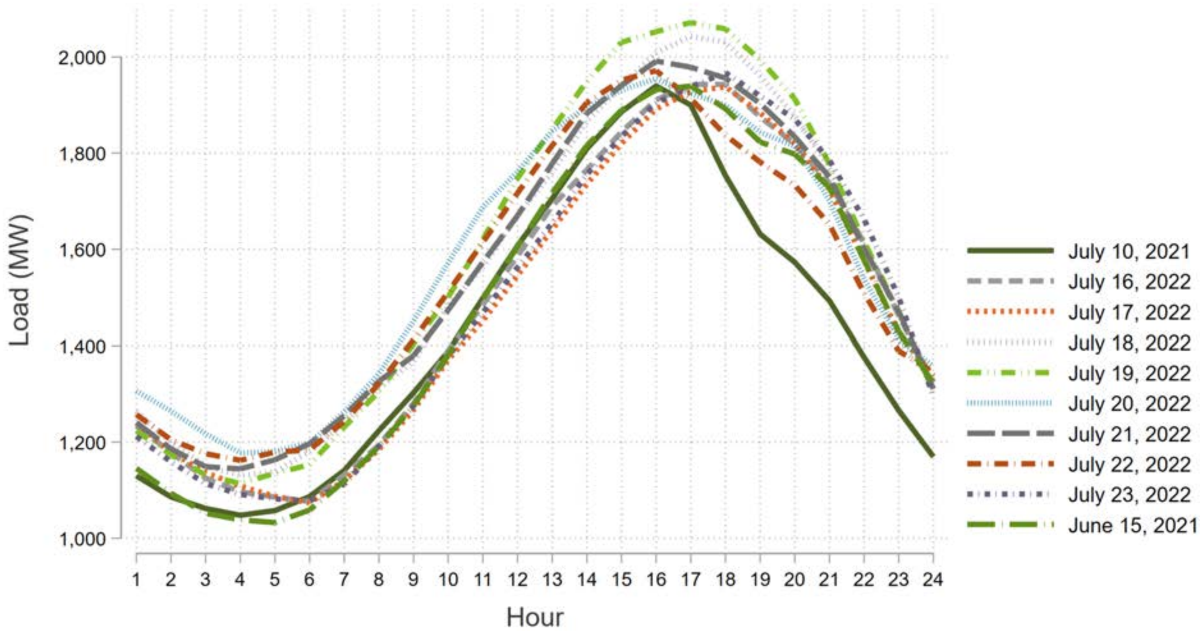
Figure 43: PNM System Load June 10, 2022



PNM's Load Management programs have been a key capacity resource for the last decade, delivering fast and reliable reductions in load when operational constraints necessitate dispatch. The value of DR as a capacity resource on the PNM system is expected to continue in the future due to two significant drivers. First, increased prevalence of extreme weather across the western US is leading to higher system loads during peak periods and sustained heat events. Second, the expansion of solar photovoltaic (PV) capacity both behind and in front of the meter. Climate concerns and decreasing costs have led to rapid growth of residential and commercial installations, which in turn has moved net system peaks later in the day. Because solar power is more intermittent than thermal generation, LM programs will remain an important tool for balancing supply and demand on the PNM system.

Figure 44 illustrates this trend by plotting the top 10 load days from 2012 to 2022. Notably, all 10 of the highest peak days recorded in this period occurred in the years 2021 and 2022. A one-degree increase in temperature (ºF) leads to a 20-25 MW increase in peak load on the PNM system. As peak loads grow, the mandated reserve capacity margin, currently set at 18%, will require higher MW capacity buffers to ensure adequate supply at peaking conditions. Moreover, greater variance among high-load hours, which results in increased costs of maintaining variable use resources, makes a strong case for the use of DR resources that are maintained at near-zero operating costs. Interestingly, the load management programs were not called on several of the highest load days of summer 2022. This illustrates the shift in focus from traditional gross peaks (when loads are highest) to net peaks (when load net of solar production is highest).

Figure 44: Top 10 System Load Days 2012-2022



The expansion of PV installations is a prominent theme in stakeholder materials released to date for PNM's 2023 Integrated Resource Plan (IRP). Afternoon load curves are being smoothed out, and peak demand is shifting to later hours in the day. This trend is expected to continue given the sustained PV network expansion. Itron's 2022-2040 adoption forecasts outline a "high PV" scenario, where PV capacity installed is over 1,100 MW by 2040, at a rate of 45 MW/year addition. It is noteworthy that even the "low" case of over 700 MW by 2040 is far above the prior IRP's forecast of 400 MW. This highlights the need for higher buffer capacity in the future, as the PV infrastructure is expected to play an increasingly significant role in shaping peak load structures.[23]

The prevalence of PV installations reduces energy demand during the traditional 12:00-17:00 PM on-peak window and creates a peak load in the late afternoon when consumption remains high but solar production has started to fade. PNM has acknowledged this trend and suggests that the system may soon be able to meet the 0.1 LOLE metric while not meeting the EUE/LOLH metric as significant energy limited resources are included in the system.[24]

Furthermore, the increased reliance on intermittent energy sources must also be taken into consideration. Figure 45 shows the load duration curve for 2022, which illustrates the high load

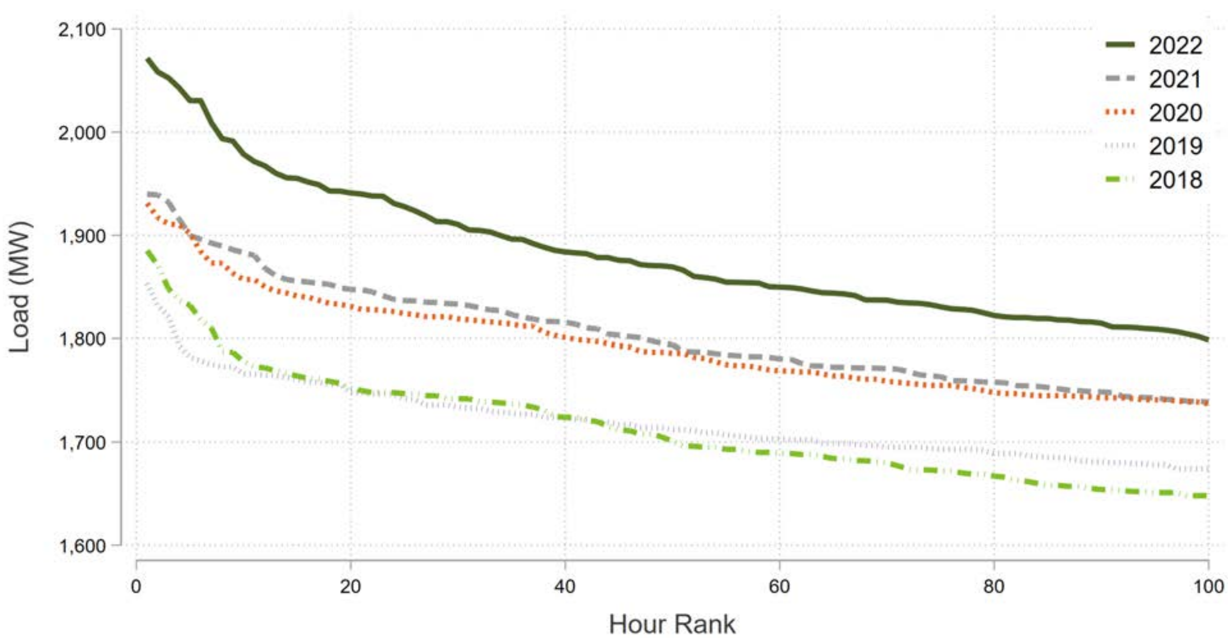
[23] PNM 2023-2042 IRP: Siemens Market Price Outlook, Itron Load Forecast, and Pricing topics. https://www.pnmforwardtogether.com/assets/uploads/Slides-IRP-PAG-Steering-Meeting-13-Pricing-TOD-Market-Prices-Forecast-Load.pdf

[24] PNM 2023-2042 IRP: Modeling for Reliability, Resource Adequacy and Resiliency. https://www.pnmforwardtogether.com/assets/uploads/2023-IRP-Technical-Session-1-Post2.pdf

variance among the highest loading hours. The standard deviation among the top 20 hours in 2022 was 65.6 MW, twice the amount recorded in 2019. The load durations illustrate just how few hours per year the last 5-10% of PNM's capacity requirement are needed. However, when LM programs are needed, they are needed quickly – almost like an ancillary services resource. PNM's LM programs have proven effective at lowering loads quickly. For example, the Peak Saver program registered a verified ten-minute capacity of 17.7 MW during the June 10th event, which exceeded the program's average event capacity of 15.3 MW.

Load Management programs fill an important role in the supply mix as PNM navigates the energy transition by helping to offset the need for traditional thermal peaking capacity. Given PNM's aggressive goal of having renewables and storage account for two-thirds of its installed capacity by 2033[25], flexible and fast-responding DR programs are a key resource to balance supply and demand on a changing system.

Figure 45: Top 100 Hour Load Duration Curves 2018-2022



The value of Load Management programs lies almost entirely in the capacity benefits they produce. Table 41 compares the energy and capacity benefit streams of PNM's Load Management programs with its EE programs. While demand response programs can provide energy benefits by shifting load, the energy value of DR is limited and over 99% of the benefits come from avoided

[25] PNM 2023-2042 IRP: Southwest Resource Adequacy in the Desert Southwest and Supply Resilience in Planning for PNM. https://www.pnmforwardtogether.com/assets/uploads/2023-IRP-Meeting-2-SWRA-and-Resiliency-Studies-20220525.pdf

capacity costs. While EE programs do reduce peak demand and produce capacity benefits, the majority of their benefits come in the form of avoided energy.

Table 41: 2022 Demand Response Program Benefits

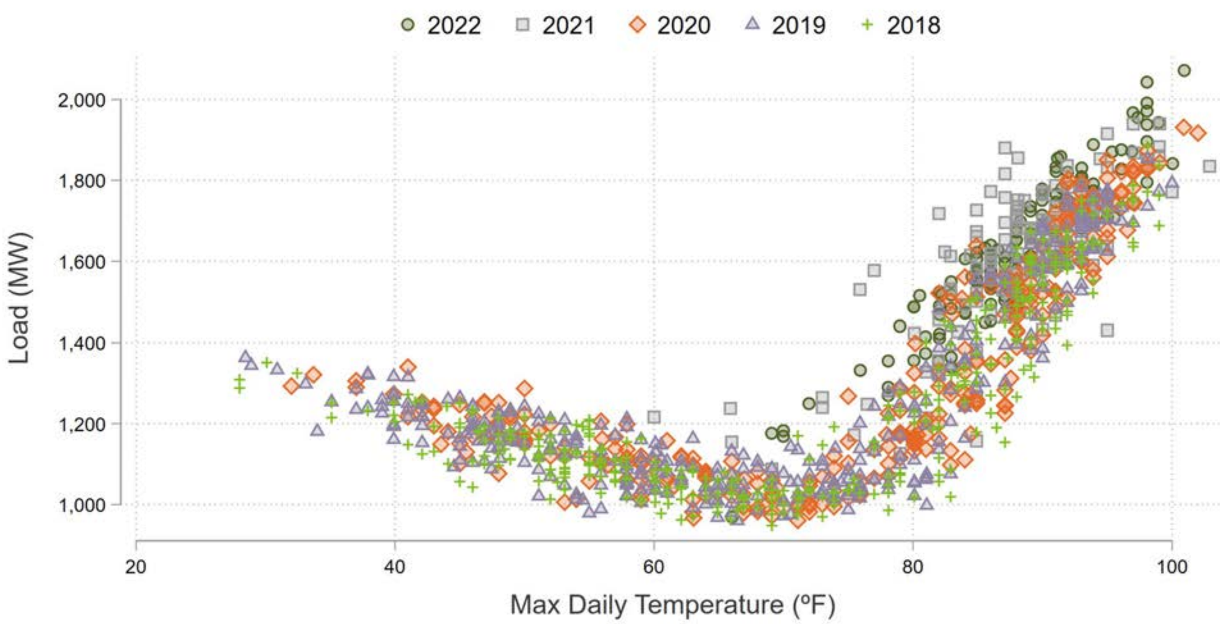
Program	Energy Benefit ($1,000)	Capacity Benefit ($1,000)	Percent Capacity
Power Saver	$42.02	$48,482.19	99.91%
Peak Saver	$17.90	$20,663.03	99.91%
Energy Efficiency Programs	$21,871.36	$38,465.81	63.86%

PNM's Load Management programs are a good fit for its peak capacity requirements for several reasons:

- Load Management resources are dispatchable and available quickly.
- PNM is a summer-peaking utility.
- PNM’s peak loads are concentrated in relatively few hours per year. As shown in Figure 45, there is often a 100 MW difference in system load between the highest load hour and the 20th load hour of the year.

Dispatchable resources like PNM’s Load Management programs work well when only called a limited number of times per year. This is different from traditional generation resources which have substantial fixed costs and become more economically viable with increased utilization. PNM's status as a summer-peaking utility is a constant trend, with peak summer load typically 20 to 30 percent higher than peak winter load, as shown in Figure 46. Power Saver relies on control of central air conditioners to deliver peak load reduction, so the program’s DR capability is inherently limited to the summer months. However, this is when the PNM system experiences constraints. While Power Saver has limited availability seasonally, it is a load-following resource – meaning it delivers the largest impacts when system loads are elevated due to extreme temperatures. The Load Management programs are also flexible with respect to timing. As net peaks shift later in the evening, PNM can call events later in the day.

Figure 46: Daily Maximum PNM System Load and Temperature by Year



9 Cost Effectiveness Summary

Earlier chapters presented the UCT cost effectiveness results for those programs evaluated in 2022. This chapter presents a summary of the cost effectiveness calculations for all of the PY2022 PNM programs.

As discussed previously, in order to do the UCT calculation, the evaluation team obtained the following from PNM:

- Avoided cost of energy for Energy Efficiency and Demand Response (costs per kWh over a 20+ year time horizon);
- Avoided cost of capacity for Energy Efficiency and Demand Response (estimated cost of adding a kW/year of generation, transmission, and distribution to the system);
- Avoided cost of CO2 (estimated monetary cost of CO2 per kWh generated);
- Avoided transmission and distribution costs;
- Discount rate;
- Line loss factor; and
- Program costs (all expenditures associated with program delivery).

Additional considerations for the UCT as applied to the PNM programs:

- PNM does not quantify the avoided cost of transmission and distribution.
- PNM provided a levelized avoided cost of capacity, to which the discount rate was not applied further.
- The NMPRC allows for the benefits of low-income programs to be boosted by 20 percent to account for utility system economic benefits. PNM estimates the following proportions of low-income customers participate in their programs:
    - 100 percent of Low-Income Home Energy Checkup
    - 39 percent of Commercial Comprehensive - Multifamily
    - 100 percent of Easy Savings
    - 100 percent of Energy Smart
    - 40 percent of Home Works
- Program costs were broken into the following categories:
    - Administration
    - Promotion
    - Measurement & Verification
    - Rebates

- Third-Party Costs
- Market Transformation

The results of the UCT for all programs based on net realized savings are shown below in Table 42. Overall, the PY2022 portfolio was found to have a UCT ratio of 1.77.

Table 42: PY2022 Cost Effectiveness

Program	Utility Cost Test (UCT)
Res Comp – Refrigerator Recycling	0.62
Res Comp – Home Energy Checkup	0.41
Res Comp – Home Energy Checkup LI	0.46
Res Comp – Residential Cooling	0.47
Residential Behavioral HER	0.06
Residential Lighting	5.35
Residential Products	3.58
Commercial Comprehensive	1.45
Commercial Comprehensive - Multifamily	0.67
Easy Savings	2.66
Energy Smart (MFA)	0.74
New Home Construction	1.34
PNM Home Works	1.28
Commercial Behavioral SEM	0.17
PNM Power Saver	1.08
PNM Peak Saver	1.09
Overall Portfolio	**1.77**

Evaluation of the 2022 Public Service Company of New Mexico Energy Efficiency and Demand Response Programs

Final Report - Appendices

April 4, 2023

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Appendix A: Commercial Comprehensive Participant Survey Instrument

Hello, my name is (your name) from Research & Polling, Inc. I am calling on behalf of PNM. I'm calling because our records show that you recently completed an energy efficiency project where you installed (measure 1) at your business located at (site address) and received a rebate through the PNM (rebate program). I'd like to ask a short set of questions about your experience with the (rebate program) program. Your time will help us improve this program for other customers like you. Are you the best person to talk to about the/these energy efficiency upgrade(s) and energy use at your firm?

Yes 1
No.......................... 2
Never installed 3

Q1-M1. (A 1) Our records show in 2022 your business got a rebate through PNM for installing (measure 1). Are you familiar with this project?

Yes 1
No 2
Never installed 3
Don't know 4

Q1a-M1. Our records show it was installed at (site address) in (site city). Is that correct?

Yes 1
No 2
Never installed 3

Q1b-M1. Where was (measure 1) installed? (Among those who installed measure 1 at a different location than PNM's records.)

[Data Processing Use Only] Q2-M1. (A 1a) Is there someone else at your company who would know about buying the (measure 1)?

Yes, transfer and go to intro 1
Yes, no transfer 2

Q3-M1. (A 2) Thinking about the (measure 1) for which you received a rebate, is the (measure 1) still installed in your facility?

Yes 1
No 2
Prefer not to answer 3
Don't know 4

Q4a-M1. (A 3) Was the (measure 1) removed? (Among those who do not currently have measure 1 installed at their facility.)

Yes, it was removed 01
No 02
Prefer not to answer 03
Don't know 99

Q4b-M1. (A 3) Was the (measure 1) never installed? (Among those who do not currently have measure 1 installed at their facility.)

Yes, never installed 01
Prefer not to answer 02
Don't know 99

Q5-M1. (A 3a) Why was the (measure 1) removed/never installed? (Among those who do not currently have measure 1 installed at their facility or never installed measure 1.)

Q6-M1. (A 4) Is the (measure 1) still functioning as intended? (Among those who currently have measure 1 installed.)

Yes 1
No 2
Prefer not to answer 3
Don't know 4

Q7-M1. (A 5) Did your firm use a contractor to install the (measure 1) or did internal staff do the work?

Contractor 01
Internal Staff 02
Prefer not to answer 03
Landlord.......................... 04
Don't know 99

Q8-M1. (A 6) Why did your firm choose to use internal staff instead of a contractor? (Among those who had internal staff install measure 1.)

Prefer not to answer 98
Don't know 99

Q1-M2. (A 1) Our records show in 2022 your business got a rebate through PNM for installing a (measure 2). Do you remember this? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Never installed 3
Don’t know 4

Q1a-M2. Our records show (measure 2) was installed at (site address) in (site city). Is that correct? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Never installed 3
Don't know 4

Q1b-M2. Where was (measure 2) installed? (Among those who received rebates for more than one measure and installed measure 2 at a different location than PNM's records.)

Q3-M2. (A 2) Thinking about the (measure 2) for which you received a rebate, is the (measure 2) still installed in your facility? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Prefer not to answer 3
Don't know 4

Q4a-M2. (A 3) Was the (measure 2) removed? (Among those who received rebates for more than one measure and currently do not have measure 2 installed at their facility.)

Yes, it was removed 01
No 02
Prefer not to answer 03
Don't know 99

Q4b-M2. (A 3) Was the (measure 2) never installed? (Among those who received rebates for more than one measure and currently do not have measure 2 installed at their facility.)

Yes, never installed 01
Prefer not to answer 02
Don't know 99

Q5-M2. (A3a) Why was the (measure 2) removed/never installed? (Among those who received rebates for more than one measure and currently do not have measure 2 installed at their facility or never installed measure 2.)

Q6-M2. (A 4) Is the (measure 2) still functioning as intended? (Among those who received rebates for more than one measure and have measure 2 installed.)

Yes 1
No 2
Prefer not to answer 3
Don't know 4

Q7-M2. (A 5) Did your firm use a contractor to install the (measure 2) or did internal staff do the work? (Among those who received rebates for more than one measure and have measure 2 installed.)

Contractor 01
Internal Staff 02
Prefer not to answer 03
Don't know 99

Q8-M2. (A 6) Why did your firm choose to use internal staff instead of a contractor? (Among those who received rebates for more than one measure and had internal staff install measure 2.)

Prefer not to answer 98
Don't know 99

Q9-M2. (A 7) Were your (measure 1) and (measure 2) installed/purchased together as a single project or were these done separately? (Among those who received rebates for two measures.)

Together as one project 1
Separately 2
Prefer not to answer 3
Don't know 4

Q1-M3. (A 1) Our records show in 2022 your business got a rebate through PNM for installing a (measure 3). Do you remember this? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Never installed 3
Don't know 4

Q1a-M3. Our records show (measure 3) was installed at (site address) in (site city). Is that correct? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Never installed 3
Don't know 4

Q1b-M3. Where was (measure 3) installed? (Among those who received rebates for more than one measure and installed measure 3 at a different location than PNM's records.)

Q3-M3. (A 2) Thinking about the (measure 3) for which you received a rebate, is the (measure 3) still installed in your facility? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Prefer not to answer 3
Don’t know 4

Q4a-M3. (A 3) Was the (measure 3) removed? (Among those who received rebates for more than one measure and currently do not have measure 3 installed at their facility.)

Yes, it was removed 01
No 02
Prefer not to answer 03
Don't know 99

Q4b-M3. (A 3) Was the (measure 3) never installed? (Among those who received rebates for more than one measure and currently do not have measure 3 installed at their facility.)

Yes, never installed 01
Prefer not to answer 02
Don't know 99

Q5-M3. (A3a) Why was the (measure 3) removed/never installed? (Among those who received rebates for more than one measure and currently do not have measure 3 installed at their facility or never installed measure 3.)

Q6-M3. (A 4) Is the (measure 3) still functioning as intended? (Among those who received rebates for more than one measure.)

Yes 1
No 2
Prefer not to answer 3
Don't know 4

Q7-M3. (A 5) Did your firm use a contractor to install the (measure 3) or did internal staff do the work? (Among those who received rebates for more than one measure.)

Contractor 01
Internal Staff 02
Prefer not to answer 03
Don't know 99

Q8-M3. (A 6) Why did your firm choose to use internal staff instead of a contractor? (Among those who received rebates for more than one measure and had internal staff install measure 3.)

Prefer not to answer 98
Don't know 99

Q9-M3. (A 7) Were your (measure 1), (measure 2) and (measure 3) installed/purchased together as a single project or were these done separately? (Among those who received rebates for three measures.)

Together as one project 1
Separately 2
Prefer not to answer 3
Don't know 4

Q10. (B 1) How did your company FIRST learn about the program?

Word of mouth (business associate, co-worker) 01
Utility program staff 02
Utility website 03
Utility bill insert 04
Utility representative 05
Utility advertising 06
Email from utility 07
Contractor/distributor 08
Building audit or assessment 09
Television Advertisement - Mass Media 10
Other mass media (sign, billboard, newspaper/magazine ad) ... 11
Event (conference, seminar, workshop) 12
Online search, web links 13
Participated or received rebate before 14
No way in particular 98
Don't know 99

Q11. (B 2) What other sources did your company use to gather information about the program? ... Were there any others?

Word of mouth (business associate, co-worker) 01
Utility program staff 02
Utility website 03
Utility bill insert 04
Utility representative 05
Utility advertising 06
Email from utility 07
Contractor/distributor 08
Building audit or assessment 09
Television Advertisement - Mass Media 10
Other mass media (sign, billboard, newspaper/magazine ad) ... 11
Event (conference, seminar, workshop) 12
Online search, web links 13
Participated or received rebate before 14
None 98
Don't know 99

Q12. (B 3) Of all the sources you mentioned, which did you find most useful in helping you decide to participate in the program? (Among those who mentioned additional sources used to gather information.)

None in particular 97
Prefer not to answer 98
Don't know 99

[Data Processing Use Only] POLLER NOTE: Was Measure Installed?

Yes 1
No 2

Q13a. (C 1) Did the equipment that your firm installed replace existing equipment?

Yes (i.e. all equipment was replacing old equipment) 1
Some equipment was a replacement, and some was a new addition 2
No (i.e. all equipment was an addition to existing equipment) 3
Prefer not to answer 4
Don't know 5

Q13b. (C 1) Is the equipment that your firm purchased intended to replace existing equipment? (Among those who did not install the measure.)

Yes (i.e. all equipment is replacing old equipment) 1
Some equipment is a replacement, and some was a new addition 2
No (i.e. all equipment is an addition to existing equipment) 3
Prefer not to answer 4
Don't know 5

Q14a. (C 2) Was the replaced equipment ... (Among those who installed the measure and some or all new equipment was replacing old equipment.)

Fully functional and not in need of repair? 1
Functional, but needed minor repairs? 2
Functional, but needed major repairs? 3
Not functional? 4
Prefer not to answer 5
Don’t know 6

Q14b. (C 2) Is the equipment you intend to replace ... (Among those who did not install the measure.)

Fully functional and not in need of repair? 1
Functional, but needs minor repairs? 2
Functional, but needs major repairs? 3
Not functional? 4
Prefer not to answer 5
Don't know 6

Q15a. (C 3a) About how old, in years, was the equipment prior to replacement? (Among those who installed the measure, and some or all new equipment was replacing old equipment, and the replaced equipment was functional.)

Number of years ______
Prefer not to answer 499
Don't know 500

Q15b. (C 3b) About how old, in years, is the equipment you are replacing? (Among those who did not install the measure, some or all new equipment was replacing old equipment, and the replaced equipment was functional.)

Number of years ______
Prefer not to answer 499
Don't know 500

Q16. (C 4) How much longer (in years) do you think your old equipment would have lasted if you had not replaced it? (Among those who installed the measure, and some or all new equipment was replacing old equipment, and the replaced equipment was functional.)

Less than a year 1
1 - 2 years 2
3 - 5 years 3
6 - 10 years 4
More than 10 years 5
Prefer not to answer 6
Don't know 7

Q17. (C 5a) Next I will read a list of reasons your firm may have considered when you decided to conduct your project. For each one, please tell me if it was not at all important, a little important, somewhat important, very important or extremely important. How important was reducing environmental impact of the business on your decision to conduct your project?

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

Q18. (C 5b) How important was upgrading out-of-date equipment on your decision to conduct your project?

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

Q19. (C 5c) How important was improving comfort at the business on your decision to conduct your project?

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

[Data Processing Use Only] POLLER NOTE: Was HVAC Measure Installed?

Yes 1
No 2

Q20. (C 5d) How important was improving air quality on your decision to conduct your project? (Among those who installed HVAC measure.)

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

Q21. (C 5e) How important was receiving the rebate on your decision to conduct your project? (Among those who did not use direct install.)

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

Q22. (C 5f) How important was reducing energy bill amounts on your decision to conduct your project?

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

[Data Processing Use Only] POLLER NOTE: Did respondent answer "Contractor" in Q.7?

Yes 1
No 2

Q23. (C 5g) How important was the contractor recommendation on your decision to conduct your project? (Among those who used a contractor to install the measure.)

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important 3
4 - Very Important 4
5 - Extremely Important 5
Don't Know/Won't Say 6

[Data Processing Use Only] POLLER NOTE: Did respondent answer "Contractor" in Q.7?

Yes	1
No	2

Q24. (D 1a) Next, I'm going to ask you to rate the importance of each of the following factors on your decision to determine how energy efficient your project would be. Please rate the importance of each of these factors in determining your project's energy efficiency level using a scale from 0 to 10, where 0 means not at all important and 10 means extremely important. Please let me know if the factor is not applicable. How important was <u>the contractor who performed the work</u> in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10 – Extremely important	10
Don't know	97
Prefer not to answer	98
N/A	99

Q25. (D 1b) How important was <u>the dollar amount of the rebate</u> in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10 – Extremely important	10
Don't know	97
Prefer not to answer	98
N/A	99

Q26. (D 1c) How important was <u>technical assistance received from PNM staff</u> in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all	00
1	01

2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10 – Extremely important	10
Don't know	97
Prefer not to answer	98
N/A	99

Q27. (D 1d) How important was endorsement or recommendation by your PNM account manager or other PNM staff in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10 – Extremely important	10
Don't know	97
Prefer not to answer	98
N/A	99

Q28. (D 1e) How important was information from PNM marketing or informational materials in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10 – Extremely important	10
Don't know	97
Prefer not to answer	98
N/A	99

Q29. (D 1f) How important was previous participation in a PNM program in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q30. (D 1g) How important was endorsement or recommendation by a contractor in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q31. (D 1h) How important was endorsement or recommendation by a vendor or distributor in determining how energy efficient your project would be? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q33. (D 1j) Now, I would like to read you some factors that are not related to the rebate program. Using the same scale from 0 to 10, where 0 means not at all important and 10 means extremely important., please rate the following non program factors' importance in determining your project's energy efficiency. How important was the age or condition of the old equipment in determining your project's energy efficiency? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q34. (D 1k) How important was corporate policy or guidelines in determining your project's energy efficiency? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q35. (D 1l) How important was minimizing operating cost in determining your project's energy efficiency? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08

9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q36. (D 1m) How important was scheduled time for routine maintenance in determining your project's energy efficiency? (Among those who did not use direct install.)

0 – Not important at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 – Extremely important 10
Don't know 97
Prefer not to answer 98
N/A 99

Q37. (D 2) Of the items I just asked you about, think of the program factors as relating to assistance provided by the utility, such as the rebate, marketing from PNM, recommendation by a contractor and technical assistance from PNM. I also asked you about some non-program factors, which included the age and condition of the old equipment, company policy, operating costs and routine maintenance.

If you had to divide 100% of the influence on your decision to determine how energy efficient your new equipment would be between the PNM program and non-program factors, what percent would you give to the importance of the program factors? (Among those who did not use direct install.)

Percentage Program Factors .... ______%
Prefer not to answer 499
Don't know 500

Q38. (D 3) And what percent would you give to the importance of the non-program factors? (Among those who did not use direct install and provided a percentage for the importance of program factors on their decision.)

Percentage Non-Program Factors .... ______%
Prefer not to answer 499
Don't know 500

Q39. (D 5) Did you first learn about the (rebate program) BEFORE or AFTER you decided how energy efficient your equipment would be? (Among those who did not use direct install.)

Before 1

After 2
Prefer not to answer 3
Don't know 4

Q40. (D 6) Using a scale from 0 to 10, where 0 means not at all likely and 10 means extremely likely, please rate the likelihood that you would have installed the same equipment with the exact same level of energy efficiency if the (rebate program) was not available. (Among those who did not use direct install.)

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q41. (D 7) You just rated your likelihood to install the same equipment without any assistance from the program as a(n) (response from Q40) out of 10. Earlier, when I asked you to rate the importance of each program factor on your decision, the highest rating you gave was a (highest rating/s from Q24-Q32) out of 10 for the importance of (re-read question wording for highest responses Q24-Q32). Can you briefly explain why you were likely to install the equipment without the program, but also rated the program as highly influential in your decision? (Among those who did not use direct install, stated that they were 08, 09, or 10 as extremely likely to install the same equipment if the rebate program was not available, and rated one or more program factors as 08, 09, or 10 on the previous list.)

Q42. (D 8) You just rated your likelihood to install the same equipment without any assistance from the program as a(n) (response from Q40) out of 10. Earlier, when I asked you to rate the importance of each program factor on your decision, the highest rating you gave was a(n) (lowest rating/s from Q24-Q32) out of 10. Can you briefly explain why you said you were not likely to install the equipment without help from the program, yet did not rate the program as highly influential in your decision? (Among those who did not use direct install, stated that they were 00, 01, or 02 as not at all likely to install the same equipment if the rebate program was not available, and rated one or more program factors as 00, 01, or 02 on the previous list.)

Q43. (D 9) If the (rebate program) was not available, would you have delayed starting the project to a later date? (Among those who did not use direct install.)

Yes 1
No 2
Would not have done the project at all 3

Prefer not to answer 4
Don't know 5

Q44. (D 10) Approximately how much later would you have done the project if the (rebate program) was not available? Would it have been … (Among those who did not use direct install and stated they would have delayed starting the project if the rebate program was not available.)

Within one year 1
Between 12 months and less than 2 years 2
Between 2 years and 3 years 3
Greater than 3 years 4
Would not have installed the equipment at all 5
Prefer not to answer 6
Don't know 7

Q45. (D 11) Using a scale from 0 to 10, where 0 means not at all likely and 10 means extremely likely, please rate the likelihood that you would have conducted this project within 12 months of when you actually completed this project if the (rebate program) was not available. (Among those who did not use direct install and stated they would have delayed starting the project within one year if the rebate program was not available.)

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q46. (E 1a) For each of the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. PNM as an energy provider.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q47. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with PNM as an energy provider.)

Q48. (E 1b) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The rebate program overall.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q49. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with the rebate program overall.)

Q50. (E 1c) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The equipment installed through the program.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q51. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with the equipment installed through the program.)

[Data Processing Use Only] POLLER NOTE: Was installation done by "Contractor" in Q.7?

Yes 1
No 2

Q52. (E 1d) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The contractor who installed the equipment. (Among those who used a contractor to do the installation.)

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7

Don't know 8

Q53. Can you tell me why you gave that rating? (Among those who used a contractor to do the installation and were Very Dissatisfied or Somewhat Dissatisfied with the contractor who installed the equipment.)

Q54. (E 1e) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The overall quality of the equipment installation. (Among those who used a contractor to do the installation.)

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q55. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with the overall quality of the equipment installation.)

Q56. (E 1f) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The amount of time it took to receive your rebate for your equipment. (Among those who did not use direct install.)

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q57. Can you tell me why you gave that rating? (Among those who did not use direct install and were Very Dissatisfied or Somewhat Dissatisfied with the amount of time it took to receive the rebate for the equipment.)

Q58. (E 1g) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The dollar amount of the rebate for the equipment. (Among those who did not use direct install.)

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4

Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q59. Can you tell me why you gave that rating? (Among those who did not use direct install and were Very Dissatisfied or Somewhat Dissatisfied with <u>the dollar amount of the rebate for the equipment.</u>)

Q60. (E 1h) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. Interactions with PNM.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q61. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with <u>interactions with PNM</u>.)

Q62. (E 1I) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The overall value of the equipment your company received for the price you paid.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q63. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with <u>the overall value of the equipment their company received for the price they paid.</u>)

Q64. (E 1j) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The amount of time and effort required to participate in the program.

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3

Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q65. Can you tell me why you gave that rating? (Among those who were Very Dissatisfied or Somewhat Dissatisfied with <u>the amount of time and effort required to participate in the program.</u>)

Q66. (E 1k) For the following, please tell me if you were very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied or very satisfied. The project application process. (Among those who did not use direct install.)

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q67. Can you tell me why you gave that rating? (Among those who did not use direct install and were Very Dissatisfied or Somewhat Dissatisfied with <u>the project application process.</u>)

Q68. (E 2) Do you have any recommendations for improving the (rebate program) program?

No 97
Prefer not to answer................ 98
Don't know 99

Q69. (Gen 1) Finally, we have a few questions about your firm for classification purposes only. Do you own or lease your building where the project was completed?

Own 01
Lease/Rent 02
Prefer not to answer 03
Don't know 99

Q70. (Gen 1a) Does your firm pay your PNM bill, or does someone else (e.g., a landlord)? (Among those who answered that they own, lease, or rent the building where the project was completed.)

Pay own 1
Someone else pays 2
Prefer not to answer 3
Don’t know 4

Q71. (Gen 2) Approximately what is the total square footage of the building where the project was completed?

Less than 1,000 square feet	1
Between 1,000 and 1,999 square feet	2
Between 2,000 and 4,999 square feet	3
Between 5,000 and 9,999 square feet	4
Between 10,000 and 49,999 square feet	5
Between 50,000 and 99,999 square feet	6
100,000 square feet or more	7
Prefer not to answer	8
Don't know	9

Q72. (Gen 3) Approximately what year was your firm's building built?

1939 or earlier	01
1940 to 1949	02
1950 to 1959	03
1960 to 1969	04
1970 to 1979	05
1980 to 1989	06
1990 to 1999	07
2000 to 2009	08
2010 and later	09
2020	10
Prefer not to answer	11
Don't know	12

Q73. (Gen 4) Approximately, How many full-time equivalent (FTE) employees does your company currently have in the state of New Mexico?

Less than 5	01
5-9	02
10-19	03
20 - 49	04
50 - 99	05
100 - 249	06
250 - 499	07
500 - 999	08
1,000 - 2,500	09
More than 2,500	10
Prefer not to say	11
Don't know	12

Q74. (Gen 5) And this is my last question. How long has your company been in business?

Number of years______

Appendix B: Residential Comprehensive Cooling Participant Survey Instrument

Hello, my name is *(your name)* **from Research & Polling, Inc. I am calling on behalf of PNM. I'm calling because our records show that you recently completed an energy efficiency project where you installed an energy efficient** *(measure 1)* **and received a rebate from PNM. I'd like to ask a short set of questions about your experience with this rebate program. Your time will help us improve this program for other customers like you. Are you the best person to talk to about these energy efficiency upgrades and energy use in your home?**

Yes 1
No 2
Never installed ... 3

Q1-M1. (A 1) Just to confirm, our records show that you received a rebate from PNM when you installed a *(measure 1)* **at your home in 2022. Is this correct?**

Yes 1
No 2
Don't know ... 3

Q2-M1. (A 2) Is the *(measure 1)* **still installed?**

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q3-M1. (A 3) Was the *(measure 1)* **removed or never installed?** *(Among those who do not currently have measure 1 installed at their home.)*

Removed 01
Never installed 02
Prefer not to answer 03
Don't know 99

Q4-M1. (A 3a) Why was the *(measure 1)* **removed/never installed?** *(Among those who do not currently have measure 1 installed at their home or never installed measure 1.)*

[Data Processing Use Only] POLLER NOTE: Was measure ever installed?

Yes .. 1
No 2

Q5-M1. (A 4) Is the *(measure 1)* **still functioning properly?**

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q1-M2. (A 1) Just to confirm, our records show that you received a rebate from PNM when you installed a *(measure 2)* **at your home in 2022. Is this correct?**

Yes 1
No 2
Don't know ... 3

Q2-M2. (A 2) Is the *(measure 2)* **still installed?**

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q3-M2. (A 3) Was the *(measure 2)* **removed or never installed?** *(Among those who do not currently have measure 2 installed at their home.)*

Yes, it was removed 01
No 02
Prefer not to answer 03
Don't know 99

Q4-M2. (A 3a) Why was the *(measure 2)* **removed/never installed?** *(Among those who do not currently have measure 2 installed at their home or never installed measure 2.)*

[Data Processing Use Only] POLLER NOTE: Was measure ever installed?

Yes .. 1
No 2

Q5-M2. (A 4) Is the *(measure 2)* **still functioning properly?**

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q6. (B 1) Did you go through a contractor to purchase the efficient equipment or did you purchase it directly from a retailer?

Used a contractor 1
Purchased at retailer ... 2
Prefer not to answer 3
Don't know 4

Q7. (B 2) Did you use a contractor to install the equipment or did you do it yourself?

Contractor installed 1
Did it myself 2
Prefer not to answer .. 3
Don't know 4

Q8. (C 1) How did you <u>first</u> hear about PNM's rebates for energy efficient equipment?

Bill insert 01
PNM website 02
Digital/web advertisement (not on PNM website) ... 03
Television advertisement 04
Radio advertisement 05
Contractor 06
Friend or family 07
Social media 08
PNM representative 09
Retailer 10
Plumber 11
Online search 12
Information on equipment itself 13
Prefer not to answer 98
Don't know 99

Q9. (C 2a) Next I will read a list of reasons you may have considered when you decided to make your energy efficient upgrade. For each one, please tell me if it was *not at all important*, a *little important*, *somewhat important*, *very important* or *extremely important*. ***How important was <u>reducing environmental impact of your home</u> on your decision to make the upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q10. (C 2b) ***How important was <u>upgrading out-of-date equipment</u> on your decision to make the upgrade?***

1 - Not Important At All 1

2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q11. (C 2c) *How important was <u>replacing faulty or failed equipment</u> on your decision to make the upgrade?*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q12. (C 2d) *How important was <u>improving comfort of your home</u> on your decision to make the upgrade?* *(Among those who installed a cooling measure)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q13. (C 2e) *How important was <u>improving air quality</u> on your decision to make the upgrade?* *(Among those who installed a cooling measure.)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q14. (C 2f) *How important was <u>improving water circulation in your pool</u> on your decision to make the upgrade?* *(Among those who installed a pool pump measure)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7

N/A 8

Q15. (C 2g) *How important was <u>receiving the financial incentive</u> on your decision to make the upgrade?*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q16. (C 2h) *How important was <u>reducing energy bill amounts</u> on your decision to make the upgrade?*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q17. (C 2i) *How important was <u>the contractor recommendation</u> on your decision to make the upgrade?* *(Among those who used a contractor to install the measure.)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q18. (C 2j) *How important was <u>the retailer recommendation</u> on your decision to make the upgrade?* *(Among those who purchased the measure at a retailer.)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q19. (C 3) Were there any other reasons that you installed the equipment that were more important than the ones we have mentioned?

No, none in particular 97
Prefer not to answer........... 98
Don't know 99

20. (D 1) Before participating in the PNM rebate program, do you recall receiving any other rebates from PNM for making energy efficiency upgrades at your home?

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q21. (D 2a) ***How influential was <u>the dollar amount of the rebate</u> on your decision to make the upgrade?***

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q22. (D 2b) ***How influential was <u>the contractor recommendation</u> on your decision to make the upgrade?*** *(Among those who used a contractor to install the measure.)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q23. (D 2c) ***How influential was <u>the retailer recommendation</u> your decision to make the upgrade?*** *(Among those who purchased the measure at a retailer.)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q24. (D 2d) *How influential was <u>information from PNM marketing or informational materials</u> on your decision to make the upgrade?*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q25. (D 2e) *How influential was <u>previous participation in a PNM program</u> on your decision to make the upgrade?*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q26. (D 3) Did you first learn about the PNM rebate program BEFORE or AFTER you decided how energy efficient your equipment would be?

Before 1

After 2
Prefer not to answer .. 3
Don't know 4

Q27. (D 4) Now I would like you to think about the efficiency level of the equipment upgrade. Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have purchased the exact same efficiency level of equipment if the PNM rebate program was NOT available.

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q28. (D 5) Now I would like you to think about the timing of the equipment purchase. Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have installed equipment, of any efficiency level, within 12 months of when you actually did if the PNM rebate program was NOT available.

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q29. (D 6) In your own words, how would you describe the influence the PNM rebate program had on your decision to install the new equipment?

Q30. (E 1) About how long did it take to receive your rebate after the equipment was installed?

1 week or less 1
More than a week, but less than 1 month ... 2
About 1 month 3
Between 1 and 2 months 4

About 2 months 5
More than 2 months 6
Have not received rebate yet 7
Prefer not to answer 8
Don't know 9

Q31. (F 1a) For each of the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **PNM as an energy provider.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q32. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with PNM as an energy provider.)*

Q33. (F 1b) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The rebate program overall.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q34. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the rebate program overall.)*

Q35. (F 1c) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The equipment that was rebated through the program.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q36. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the equipment that was rebated through the program.)*

Q37. (F 1d) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The contractor who installed the equipment.** *(Among those who used a contractor to install the measure.)*

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q38. Can you tell me why you gave that rating? *(Among those who used a contractor to install the measure and were* Very Dissatisfied *or* Somewhat Dissatisfied *with the contractor who installed the equipment.)*

Q39. (F 1e) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The amount of time it took to receive your rebate.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q40. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the amount of time it took to receive your rebate.)*

Q41. (F 1f) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The dollar amount of the rebate.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7

Don't know 8

Q42. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the dollar amount of the rebate.)*

Q43. (F 1g) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **Interactions with PNM regarding this project.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q44. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with interactions with PNM regarding this project.)*

Q45. (F 1h) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The overall value of the equipment you received for the price you paid.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q46. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the overall value of the equipment you received for the price you paid.)*

Q47. (F 2) Do you have any recommendations for improving the PNM program?

No 97
Prefer not to answer............ 98
Don't know 99

Q48. (Gen 1) Finally, we have a few questions about your firm for classification purposes only. Do you own or rent your home where the equipment was installed?

Own 01
Rent 02

Prefer not to answer 03
Don't know 99

Q49. (Gen 1a) Do you pay your PNM bill, or does someone else (e.g., a landlord)? *(Among those who answered that they own or rent the building where the project was completed.)*

Pay own 1
Someone else pays ... 2
Prefer not to answer .. 3
Don't know 4

Q50. (Gen2) Is your home a single-family home or part of a multifamily building with more than one unit?

Single-family home 1
More than one residence in building ... 2
Prefer not to answer 3
Don't know 9

Q51. (Gen2a) How many units are in the structure?

Number of units: ______

Prefer not to answer 499
Don't know 500

Q52. (Gen 3) Approximately what is the total square footage of your home?

Less than 1,000 square feet 1
Between 1,000 and 1,499 square feet ... 2
Between 1,500 and 1,999 square feet ... 3
Between 2,000 and 2,499 square feet ... 4
Between 2,500 and 2,499 square feet ... 5
Between 3,000 and 3,999 square feet ... 6
4,000 square feet or more 7
Prefer not to answer 8
Don't know 9

Q53. (Gen 4) Approximately what year was your home built?

1939 or earlier 01
1940 to 1949 02
1950 to 1959 03
1960 to 1969 04
1970 to 1979 05
1980 to 1989 06
1990 to 1999 07
2000 to 2009 08
2010 to 2019 09
2020 10

Prefer not to answer 11
Don't know 12

Q54. (Gen 5) How many people live in your household?

Number of people: ______

Prefer not to answer 499
Don't know 500

Q55. (Gen 6) How long have you lived in this home?

Less than 6 years 1
6 to 10 years 2
11 to 15 years 3
16 to 20 years 4
21 to 25 years 5
26 to 30 years 6
More than 30 years 7
Prefer not to answer .. 8
Don't know 9

Appendix C: Residential Comprehensive Home Energy Checkup Participant Survey Instrument

Hello, my name is *(your name)* **from Research & Polling, Inc. I am calling on behalf of PNM. I'm calling because our records show that you recently installed energy efficient equipment and received a rebate from PNM at your home located at [SITE_ADDRESS]. I'd like to ask a short set of questions about your experience with this rebate program. Your time will help us improve this program for other customers like you. Are you the best person to talk to about these energy efficiency upgrades and energy use in your home?**

Yes 1
.... 2
Never installed ... 3

Q1-M1. (A 1) Our records show that you received a rebate from PNM when you installed a [MEASURE_TYPE1] at your home at [SITE_ADDRESS] in 2022. Is this correct?

Yes 1
No 2
Don't know ... 3

Q2-M1. (A 2) Is the [MEASURE_TYPE1] still installed?

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q3-M1. (A 3) Was the [MEASURE_TYPE1] removed or never installed? *(Among those who do not currently have measure 1 installed at their home.)*

Removed 01
Never installed 02
Prefer not to answer 03
Don't know 99

Q4-M1. (A 3a) Why was the [MEASURE_TYPE1] removed/never installed? *(Among those who do not currently have measure 1 installed at their home or never installed measure 1.)*

No reason in particular 99

[Data Processing Use Only] POLLER NOTE: Was measure installed?

Yes .. 1
No 2

Q5-M1. (A 4) Is the [MEASURE_TYPE1] still functioning properly? *(Among those who currently have measure 1 installed)*

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q1-M2. (A 1) Our records show that you received a rebate from PNM when you installed a [MEASURE_TYPE2] at your home at [SITE_ADDRESS] in 2022. Is this correct?

Yes 1
No 2
Don't know ... 3

Q2-M2. (A 2) Is the [MEASURE_TYPE2] still installed?

Yes 1
No 2
Prefer not to answer .. 3
Don’t know 4

Q3-M2. (A 3) Was the [MEASURE_TYPE2] removed or never installed? *(Among those who do not currently have measure 2 installed at their home.)*

Removed 01
Never installed 02
Prefer not to answer 03
Don't know 99

Q4-M2. (A 3a) Why was the [MEASURE_TYPE2] removed/never installed? *(Among those who do not currently have measure 2 installed at their home or never installed measure 2.)*

No reason in particular 99

[Data Processing Use Only] POLLER NOTE: Was measure installed?

Yes .. 1
No 2

Q5-M2. (A 4) Is the [MEASURE_TYPE2] still functioning properly? *(Among those currently have measure 1 installed)*

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q6. (B 1) Did you go through a contractor to purchase the efficient equipment or did you purchase it directly from a retailer? *(Among group C)*

Used a contractor 1
Purchased at retailer ... 2
Prefer not to answer 3
Don't know 4

Q7. (B 2) Did you use a contractor to install the equipment or did you do it yourself? *(Among group C)*

Contractor installed 1
Did it myself 2
Prefer not to answer .. 3
Don't know 4

Q8. (C 1) How did you <u>first</u> hear about PNM's Home Energy Checkup program? *(Among group B)*

Bill insert 01
PNM website 02
Digital/web advertisement (not on PNM website) ... 03
Television advertisement 04
Radio advertisement 05
Contractor 06
Friend or family 07
Social media 08
PNM representative 09
Landlord 10
Veteran program 11
Email 12
Santa Fe school district 13
Newspaper 14
Prefer not to answer 98
Don't know 99

Q9. (C 2a) Next I will read a list of reasons you may have considered when you decided to pursue the Home Energy Checkup/make the energy efficient upgrade. For each one, please tell me if it was *not at all important*, a *little important*, *somewhat important*, *very important* or *extremely* *important*. ***How important was <u>reducing environmental impact of your home</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q10. (C 2b) ***How important was <u>upgrading out-of-date equipment</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q11. (C 2c) ***How important was <u>replacing faulty or failed equipment</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q12. (C 2d) ***How important was <u>improving comfort of your home</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q13. (C 2e) ***How important was <u>improving air quality</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1

2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q14. (C 2f) ***How important was <u>receiving the financial incentive</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q15. (C 2g) ***How important was <u>reducing energy bill amounts</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q16. (C 2h) ***How important was <u>the contractor recommendation</u> on your decision to make the Home Energy Checkup/Energy Efficiency upgrade?*** *(Among those in group C who used a contractor to install the measure.)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q17. (C 2i) ***How important was <u>the retailer recommendation</u> on your decision to conduct your project?*** *(Among those in group C who purchased the measure at a retailer.)*

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7

N/A 8

Q18. (C 3) Were there any other reasons that you installed the equipment that were more important than the ones we have mentioned?

No, none in particular 97
Prefer not to answer........... 98
Don't know 99

Q19. (D 1) Before participating in the PNM rebate program, do you recall receiving any other rebates from PNM for making energy efficiency upgrades at your home? *(Among group C)*

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q21. (D 2b) ***How important was <u>the dollar amount of the rebate</u> on your decision to make the Energy Efficiency upgrade?*** *(Among group C)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q22. (D 2c) ***How important was <u>the contractor recommendation</u> on your decision to make the Energy Efficient upgrade?*** *(Among those in group C who used a contractor to install the measure.)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98

N/A 99

Q23. (D 2d) ***How important was <u>the retailer recommendation</u> your decision to make the Energy Efficient upgrade?*** *(Among those in group C who purchased the measure at a retailer.)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q24. (D 2e) ***How important was <u>information from PNM marketing or informational materials</u> on your decision to make the Energy Efficient upgrade?*** *(Among group C)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q25. (D 2f) ***How important was <u>previous participation in a PNM program</u> on your decision to make the Energy Efficient upgrade?*** *(Among group C)*

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q26. (D 3) Did you first learn about the PNM rebate program BEFORE or AFTER you decided how energy efficient your equipment would be? *(Among group C)*

Before 1
After 2
Prefer not to answer .. 3
Don't know 4

Q27. (D 4) Now I would like you to think about the efficiency level of the equipment upgrade. Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have purchased the exact same efficiency level of equipment if the PNM rebate program was NOT available. *(Among group C)*

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q28. (D 5) Now I would like you to think about the timing of the equipment purchase. Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have installed equipment, of any efficiency level, within 12 months of when you actually did if the PNM rebate program was NOT available. *(Among group C)*

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q29. (D 6) In your own words, how would you describe the influence the PNM rebate program had on your decision to install the new equipment? *(Among group C)*

Q30. (E 1) Did you schedule your Home Energy Checkup online or over the phone? *(Among group B)*

Online 1
Over the phone 2
Prefer not to say .. 3
Don't know 4

Q31. (E 2) About how long did it take to receive your Home Energy Checkup once you scheduled it with PNM? *(Among group B)*

2 weeks or less 01
More than 2 weeks and up to 4 weeks/1 month 02
More than 4 weeks and up to 6 weeks 03
More than 6 weeks and up to 8 weeks/2 months 04
More than 8 weeks and up to 10 weeks 05
More than 10 weeks and up to 12 weeks/3 months . 06
More than 12 weeks and up to 14 weeks 07
More than 14 weeks and up to 16 weeks/4 months . 08
More than 16 weeks/4 months 09
Prefer not to answer 10
Don't know 11

Q32. (E 1) About how long did it take to receive your rebate after the equipment was installed? *(Among group C)*

1 week or less 1
More than a week, but less than 1 month ... 2
About 1 month 3
Between 1 and 2 months 4
About 2 months 5
More than 2 months 6
Have not received rebate yet 7
Prefer not to answer 8
Don't know 9

Q33. (F 1a) For each of the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **PNM as an energy provider.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q34. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with PNM as an energy provider.)*

Q35. (F 1b) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The rebate program overall.**

Very Dissatisfied	1
Somewhat Dissatisfied	2
Neither Satisfied nor Dissatisfied	3
Somewhat Satisfied	4
Very Satisfied	5
Not applicable	6
Prefer not to answer	7
Don't know	8

Q36. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the rebate program overall.)*

Q37. (F 1c) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The equipment that was rebated through the program.**

Very Dissatisfied	1
Somewhat Dissatisfied	2
Neither Satisfied nor Dissatisfied	3
Somewhat Satisfied	4
Very Satisfied	5
Not applicable	6
Prefer not to answer	7
Don't know	8

Q38. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the equipment that was rebated through the program.)*

Q39. (F 1d) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The contractor who installed the equipment.** *(Among group C and those who used a contractor to install the measure.)*

Very Dissatisfied	1
Somewhat Dissatisfied	2
Neither Satisfied nor Dissatisfied	3
Somewhat Satisfied	4
Very Satisfied	5
Not applicable	6
Prefer not to answer	7
Don't know	8

Q40. Can you tell me why you gave that rating? *(Among those who used a contractor to install the measure and were* Very Dissatisfied *or* Somewhat Dissatisfied *with* <u>*the contractor who installed the equipment*</u>*.)*

Q41. (F 1e) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The amount of time it took to receive your rebate.** *(Among group C)*

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q42. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with* <u>*the amount of time it took to receive your rebate*</u>*.)*

Q43. (F 1f) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The dollar amount of the rebate.** *(Among group C)*

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q44. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with* <u>*the dollar amount of the rebate.*</u>*)*

Q45. (F 1g) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **Interactions with PNM regarding this project.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q46. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with interactions with PNM regarding this project.)*

Q47. (F 1h) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The overall value of the equipment you received for the price you paid.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q48. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the overall value of the equipment you received for the price you paid.)*

Q49. (F 2) Do you have any recommendations for improving the Home Energy Check-up program? *(Among group B)*

No 97
Prefer not to answer............ 98
Don't know 99

Q50. (F 2) Do you have any recommendations for improving the PNM rebate program? *(Among group C)*

No 97
Prefer not to answer............ 98
Don't know 99

Q51. (Gen 1) Finally, we have a few questions about your firm for classification purposes only. Do you own or rent your home where the equipment was installed?

Own 01
Rent 02
Prefer not to answer 03
We manage the property ... 04
Don't know 99

Q52. (Gen 1a) Do you pay your PNM bill, or does someone else (e.g., a landlord)? *(Among those who answered that they own or rent the building where the project was completed.)*

Pay own 1
Someone else pays ... 2
Prefer not to answer .. 3
Don’t know 4

Q53. (Gen2) Is your home a single-family home or part of a multifamily building with more than one unit?

Single-family home 1
More than one residence in building ... 2
Prefer not to answer 3
Don't know 9

Q54. (Gen2a) How many units are in the structure?

Number of units: ______

Prefer not to answer 499
Don't know 500

55. (Gen 3) Approximately what is the total square footage of your home?

Less than 1,000 square feet 1
Between 1,000 and 1,499 square feet ... 2
Between 1,500 and 1,999 square feet ... 3
Between 2,000 and 2,499 square feet ... 4
Between 2,500 and 2,499 square feet ... 5
Between 3,000 and 3,999 square feet ... 6
4,000 square feet or more 7
Prefer not to answer 8
Don't know 9

Q56. (Gen 4) Approximately what year was your home built?

1939 or earlier 01
1940 to 1949 02
1950 to 1959 03
1960 to 1969 04
1970 to 1979 05
1980 to 1989 06
1990 to 1999 07
2000 to 2009 08
2010 and later 09
2020 10
Prefer not to answer 11
Don't know 12

Q57. (Gen 5) How many people live in your household?

Number of people ______

Prefer not to answer 499
Don't know 500

Q58. (Gen 6) How long have you lived in this home?

Less than 6 years 1
6 to 10 years 2
11 to 15 years 3
16 to 20 years 4
21 to 25 years 5
26 to 30 years 6
More than 30 years 7
Prefer not to answer .. 8
Don't know 9

Appendix D: Residential Comprehensive Appliance Recycling Participant Survey Instrument

I'M CALLING BECAUSE OUR RECORDS SHOW THAT YOU RECENTLY RECYCLED A [MEASURE_TYPE1] and received a rebate from PNM. I'd like to ask a short set of questions about your experience with this rebate program. Your time will help us improve this program for other customers like you. Are you the best person to talk to about the program and energy use in your home?

Yes 1
No 2

Q1. (A 1) Just to confirm, our records show that you received a rebate from PNM when you recycled a [MEASURE_TYPE1]. And this was done in approximately [MONTH, YEAR]. Is this correct?

Yes 1
No 2
Don't know ... 3

Q2. (A 2) Was the [MEASURE_TYPE1] still functioning properly?

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q3. (A 3) Did you install a new [MEASURE_TYPE1] to replace the one that was recycled?

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q4. (A 4) Did the recycled [MEASURE_TYPE1] serve as your primary or secondary MEASURE_TYPE1]?

Primary 1
Secondary 2
Prefer not to answer .. 3
Don't know 4

Q5. (A 5) Approximately how old was the [MEASURE_TYPE1] that was recycled?

0-5 years	1
6-10 years	2
11-15 years	3
16-20 years	4
More than 20 years	5
Don't know/won't say	6

Q6. (A 6) If you had not been able to recycle your old [MEASURE_TYPE1], what were you planning to do with it?

Take it to the dump	01
Put it in a trash can/dumpster	02
Schedule a large item pick up	03
Donate it to an organization	04
Give it to a family member/friend	05
Keep it as a spare	06
Sell it	07
Nothing in particular	97
Prefer not to answer	98
Don't know	99

Q7. (C 1) How did you <u>first</u> hear about PNM's rebates for recycling?

Bill insert	01
PNM website	02
Digital/web advertisement (not on PNM website)	03
Television advertisement	04
Radio advertisement	05
Contractor	06
Friend or family	07
Social media	08
PNM representative	09
Used before	10
Do not recall	97
Prefer not to answer	98
Don't know	99

Q8. (C 2a) Next I will read a list of reasons you may have considered when you decided to recycle your [MEASURE_TYPE1]. For each one, please tell me if it was *not at all important*, a *little important*, *somewhat important*, *very important* or *extremely important*. ***How important was <u>reducing environmental impact of your home</u> on your decision to recycle your*** [MEASURE_TYPE1]***?***

1 - Not Important At All	1
2 - A Little Important	2
3 - Somewhat Important	3
4 - Very Important	4
5 - Extremely Important	5
Don't Know	6
Prefer not to answer	7
N/A	8

Q9. (C 2b) ***How important was <u>upgrading out-of-date equipment</u> on your decision to recycle your*** [MEASURE_TYPE1]***?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q10. (C 2c) ***How important was <u>reducing energy bill amounts</u> on your decision to recycle your*** [MEASURE_TYPE1]***?***

1 - Not Important At All 1
2 - A Little Important 2
3 - Somewhat Important .. 3
4 - Very Important 4
5 - Extremely Important ... 5
Don't Know 6
Prefer not to answer 7
N/A 8

Q11. (C 3) Were there any other reasons that you recycled the equipment that were more important than the ones we have mentioned?

No, none in particular 97
Prefer not to answer 98
Don't know 99

Q12. (D 3) Before participating in the PNM recycling program, do you recall receiving any other rebates from PNM for making energy efficiency upgrades at your home?

Yes 1
No 2
Prefer not to answer .. 3
Don't know 4

Q13. (D 2a) ***How influential was <u>the dollar amount of the rebate</u> on your decision to recycle your*** [MEASURE_TYPE1]***?***

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07

8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q14. (D 2d) *How influential was <u>information from PNM marketing or informational materials</u> on your decision to recycle your* [MEASURE_TYPE1]***?***

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q15. (D 2e) *How influential was <u>previous participation in a PNM program</u> on your decision to recycle your* [MEASURE_TYPE1]***?***

0 - Not influential at all 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely influential ... 10
Don't know 97
Prefer not to answer 98
N/A 99

Q16. (D 3) Did you first learn about the PNM rebate program BEFORE or AFTER you decided to recycle your equipment?

Before 1
After 2
Prefer not to answer .. 3
Don’t know 4

Q17. (D 4) Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have recycled the same equipment if the PNM rebate program was NOT available.

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q18. (D 5) Now I would like you to think about the timing of when you recycled the equipment. Using a scale from 0 to 10, where 0 means *not at all likely* and 10 means *extremely likely*, please rate the likelihood that you would have recycled the equipment within 12 months of when you actually did if the PNM rebate program was NOT available.

0 - Not at all likely 00
1 01
2 02
3 03
4 04
5 05
6 06
7 07
8 08
9 09
10 - Extremely likely 10
Don't know 97
Prefer not to answer 98
N/A 99

Q19. (D 6) In your own words, how would you describe the influence the PNM rebate program had on your decision to recycle the equipment?

Q20. (E 1) About how long did it take to receive your rebate after the equipment was recycled?

1 week or less 1
More than a week, but less than 1 month ... 2
About 1 month 3
Between 1 and 2 months 4
About 2 months 5
More than 2 months 6
Have not received rebate yet 7
Prefer not to answer 8
Don't know 9

Q21. (F 1a) For each of the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **PNM as an energy provider.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q22. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with PNM as an energy provider.)*

Q23. (F 1b) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The recycling program overall.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q24. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the recycling program overall.)*

Q25. (F 1e) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The amount of time it took to receive your rebate.**

Very Dissatisfied 1
Somewhat Dissatisfied 2
Neither Satisfied nor Dissatisfied ... 3
Somewhat Satisfied 4
Very Satisfied 5
Not applicable 6
Prefer not to answer 7
Don't know 8

Q26. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the amount of time it took to receive your rebate.)*

Q27. (F 1f) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **The dollar amount of the rebate.**

Very Dissatisfied	1
Somewhat Dissatisfied	2
Neither Satisfied nor Dissatisfied	3
Somewhat Satisfied	4
Very Satisfied	5
Not applicable	6
Prefer not to answer	7
Don't know	8

Q28. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with the dollar amount of the rebate.)*

Q29. (F 1g) For the following, please tell me if you were *very dissatisfied*, *somewhat dissatisfied*, *neither satisfied nor dissatisfied*, *somewhat satisfied* or *very satisfied*. **Interactions with PNM regarding this project.**

Very Dissatisfied	1
Somewhat Dissatisfied	2
Neither Satisfied nor Dissatisfied	3
Somewhat Satisfied	4
Very Satisfied	5
Not applicable	6
Prefer not to answer	7
Don't know	8

Q30. Can you tell me why you gave that rating? *(Among those who were* Very Dissatisfied *or* Somewhat Dissatisfied *with interactions with PNM regarding this project.)*

Q31. (F 2) Do you have any recommendations for improving the PNM Refrigerator Recycling program?

No	97
Prefer not to answer	98
Don't know	99

Q32. (Gen 1) Finally, we have a few questions about your household for classification purposes only. Do you own or rent your home where the recycled equipment was taken from?

Own	01
Rent	02
Prefer not to answer	03
Don't know	99

Q33. (Gen 1a) Do you pay your PNM bill, or does someone else (e.g., a landlord)? *(Among those who answered that they rent the home where the equipment was taken from.)*

Pay own 1
Someone else pays ... 2
Prefer not to answer .. 3
Don't know 4

Q34. (Gen2) Is your home a single-family home or part of a multifamily building with more than one unit?

Single-family home 1
More than one residence in building ... 2
Prefer not to answer 3
Don't know 9

Q35. (Gen2a) How many units are in the structure?

Number of units: ______

Prefer not to answer 499
Don't know 500

Q36. (Gen 3) Approximately what is the total square footage of your home?

Less than 1,000 square feet 1
Between 1,000 and 1,499 square feet ... 2
Between 1,500 and 1,999 square feet ... 3
Between 2,000 and 2,499 square feet ... 4
Between 2,500 and 2,499 square feet ... 5
Between 3,000 and 3,999 square feet ... 6
4,000 square feet or more 7
Prefer not to answer 8
Don't know 9

Q37. (Gen 4) Approximately what year was your home built?

1939 or earlier 01
1940 to 1949 02
1950 to 1959 03
1960 to 1969 04
1970 to 1979 05
1980 to 1989 06
1990 to 1999 07
2000 to 2009 08
2010 and later 09
2020 10
Prefer not to answer 11
Don't know 12

Q38. (Gen 5) How many people live in your household?

Number of people in household

______

Prefer not to answer 499
Don't know 500

Q39. (Gen 6) How long have you lived in this home?

Less than 6 years 1
6 to 10 years 2
11 to 15 years 3
16 to 20 years 4
21 to 25 years 5
26 to 30 years 6
More than 30 years 7
Prefer not to answer .. 8
Don't know ...………… 9

Appendix E: Commercial Comprehensive Contractor Interview Guide

INTRODUCTION

TALKING POINTS FOR RECRUITMENT

- EVERGREEN ECONOMICS IS CONDUCTING AN EVALUATION OF [UTILITY'S] [PROGRAM] FOR THE NEW MEXICO PUBLIC REGULATION COMMISSION AND THE STATE'S UTILITIES.
- WE HAVE IDENTIFIED SELECTED CONTRACTORS THAT INSTALLED EQUIPMENT THAT RECEIVED REBATES FROM THE EFFICIENCY PROGRAMS IN 2022 FOR BRIEF TELEPHONE INTERVIEWS.
- WE WOULD NEED ABOUT 20 MINUTES FOR THE INTERVIEW.
- YOUR RESPONSES WILL BE ANONYMOUS BUT WILL BE VERY HELPFUL IN HELPING THE STATE'S UTILITIES ENSURE THEIR ENERGY EFFICIENCY PROGRAMS BEST SERVE THEIR CUSTOMERS.
- WHEN WOULD BE A GOOD TIME TO TALK?

TALKING POINTS FOR STARTING THE INTERVIEW

- IDENTIFY SELF.
- THIS SHOULD TAKE ABOUT 20 MINUTES.
- YOUR RESPONSES WILL BE ANONYMOUS, SO PLEASE FEEL FREE TO SPEAK CANDIDLY.
- DO YOU HAVE ANY QUESTIONS BEFORE WE BEGIN?
- WOULD YOU FEEL COMFORTABLE IF I RECORD THIS CALL FOR NOTE TAKING PURPOSES? WE WILL NOT SHARE THE RECORDING WITH ANYONE OUTSIDE OUR COMPANY AND WILL NOT ATTRIBUTE ANYTHING YOU SAY BACK TO YOU.

INTERVIEWEE BACKGROUND

LET'S BEGIN WITH A COUPLE OF BACKGROUND QUESTIONS….

A1. TO START, PLEASE TELL ME A BIT ABOUT YOUR COMPANY.

PROBE TO UNDERSTAND:

- SERVICES OFFERED
- TYPES OF CUSTOMERS (ESP. SECTOR – RESIDENTIAL, COMMERCIAL, OR BOTH)
- REGIONS SERVED
- INTERVIEWEE ROLE

PROGRAM AWARENESS AND ENGAGEMENT

B1. DO YOU RECALL HOW YOU FIRST LEARNED ABOUT AND GOT INVOLVED WITH THE [RESIDENTIAL/COMMERCIAL] REBATE PROGRAMS THROUGH [UTILITY]?

LISTEN (AND PROBE AS NEEDED) FOR:

- ANY RESERVATIONS ABOUT PARTICIPATING
- ANY BARRIERS TO PARTICIPATING
- WHETHER OR NOT THEY WORK WITH ANY OTHER NEW MEXICO [UTILITY] REBATE PROGRAMS

B2. COULD YOU DESCRIBE WHAT INVOLVEMENT WITH NEW MEXICO [UTILITY] REBATE PROGRAMS AS A CONTRACTOR INVOLVES?

PROBE AS NEEDED:

- IN WHAT WAYS DO YOU INTERACT WITH NEW MEXICO [UTILITY] OR THEIR IMPLEMENTERS ABOUT THIS PROGRAM?
- WHAT INFORMATION OR SERVICES DO YOU RECEIVE FROM NEW MEXICO [UTILITY] (BEYOND THE ABILITY TO OFFER REBATES TO YOUR CUSTOMERS)?

B3. IN WHAT WAYS IS THE [UTILITY] PROGRAM HELPFUL TO YOU IN YOUR BUSINESS?

PROBE, AS NEEDED:

- REBATE
    - INCREASES CUSTOMER SATISFACTION WITH US
    - INCREASES BUSINESS
    - HELPS US UP-SALE TO HIGHER EFFICIENCY LEVELS
- ABILITY TO MENTION THE CONNECTION WITH THE [UTILITY] PROGRAM
- [UTILITY] MESSAGING TO CUSTOMERS ON BENEFITS OF [MEASURE(S)]

B4. WHAT SHARE OF YOUR [RESIDENTIAL/COMMERCIAL] PROJECTS WITHIN [UTILITY] TERRITORY WOULD YOU ESTIMATE CURRENTLY END UP QUALIFYING FOR AND RECEIVING A [UTILITY] REBATE?

- WHAT COULD [UTILITY] DO TO INVOLVE YOU MORE IN THE PROGRAM?

B5. DOES [UTILITY] MAKE IT CLEAR WHICH OF YOUR PRODUCTS OR SERVICES ARE ELIGIBLE FOR [UTILITY] REBATES?

PROBE AS NEEDED:

- IS THERE ANYTHING [UTILITY] SHOULD DO TO MORE CLEARLY COMMUNICATE THAT?

B6. HAVE THE PROGRAMS INFLUENCED WHAT EQUIPMENT YOU SUGGEST TO A CUSTOMER?

B7. DO YOU HAVE ANY SUGGESTIONS FOR [UTILITY] CONTRACTOR SERVICES AND SUPPORT – EITHER OVERALL OR FOR THE [PROGRAM] SPECIFICALLY?

PROGRAM PROCESSES

C1. IN WHAT WAYS ARE YOU INVOLVED WITH THE REBATE PORTION OF THE PROGRAM AND THE PAPERWORK AND PROCESS REQUIRED TO PARTICIPATE?

PROBE TO UNDERSTAND:

- WHETHER CONTRACTOR COMPLETES THE REBATE APPLICATION
- TIME REQUIRED FOR PAPERWORK AND WHETHER THAT IS A BURDEN
- WHETHER THE REBATE GOES DIRECTLY TO THE CUSTOMER OR CONTRACTOR (WITH A MARKDOWN ON THE CHARGE TO CUSTOMER)
- RECOMMENDED IMPROVEMENTS

C2. WHEN AND HOW DO YOU BRING UP EITHER [UTILITY] REBATES OR THE EQUIPMENT THEY REBATE WHEN TALKING WITH CUSTOMERS?

LISTEN FOR (AND PROBE AS NEEDED):

- WHAT SHARE OF CUSTOMERS ARE ALREADY AWARE OF REBATES BEFORE THE CONTRACTOR BRINGS IT UP
- WHAT IT IS THE MOST EFFECTIVE SALES TOOL OR MESSAGE TO GET CUSTOMERS TO UPGRADE TO HIGH EFFICIENCY
- WHAT ROLE THE [UTILITY] REBATES PLAY IN MOTIVATING UPGRADES
- WHAT PARTICULAR EQUIPMENT IS EASIER OR HARDER TO GET CUSTOMERS TO UPGRADE TO HIGH EFFICIENCY AND WHY

C3. DO YOU HAVE ANY COMMENTS ABOUT THE PROGRAM OFFERINGS? IS THERE ANYTHING MISSING? ANYTHING NOT NEEDED? OR ANYTHING THAT COULD BE BETTER?

MARKET RESPONSE

D1. OVERALL, TO WHAT DEGREE DO YOU SEE THE PROGRAM INCREASING THE INTEREST AND DEMAND FOR ENERGY EFFICIENT EQUIPMENT?

PROBE TO UNDERSTAND:

- WHY IS THAT?
- IS THE PROGRAM HAVING A LARGE OR SMALL EFFECT ON THE MARKET?

D2. ARE THERE MARKETS THAT YOU FEEL [UTILITY] [RESIDENTIAL/COMMERCIAL] ENERGY EFFICIENCY PROGRAMS ARE REACHING WELL? NOT WELL?

PROBE TO UNDERSTAND:

- SUGGESTED APPROACHES THAT MIGHT EXPAND THE REACH OF THE PROGRAM INTO MARKETS THAT MAY BE UNDERSERVED BY THE PROGRAM.

D3. OVERALL, WHAT ISSUE(S), IF ANY, MAY AFFECT FUTURE PROGRAM PARTICIPATION BY CUSTOMERS? WHAT ABOUT FUTURE PROGRAM PARTICIPATION BY CONTRACTORS? [INTERVIEWER NOTE: EXAMPLE ISSUES ARE CHANGES TO BUILDING CODES AND STANDARDS BEING PROMOTED AND PROGRAM INCENTIVE LEVELS].

PROGRAM SATISFACTION

E1. FINALLY, I'D LIKE TO ASK ABOUT YOUR AND YOUR CUSTOMERS' SATISFACTION WITH THE [UTILITY] [PROGRAM]. PLEASE RATE YOUR OVERALL SATISFACTION WITH THE PROGRAM ON A 1 TO 5 SCALE WHERE 1 IS NOT AT ALL SATISFIED, 2 IS SOMEWHAT DISSATISFIED, 3 IS NEITHER SATISFIED NOR DISSATISFIED, 4 IS SOMEWHAT SATISFIED AND 5 IS VERY SATISFIED?

- WHAT IS YOUR SATISFACTION?
- HOW DO YOU THINK YOUR CUSTOMERS WOULD RATE THE PROGRAM?

[IF RATING < 5] WHAT COULD [UTILITY] DO TO INCREASE YOUR SATISFACTION WITH THE PROGRAM?

PROBE IF NEEDED:

- WHAT IS WORKING BEST?
- WHAT IS MOST CHALLENGING OR NEEDS IMPROVEMENT?

E2. HAVE YOU HAD ANY FEEDBACK FROM YOUR CUSTOMERS ABOUT THEIR EXPERIENCES WITH THE [PROGRAM] THAT YOU THINK [UTILITY] SHOULD KNOW?

E3. ASIDE FROM ANYTHING WE'VE ALREADY DISCUSSED, WAS THERE EVER AN OCCASION WHEN THE PROGRAM DIDN'T MEET YOUR EXPECTATIONS? PLEASE EXPLAIN.

CLOSING

F1. IS THERE ANYTHING ELSE WE DIDN'T COVER THAT YOU'D LIKE TO MENTION OR DISCUSS ABOUT YOUR EXPERIENCES WITH THE [UTILITY] [PROGRAM]?

[THANK AND END]

Appendix F: Power Saver Detailed Evaluation Methods and Findings

Power Saver is a direct load control program offered to residential, small commercial (< 50 kW), and medium commercial (50 kW – 150 kW) Public Service New Mexico (PNM) customers. There are five program components:

- Residential Digital Control Unit (DCU)
- Small Commercial DCU
- Medium Commercial DCU
- Residential Two-Way Smart Thermostat
- Residential Bring Your Own Thermostat (BYOT)

To facilitate load control in the DCU program components, participants must have a device attached to the exterior of their air conditioning unit. This device is capable of receiving a radio signal that will turn off the unit's compressor for an interval of time. For the smart thermostat components, load curtailment is achieved via communication with the WiFi-enabled thermostat. Residential and small commercial participants receive an annual $25 incentive for their participation. Medium commercial participants receive an annual incentive of $9 per ton of refrigerated air conditioning.

There were four Power Saver events during the summer 2022 demand response (DR) season, which began May 15th and ended September 30th. Table 1 provides some information on the 2022 events. During the first two events, all five program components were dispatched. For the latter two events, only the Residential DCU and Small Commercial DCU components were dispatched. For all segments other than Residential BYOT, each event used an adaptive 50% cycling strategy where curtailment is based on the runtime in the previous hour. For the BYOT component, thermostat devices are curtailed using a 50% cycling strategy performed by the thermostat manufacturer.

Table 1: 2022 Power Saver Event Summary

Date	Day of Week	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
6/10/2022	Friday	3:00 PM	7:00 PM	100
7/11/2022	Monday	3:00 PM	7:00 PM	96
7/18/2022	Monday	3:00 PM	7:00 PM	98
7/19/2022	Tuesday	3:00 PM	7:00 PM	101

The average load reduction delivered by the Power Saver program during summer 2022 event hours was **34.0 MW**. Under planning conditions, we estimate the load reduction capability of the Power Saver program to be **36.3 MW**. The realized gross energy savings for summer 2022 was **366.0 MWh**. The energy savings estimate for the program takes into account the load shed during the event and the post-event snapback and is a function of the number of events called.

After the conclusion of the summer 2022 season, Itron provided the evaluation team with a series of datasets for the evaluation. These files included:

- For Residential DCU and Small Commercial sites, 5-minute load data from 6/1/2022 to 9/30/2022
- For Medium Commercial DCU sites, 5-minute load data from 6/1/2022 to 9/30/2022
- For Residential DCU and Small Commercial sites, an M&V list that provided the location type (residential or commercial), the group (control or curtailment), and/or the dates each load control device was active
- For Medium Commercial sites, an M&V list that provided the dates each load control device was active
- For the Two-Way Smart Thermostat and BYOT groups, 5-minute runtime data from 6/1/2022 to 9/30/2022

The evaluation team also received Itron's Power Saver impact evaluation report, which detailed the methods Itron employed in calculating customer baselines (CBLs) for the five different DR program components. A CBL is an estimate of what participant loads would have been absent the DR event dispatch. For each DR program component, the report also showed the load impact, which is the difference between the CBL and the metered load, for each 5-minute interval of each curtailment day. The key steps in the evaluation verified savings analysis were:

1) For each DR program component, reproduce the performance estimates calculated by Itron using the contractually-agreed upon CBL method.
2) Modify the CBL methodology and produce ex post estimates of what the per-device impact was during the 2022 DR season.

3) Where possible, leverage additional historical data from 2015 through 2022 to produce ex ante estimates of what the per-device impact at peaking conditions (5-6 PM at 100°F) will be in future summers.
4) Scale the per-device estimates by the number of active program devices to calculate the aggregate load reduction capability (MW) of the Power Saver program.

Table 2 and Table 3 summarize our findings for residential and commercial segments, respectively. The main driver in the difference between Itron and Evergreen load reduction estimates is that Itron commonly summarized impacts with the maximum (e.g., the largest 5-minute impact in a one-hour interval is the impact for that hour), whereas the evaluation team summarized impacts with an average. Multiplying our per-device reduction estimates by the number of devices in each class leads to a 2022 average total estimated load reduction of approximately 33.69 MW, 1.11 MW, 0.54 MW, 2.48 MW, and 1.28 MW for the Residential DCU, Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Commercial segments respectively. In aggregate, the average 2022 performance prior to making offline and operability adjustments is 39.10 MW. This is approximately 69% of Itron's pre-adjustment estimate for the 2022 season (56.80 MW). After making an online adjustment for the thermostat groups of (82% for Two-Way Smart Thermostats and 85% for BYOT) and an operability adjustment for the three DCU segments (87%), the aggregate evaluation-calculated impact for 2022 is 33.95 MW (compared to 49.48 MW from Itron after adjustment).

The evaluation team used Power Saver results from 2015 to 2022 to estimate the load relief capability under extreme conditions. At 100% operability, we estimate the program is capable of delivering 41.77 MW of load reduction under planning conditions of 100°F between 5:00 PM and 6:00 PM MDT. Of the estimated 41.77 MW of load reduction capability, 35.81 MW comes from the Residential DCU segment, 1.32 MW comes from the Two-Way Smart Thermostat segment, 0.59 MW comes from the BYOT segment, and 2.66 MW and 1.39 MW come from the Small and Medium Commercial segments, respectively. Factoring in the operability/online adjustments, the aggregate program can provide 36.25 MW of load relief.

Table 2: Residential Results

		Unit	Residential DCU		Two-Way Smart Thermostats		BYOT Smart Thermostats	
			Measured	Adjusted	Measured	Adjusted	Measured	Adjusted
Number of Devices		#	49,589	49,589	759	759	775	775
Itron	2022 Load Reduction Estimate	kW / device[1]	0.90	0.78	1.58	1.30	1.95	1.66
Itron	2022 Load Reduction Estimate	Total MW	44.46	38.68	1.20	0.99	1.51	1.29
Evaluation	2022 Load Reduction Estimate	kW / device	0.68	0.59	1.46	1.20	0.70	0.60
Evaluation	2022 Load Reduction Estimate	Total MW	33.69	29.31	1.11	0.91	0.54	0.46
Evaluation	Ex Ante Load Reduction Estimate[2]	kW / device	0.72	0.63	1.74	1.42	0.76	0.64
Evaluation	Ex Ante Load Reduction Estimate[2]	Total MW	35.81	31.15	1.32	1.08	0.59	0.50
Evaluation	2022 Energy Savings	kWh / device	1.84	1.60	4.52	3.70	2.63	2.24
Evaluation	2022 Energy Savings	Total MWh	365.21	317.73	6.86	5.62	4.08	3.47

[1] An operability adjustment of 87% is applied to the 2022 kW factors for Residential DCU, Small Commercial DCU, and Medium Commercial DCU. An online adjustment of 82% is applied to Residential Two-Way Smart Thermostats, and an online adjustment of 85% is applied to Residential BYOT.

[2] Ex ante program capability is reported in the 5 PM – 6 PM MDT hour at 100°F.

Table 3: Commercial Results

		Unit	Small Commercial		Medium Commercial	
			Measured	Adjusted	Measured	Adjusted
Number of Devices (Number of Locations)		#	5,464	5,464	3,209 (439)	3,209 (439)
Itron	2022 Load Reduction Estimate	kW / device	1.09	0.95	1.19	1.04
		Total MW	5.97	5.19	3.83	3.34
Evaluation	2022 Load Reduction Estimate	kW / device	0.45	0.39	2.91	2.53
		Total MW	2.48	2.15	1.28	1.11
	Ex Ante Load Reduction Estimate	kW / device	0.49	0.42	3.16	2.75
		Total MW	2.66	2.31	1.39	1.21
	2022 Energy Savings	kWh / device	1.72	1.50	1.16	1.01
		Total MWh	37.60	32.71	7.47	6.50

1 Methodology

This section discusses the methods used to validate Itron's impact estimates and those used by the evaluation team to provide their ex post and ex ante impact estimates.

1.1 Residential DCU Impact Validation

The impact evaluation for the Residential DCU class relies on an alternating treatment design. Under this approach, load in the group that was not dispatched serves as a proxy for what curtailment group load would have been if the DR event had not been initiated. Both groups contained approximately 130 devices.

Impact estimates were derived using 5-minute interval kW data collected by DENT Elite Pro SP Portable Power Data Loggers and PowerCAMP and IntelliMEASURE M&V equipment. Steps taken are as follows:

1. For both the control and curtailment groups, calculate the average demand (kW) for each 5-minute interval.
2. For both the control and curtailment groups, calculate a fifteen-minute rolling average demand. Suppose the average demand for the control group is 3 kW during interval t, 4 kW during interval $t + 1$, and 5 kW during interval $t + 2$. The fifteen-minute rolling average demand for interval t would then be 4 kW.
3. For each interval, find the difference between the rolling averages for the control and curtailment groups (where difference = control – curtailment).
4. The impact for any given event hour is the maximum difference across the 12 intervals in the hour, as calculated in step 3.
5. The maximum difference across all qualified event hours[3] is the kW per device impact estimate for the 2022 DR season.
6. Adjust the residential impacts for an operability factor of 87%. The determination of the operability percentage is detailed in detail in Section 1.6.

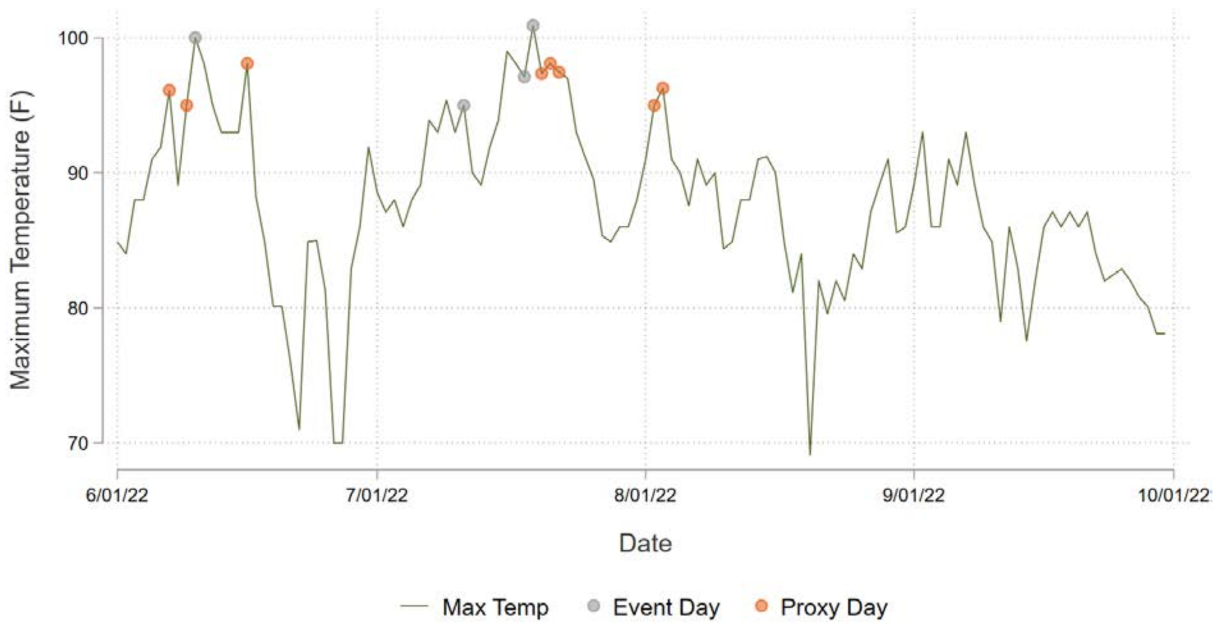
1.2 Estimate of Residential DCU Impacts

In 2018, the Residential DCU segment of Power Saver switched to alternating dispatch between M&V groups to determine which devices were called to reduce load on event days. In theory, this means that any difference in the behavior of the two groups is removed when we look at events across the whole summer. Because dispatch alternates between the two groups, any bias in impacts should be minimal, on average. Nevertheless, to assess the differences between the groups, the evaluation team compared the load profiles of the two groups on proxy days. Proxy days are non-event days that were chosen from non-holiday weekdays where the maximum

[3] 'Qualified' hours were defined as hours where the outdoor temperature is at least 97 degrees (F).

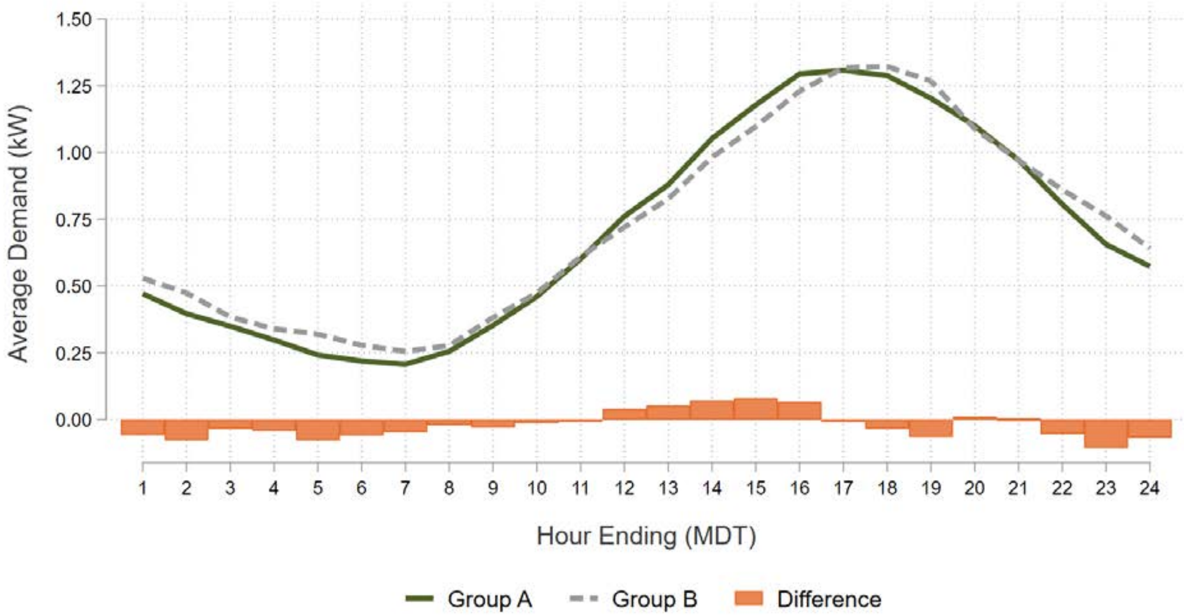
temperature was at least as hot as the event days. There were eight proxy days used to develop this comparison. Figure 1 shows the maximum temperature and distribution of proxy days throughout the summer, compared to the event days and non-event days.

Figure 1: Albuquerque Weather on Event and Proxy Days



The average hourly load profiles for the two residential M&V groups, averaged across all proxy days, are shown in Figure 2. The average difference between the two groups is 0.02 kW, with a maximum difference of 0.10 kW. The average difference during typical event hours is 0.01 kW and the maximum is 0.07 kW. Group B tends to have slightly higher average cooling load than Group A. This means when Group B is curtailed, impact estimates that rely on a simple difference will be understated. When Group A is curtailed and Group B acts as the control group, a simple difference in average group loads will overstate the load reduction.

Figure 2: Residential DCU Load Shapes on Event-Like Days



The evaluation team felt that taking the simple difference between the two groups would not be sufficient to calculate an unbiased ex post event impact. Instead, we used a difference-in-differences approach. Table 4 provides an illustration. In this illustration, Group A is the curtailment group. The difference-in-difference calculation nets out the proxy day difference from the event day difference.

Table 4: Difference-in-Difference Illustration

Hour Ending (MDT)	Proxy Day Difference (kW)	Event Day Difference (kW)	Difference-in-Difference (kW)
3:00 PM	0.08	0.54	0.46
4:00 PM	0.07	0.70	0.63
5:00 PM	-0.01	0.61	0.62
6:00 PM	-0.03	0.58	0.61

As described further in Section 2, the evaluation team also believes that the Itron method for calculating the impacts for the Residential DCU segment overstates the actual program performance because the impact for each hour is defined as the *maximum* difference out of the twelve 5-minute intervals within the hour (see step 4 of Section 1.1). We believe that using the maximum difference of all intervals within each hour, as opposed to the average difference, overstates the amount of load shed produced by a typical DR event because it counts favorable noise. In Section 2, we develop an alternative DR impact methodology that relies on the average impact rather than the maximum, and use this methodology to produce ex ante estimates for future program planning.

1.3 Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Impact Validation

The impact evaluation for the Small Commercial, Medium Commercial, Two-Way Smart Thermostat, and BYOT components relies on a "high X of Y" customer baseline (CBL) approach with a multiplicative day-of adjustment. Under this approach, the average load for three of the previous five eligible[4] days is used as a proxy for what load would have been if the DR event had not been called. In selecting which three days to use, the criterion is greatest maximum load between 1:00 PM and 8:00 PM. For a hypothetical event that lasts from 3:00 PM until 7:00 PM, the steps to calculating the impact estimate are as follows:

1. Calculate the unadjusted baseline.
    - For each of the five eligible days prior to the event day, calculate the average demand between 1:00 PM and 8:00 PM across the entire M&V population. Select the three days with the greatest average demand (i.e., "high 3 of 5").
    - Across the three baseline days, calculate the average demand across the entire M&V population for each 5-minute interval. This essentially collapses the three baseline days into one baseline day.
    - For each 5-minute interval, calculate a 15-minute rolling average kW load. As an example, suppose the average 5-minute interval load is 10 kW at time t, 12 kW at time $t + 1$, and 14 kW at time $t + 2$. The 15-minute rolling average kW load at time t would be (10 + 12 + 14)/3 = 12 kW. This value (12 kW) would be the unadjusted CBL at time t.
2. Calculate 15-minute rolling average demand (kW) for the entire M&V population.
    - Across the entire M&V population, calculate average demand for each 5-minute interval.
    - For each 5-minute interval, calculate a 15-minute rolling average as described above.
3. Calculate the multiplicative adjustment factor.
    - For the twelve 5-minute intervals preceding the event, sum up the 15-minute rolling average demand for the unadjusted baseline.
    - For the twelve 5-minute intervals preceding the event, sum up the 15-minute rolling average demand for the M&V population.
    - Divide the second sum by the first sum. This quotient is the adjustment factor.
4. Calculate the impact.

[4] Eligible days are weekdays that are neither holidays or DR event days.

- Multiply the unadjusted baseline by the adjustment factor. This yields the adjusted CBL.
- For each 5-minute interval, subtract the 15-minute rolling average demand for the entire M&V population (as calculated in Step 2) from the adjusted baseline. Note that this yields 12 impacts in every hour.
- For Two-Way and BYOT add 0.1 kW to impacts to account for the thermostats curtailing the air handler fan in addition to the AC compressor.
- For each event hour, take the maximum 5-minute impact. This value serves as the impact estimate for the event hour.
- The maximum 5-minute impact across all qualified event hours (when temperature exceeds 97°F) is the 2022 Power Saver impact estimate.

1.3.1 BYOT Connected Load Assumption

BYOT Smart Thermostats are not installed by Itron field technicians. As a result, A/C tonnage and amperage information is missing for all participants who have enrolled in the BYOT program component. In the absence of A/C unit nameplate information, a default value is used as the connected load estimate. This default connected load value is estimated from the 2020 Two-Way Smart Thermostat residential population. This value is then used to convert A/C runtime to power draw (kW) for each 5-minute interval.

Itron uses a connected load of 4.19 kW. The evaluation team used a connected load of 3.22 kW to calculate BYOT 5-minute kW interval data based on the formulas and assumptions below drawn from the Smart Thermostat and High Efficiency Air Conditioner measures in the New Mexico 2021 Technical Reference Manual.

$$Connected\ Load = \frac{Capacity_{cool}}{1000\frac{W}{kW}} \times \frac{1}{EER} = 3.22\ kW$$

Where:

- $Capacity_{cool}$ = 36,000 BTU/hour (2021 TRM Section 4.20.3)
- EER = -0.02 * $SEER^2$ + 1.12 * SEER (2021 TRM Section 4.6.4)
  - Assuming SEER = 13 (2021 TRM Section 4.20.3)

1.4 Estimate of Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Commercial Impacts

Reported impacts for the Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Commercial offerings rely on a CBL method where the key step involves taking the maximum 5-minute rolling average difference within each hour. The maximum difference for the hour is the reported impact. The evaluation team feels that using the maximum difference, rather than the average difference, overstates the capability of the program by including favorable noise into the impact calculation. Therefore, the evaluated impact estimates for these program offerings use the same general baseline method as summarized in Section 1.3 except that the rolling 5-minute impacts are summarized by the mean rather than the maximum by hour.

Figure 3 illustrates why using the maximum 5-minute impact within each hour overstates the true DR program impact, using the BYOT program as an example. The figure shows the baseline (green) and average participant load (gray) for each 5-minute interval on 7/11/2022. Within a given event hour, the average participant load ranges from as low as 0.42 kW to as high as 1.74 kW. The average participant load across the event period was 1.10 kW. Therefore, taking the maximum of the 5-minute impacts within a given hour will yield an inflated impact value compared to taking the average 5-minute impact.

Figure 3: BYOT Baseline and Actual Load for July 11, 2022

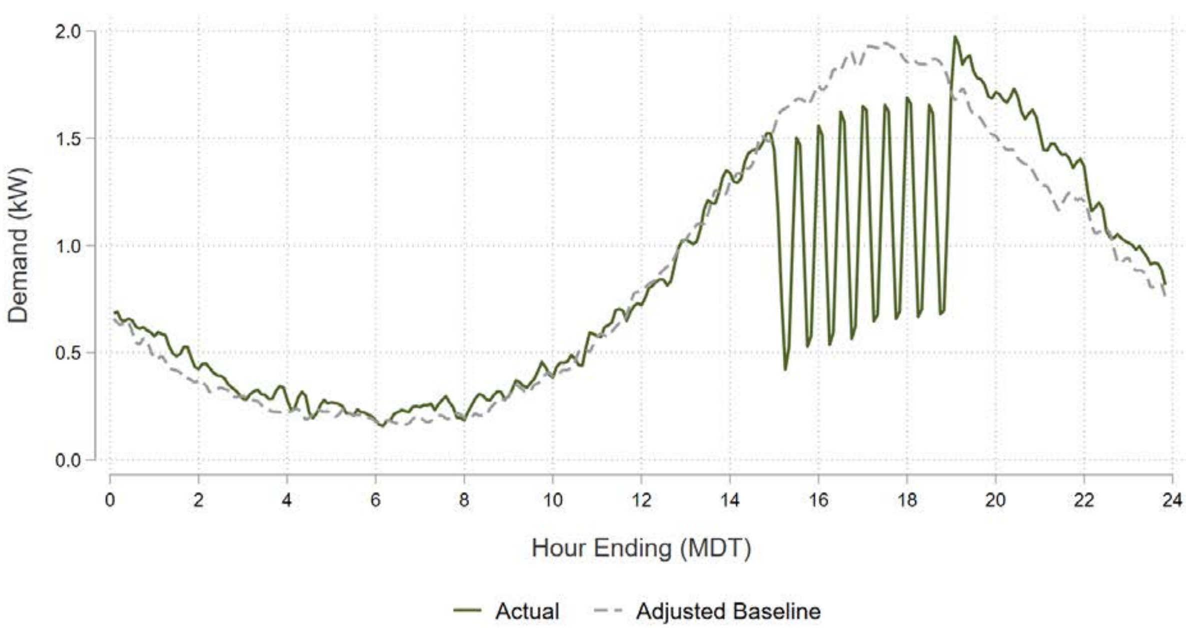
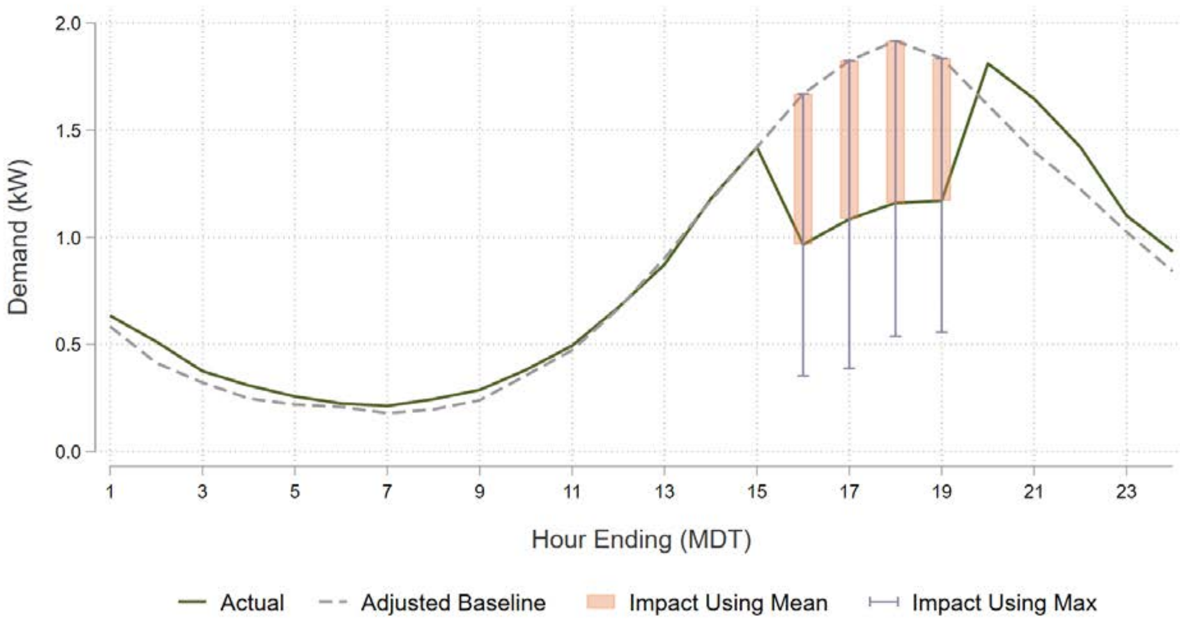


Figure 4 compares the impacts using the two different methods. As in Figure 3, the green and gray lines represent the customer baseline and participant load on 7/11/2022; the key difference is that the values shown are the average for each hour, as opposed to the granular 5-minute intervals. The orange bars represent the hourly DR impacts using the average 5-minute impact within each hour, while the purple capped lines represent the hourly DR impacts using the Itron maximum methodology. Note that the average impacts (orange) are equal to the difference between the baseline and the average participants' loads, while the Itron impacts (purple) far overstate actual DR program performance. Again, this is an artifact of using the highest 5-minute impact within each hour. The degree to which impacts are overstated using the Itron method depends on how much loads vary within each hour.

Figure 4: BYOT Baseline and Actual Load for July 11, 2022 with Impacts Calculated Using Mean and Max Methodologies



1.5 Ex Ante Impacts

Of particular interest for ex ante load considerations is how sensitive the program performance is to temperature and time of day. When multiple years of data are included in such an analysis, a wider range of program conditions can be investigated which leads to a more robust understanding of the capability of the program.

To produce an ex ante impact estimate for Residential DCU customers, the evaluation team leveraged 2015-2022 verified load reduction estimates. In 2015, 2016, 2017, and 2019, only one of the Residential DCU M&V groups was consistently curtailed while the other group acted as a control. In 2018, 2020, 2021, and 2022, the curtailment groups switched between event days. Because some differences exist between the two groups in terms of load profile on event-like days, the evaluation team used a difference-in-differences impact estimation method, which was described in Section 1.2, to estimate the impacts for these earlier summers.[5] Ex post impacts in

[5] There were not many non-event weekdays during the summer of 2015 where the maximum outdoor temperature exceeded 94 degrees (F), so a threshold of 91 degrees (F) was used for the 2015 data instead. The temperature threshold for the summer of 2016 was 94 degrees (F), just like the threshold for the summer of 2017. In 2018, the groups were similar in terms of non-event day usage, so the difference-in-differences method was not necessary.

2018 were not calculated via difference-in-differences, as statistically significant differences between the groups were not found.

To produce an ex ante impact estimate for the Small Commercial segment, the evaluation team leveraged 2015-2022 verified load reduction estimates. Prior to 2019, impacts for the Small Commercial segment were calculated in a manner similar to the Residential DCU segment – an M&V group was split into curtailment and control groups. The control group was used as a baseline for the curtailment group. Since 2019, the full M&V group was curtailed for all events, and the program implementer relied on an X-of-Y baseline method to estimate impacts (same method as the one used for the Large Commercial segment). Therefore, the ex ante estimate is a function of historical ex post estimates that were developed using slightly different methods over the years.

For the Medium Commercial segment, we leveraged 2017-2022 verified load reduction estimates. The same approach for estimating ex post results for the Medium Commercial segment was used in each year.

For the Two-Way Smart Thermostat segment, we leveraged 2019-2022 verified load reduction estimates. The 2019 approach relied on control groups. Since then, the approach has relied on the X-of-Y baseline method described above.

For the BYOT segment, we leveraged 2020-2022 verified load reduction estimates. The same approach for estimating ex post results was used in each year.

Once data had been compiled for each customer segment, regression modeling was used to estimate the effect temperature and time of day have on demand reductions. The resulting regression model was used to predict impacts for a range of planning scenarios. Two event days (7/31/2015 and 7/13/2020) were excluded from the regressions because weather conditions on these days differed from typical planning scenarios. The former date had relatively low temperatures throughout the event, while the latter experienced storm conditions midway through the event. The regression equation specified was:

$$\Delta kW_h = \alpha + \beta * T_t + \sum_{h=15}^{h=20} \gamma_h * I_h + \sum_{h=15}^{h=20} \delta_h * I_h * T_h + \varepsilon_h$$

Where the variables have the following interpretations:

Table 5: Ex Ante Regression Terms

Variable	Interpretation
α	Constant term
β	The incremental kW usage associated with a warming of 1 degree Fahrenheit
T_t	Outdoor air temperature in hour h
γ_h	Incremental kW usage associated with each hour
I_h	Indicator variable equal to 1 if the hour is 14, 15, 16, etc., and 0 if not
δ_h	Incremental kW usage associated with a 1-degree increase in outdoor temperature in hour h
ε_h	The error term

1.6 Operability Adjustments

To reach a true estimate of program capability, ex post and ex ante impacts in this analysis need to be adjusted for operability. In a previous evaluation, the evaluation team recommended adjusting residential impacts by 8% based on operability inspections that occurred during Summer 2018. Our 2018 Evaluation Report covered the inspection process and key findings in detail. Itron's 2018 report adopted this recommendation. In 2022, the adjustment factor was 87% for the Residential DCU, Small Commercial, and Medium Commercial programs. The 87% operability adjustment value represents a weighted average of 85% and 95% where the two values correspond to sites that have not been visited in the past two years and sites that have been visited in the past two years, respectively. Separately, Itron's report notes that an 82% online factor (not operability factor) is applied to the Two-Way Smart Thermostat group and an 85% online factor is applied to the BYOT group. We have adopted these adjustments as well. Unless otherwise noted, results in this analysis are reported without the operability adjustment applied.

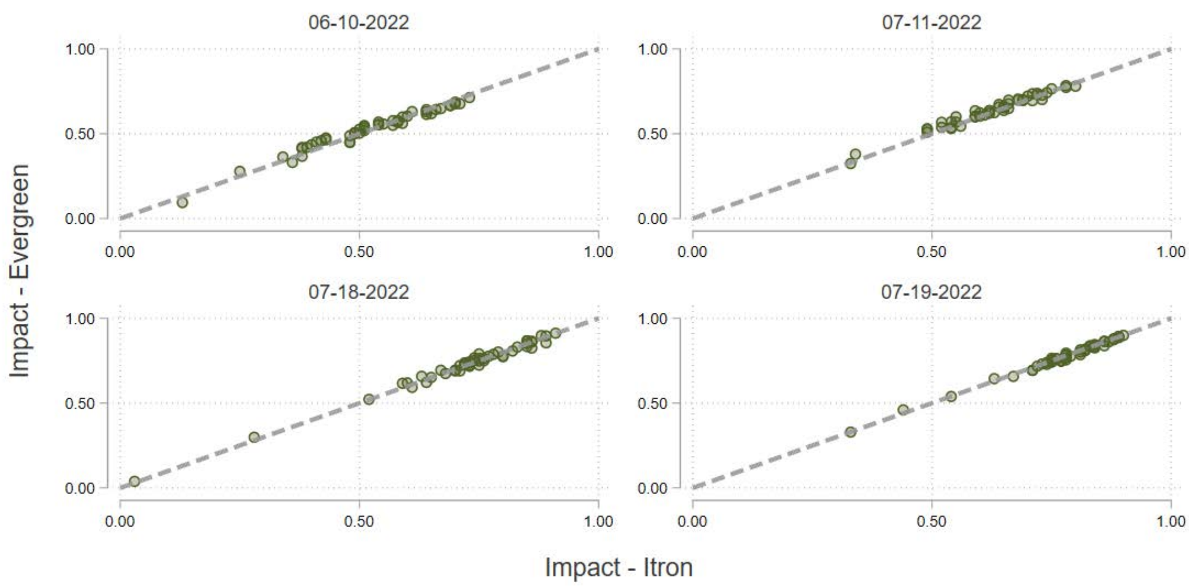
2 Residential DCU Results

This section reviews the Residential DCU impacts calculated by Itron and validated by the evaluation team. Additionally, the team provides feedback on the evaluation approach used by Itron and provides an alternative impact analysis for summer 2022 events. Finally, multiple years of event history are combined to develop ex ante impacts for various temperature scenarios.

2.1 Validation of Calculations

After receiving the participant load data from Itron, the evaluation team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 5 compares the impacts as calculated by Itron and by the evaluation team at the 5-minute level for each event day. There is strong but imperfect alignment. The average difference between Itron's impacts and the evaluation teams validated impacts is 0.003 kW (with the evaluation teams validated impacts being slightly larger, on average). For reference, Itron's Residential DCU impact estimates are shown in Table 6. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 0.90 kW per device for the Residential DCU class without any adjustment for operability.

Figure 5: Residential DCU Impact Verification



The dotted line represents what a perfect match would look like.

Table 6: Residential Impact Estimates (kW) by Date and Time[6]

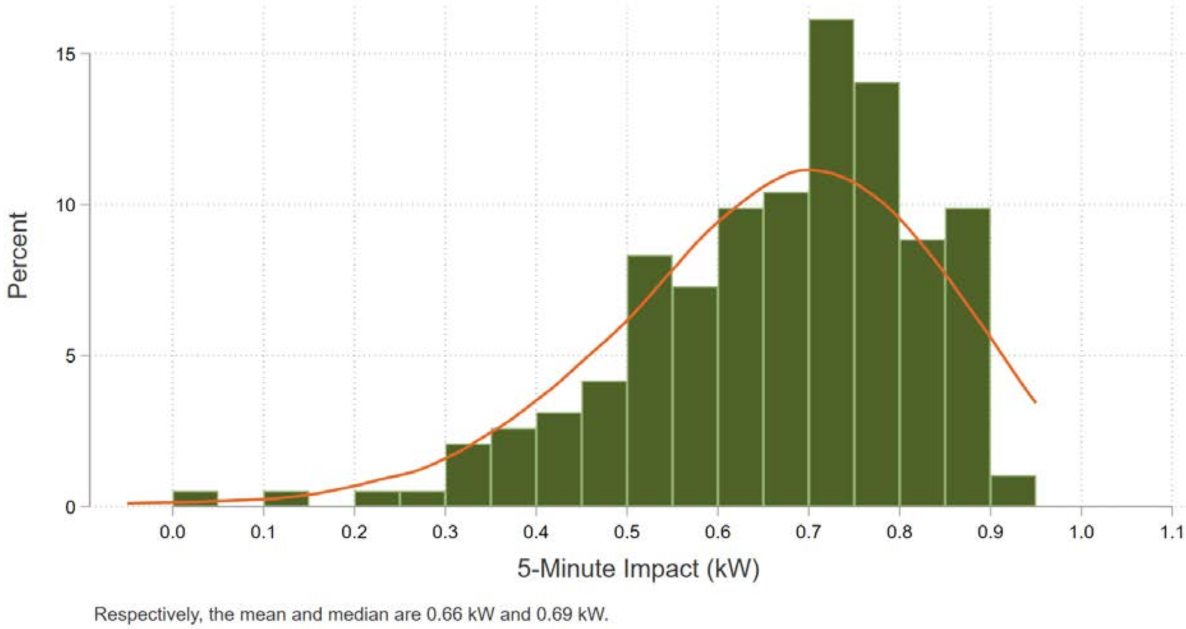
Date	Hour Ending (MDT)			
	4:00 PM	5:00 PM	6:00 PM	7:00 PM
6/10/2022	0.67	0.71*	0.70*	0.73*
7/11/2022	0.80	0.78	0.75	0.69
7/18/2022	0.86*	0.89*	0.89*	0.91
7/19/2022	0.89*	0.90*	0.88*	0.89*

2.2 Ex Post Impacts

For the Residential DCU segment, Itron's per device kW impact estimate for the 2022 season is the maximum difference between 5-minute rolling average loads for the control and curtailment groups (0.90 kW). (See Section 1.1 for more details.) The critical word here is *maximum*. The evaluation team feels that using the maximum difference overstates the amount of load shed produced by a typical Power Saver DR event by counting favorable noise. This is especially true from a system planning perspective, as using the maximum is a poor basis for the estimated load relief upon dispatch. Figure 6 shows the distribution of impacts at the 5-minute level – 0.90 kW clearly overstates the center of the distribution.

[6] Source: Itron's 2022 PNM Power Saver Program Report. Table 37.

Figure 6: Distribution of 5-Minute Residential DCU Impacts



Rather than the maximum difference, the evaluation team feels that using an average impact across an hour returns an unbiased estimate of Power Saver program impacts during DR events. To account for differences between the two M&V groups, the evaluation team opted for a difference-in-difference approach for estimating ex post impacts. This approach was described in Section 1.2. Results for the 2022 DR season are summarized in Table 7. Qualifying event hours are denoted with an asterisk (*). Note that the curtailment group rotated between events, which is why the sign of the non-event-day difference changes from one event to the next.

Table 7: Impact Calculations

Date	# of Curtailed Devices	Hour Ending (MDT)	Temp. (F)	Control kW	Curtail kW	Non-Event Diff. (kW)	Impact (kW)
6/10/2022	132	16	96	1.09	0.69	-0.07	0.47
		17*	97	1.24	0.70	0.01	0.54
		18*	100	1.32	0.75	0.03	0.54
		19*	97	1.31	0.74	0.07	0.50
7/11/2022	123	16	95	1.23	0.65	0.07	0.52
		17	94	1.29	0.61	-0.01	0.68
		18	93	1.31	0.64	-0.03	0.71
		19	91	1.24	0.63	-0.07	0.67
7/18/2022	128	16*	98	1.38	0.79	-0.07	0.65
		17*	97	1.55	0.79	0.01	0.75
		18*	97	1.53	0.79	0.03	0.70
		19	96	1.57	0.76	0.07	0.75
7/19/2022	123	16*	101	1.53	0.81	0.07	0.65
		17*	100	1.55	0.77	-0.01	0.79
		18*	101	1.58	0.80	-0.03	0.82
		19*	99	1.58	0.79	-0.07	0.86

The average impact during qualifying event hours was 0.68 kW. As of the end of summer 2022, there were 49,589 active residential DCUs. Thus, the average qualifying event hour aggregate impact was 33.69 MW. Adjusted for 87% operability, the aggregate impact was 29.31 MW.

Figure 7 visualizes the impact estimates and Figure 8 compares the evaluation teams ex post hourly impacts with the impacts calculated by Itron. The evaluation teams impact is lower in all cases, by about 0.15 kW on average.

Figure 7: Residential DCU DR Impacts by Date

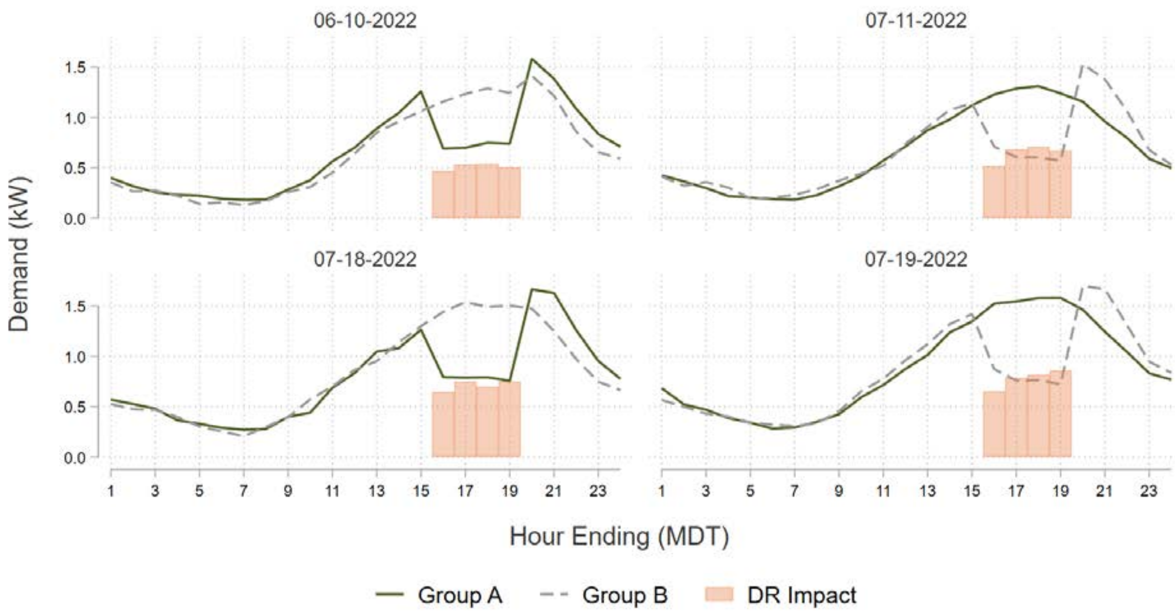
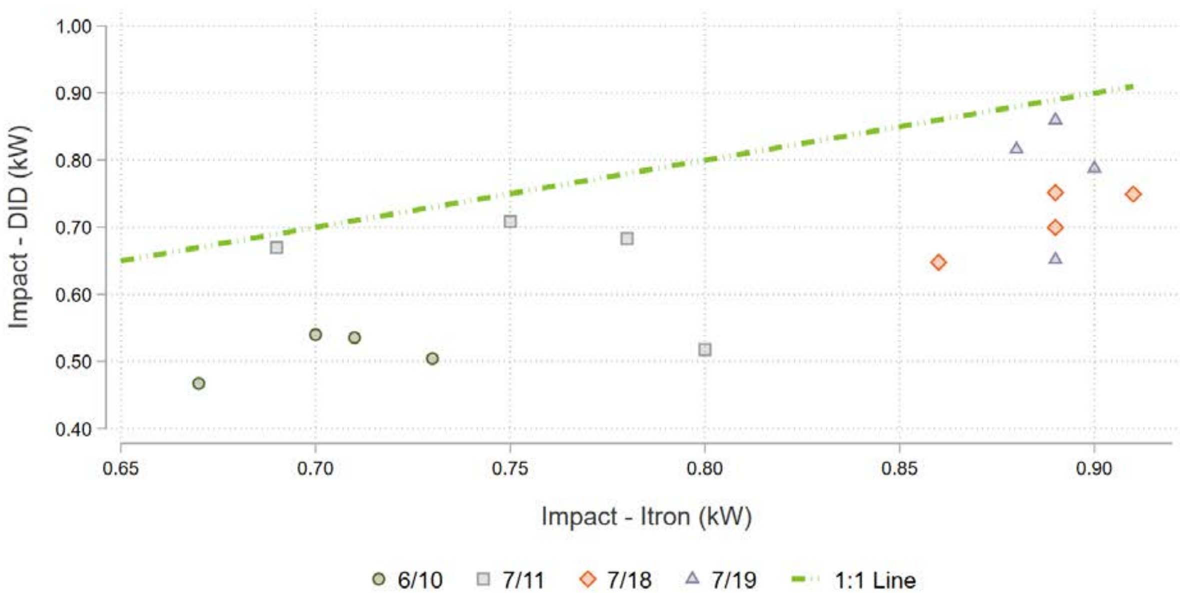


Figure 8: Comparison of Evaluated Ex Post Impacts and Itron Impacts



The 1:1 line shows what the trend would look like if the DID and Itron impacts were identical.

2.2.1 Net Energy Savings

The evaluation team estimated net energy impacts for the Residential DCU program offering by summing ex post impacts from the onset of each event through the end of the event day. The calculation of impacts is exactly as described earlier in this section. Table 8 shows the energy savings estimates (per device) for each event day. On average, net daily energy savings were 1.84 kWh per device. Multiplying by the number of events (four) and the number of active devices (49,589) yields an aggregate savings estimate of 365.21 MWh for the Residential DCU segment. After applying the operability factor of 87%, the aggregate energy savings estimate is 317.73 MWh.

Table 8: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/10/2022	3:00 PM	2.05	-0.86	1.18
7/11/2022	3:00 PM	2.58	-1.18	1.40
7/18/2022	3:00 PM	2.85	-1.17	1.67
7/19/2022	3:00 PM	3.12	-1.11	2.01
Average	**---**	**2.98**	**-1.14**	**1.84**

2.3 Ex Ante Impacts

While ex post impact estimates serve to measure prior program performance, ex ante impact estimates are forward-looking. In other words, ex ante estimates represent expected demand reductions in future years at peaking conditions.

To develop an ex ante impact estimate for the Residential DCU component of Power Saver, the evaluation team leveraged linear regression to model historical ex post impacts as a function of temperature and time. Figure 9 highlights the relationship between historical ex post impact estimates (2015-2022) and outdoor air temperature (in Albuquerque). There is a clear trend in the figure – the hotter it is outside, the greater the impacts tend to be.

The specification of the ex ante regression model was shown in Section 1.5, and the results from the model are described in more detail below. The evaluation team predicts that the impact of a Residential DCU DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 0.72 kW per device.

Figure 9: Hourly Impacts against Outdoor Temperature (F)

The regression was run on full event hours (some events in prior summers started mid-hour) and weighted by the number of curtailed devices (each summer had slightly different numbers of dispatched devices). Regression output is shown in the table below. In the table, note an "hour ending" convention is used (so hour 15 refers to the hour from 2:00 PM through 3:00 PM). In general, earlier hours corresponded to higher kW values, with a drop over time in impacts as less load is available to shed. Temperature has a positive coefficient, indicating that higher temperatures produce larger load reductions. Note that any coefficient with "*" next to it is statistically significant at the 95% confidence level.

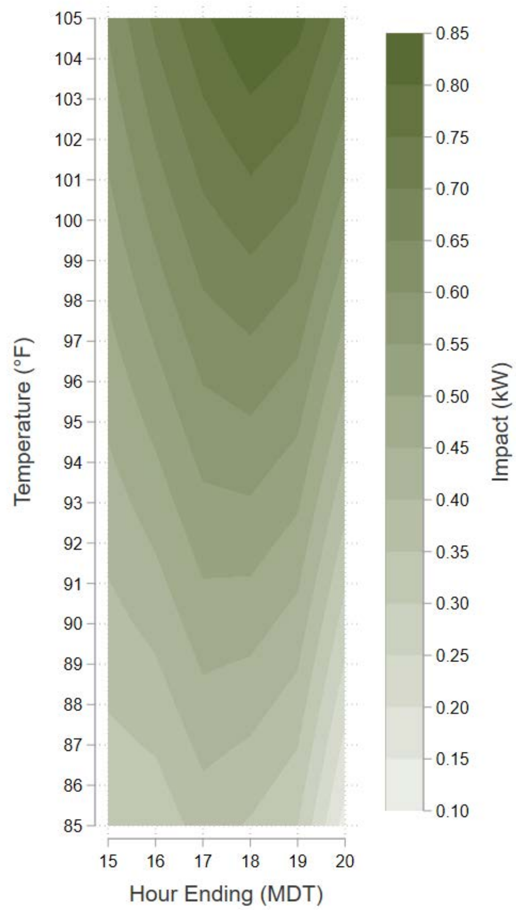
Table 9: Residential DCU Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value
β	Temperature	0.015*	0.001	0.000
γ_h	Hour 15		(base – omitted)	
	Hour 16	-0.405*	0.074	0.000
	Hour 17	-0.444*	0.075	0.000
	Hour 18	-0.834*	0.070	0.000
	Hour 19	-0.932*	0.077	0.000
	Hour 20	-1.428*	0.143	0.000
δ_h	Hour_15_x_Temp		(base – omitted)	
	Hour_16_x_Temp	0.005*	0.001	0.000
	Hour_17_x_Temp	0.006*	0.001	0.000
	Hour_18_x_Temp	0.010*	0.001	0.000
	Hour_19_x_Temp	0.011*	0.001	0.000
	Hour_20_x_Temp	0.015*	0.002	0.000
α	Constant	-0.962*	0.056	0.000

Using the regression coefficients shown in the table above, the evaluation team created a time-temperature matrix (TTM) that shows expected load reductions (per device) for different outdoor temperatures and at different times of the day. The TTM is shown in Table 10. The evaluation team predicts that the impact of a Residential DCU DR event at peaking conditions is 0.72 kW per device.

Table 10: Residential DCU Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	0.61	0.71	0.79	0.85	0.82	0.72
104	0.59	0.69	0.77	0.82	0.79	0.69
103	0.58	0.67	0.75	0.80	0.77	0.66
102	0.56	0.65	0.73	0.77	0.74	0.63
101	0.55	0.63	0.71	0.75	0.71	0.60
100	0.53	0.61	0.69	0.72	0.69	0.57
99	0.52	0.59	0.66	0.70	0.66	0.54
98	0.50	0.57	0.64	0.67	0.64	0.51
97	0.49	0.55	0.62	0.65	0.61	0.48
96	0.47	0.53	0.60	0.62	0.58	0.45
95	0.46	0.51	0.58	0.60	0.56	0.42
94	0.44	0.49	0.56	0.57	0.53	0.39
93	0.43	0.47	0.54	0.55	0.51	0.36
92	0.41	0.45	0.52	0.52	0.48	0.34
91	0.40	0.43	0.50	0.50	0.46	0.31
90	0.38	0.42	0.48	0.47	0.43	0.28
89	0.37	0.40	0.46	0.45	0.40	0.25
88	0.35	0.38	0.43	0.42	0.38	0.22
87	0.34	0.36	0.41	0.39	0.35	0.19
86	0.32	0.34	0.39	0.37	0.33	0.16
85	0.31	0.32	0.37	0.34	0.30	0.13



To get an idea of the Residential DCU resource capability on aggregate, the number of active devices can be multiplied by the values shown in Table 10. As of the end of summer 2022, there were 49,589 active residential DCUs. Thus, the expected aggregate impact of an event hour ending at 6:00 PM (MDT) when the outdoor temperature is 100 degrees would be 35.81 MW. Residential DCU results are subject to an operability adjustment to better reflect the fact that not all devices in the population will be able to curtail load when called due to damage, wiring, or connection issues. The operability-adjusted aggregate impact is 87% of the unadjusted impact, or 31.15 MW.

3 Two-Way Smart Thermostat

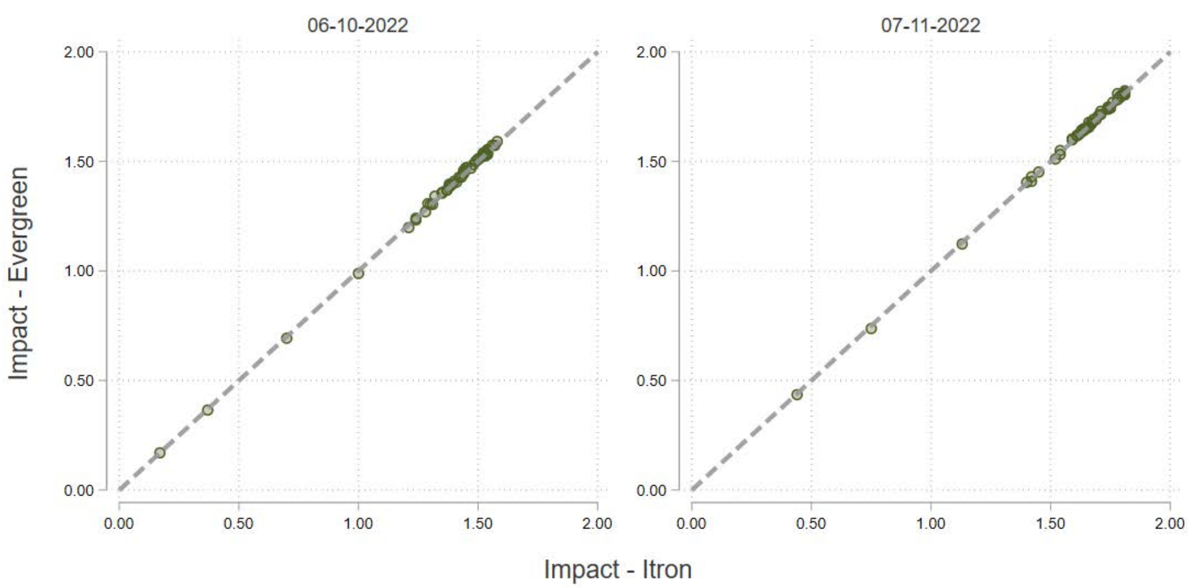
For the Two-Way Smart Thermostat program offering, usage during the curtailment event is compared to usage on high load days preceding the event. This section reviews the Two-Way

Smart Thermostat impacts calculated by Itron and validated by the evaluation team. Additionally, we provide feedback on the evaluation approach used by Itron and provide an alternative impact analysis for summer 2022 events. Finally, multiple years of event history are combined to develop ex ante impacts for various temperature scenarios.

3.1 Validation of Calculations

After receiving the participant load data from Itron, the evaluation team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 10 compares the impacts as calculated by Itron and by the evaluation team at the 5-minute level for each event day. There is nearly perfect alignment. The average difference between Itron's impacts and the evaluation teams validated impacts is 0.005 kW (with the evaluation teams validated impacts being slightly larger, on average). Itron's Two-Way Smart Thermostat impact estimates are shown in Table 11. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 1.58 kW per device for the Two-Way Smart Thermostat component without any adjustment for offline devices.

Figure 10: Two-Way Smart Thermostat Impact Verification



The dotted line represents what a perfect match would look like.

Table 11: Two-Way Smart Thermostat Impact Estimates (kW) by Date and Time[7]

Date	Hour Ending (MDT)			
	4:00 PM	5:00 PM	6:00 PM	7:00 PM
6/10/2022	1.54	1.54*	1.58*	1.53*
7/11/2022	1.64	1.81	1.81	1.81

3.2 Ex Post Impacts

As discussed in Section 1.4, the evaluation team thinks the method used to estimate impacts for the Two-Way Smart Thermostat program offering overstates the true average impact. For each event hour during the 2022 DR season, Table 12 shows the impact estimates produced by the evaluation team.[8] Qualifying event hours are denoted with an asterisk (*). Our methods differed from Itron's just slightly – in any place where Itron summarized with a maximum, we replaced it with an average.

Table 12: Two-Way Smart Thermostat Impact Results

Date	# of Curtailed Devices	Hour Ending (MDT)	Temp.	CBL kW	Observed kW	Impact
6/10/2022	532	16	96	1.91	0.95	1.06
		17*	97	2.08	0.72	1.46
		18*	100	2.19	0.78	1.51
		19*	97	2.17	0.85	1.42
7/11/2022	535	16	95	2.21	0.98	1.33
		17	94	2.39	0.78	1.71
		18	93	2.45	0.83	1.72
		19	91	2.47	0.88	1.69

The average impact during qualifying event hours was 1.46 kW. As of the end of summer 2022, there were 759 active Two-Way Smart Thermostat devices. Thus, the average qualifying event

[7] Source: Itron's 2022 PNM Power Saver Program Report. Table 40.

[8] Note that the Two-Way devices include a 0.1 kW adjustment to the impact to account for the thermostat curtailment on the air handler fan for systems set to "auto".

hour aggregate impact was 1.11 MW. Adjusted by an 82% online factor, the aggregate impact was 0.91 MW.

Figure 11 visualizes the impact estimates and Figure 12 compares the evaluation teams ex post hourly impacts with the impacts calculated by Itron. The evaluation teams impact is lower in all cases, by about 0.17 kW on average.

Figure 11: Two-Way Smart Thermostat DR Impacts by Date

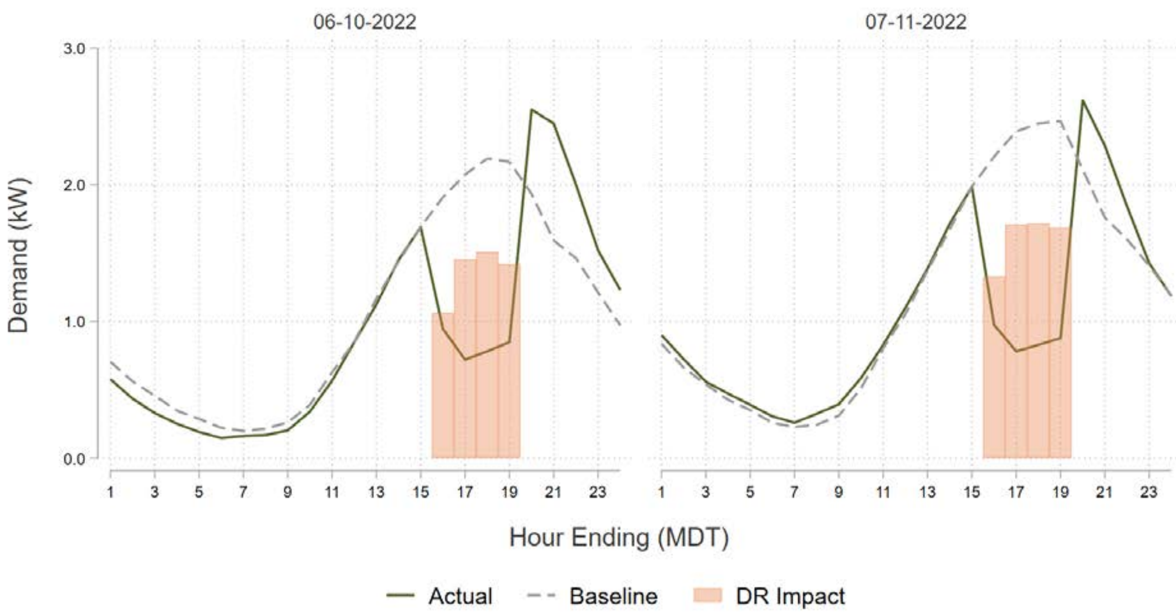
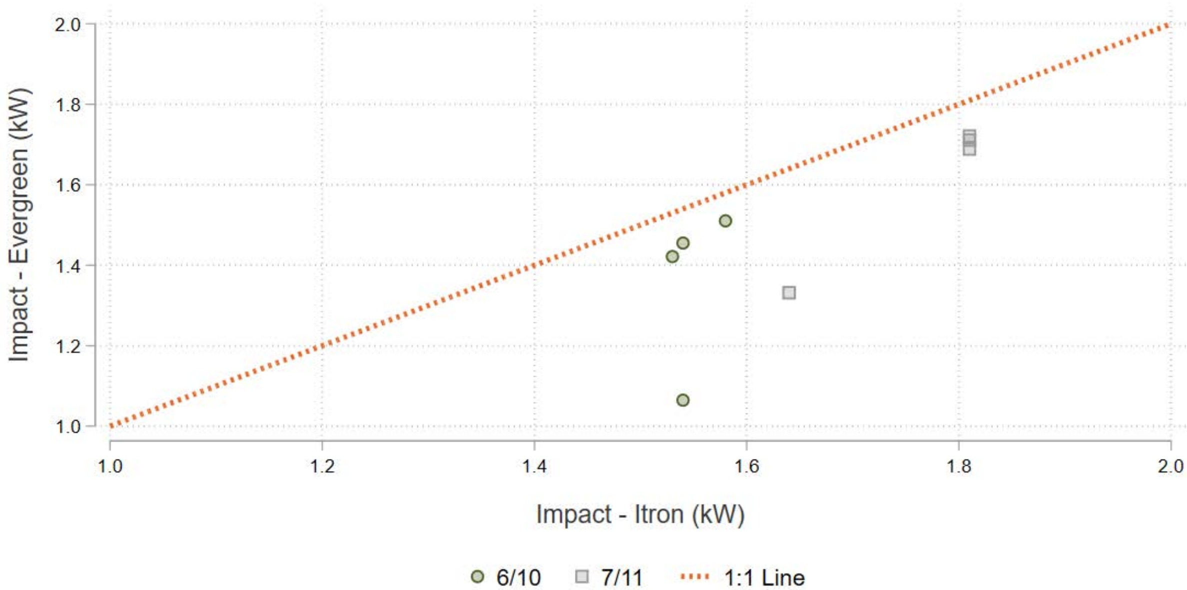


Figure 12: Comparison of Evaluated Ex Post Impacts and Itron Impacts



The 1:1 line shows what the trend would look like if the Evergreen and Itron impacts were identical.

3.2.1 Net Energy Savings

The evaluation team estimated net energy impacts for the Two-Way Smart Thermostat program offering by summing ex post impacts from the onset of each event through the end of the event day. The calculation of impacts is exactly as described earlier in this section. Table 13 shows the energy savings estimates for each event day. On average, net daily energy savings were 4.52 kWh per device. Multiplying this estimate by the number of event days (two) and the number of active devices (759) yields an aggregate savings estimate of 6.86 MWh for the Two-Way Smart Thermostat program offering. After applying an online factor of 82%, the aggregate energy savings estimate is 5.62 MWh.

Table 13: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/10/2022	3:00 PM	5.45	-2.08	3.37
7/11/2022	3:00 PM	6.45	-0.79	5.66
Average		**5.95**	**-1.44**	**4.52**

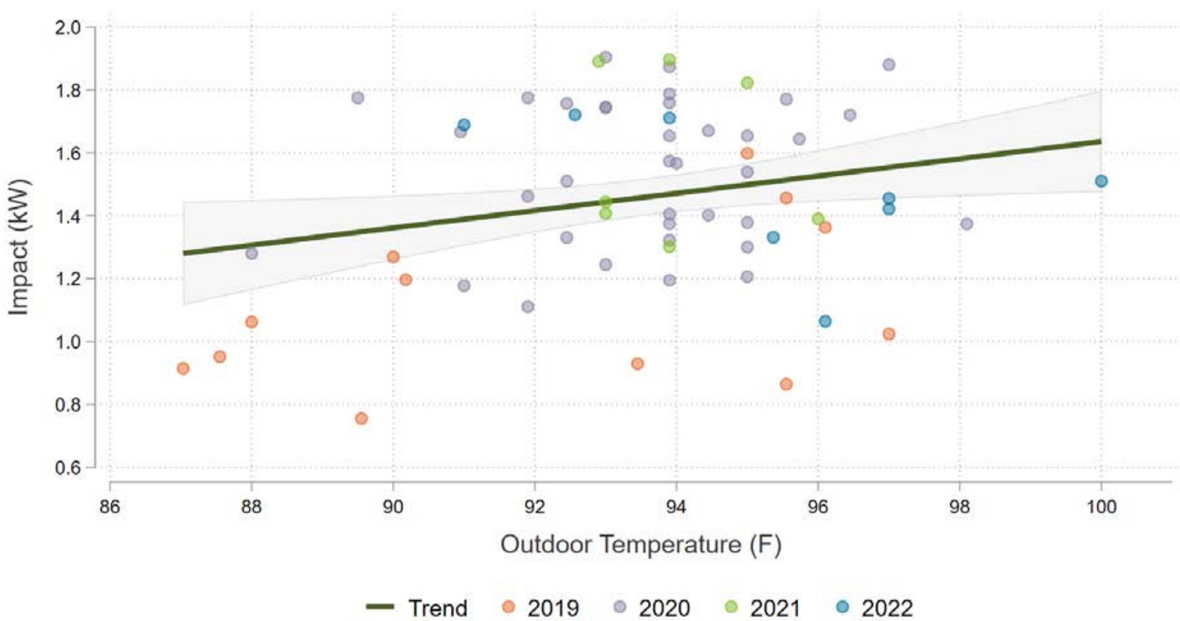
3.3 Ex Ante Impacts

While ex post impact estimates serve to measure prior program performance, ex ante impact estimates are forward-looking. In other words, ex ante estimates represent expected demand reductions in future years at peaking conditions.

To develop an ex ante impact estimate for the Residential Two-Way Smart Thermostat component of Power Saver, the evaluation team leveraged linear regression to model historical ex post impacts as a function of temperature and time. Figure 13 highlights the relationship between historical ex post impact estimates (2019-2022) and outdoor air temperature (in Albuquerque).[9] There is a clear trend in the figure – the hotter it is outside, the greater the impacts tend to be.

The specification of the ex ante regression model was shown in Section 1.5, and the results from the model are described in more detail below. The evaluation team predicts that the impact of a Residential Two-Way Smart Thermostat DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 1.74 kW per device.

Figure 13: Hourly Impacts against Outdoor Temperature (F)



The ex-ante regression model was run on full event hours and weighted by the number of curtailed devices (each summer had slightly different numbers of dispatched devices). Regression output is shown below. In the table, note an "hour ending" convention is used (so hour 15 refers

[9] Note that the baseline method used to calculate ex post impacts for 2020-2022 differed slightly from the control group method used to calculate ex post impacts in 2019.

to the hour from 2:00 PM through 3:00 PM). Note that any coefficient with "*" next to it is statistically significant at the 95% confidence level. Temperature has a positive coefficient, indicating that higher temperatures produce higher impacts. The interaction terms, represented by δ_h, are mostly negative, indicating that the incremental effect of temperature in a given hour actually decreases the impact. It should be noted that hour ending 20 was extremely rare and accounted for only three of the 64 event hours during the past four years. In addition, hour ending 15 is not included in the regression due to a lack of data.

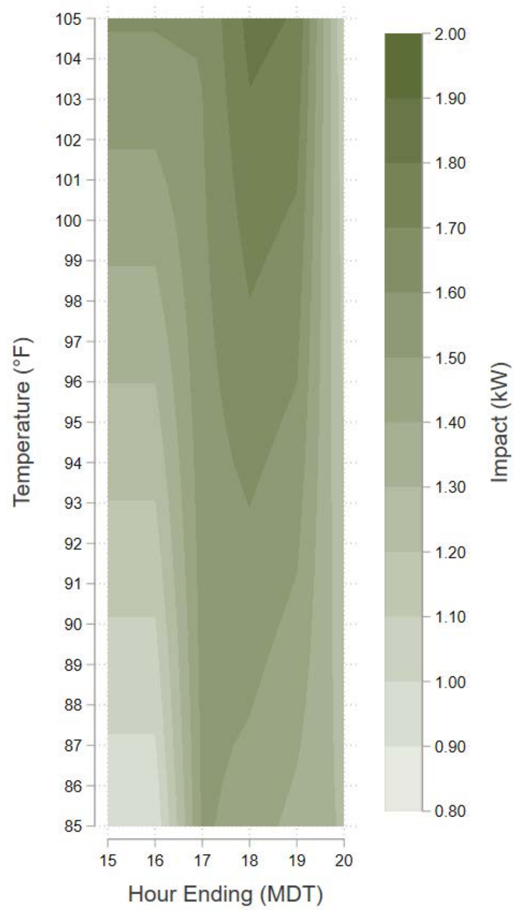
Table 14: Two-Way Smart Thermostat Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value
β	Temperature	0.034*	0.002	0.000
γ_h	Hour 16		(base – omitted)	
	Hour 17	3.151*	0.194	0.000
	Hour 18	1.816*	0.180	0.000
	Hour 19	1.589*	0.177	0.000
	Hour 20	4.083*	0.287	0.000
δ_h	Hour_16_x_Temp		(base – omitted)	
	Hour_17_x_Temp	-0.030*	0.002	0.000
	Hour_18_x_Temp	-0.015*	0.002	0.000
	Hour_19_x_Temp	-0.013*	0.002	0.000
	Hour_20_x_Temp	-0.044*	0.003	0.000
α	Constant	-2.011*	0.152	0.000

Using the regression coefficients shown in Table 29, the evaluation team created a time-temperature matrix (TTM) that shows expected load reductions (per device) for different outdoor temperatures and at different times of the day. The TTM is shown in Table 30. The evaluation team predicts that the impact of a Two-Way Smart Thermostat DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 1.74 kW per device.

Table 15: Two-Way Smart Thermostat Time-Temperature Matrix

Temp	Hour Ending MDT				
	16	17	18	19	20
105	1.61	1.61	1.83	1.79	1.10
104	1.58	1.60	1.81	1.77	1.11
103	1.54	1.60	1.80	1.75	1.12
102	1.51	1.59	1.78	1.73	1.13
101	1.47	1.59	1.76	1.71	1.14
100	1.44	1.59	1.74	1.69	1.15
99	1.40	1.58	1.72	1.66	1.16
98	1.37	1.58	1.70	1.64	1.17
97	1.34	1.57	1.68	1.62	1.18
96	1.30	1.57	1.66	1.60	1.18
95	1.27	1.56	1.64	1.58	1.19
94	1.23	1.56	1.62	1.56	1.20
93	1.20	1.55	1.60	1.54	1.21
92	1.16	1.55	1.58	1.52	1.22
91	1.13	1.55	1.56	1.50	1.23
90	1.09	1.54	1.54	1.47	1.24
89	1.06	1.54	1.52	1.45	1.25
88	1.02	1.53	1.51	1.43	1.26
87	0.99	1.53	1.49	1.41	1.27
86	0.96	1.52	1.47	1.39	1.28
85	0.92	1.52	1.45	1.37	1.29



To get an idea of Two-Way Smart Thermostat resource capability on aggregate, the number of active facilities can be multiplied by the values shown in Table 30. As of the end of summer 2022, there were 759 active Two-Way Smart Thermostat devices. Thus, the expected aggregate impact of an event hour ending at 6:00 PM (MDT) when the outdoor temperature is 100 degrees would be 1.32 MW. Two-Way Smart Thermostat results are subject to an offline adjustment to reflect the fact that not all thermostats in the population will be able to curtail load when called due to being offline. The offline-adjusted aggregate impact is 82% of the unadjusted impact, or 1.08 MW.

4 Bring Your Own Thermostat (BYOT)

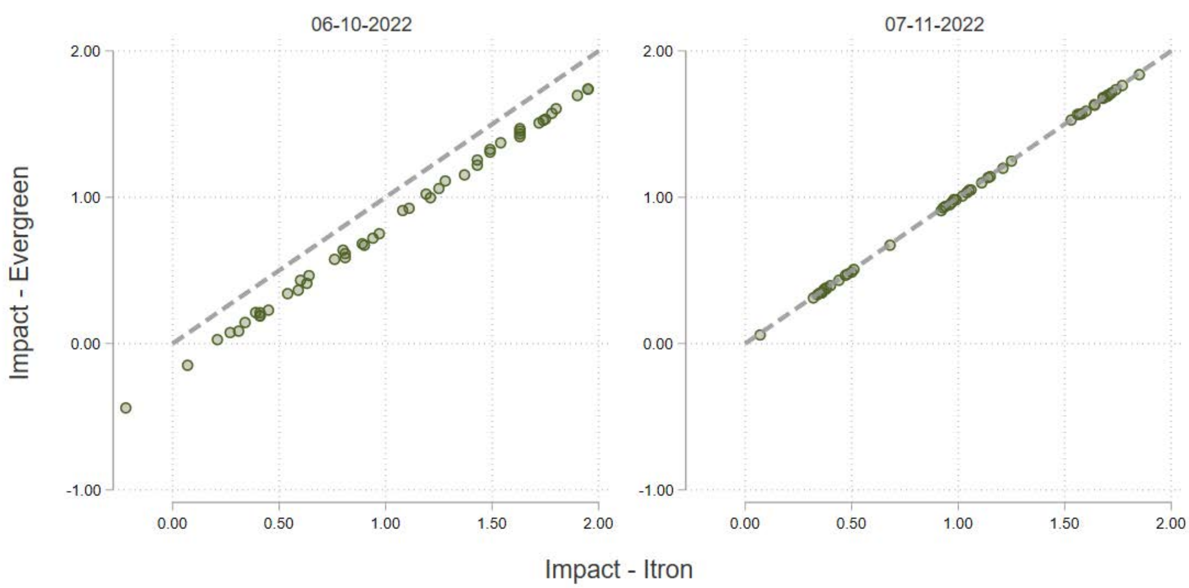
For the BYOT program offering, usage during the curtailment event is compared to usage on high load days preceding the event. This section reviews the BYOT impacts calculated by Itron and validated by the evaluation team. Additionally, we provide feedback on the evaluation approach used by Itron and provide an alternative impact analysis for summer 2022 events. Finally, multiple years of event history are combined to develop ex ante impacts for various temperature scenarios.

4.1 Validation of Calculations

After receiving the participant load data from Itron, the evaluation team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 14 compares the impacts as calculated by Itron and by the evaluation team at the 5-minute level for each event day. For the event on 7/11, there is nearly perfect alignment between Itron's impacts and Evergreen's validated impacts. For the 6/10 event, however, Itron used an alternative baseline adjustment mechanism. The contract language is specific and does not allow for ad hoc judgment calls on methods, so the alternative baseline adjustment mechanism used for the 6/10 event was not appropriate.

The evaluation teams replicated Two-Way Smart Thermostat impact estimates are shown in Table 16. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 1.74 kW per device for the BYOT component without any adjustment for offline devices. Itron claimed an impact of 1.95 kW per device due to the ad hoc baseline adjustment mentioned in the previous paragraph.

Figure 14: BYOT Impact Verification



The dotted line represents what a perfect match would look like.

Table 16: BYOT Impact Estimates (kW) by Date and Time

Date	Hour Ending (MDT)			
	4:00 PM	5:00 PM	6:00 PM	7:00 PM
6/10/2022	1.37	1.60*	1.74*	1.74*
7/11/2022	1.68	1.84	1.76	1.63

4.2 Ex Post Impacts

As discussed in Section 1.4, the evaluation team thinks the method used to estimate impacts for the BYOT program offering overstates the true average impact. For each event hour during the 2022 DR season, Table 17 shows the impact estimates produced by the evaluation team[10]. Qualifying event hours are denoted with an asterisk (*). Our methods differed from Itron's in two ways. First, any calculation based on a maximum was replaced with a calculation based on an average. Second, the evaluation team opted for a lower connected load when converting A/C runtime to electric demand.

Table 17: BYOT Impact Results

Date	# of Curtailed Devices	Hour Ending (MDT)	Temp.	CBL kW	Observed kW	Impact
6/10/2022	158	16	96	1.65	1.18	0.57
		17*	97	1.82	1.24	0.67
		18*	100	2.04	1.35	0.79
		19*	97	2.01	1.47	0.64
7/11/2022	194	16	95	1.67	0.97	0.80
		17	94	1.82	1.08	0.84
		18	93	1.92	1.16	0.86
		19	91	1.84	1.17	0.76

[10] Note that the BYOT devices include a 0.1 kW adjustment to the impact to account for the thermostat curtailment of the air handler fan for system set to 'auto'.

The average impact during qualifying event hours was 0.70 kW. As of the end of summer 2022, there were 775 active BYOT devices. Thus, the average qualifying event hour aggregate impact was 0.54 MW. Adjusted by an 85% online factor, the aggregate impact was 0.46 MW.

Figure 15 visualizes the impact estimates and Figure 16 compares the evaluation teams ex post hourly impacts with the impacts calculated by Itron. The evaluation teams impact is lower in all cases, by about 1.03 kW on average.

Figure 15: BYOT DR Impacts by Date

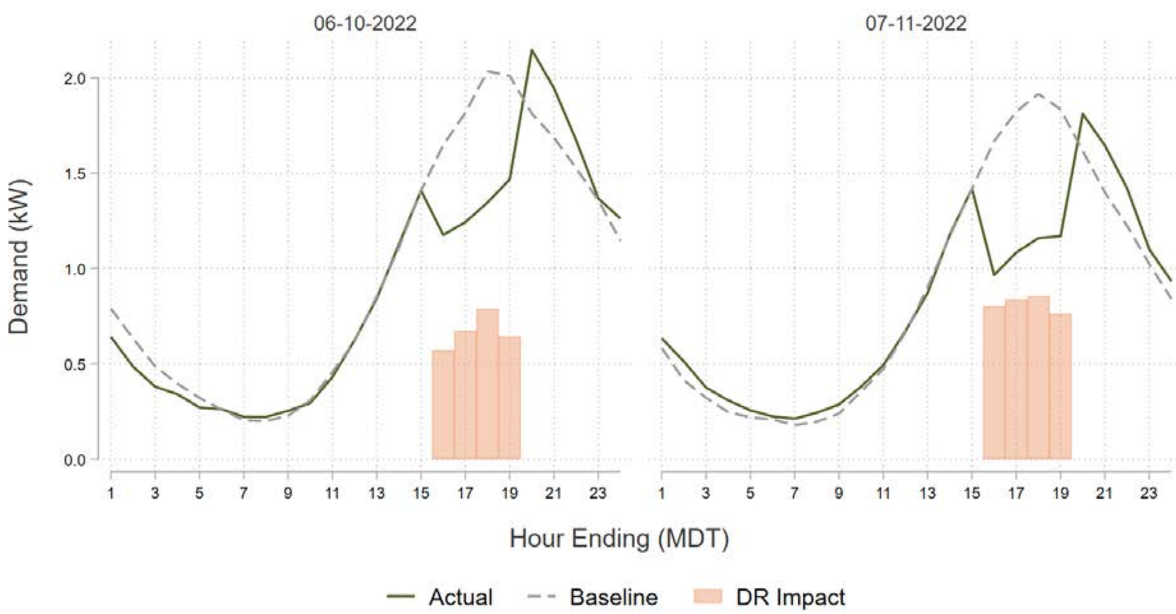
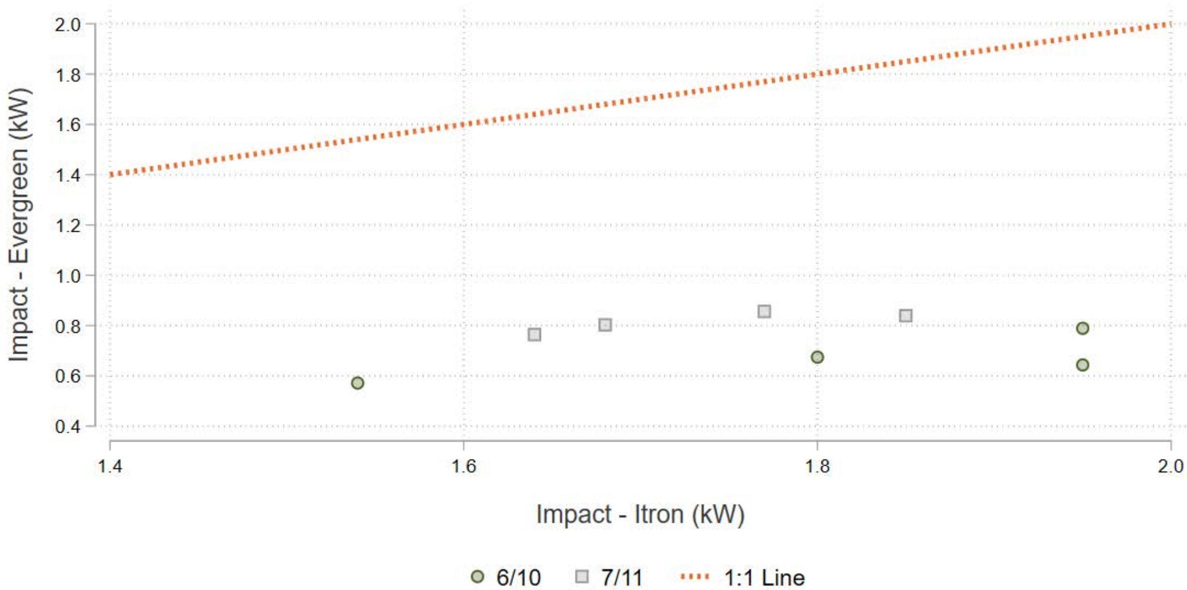


Figure 16: Comparison of Evaluated Ex Post Impacts and Itron Impacts



The 1:1 line shows what the trend would look like if the Evergreen and Itron impacts were identical.

4.2.1 Net Energy Savings

The evaluation team estimated net energy impacts for the BYOT program offering by summing ex post impacts from the onset of each event through the end of the event day. The calculation of impacts is exactly as described earlier in this section. Table 18 shows the energy savings estimates for each event day. On average, net daily energy savings were 2.63 kWh per device. Multiplying this estimate by the number of events (two) and active devices (775) yields an aggregate savings estimate of 4.08 MWh for the BYOT program offering. After applying an online factor of 85%, the aggregate energy savings estimate is 3.47 MWh.

Table 18: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/10/2022	3:00 PM	2.68	-0.37	2.31
7/11/2022	3:00 PM	3.26	-0.31	2.96
Average		**2.97**	**-0.34**	**2.63**

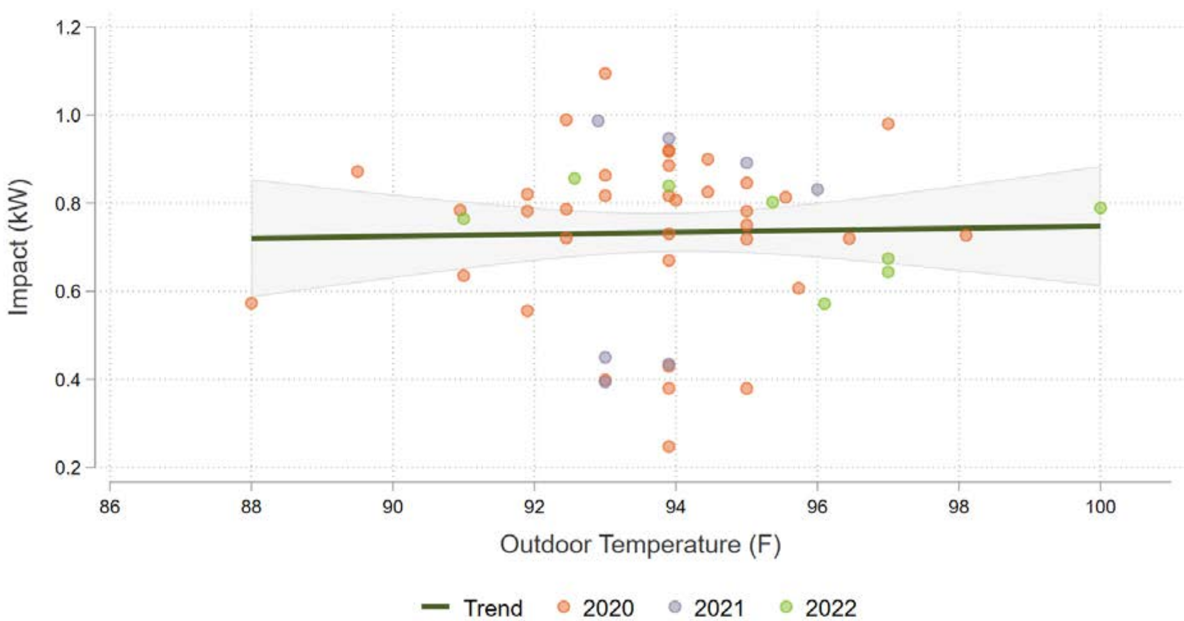
4.3 Ex Ante Impacts

While ex post impact estimates serve to measure prior program performance, ex ante impact estimates are forward-looking. In other words, ex ante estimates represent expected demand reductions in future years at peaking conditions.

To develop an ex ante impact estimate for the Residential Two-Way Smart Thermostat component of Power Saver, the evaluation team leveraged linear regression to model historical ex post impacts as a function of temperature and time. Figure 17 highlights the relationship between historical ex post impact estimates (2020-2022) and outdoor air temperature (in Albuquerque). The trend in the figure is weak, implying DR impacts are not strongly linked to temperature.

The specification of the ex ante regression model was shown in Section 1.5, and the results from the model are described in more detail below. The evaluation team predicts that the impact of a Residential BYOT DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 0.76 kW per device.

Figure 17: Hourly Impacts against Outdoor Temperature (F)



The ex-ante regression model was run on full event hours and weighted by the number of curtailed devices (each summer had slightly different numbers of dispatched devices). Regression output is shown below. In the table, note an "hour ending" convention is used (so hour 15 refers to the hour from 2:00 PM through 3:00 PM). Note that any coefficient with "*" next to it is statistically significant at the 95% confidence level. Temperature has a positive coefficient, indicating that higher temperatures produce higher impacts. The interaction terms, represented by δ_h, are all negative, indicating that the incremental effect of temperature in a given hour actually decreases the impact. It should be noted that hour ending 20 was extremely rare and accounted for only three of the 52 event hours during the past four years. In addition, hour ending 15 is not included in the regression due to a lack of data.

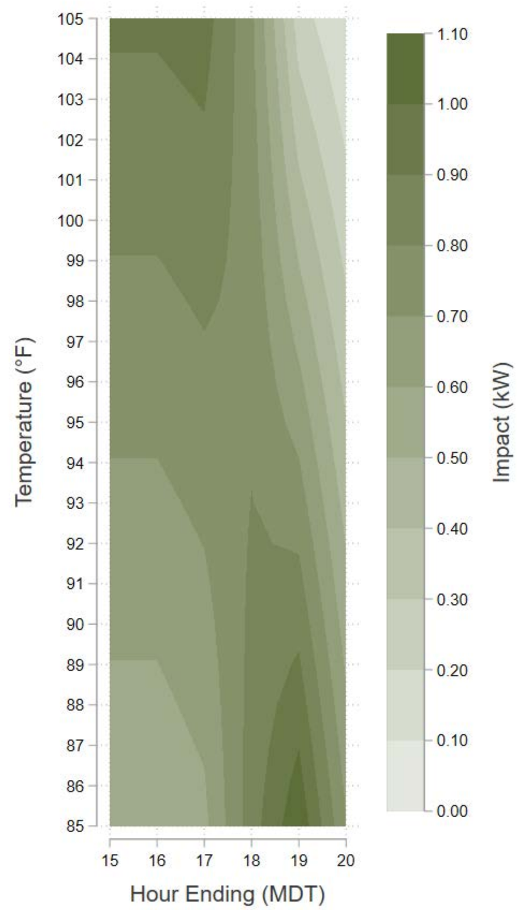
Table 19: BYOT Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value
β	Temperature	0.020*	0.003	0.000
γ_h	Hour 16		(base – omitted)	
	Hour 17	0.175	0.367	0.634
	Hour 18	2.590*	0.343	0.000
	Hour 19	5.796*	0.348	0.000
	Hour 20	4.477*	0.473	0.000
δ_h	Hour_16_x_Temp		(base – omitted)	
	Hour_17_x_Temp	-0.001	0.004	0.716
	Hour_18_x_Temp	-0.027*	0.004	0.000
	Hour_19_x_Temp	-0.062*	0.004	0.000
	Hour_20_x_Temp	-0.050*	0.005	0.000
α	Constant	-1.176*	0.296	0.000

Using the regression coefficients shown in Table 19, the evaluation team created a time-temperature matrix (TTM) that shows expected load reductions (per device) for different outdoor temperatures and at different times of the day. The TTM is shown in Table 20. Using the model, the evaluation team predicts that the impact of a BYOT DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 0.76 kW per device.

Table 20: BYOT Time-Temperature Matrix

Temp	Hour Ending MDT				
	16	17	18	19	20
105	0.92	0.94	0.72	0.25	0.10
104	0.90	0.92	0.73	0.29	0.13
103	0.88	0.91	0.74	0.33	0.16
102	0.86	0.89	0.74	0.37	0.19
101	0.84	0.87	0.75	0.41	0.22
100	0.82	0.85	0.76	0.46	0.25
99	0.80	0.83	0.76	0.50	0.28
98	0.78	0.81	0.77	0.54	0.31
97	0.76	0.80	0.78	0.58	0.34
96	0.74	0.78	0.78	0.62	0.37
95	0.72	0.76	0.79	0.66	0.40
94	0.70	0.74	0.80	0.71	0.43
93	0.68	0.72	0.80	0.75	0.46
92	0.66	0.70	0.81	0.79	0.49
91	0.64	0.68	0.82	0.83	0.53
90	0.62	0.67	0.82	0.87	0.56
89	0.60	0.65	0.83	0.91	0.59
88	0.58	0.63	0.84	0.96	0.62
87	0.56	0.61	0.84	1.00	0.65
86	0.54	0.59	0.85	1.04	0.68
85	0.52	0.57	0.85	1.08	0.71



To get an idea of BYOT resource capability on aggregate, the number of active participants can be multiplied by the values shown in Table 30. As of the end of summer 2022, there were 775 active BYOT participants. Thus, the expected aggregate impact of an event hour ending at 6:00 PM (MDT) when the outdoor temperature is 100 degrees would be 0.59 MW. Residential BYOT results are subject to an offline adjustment to reflect the fact that not all thermostats in the population will be able to curtail load when called due to being offline. The offline-adjusted aggregate impact is 85% of the unadjusted impact, or 0.50 MW.

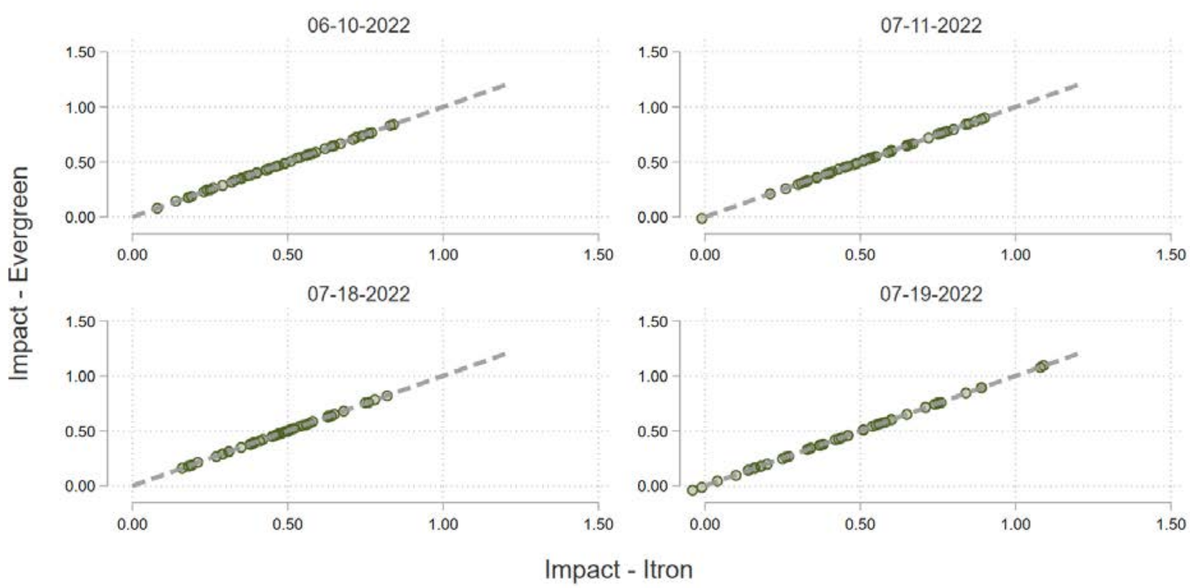
5 Small Commercial Results

For the Small Commercial program component, usage during the curtailment event is compared to usage on high load days preceding the event. This section reviews the Small Commercial impacts calculated by Itron and validated by the Evergreen team. Additionally, we provide feedback on the evaluation approach used by Itron and provide an alternative impact analysis for summer 2022 events. Finally, multiple years of event history are combined to develop ex ante impacts for various temperature scenarios.

5.1 Validation of Calculations

After receiving the participant load data from Itron, the evaluation team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 18 compares the impacts as calculated by Itron and by the evaluation teams at the 5-minute level for each event day. There is nearly perfect alignment. The average difference between Itron's impacts and the evaluation teams validated impacts is 0.001 kW (with the evaluation teams validated impacts being slightly smaller, on average). For reference, Itron's Small Commercial DCU impact estimates are shown in Table 21. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 1.09 kW per device for the Small Commercial DCU class without any adjustment for operability.

Figure 18: Small Commercial Impact Verification



The dotted line represents what a perfect match would look like.

Table 21: Small Commercial Impact Estimates (kW) by Date and Time[11]

Date	Hour Ending (MDT)			
	4:00 PM	5:00 PM	6:00 PM	7:00 PM
6/10/2022	0.84	0.83*	0.59*	0.35*
7/11/2022	0.90	0.89	0.85	0.54
7/18/2022	0.82*	0.56*	0.58*	0.50
7/19/2022	1.09*	0.75*	0.76*	0.43*

5.2 Ex Post Impacts

As discussed in Section 1.4, the evaluation team thinks the method used to estimate impacts for the Small Commercial program offering overstates the true average impact. For each event hour during the 2022 DR season, Table 22 shows the impact estimates produced by the evaluation team. Qualifying event hours are denoted with an asterisk (*). Our methods differed from Itron's in that in any calculation based on a maximum was replaced with a calculation based on an average.

Table 22: Impact Calculations for the Small Commercial Segment

Date	# of Curtailed Devices	Hour Ending (MDT)	Temp.	CBL kW	Observed kW	Impact
6/10/2022	40	16	96	1.71	1.05	0.66
		17*	97	1.52	0.95	0.56
		18*	100	1.29	0.87	0.42
		19*	97	1.01	0.78	0.22
7/11/2022	40	16	95	1.80	1.26	0.54
		17	94	1.68	1.03	0.65
		18	93	1.45	0.90	0.55
		19	91	1.22	0.81	0.40
7/18/2022	40	16*	98	1.75	1.12	0.63
		17*	97	1.45	1.03	0.42
		18*	97	1.28	0.82	0.47

[11] Source: Itron's 2022 PNM Power Saver Program Report. Table 38.

Date	# of Curtailed Devices	Hour Ending (MDT)	Temp.	CBL kW	Observed kW	Impact
		19	96	1.03	0.69	0.34
7/19/2022	40	16*	101	1.89	1.22	0.67
		17*	100	1.57	1.12	0.45
		18*	101	1.39	0.90	0.49
		19*	99	1.11	0.91	0.20

The average impact during qualifying event hours was 0.45 kW. As of the end of summer 2022, there were 5,464 active small commercial DCUs. Thus, the average qualifying event hour aggregate impact was 2.48 MW. Adjusted for 87% operability, the aggregate impact was 2.15 MW.

Figure 19 visualizes the impact estimates and Figure 20 compares the evaluation teams ex post hourly impacts with the impacts calculated by Itron. The evaluation teams impact is lower in all cases, by about 0.22 kW on average.

Figure 19: Small Commercial DCU DR Impacts by Date

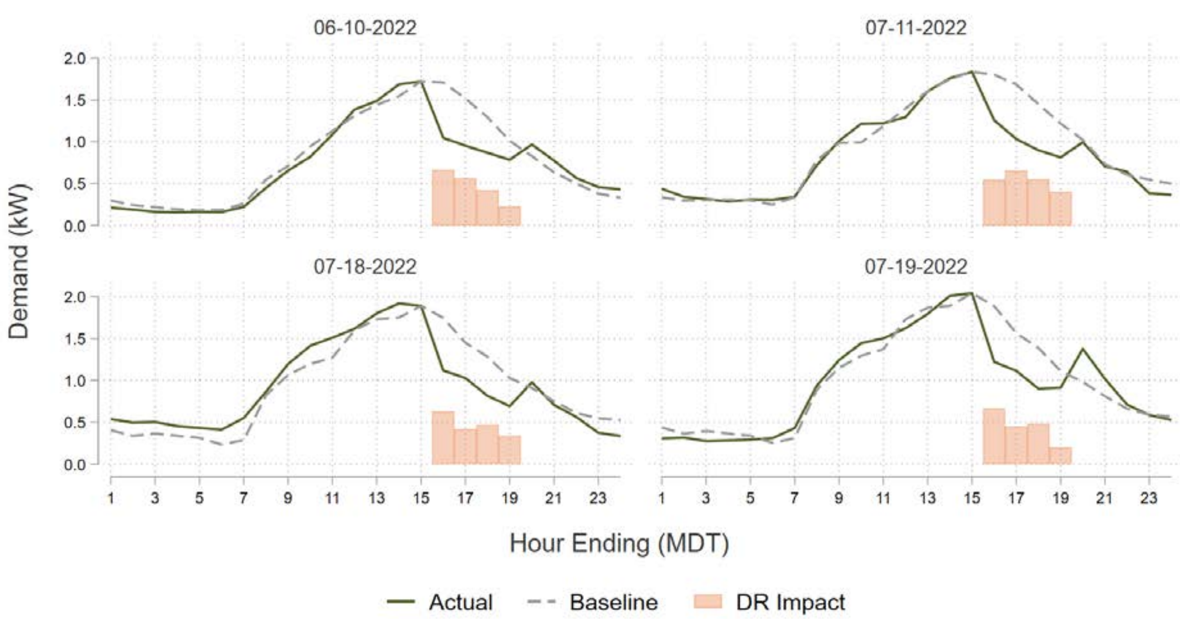
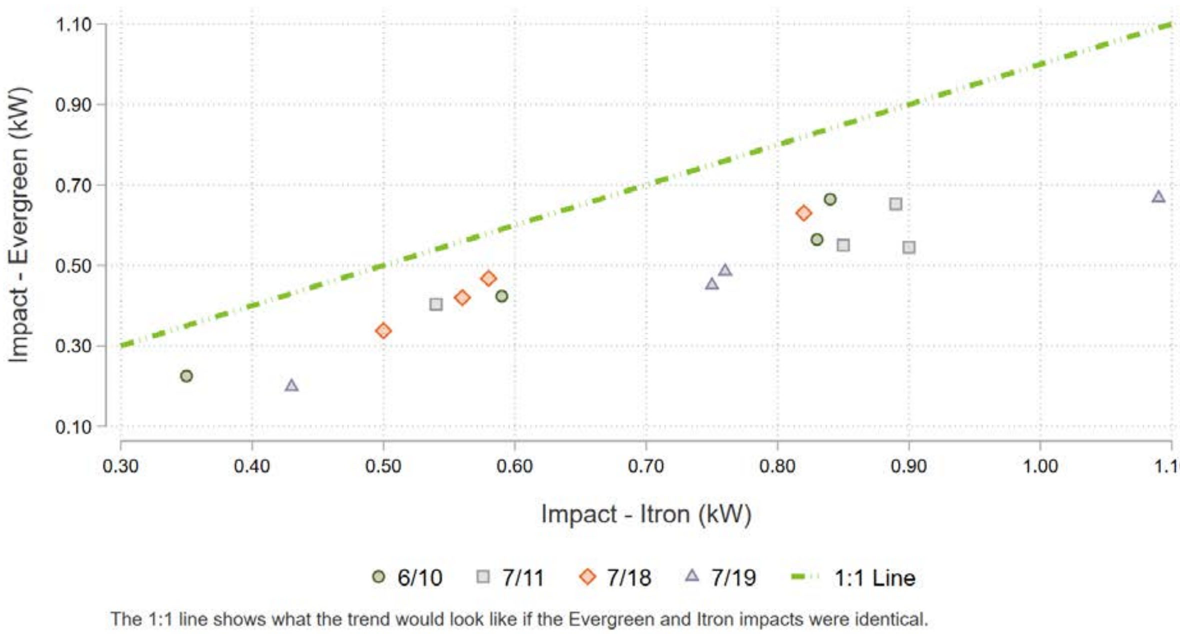


Figure 20: Comparison of Evaluated Ex Post Impacts and Itron Impacts



5.2.1 Net Energy Savings

The evaluation team estimated net energy impacts for the Small Commercial program offering by summing ex post impacts from the onset of each event through the end of the event day. The calculation of impacts is exactly as described earlier in this section. Table 23 shows the energy savings estimates (per device) for each event day. On average, net daily energy savings were 1.72 kWh per device. Multiplying by the number of events (four) and the number of active devices (5,464) yields an aggregate savings estimate of 37.60 MWh for the Small Commercial DCU segment. After applying the operability factor of 87%, the aggregate energy savings estimate is 32.71 MWh.

Table 23: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/10/2022	3:00 PM	1.88	-0.52	1.35
7/11/2022	3:00 PM	2.15	0.31	2.46
7/18/2022	3:00 PM	1.85	0.39	2.24
7/19/2022	3:00 PM	1.80	-0.60	1.20
Average		**1.83**	**-0.11**	**1.72**

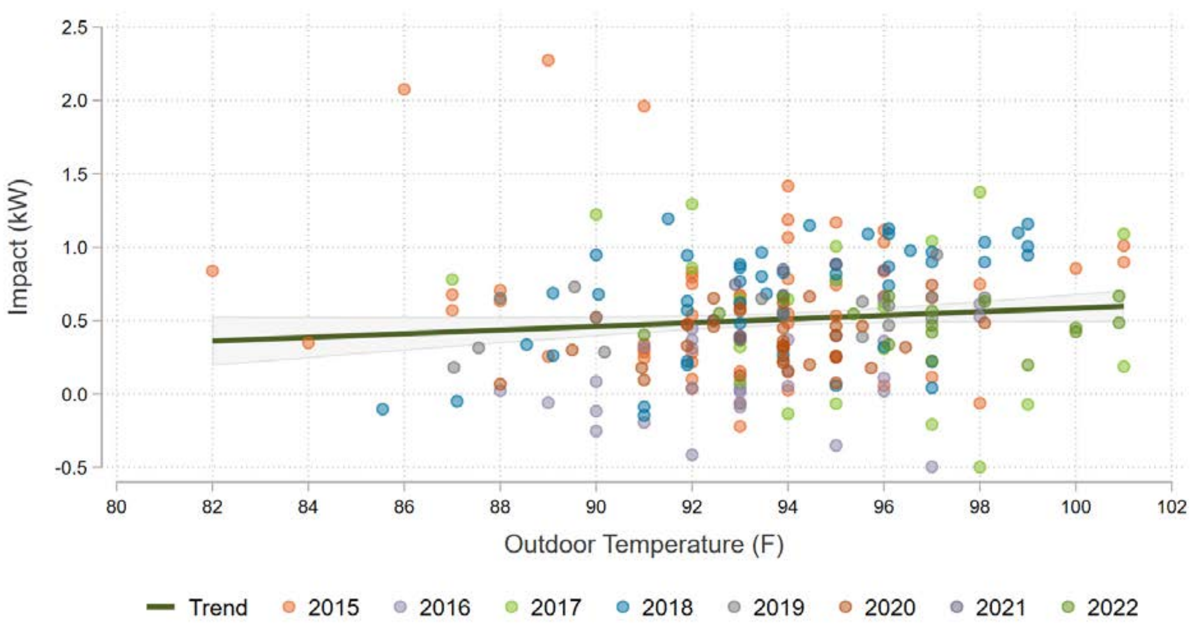
5.3 Ex Ante Impacts

While ex post impact estimates serve to measure prior program performance, ex ante impact estimates are forward-looking. In other words, ex ante estimates represent expected demand reductions in future years at peaking conditions.

To develop an ex ante impact estimate for the Small Commercial DCU component of Power Saver, the evaluation team leveraged linear regression to model historical ex post impacts as a function of temperature and time. Figure 21 highlights the relationship between historical ex post impact estimates (2015-2022) and outdoor air temperature (in Albuquerque). The trend in temperature is quite subtle; there are only slight increases in impact magnitude as temperature increases.

The specification of the ex ante regression model was shown in Section 1.5, and the results from the model are described in more detail below. The evaluation team predicts that the impact of a Small Commercial DCU DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 0.49 kW per device.

Figure 21: Hourly Impacts against Outdoor Temperature (F)



The regression was run on full event hours (some events in prior summers started mid-hour) and weighted by the number of curtailed devices (each summer had slightly different numbers of dispatched devices). Regression output is shown below in Table 24. In the table, note an "hour ending" convention is used (so hour 15 refers to the hour from 2:00 PM through 3:00 PM). In general, earlier hours corresponded to higher kW values, with a drop over time in impacts as less load is available to shed. Temperature has a negative coefficient, indicating that higher temperatures produce lower impacts after accounting for the hour and the interaction between temperature and time. The interaction terms, represented by δ_h, are all positive, indicating that the incremental effect of temperature in a given hour increases the impact. Results for hour 20 should be interpreted with caution as only seven data points were available to fit the model. Due to year-to-year variability, none of the estimates in this regression are statistically significant.

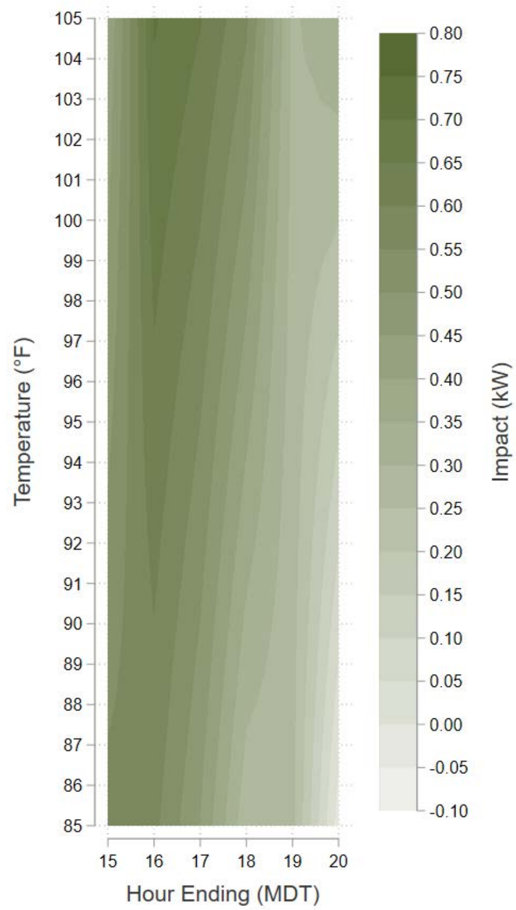
Table 24: Small Commercial Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value
β	Temperature	-0.008	0.023	0.722
γ_h	Hour 14		(base – omitted)	
	Hour 15	-1.290	2.600	0.620
	Hour 16	-1.683	2.600	0.518
	Hour 17	-2.245	2.461	0.363
	Hour 18	-1.121	2.614	0.668
	Hour 19	-2.859	4.447	0.521
δ_h	Hour_14_x_Temp		(base – omitted)	
	Hour_15_x_Temp	0.015	0.028	0.592
	Hour_16_x_Temp	0.018	0.028	0.514
	Hour_17_x_Temp	0.023	0.027	0.393
	Hour_18_x_Temp	0.010	0.028	0.735
	Hour_19_x_Temp	0.027	0.049	0.587
α	Constant	1.257	2.075	0.545

Using the regression coefficients shown in Table 24, the evaluation team created a time-temperature matrix (TTM) that shows expected load reductions (per device) for different outdoor temperatures and at different times of the day. The TTM is shown in Table 25. For the 5-6 PM interval at 100°F, the expected load impact is 0.49 kW per device. The expected load impact is lower for the 5-6 PM interval relative to earlier in the day because of the small commercial load profile – there is less load available for curtailment in the evening (see Figure 19).

Table 25: Small Commercial Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	0.41	0.70	0.65	0.56	0.29	0.34
104	0.41	0.70	0.64	0.55	0.29	0.33
103	0.42	0.69	0.63	0.53	0.29	0.31
102	0.43	0.68	0.62	0.52	0.29	0.29
101	0.44	0.68	0.61	0.50	0.29	0.27
100	0.45	0.67	0.60	0.49	0.28	0.25
99	0.45	0.66	0.59	0.47	0.28	0.23
98	0.46	0.66	0.58	0.46	0.28	0.21
97	0.47	0.65	0.57	0.44	0.28	0.20
96	0.48	0.64	0.56	0.43	0.28	0.18
95	0.49	0.63	0.55	0.41	0.28	0.16
94	0.49	0.63	0.54	0.40	0.28	0.14
93	0.50	0.62	0.53	0.38	0.27	0.12
92	0.51	0.61	0.52	0.37	0.27	0.10
91	0.52	0.61	0.51	0.35	0.27	0.09
90	0.53	0.60	0.50	0.34	0.27	0.07
89	0.54	0.59	0.49	0.32	0.27	0.05
88	0.54	0.59	0.48	0.31	0.27	0.03
87	0.55	0.58	0.47	0.29	0.27	0.01
86	0.56	0.57	0.46	0.28	0.26	-0.01
85	0.57	0.56	0.45	0.27	0.26	-0.03



To get an idea of the Small Commercial resource capability on aggregate, the number of active devices can be multiplied by the values shown in Table 25. As of the end of summer 2022, there were 5,464 active small commercial devices. Thus, the expected aggregate impact of an event hour ending at 6:00 PM (MDT) when the outdoor temperature is 100 degrees would be 2.66 MW. Small Commercial DCU results are subject to an operability adjustment to better reflect the fact that not all devices in the population will be able to curtail load when called due to damage, wiring, or connection issues. The operability-adjusted aggregate impact is 87% of the unadjusted impact, or 2.31 MW.

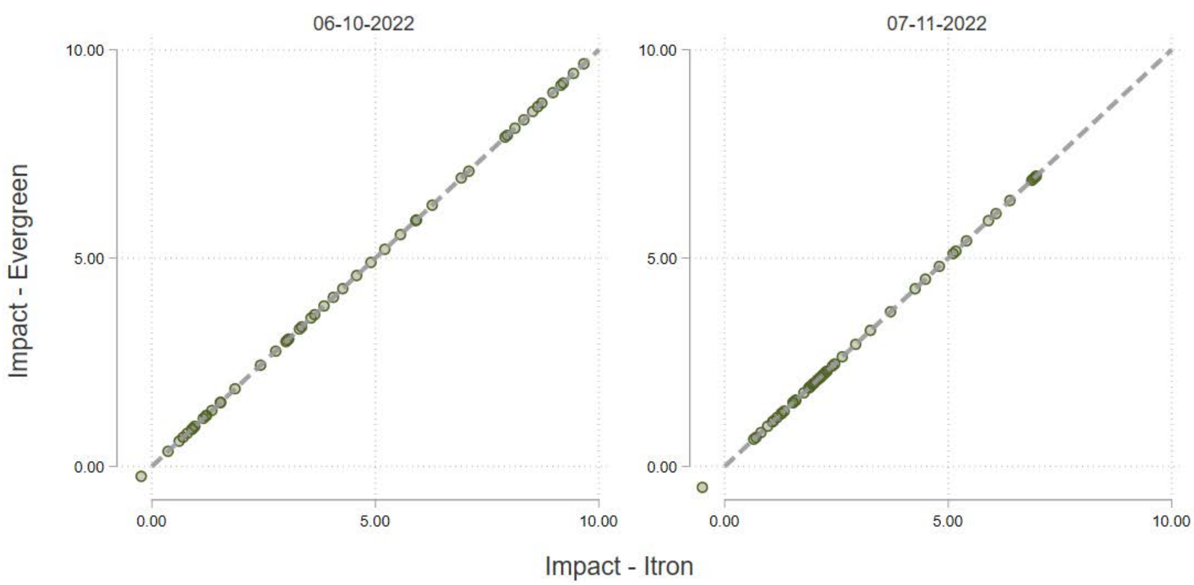
6 Medium Commercial

For the Medium Commercial program component, usage during the curtailment event is compared to usage on high load days preceding the event. This section reviews the Medium Commercial impacts calculated by Itron and validated by the evaluation team. Additionally, we provide feedback on the evaluation approach used by Itron and provide an alternative impact analysis for summer 2022 events. Finally, multiple years of event history are combined to develop ex ante impacts for various temperature scenarios.

6.1 Validation of Calculations

After receiving the participant load data from Itron, the evaluation team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 22 compares the impacts as calculated by Itron and by the evaluation team at the 5-minute level for each event day. There is essentially perfect alignment. The average difference between Itron's impacts and the evaluation teams validated impacts is less than 0.001 kW (with the evaluation teams validated impacts being slightly smaller, on average). For reference, Itron's Medium Commercial DCU impact estimates are shown in Table 26. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 8.72 kW per facility for the Medium Commercial DCU class without any adjustment for operability.

Figure 22: Medium Commercial Impact Verification



The dotted line represents what a perfect match would look like.

Table 26: Medium Commercial Impact Estimates (kW) by Date and Time[12]

Date	Hour Ending (MDT)			
	4:00 PM	5:00 PM	6:00 PM	7:00 PM
6/10/2022	9.66	8.72*	3.64*	1.53*
7/11/2022	6.94	6.97	2.63	1.89

6.2 Ex Post Impacts

As discussed in Section 1.4, the evaluation team believes that the method used to estimate impacts for the Medium Commercial program offering overstates the true average impact. For each event hour during the 2022 DR season, Table 27 shows the impact estimates produced by the evaluation team. Qualifying event hours are denoted with an asterisk (*). Our methods differed from Itron's in that in any calculation based on a maximum was replaced with a calculation based on an average.

Table 27: Medium Commercial Impact per Facility Results

Date	# of Facilities	Hour Ending (MDT)	Temp.	CBL kW	Observed kW	Impact (kW)
6/10/2022	45	16	96	60.02	51.62	8.41
		17*	97	54.61	49.10	5.51
		18*	100	50.58	48.03	2.55
		19*	97	47.72	47.05	0.67
7/11/2022	44	16	95	60.53	55.24	5.29
		17	94	53.82	50.77	3.05
		18	93	49.43	47.65	1.78
		19	91	45.79	45.26	0.53

The average impact during qualifying event hours was 2.91 kW per facility. As of the end of summer 2022, there were 3,209 active medium commercial DCUs across 439 facilities, indicating there were approximately 7.31 devices per facility. Thus, the evaluation teams per-device estimate

[12] Source: Itron's 2022 PNM Power Saver Program Report. Table 39.

during qualifying hours is 0.40 kW and the average qualifying event hour aggregate impact was 1.28 MW. Adjusted for 87% operability, the aggregate impact was 1.11 MW.

Figure 23 visualizes the impact estimates (per facility) and Figure 24 compares the evaluation teams ex post hourly impacts with the impacts calculated by Itron. The evaluation teams impact is lower in all cases, by about 1.77 kW on average.

Figure 23: Medium Commercial DCU DR Impacts by Date

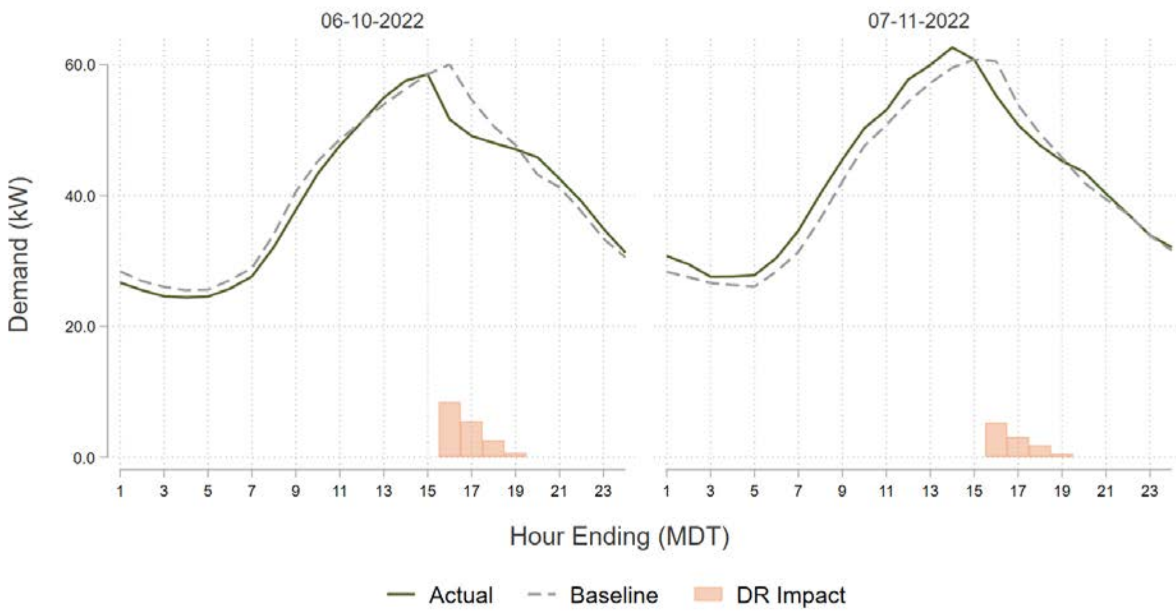
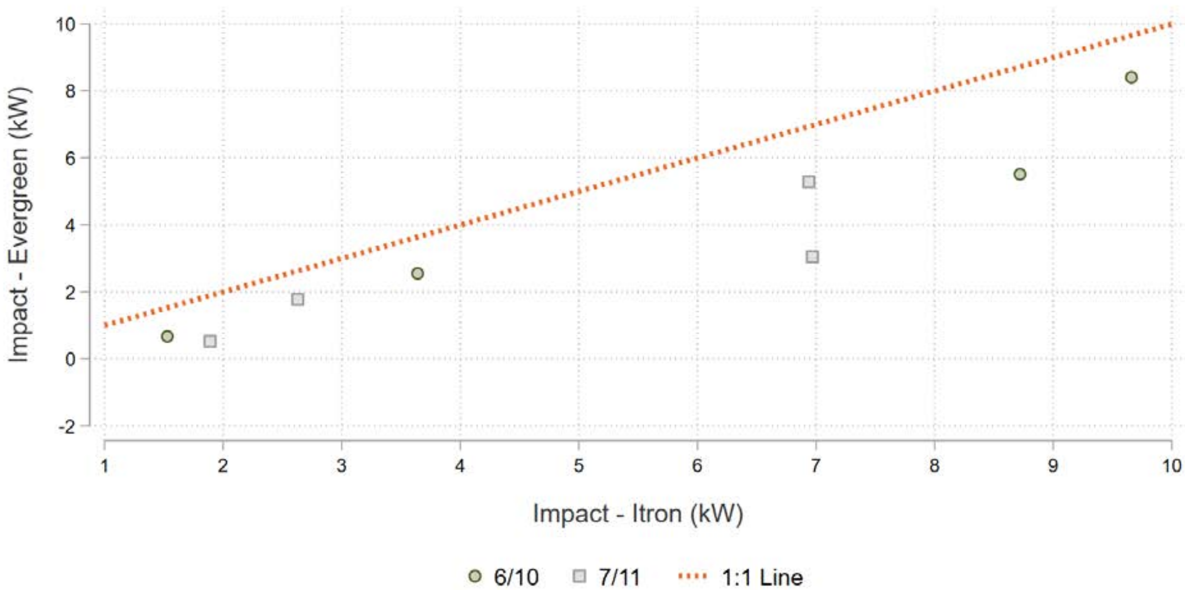


Figure 24: Comparison of Evaluated Ex Post Impacts and Itron Impacts



The 1:1 line shows what the trend would look like if the Evergreen and Itron impacts were identical.

6.2.1 Net Energy Savings

The evaluation team estimated net energy impacts for the Medium Commercial program offering by summing ex post impacts from the onset of each event through the end of the event day. The calculation of impacts is exactly as described earlier in this section. Table 28 shows the energy savings estimates (per facility) for each event day. On average, net daily energy savings were 8.50 kWh per facility. Multiplying this estimate by the number of events (two) and by the number of active facilities (439) yields an aggregate savings estimate of 7.47 MWh for the Medium Commercial program offering. After applying the 87% operability factor, the aggregate energy savings estimate is 6.50 MWh.

Table 28: Energy Savings per Facility by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/10/2022	3:00 PM	17.15	-7.76	9.39
7/11/2022	3:00 PM	10.64	-3.02	7.62
Average		**13.89**	**-5.39**	**8.50**

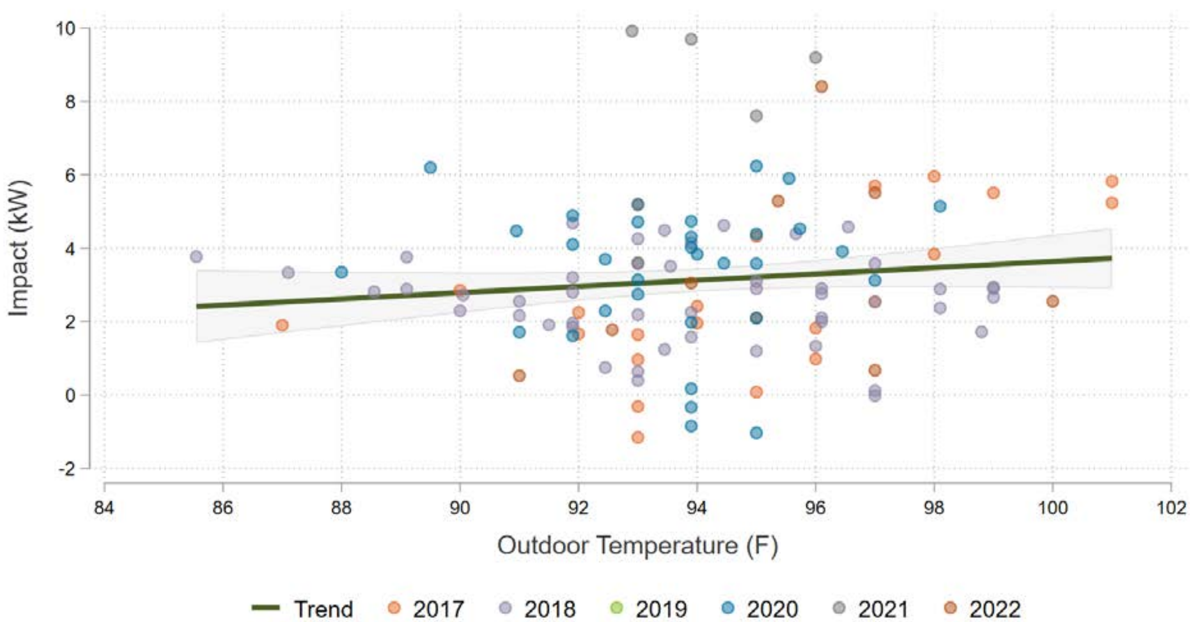
6.3 Ex Ante Impacts

While ex post impact estimates serve to measure prior program performance, ex ante impact estimates are forward-looking. In other words, ex ante estimates represent expected demand reductions in future years at peaking conditions.

To develop an ex ante impact estimate for the Medium Commercial DCU component of Power Saver, the evaluation team leveraged linear regression to model historical ex post impacts as a function of temperature and time. Figure 25 highlights the relationship between historical ex post impact estimates (2017-2022) and outdoor air temperature (in Albuquerque). The trend in temperature is quite subtle; there are only slight increases in impact magnitude as temperature increases. It is interesting to note that the 2018-2022 load impacts did not demonstrate much temperature sensitivity, while 2017 impacts did. With a small sample and large, variable customer loads, any change in sample composition can dramatically affect the overall result, meaning that any trends should be observed with caution.

The specification of the ex ante regression model was shown in Section 1.5, and the results from the model are described in more detail below. The evaluation team predicts that the impact of a Medium Commercial DCU DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 3.16 kW per facility or 0.43 kW per device.

Figure 25: Hourly Impacts against Outdoor Temperature (F)



The ex-ante regression model was run on full event hours (some events in prior summers started mid-hour) and weighted by the number of curtailed devices (each summer had slightly different numbers of dispatched devices). Regression output is shown in Table 29. In the table, note an "hour ending" convention is used (so hour 15 refers to the hour from 2:00 PM through 3:00 PM). There is no clear relationship between event hour and impact. Temperature has a positive coefficient, indicating that higher temperatures produce higher impacts. The interaction terms, represented by δ_h, are mostly negative, indicating that the incremental effect of temperature in a given hour actually decreases the impact. Due to the small sample sizes and year-to-year variability, none of the estimates in this regression are statistically significant. Results for hours 15 and 20 should be interpreted with caution, as there were only three historical events that began at 2:00 PM and only six historical events that ended later than 7:00 PM.

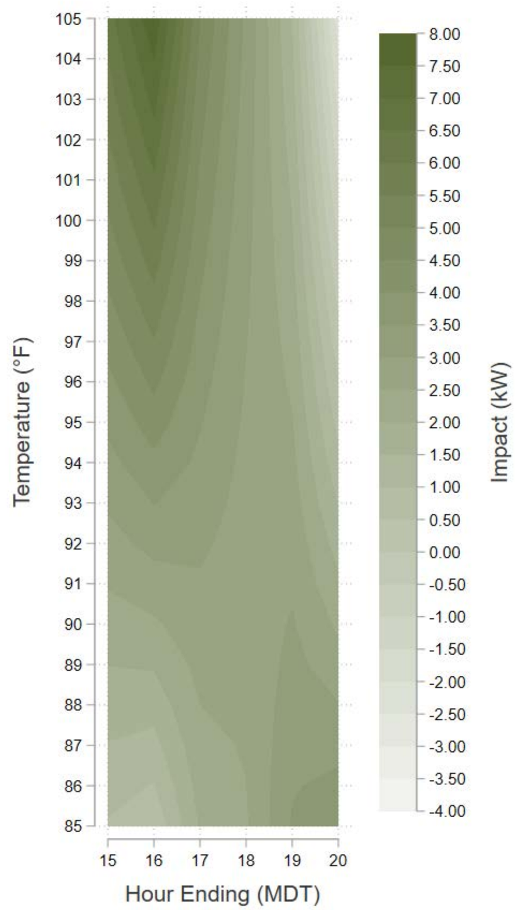
Table 29: Medium Commercial Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value
β	Temperature	0.267	0.376	0.479
γ_h	Hour 15		(base – omitted)	
	Hour 16	-8.673	38.271	0.821
	Hour 17	11.181	37.317	0.765
	Hour 18	20.089	36.421	0.582
	Hour 19	34.066	36.440	0.352
	Hour 20	52.095	42.033	0.218
δ_h	Hour_15_x_Temp		(base – omitted)	
	Hour_16_x_Temp	0.098	0.417	0.814
	Hour_17_x_Temp	-0.118	0.406	0.771
	Hour_18_x_Temp	-0.219	0.397	0.583
	Hour_19_x_Temp	-0.370	0.397	0.354
	Hour_20_x_Temp	-0.577	0.461	0.213
α	Constant	-21.719	34.324	0.528

Using the regression coefficients shown in Table 29, the evaluation team created a time-temperature matrix (TTM) that shows expected load reductions (per facility) for different outdoor temperatures and at different times of the day. The TTM is shown in Table 30. Using the model, the evaluation team predicts that the impact of a Medium Commercial DR event at peaking conditions (5:00 PM – 6:00 PM MDT when outdoor temperature is 100 degrees) is 3.16 kW per facility, or 0.43 kW per device.

Table 30: Medium Commercial Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	6.27	7.90	5.02	3.40	1.50	-2.26
104	6.01	7.53	4.87	3.36	1.60	-1.95
103	5.74	7.17	4.72	3.31	1.70	-1.63
102	5.47	6.80	4.57	3.26	1.81	-1.32
101	5.21	6.44	4.43	3.21	1.91	-1.01
100	4.94	6.07	4.28	3.16	2.01	-0.70
99	4.68	5.71	4.13	3.12	2.12	-0.39
98	4.41	5.34	3.98	3.07	2.22	-0.08
97	4.14	4.98	3.83	3.02	2.32	0.23
96	3.88	4.61	3.68	2.97	2.43	0.54
95	3.61	4.25	3.54	2.92	2.53	0.85
94	3.34	3.89	3.39	2.88	2.63	1.16
93	3.08	3.52	3.24	2.83	2.74	1.47
92	2.81	3.16	3.09	2.78	2.84	1.78
91	2.54	2.79	2.94	2.73	2.94	2.10
90	2.28	2.43	2.80	2.68	3.05	2.41
89	2.01	2.06	2.65	2.64	3.15	2.72
88	1.74	1.70	2.50	2.59	3.25	3.03
87	1.48	1.33	2.35	2.54	3.36	3.34
86	1.21	0.97	2.20	2.49	3.46	3.65
85	0.94	0.60	2.06	2.45	3.56	3.96



To get an idea of Medium Commercial resource capability on aggregate, the number of active facilities can be multiplied by the values shown in Table 30. As of the end of summer 2022, there were 439 active Medium Commercial facilities. Thus, the expected aggregate impact of an event hour ending at 6:00 PM (MDT) when the outdoor temperature is 100 degrees would be 1.39 MW. Medium Commercial DCU results are subject to an operability adjustment to better reflect the fact that not all devices in the population will be able to curtail load when called due to damage, wiring, or connection issues. The operability-adjusted aggregate impact is 87% of the unadjusted impact, or 1.21 MW.

7 Recommendations

After our review of the 2022 Power Saver program, the evaluation team offers the following recommendations:

- Ex post impacts provide a helpful look at program performance. For planning purposes, a consistent, weather-normalized impact estimate should be used. The evaluation team recommends that ex ante program impacts from 5:00 PM to 6:00 PM MDT at 100°F, de-rated for operability, be used for reporting, cost-effectiveness, and planning.
- The Itron contract definition of capacity performance is upwardly biased by capturing favorable noise along with the program impact. If there is a chance to review the terms, we recommend collapsing to the hourly mean rather than the maximum.
- For the BYOT component, Itron used an alternative baseline adjustment mechanism for one of the events rather than the contractually-agreed upon adjustment. The resulting impact estimates were higher than they would have been using the adjustment method called for in Itron's contract with PNM and in Itron's M&V Plan for the year. Importantly, all of the qualifying event hours for the BYOT component occurred during the event in which Itron employed the alternative adjustment. Thus, the kW reduction estimate for this component is overstated in Itron's report. Itron should refrain from ad hoc adjustments to the terms agreed to in the contract and laid out in the M&V plan.
- The connected load assumption used to convert air conditioner runtime to electric demand for the thermostat program components is high given the average air conditioner size in the region. It is also higher than the assumed value in the smart thermostat protocol of the New Mexico TRM. We revised the assumption for the ex post analysis of BYOT, but not for Two-Way because Itron technicians record A/C nameplate information during installation of Two-Way thermostats. Currently the BYOT and Two-Way thermostat offerings represent a small fraction of the Power Saver resource capability, but as they grow it will be important to base the load impact calculations on sound assumptions.

Appendix G: Peak Saver Detailed Evaluation Methods and Findings

Public Service New Mexico (PNM) offers the Peak Saver program to non-residential customers with peak load contributions of at least 50 kW. The program compensates participants for reducing electric load upon dispatch during high periods of high system load. Enbala implemented the Peak Saver program in 2022, handling the enrollment, dispatch, and settlement with participating facilities and three demand response events. The events are summarized in Table 31.

Table 31: 2022 Peak Saver Event Summary

Date	Weekday	Participants	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
06/10/2022	Friday	159	3:00 PM	7:00 PM	100
07/11/2022	Monday	159	2:00 PM	6:00 PM	95
09/02/2022	Friday	159	5:00 PM	7:00 PM	93

After the 2022 demand response (DR) season concluded, Enbala provided the evaluation team with one-minute interval load data and end-of-season summary information on performance metrics for each site/event combination. The interval data spanned from May 19th to September 4th and included load impacts calculated using a customer baseline (CBL) method outlined in the PNM-Enbala contract. A CBL is an estimate of participant loads absent the DR event dispatch, and load impacts are the difference between CBL and the metered load during the event. The relevant CBLs were also included in the one-minute load data.

Using these data sources, the evaluation team completed our verified savings analysis. The three key steps in the analysis were:

1) Reproducing the performance estimates calculated by Enbala using the contractually-agreed upon CBL method;
2) Assessing the accuracy of the contract CBL method by examining its ability to predict loads on non-event weekdays; and
3) Modifying the CBL methodology to reduce bias and calculate verified impacts for each event.

The subsequent sections describe the findings of our analysis.

1 Validation of Settlement Calculations

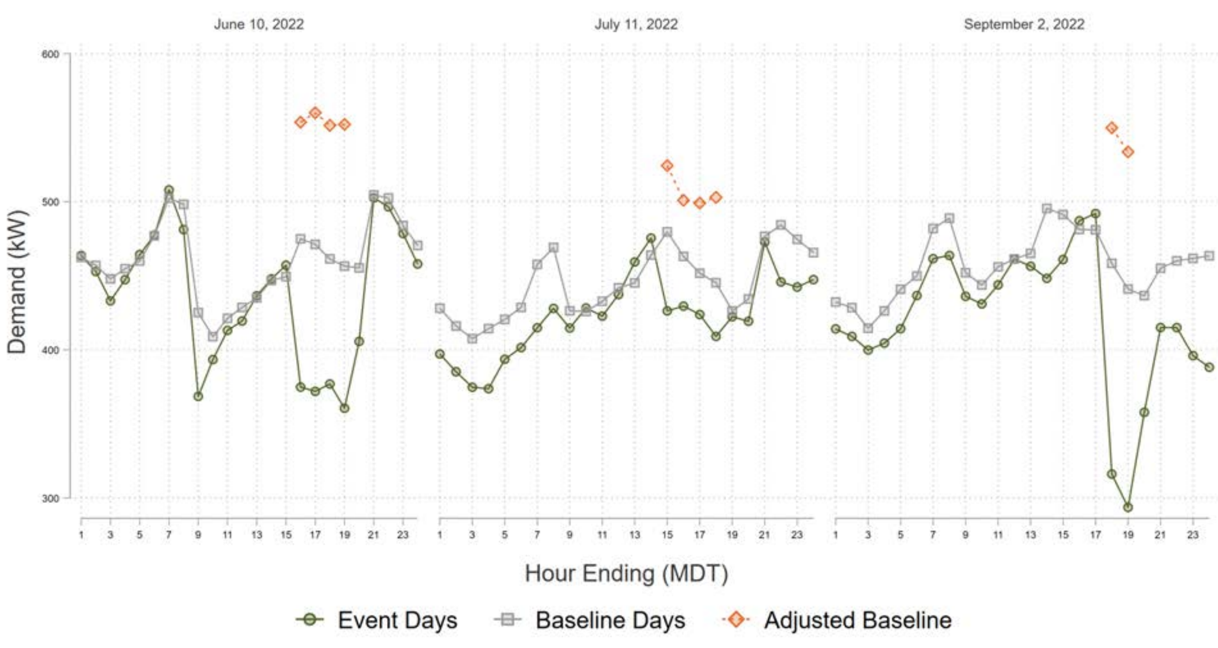
The settlement calculations called for a "high 3-of-5" baseline with an uncapped, asymmetric day-of adjustment. To determine the high 3-of-5 days, the following process was used:

- Select the five non-holiday, non-event weekdays that immediately precede the event; and
- Out of those five days, pick the three days with the highest average demand during the hours in which the event occurred. In the case of a tie, the baseline day chosen was the one closest to the event day.

Our team was successful in replicating almost all of the settlement baselines. Enbala's average settlement baseline for all sites and event hours was 532.85 kW, while our team's average settlement baseline was 532.86 kW. Any variances between the settlement baseline and our team's baseline were minimal, with differences typically less than 0.01 percent. The baseline calculations adhered to a highly consistent rule set, with the exception of one participant with solar and negative loads during daytime hours. Section 2.3 details the methodological considerations for net exporting sites.

Figure 26 shows the average hourly event day loads for the full population, the average hourly loads on the high 3-of-5 baseline days, and the average hourly baselines for the event intervals. Note dispatch hours varied across events days (3:00 PM to 7:00 PM on June 10th, 2:00 PM to 6:00 PM on July 11th, and 5:00 PM to 7:00 PM on September 2nd).

Figure 26: Peak Saver Loads and Baselines



Once we validated that the baselines were calculated according to the contract methods, our team proceeded to the performance metric calculations. The performance metrics are defined as follows:

- **10-Minute Participant Capacity Performance** – The difference between the CBL and the lowest actual electrical demand measured by a one-minute interval reading between eight and ten minutes after the start of an event.
- **Average Participant Capacity Performance** – The average difference between the CBL and the participant's actual electric demand beginning ten minutes after the initiation of the event.
- **Participant Event Capacity Performance** – Weighted average of 10-Minute Participant Capacity Performance (40% weight) and Average Participant Capacity Performance (60% weight).
- **Energy Delivered** – The difference (in kWh) between the adjusted CBL and the metered load summed across all DR event hours.

Using the settlement baselines, all performance calculations were replicated without problem. Table 32 shows portfolio performance metrics by date.

Table 32: Peak Saver Performance Metrics by Date – Contract Settlement Method

Date	10-Minute Participant Capacity (kW)	Average Participant Capacity (kW)	Participant Event Capacity Performance (kW)	Energy Delivered (kWh)
06/10/2022	29,543	27,456	28,882	111,137
07/11/2022	17,476	11,761	14,578	50,955
09/02/2022	37,736	36,316	37,032	71,673
Average	**28,252**	**25,178**	**26,831**	**77,922**

2 Assessment of CBL Accuracy

Developing an unbiased prediction of what load would have been absent a demand response event is essential to producing a defensible demand response impact estimate. This hypothetical non-event load is the customer baseline (CBL). If the CBL methodology tends to produce unbiased estimates of load (i.e., average error of zero), then demand response impact estimates will also be unbiased. If the CBL tends to overpredict or underpredict load, then demand response impacts will be overstated or understated.

This section details our review of the Enbala contract CBL methodology (described at the beginning of Validation of Settlement Calculations). Specifically, we assess the ability of the CBL methodology to predict load on non-event weekdays, and we explore the distribution of adjustment factors.

2.1 Placebo Event Analysis

Assessing the accuracy of a baseline on an event day is not possible because the counterfactual is unknown. In other words, we do not know what the demand would have been if the event was not called. However, on non-event weekdays there is no demand response, so using the same algorithm to generate a baseline should reasonably predict the metered load. For these days, the true value of demand response is 0 kW so if the baseline yields a non-zero impact estimate, it can be attributed to error. Individual errors are expected as the lookback window is not intended to be a perfect predictor of future load. That said, an unbiased baseline methodology should produce a distribution of errors which is centered around zero, on average.

To evaluate the accuracy of the settlement CBL, the Evergreen team analyzed the central tendency of prediction errors by creating placebo event days from each non-event weekday for which there was sufficient data to calculate a high 3-of-5 baseline. The team assumed that each placebo event would start at 3:00 PM and last for four hours until 7:00 PM. This timing mimics several historical Peak Saver DR events. For each placebo event, the aggregate hourly CBL was calculated by summing the average hourly CBLs during the event window at each site. The same method was used to calculate the aggregate metered load. Since demand response was not dispatched, the impact estimate (the difference between CBL and metered load) should be zero. Any deviation from zero is considered error. Notably, negative impacts were not zeroed out, and sites with solar power were excluded from this analysis. For sites with solar, the baseline adjustment mechanism used in the settlement CBL is affected by cloud coverage as well as gross load. That’s problematic, of course, but it’s a separate issue that we did not want to confound with the results of the exercise described in this section.

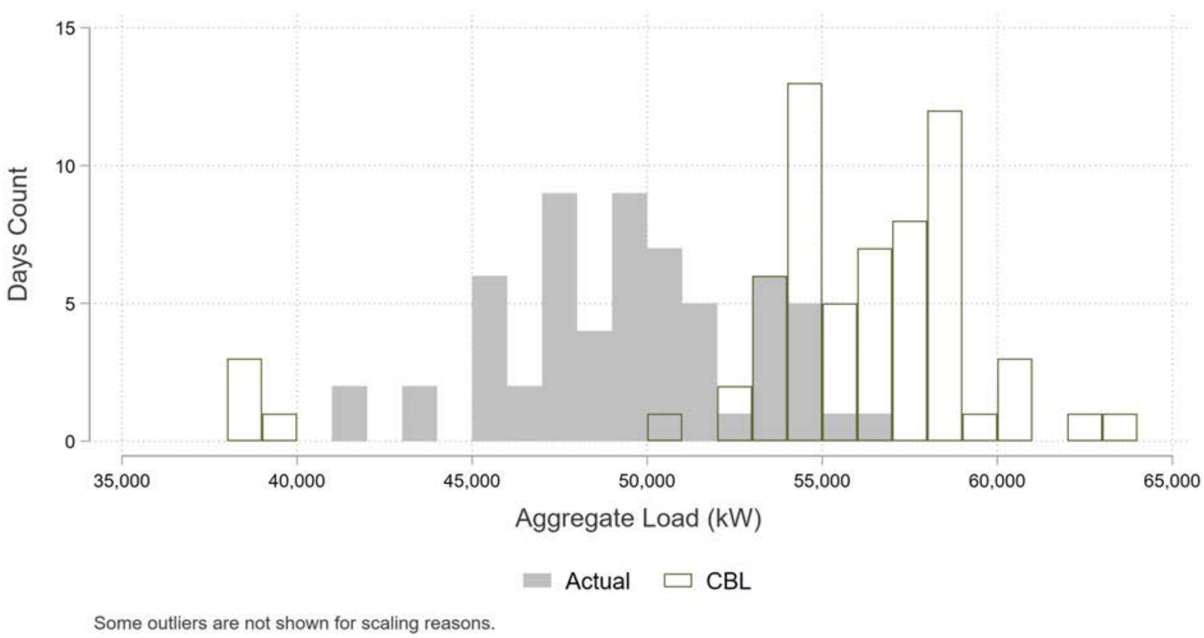
Results for the settlement baseline, aggregated by month, are shown in Table 33. On average, the baseline produced about 6.5 MW of upwards bias (meaning the baseline overstated load by 6.5 MW). The average percent bias across the 67 placebo events was 14 percent. Since actual DR reductions are not 100 percent of load, the bias in impact estimates for actual events is necessarily greater than 14 percent.

Table 33: CBL Accuracy Assessment for Placebo Events

Month	Number of Placebo Events	Avg. Daily High Temp at KABQ	Avg. Aggregate Metered Load (kW)	Avg. Aggregate CBL (kW)	Avg. Error (kW)
June	22	87.5	43,381	50,559	7,178
July	20	92.3	47,815	54,616	6,802
August	23	87.3	49,805	55,815	6,009
September	2	91.0	25,252	27,710	2,458
Weighted Average	**---**	**89.0**	**46,369**	**52,892**	**6,524**

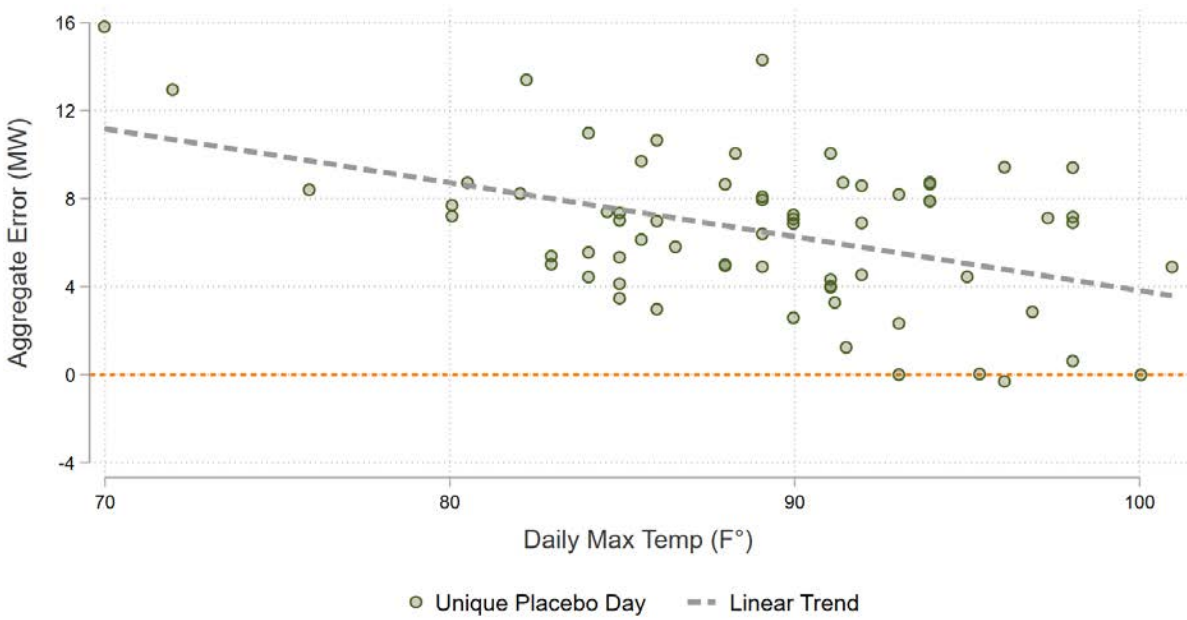
Figure 27 compares actual aggregate load from the placebo event days (gray bars) to aggregate baselines (translucent bars). Ideally, the two distributions would be approximately identical. It is clear from the distribution that the CBL is upward biased

Figure 27: Histogram of Placebo Event Days – Settlement Method



The placebo days summarized in Table 33 are not perfect representations of actual event days, which tend to be the hottest days of the summer. DR events are called because system operators expect higher than normal loads which will approach the constraints of the system. As a result, the performance of a baseline on hot days is much more important for assessing accuracy than its performance on a mild day. As shown in Figure 28, the settlement method shows less bias at extreme temperatures. That said, the average error on a placebo day with a maximum temperature of at least 90 degrees was still over 5.2 MW.

Figure 28: Enbala Average Aggregate Baseline Error vs. Temperature



The Evergreen Team believes that the primary reason for the large errors in the settlement CBL is the asymmetric application of the weather-sensitive adjustment. The baseline can only be adjusted up, not down, which naturally biases the error upward. The unadjusted baseline actually produces less aggregate error than the adjusted baseline. While adjusting the baseline using event day loads has been shown to improve accuracy, the adjustment needs to be bi-directional. In most organized demand response markets, including PJM, CAISO, and ISO New England, a symmetric adjustment is employed.

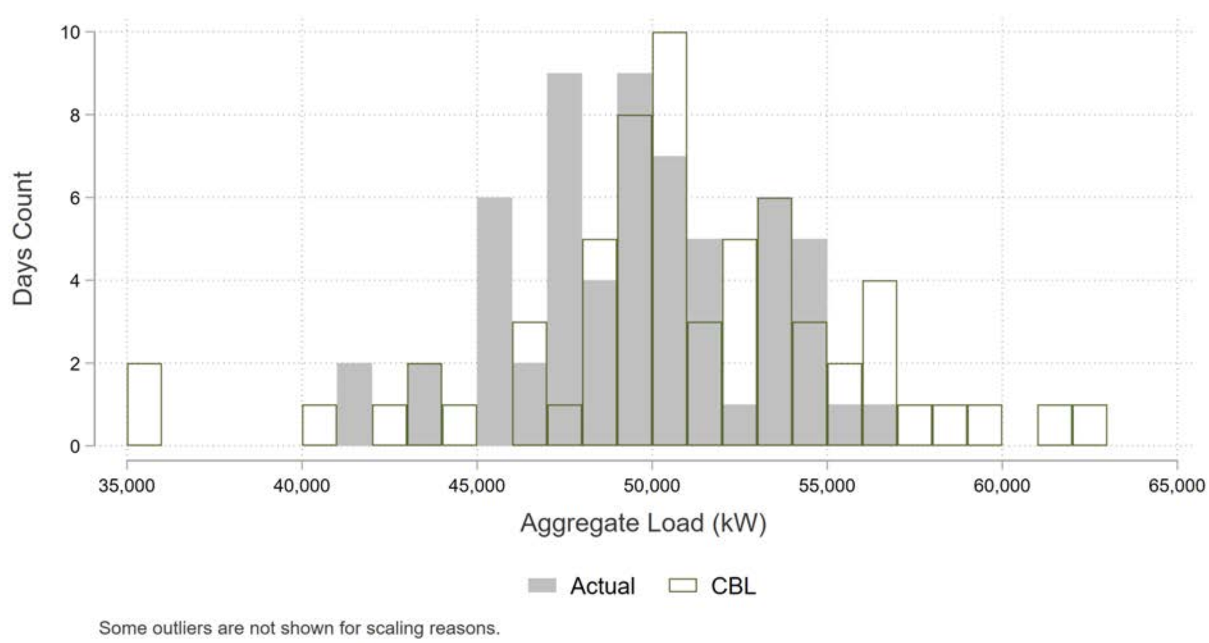
To demonstrate the impact of a symmetric adjustment, we modified the CBL methodology to allow for adjustments in both directions. Using this new adjusted baseline, we conducted the same accuracy test described earlier. The results, presented in Table 34, show an average error of less than 1.6 MW.

Table 34: Accuracy Assessment with Symmetric Adjustment

Month	Number of Placebo Events	Avg. Daily High Temp at KABQ	Avg. Aggregate Metered Load (kW)	Avg. Aggregate CBL (kW)	Avg. Error (kW)
June	22	87.5	43,381	44,967	1,586
July	20	92.3	47,815	50,104	2,289
August	23	87.3	49,805	50,799	994
September	2	91.0	25,252	26,076	824
Weighted Average	**---**	**89.0**	**46,369**	**47,939**	**1,570**

Figure 29 shows the same histogram as Figure 27 but using the symmetric adjustment rather than the asymmetric adjustment. It is clear that the actual and counterfactual loads are better aligned in this case.

Figure 29: Histogram of Placebo Event Days – Symmetric Adjustment



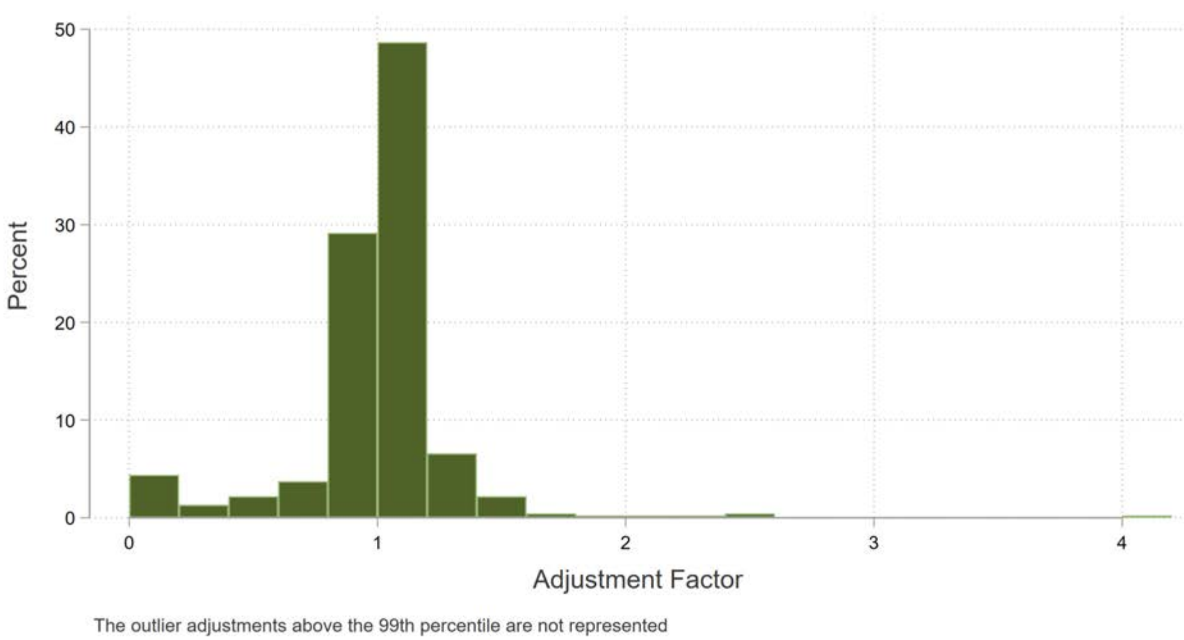
Using an asymmetric adjustment yielded an average error of 6.5 MW and an upwards bias of 14 percent. Using a symmetric adjustment yielded an average error under 1.6 MW and an upwards bias of 3.2 percent. While the baseline with a symmetric adjustment still overestimates on average, the distribution of errors falls on both sides of zero and the mean prediction is much closer to true load.

2.2 Adjustment Factors

As demonstrated above, the application of the adjustment factor plays a significant role in the accuracy of the CBL. Because the adjustment in the settlement CBL is applied as a multiplicative adjustment, even values that appear close to 1 (i.e., 1.1) can result in significant adjustments for large customers. The average symmetric adjustment factor across event days and sites was 1.10. The median factor, which is unaffected by extreme values, was 1.02.

Figure 30 shows the distribution of adjustment factors (except for the top 1 percent of observations). Recall that the adjustment factors are only applied if they increase the baseline in the contract CBL. In other words, any factor less than one is rounded up to one. In the majority of cases, the adjustments produced baseline values that were reasonable in the context of their distribution of load throughout the summer. Still, there were a handful of adjustment factors larger than two. Even for the most extreme cases of weather sensitivity, adjusting the baseline by a factor of two or more is dubious. Undoubtedly, leaving the asymmetric adjustment factor uncapped leads to an upwards bias in event day baselines, particularly when the adjustment is not symmetric. This again means impacts are, on average, being overstated using the settlement baseline calculation method. This can be addressed by subjecting the adjustment factor to a cap which prevents the adjustment factor (and the CBL) from taking on extreme values.

Figure 30: Distribution of Adjustment Factors



Extreme adjustment factors were relatively uncommon in the 2022 evaluation, with only one site receiving an adjustment larger than 10 (25.3). The Evergreen team investigated load at this site to see if we could determine what happened. Figure 31 shows average hourly demand for the baseline days and hourly demand for the event day in question. The settlement baseline is orders of magnitude higher than the hourly demand during the event hours. Figure 32 shows the same graph with the settlement baseline removed for clarity. Note the change in scale of the y-axis. The customer's highest metered load for the whole summer was only 133 kW. Perhaps the site did curtail load during the event, but a baseline of 800 kW is unreasonable for this site. This investigation helps to highlight the problematic nature of an uncapped adjustment in conjunction with erratic load patterns.

Figure 31: Investigating a Large Adjustment Factor

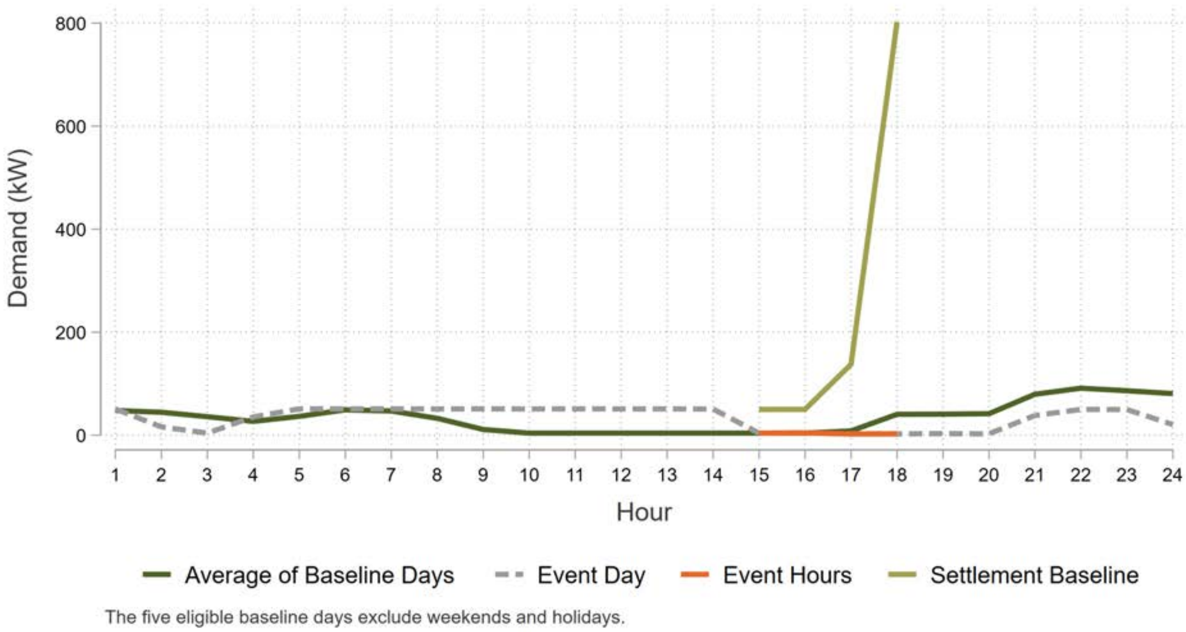
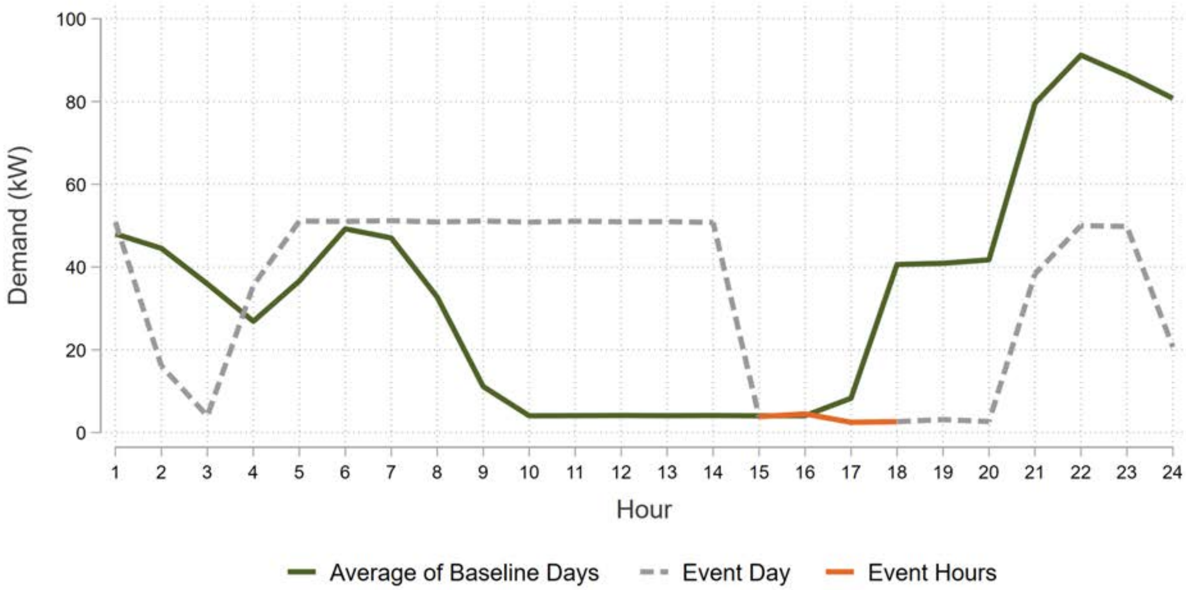


Figure 32: Investigating a Large Adjustment Factor – Settlement Baseline Removed



The five eligible baseline days exclude weekends and holidays.

For sites with solar power, the adjustment factor is dependent on a cloud coverage effect that is not accounted for. If cloud cover begins mid-way through the adjustment window on the event day, net utility-supplied load for the hour will increase. If the lookback days were all sunny, then average load during the adjustment window on the lookback days will necessarily be lower than average load during the same window on the event day. This will result in a large adjustment ratio.

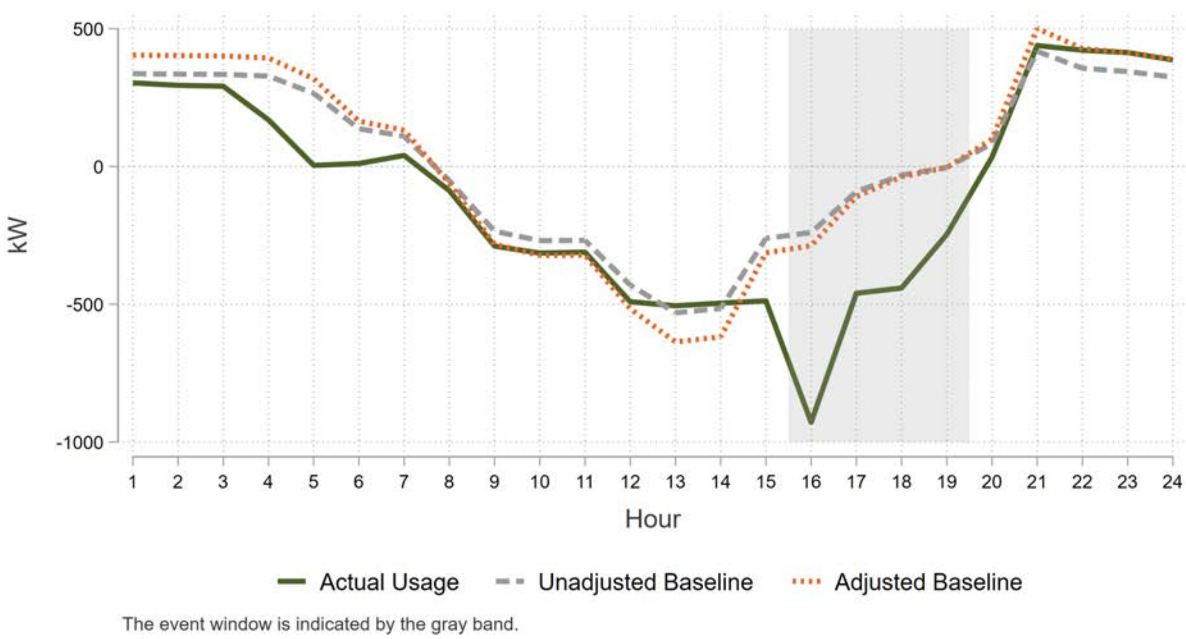
A similar effect may occur if sites engage in pre-cooling or pre-pumping in response to the pending demand response event. There is nothing wrong or nefarious about such behavior, but when this occurs, the adjustment factor will be artificially inflated.

The adjustment factor is intended to correct for the differences in load between event and baseline days that result from the non-random selection of event-days. Event days are typically the hottest days of the summer and, as such, may be reasonably expected to have higher demand than baseline days. However, a weather adjustment need not be applied to sites which do not have weather sensitive load. It is our view that sites identified as weather sensitive are the only ones which should receive an adjustment to the baseline (excluding those with solar power and those who pre-pump in preparation for the demand response event).

2.3 Solar Plus Storage

Sites that are exporting to the grid during typical event hours create an interesting baseline issue because DR actions make the load more negative. A multiplicative adjustment greater than 1.0 makes the CBL more negative, which lowers the estimated DR performance. During the 2022 evaluation, one site which had solar paired with a behind-the-meter battery encountered this issue. Figure 33 illustrates this occurrence on the June 10th event. The negative baseline values reflect that this site is a net exporter on the baseline days. Their net exports were larger on the event day than the baseline days, resulting in an adjustment factor greater than 1. This ultimately led to the adjusted baseline falling beneath the unadjusted baseline. To resolve this issue, the Enbala team used the unadjusted baseline rather than the adjusted baseline.

Figure 33: Multiplicative Adjustment Factor and Battery Discharge



3 Evaluated Impacts

3.1 Approach

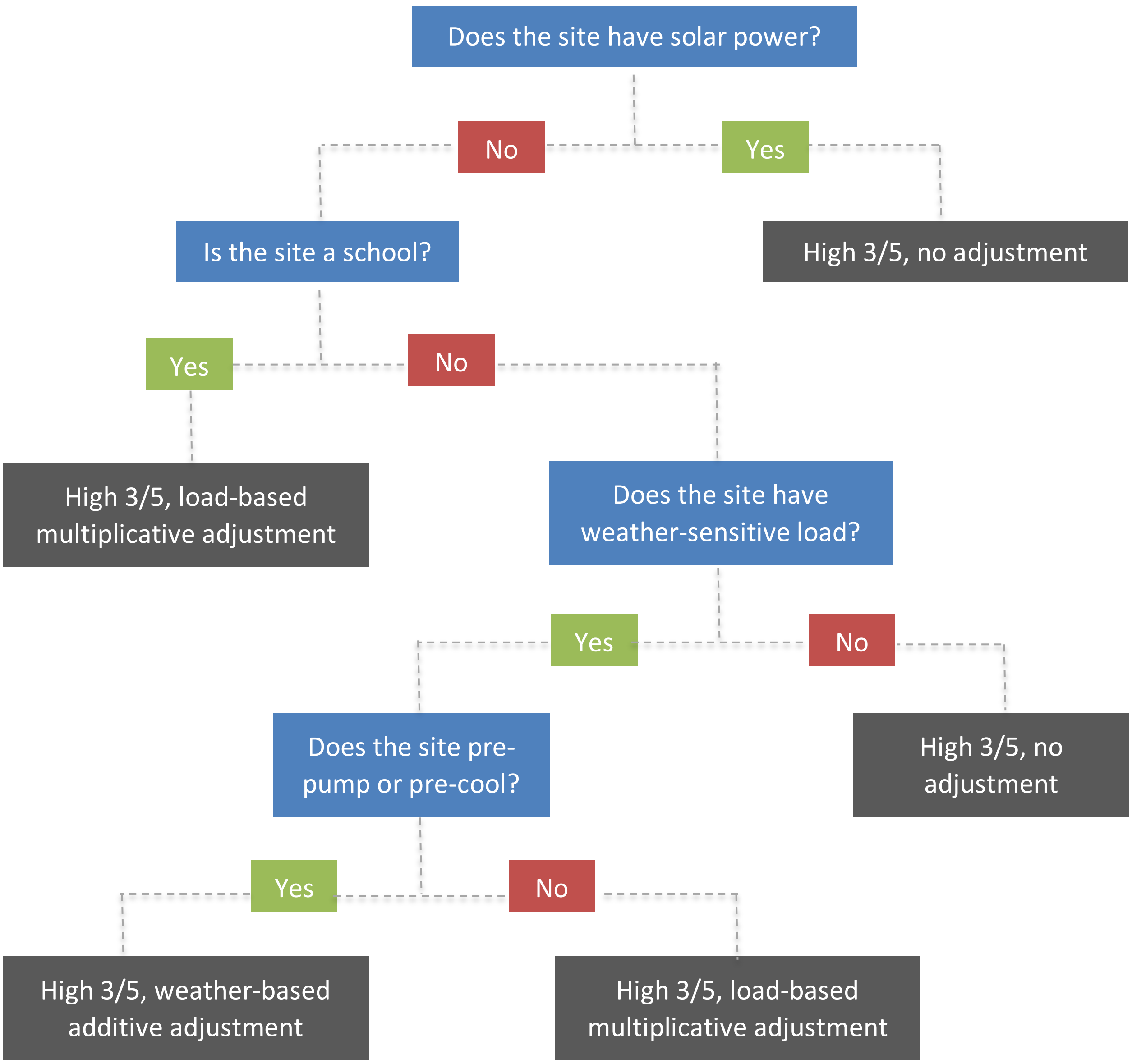
Based on our review of the contract CBL methodology used to generate the settlement baselines and impact estimates, the Evergreen team calculated the evaluated CBL (and the performance metrics they feed into) using the following methodology:

- The multiplicative adjustment factor is symmetric, meaning it can increase or decrease baselines, rather than only serving to increase baselines;
- The multiplicative adjustment factor is capped at ±20 percent rather than uncapped;
- The multiplicative adjustment factor is only applied to sites that (1) have weather sensitive loads, (2) do not have solar power, and (3) do not pre-pump or pre-cool prior to demand response events; and

- For sites that meet the first two requirements listed above but not the third, an additive adjustment factor based on weather was applied rather than an adjustment factor based on pre-event load.

Additionally, all schools without solar power were given the load-based multiplicative adjustment factor. A CBL method flow chart is presented in Figure 34.

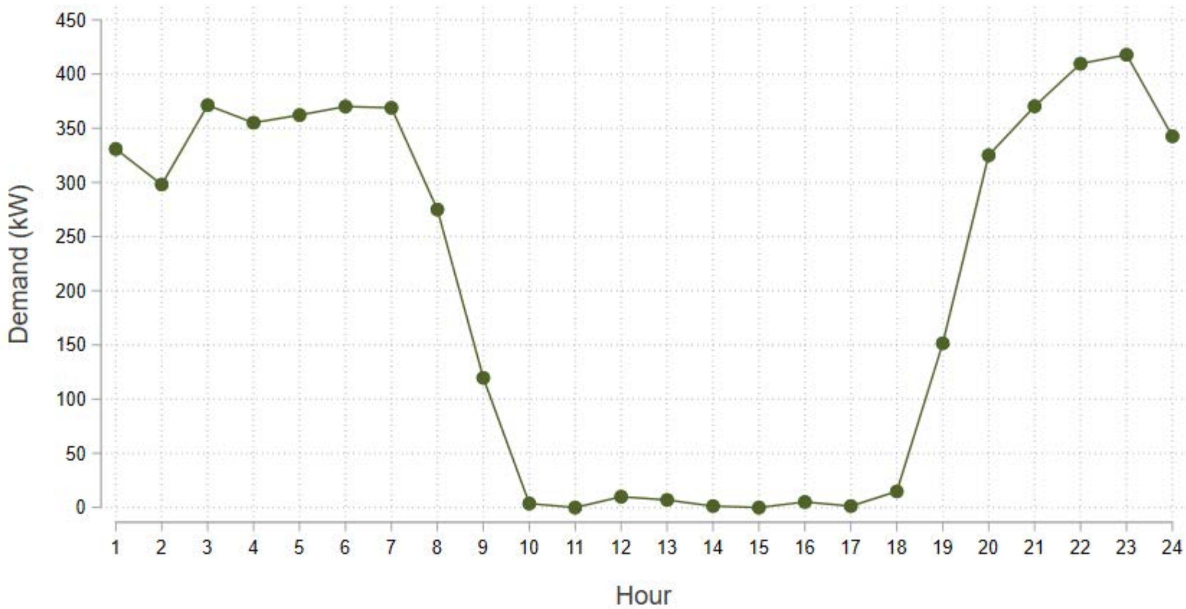
Figure 34: Adjustment Factor Assignment



To determine which sites have solar power, our team reviewed hourly load profiles for the full population of program participants. Sites that showed the distinct solar net load profile, as in

Figure 35, were treated as solar sites. Additionally, Enbala provided the Evergreen team with a list of sites with known solar power. In total, 33 of 159 sites were considered sites with solar power.

Figure 35: Example of Solar Load Profile



Regarding weather-sensitive loads, the Evergreen team estimated weather sensitivity at each site by assessing the relationship between load and temperature during the combined event hours (2:00 PM – 7:00 PM, which includes the most common adjustment window) on non-event, non-holiday weekdays during the 2022 summer. Sites were considered to be weather sensitive if (1) the correlation between temperature and load was positive and (2) temperature was found to be a statistically significant predictor of load. In total, 106 of the 159 sites met these criteria.

Regarding pre-pumping or pre-cooling, our team reviewed hourly load profiles on event days and baseline days for the full population of program participants. Figure 36 illustrates this exercise. Sites with a notable incline in pre-event load, relative to load during the same hours on baseline days, were treated as pre-pumpers or pre-coolers. This is a reasonable action for a demand response participant. The issue is that pre-pumping behavior inflates the baseline adjustment, which is calculated based on pre-event load. In total, only nine of 159 sites were considered pre-pumpers. (Note we're using "pre-pumping" as a catch-all term to identify any load-shifting behaviors that precede a DR event.)

Figure 36: Example of Pre-Pumper Load Profile

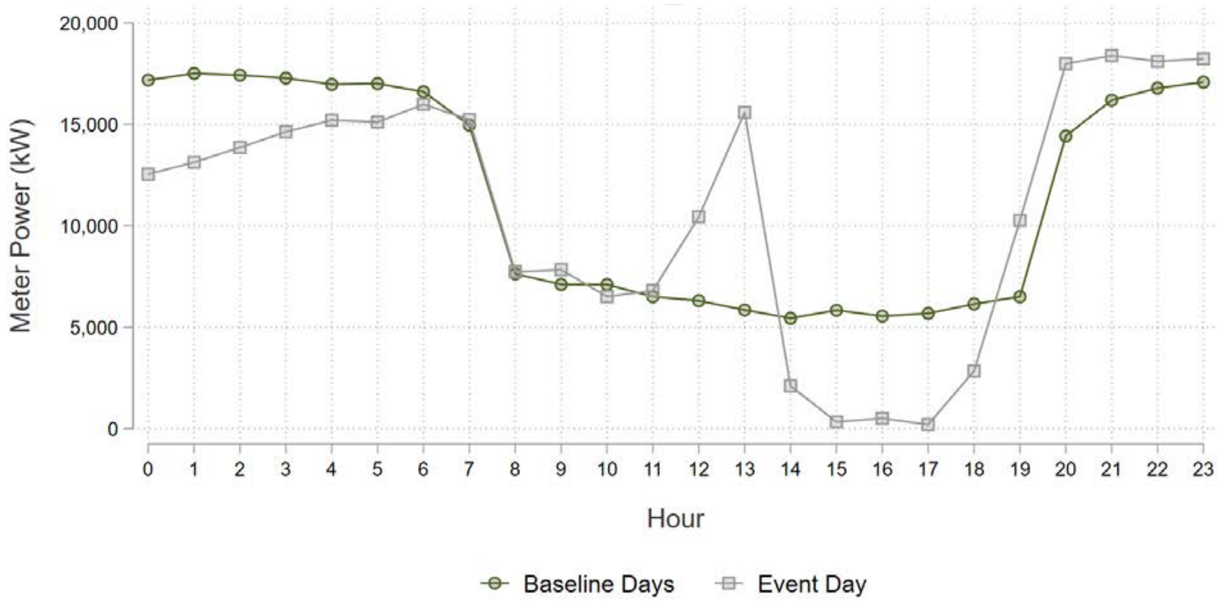


Table 35 shows the distribution of CBL methodology for the 2022 verified savings analysis. Note the weather-based adjustment is an additive adjustment similar to the weather-based adjustment used by PJM.[13] The adjustment is calculated as:

$$Adjustment = Slope * (\Delta_{Temp})$$

In the equation above, "Slope" is a value that quantifies the relationship between outdoor temperature and load for the facility (i.e., for each one-degree increase in temperature, how much does load increase on average?). This value is determined via the regression modeling. The second component, Δ_{Temp}, represents the difference between the average outdoor temperature during the event and the average outdoor temperature during the event window on the three selected baseline days.

[13] Available at https://www.pjm.com/-/media/markets-ops/demand-response/dsr-weather-sensitive-adjustment-using-wsa-factor-method.ashx?la=en

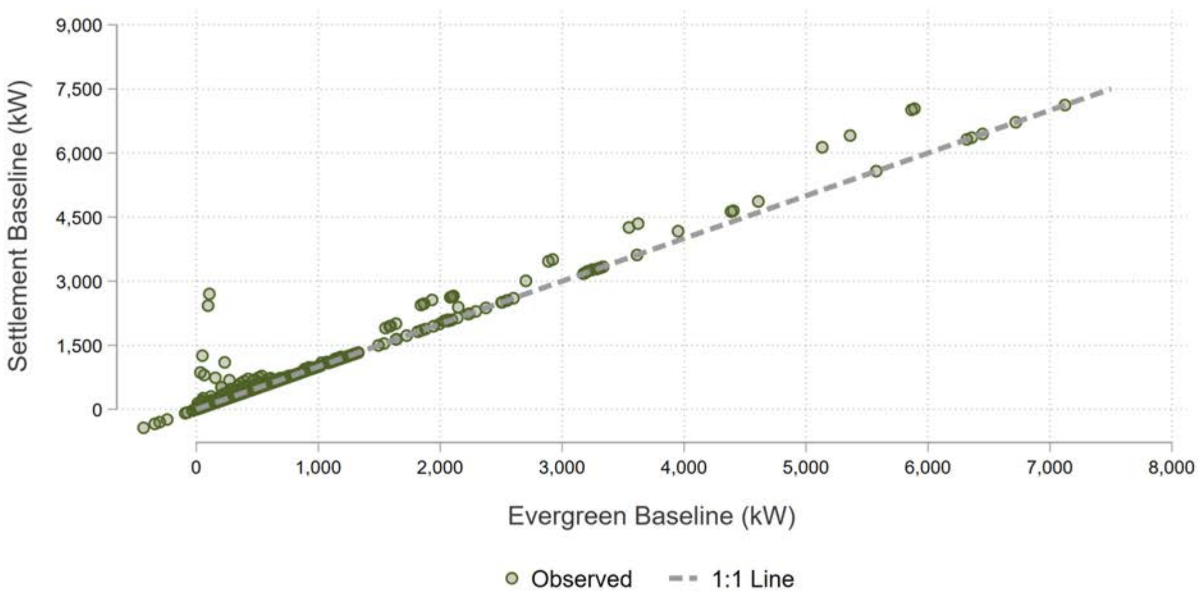
Table 35: Distribution of CBL Method

CBL Approach	Number of Sites
High 3/5, no adjustment	71
High 3/5, load-based multiplicative adjustment	86
High 3/5, weather-based additive adjustment	2
Total	**159**

3.2 CBL Comparison

Because the Evergreen team calculated baselines in a manner that was similar to settlement baseline methodology, the baselines themselves were largely similar. The correlation between the two methods can be seen in Figure 37, which compares the baselines calculated by our team with the settlement baselines. One site, whose demand is significantly higher than the other sites, is shown in a separate figure (Figure 38) due to the vast difference in scale.

Figure 37: Baseline Comparison – All Sites but One



The 1:1 line represents what the trend would look like if the two methods produced identical baselines.

Figure 38: Baseline Comparison – Separate Site

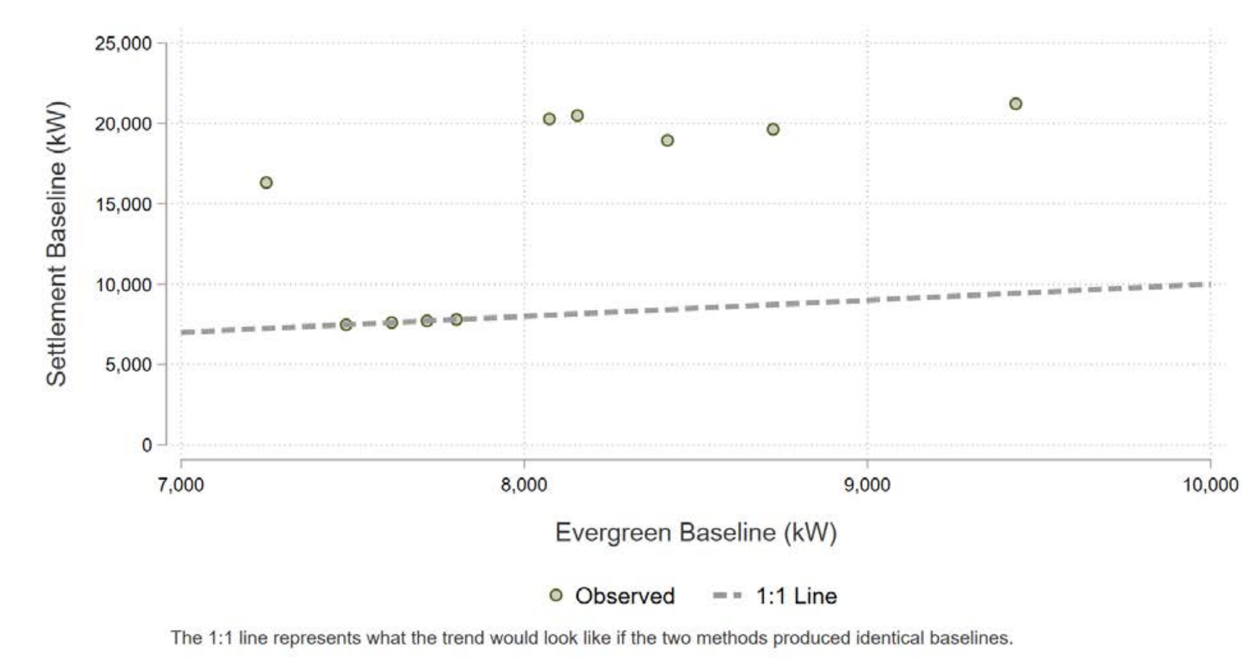


Table 36 and Table 37 show the average aggregate baseline under the settlement method and under the Evergreen method. The settlement method is naturally going to produce a much larger baseline since it uses an asymmetric adjustment mechanism. Table 37 singles out a site that has significantly higher demand, which is absent from Table 36. This site accounts for 60 percent of the differences in baselines. Notably, the settlement baseline for this site matches the Evergreen baseline for the 7/11 event.

Table 36: Baseline Comparison – All Sites but One

Date	Settlement Baseline (kW)	Evergreen Baseline (kW)	Difference (kW)
06/10/2022	66,329	63,305	3,024
07/11/2022	70,394	64,075	6,319
09/02/2022	62,533	60,983	1,550
Average	**66,419**	**62,788**	**3,631**

Table 37: Baseline Comparison – Other Site

Date	Settlement Baseline (kW)	Evergreen Baseline (kW)	Difference (kW)
06/10/2022	19,026	8,456	3,940
07/11/2022	7,653	7,653	0
09/02/2022	20,380	8,114	12,266
Average	**15,686**	**8,074**	**5,402**

3.3 Performance Metrics

The results of the Evergreen team's 2022 Peak Saver Demand Response evaluation are shown in Table 38. For comparison, the savings produced by the program implementer are shown in Table 39. Note that we do not zero out any negative performance metrics in our evaluated impacts but the program implementer does zero out the verified capacity performance if it is negative. On average, the verified capacity performance estimates using the Evergreen methodology are 58 percent of the values calculated by Enbala using the settlement CBL. Section 2 described some of the drivers leading to lower estimates for the Evergreen method.

Our findings indicate the Peak Saver program is approximately a 15.4 MW capacity resource, down from the 2021 estimate (17.5 MW). Importantly, there was substantial variation in verified capacity performance between the three events in the 2022 season (15.3 MW in June, 7.9 MW in July, and 23.1 MW in September). A few key sources of the variation in verified capacity performance include:

1. **The program is top heavy.** Figure 39 shows participant-level verified capacity performance for each event day. It is clear that a handful of sites will drive the overall results. The top three sites (in terms of average demand reductions) accounted for approximately 65% of the verified capacity performance in the June event, 40% of the verified capacity performance in the July event, and 61% of the verified capacity performance in the September event. These three sites alone account for over half of the verified capacity performance, on average. The largest participant in the program contributed 5.5 MW in the June event, 0.9 MW in the July event, and 6.9 MW in the September event.
2. **Variation in reference loads.** Aggregate daily peak demand for the Peak Saver participant population ranged from about 65 MW to about 82 MW during the 2022 summer. This is a wide range (~17 MW) – so wide, in fact, it's larger than the average capacity performance for 2022 (15.4 MW). The amount of load a participant can shed is a function the amount of available load. Schools are an obvious example (nearly one-third of Peak Saver participants are schools), but a number of other Peak Saver participants showed significant variation in reference loads from week-to-week (and even day-to-day). The program allows for separate nominations by month but few sites vary their nominations in practice.

3. **Event conditions.** Temperatures might have also contributed to the lower performance of the program. While temperatures ranged from 94°F to 97°F during the summer 2021 event hours, average event-hour temperature in summer 2022 was 94.5°F with a broader temperature range between 87°F to 100°F. Higher temperatures during event hours in 2021 could therefore explain some part of the decreased performance of the Peak Saver program in 2022.

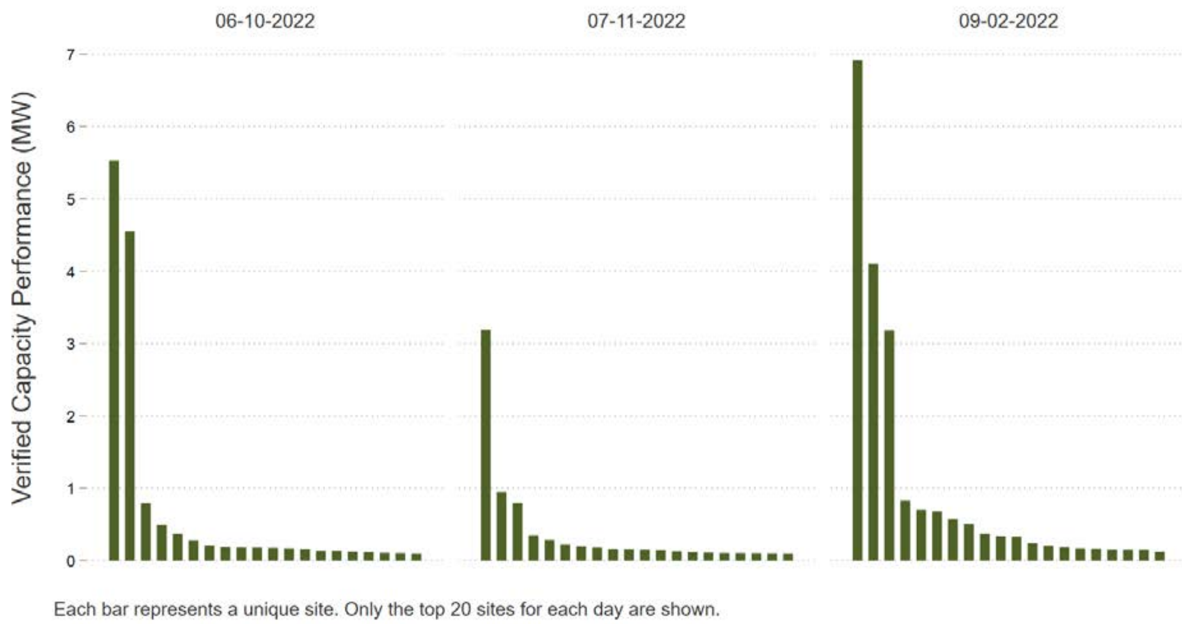
Table 38: Evaluated Performance Summary by Event

Event Date	10-Minute Capacity Performance (kW)	Average Capacity Performance (kW)	Verified Capacity Performance (kW)	Energy Performance During Event Hours (kWh)
06/10/2022	17,525	13,877	15,336	54,781
07/11/2022	11,509	5,488	7,896	22,111
09/02/2022	23,944	22,561	23,114	43,345
Average	**17,659**	**13,975**	**15,449**	**40,079**

Table 39: Performance Summary – Program Implementer

Event Date	10-Minute Capacity Performance (kW)	Average Capacity Performance (kW)	Verified Capacity Performance (kW)	Energy Performance During Event Hours (kWh)
06/10/2022	29,543	27,456	28,882	111,137
07/11/2022	17,476	11,761	14,578	50,955
09/02/2022	37,736	36,316	37,032	71,673
Average	**28,252**	**25,178**	**26,831**	**77,922**

Figure 39: Site-Level Verified Capacity Performance by Date



3.4 Energy Savings

Table 40 compares aggregate energy savings during the event with the aggregate daily energy savings. Here, a "day" is defined as all hours following the beginning of the event (including the event hours), with the adjustment factor applied to all hours.[14] Comparing the energy savings during the event and the daily energy savings helps illustrate the extent to which event load was shifted to other hours.

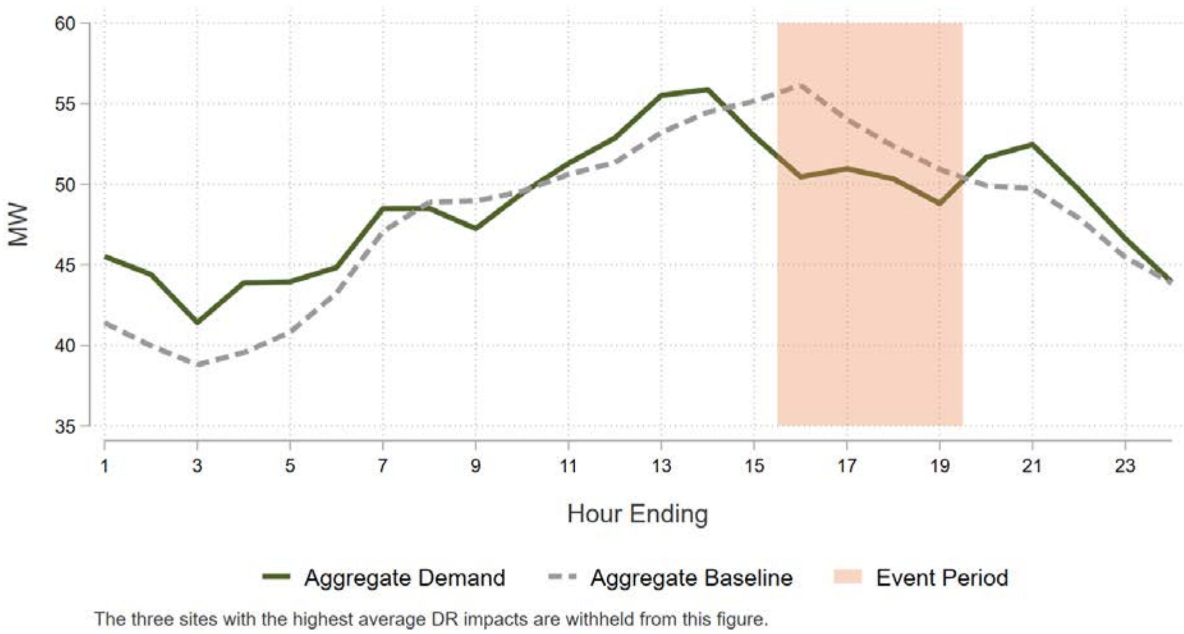
Although the capacity value of DR dominates its energy value, the table provides no evidence of consumption snapbacks *in aggregate*. That said, this aggregate comparison is muddied by the program's top-heaviness. There is evidence of consumption snapback when some of the larger sites are withheld. Figure 40 shows the aggregate hourly loads and baselines on June 10th but withholds three of the program participants. In this figure, post-event snapback is evident.

[14] For sites designated as pre-pumpers, we also included the hour before the event in the calculation of the daily energy impact.

Table 40: Energy Savings – Event Hours and Hours Around Events

Event Date	Event Energy Impact (kWh)	Daily Energy Impact (kWh)
06/10/2022	54,781	49,382
07/11/2022	22,111	34,298
09/02/2022	43,345	72,243
Total	**120,237**	**155,922**

Figure 40: Load Shifting



4 Recommendations

After our review of the 2022 Peak Saver program, the Evergreen team offers the following recommendations:

- Make the multiplicative adjustment symmetric rather than asymmetric. As discussed in the assessment of CBL accuracy presented in Section 2.1, using an asymmetric adjustment results in an upwards bias in the baseline. Biasing the baseline inherently biases the performance metrics. The bias is greatly reduced when using a symmetric adjustment.
- Set a cap for the multiplicative adjustment factor to prevent unrealistic baselines.
- Examine load data for solar patterns or pre-pumping/pre-cooling on event days. Pre-pumping/pre-cooling on event days is fine, but sites that do so should not receive the

adjustment factor (or the adjustment factor should be based on weather rather than load). For sites with solar, consider using a smaller adjustment factor cap, using an additive adjustment, or removing the adjustment factor altogether.
- Compare DR nominations with the average demand on typical summer afternoons. If any nominations seem too high, update them. (We'll note that nominations for some sites do change throughout the summer.)
- PNM should also consider collecting all meter channels for sites with solar PV. This would allow the CBL to fully capture the load shape of sites that are net exporters during key times of day. It's possible that these sites reduced load and thus became larger exporters than they would have been on a non-event day, but the available data doesn't allow for a measurement. Also, an additive adjustment may work better than a multiplicative one for sites whose load can cross zero during the event period or adjustment window.

Set DR performance equal to the battery discharge to measure the performance of solar + storage sites provided that the battery system records telemetry, the site does not discharge their battery on non-event days, and does not engage in other curtailment activities within the facility.

5 Appendix

The table below offers a year-over-year comparison of the Peak Savers performance metrics for the years 2018 through 2022. The relevant performance metrics are:

- **10-Minute Participant Capacity Performance** – The difference between the CBL and the lowest actual electrical demand measured by a one-minute interval reading between eight and ten minutes after the start of an event.
- **Average Participant Capacity Performance** – The average difference between the CBL and the participant's actual electric demand beginning ten minutes after the initiation of the event.
- **Participant Event Capacity Performance** – Weighted average of 10-Minute Participant Capacity Performance (40% weight) and Average Participant Capacity Performance (60% weight).
- **Energy Delivered** – The difference (in kWh) between the adjusted CBL and the metered load summed across all DR event hours.

Per the settlement baselines, Table 12 shows average portfolio performance metrics by year as calculated by the evaluation team. Table 13 shows average portfolio performance metrics by year as calculated by the program implementer.

Table 12: Historical Evaluated Performance Summary Averages

Year	Participants	Events	10-Minute Capacity Performance (kW)	Average Capacity Performance (kW)	Verified Capacity Performance (kW)	Energy Performance During Event Hours (kWh)
2018	86	12	17,558	13,655	15,216	57,371
2019	92	3	17,460	15,342	16,189	60,250
2020	130	10	13,433	12,528	12,890	52,991
2021	157	2	18,975	16,532	17,509	64,662
2022	159	3	17,659	13,975	15,449	40,079
Weighted Average	**125**	**6**	**16,278**	**13,672**	**14,714**	**54,956**

Table 13: Historical Performance Summary Averages - Program Implementer

Year	Participants	Events	10-Minute Capacity Performance (kW)	Average Capacity Performance (kW)	Verified Capacity Performance (kW)	Energy Performance During Event Hours (kWh)
2018	86	12	28,337	24,438	25,998	96,437
2019	92	3	30,419	27,645	28,754	109,958
2020	130	10	18,728	17,806	18,175	70,905
2021	157	2	42,182	41,420	42,176	165,911
2022	159	3	28,252	25,178	26,831	77,922
Weighted Average	**125**	**6**	**26,257**	**23,754**	**24,828**	**92,059**

5.1 Nominations

The following sections detail comparisons between monthly site-level DR kW commitments (“nominations”), average demand, and DR impacts. Section 5.1.1 seeks to answer the question: How do nominations compare to average demand? Section **Error! Reference source not found.** seeks to answer the question: How do nominations compare with verified DR performance? Throughout these two sections, note that results are presented at the participant level rather than the site level. That is, if one participant has three sites in the program, those three sites will be aggregated.

It is important to note that nominations may change throughout the summer for some participants, but this is not the case for the majority. Out of the 131 participants, only 29 had changes in nominations over the 2022 summer. For the comparisons made in Section 5.1.1, the average nomination between June 2022 and September 2022 was used, while Section **Error! Reference source not found.** uses the actual values for each site on each participating event day.

5.1.1 Comparing DR Nominations and Average Demand

In comparing DR nominations to load, our team only investigated the most common event hours (3:00 PM – 7:00 PM) on non-event, non-holiday weekdays. Additionally, any hours where the temperature was below 80 were removed. Under these conditions, we calculated average hourly demand for each participant, then compared these averages to the average nomination. For the comparison, two metrics were calculated: raw differences and ratios. Raw differences are simply the difference between average demand and the average nomination. Ratios were calculated as the average nomination divided by average load (and multiplied by 100%).

Figure 41 shows the distribution of ratios (ratio = average nomination / average demand * 100%). A value greater than 100 percent implies the average nomination exceeds average demand. Most sites had ratios close to 100 percent, indicating that the average nomination and demand were similar. However, there was one large outlier with a ratio of 472. This outlier site had a nomination of 15 kW (represented by the grey line in Figure 42**Error! Reference source not found.**), but average demand at this site between 3:00 PM and 7:00 PM on the day types considered was less than 5 kW.

Figure 41: Nominations as a Percentage of Demand

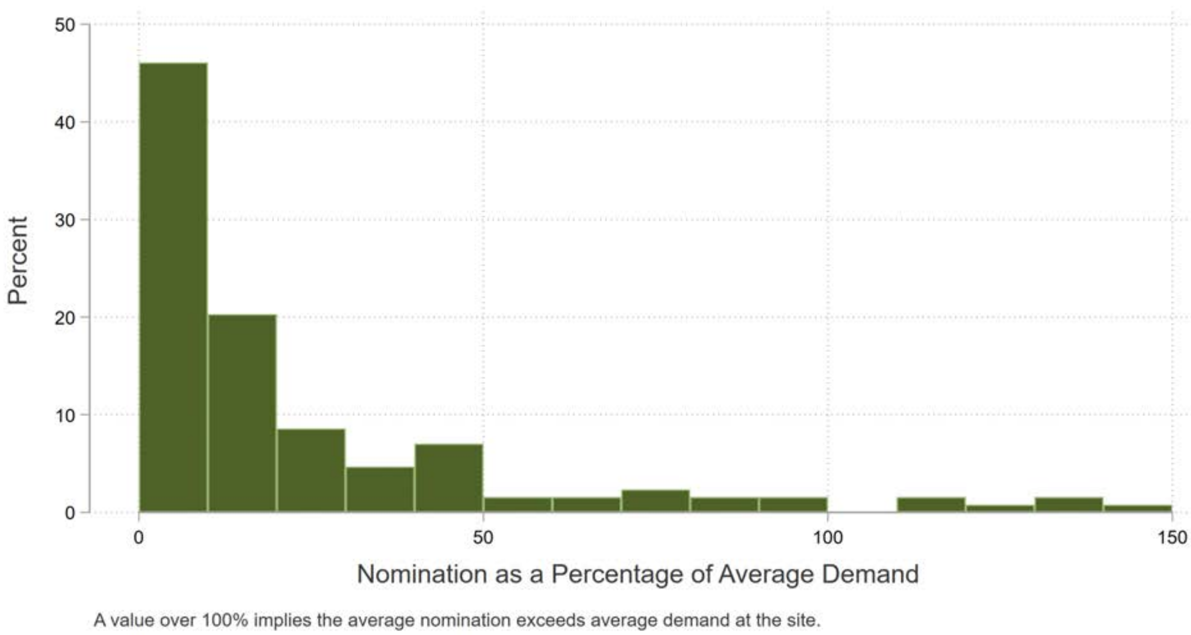
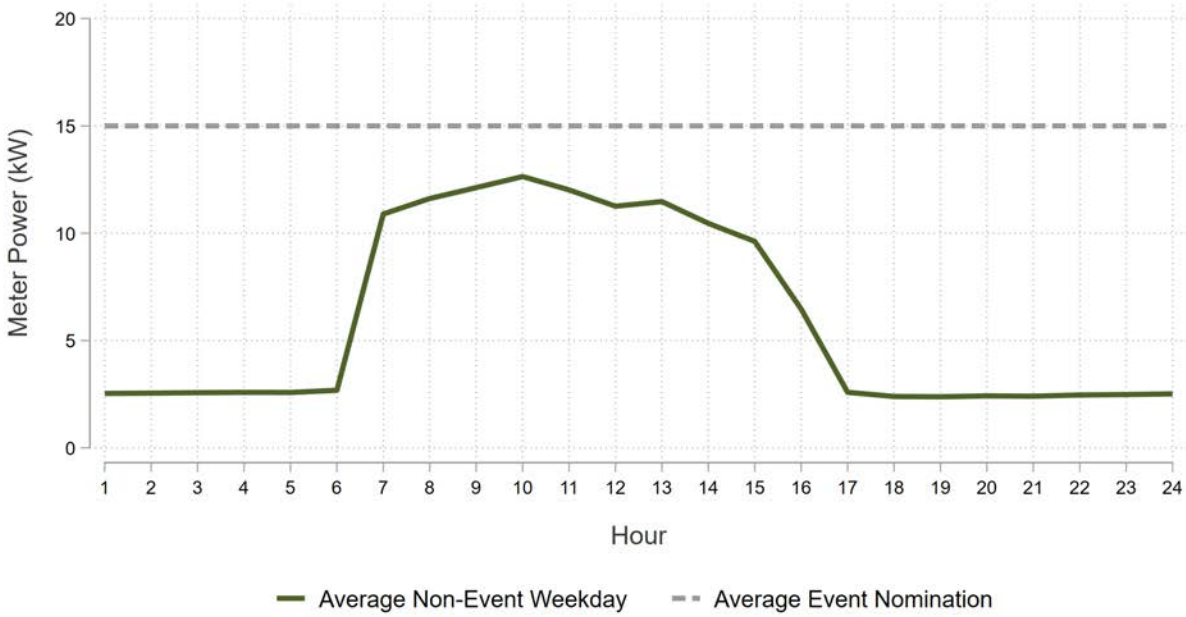


Figure 42: Investigating Nomination as a Percentage of Average Demand



For most participants, DR nominations make sense relative to their average hourly demand on non-event summer afternoons. For a handful of others, we would recommend reviewing the loads and nominations with Enbala (and possibly the customer).

5.1.2 Comparing DR Nominations and DR Performance

This section compares DR nominations with verified performance metrics (as calculated by the Evergreen team). The metric our team reviewed was the percent of the nomination achieved, calculated as follows:

$$Percent\ of\ Nomination\ Achieved = 100\% * \frac{Verified\ Reduction}{Nominated\ Reduction}$$

Figure 43 shows the distribution of these percentages. For each participant, unique percentages were calculated for each event, using the nomination for the relevant month. Sites that did not participate in a certain event day are not included in this analysis. Instances where actual reductions do not exceed nominated reductions result in percentages that are less than 100 percent, and vice-versa. The majority of the distribution falls below 100 percent, implying that most sites did not achieve their nominated load reduction on most event days. An achievement percentage less than zero means the DR performance for the event was negative.

Figure 43: Distribution of Percent Differences

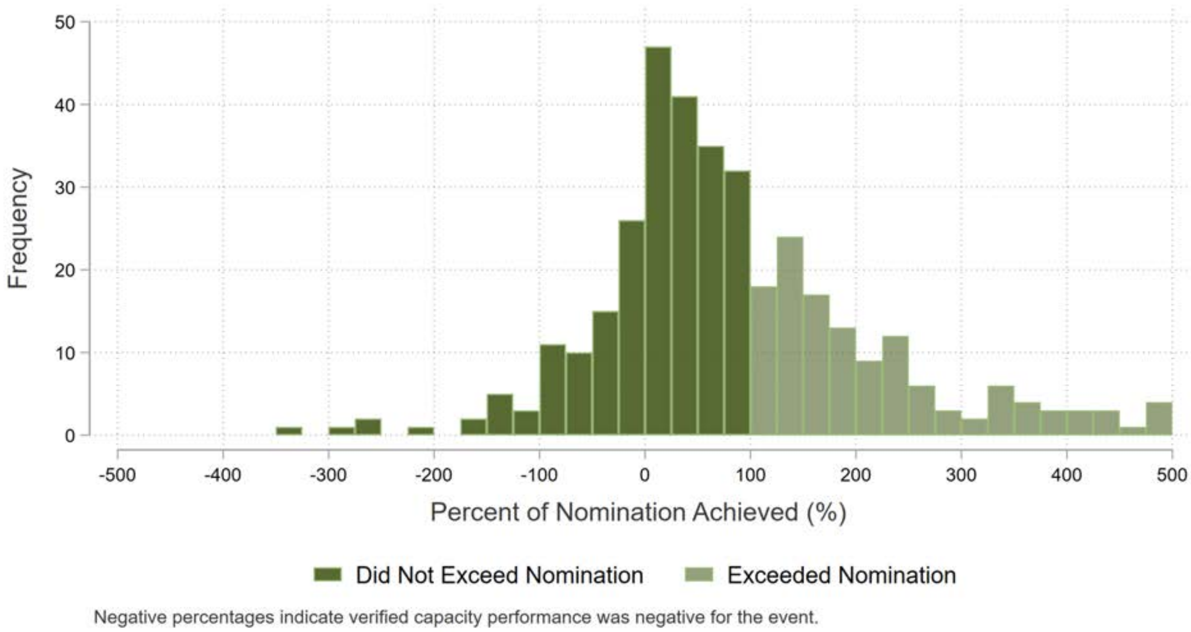


Table 41 groups participants based on how their verified reductions compared to their nominated reductions. Several participants made a bulk nomination for their multiple sites. Of the 131 participants, 44 exceeded their nomination on average.[15] Another 67 participants – accounting for roughly 89 percent of the total nominations – did not exceed their nomination but did provide demand reductions. Figure 44 shows, on average, what percentage of their nomination each site achieved. The 16 participants with negative verified reductions are not included in the figure. Four of these 16 sites have solar PV and six of them are schools.

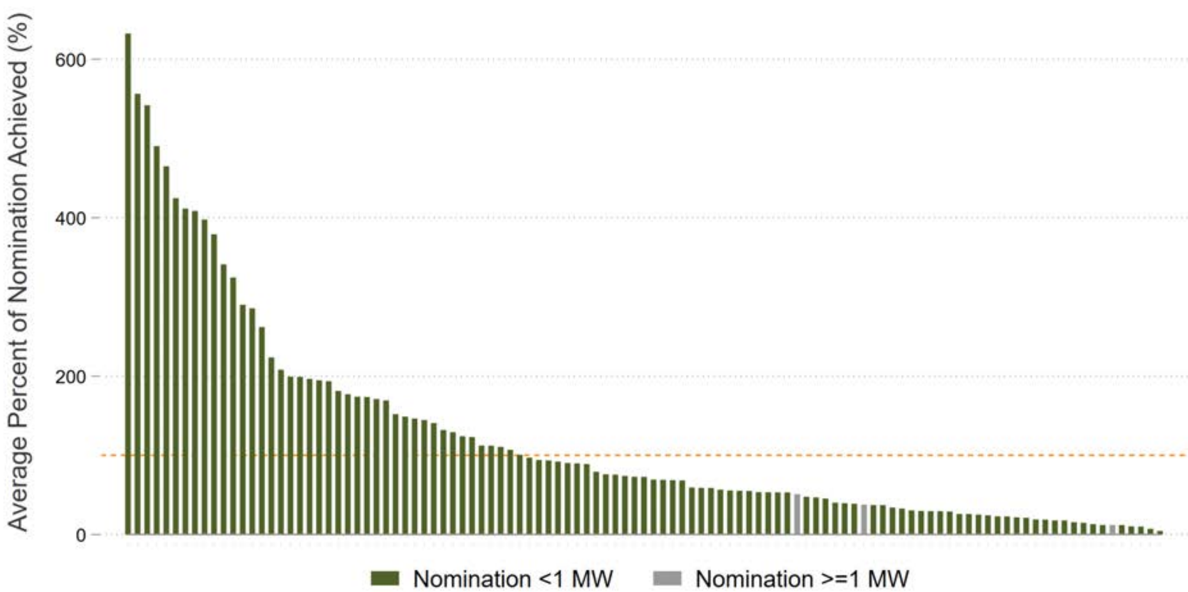
[15] Recall that sites are aggregated to the participant level. Some participants had multiple sites.

Table 41: Comparing Performance and Nominations

Result	Frequency	Aggregate Nomination (kW)[1]
Did Not Exceed Nomination	67	22,300
Exceeded Nomination	44	2,020
Negative Performance	16	660
Nomination of 0 kW	4	0
Total	**131**	**24,980**

[1] Participant-level nominations are averaged across the summer before aggregating.

Figure 44: Average Performance by Site



Each bar represents a unique participant. Outliers with ratios above the 99th percentile were excluded.

Appendix H: Commercial Comprehensive Desk Review Results Summary

Project ID	PNM-22-04735	PNM-22-04726	PNM-22-04724	PNM-22-04722	PNM-22-04713	PNM-22-04698	PNM-22-04697
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Multifamily	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	New Construction	New Construction
Sampling Group	Custom	Multifamily	Lighting	Lighting	HVAC	New Construction	New Construction
Project Description	Custom - High Efficient Transformers and Building Envelopment improvement	Exterior LED fixture retrofit	Lowe's Multisite Lighting Retrofit	Installation of new high-efficiency lighting fixtures	10 Ton Roof Top AC unit retrofitting in a retail space	HVAC + LPD	Energy efficient lighting installation in exterior spaces (Soccer and Baseball field)
Building Type	Miscellaneous	Multifamily	Retail	Heavy Industry	Retail	Education	Exterior
Other Building Type							
Site Visit Being Conducted	No	No	No	No	No	Yes	No
Gross Reported kWh	74,606	89,876	1,245,693	149,361	1,551	19,844	223,452
Gross Reported kW	35.00	0.00	51.99	19.96	0.39	4.53	0.00
Gross Verified kWh	58,034	89,876	1,253,720	145,888	1,503	20,685	248,280
Gross Verified kW	2.38	0.00	59.38	19.62	0.92	6.63	0.00
kWh Realization Rate	0.78	1.00	1.01	0.98	0.97	1.04	1.11
kW Realization Rate	0.07		1.14	0.98	2.35	1.46	
Calculation Assessment	Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for."						
Reasons for RR(s) <> 1	For Efficient Transformer Measure : Change in calculation approach. Baseline transformer efficiency values are much lower than that of federal minimum efficiency levels. PNM Workpaper methodology used in "NEMA Premium Low Voltage Dry-Type Distribution Transformers " measure seemed more appropriate and savings calculations are revised accordingly. This Resulted in the reduction of both kWh and kW savings. For Building Envelope Improvement Measure : Sensible Heat Coefficient used in heating load reduction calculation is changed to 1.08 from 0.85 ((Btu/hr)/cfmDeg.F). This resulted in the increase of kWh savings.		The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.196 and 1.283) and CF (0.83) associated with a Retail/Service building type. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.024 and 1.054) and CF (0.85) associated with a Heavy Industry building type listed in the workpapers. The evaluation team calculated the controls savings using a controls factor of 0.24 and 20,915 connected Watts. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	The discrepancy between the ex ante and ex post savings is not known. The evaluation team used the savings methodology in the NM TRM to calculate the savings for one, 9.4 ton unitary AC with an efficiency of 12.4 in a Retail/Service building type.	The ex ante LPD calculation used the "Education, K-12 School" building type for operating hours, HVAC EIF interactive factor, and CDF. The application lists the building type as "College/University," which was used in the ex post calculation. These changes affected RRs. It is unclear why kWh RR increased for the HVAC measures. kW increased due to the use of the College/University CF (0.87, Las Cruces) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34, Albuquerque).	Reported savings consider Factor of Safety of 10% which is causing variation of roughly 11% in the verified savings . The evaluation team removed the Safety Factor when calculating the verified savings. No other adjustments were made.

Project ID	PNM-22-04693	PNM-22-04663	PNM-22-04661	PNM-22-04659	PNM-22-04658	PNM-22-04643	PNM-22-04639
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	New Construction
Sampling Group	Lighting	HVAC	HVAC	HVAC	Custom	Lighting	New Construction
Project Description	Replacing exterior HID with LED	VFD retrofitting in a retail facility	VSD on Supply Fans	VSD on Supply Fans	Installation of new high-efficient stage lighting	Installation of new high-efficiency lighting fixtures	Custom (LPD + HVAC)
Building Type	K-12 School	Retail	Retail	Retail	Miscellaneous	Retail/Service	Office
Other Building Type							
Site Visit Being Conducted	No	No	No	No	No	No	Yes
Gross Reported kWh	352,371	30,495	67,089	81,320	17,555	1,256,963	13,976
Gross Reported kW	0.00	4.29	9.44	11.44	12.15	37.72	3.06
Gross Verified kWh	352,371	30,495	67,089	81,320	20,859	1,272,898	10,531
Gross Verified kW	0.00	4.29	9.44	11.44	15.12	40.86	2.47
kWh Realization Rate	1.00	1.00	1.00	1.00	1.19	1.01	0.75
kW Realization Rate		1.00	1.00	1.00	1.24	1.08	0.81
Calculation Assessment					Custom calculation was used to determine the Ex-Ante Savings. No HVAC interactive factors were used in the analysis so confirmation required whether the space is conditioned or not. Building type is mentioned as "Miscellaneous" in the Application while it is mentioned as " Assembly" in UCT document. Hours of Use is considered to be 20 hours per week (confirmation required).		Both measures were calculated using utility workpapers. There were no issues with the LPD calculation. The ex post approach for the heat pump calculation used deemed savings and bonus savings from the workpaper workbook.
Reasons for RR(s) <> 1					HVAC Interactive factors were not considered in the Ex-Ante analysis. Ex post analysis used TRM values for HVAC interactive factors considering the space type to be " Assembly "	The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.196 and 1.283) and CF (0.83) associated with a Retail/Service building type. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	RRs decreased for the LPD calculations. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis, which decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. The removal of ineligible fixtures and reduction in square footage decreased RRs. It is unclear why kWh RR increased for the HVAC measure. kW increased due to the use of the Office CF (0.67) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34).

Project ID	PNM-22-04638	PNM-22-04631	PNM-22-04624	PNM-22-04623	PNM-22-04622	PNM-22-04602	PNM-22-04597
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Multifamily
Sampling Group	Custom	Custom	Lighting	Lighting	Lighting	HVAC	Multifamily
Project Description	LED Grow Lights and Dehumidifiers	Custom Refrigeration	Exterior Lighting Replacement	Interior LED lighting and controls	Exterior LED pole lamps replacing HID	VSD on Supply Fans	Air-cooled chiller retrofit (27.6 Tons)
Building Type	Warehouse/ Industrial	Grocery	Exterior	Retail	Exterior	Retail	Miscellaneous
Other Building Type					Restaurant		Apartments
Site Visit Being Conducted	Yes	Yes	Yes	No	No	No	No
Gross Reported kWh	253,526	127,724	1,699,022	19,058	22,213	66,072	1,622
Gross Reported kW	31.19	10.83	0.00	5.60	0.00	9.30	3.94
Gross Verified kWh	241,026	127,724	1,699,046	25,419	20,848	66,073	974
Gross Verified kW	34.43	10.83	0.00	6.18	0.00	9.30	1.57
kWh Realization Rate	0.95	1.00	1.00	1.33	0.94	1.00	0.60
kW Realization Rate	1.10	1.00		1.10		1.00	0.40
Calculation Assessment	LED Grow Lights used algorithms for Commercial Grow Lights from version 10 of the IL TRM. A custom calculation was used for the Dehumidifiers referencing "FES- A22 Dehumidification for Indoor Horticultural Facilities." For both kWh and kW calculations, energy efficient kWh/kW was subtracted from base kWh/kW, respectively.	The custom calculation determined the annual kWh/ft avoided by retrofitting 230 linear feet of medium temperature glass doors onto existing cases. The annual energy consumption with the glass doors was subtracted from the annual energy consumption without the glass doors. Demand savings were calculated similarly. Assumptions from the ex ante calculator included: -Use of actual running time of condensing unit (off during defrosts) -Use of actual operation time of fans, defrost heat -Use of 24 hr/day operation of lights, anti-condensate heat -Case refrigeration requirement (Q) was determined in accordance with ASHRAE 72 or 117 -Compressor suction temp was evap temp - 2°F for medium temp, evap temp - 3°F for low temp EER is determined via ARI 1200, Table 1 -Existing lighting was shown as Efficient Lights LEDs	Prescriptive (TRM, Workpaper)			The calculation approach used the prescribed measure for Variable-Speed Drives for HVAC Applications in the 2021 PNM workpaper. Energy and demand savings for HVAC VFDs were estimated from a study sponsored by Northeast Energy Efficiency Partnerships. HVAC applications specific to heating or cooling were adjusted for New Mexico climate zones. Annual kWh and kW savings for Supply Fans are listed per HP in the workpaper and are based on the Albuquerque climate zone. The annual energy savings for Supply Fans is 2033 kWh. This value was multiplied by equipment quantity and HP. Demand savings for Supply Fans is 0.286. This value was multiplied by equipment quantity and HP.	Difference in kWh savings is probably due to cooling EFLH. Difference in kW savings is probability due to a different baseline efficiency considered.
Reasons for RR(s) <> 1	kWh and kW RRs were affected by a modification to the Energy Factor_EE (EF) for the Quest 225 unit. The algorithm provided requires this variable to be in L/kWh. The ex ante calculation used 6.1, which is the efficiency in PINTS/kWh. According to the Quest website (specifications were not provided for this model), EF for a water removal of 225 pints/day is 2.9 L/kWh. This change reduced RRs.			The evaluation team calculated the ex post savings using the fixture types, fixture quantities, and fixture input power that were listed on the Lighting tab of the Final Application. The ex post calculations used the HOUs, CF, and HVAC factors for a Retail/Service building type listed in the 2021 PNM workpapers. The lighting controls ex post calculations used a savings factor of 0.24 for 400 controlled watts.	App summary states 22,213 kWh savings, ex ante calcs via final app state 20,792 kWh savings. - Ex post savings have 99.7% RR against ex ante, discrepancy due to HOU update from 52 hr/wk to 52.14 hr/wk.		The evaluation team referenced the PY2021 PNM workpapers to calculate the verified ex post savings. Based on the supplied documentation, the reason for the discrepancy in savings is not clear.

Project ID	PNM-21-04545	PNM-21-04539	PNM-21-04495	PNM-21-04462	PNM-21-04418	PNM-21-04416	PNM-21-04414
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction	New Construction	Retrofit Rebate	Multifamily	BTU	Multifamily	BTU
Sampling Group	New Construction	New Construction	Lighting	Multifamily	Building Tune-Up	Multifamily	Building Tune-Up
Project Description	New construction lighting and HVAC	Installation of new high efficiency Lighting and HVAC units in a Warehouse	Lighting Retrofit	NC multifamily lighting and ASHP	Other	LED lighting retrofit	Other
Building Type	Warehouse/ Industrial	Warehouse/ Industrial	Retail	Multifamily	Hospital	Multifamily	Office
Other Building Type		Office & Parking Lots					
Site Visit Being Conducted	Yes	Yes	No	Yes	No	No	No
Gross Reported kWh	3,030,582	500,212	144,089	358,999	61,620	85,366	59,250
Gross Reported kW	332.49	72.31	18.80	51.79	0.00	16.10	0.00
Gross Verified kWh	3,030,945	547,743	153,142	147,204	61,620	41,459	59,250
Gross Verified kW	386.46	90.81	20.75	25.03	0.00	1.97	0.00
kWh Realization Rate	1.00	1.10	1.06	0.41	1.00	0.49	1.00
kW Realization Rate	1.16	1.26	1.10	0.48		0.12	
Calculation Assessment	The custom lighting calculation used 24/7 hours of operation with a 10% safety factor instead of NM TRM hours.						
Reasons for RR(s) <> 1	Ex post energy savings were slightly higher due to the removal of certain light fixtures in the custom lighting calculation. These fixtures were "Not Approved" on the electrical drawings. The fixtures used will need to be verified onsite. The ex post coincident demand savings were higher for HVAC calculations. The ex ante analysis appeared to multiply the demand savings by a CF of 0.34, which corresponds to "Commercial, General." The ex post analysis used a CF of 0.55, which corresponds to a Warehouse.	The discrepancy between the ex ante and ex post savings is not clear based on the supplied project documentation. The evaluation team calculated the verified savings using the project specific details listed in the supplied project files. The ex post savings used HOU, HVAC factors, and CF values for an office, warehouse, and exterior building types. The evaluation team was able to use the appropriate factors for each building type based on the project documentation.	Baseline wattage and quantity has discrepancy in Lighting sheet and Lighting SOW sheet. Quantity of proposed fixture differs from Invoice and Lighting sheet. Proposed Fixture wattage is used as per DLC certificate.	Lighting - As ex-ante calculation file is not provided, exact reason for variation could not be identified. RR variation could be due to difference in the Baseline LPD values, HVAC interactive factors and CF between ex-ante and ex-post calculations. Ex-post analysis referred to PNM workpapers. As per post inspection file, ex-ante analysis had considered the building type as 'Medical' in place of 'Multifamily' in their analysis. The building type as per the application is Multifamily. ASHP- As ex-ante calculation file is not provided, exact reason for variation could not be identified. RR variation could be due to differences in the EFLH and CF values between ex-ante and ex-post analysis. Ex-post analysis have referred to both PNM 2019 (for qualifying and baseline efficiency) and PNM 2021 (EFLH cooling, EFLH heating and CF as Multifamily was not a building type in PNM 2019 workpaper) workpapers.		RR variation due to difference in HOU, HVAC interactive factors and CF for the Interior fixtures between ex-ante and ex-post analysis. As ex-ante calculation file has not been provided, it's not clear as to what factors and HOU were used in ex-ante analysis. Ex-post analysis have used the factors corresponding to the Multifamily building type as mentioned in the application for the interior fixtures. Baseline fixture wattage and qty. are taken from the 'Lighting' sheet in Final Application excel file. Baseline incandescent fixture information is not provided. The fixture qty. is 121. Ex-post analysis have referred to PNM 2021 workpaper for baseline incandescent fixture wattage.	

Project ID	PNM-21-04354	PNM-21-04339	PNM-21-04323	PNM-21-04277	PNM-20-04194	PNM-20-04137	PNM-20-04135
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction	Multifamily	Retrofit Rebate	Retrofit Rebate	Multifamily	Multifamily	Multifamily
Sampling Group	New Construction	Multifamily	Other	Lighting	Multifamily	Multifamily	Multifamily
Project Description	Energy Efficient Lighting installation in a light manufacturing facility	New Construction Lighting and HVAC	Lighting Retrofit and LED Refrigeration case lighting	Retrofit of interior lighting and HVAC.	0	0	Installation of Efficient Light Fixtures for NC Building
Building Type	Warehouse/ Industrial	Multifamily	Retail	Office	Multifamily	Miscellaneous	Miscellaneous
Other Building Type							Residential - Multifamily
Site Visit Being Conducted	No	No	No	No	No	No	Yes
Gross Reported kWh	38,165	71,463	27,390	304,923	133,200	64,284	385,457
Gross Reported kW	12.62	7.82	4.85	103.06	20.10	4.79	22.34
Gross Verified kWh	60,901	82,177	27,183	271,014	153,308	47,922	364,555
Gross Verified kW	13.81	7.85	4.98	50.29	22.86	6.57	30.75
kWh Realization Rate	1.60	1.15	0.99	0.89	1.15	0.75	0.95
kW Realization Rate	1.09	1.00	1.03	0.49	1.14	1.37	1.38
Calculation Assessment			* Interior space lighting retrofit measure calculation is done using custom calculation approach. DLC certificates provided for Post fixture wattages. Annual hours of use considered to be 5068 (Not from TRM) * Refrigerated case lighting retrofit calculation is done using deemed values from TRM			SEER baseline value for AC is taken from Workpaper 2019, factor of safety is not considered in kWh saving calculations,	The calculation methodology is based on Utility Workpaper and New Mexico TRM 2021
Reasons for RR(s) <> 1	The facility is broadly classified as a Workshop. However, it has an office, a juice processing space and a refrigerated product storage. This means HVAC interaction factors could vary from space to space in the interior. The lighting is intended to operate for 24 hours, but occupancy sensors are installed, which may affect the operating hours. These two reasons are the causes for RR variation.	Lighting- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference between the LPD Baseline, HVAC Interactive factors and CF between ex-ante and ex-post analysis. Ex-post analysis have referred to the PNM workpapers for these factors. Source of ex-ante factors is not clear. ASHP- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference in capacity and EFLH values between ex-ante and ex-post analysis. Ex-post analysis have referred to both PNM 2019 (for qualifying and baseline SEER values) and PNM 2021 (EFLH cooling, EFLH heating and CF as Multifamily was not a building type in PNM 2019 workpaper) workpapers. Capacity used in ex-post calculations is as per the attached AHRI certificates.	HVAC interactive factors were not considered for lighting retrofit measure in the Ex-Ante calculation. Annual Hours of use value updated from TRM	Occupancy sensor savings have been claimed but exact information of sensor is not provided. HVAC savings calculation is done using TRM methodology.	Lighting- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference between the LPD Baseline, HVAC Interactive factors and CF between ex-ante and ex-post analysis. Ex-post analysis have referred to the PNM workpapers for these factors. ASHP & RTU- Exact reason for kWh RR variation could not be identified.	The discrepancy in savings is not known for the kWh savings. Difference in kW RR is due to difference in CF assumption for both lighting and HVAC.	Discrepancy between Tracking Data and Application Summary (Dt. 7/12/2022) is observed. Ex-post new fixtures exterior lighting calculations were based on calculated LPD. Slight reduction in kWh is observed because of rounding error. Slight variation in peak kW savings for interior lighting is observed. No ex ante calculation file for lighting was present, so exact reason for the discrepancy cannot be determined. Ex ante considered TRM based value of 127 kWh for Efficient rated unit electricity consumption for ENERGY STAR Washer. Ex post considered 123 kWh as per specifications sheet. Ex post calculations for ASHP were based on NM 2021 TRM section 4.13 Heat Pumps for Residential areas. No ex ante calculation file for this measure was present, so exact reason for the discrepancy cannot be determined.

Project ID	PNM-20-03988	PNM-19-03861	PM-22-05849	19884	19808	19761
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Midstream	Multifamily	Multifamily	Multifamily
Sampling Group	Custom	HVAC	Midstream	Multifamily	Multifamily	Multifamily
Project Description	Custom - Transformers	VRFs, Transformers (custom), Wall insulation (custom)	Installing high-efficient Refrigerators	Replacing existing lighting fixtures with energy efficient LED fixtures in exterior spaces	LED Retrofit	Replacement of Existing Lighting Fixtures with LED Fixtures
Building Type	Office	Office	Retail	Miscellaneous	Multifamily- common areas	Exterior
Other Building Type				Exterior and Interior		
Site Visit Being Conducted	No	Yes	No	No	No	No
Gross Reported kWh	130,319	367,045	3,911	13,191	72,745	38,255
Gross Reported kW	124.94	191.00	0.45	0.33	0.22	1.63
Gross Verified kWh	130,320	258,653	4,169	13,960	73,089	35,771
Gross Verified kW	124.93	216.07	0.45	0.04	0.03	0.00
kWh Realization Rate	1.00	0.70	1.07	1.06	1.00	0.94
kW Realization Rate	1.00	1.13	0.99	0.11	0.12	0.00
Calculation Assessment	Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for."	The ex post approach for the VRF calculation used deemed savings and bonus savings from the workpaper workbook. Transformers - Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for." Wall Insulation - kW: The kW usage for the following factors were initially considered: space cooling, heat rejection, refrigeration, space heat, HP supp., hot water, vent. fans, pumps and aux., ext. usage, misc. equip, task lights, and area lights. The kW usage of those factors were totaled for each month from January to December for both the roof and the wall insulation. kW from the walls was subtracted from kW from the roof for each month. The sum of the savings for each month resulted in an annual savings of 164 kW. kWh: The kWh (on-peak and off-peak) usage for each factor above was totaled for each month from January to December for both the roof and the wall insulation. Total kWh from the walls was subtracted from total kWh from the roof for each month. The sum of the savings for each month resulted in an annual savings of 102,063 kWh.	Energy saving per Cu.ft of refrigerated volume was obtained from Work paper and Volume was obtained from Energy star certificate	Weekly operating hours are listed in the application summary which are multiplied by 52.1429 to get the annual operating hours.		Weekly operating hours are listed in the application summary which are multiplied by 52.1429 to get the annual operating hours.
Reasons for RR(s) <> 1		kWh and kW RRs are affected by the VRF measure. It is unclear why kWh RR increased for the VRF measure. kW increased due to the use of the Office CF (0.67) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34).	9 Out of 12 refrigerator units were considered as glass door refrigerators but those models are actually solid door refrigerators as per the Energy Star Certificates	RR variation is probably due to a different value of HVAC factor considered for Multifamily unit> interior spaces rather than exterior spaces (which is 1). Higher kW savings also indicates that a non-zero CF value is considered for exterior spaces, which may result in the higher peak savings.	Reported peak demand savings of 0.22kW is actually just the kW reduction without the CF and HVAC interactive factors applied.	All measures seem to be installed in Exterior spaces (from the pictures), however there are demand savings reported, which means a non-zero CF value is used. RR variation could be due to difference in baseline wattages between ex ante and ex post and HVAC factor considered for Multifamily unit, interior spaces rather than exterior spaces.

Project ID	19495	PM-21-05702	19801	19818	19858	19902
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Multifamily	Midstream	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Sampling Group	Multifamily	Midstream	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	LED lighting retrofit	HVAC	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures	Installation of LED light fixtures (exterior) and removal of MH fixtures	Installation of interior and exterior LED fixtures
Building Type	Multifamily - common areas IQ	Miscellaneous	Miscellaneous	Miscellaneous	Exterior	Retail
Other Building Type		Commercial, General	Commercial, General	Commercial, General	Commercial, General for interior fixtures	Gas station
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	145,079	216,188	64,224	136,146	159,956	11,641
Gross Reported kW	4.90	21.95	7.80	9.43	8.77	0.74
Gross Verified kWh	163,639	384,294	76,190	145,406	167,099	12,792
Gross Verified kW	0.60	46.22	6.68	8.47	7.87	0.79
kWh Realization Rate	1.13	1.78	1.19	1.07	1.04	1.10
kW Realization Rate	0.12	2.11	0.86	0.90	0.90	1.07
Calculation Assessment						
Reasons for RR(s) <> 1	Ex-ante savings could not be replicated. Variation could be due to difference in the baseline wattages, HVAC interactive factors and CF between the ex-ante and ex-post analysis. Ex-ante calculations were not provided.	For Heat Pumps and VRF systems, the cooling and heating savings are calculated separate which resulted in a reduction in heating kWh Savings. Ex-Ante calculation used the cumulative table (Both Heating and Cooling Savings For Heat Pumps, conversion factor used to arrive at Heating demand savings was 12/3.412 instead of 12 for units Less than or equal 5.4 tons (HSPF considered not COP). It was corrected for Ex-Post calculations and the Heating kWh savings increased. " Commercial, General" Building type was used in most of the cases for calculating the Peak KW Savings. Ex-Post calculation considers particular building types mentioned in the files. This resulted in an increase in Ex-Post Peak Coincident kW savings.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation assumed all fixtures were interior and used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. The CF for one fixture was changed to 0 in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), has all line items are marked "N." The ex post calculation assumed one line item was an exterior fixture based on the photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Other Notes: • 3-4' 40W T12, Magnetic Ballast (2) - Not available in Fixture List on PNM workpaper. This assumes a ballast factor of approximately 1.19 for 3 40 W fixtures. • 2-4' 40W T12, Magnetic Ballast (1)) - Not available in Fixture List on PNM workpaper. This assumes a ballast factor of approximately 1.075 for 2 40 W fixtures. • What is the justification for HOU for some locations (i.e., 168 hours per week for a storage rooms; are there no controls?); there may be an opportunity for the installation of controls	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications). Lastly, the tracking data and ex ante calculation are missing line item #23 (see post inspection document>Lighting Summary Table, page 2 of 3>"Item #" column). The ex post calculation included line item #23 because it was verified as installed in the project documentation, including a photo.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The post inspection document (Lighting Summary Table, page 2 of 3) lists fixtures (that are being removed) in column name "Outside" as "N," which is assumed to mean "no." There were no photos in the project documentation of these removed fixtures to indicate whether they were interior or exterior. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for indoor fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type. These modifications increased RRs. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 2-4' 32W-T8-HPEB1-R). The ex ante calculation used 74 W, whereas the ex post calculation used 70 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).

Project ID	19938	19797	19326	19563	19612	19643
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Sampling Group	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures	Lighting Retrofit	Replacement of Light Fixtures with LED	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs
Building Type	Restaurant - Sit Down	Warehouse/ Industrial	Miscellaneous	Miscellaneous	Miscellaneous	Exterior
Other Building Type			Car Dealership	Entertainment	Church	
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	4,473	123,912	105,313	155,649	59,746	73,345
Gross Reported kW	1.02	24.61	23.76	24.94	0.00	0.00
Gross Verified kWh	5,032	126,788	124,013	179,685	59,746	87,714
Gross Verified kW	0.74	14.50	21.33	14.39	0.00	0.00
kWh Realization Rate	1.13	1.02	1.18	1.15	1.00	1.20
kW Realization Rate	0.73	0.59	0.90	0.58		
Calculation Assessment			Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.
Reasons for RR(s) <> 1	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for both interior and exterior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The CF for exterior fixtures was changed to 0 in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3) lists some fixtures as having a location "Outside" in the Location column. In another column in the same table (column name "Outside"), all items are marked "N." The ex post calculation assumed the "Outside" space types were indeed exterior fixtures based on the pre- and post-inspection photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 2-4' 32W-T8-HPEB1-R). The ex ante calculation used 74 W, whereas the ex post calculation used 70 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RRs (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for both interior and exterior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Storage – Unconditioned. It is important to note there is conflicting information in the project documentation. In the post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), all items are marked "N." The ex post calculation assumed that some space types were indeed exterior fixtures based on the photographs in the project documentation. As such, the CF for exterior fixtures was changed to 0 in the ex post calculation. These modifications increased kWh RR and decreased kW RR.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Note: It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation assumed all fixtures were interior (with the exception of line item #77) and used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. The CF for several exterior fixtures were changed to 0 in the ex post calculation. The ex ante calculated assumed these fixtures were interior. These modifications increased kWh RR and decreased kW RR. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), has all line items are marked "N," with the exception of line item #77.		The ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 175 Watt Metal Halide). The ex ante calculation used 150.5 W, whereas the ex post calculation used 215 W, based on the PNM workpaper fixture list. The 175 W MH fixture was verified in the project photos. This modification increased the kWh RR.

Project ID	19704	19723	19766	19788	20066	20072
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Retrofit Lighting	Retrofit Lighting
Sampling Group	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures
Building Type	Exterior	Miscellaneous	Miscellaneous	Warehouse/ Industrial	Miscellaneous	Miscellaneous
Other Building Type		Government City/County	Shipping Service Center		Commercial, General	Commercial, General
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	45,694	66,101	384,261	18,739	239,979	347,729
Gross Reported kW	0.00	10.94	57.44	6.01	25.10	83.73
Gross Verified kWh	45,694	78,726	451,244	19,638	280,434	409,766
Gross Verified kW	0.00	9.83	51.41	4.60	22.75	72.42
kWh Realization Rate	1.00	1.19	1.17	1.05	1.17	1.18
kW Realization Rate		0.90	0.89	0.77	0.91	0.86
Calculation Assessment	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)
Reasons for RR(s) <> 1	The ex post calculation includes custom LED signage kWh. No custom calculations were present in project documentation. It is important to include custom calculations in project files so that savings can be reproduced. Additionally, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage did not greatly influence savings due to the low quantity of these fixtures.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for the fixtures. All fixtures are interior as depicted in the photos in the project documentation. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type. The building type selected was Storage - Unconditioned. The project documentation only described the building type as "warehouse" and did not specify whether or not it was conditioned. It is assumed this space is unconditioned. These modifications increased kWh RR and decreased kW RR. Other Notes: • 4-4' 32W-T8-HPEB1 is not in the Fixture List on the PNM workpaper. • Some of the lamps in the fixture are burnt out from the photos.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 4-4' 54W-T5-EB1). The ex ante calculation used 226 W, whereas the ex post calculation used 234 W, based on the PNM workpaper fixture list. This modification (increase) to the baseline fixture wattage led to a slight increase in the RRs. It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for ALL fixtures (note: there was an assumption that all fixtures were interior). The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. For exterior fixtures, a CF of 0 was used in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table) lists two fixtures as having a location "Outside" in the Location column. In another column in the same table (column name "Outdoor"), all items are marked "N." The ex post calculation assumed the "Outside" space types were indeed exterior fixtures based on the pre- and post-inspection photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR. It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List.

Project ID	PNM-21-04441	PNM-21-04453	PNM-22-04609	PM-22-05980	PM-22-06116	PNM-21-04415	PNM-21-04583
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction Lighting	New Construction Lighting, HVAC, and Custom	New Construction Lighting	Retrofit HVAC	Energy Star Refrigerators/Freezers	Building Tune-Up	Retrofit Custom
Sampling Group	New Construction	New Construction	New Construction	Midstream	Midstream	Building Tune-Up	Custom
Project Description	New construction interior and exterior lights	Installation of HVAC, interior and exterior lighting. Also custom geothermal source heat pump installed.	Horticulture Lighting	HVAC	Energy Star Refrigerators/Freezers	Other	Water-Cooled Chillers, VSD on HVAC Motors, Motors & VSDs, HVAC Controls, Cooling Tower
Building Type	Retail	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Office	Office
Other Building Type		Commercial, General (Library)	Horticultural				
Site Visit Being Conducted	No	No	No	No	No	No	No
Gross Reported kWh	49,318	67,879	120,914	79,752	10,644	61,620	855,559
Gross Reported kW	7.33	21.24	0.00	8.40	1.17	0.00	74.21
Gross Verified kWh	49,921	61,101	119,738	104,588	10,356	61,620	855,559
Gross Verified kW	7.32	21.11	0.00	17.23	1.12	0.00	74.21
kWh Realization Rate	1.01	0.90	0.99	1.31	0.97	1.00	1.00
kW Realization Rate	1.00	0.99		2.05	0.96		1.00
Calculation Assessment	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper) & Custom Calculation	Custom Calculation	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Custom Calculation
Reasons for RR(s) <> 1	The discrepancy in savings is due to operational hours and interactive factor selection. The ex post calculation used a Retail building type (with the exception of exterior light fixtures).	The discrepancy in savings is due to operational hours and interactive factor selection. The building type was modified to Commercial, General to be consistent across all prescriptive measures in this project (with the exception of exterior light fixtures).	The discrepancy in savings is due to the use of DLC tested wattage in the ex post calculation. Also, it is important to note that both the ex ante and ex post calculations are assuming no cooling.	The evaluation team used the prescriptive savings methodology from the NM TRM to calculate savings for these HVAC measures. The discrepancy in savings is not known.	No ex-ante calcs or line-by-line savings provided. The discrepancy could be due to different volume values stated.		

Project ID	PNM-22-04608	PNM-22-04715	PNM-22-04795	PNM-22-04813	PNM-22-04817
Utility	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Custom	New Construction Lighting	New Construction Lighting	Retrofit Lighting	Custom Horticultural Lighting, Custom Horticultural Dehumidification
Sampling Group	Custom	New Construction	New Construction	New Construction	Custom
Project Description	HVAC & indoor horticulture lighting	LPD + HVAC	LPD + HVAC	Installation of new high efficiency HVAC/ custom HVAC units and lighting/ custom lighting measures	LED Grow Lights, Dehumidifiers
Building Type	Miscellaneous	Health	Health	Miscellaneous	Warehouse/Industrial
Other Building Type	Horticultural	Hospital	Medical/Hospital		Light Industry
Site Visit Being Conducted	No	No	No	No	No
Gross Reported kWh	424,745	1,585,948	610,919	3,086,174	1,002,404
Gross Reported kW	84.60	231.17	81.40	225.81	61.35
Gross Verified kWh	474,856	1,321,318	534,205	2,525,343	1,072,257
Gross Verified kW	100.96	204.76	106.97	334.79	209.92
kWh Realization Rate	1.12	0.83	0.87	0.82	1.07
kW Realization Rate	1.19	0.89	1.31	1.48	3.42
Calculation Assessment	Custom Calculation	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper) & Custom Calculation	Custom Calculation
Reasons for RR(s) <> 1	Lighting (Retrofit & NC): The evaluation team referenced the IL TRM for this measure and used NM interactive factors for Commercial/General. HVAC interactive factors were considered for the LED lights in the ex post calculation while the ex ante calculation did not. Annual hrs & CF 0.9 is considered for both measures as per ex ante calculations. HVAC VRF & AC : CF 0.9 is considered for both measures as per ex ante calculations.	LPD RRs decreased due to the interior LPD calculation. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis. Additional fixtures were removed from the analysis because the submittals stated these fixtures were not approved. These modifications decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. The removal of ineligible fixtures and reduction in square footage decreased RRs. HVAC The ex ante calculation used a CF of 0.49 (Commercial, General), whereas the ex post calculation used a CF of 0.63 (Medical). This modification increased the kW savings for the water-cooled chiller measure. It is unclear why kWh RR increased for the HVAC measure. Since the ex ante calculation was not provided, the exact reason cannot be determined. The discrepancy may be due to the use of a different EFLH for the ex post calculation based on the building type.	LPD RRs decreased due to a modification to the LPD calculation for the warehouse. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis, which decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Additionally, one fixture type was given as 19.1 W in the ex ante calculation. The ex post calculation used 19.9 W per DLC. The removal of ineligible fixtures, reduction in square footage, and use of DLC wattage decreased RRs. VRF It is unclear why kWh RR increased for the VRF measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34). ASHP It is unclear why kWh RR decreased for the ASHP measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34). Unitary & Split AC It is unclear why kWh RR increased for the Unitary & Split AC measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34).	Interior kWh and kW RRs are affected by a modification to the LPD calculation for the warehouse. One fixture type was not DLC or Energy Star certified and was removed from the analysis. It was assumed that the square footage illuminated by the ineligible fixture was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Additionally, DLC wattages were used in place of the wattages from ComCheck, which also affected RRs. Lastly, a CF was applied twice in the ex ante calculation. It was applied only once in the ex post analysis, which increased kW savings. The exterior kWh RR is affected by a modification to the LPD calculation. One fixture type was not DLC or Energy Star certified and was removed from the analysis. Additionally, several fixture IDs from the ComCheck document were not in the exterior spec sheets in the project documentation. Since there was no way to verify the model numbers for these fixtures, they were removed from the analysis. It was assumed that the square footage illuminated by the ineligible fixtures (including those missing from the spec sheets) was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Furthermore, DLC wattages were used in place of the wattages from ComCheck, which also affected RRs. Lastly, the ex post analysis used HOU per the PNM workpaper for exterior fixtures.	Dehumidification: No ex-ante calculations were provided, and as such the discrepancy in savings could not be determined. The ex-post calculation references FES- A22 Dehumidification for Indoor Horticultural Facilities. Horticultural Lighting: Ex-ante and ex-post calculation methodologies are consistent. The discrepancy in savings is due to the modification of quantities and wattages per invoices and DLC tested wattages, respectively. There is a large discrepancy in ex-ante vs ex-post peak kW; however, kW savings are consistent between both calculations. Assuming CF used in ex-ante peak kW inconsistent with methodology followed, could not verify as no ex-ante peak kW calcs were provided.

Project ID	PNM-19-03602
Utility	PNM
Program	Commercial Comprehensive
Component	HVAC Custom
Sampling Group	Custom
Project Description	RCx Tier 2
Building Type	Health
Other Building Type	Health Care
Site Visit Being Conducted	No
Gross Reported kWh	950,950
Gross Reported kW	172.50
Gross Verified kWh	950,950
Gross Verified kW	172.50
kWh Realization Rate	1.00
kW Realization Rate	1.00
Calculation Assessment	Custom Calculation
Reasons for RR(s) <> 1	

Project ID	PNM-22-04735	PNM-22-04726	PNM-22-04724	PNM-22-04722	PNM-22-04713	PNM-22-04698	PNM-22-04697
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Multifamily	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	New Construction	New Construction
Sampling Group	Custom	Multifamily	Lighting	Lighting	HVAC	New Construction	New Construction
Project Description	Custom - High Efficient Transformers and Building Envelopment improvement	Exterior LED fixture retrofit	Lowe's Multisite Lighting Retrofit	Installation of new high-efficiency lighting fixtures	10 Ton Roof Top AC unit retrofitting in a retail space	HVAC + LPD	Energy efficient lighting installation in exterior spaces (Soccer and Baseball field)
Building Type	Miscellaneous	Multifamily	Retail	Heavy Industry	Retail	Education	Exterior
Other Building Type							
Site Visit Being Conducted	No	No	No	No	No	Yes	No
Gross Reported kWh	74,606	89,876	1,245,693	149,361	1,551	19,844	223,452
Gross Reported kW	35.00	0.00	51.99	19.96	0.39	4.53	0.00
Gross Verified kWh	58,034	89,876	1,253,720	145,888	1,503	20,685	248,280
Gross Verified kW	2.38	0.00	59.38	19.62	0.92	6.63	0.00
kWh Realization Rate	0.78	1.00	1.01	0.98	0.97	1.04	1.11
kW Realization Rate	0.07		1.14	0.98	2.35	1.46	
Calculation Assessment	Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for."						
Reasons for RR(s) <> 1	For Efficient Transformer Measure : Change in calculation approach. Baseline transformer efficiency values are much lower than that of federal minimum efficiency levels. PNM Workpaper methodology used in "NEMA Premium Low Voltage Dry-Type Distribution Transformers " measure seemed more appropriate and savings calculations are revised accordingly. This Resulted in the reduction of both kWh and kW savings. For Building Envelope Improvement Measure : Sensible Heat Coefficient used in heating load reduction calculation is changed to 1.08 from 0.85 ((Btu/hr)/cfmDeg.F). This resulted in the increase of kWh savings.		The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.196 and 1.283) and CF (0.83) associated with a Retail/Service building type. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.024 and 1.054) and CF (0.85) associated with a Heavy Industry building type listed in the workpapers. The evaluation team calculated the controls savings using a controls factor of 0.24 and 20,915 connected Watts. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	The discrepancy between the ex ante and ex post savings is not known. The evaluation team used the savings methodology in the NM TRM to calculate the savings for one, 9.4 ton unitary AC with an efficiency of 12.4 in a Retail/Service building type.	The ex ante LPD calculation used the "Education, K-12 School" building type for operating hours, HVAC EIF interactive factor, and CDF. The application lists the building type as "College/University," which was used in the ex post calculation. These changes affected RRs. It is unclear why kWh RR increased for the HVAC measures. kW increased due to the use of the College/University CF (0.87, Las Cruces) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34, Albuquerque).	Reported savings consider Factor of Safety of 10% which is causing variation of roughly 11% in the verified savings . The evaluation team removed the Safety Factor when calculating the verified savings. No other adjustments were made.

Project ID	PNM-22-04693	PNM-22-04663	PNM-22-04661	PNM-22-04659	PNM-22-04658	PNM-22-04643	PNM-22-04639
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	New Construction
Sampling Group	Lighting	HVAC	HVAC	HVAC	Custom	Lighting	New Construction
Project Description	Replacing exterior HID with LED	VFD retrofitting in a retail facility	VSD on Supply Fans	VSD on Supply Fans	Installation of new high-efficient stage lighting	Installation of new high-efficiency lighting fixtures	Custom (LPD + HVAC)
Building Type	K-12 School	Retail	Retail	Retail	Miscellaneous	Retail/Service	Office
Other Building Type							
Site Visit Being Conducted	No	No	No	No	No	No	Yes
Gross Reported kWh	352,371	30,495	67,089	81,320	17,555	1,256,963	13,976
Gross Reported kW	0.00	4.29	9.44	11.44	12.15	37.72	3.06
Gross Verified kWh	352,371	30,495	67,089	81,320	20,859	1,272,898	10,531
Gross Verified kW	0.00	4.29	9.44	11.44	15.12	40.86	2.47
kWh Realization Rate	1.00	1.00	1.00	1.00	1.19	1.01	0.75
kW Realization Rate		1.00	1.00	1.00	1.24	1.08	0.81
Calculation Assessment					Custom calculation was used to determine the Ex-Ante Savings. No HVAC interactive factors were used in the analysis so confirmation required whether the space is conditioned or not. Building type is mentioned as "Miscellaneous" in the Application while it is mentioned as " Assembly" in UCT document. Hours of Use is considered to be 20 hours per week (confirmation required).		Both measures were calculated using utility workpapers. There were no issues with the LPD calculation. The ex post approach for the heat pump calculation used deemed savings and bonus savings from the workpaper workbook.
Reasons for RR(s) <> 1					HVAC Interactive factors were not considered in the Ex-Ante analysis. Ex post analysis used TRM values for HVAC interactive factors considering the space type to be " Assembly "	The evaluation team calculated the verified savings using the fixture quantities, fixture types, input fixture power, and annual hours of use listed in the Lighting SOW tab of the Final Application file for this project. For the interior lighting fixtures, the evaluation team used the interactive effects factors (1.196 and 1.283) and CF (0.83) associated with a Retail/Service building type. The evaluation team was not able to identify the discrepancy in energy and peak demand saving using the supplied project documentation.	RRs decreased for the LPD calculations. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis, which decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. The removal of ineligible fixtures and reduction in square footage decreased RRs. It is unclear why kWh RR increased for the HVAC measure. kW increased due to the use of the Office CF (0.67) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34).

Project ID	PNM-22-04638	PNM-22-04631	PNM-22-04624	PNM-22-04623	PNM-22-04622	PNM-22-04602	PNM-22-04597
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Retrofit Rebate	Multifamily
Sampling Group	Custom	Custom	Lighting	Lighting	Lighting	HVAC	Multifamily
Project Description	LED Grow Lights and Dehumidifiers	Custom Refrigeration	Exterior Lighting Replacement	Interior LED lighting and controls	Exterior LED pole lamps replacing HID	VSD on Supply Fans	Air-cooled chiller retrofit (27.6 Tons)
Building Type	Warehouse/ Industrial	Grocery	Exterior	Retail	Exterior	Retail	Miscellaneous
Other Building Type					Restaurant		Apartments
Site Visit Being Conducted	Yes	Yes	Yes	No	No	No	No
Gross Reported kWh	253,526	127,724	1,699,022	19,058	22,213	66,072	1,622
Gross Reported kW	31.19	10.83	0.00	5.60	0.00	9.30	3.94
Gross Verified kWh	241,026	127,724	1,699,046	25,419	20,848	66,073	974
Gross Verified kW	34.43	10.83	0.00	6.18	0.00	9.30	1.57
kWh Realization Rate	0.95	1.00	1.00	1.33	0.94	1.00	0.60
kW Realization Rate	1.10	1.00		1.10		1.00	0.40
Calculation Assessment	LED Grow Lights used algorithms for Commercial Grow Lights from version 10 of the IL TRM. A custom calculation was used for the Dehumidifiers referencing "FES- A22 Dehumidification for Indoor Horticultural Facilities." For both kWh and kW calculations, energy efficient kWh/kW was subtracted from base kWh/kW, respectively.	The custom calculation determined the annual kWh/ft avoided by retrofitting 230 linear feet of medium temperature glass doors onto existing cases. The annual energy consumption with the glass doors was subtracted from the annual energy consumption without the glass doors. Demand savings were calculated similarly. Assumptions from the ex ante calculator included: -Use of actual running time of condensing unit (off during defrosts) -Use of actual operation time of fans, defrost heat -Use of 24 hr/day operation of lights, anti-condensate heat -Case refrigeration requirement (Q) was determined in accordance with ASHRAE 72 or 117 -Compressor suction temp was evap temp - 2°F for medium temp, evap temp - 3°F for low temp EER is determined via ARI 1200, Table 1 -Existing lighting was shown as Efficient Lights LEDs	Prescriptive (TRM, Workpaper)			The calculation approach used the prescribed measure for Variable-Speed Drives for HVAC Applications in the 2021 PNM workpaper. Energy and demand savings for HVAC VFDs were estimated from a study sponsored by Northeast Energy Efficiency Partnerships. HVAC applications specific to heating or cooling were adjusted for New Mexico climate zones. Annual kWh and kW savings for Supply Fans are listed per HP in the workpaper and are based on the Albuquerque climate zone. The annual energy savings for Supply Fans is 2033 kWh. This value was multiplied by equipment quantity and HP. Demand savings for Supply Fans is 0.286. This value was multiplied by equipment quantity and HP.	Difference in kWh savings is probably due to cooling EFLH. Difference in kW savings is probability due to a different baseline efficiency considered.
Reasons for RR(s) <> 1	kWh and kW RRs were affected by a modification to the Energy Factor_EE (EF) for the Quest 225 unit. The algorithm provided requires this variable to be in L/kWh. The ex ante calculation used 6.1, which is the efficiency in PINTS/kWh. According to the Quest website (specifications were not provided for this model), EF for a water removal of 225 pints/day is 2.9 L/kWh. This change reduced RRs.			The evaluation team calculated the ex post savings using the fixture types, fixture quantities, and fixture input power that were listed on the Lighting tab of the Final Application. The ex post calculations used the HOUs, CF, and HVAC factors for a Retail/Service building type listed in the 2021 PNM workpapers. The lighting controls ex post calculations used a savings factor of 0.24 for 400 controlled watts.	App summary states 22,213 kWh savings, ex ante calcs via final app state 20,792 kWh savings. - Ex post savings have 99.7% RR against ex ante, discrepancy due to HOU update from 52 hr/wk to 52.14 hr/wk.		The evaluation team referenced the PY2021 PNM workpapers to calculate the verified ex post savings. Based on the supplied documentation, the reason for the discrepancy in savings is not clear.

Project ID	PNM-21-04545	PNM-21-04539	PNM-21-04495	PNM-21-04462	PNM-21-04418	PNM-21-04416	PNM-21-04414
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction	New Construction	Retrofit Rebate	Multifamily	BTU	Multifamily	BTU
Sampling Group	New Construction	New Construction	Lighting	Multifamily	Building Tune-Up	Multifamily	Building Tune-Up
Project Description	New construction lighting and HVAC	Installation of new high efficiency Lighting and HVAC units in a Warehouse	Lighting Retrofit	NC multifamily lighting and ASHP	Other	LED lighting retrofit	Other
Building Type	Warehouse/ Industrial	Warehouse/ Industrial	Retail	Multifamily	Hospital	Multifamily	Office
Other Building Type		Office & Parking Lots					
Site Visit Being Conducted	Yes	Yes	No	Yes	No	No	No
Gross Reported kWh	3,030,582	500,212	144,089	358,999	61,620	85,366	59,250
Gross Reported kW	332.49	72.31	18.80	51.79	0.00	16.10	0.00
Gross Verified kWh	3,030,945	547,743	153,142	147,204	61,620	41,459	59,250
Gross Verified kW	386.46	90.81	20.75	25.03	0.00	1.97	0.00
kWh Realization Rate	1.00	1.10	1.06	0.41	1.00	0.49	1.00
kW Realization Rate	1.16	1.26	1.10	0.48		0.12	
Calculation Assessment	The custom lighting calculation used 24/7 hours of operation with a 10% safety factor instead of NM TRM hours.						
Reasons for RR(s) <> 1	Ex post energy savings were slightly higher due to the removal of certain light fixtures in the custom lighting calculation. These fixtures were "Not Approved" on the electrical drawings. The fixtures used will need to be verified onsite. The ex post coincident demand savings were higher for HVAC calculations. The ex ante analysis appeared to multiply the demand savings by a CF of 0.34, which corresponds to "Commercial, General." The ex post analysis used a CF of 0.55, which corresponds to a Warehouse.	The discrepancy between the ex ante and ex post savings is not clear based on the supplied project documentation. The evaluation team calculated the verified savings using the project specific details listed in the supplied project files. The ex post savings used HOU, HVAC factors, and CF values for an office, warehouse, and exterior building types. The evaluation team was able to use the appropriate factors for each building type based on the project documentation.	Baseline wattage and quantity has discrepancy in Lighting sheet and Lighting SOW sheet. Quantity of proposed fixture differs from Invoice and Lighting sheet. Proposed Fixture wattage is used as per DLC certificate.	Lighting - As ex-ante calculation file is not provided, exact reason for variation could not be identified. RR variation could be due to difference in the Baseline LPD values, HVAC interactive factors and CF between ex-ante and ex-post calculations. Ex-post analysis referred to PNM workpapers. As per post inspection file, ex-ante analysis had considered the building type as 'Medical' in place of 'Multifamily' in their analysis. The building type as per the application is Multifamily. ASHP- As ex-ante calculation file is not provided, exact reason for variation could not be identified. RR variation could be due to differences in the EFLH and CF values between ex-ante and ex-post analysis. Ex-post analysis have referred to both PNM 2019 (for qualifying and baseline efficiency) and PNM 2021 (EFLH cooling, EFLH heating and CF as Multifamily was not a building type in PNM 2019 workpaper) workpapers.		RR variation due to difference in HOU, HVAC interactive factors and CF for the Interior fixtures between ex-ante and ex-post analysis. As ex-ante calculation file has not been provided, it's not clear as to what factors and HOU were used in ex-ante analysis. Ex-post analysis have used the factors corresponding to the Multifamily building type as mentioned in the application for the interior fixtures. Baseline fixture wattage and qty. are taken from the 'Lighting' sheet in Final Application excel file. Baseline incandescent fixture information is not provided. The fixture qty. is 121. Ex-post analysis have referred to PNM 2021 workpaper for baseline incandescent fixture wattage.	

Project ID	PNM-21-04354	PNM-21-04339	PNM-21-04323	PNM-21-04277	PNM-20-04194	PNM-20-04137	PNM-20-04135
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction	Multifamily	Retrofit Rebate	Retrofit Rebate	Multifamily	Multifamily	Multifamily
Sampling Group	New Construction	Multifamily	Other	Lighting	Multifamily	Multifamily	Multifamily
Project Description	Energy Efficient Lighting installation in a light manufacturing facility	New Construction Lighting and HVAC	Lighting Retrofit and LED Refrigeration case lighting	Retrofit of interior lighting and HVAC.	0	0	Installation of Efficient Light Fixtures for NC Building
Building Type	Warehouse/ Industrial	Multifamily	Retail	Office	Multifamily	Miscellaneous	Miscellaneous
Other Building Type							Residential - Multifamily
Site Visit Being Conducted	No	No	No	No	No	No	Yes
Gross Reported kWh	38,165	71,463	27,390	304,923	133,200	64,284	385,457
Gross Reported kW	12.62	7.82	4.85	103.06	20.10	4.79	22.34
Gross Verified kWh	60,901	82,177	27,183	271,014	153,308	47,922	364,555
Gross Verified kW	13.81	7.85	4.98	50.29	22.86	6.57	30.75
kWh Realization Rate	1.60	1.15	0.99	0.89	1.15	0.75	0.95
kW Realization Rate	1.09	1.00	1.03	0.49	1.14	1.37	1.38
Calculation Assessment			* Interior space lighting retrofit measure calculation is done using custom calculation approach. DLC certificates provided for Post fixture wattages. Annual hours of use considered to be 5068 (Not from TRM) * Refrigerated case lighting retrofit calculation is done using deemed values from TRM			SEER baseline value for AC is taken from Workpaper 2019, factor of safety is not considered in kWh saving calculations,	The calculation methodology is based on Utility Workpaper and New Mexico TRM 2021
Reasons for RR(s) <> 1	The facility is broadly classified as a Workshop. However, it has an office, a juice processing space and a refrigerated product storage. This means HVAC interaction factors could vary from space to space in the interior. The lighting is intended to operate for 24 hours, but occupancy sensors are installed, which may affect the operating hours. These two reasons are the causes for RR variation.	Lighting- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference between the LPD Baseline, HVAC Interactive factors and CF between ex-ante and ex-post analysis. Ex-post analysis have referred to the PNM workpapers for these factors. Source of ex-ante factors is not clear. ASHP- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference in capacity and EFLH values between ex-ante and ex-post analysis. Ex-post analysis have referred to both PNM 2019 (for qualifying and baseline SEER values) and PNM 2021 (EFLH cooling, EFLH heating and CF as Multifamily was not a building type in PNM 2019 workpaper) workpapers. Capacity used in ex-post calculations is as per the attached AHRI certificates.	HVAC interactive factors were not considered for lighting retrofit measure in the Ex-Ante calculation. Annual Hours of use value updated from TRM	Occupancy sensor savings have been claimed but exact information of sensor is not provided. HVAC savings calculation is done using TRM methodology.	Lighting- Exact reason for kWh RR variation could not be identified as ex-ante calculations were not provided. Variation could be due to difference between the LPD Baseline, HVAC Interactive factors and CF between ex-ante and ex-post analysis. Ex-post analysis have referred to the PNM workpapers for these factors. ASHP & RTU- Exact reason for kWh RR variation could not be identified.	The discrepancy in savings is not known for the kWh savings. Difference in kW RR is due to difference in CF assumption for both lighting and HVAC.	Discrepancy between Tracking Data and Application Summary (Dt. 7/12/2022) is observed. Ex-post new fixtures exterior lighting calculations were based on calculated LPD. Slight reduction in kWh is observed because of rounding error. Slight variation in peak kW savings for interior lighting is observed. No ex ante calculation file for lighting was present, so exact reason for the discrepancy cannot be determined. Ex ante considered TRM based value of 127 kWh for Efficient rated unit electricity consumption for ENERGY STAR Washer. Ex post considered 123 kWh as per specifications sheet. Ex post calculations for ASHP were based on NM 2021 TRM section 4.13 Heat Pumps for Residential areas. No ex ante calculation file for this measure was present, so exact reason for the discrepancy cannot be determined.

Project ID	PNM-20-03988	PNM-19-03861	PM-22-05849	19884	19808	19761
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Rebate	Retrofit Rebate	Midstream	Multifamily	Multifamily	Multifamily
Sampling Group	Custom	HVAC	Midstream	Multifamily	Multifamily	Multifamily
Project Description	Custom - Transformers	VRFs, Transformers (custom), Wall insulation (custom)	Installing high-efficient Refrigerators	Replacing existing lighting fixtures with energy efficient LED fixtures in exterior spaces	LED Retrofit	Replacement of Existing Lighting Fixtures with LED Fixtures
Building Type	Office	Office	Retail	Miscellaneous	Multifamily- common areas	Exterior
Other Building Type				Exterior and Interior		
Site Visit Being Conducted	No	Yes	No	No	No	No
Gross Reported kWh	130,319	367,045	3,911	13,191	72,745	38,255
Gross Reported kW	124.94	191.00	0.45	0.33	0.22	1.63
Gross Verified kWh	130,320	258,653	4,169	13,960	73,089	35,771
Gross Verified kW	124.93	216.07	0.45	0.04	0.03	0.00
kWh Realization Rate	1.00	0.70	1.07	1.06	1.00	0.94
kW Realization Rate	1.00	1.13	0.99	0.11	0.12	0.00
Calculation Assessment	Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for."	The ex post approach for the VRF calculation used deemed savings and bonus savings from the workpaper workbook. Transformers - Calculations used entered data of baseline and ex post losses. Ex post losses are subtracted from baseline losses to estimate the transformer peak demand and energy savings. For peak demand savings, the ex ante calculation used the Building Type "Office" with a CDF of 0.7 for all spaces. The building type on the application is listed as "Office." According to IL TRM, "CF for distribution transformers is 1.0 by definition. By including the load factor in the demand savings calculation, the load profile is accounted for." Wall Insulation - kW: The kW usage for the following factors were initially considered: space cooling, heat rejection, refrigeration, space heat, HP supp., hot water, vent. fans, pumps and aux., ext. usage, misc. equip, task lights, and area lights. The kW usage of those factors were totaled for each month from January to December for both the roof and the wall insulation. kW from the walls was subtracted from kW from the roof for each month. The sum of the savings for each month resulted in an annual savings of 164 kW. kWh: The kWh (on-peak and off-peak) usage for each factor above was totaled for each month from January to December for both the roof and the wall insulation. Total kWh from the walls was subtracted from total kWh from the roof for each month. The sum of the savings for each month resulted in an annual savings of 102,063 kWh.	Energy saving per Cu.ft of refrigerated volume was obtained from Work paper and Volume was obtained from Energy star certificate	Weekly operating hours are listed in the application summary which are multiplied by 52.1429 to get the annual operating hours.		Weekly operating hours are listed in the application summary which are multiplied by 52.1429 to get the annual operating hours.
Reasons for RR(s) <> 1		kWh and kW RRs are affected by the VRF measure. It is unclear why kWh RR increased for the VRF measure. kW increased due to the use of the Office CF (0.67) in the ex post calculation. The ex ante analysis used the Commercial, General CF (0.34).	9 Out of 12 refrigerator units were considered as glass door refrigerators but those models are actually solid door refrigerators as per the Energy Star Certificates	RR variation is probably due to a different value of HVAC factor considered for Multifamily unit> interior spaces rather than exterior spaces (which is 1). Higher kW savings also indicates that a non-zero CF value is considered for exterior spaces, which may result in the higher peak savings.	Reported peak demand savings of 0.22kW is actually just the kW reduction without the CF and HVAC interactive factors applied.	All measures seem to be installed in Exterior spaces (from the pictures), however there are demand savings reported, which means a non-zero CF value is used. RR variation could be due to difference in baseline wattages between ex ante and ex post and HVAC factor considered for Multifamily unit, interior spaces rather than exterior spaces.

Project ID	19495	PM-21-05702	19801	19818	19858	19902
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Multifamily	Midstream	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Sampling Group	Multifamily	Midstream	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	LED lighting retrofit	HVAC	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures	Installation of LED light fixtures (exterior) and removal of MH fixtures	Installation of interior and exterior LED fixtures
Building Type	Multifamily - common areas IQ	Miscellaneous	Miscellaneous	Miscellaneous	Exterior	Retail
Other Building Type		Commercial, General	Commercial, General	Commercial, General	Commercial, General for interior fixtures	Gas station
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	145,079	216,188	64,224	136,146	159,956	11,641
Gross Reported kW	4.90	21.95	7.80	9.43	8.77	0.74
Gross Verified kWh	163,639	384,294	76,190	145,406	167,099	12,792
Gross Verified kW	0.60	46.22	6.68	8.47	7.87	0.79
kWh Realization Rate	1.13	1.78	1.19	1.07	1.04	1.10
kW Realization Rate	0.12	2.11	0.86	0.90	0.90	1.07
Calculation Assessment						
Reasons for RR(s) <> 1	Ex-ante savings could not be replicated. Variation could be due to difference in the baseline wattages, HVAC interactive factors and CF between the ex-ante and ex-post analysis. Ex-ante calculations were not provided.	For Heat Pumps and VRF systems, the cooling and heating savings are calculated separate which resulted in a reduction in heating kWh Savings. Ex-Ante calculation used the cumulative table (Both Heating and Cooling Savings For Heat Pumps, conversion factor used to arrive at Heating demand savings was 12/3.412 instead of 12 for units Less than or equal 5.4 tons (HSPF considered not COP). It was corrected for Ex-Post calculations and the Heating kWh savings increased. " Commercial, General" Building type was used in most of the cases for calculating the Peak KW Savings. Ex-Post calculation considers particular building types mentioned in the files. This resulted in an increase in Ex-Post Peak Coincident kW savings.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation assumed all fixtures were interior and used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. The CF for one fixture was changed to 0 in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), has all line items are marked "N." The ex post calculation assumed one line item was an exterior fixture based on the photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Other Notes: • 3-4' 40W T12, Magnetic Ballast (2) - Not available in Fixture List on PNM workpaper. This assumes a ballast factor of approximately 1.19 for 3 40 W fixtures. • 2-4' 40W T12, Magnetic Ballast (1)) - Not available in Fixture List on PNM workpaper. This assumes a ballast factor of approximately 1.075 for 2 40 W fixtures. • What is the justification for HOU for some locations (i.e., 168 hours per week for a storage rooms; are there no controls?); there may be an opportunity for the installation of controls	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications). Lastly, the tracking data and ex ante calculation are missing line item #23 (see post inspection document>Lighting Summary Table, page 2 of 3>"Item #" column). The ex post calculation included line item #23 because it was verified as installed in the project documentation, including a photo.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The post inspection document (Lighting Summary Table, page 2 of 3) lists fixtures (that are being removed) in column name "Outside" as "N," which is assumed to mean "no." There were no photos in the project documentation of these removed fixtures to indicate whether they were interior or exterior. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for indoor fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type. These modifications increased RRs. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 2-4' 32W-T8-HPEB1-R). The ex ante calculation used 74 W, whereas the ex post calculation used 70 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).

Project ID	19938	19797	19326	19563	19612	19643
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Sampling Group	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures	Lighting Retrofit	Replacement of Light Fixtures with LED	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs
Building Type	Restaurant - Sit Down	Warehouse/ Industrial	Miscellaneous	Miscellaneous	Miscellaneous	Exterior
Other Building Type			Car Dealership	Entertainment	Church	
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	4,473	123,912	105,313	155,649	59,746	73,345
Gross Reported kW	1.02	24.61	23.76	24.94	0.00	0.00
Gross Verified kWh	5,032	126,788	124,013	179,685	59,746	87,714
Gross Verified kW	0.74	14.50	21.33	14.39	0.00	0.00
kWh Realization Rate	1.13	1.02	1.18	1.15	1.00	1.20
kW Realization Rate	0.73	0.59	0.90	0.58		
Calculation Assessment			Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.
Reasons for RR(s) <> 1	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for both interior and exterior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The CF for exterior fixtures was changed to 0 in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3) lists some fixtures as having a location "Outside" in the Location column. In another column in the same table (column name "Outside"), all items are marked "N." The ex post calculation assumed the "Outside" space types were indeed exterior fixtures based on the pre- and post-inspection photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 2-4' 32W-T8-HPEB1-R). The ex ante calculation used 74 W, whereas the ex post calculation used 70 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RRs (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for both interior and exterior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Storage – Unconditioned. It is important to note there is conflicting information in the project documentation. In the post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), all items are marked "N." The ex post calculation assumed that some space types were indeed exterior fixtures based on the photographs in the project documentation. As such, the CF for exterior fixtures was changed to 0 in the ex post calculation. These modifications increased kWh RR and decreased kW RR.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Note: It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation assumed all fixtures were interior (with the exception of line item #77) and used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. The CF for several exterior fixtures were changed to 0 in the ex post calculation. The ex ante calculated assumed these fixtures were interior. These modifications increased kWh RR and decreased kW RR. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table, page 2 of 3, column name "Outdoor"), has all line items are marked "N," with the exception of line item #77.		The ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 175 Watt Metal Halide). The ex ante calculation used 150.5 W, whereas the ex post calculation used 215 W, based on the PNM workpaper fixture list. The 175 W MH fixture was verified in the project photos. This modification increased the kWh RR.

Project ID	19704	19723	19766	19788	20066	20072
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Retrofit Lighting	Retrofit Lighting
Sampling Group	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)	Direct Install (Quicksaver)
Project Description	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Replacement of Conventional Light Fixtures with LEDs	Installation of interior and exterior LED fixtures	Installation of interior and exterior LED fixtures
Building Type	Exterior	Miscellaneous	Miscellaneous	Warehouse/ Industrial	Miscellaneous	Miscellaneous
Other Building Type		Government City/County	Shipping Service Center		Commercial, General	Commercial, General
Site Visit Being Conducted	No	No	No	No	No	No
Gross Reported kWh	45,694	66,101	384,261	18,739	239,979	347,729
Gross Reported kW	0.00	10.94	57.44	6.01	25.10	83.73
Gross Verified kWh	45,694	78,726	451,244	19,638	280,434	409,766
Gross Verified kW	0.00	9.83	51.41	4.60	22.75	72.42
kWh Realization Rate	1.00	1.19	1.17	1.05	1.17	1.18
kW Realization Rate		0.90	0.89	0.77	0.91	0.86
Calculation Assessment	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Savings are calculated based on reduction in wattages between baseline and efficient Light fixtures. Interactive Factors and Coincidence Factor is taken based on the building type.	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)
Reasons for RR(s) <> 1	The ex post calculation includes custom LED signage kWh. No custom calculations were present in project documentation. It is important to include custom calculations in project files so that savings can be reproduced. Additionally, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage did not greatly influence savings due to the low quantity of these fixtures.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR (which was counterbalanced by the aforementioned modifications).	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for the fixtures. All fixtures are interior as depicted in the photos in the project documentation. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type. The building type selected was Storage - Unconditioned. The project documentation only described the building type as "warehouse" and did not specify whether or not it was conditioned. It is assumed this space is unconditioned. These modifications increased kWh RR and decreased kW RR. Other Notes: • 4-4' 32W-T8-HPEB1 is not in the Fixture List on the PNM workpaper. • Some of the lamps in the fixture are burnt out from the photos.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 4-4' 54W-T5-EB1). The ex ante calculation used 226 W, whereas the ex post calculation used 234 W, based on the PNM workpaper fixture list. This modification (increase) to the baseline fixture wattage led to a slight increase in the RRs. It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List.	RRs are affected by the use of HVAC EIF, HVAC DIF, and CF for interior fixtures. The ex ante calculation used 1 for HVAC EIF, HVAC DIF, and CF for ALL fixtures (note: there was an assumption that all fixtures were interior). The ex post calculation selected HVAC EIF, HVAC DIF, and CF factors based on building type for interior fixtures. The building type selected was Commercial, General. For exterior fixtures, a CF of 0 was used in the ex post calculation. It is important to note there is conflicting information in the project documentation. The post inspection document (Lighting Summary Table) lists two fixtures as having a location "Outside" in the Location column. In another column in the same table (column name "Outdoor"), all items are marked "N." The ex post calculation assumed the "Outside" space types were indeed exterior fixtures based on the pre- and post-inspection photographs in the project documentation. These modifications increased kWh RR and decreased kW RR. Also, the ex ante and ex post calculations had a discrepancy for one baseline fixture type (i.e., 400 Watt Metal Halide). The ex ante calculation used 458 W, whereas the ex post calculation used 456 W, based on the PNM workpaper fixture list. This modification to the baseline fixture wattage led to a slight decrease in the RR. It is recommended to use the baseline fixture nomenclature per the PNM Workpaper Fixture List.

Project ID	PNM-21-04441	PNM-21-04453	PNM-22-04609	PM-22-05980	PM-22-06116	PNM-21-04415	PNM-21-04583
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	New Construction Lighting	New Construction Lighting, HVAC, and Custom	New Construction Lighting	Retrofit HVAC	Energy Star Refrigerators/Freezers	Building Tune-Up	Retrofit Custom
Sampling Group	New Construction	New Construction	New Construction	Midstream	Midstream	Building Tune-Up	Custom
Project Description	New construction interior and exterior lights	Installation of HVAC, interior and exterior lighting. Also custom geothermal source heat pump installed.	Horticulture Lighting	HVAC	Energy Star Refrigerators/Freezers	Other	Water-Cooled Chillers, VSD on HVAC Motors, Motors & VSDs, HVAC Controls, Cooling Tower
Building Type	Retail	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Office	Office
Other Building Type		Commercial, General (Library)	Horticultural				
Site Visit Being Conducted	No	No	No	No	No	No	No
Gross Reported kWh	49,318	67,879	120,914	79,752	10,644	61,620	855,559
Gross Reported kW	7.33	21.24	0.00	8.40	1.17	0.00	74.21
Gross Verified kWh	49,921	61,101	119,738	104,588	10,356	61,620	855,559
Gross Verified kW	7.32	21.11	0.00	17.23	1.12	0.00	74.21
kWh Realization Rate	1.01	0.90	0.99	1.31	0.97	1.00	1.00
kW Realization Rate	1.00	0.99		2.05	0.96		1.00
Calculation Assessment	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper) & Custom Calculation	Custom Calculation	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Custom Calculation
Reasons for RR(s) <> 1	The discrepancy in savings is due to operational hours and interactive factor selection. The ex post calculation used a Retail building type (with the exception of exterior light fixtures).	The discrepancy in savings is due to operational hours and interactive factor selection. The building type was modified to Commercial, General to be consistent across all prescriptive measures in this project (with the exception of exterior light fixtures).	The discrepancy in savings is due to the use of DLC tested wattage in the ex post calculation. Also, it is important to note that both the ex ante and ex post calculations are assuming no cooling.	The evaluation team used the prescriptive savings methodology from the NM TRM to calculate savings for these HVAC measures. The discrepancy in savings is not known.	No ex-ante calcs or line-by-line savings provided. The discrepancy could be due to different volume values stated.		

Project ID	PNM-22-04608	PNM-22-04715	PNM-22-04795	PNM-22-04813	PNM-22-04817
Utility	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Component	Retrofit Custom	New Construction Lighting	New Construction Lighting	Retrofit Lighting	Custom Horticultural Lighting, Custom Horticultural Dehumidification
Sampling Group	Custom	New Construction	New Construction	New Construction	Custom
Project Description	HVAC & indoor horticulture lighting	LPD + HVAC	LPD + HVAC	Installation of new high efficiency HVAC/ custom HVAC units and lighting/ custom lighting measures	LED Grow Lights, Dehumidifiers
Building Type	Miscellaneous	Health	Health	Miscellaneous	Warehouse/Industrial
Other Building Type	Horticultural	Hospital	Medical/Hospital		Light Industry
Site Visit Being Conducted	No	No	No	No	No
Gross Reported kWh	424,745	1,585,948	610,919	3,086,174	1,002,404
Gross Reported kW	84.60	231.17	81.40	225.81	61.35
Gross Verified kWh	474,856	1,321,318	534,205	2,525,343	1,072,257
Gross Verified kW	100.96	204.76	106.97	334.79	209.92
kWh Realization Rate	1.12	0.83	0.87	0.82	1.07
kW Realization Rate	1.19	0.89	1.31	1.48	3.42
Calculation Assessment	Custom Calculation	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper)	Prescriptive (TRM, Workpaper) & Custom Calculation	Custom Calculation
Reasons for RR(s) <> 1	Lighting (Retrofit & NC): The evaluation team referenced the IL TRM for this measure and used NM interactive factors for Commercial/General. HVAC interactive factors were considered for the LED lights in the ex post calculation while the ex ante calculation did not. Annual hrs & CF 0.9 is considered for both measures as per ex ante calculations. HVAC VRF & AC : CF 0.9 is considered for both measures as per ex ante calculations.	LPD RRs decreased due to the interior LPD calculation. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis. Additional fixtures were removed from the analysis because the submittals stated these fixtures were not approved. These modifications decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. The removal of ineligible fixtures and reduction in square footage decreased RRs. HVAC The ex ante calculation used a CF of 0.49 (Commercial, General), whereas the ex post calculation used a CF of 0.63 (Medical). This modification increased the kW savings for the water-cooled chiller measure. It is unclear why kWh RR increased for the HVAC measure. Since the ex ante calculation was not provided, the exact reason cannot be determined. The discrepancy may be due to the use of a different EFLH for the ex post calculation based on the building type.	LPD RRs decreased due to a modification to the LPD calculation for the warehouse. Several fixtures were not DLC or Energy Star Certified and were removed from the analysis, which decreased the total proposed watts. It was assumed that the square footage illuminated by these ineligible fixtures was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Additionally, one fixture type was given as 19.1 W in the ex ante calculation. The ex post calculation used 19.9 W per DLC. The removal of ineligible fixtures, reduction in square footage, and use of DLC wattage decreased RRs. VRF It is unclear why kWh RR increased for the VRF measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34). ASHP It is unclear why kWh RR decreased for the ASHP measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34). Unitary & Split AC It is unclear why kWh RR increased for the Unitary & Split AC measure. It is possible the ex ante calculation used a different building type. kW increased due to the use of CF (0.78) for the Medical building type in the ex post calculation. The ex ante analysis used the Commercial, General building type which has a lower CF (0.34).	Interior kWh and kW RRs are affected by a modification to the LPD calculation for the warehouse. One fixture type was not DLC or Energy Star certified and was removed from the analysis. It was assumed that the square footage illuminated by the ineligible fixture was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Additionally, DLC wattages were used in place of the wattages from ComCheck, which also affected RRs. Lastly, a CF was applied twice in the ex ante calculation. It was applied only once in the ex post analysis, which increased kW savings. The exterior kWh RR is affected by a modification to the LPD calculation. One fixture type was not DLC or Energy Star certified and was removed from the analysis. Additionally, several fixture IDs from the ComCheck document were not in the exterior spec sheets in the project documentation. Since there was no way to verify the model numbers for these fixtures, they were removed from the analysis. It was assumed that the square footage illuminated by the ineligible fixtures (including those missing from the spec sheets) was proportional to the percentage of total fixtures they represented. This square footage was removed from the total floor area represented by the project. Furthermore, DLC wattages were used in place of the wattages from ComCheck, which also affected RRs. Lastly, the ex post analysis used HOU per the PNM workpaper for exterior fixtures.	Dehumidification: No ex-ante calculations were provided, and as such the discrepancy in savings could not be determined. The ex-post calculation references FES- A22 Dehumidification for Indoor Horticultural Facilities. Horticultural Lighting: Ex-ante and ex-post calculation methodologies are consistent. The discrepancy in savings is due to the modification of quantities and wattages per invoices and DLC tested wattages, respectively. There is a large discrepancy in ex-ante vs ex-post peak kW; however, kW savings are consistent between both calculations. Assuming CF used in ex-ante peak kW inconsistent with methodology followed, could not verify as no ex-ante peak kW calcs were provided.

Project ID	PNM-19-03602
Utility	PNM
Program	Commercial Comprehensive
Component	HVAC Custom
Sampling Group	Custom
Project Description	RCx Tier 2
Building Type	Health
Other Building Type	Health Care
Site Visit Being Conducted	No
Gross Reported kWh	950,950
Gross Reported kW	172.50
Gross Verified kWh	950,950
Gross Verified kW	172.50
kWh Realization Rate	1.00
kW Realization Rate	1.00
Calculation Assessment	Custom Calculation
Reasons for RR(s) <> 1	