Evaluation of the 2020 Public Service Company of New Mexico Energy Efficiency and Demand Response Programs

FINAL Report - Appendices

April 2, 2021

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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 2019 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 2019 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 2019 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 the contractor who performed the work 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 the dollar amount of the rebate 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 technical assistance received from 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

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 <u>the contractor who installed the equipment</u>.)

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 <u>the overall quality of the equipment installation</u>.)

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 the dollar amount of the rebate for the equipment.)

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 interactions with PNM.)

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 the overall value of the equipment their company received for the price they paid.)

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 the amount of time and effort required to participate in the program.)

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 the project application process.)

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 2020. 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 2020. 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 first 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 reducing environmental impact of your home 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 upgrading out-of-date equipment 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 replacing faulty or failed equipment 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 improving comfort of your home 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 improving air quality 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 improving water circulation in your pool 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 receiving the financial incentive 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 reducing energy bill amounts 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 the contractor recommendation 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 the retailer recommendation 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 the retailer recommendation 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 information from PNM marketing or informational materials 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 previous participation in a PNM program 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 2020. 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 2020. 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 first 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 reducing environmental impact of your home 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 upgrading out-of-date equipment 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 replacing faulty or failed equipment 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 improving comfort of your home 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 improving air quality 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 receiving the financial incentive 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 reducing energy bill amounts 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 the contractor recommendation 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 previous participation in a PNM program 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 the contractor who installed the equipment.)

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 the amount of time it took to receive your rebate.)

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 the dollar amount of the rebate.)

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 in household______

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 Refrigerator 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: New Home Construction Builder Interview Guide

Introduction

Talking points for recruitment

- Evergreen Economics is conducting an evaluation of utility energy efficiency programs for the New Mexico Public Regulation Commission and the state's utilities.
- We have identified selected builders that participated in the efficiency programs in 2020 for brief telephone interviews.
- The purpose of the interviews is to help us understand decision-making on what equipment goes in homes and building envelope characteristics for participating homes you build, as well as your experiences with the program overall. Who would be the best person to talk to about these things?
- We would need about 20 minutes for the interview. [Note to interviewers: Be ready to adjust interview length and focus on high priority, high-level questions if decision-makers indicate they don't have this much time. NTG questions are the highest priority]
- 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. What is your role in your company? [INTERVIEWER INSTRUCTIONS: Listen for whether management, sales, design, construction, purchasing manager, or other role.]

A2. What is your role in making use of utility new homes incentive programs? [INTERVIEWER INSTRUCTIONS: Listen for any customer contact about specs for individual homes or interviewee involvement in setting product specifications the company presents as options.]

- How long?
- Who else?

Builder Background

B1. Do you build mostly custom, semi-custom, or spec / tract homes?

B2. How many homes a year do you build?

- How many of those are in PNM, NMGC, and EPE service territories? [INTERVIEWER INSTRUCTIONS: Ranges are okay but want to be generally consistent in how we get this.]

B3. What is the typical price range of the homes you build? Would you say they're typically:

a. Less than $200,000
b. Between $200,001 and $400,000
c. More than $400,000
d. Don't know

Program Involvement and Use

Ask about PNM

Ask what other utilities the work for

What share of homes get rebates through PNM?

C1. Which of the utility programs are you currently utilizing - do you make use of prescriptive, appliance-specific incentives or the whole-home performance-based incentives? Why?

C2. How did you get involved initially? [INTERVIEWER INSTRUCTIONS: Listen for outreach and any volunteered elements of the program that attracted them. Could also be just an internal referral.]

C3. What share of your homes in the utilities service areas would you say qualify for the utility new construction rebates?

- [If most or all:] a) How long have you been building to specs that qualify? Did you make any changes when you started using the program? What? (Probe with anything else as long as needed)

- [IF Less than most:] b) What factors ultimately drive whether you will build a given home to the qualifying standards or not? What changes do you make from your standard design so the homes will qualify?
- [IF multiple changes mentioned above:] c) Of the changes you just mentioned, which make the biggest differences in the homes' projected energy consumption?
- d) How influential would you say the program has been in spurring those changes in your home designs?
- e) For homes which don't participate in the program or are located where they don't have access to one, have the New Mexico new homes programs influenced your typical home design? How?

Program Awareness, Clarity, and Process

D1. If you were to describe the New Mexico utility new homes programs offerings to a new colleague or peer in the construction industry, how would you describe what they offer?

- [INTERVIEWER INSTRUCTIONS: Listen for prescriptive, whole-house, marketing support, training for builders. Probe on any not mentioned to ask whether they are aware of it, make use of it.]

D2. [IF work with multiple utilities:] Are the differences between the utilities' programs clear? [Probe: What isn't?]

D3. How well do the individual utilities describe their program offerings? Where do you find out about how they work?

D4. Do you have any comments about the program offerings? Is there anything missing? Anything not needed? Or anything that could be better?

D5. What does the process for participating look like? How is that working for you?

NTG Questions

[INTERVIEWER INSTRUCTIONS: Use, skip, or modify the blue text, as needed, to adjust to the interviewee context. Use text in green for builders who participate primarily in whole home offers and text in orange for builders who participate primarily in prescriptive offers. Tailor the measures listed to those the builder actually claims.]

Next, I'd like to ask you about the effect the current utility new homes programs are having on the efficiency characteristics of the homes you are building in New Mexico this year regardless of utility service area or program participation.

E1. Using a scale from 0 to 10, where 0 means not at all important and 10 means extremely important, how influential are the utility rebates on (the degree to which you build beyond energy code requirements) (on the HVAC equipment, lighting, refrigeration, and insulation you include in homes)? [REMINDER: If prescriptive, ask only about the measures the builder consistently claims on rebate applications – here and below.]

E2. And, using that same scale, how influential are the other facets of the utility programs, such as the involvement of raters, training, and marketing?

E3. Next, I'd like to ask how likely you think it is that you would be (building to the same levels beyond energy code requirements) (using the same types of HVAC equipment, lighting, refrigeration, and insulation you put in homes that qualify for the program) if the utility new homes efficiency programs had not been available when you built these homes? This time, please tell me using a 0 to 10 scale, where 0 means you would definitely not be building the way you are now and 10 means you would definitely be building the same way.

[IF E3 > 6]

E4. What is the likelihood that you would have built fewer homes (to the same level beyond code requirements) (using the same types of HVAC equipment, lighting, refrigeration, and insulation you include in homes that qualify for the program) if the utility homes efficiency program had not been available? What percentage fewer?

[IF QUALITATIVE RESPONSES IN PROGRAM INVOLVEMENT SECTION AND NTG RESPONSES ARE DIRECTIONALLY INCONSISTENT, ASK:]

E5. I'd like to make sure I'm interpreting what you are telling me correctly. I got the impression earlier that the utility programs had (a good deal of / only a little / no) impact on your building practices, and your answers to the questions I just asked make me think the utility programs have (a good deal of / only a little / no) impact. We are trying to understand just how influential the programs are in spurring the higher efficiency levels you are building to. Could you elaborate on what degree of influence they are having and why?

Program Satisfaction

Now, I'd like you to rate your satisfaction with various organizations involved with the new homes programs and with some program attributes. For each one, please tell me if you are very dissatisfied, somewhat dissatisfied, neither satisfied or dissatisfied, somewhat satisfied, very satisfied, or have no basis for an opinion. [INTERVIEWER INSTRUCTION: Skip items that are clearly not applicable, such as utilities the builder does not work with.]

F1. PNM's new home construction program overall

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F2. NMGC's new home construction program overall

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F3. EPE's new home construction program overall

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F4. Your interaction with ICF, the implementation contractor that runs these programs

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F5. The reasonableness of the programs' technical requirements, such as rebated efficiency levels, and installation and inspection requirements

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F6. The reasonableness of the rebate application process

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F7. The amount of rebate offered

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F8. How long it takes to receive the rebates

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

F9. Other program support offered by the utilities, like training and marketing

- [IF RATING < somewhat satisfied] Can you tell me why you gave that rating?

Closing

G1. What else could New Mexico's utilities do to support greater energy efficiency in new homes?

G2. Is there anything else you would like to comment on?

[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. To facilitate load control, 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. Such signals are typically sent on the hottest weekday afternoons of the summer, with the goal being to reduce peak demand. 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. A residential smart thermostat component was added to the program in 2018 and a residential bring your own thermostat ("BYOT") program was added in 2020. For these components, load curtailment is achieved via communication with the WiFi-enabled thermostat.

There were ten Power Saver events during the summer 2020 demand response (DR) season, which began June 1st and ended September 30th. Table 1 provides some information on these ten 2020 events. All events used a 50% cycling strategy where curtailment is based on the runtime in the previous hour. Note that the event start times, and end times are in Mountain Daylight Time (MDT).

The realized gross energy savings is 280,142 kWh and the realized gross demand savings is 31,028 kW.

Table 1: 2020 Power Saver Event Summary

Date	Day of Week	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
6/4/2020	Thursday	3:00 PM	7:00 PM	95
6/25/2020	Thursday	3:00 PM	7:00 PM	94
7/6/2020	Monday	3:00 PM	7:00 PM	97
7/13/2020	Monday	3:00 PM	7:00 PM	95
7/14/2020	Tuesday	3:00 PM	7:00 PM	93
7/29/2020	Wednesday	3:00 PM	7:00 PM	94
8/14/2020	Friday	3:00 PM	7:00 PM	96
8/18/2020	Tuesday	4:00 PM	8:00 PM	92
8/19/2020	Wednesday	4:00 PM	8:00 PM	95
8/20/2020	Thursday	4:00 PM	8:00 PM	98

Shortly after the conclusion of the summer 2020 season, Itron provided the Evergreen team with a series of datasets for the evaluation. These files included:

- For Residential DCU, Small Commercial, and Medium Commercial sites, 5-minute load data from 6/1/2020 to 9/30/2020
- 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 6/1/2020 to 9/30/2020

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 offerings. A CBL is an estimate of what participant loads would have been absent the DR event dispatch. For each DR program offering, 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 offering, 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 2020 DR season.
3) Where possible, leverage additional historical data from 2015 - 2019 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 Evergreen team summarized impacts with an average. Multiplying our per-device reduction estimates by the number of devices in each class (shown in Table 2) leads to a 2020 average total estimated load reduction of approximately 22.8 MW, 1.0 MW, 0.1 MW, 2.6 MW, and 1.7 MW for the Residential DCU, Two-Way Smart Thermostat, BYOT, Small Commercial, and Medium Commercial segments respectively. In aggregate, the average 2020 performance is 28.2 MW. This is approximately 75% of Itron's estimate for the 2020 season (38.8 MW). After making an online adjustment for the thermostat groups of (87% for Two-Way Smart Thermostats and 85% for BYOT) and an operability adjustment for the other three segments (87%), the aggregate Evergreen-calculated impacts for 2020 are 24.5 MW (compared to 33.8 MW from Itron after adjustment).

The Evergreen team used Power Saver results from 2015-2020 to estimate the load relief capability under extreme conditions. We estimate the program is capable of delivering 35.7 MW of load reduction under planning conditions of 100°F between 5:00 PM and 6:00 PM MDT, of which 31.1 MW comes from the Residential DCU segment, 1.2 MW comes from the Two-Way Smart Thermostat segment, 0.1 MW comes from the BYOT segment, and 2.1 MW and 1.1 MW come from the Small and Medium Commercial segments, respectively. Factoring in the operability/online adjustments, the aggregate program can provide 31.0 MW of load relief.

Table 2: High Level Results – Residential

		Unit	Residential DCU Measured	Residential DCU Adjusted	Two-Way Smart Thermostats Measured	Two-Way Smart Thermostats Adjusted	BYOT Smart Thermostats Measured	BYOT Smart Thermostats Adjusted
Number of Devices Installed		#	42,640	42,640	636	636	142	142
Itron	5-year Rolling Average kW Factor	kW / device[1]	0.77		1.28		1.50	
		Total MW	32.66		0.81		0.21	
	2020 Load Reduction Estimate	kW / device	0.74	0.64	2.06	1.79	1.76	1.53
		Total MW	31.55	27.45	1.31	1.14	0.25	0.22
Evergreen	2020 Load Reduction Estimate	kW / device	0.54	0.47	1.63	1.41	0.86	0.73
		Total MW	22.81	19.85	1.03	0.90	0.12	0.10
	Ex Ante Load Reduction Estimate[2]	kW / device	0.73	0.64	1.93	1.68	0.77	0.65
		Total MW	31.13	27.08	1.23	1.07	0.11	0.09
	2020 Energy Savings	kWh / device	0.44	0.38	4.79	4.17	2.19	1.86
		Total MWh	187.59	163.20	30.47	26.51	3.11	2.65

[1] 2020 kW factors include a rolling average per-device result for 2016-2020. 2018 Residential DCU kW factor has an 85% operability adjustment applied. 2020 Residential DCU kW factors have an 87% operability adjustment applied. The 87% operability percentage was calculated as 85% multiplied by the number of DCU sites that have not been visited in the last two years plus 95% multiplied by the number of DCU sites that were visited in the last two years. 2020 Two-Way Smart Thermostats have an 87% offline (not operability) adjustment applied. The 2020 BYOT have an 85% offline (not operability) adjustment applied.

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

Table 3: High Level Results – Commercial

		Unit	Small Commercial Measured	Small Commercial Adjusted	Medium Commercial Measured	Medium Commercial Adjusted
	Number of Devices Installed (Number of Locations)	#	4,194	4,194	2,965 (400)	2,965 (400)
Itron	5-year Rolling Average kW Factor	kW / device[3]	1.24		0.68	
Itron	5-year Rolling Average kW Factor	Total MW	5.22		2.01	
Itron	2020 Load Reduction Estimate	kW / device	0.66	0.57	0.99	0.86
Itron	2020 Load Reduction Estimate	Total MW	2.77	2.41	2.94	2.55
Evergreen	2020 Load Reduction Estimate	kW / device	0.61	0.53	0.56	0.49
Evergreen	2020 Load Reduction Estimate	Total MW	2.56	2.23	1.65	1.44
Evergreen	Ex Ante Load Reduction Estimate	kW / device	0.49	0.43	0.39	0.34
Evergreen	Ex Ante Load Reduction Estimate	Total MW	2.06	1.79	1.15	1.00
Evergreen	2020 Energy Savings	kWh / device	1.13	0.98	1.80	1.57
Evergreen	2020 Energy Savings	Total MWh	47.39	41.23	53.52	46.56

[3] 2020 kW factors include a rolling average per-device result for 2016-2020. 2020 Small Commercial and Medium Commercial have an 87% operability adjustment applied. The 87% operability percentage was calculated as 85% multiplied by the number of DCU sites that have not been visited in the last two years plus 95% multiplied by the number of DCU sites that were visited in the last two years.

1 Methodology

This section discusses the methods used to validate Itron's impact estimates and those used by the Evergreen 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. The number of devices in each group was adjusted for balancing purposes at different times during the summer 2020 event season.

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[4] is the kW per device impact estimate for the 2020 DR season.
6. Adjust the residential impacts for an operability factor of 85%. The determination of the operability percentage is detailed in detail in Section 1.6.

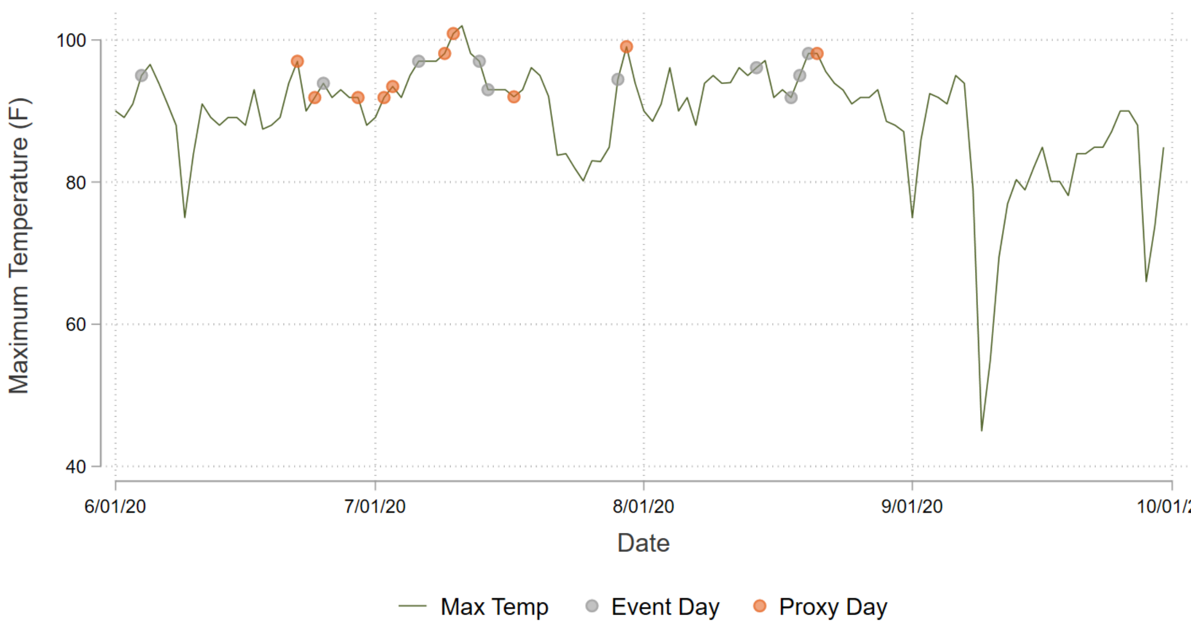
1.2 Evergreen Estimate of Residential DCU Impacts

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 alternated between the two groups, any bias in impacts should be minimal, on average. Nevertheless, to assess the differences between the groups, the Evergreen team compared the load profiles of the two groups on proxy days. Proxy

[4] 'Qualified' hours were defined as hours where the outdoor temperature is at least 97 degrees (F). For the 2020 DR season, there were two qualifying hours: 4-5 PM on 7/6, and 4-5 PM on 8/20.

days are non-event days that were chosen from non-holiday weekdays where the maximum temperature was at least as hot as the event days. From this pool, of which there were 43 available days, the top five hottest were chosen and five more were randomly selected to provide a 1:1 proxy to event day ratio.[5] Figure 1 shows the maximum temperature and distribution of proxy days throughout the summer, compared to the event days and non-event days.

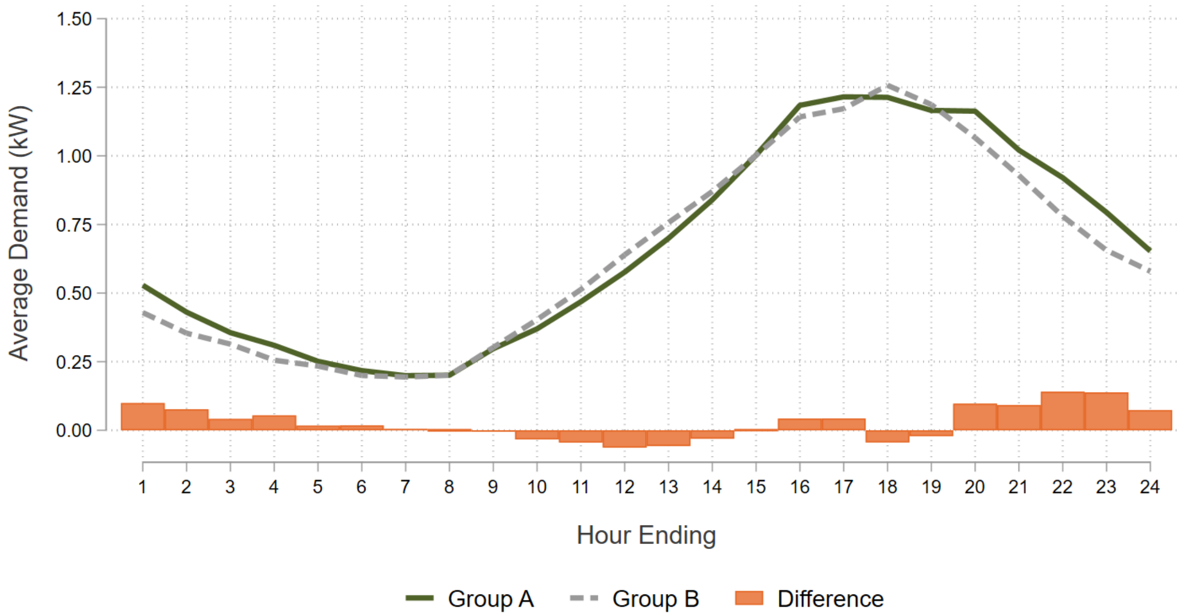
Figure 1: Weather on Event and Proxy Days



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 0.03 kW, with a maximum difference of 0.14 kW. The average difference during typical event hours ending 4 PM to 8 PM is 0.02 kW and the maximum is 0.10 kW.

[5] In order, the proxy dates were 6/22, 6/24, 6/29, 7/2, 7/3, 7/9, 7/10, 7/17, 7/30, and 8/21.

Figure 2: Residential DCU Load Shapes on Event-Like Days



Using a t-test, the Evergreen team found the difference between average demand in Group A and Group B to be small but statistically significant during event hours. Therefore, we 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)
4:00 PM	0.04	0.30	0.26
5:00 PM	0.04	0.40	0.36
6:00 PM	-0.04	0.50	0.54
7:00 PM	-0.02	0.60	0.62
8:00 PM	0.10	0.50	0.40

In addition, as we describe further in Section 2, the Evergreen team believes that the 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 classes 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[6] 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 during the event window. 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 during event hours 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.

[6] Eligible days are weekdays that are neither holidays or DR event days.

- Divide the second sum by the first sum. This quotient is the adjustment factor.
4. Calculate the impact.
   - 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 each event hour, take the maximum 5-minute impact. This value serves as the impact estimate for the event hour.[7]
   - The maximum 5-minute impact across all qualified event hours (when temperature exceeds 96°F) is the 2020 Power Saver impact estimate.

1.4 Evergreen 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 Evergreen 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 Evergreen 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 five-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 7/6/2020 (a qualifying event day). Within a given event hour, the average participant load ranges from as low as 0.8 kW to as high as 2 kW. Therefore, taking the maximum of the five-minute impacts within a given hour will yield an impact equal to the baseline minus 0.8 kW – even though the average load across the event window is approximately 1.6 kW.

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 7/6/2020; the key change is that the values shown are the average for each hour, as opposed to the granular five-minute intervals. The added orange bars show the hourly DR impacts using the average impacts, while the purple capped lines show the impact calculations using the Itron maximum methodology. Note that the average impacts (orange) are equal to the difference between the baseline and the average

[7] As discussed in Section 1.4 below, this is the step that results in impact results that are biased upwards relative to actual program performance.

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.

Figure 3: BYOT Baseline and Actual Load for July 6, 2020

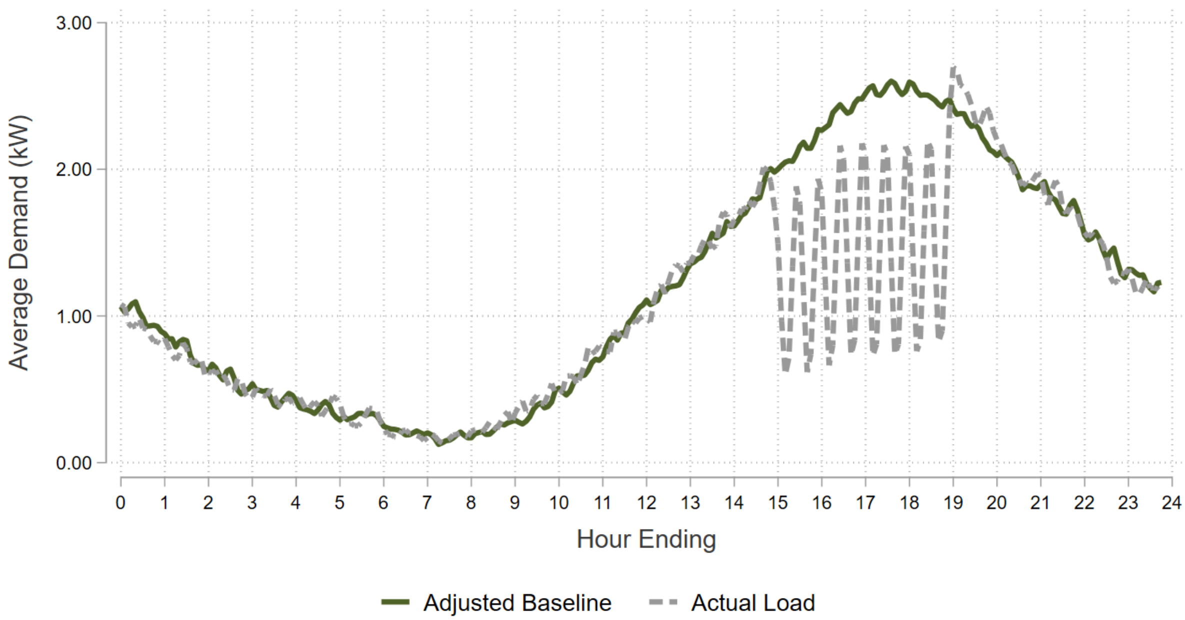
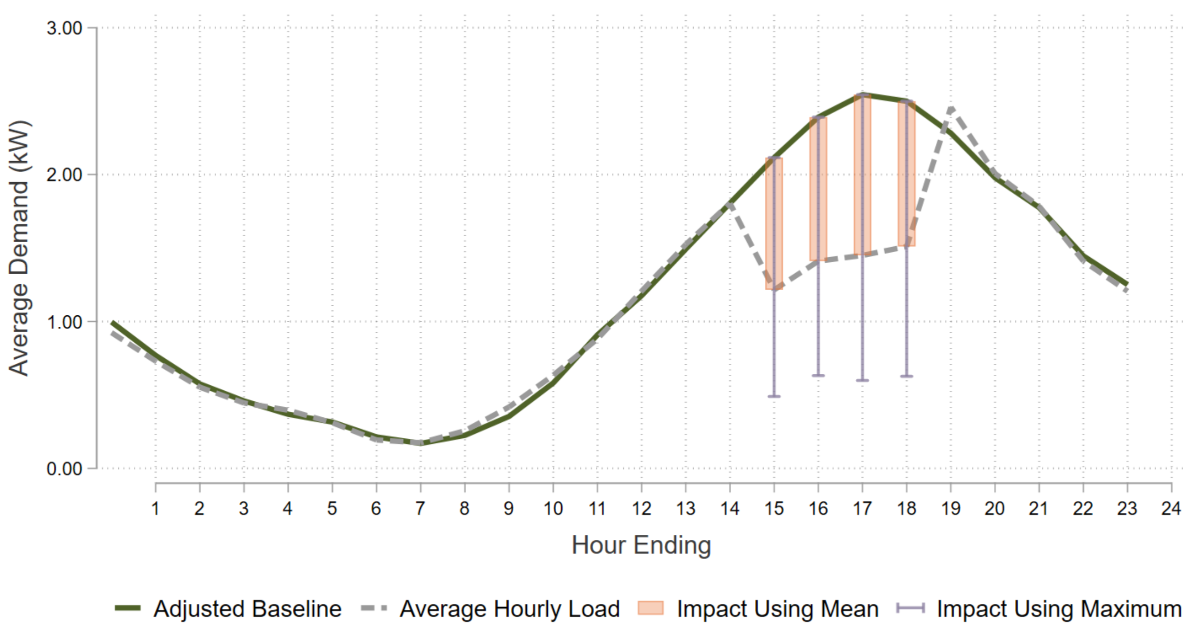


Figure 4: BYOT Baseline and Actual Load for July 6, 2020 with Impacts Calculated Using Mean and Max Methodologies



The degree to which impacts are overstated using the Itron method depends on how much loads vary within each hour. To illustrate the bias of this method for different programs, in Figure 5 we plot the load profiles on 7/6/2020 for all four programs that rely on the CBL method (BYOT, Two-Way Smart Thermostats, Small Commercial, and Medium Commercial). Figure 6 adds the same impacts as in Figure 4 – the impact for the Evergreen “mean” approach in orange and the impact for the Itron “maximum” approach in purple. The level of bias of the Itron method is represented by the relative size of the purple lines to the orange bars. Figure 6 shows that while the Itron impact calculation method is most biased for the BYOT segment, the Two-Way Smart Thermostat, Small Commercial, and Medium Commercial segments are also overstated.

Figure 5: Baseline and Actual Loads for SCI, MCI, Two-Way, and BYOT Program Offerings for July 6, 2020

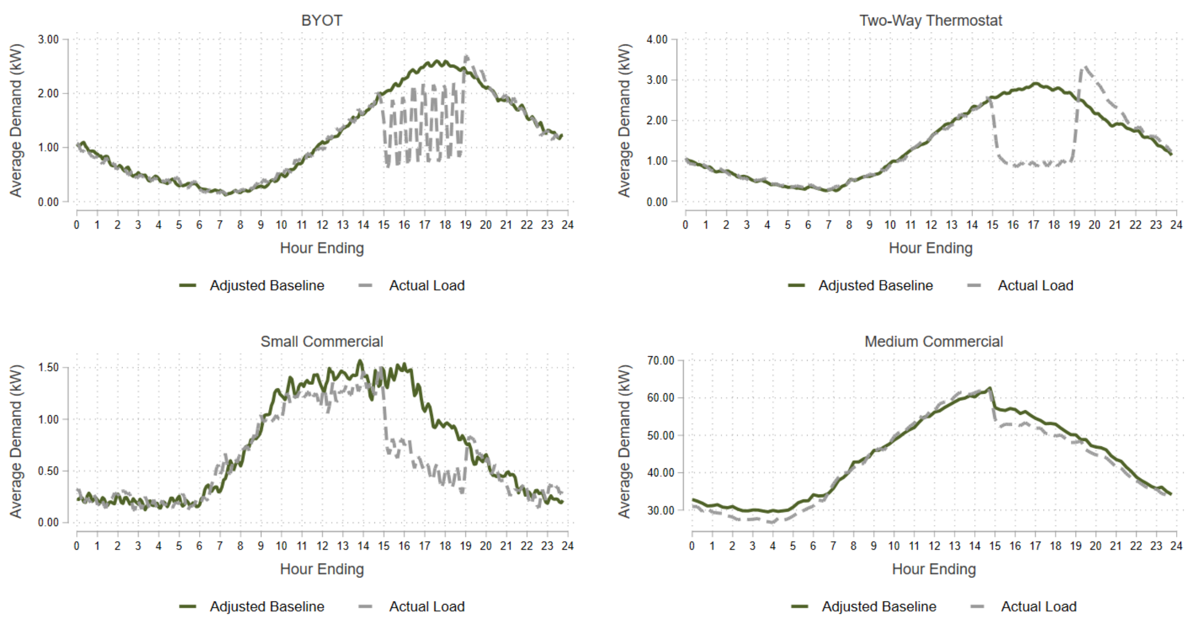
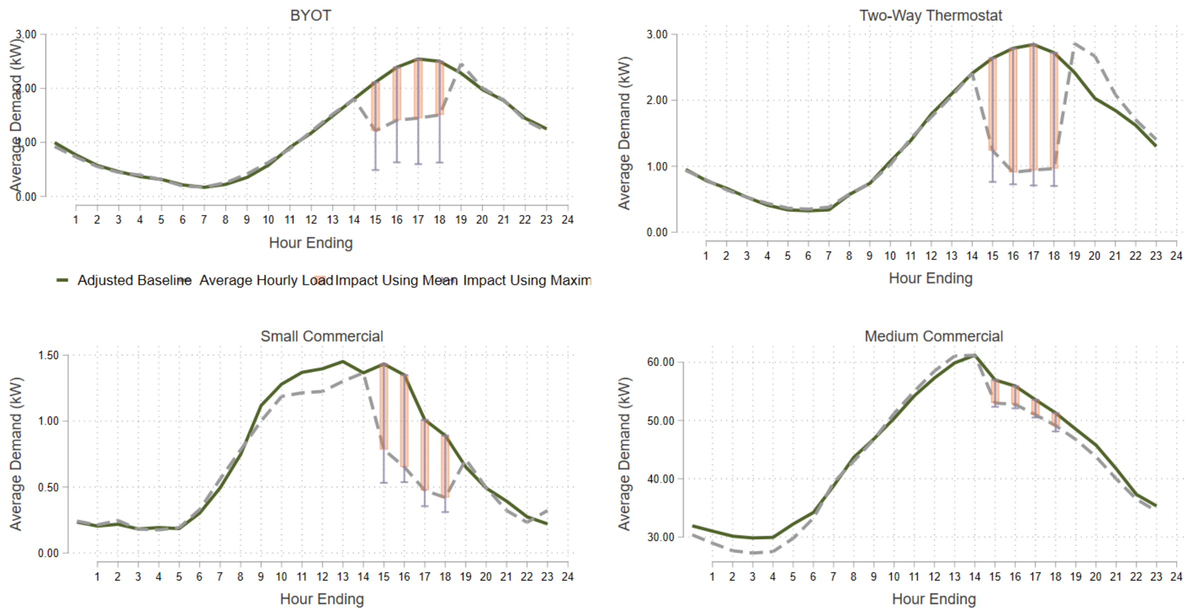


Figure 6: Baseline and Actual Loads for SCI, MCI, Two-Way, and BYOT Program Offerings for July 6, 2020 with Mean and Max Impacts



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 additional 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 Evergreen team leveraged 2015-2020 verified load reduction estimates. In 2015-2017 and in 2019, only one of the Residential DCU M&V groups was consistently curtailed while the other group acted as a control. Because some differences exist between the two groups in terms of load profile on event-like days, the Evergreen team used a difference-in-differences impact estimation method, which was described in Section 1.2, to estimate the impacts for these earlier summers.[8] Ex post impacts in 2018 were not calculated via difference-in-differences, as statistically significant differences between the groups were not found.

[8] 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.

To produce an ex ante impact estimate for the Small Commercial segment, the Evergreen team leveraged 2015-2020 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. In 2019 and 2020, 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 2017-2020 verified load reduction estimates. The same approach for estimating ex post results for the Medium Commercial segment was used in 2017, 2018, 2019, and 2020.

For the Two-Way Smart Thermostat segment, we leveraged 2019-2020 verified load reduction estimates. The 2019 approach relied on control groups, while the 2020 approach relied on the X-of-Y baseline method described above.

For the BYOT segment, only 2020 summer data was available. Thus, our ex ante impact estimate does not leverage any additional historical data for this segment.

Note that all Evergreen ex ante impacts rely on Evergreen's calculated impacts for all years, as opposed to Itron's impacts (i.e., the impacts that go into the ex ante values rely on the average load reductions for each hour instead of the maximum load reductions).

Once data had been compiled for each customer segment, a regression was run that explains changes in impacts as a function of temperature and hour. 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:

$$\Delta kW_h = \alpha + \beta * T_t + \sum_{h=14}^{h=19} \gamma_h * I_h + \sum_{h=14}^{h=19} \delta_h * I_h * T_h + \varepsilon_h$$

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 Evergreen team recommended adjusting residential impacts by 85% 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 2020, 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 87% 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.

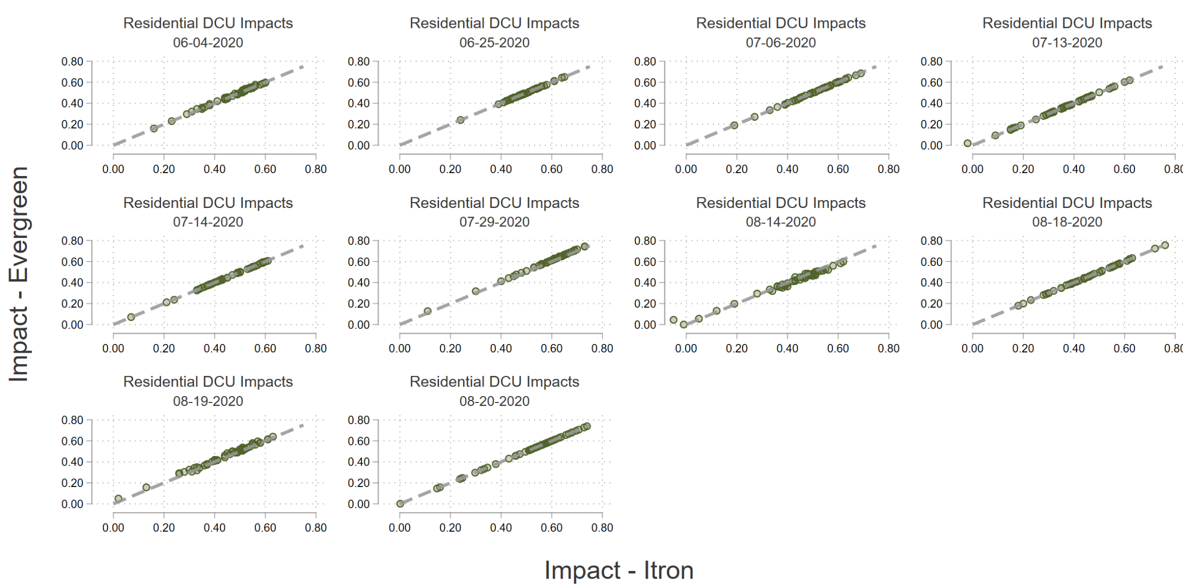
2 Residential DCU Results

This section reviews the Residential DCU impacts calculated by Itron and validated by the Evergreen team. Additionally, the team provides feedback on the evaluation approach used by Itron and provides an alternative impact analysis for summer 2020 events. Finally, ex ante impacts, combining multiple years of event history, are produced for various temperature scenarios.

2.1 Validation of Calculations

After receiving the participant load data from Itron, the Evergreen team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. Figure 7 compares the impacts as calculated by Itron and by Evergreen at the 5-minute level for each event day. The Evergreen team successfully replicated impacts for most days, including the two qualifying hour event days (7/6 and 8/20), though there were minor differences in impacts for the 8/19 event. For reference, Itron's Residential DCU impact estimates are shown in Table 6. Note that an asterisk (*) denotes a qualifying event hour (when the outdoor temperature was at least 97 degrees). The maximum impact during qualifying event hours was 0.74 kW for the Residential DCU class without any adjustment for operability.

Figure 7: Residential DCU Impact Verification, Comparison by Day



The dotted line represents what a perfect match would look like.

Table 6: Residential Impact Estimates (kW) by Date and Time[9]

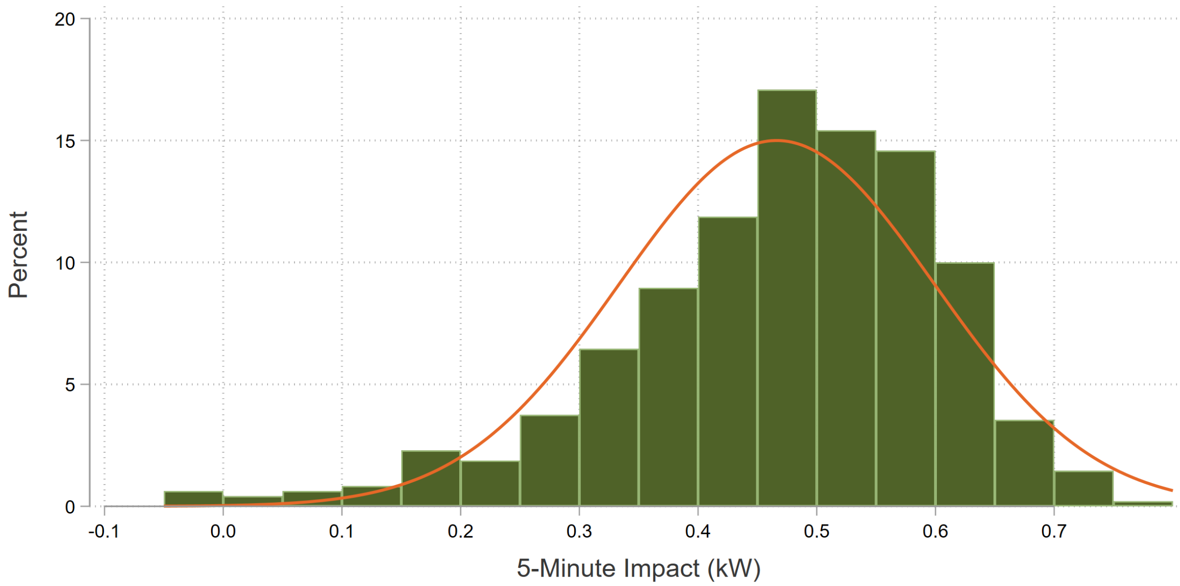
Date	Hour Ending (MDT)				
	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
6/4/2020	0.51	0.56	0.60	0.55	-
6/25/2020	0.5	0.56	0.65	0.55	-
7/6/2020	0.67	0.69*	0.53	0.57	-
7/13/2020	0.56	0.62	0.39	0.32	-
7/14/2020	0.49	0.6	0.61	0.43	-
7/29/2020	0.66	0.73	0.73	0.68	-
8/14/2020	0.53	0.54	0.62	0.51	-
8/18/2020	-	0.76	0.63	0.58	0.42
8/19/2020	-	0.63	0.61	0.58	0.41
8/20/2020	-	0.74*	0.75	0.70	0.60

2.2 Evergreen Ex Post Impacts

For the Residential DCU segment, Itron's per device kW impact estimate for the 2020 season is the maximum difference between 5-minute rolling average loads for the control and curtailment groups (0.74 kW). (See Section 1.1 for more details.) The critical word here is *maximum*. The Evergreen 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 8 shows the distribution of impacts at the 5-minute level – 0.74 kW clearly overstates the center of the distribution.

[9] Source: Itron's 2020 PNM Power Saver Program Report. Table 44.

Figure 8: Distribution of 5-Minute Residential DCU Impacts



Respectively, the mean and median are 0.47 kW and 0.48 kW.

Rather than the maximum difference, the Evergreen team feels that using an average impact across an hour (rather than a maximum) returns an unbiased estimate of Power Saver program impacts during DR events. Since statistically significant differences in afternoon demand were found between the two groups (Figure 2), the Evergreen team opted for a difference-in-difference approach for estimating ex post impacts. This approach was described in Section 1.2. Results for the 2020 DR season are summarized in Table 7. 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

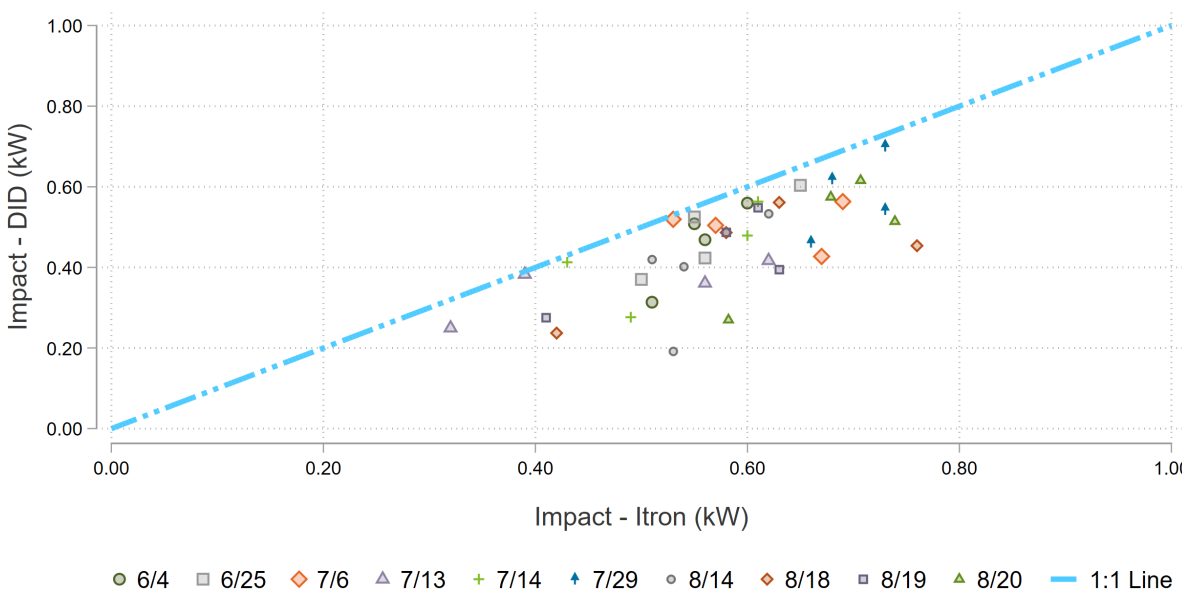
Date	# of Curtailed Devices	Hour Ending MDT	Temp. (F)	Control kW	Curtail kW	Non-Event Diff. (kW)	Impact (kW)
6/4/2020	124	16	94	0.94	0.58	0.04	0.31
		17	94	1.05	0.53	0.04	0.47
		18	95	1.12	0.60	-0.04	0.56
		19	95	1.10	0.62	-0.02	0.51
6/25/2020	124	16	92	0.94	0.53	0.04	0.37
		17	94	1.05	0.59	0.04	0.42
		18	94	1.15	0.59	-0.04	0.60

Date	# of Curtailed Devices	Hour Ending MDT	Temp. (F)	Control kW	Curtail kW	Non-Event Diff. (kW)	Impact (kW)
		19	94	1.12	0.61	-0.02	0.53
7/6/2020	124	16	94	1.15	0.69	0.04	0.43
		17*	97	1.24	0.63	0.04	0.56
		18	93	1.17	0.69	-0.04	0.52
		19	92	1.17	0.69	-0.02	0.50
7/13/2020	123	16	95	1.12	0.71	0.04	0.36
		17	79	1.04	0.58	0.04	0.42
		18	82	0.86	0.52	-0.04	0.38
		19	81	0.73	0.50	-0.02	0.25
7/14/2020	123	16	92	1.01	0.69	0.04	0.28
		17	93	1.12	0.60	0.04	0.48
		18	93	1.15	0.63	-0.04	0.56
		19	90	1.00	0.61	-0.02	0.41
7/29/2020	123	16	92	1.07	0.56	0.04	0.46
		17	94	1.13	0.54	0.04	0.54
		18	94	1.25	0.59	-0.04	0.70
		19	94	1.21	0.61	-0.02	0.62
8/14/2020	124	16	95	1.02	0.79	0.04	0.19
		17	96	1.06	0.62	0.04	0.40
		18	94	1.15	0.66	-0.04	0.53
		19	94	1.10	0.70	-0.02	0.42
8/18/2020	123	17	92	1.14	0.64	0.04	0.45
		18	92	1.13	0.61	-0.04	0.56
		19	91	1.07	0.61	-0.02	0.49
		20	88	0.95	0.62	0.10	0.24
8/19/2020	123	17	95	1.17	0.73	0.04	0.39
		18	95	1.14	0.64	-0.04	0.55

Date	# of Curtailed Devices	Hour Ending MDT	Temp. (F)	Control kW	Curtail kW	Non-Event Diff. (kW)	Impact (kW)
		19	94	1.09	0.62	-0.02	0.49
		20	91	0.96	0.59	0.10	0.28
8/20/2020	125	17*	98	1.31	0.76	0.04	0.51
		18	96	1.24	0.67	-0.04	0.62
		19	96	1.22	0.67	-0.02	0.57
		20	93	1.02	0.65	0.10	0.27

The average impact during full event hours was 0.42 kW. This is in line with the center of the distribution shown in Figure 8. The average impact during full qualifying event hours was 0.53 kW. Figure 9 compares Evergreen's ex post hourly impacts with the impacts calculated by Itron. The Evergreen impact is lower in nearly all cases, by about 0.10 kW on average.

Figure 9: Comparison of Evergreen 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 Evergreen 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 facility) for each event day. On average, net daily energy savings were 0.44

kWh per device. Multiplying this estimate by the ten event days and the number of active devices (42,640) yields an aggregate savings estimate of 187.6 MWh for the Residential DCU program offering.

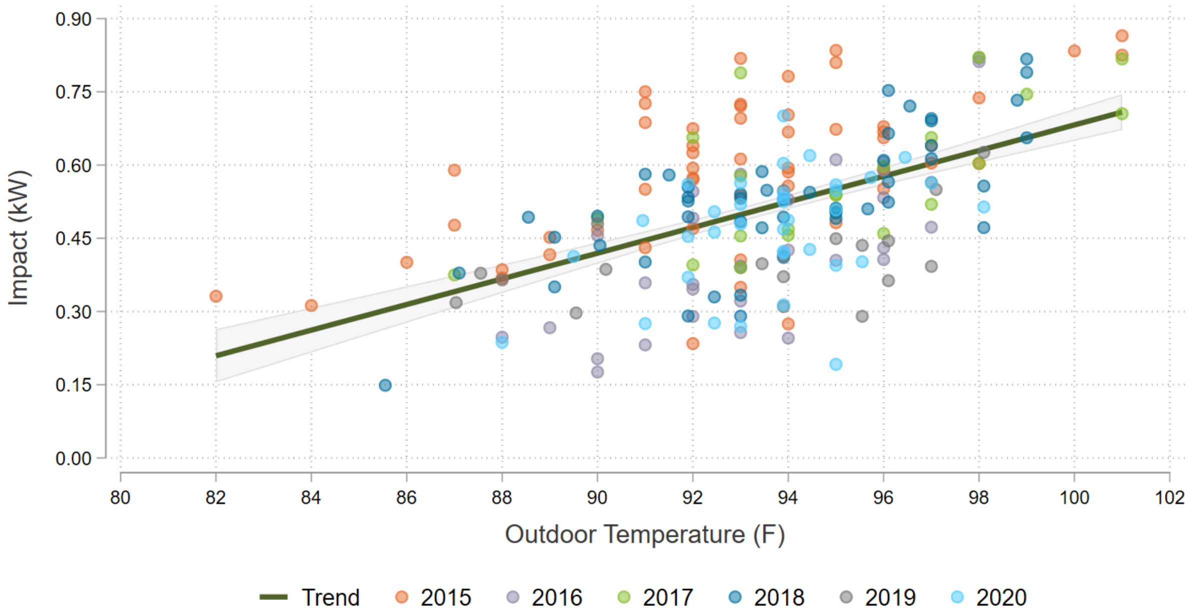
Table 8: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/4/2020	3:00 PM	1.85	-1.35	0.50
6/25/2020	3:00 PM	1.92	-1.52	0.40
7/6/2020	3:00 PM	2.01	-1.23	0.79
7/13/2020	3:00 PM	1.41	-1.77	-0.36
7/14/2020	3:00 PM	1.73	-1.08	0.66
7/29/2020	3:00 PM	2.33	-1.85	0.48
8/14/2020	3:00 PM	1.55	-0.71	0.84
8/18/2020	4:00 PM	1.74	-1.76	-0.02
8/19/2020	4:00 PM	1.71	-0.80	0.91
8/20/2020	4:00 PM	1.97	-1.77	0.20
Average		**1.82**	**-1.38**	**0.44**

2.3 Evergreen Ex Ante Impacts

Figure 10 compares 2015-2020 ex post impact estimates for each event hour with the outdoor air temperature for that hour (weather data comes from weather station KABQ in Albuquerque). There is a clear trend in the figure – the hotter it is outside, the greater the impacts tend to be. To develop an ex ante impact estimate, the Evergreen team developed a regression model that estimates the ex post impact as a function of temperature and time. The specified model was shown in Section 1.5, and the results from the model are described in more detail below. The Evergreen 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 0.73 kW per device.

Figure 10: 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 general, earlier hours corresponded to higher kW values, with a drop over time in impacts as less load was available to shed. It should be noted that hour 20 was relatively rare; only six events during the past four years included a full-hour event during this period and as such, should be interpreted with care. Temperature has a positive coefficient, indicating that higher temperatures produce larger load reductions. The interaction terms, represented by δ_h, are all positive except for hour 17, indicating that the incremental effect of temperature in a given hour further increases the impact. Again, hour 20 should be interpreted with caution, as only six data points were available to fit the model. Note that any coefficient with "*" next to it is statistically significant at the 95% confidence level.

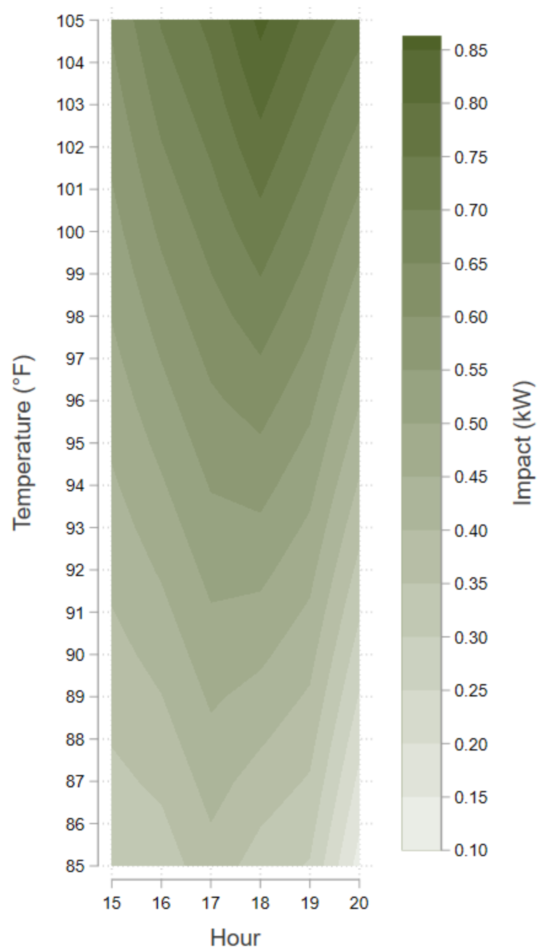
Table 9: Residential Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value	95% CI
β	Temperature	0.015*	0.001	0.000	(0.014, 0.016)
γ_h	Hour 15		(base – omitted)		
	Hour 16	-0.341*	0.079	0.000	(-0.496, -0.187)
	Hour 17	-0.289*	0.077	0.000	(-0.44, -0.138)
	Hour 18	-0.998*	0.072	0.000	(-1.139, -0.857)
	Hour 19	-0.813*	0.081	0.000	(-0.971, -0.655)
	Hour 20	-1.428*	0.144	0.000	(-1.709, -1.146)
δ_h	Hour_15_x_Temp		(base – omitted)		
	Hour_16_x_Temp	0.004*	0.001	0.000	(0.003, 0.006)
	Hour_17_x_Temp	0.004*	0.001	0.000	(0.003, 0.006)
	Hour_18_x_Temp	0.012*	0.001	0.000	(0.01, 0.013)
	Hour_19_x_Temp	0.009*	0.001	0.000	(0.008, 0.011)
	Hour_20_x_Temp	0.015*	0.002	0.000	(0.012, 0.018)
α	Constant	-0.962*	0.056	0.000	(-1.073, -0.851)

Using the regression coefficients shown in the table above, the Evergreen 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. As noted, Residential DCU Power Saver DR events have historically been infrequent during hour ending 19 and 20, so the values in these columns are informed by fewer data points. Again, the Evergreen team predicts that the impact of a Residential DCU DR event at peaking conditions is 0.73 kW per device.

Table 10: Residential DCU Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	0.61	0.70	0.76	0.86	0.78	0.72
104	0.59	0.69	0.75	0.84	0.76	0.69
103	0.58	0.67	0.73	0.81	0.73	0.66
102	0.56	0.65	0.71	0.78	0.71	0.63
101	0.55	0.63	0.69	0.76	0.69	0.60
100	0.53	0.61	0.67	0.73	0.66	0.57
99	0.52	0.59	0.65	0.70	0.64	0.54
98	0.50	0.57	0.63	0.68	0.61	0.51
97	0.49	0.55	0.61	0.65	0.59	0.48
96	0.47	0.53	0.59	0.62	0.56	0.45
95	0.46	0.51	0.57	0.59	0.54	0.42
94	0.44	0.49	0.55	0.57	0.51	0.39
93	0.43	0.48	0.53	0.54	0.49	0.36
92	0.41	0.46	0.51	0.51	0.47	0.34
91	0.40	0.44	0.50	0.49	0.44	0.31
90	0.38	0.42	0.48	0.46	0.42	0.28
89	0.37	0.40	0.46	0.43	0.39	0.25
88	0.35	0.38	0.44	0.41	0.37	0.22
87	0.34	0.36	0.42	0.38	0.34	0.19
86	0.32	0.34	0.40	0.35	0.32	0.16
85	0.31	0.32	0.38	0.33	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 2020, there were 42,640 active residential 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 31.13 MW. Residential 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 load is 87% of the unadjusted load, or 27.08 MW.

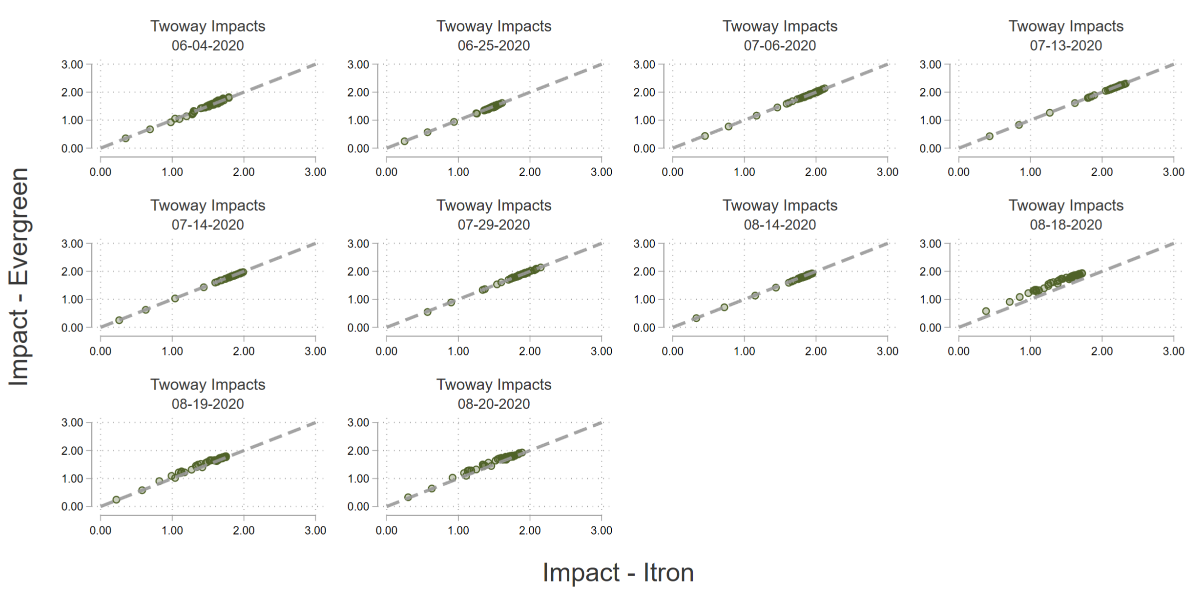
3 Two-Way Smart Thermostat

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 Evergreen team. Additionally, we provide feedback on the evaluation approach used by Itron and provides an alternative impact analysis for summer 2020 events, which we implemented for the Two-Way Smart Thermostat program offering as well as the BYOT, Small Commercial, and Medium Commercial program offerings in their respective sections. Finally, ex ante impacts, combining multiple years of event history are produced for various temperature scenarios.

3.1 Validation of Calculations

After receiving the participant load data from Itron, the Evergreen team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. We were able to exactly replicate impacts for six of the event days, including the 7/6 qualifying event hour, but we were unable to replicate impacts for the 6/4, 8/18, 8/19, and 8/20 event days. Figure 11 compares impacts as calculated by Itron and by Evergreen at the 5-minute level. For reference, Two-Way Smart Thermostat impact estimates are shown in Table 11. Note that an asterisk (*) denotes a qualifying event hour (when the outdoor temperature was at least 97 degrees). The maximum impact during qualifying event hours was 2.06 kW per participant, recorded on 7/6 from 4-5 PM.

Figure 11: 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

Date	Hour Ending (MDT)				
	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
6/4/2020	1.56	1.71	1.79	1.55	-
6/25/2020	1.48	1.57	1.61	1.53	-
7/6/2020	1.88	2.06*	2.12	2.03	-
7/13/2020	2.17	2.22	2.27	2.33	-
7/14/2020	1.93	1.95	1.95	1.99	-
7/29/2020	1.93	2.09	2.15	2.01	-
8/14/2020	1.87	1.95	1.93	1.89	-
8/18/2020	-	1.66	1.72	1.60	1.32
8/19/2020	-	1.75	1.75	1.69	1.40
8/20/2020	-	1.89*	1.85	1.72	1.42

3.2 Evergreen Ex Post Impacts

As discussed in Section 1.4, the Evergreen 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 2020 DR season, Table 12 shows the estimates produced by the Evergreen team. Our methods differed from Itron's just slightly – in any place where a maximum was called for, we replaced it with the mean. Our reduction estimate is the average of the values in the 'Impact' column during qualifying event hours, which is 1.63 kW, compared to 1.58 kW for all hours.

Table 12: Two-Way Smart Thermostat Impact Results

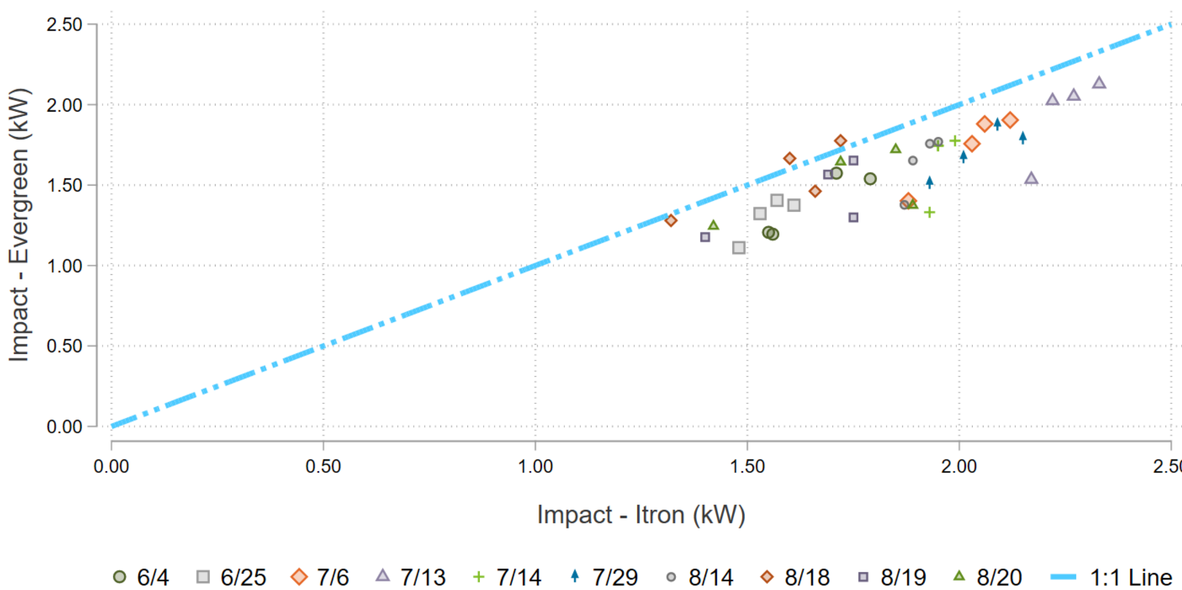
Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
6/4/2020	527	16	94	2.24	1.04	1.20
		17	94	2.37	0.80	1.57
		18	95	2.36	0.82	1.54
		19	95	2.07	0.87	1.21
6/25/2020	526	16	92	2.16	1.05	1.11
		17	94	2.21	0.80	1.41

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
		18	94	2.22	0.85	1.37
		19	94	2.20	0.87	1.32
7/6/2020	518	16	94	2.64	1.24	1.40
		17*	97	2.79	0.91	1.88
		18	93	2.85	0.94	1.90
		19	92	2.72	0.97	1.76
7/13/2020	516	16	95	2.85	1.31	1.53
		17	79	2.96	0.93	2.02
		18	82	2.98	0.92	2.05
		19	81	3.03	0.90	2.13
7/14/2020	515	16	92	2.50	1.17	1.33
		17	93	2.61	0.86	1.75
		18	93	2.64	0.90	1.74
		19	90	2.69	0.92	1.78
7/29/2020	486	16	92	2.63	1.12	1.51
		17	94	2.75	0.87	1.87
		18	94	2.71	0.92	1.79
		19	94	2.65	0.98	1.67
8/14/2020	543	16	95	2.58	1.21	1.38
		17	96	2.69	0.92	1.77
		18	94	2.70	0.94	1.76
		19	94	2.62	0.96	1.65
8/18/2020	532	17	92	2.64	1.18	1.46
		18	92	2.66	0.89	1.78
		19	91	2.60	0.93	1.67
		20	88	2.24	0.96	1.28
8/19/2020	529	17	95	2.55	1.25	1.30
		18	95	2.57	0.91	1.65
		19	94	2.49	0.86	1.57
		20	91	2.14	0.96	1.18
8/20/2020	526	17*	98	2.68	1.30	1.37

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
		18	96	2.70	0.98	1.72
		19	96	2.65	1.01	1.64
		20	93	2.27	1.03	1.24

Figure 12 compares Evergreen's ex post hourly impacts with the impacts calculated by Itron. The Evergreen impact is lower in almost all cases.

Figure 12: Comparison of Evergreen 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.

3.2.1 Net Energy Savings

The Evergreen 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 (per device) for each event day. On average, net daily energy savings were 4.79 kWh per device. Multiplying this estimate by the number of event days (ten) and the number of active devices (636) yields an aggregate savings estimate of 30.5 MWh for the Two-Way Smart Thermostat program offering.

Table 13: Per Device Energy Savings by Event Day

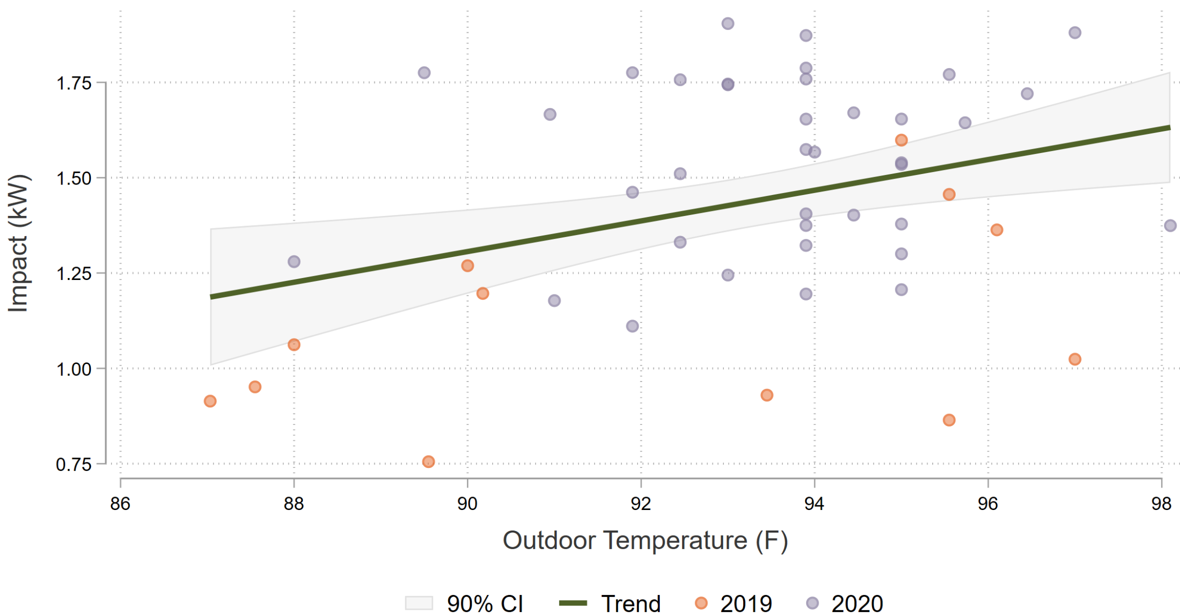
Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/4/2020	3:00 PM	5.51	-2.89	2.63
6/25/2020	3:00 PM	5.21	-2.75	2.46
7/6/2020	3:00 PM	6.94	-1.50	5.44
7/13/2020	3:00 PM	7.74	1.99	9.72
7/14/2020	3:00 PM	6.60	-0.78	5.82
7/29/2020	3:00 PM	6.84	-2.63	4.21
8/14/2020	3:00 PM	6.56	-1.90	4.66
8/18/2020	4:00 PM	6.18	-1.36	4.83
8/19/2020	4:00 PM	5.70	-1.62	4.08
8/20/2020	4:00 PM	5.98	-1.93	4.06
Average		**6.33**	**-1.54**	**4.79**

3.3 Evergreen Ex Ante Impacts

Figure 13 compares 2019-2020 ex post impact estimates for each event hour with the outdoor air temperature for that hour.[10] Weather data comes from weather station KABQ in Albuquerque. The magnitude of the impact increases with temperature. To produce an ex ante impact estimate, the Evergreen team developed a regression model that estimates the ex post impact as a function of temperature and time. The specified model was shown in Section 1.5, and the results from the model are described in more detail below. Using the model, the Evergreen 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 1.93 kW per device.

[10] Note that the baseline method used to calculate ex post impacts for 2020 differed slightly from the control group method used to calculate ex post impacts in 2019. In addition, the connected load assumption was slightly higher for 2020 than 2019.

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. Temperature has a positive coefficient, indicating that higher temperatures produce higher impacts, as do the hour 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 20 was extremely rare and accounted for only three of the 48 event hours during the past two years. In addition, unlike other programs, hour ending 15 is not included in the regression due to a lack of data. Due to the small sample sizes and year-to-year variability, none of the estimates in this regression are statistically significant.

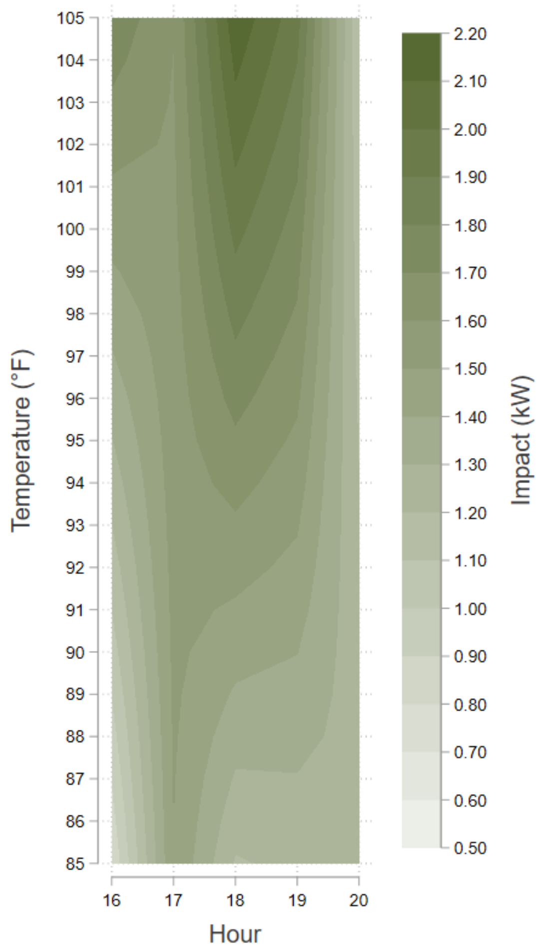
Table 14: Two-Way Smart Thermostat Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value	95% CI
β	Temperature	0.049	0.053	0.369	(-0.060, 0.157)
γ_h	Hour 16	(base – omitted)			
	Hour 17	4.358	5.964	0.469	(-7.715, 16.432)
	Hour 18	0.321	5.948	0.957	(-11.72, 12.361)
	Hour 19	1.508	5.582	0.789	(-9.793, 12.808)
	Hour 20	5.395	7.834	0.495	(-10.464, 21.253)
δ_h	Hour_16_x_Temp	(base – omitted)			
	Hour_17_x_Temp	-0.043	0.064	0.502	(-0.172, 0.086)
	Hour_18_x_Temp	0.001	0.064	0.991	(-0.128, 0.13)
	Hour_19_x_Temp	-0.013	0.060	0.831	(-0.134, 0.108)
	Hour_20_x_Temp	-0.058	0.085	0.503	(-0.231, 0.115)
α	Constant	-3.323	4.985	0.509	(-13.415, 6.769)

Using the regression coefficients shown in Table 14, the Evergreen 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 15. These results should be interpreted with caution due to their small sample sizes. The Evergreen 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 1.93 kW per device.

Table 15: Two-Way Smart Thermostat Time-Temperature Matrix

Temp	Hour Ending MDT				
	16	17	18	19	20
105	1.78	1.60	2.18	1.94	1.10
104	1.73	1.60	2.13	1.90	1.11
103	1.68	1.59	2.08	1.87	1.12
102	1.63	1.59	2.03	1.83	1.13
101	1.59	1.58	1.98	1.80	1.14
100	1.54	1.58	1.93	1.76	1.15
99	1.49	1.57	1.88	1.72	1.16
98	1.44	1.57	1.83	1.69	1.17
97	1.39	1.56	1.78	1.65	1.18
96	1.34	1.56	1.73	1.62	1.18
95	1.29	1.55	1.68	1.58	1.19
94	1.25	1.54	1.63	1.55	1.20
93	1.20	1.54	1.58	1.51	1.21
92	1.15	1.53	1.53	1.47	1.22
91	1.10	1.53	1.49	1.44	1.23
90	1.05	1.52	1.44	1.40	1.24
89	1.00	1.52	1.39	1.37	1.25
88	0.95	1.51	1.34	1.33	1.26
87	0.91	1.51	1.29	1.30	1.27
86	0.86	1.50	1.24	1.26	1.28
85	0.81	1.50	1.19	1.22	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 15. As of the end of summer 2020, there were 636 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 1.23 MW. Adjusted for operability using the 87% adjustment factor, this aggregate impact is 1.07 MW.

4 Bring Your Own Thermostat (BYOT)

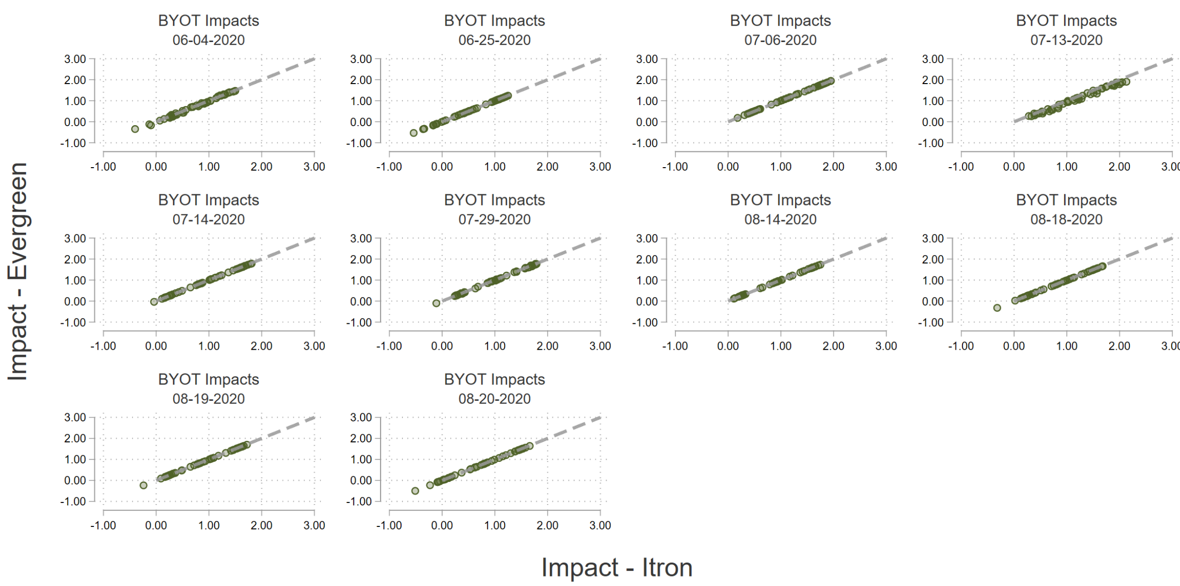
For the BYOT program offering, usage during the curtailment event is compared to usage on high load days preceding the event. The remainder of this section provides greater detail on how the

Evergreen team attempted to validate Itron's calculations, as well as a discussion of ex post and ex ante impacts and baseline accuracy.

4.1 Validation of Calculations

After receiving the participant load data from Itron, the Evergreen team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. We were able to replicate impacts for eight of the ten event days, including both qualifying hour event days (though we were not able to replicate impacts for 6/4 and 7/13). Figure 14 compares impacts as calculated by Itron and by Evergreen at the 5-minute level. For reference, BYOT impact estimates are shown in Table 16. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 1.76 kW per facility for this class, recorded on the 7/6 from 4-5 PM.

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	8:00 PM
6/4/2020	1.31	1.49	1.50	1.17	-
6/25/2020	1.25	1.20	1.15	1.09	-
7/6/2020	1.63	1.76*	1.95	1.88	-
7/13/2020	1.67	1.86	2.05	2.13	-
7/14/2020	1.52	1.68	1.81	1.79	-
7/29/2020	1.41	1.79	1.77	1.77	-
8/14/2020	1.45	1.61	1.75	1.60	-
8/18/2020	-	1.51	1.68	1.66	1.52
8/19/2020	-	1.57	1.72	1.66	1.59
8/20/2020	-	1.51*	1.66	1.53	1.39

4.2 Evergreen Ex Post Impacts

As discussed in Section 1.4, the Evergreen team thinks the method used to estimate impacts for the BYOT program offering overstates the true average impact. For each event hour during the 2020 DR season, Table 17 shows the estimates produced by the Evergreen team. Our methods differed from Itron's just slightly – in any place where a maximum was called for, we replaced it with the mean.

Table 17: BYOT Impact Results

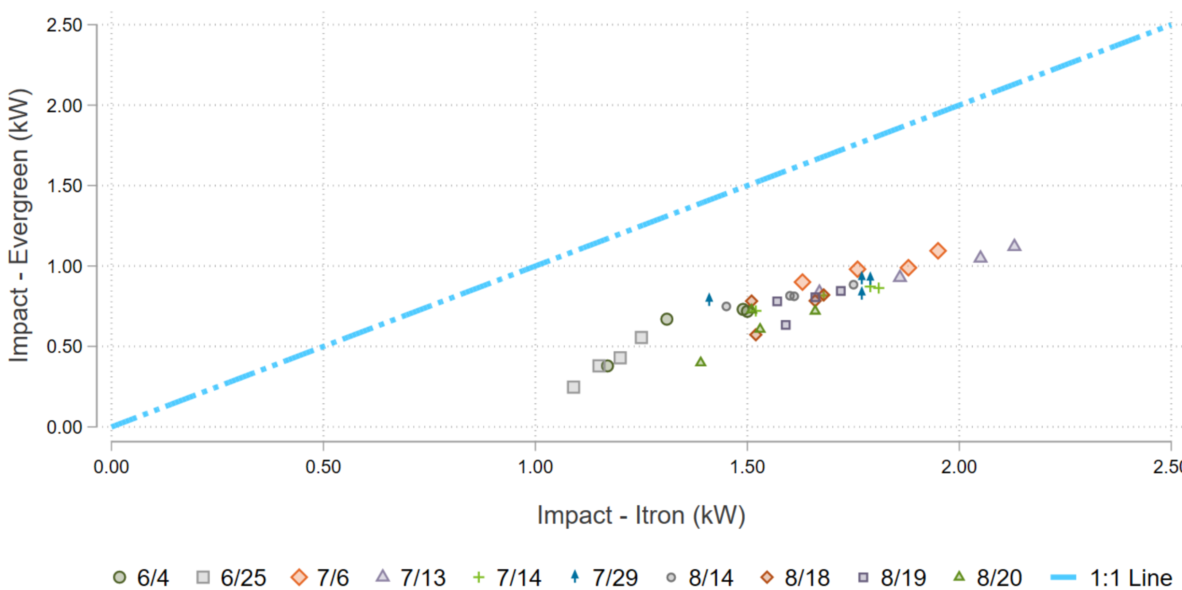
Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
6/4/2020	105	16	94	1.72	1.05	0.67
		17	94	1.92	1.19	0.73
		18	95	2.01	1.29	0.72
		19	95	1.72	1.34	0.38

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
6/25/2020	121	16	92	1.53	0.98	0.56
		17	94	1.67	1.24	0.43
		18	94	1.74	1.36	0.38
		19	94	1.62	1.38	0.25
7/6/2020	118	16	94	2.12	1.22	0.90
		17*	97	2.39	1.41	0.98
		18	93	2.54	1.45	1.09
		19	92	2.50	1.51	0.99
7/13/2020	117	16	95	2.12	1.28	0.84
		17	79	2.33	1.40	0.93
		18	82	2.38	1.33	1.05
		19	81	2.39	1.27	1.12
7/14/2020	115	16	92	1.97	1.25	0.72
		17	93	2.18	1.36	0.82
		18	93	2.26	1.40	0.86
		19	90	2.31	1.44	0.87
7/29/2020	124	16	92	1.88	1.09	0.79
		17	94	2.27	1.35	0.92
		18	94	2.35	1.43	0.92
		19	94	2.32	1.50	0.83
8/14/2020	129	16	95	1.96	1.21	0.75
		17	96	2.22	1.40	0.81
		18	94	2.35	1.47	0.89
		19	94	2.29	1.47	0.82
8/18/2020	128	17	92	1.99	1.21	0.78
		18	92	2.18	1.36	0.82
		19	91	2.18	1.40	0.78
		20	88	1.97	1.40	0.57
8/19/2020	127	17	95	2.07	1.29	0.78
		18	95	2.24	1.39	0.85
		19	94	2.23	1.43	0.81

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
		20	91	2.01	1.38	0.64
8/20/2020	128	17*	98	2.08	1.35	0.73
		18	96	2.23	1.51	0.72
		19	96	2.16	1.56	0.61
		20	93	1.94	1.54	0.40

Our reduction estimate is the average of the values in the 'Impact' column during qualifying event hours, which is 0.86 kW, compared to 0.76 kW for all hours. Figure 15 compares Evergreen's ex post hourly impacts with the impacts calculated by Itron. The Evergreen impact is lower in all cases, and by a larger amount than other customer sectors, due to a greater cycling strategy that leads to a low average impact (see Figure 64 of the Itron report and Section 1.4 of this report). As of the end of summer 2020, there were 142 active BYOT devices. Thus, the average qualifying event hour aggregate impact was 0.12 MW. Multiplying by the percent of online thermostats (85%) yields an aggregate impact of 0.10 MW.

Figure 15: Comparison of Evergreen 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.

4.2.1 Net Energy Savings

The Evergreen 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 (per facility) for each event day. On average, net daily energy savings were 2.19 kWh per facility. Multiplying this estimate by the number of event days (ten) and active devices (142) yields an aggregate savings estimate of 3.1 MWh for the BYOT program offering.

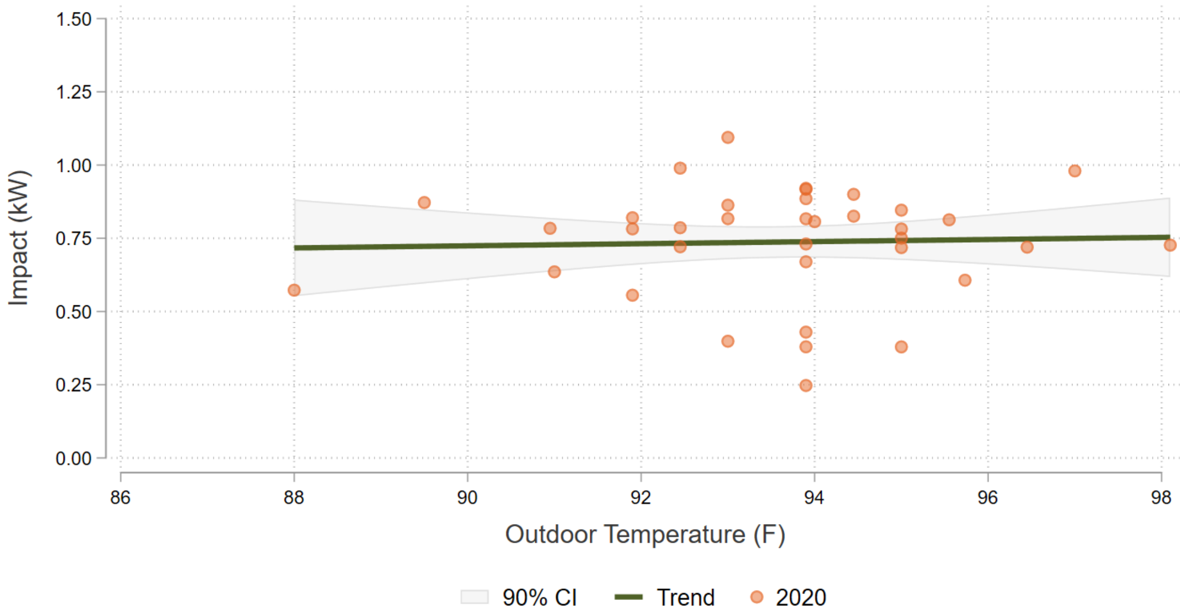
Table 18: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/4/2020	3:00 PM	2.50	-2.48	0.02
6/25/2020	3:00 PM	1.61	-3.08	-1.47
7/6/2020	3:00 PM	3.96	-0.13	3.83
7/13/2020	3:00 PM	3.93	1.80	5.74
7/14/2020	3:00 PM	3.27	0.06	3.33
7/29/2020	3:00 PM	3.45	-1.12	2.33
8/14/2020	3:00 PM	3.27	-0.72	2.54
8/18/2020	4:00 PM	2.96	-0.51	2.45
8/19/2020	4:00 PM	3.07	-0.89	2.18
8/20/2020	4:00 PM	2.45	-1.48	0.97
Average		**3.05**	**-0.86**	**2.19**

4.3 Evergreen Ex Ante Impacts

Figure 16 compares 2020 ex post impact estimates for each event hour with the outdoor air temperature for that hour. Weather data comes from weather station KABQ in Albuquerque. The 2020 results do not show strong weather sensitivity, though this might change with additional data from future program years.

Figure 16: Hourly Impacts against Outdoor Temperature (F)



To develop an ex ante impact estimate, the Evergreen team developed a regression model that estimates the ex post impact as a function of temperature. Unlike the other ex ante models following the form of Section 1.5, "hour" was not included as an explanatory variable in this model, as there simply are not enough data points to do so. When evaluating 2021 impacts, we will attempt to include the "hour" terms. The ex ante regression model was weighted by the number of curtailed devices in each event hour. Regression output is shown below in Table 19. Due to the small sample size, temperature is not considered a statistically significant predictor of the demand reduction.

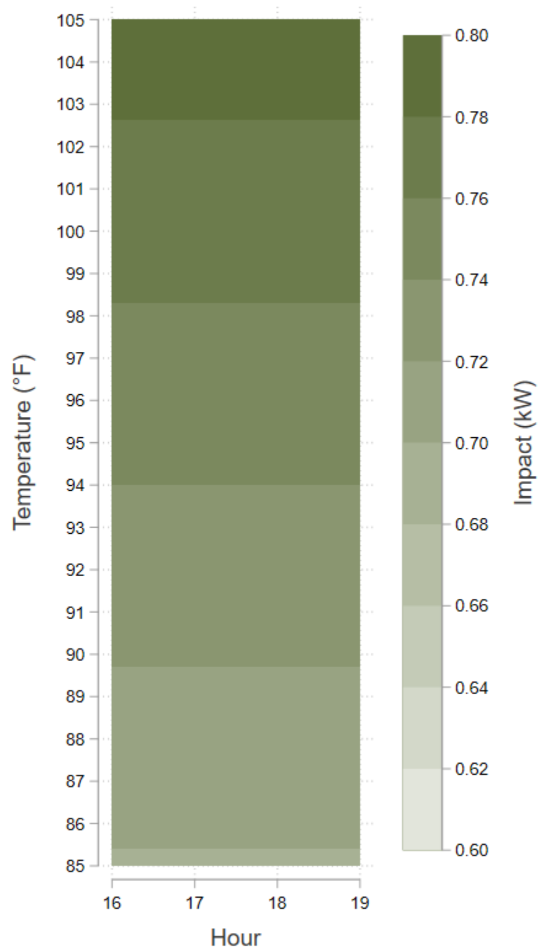
Table 19: BYOT Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value	95% CI
β	Temperature	0.005	0.016	0.775	(-0.028, 0.037)
α	Constant	0.303	1.511	0.842	(-2.769, 3.375)

Using the regression coefficients shown in Table 19, the Evergreen 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 Evergreen 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 0.77 kW per device. However, these results should be interpreted with caution due to their small sample sizes.

Table 20: BYOT Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	0.79	0.79	0.79	0.79	0.79	0.79
104	0.79	0.79	0.79	0.79	0.79	0.79
103	0.78	0.78	0.78	0.78	0.78	0.78
102	0.78	0.78	0.78	0.78	0.78	0.78
101	0.77	0.77	0.77	0.77	0.77	0.77
100	0.77	0.77	0.77	0.77	0.77	0.77
99	0.76	0.76	0.76	0.76	0.76	0.76
98	0.76	0.76	0.76	0.76	0.76	0.76
97	0.75	0.75	0.75	0.75	0.75	0.75
96	0.75	0.75	0.75	0.75	0.75	0.75
95	0.74	0.74	0.74	0.74	0.74	0.74
94	0.74	0.74	0.74	0.74	0.74	0.74
93	0.74	0.74	0.74	0.74	0.74	0.74
92	0.73	0.73	0.73	0.73	0.73	0.73
91	0.73	0.73	0.73	0.73	0.73	0.73
90	0.72	0.72	0.72	0.72	0.72	0.72
89	0.72	0.72	0.72	0.72	0.72	0.72
88	0.71	0.71	0.71	0.71	0.71	0.71
87	0.71	0.71	0.71	0.71	0.71	0.71
86	0.70	0.70	0.70	0.70	0.70	0.70
85	0.70	0.70	0.70	0.70	0.70	0.70



To get an idea of BYOT resource capability on aggregate, the number of active participants can be multiplied by the values shown in Table 20. As of the end of summer 2020, there were 142 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 0.11 MW. Adjusted for operability using the 85% online factor, this aggregate impact is 0.09 MW.

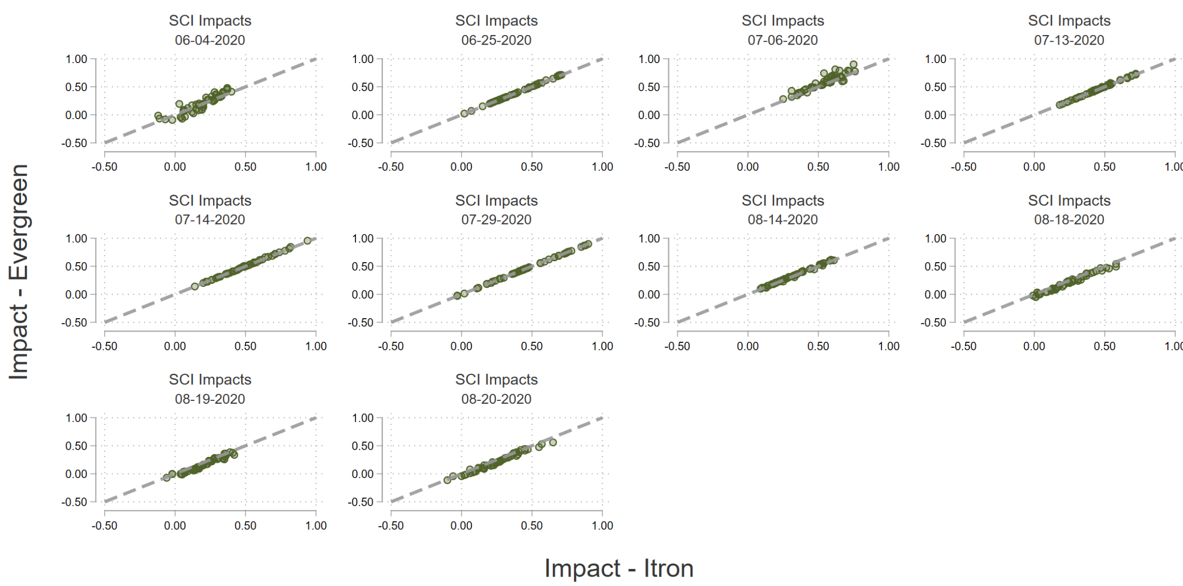
5 Small Commercial Results

For the Small Commercial program offering, 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, ex ante impacts, combining multiple years of event history are produced for various temperature scenarios.

5.1 Validation of Calculations

After receiving the participant load data from Itron, the Evergreen team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. We were unable to replicate impacts for six of the ten event days, including the qualifying event days of 7/6 and 8/20, but were able to replicate impacts for four days (6/25, 7/13, 7/14, and 7/29). Figure 17 compares impacts as calculated by Itron and by Evergreen at the 5-minute level. After reviewing the Itron calculations for the 7/6 event day, we found that the difference was driven by the use of different baseline days – and that our impacts on the qualifying event day were slightly lower than Itron's. A full summary of Itron's event hour impacts is shown in Table 21. Itron's per device kW impact estimate for the Small Commercial class (0.66 kW) is the maximum fifteen-minute rolling average reduction during the qualifying event hours on 7/6 and 8/20. (See Section 1.3 for more details.)

Figure 17: 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

Date	Hour Ending (MDT)				
	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
6/4/2020	0.37	0.37	0.40	0.27	-
6/25/2020	0.71	0.69	0.51	0.32	-
7/6/2020	0.76	0.66*	0.61	0.58	-
7/13/2020	0.72	0.72	0.47	0.44	-
7/14/2020	0.78	0.94	0.62	0.52	-
7/29/2020	0.90	0.88	0.46	0.48	-
8/14/2020	0.61	0.54	0.39	0.28	-
8/18/2020	-	0.58	0.44	0.27	0.13
8/19/2020	-	0.42	0.31	0.23	0.19
8/20/2020	-	0.65*	0.41	0.28	0.27

5.2 Evergreen Ex Post Impacts

As discussed in Section 1.4, the Evergreen 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 2020 DR season, Table 22 shows the estimates produced by the Evergreen team. Our methods differed from Itron's in that in any place where a maximum was called for, we replaced it with the mean.

Table 22: Impact Calculations for the Small Commercial Segment

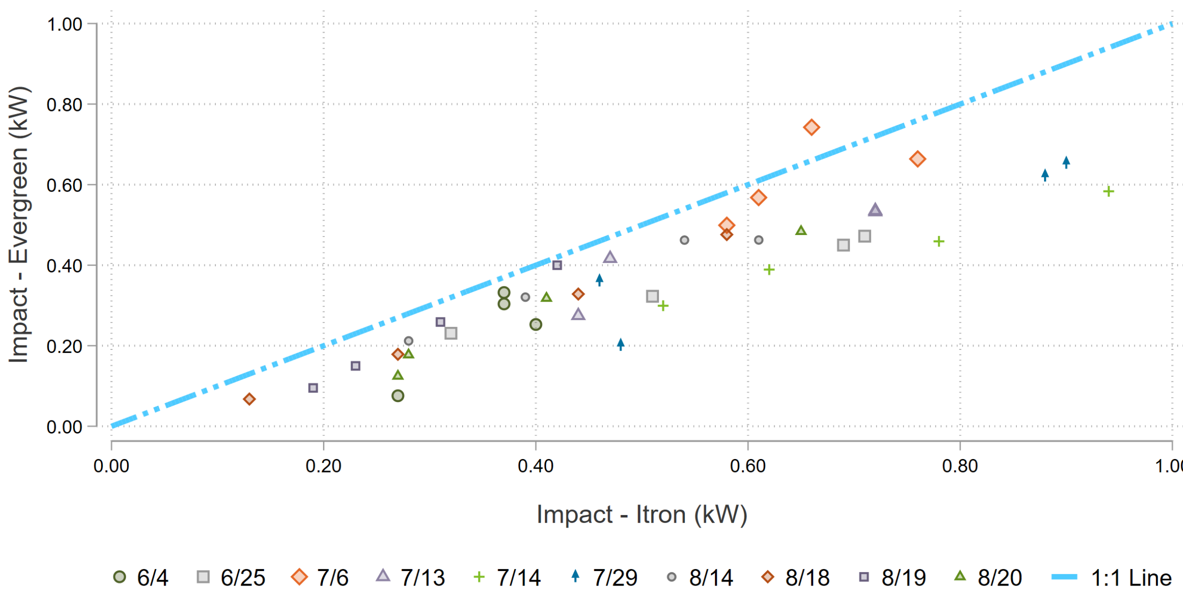
Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
6/4/2020		16	94	1.23	0.90	0.33
		17	94	1.06	0.76	0.30
		18	95	0.74	0.49	0.25
		19	95	0.45	0.38	0.08
6/25/2020		16	92	1.23	0.76	0.47
		17	94	1.07	0.62	0.45
		18	94	0.78	0.45	0.32

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
		19	94	0.63	0.40	0.23
7/6/2020		16	94	1.51	0.84	0.66
		17*	97	1.38	0.64	0.74
		18	93	1.03	0.46	0.57
		19	92	0.91	0.41	0.50
7/13/2020		16	95	1.53	1.00	0.54
		17	79	1.33	0.79	0.53
		18	82	0.98	0.57	0.42
		19	81	0.77	0.50	0.27
7/14/2020		16	92	1.41	0.95	0.46
		17	93	1.22	0.64	0.58
		18	93	0.91	0.52	0.39
		19	90	0.71	0.41	0.30
7/29/2020		16	92	1.52	0.87	0.65
		17	94	1.23	0.61	0.62
		18	94	0.83	0.47	0.36
		19	94	0.56	0.36	0.20
8/14/2020		16	95	1.23	0.77	0.46
		17	96	1.05	0.59	0.46
		18	94	0.81	0.48	0.32
		19	94	0.61	0.39	0.21
8/18/2020		17	92	1.05	0.57	0.48
		18	92	0.81	0.48	0.33
		19	91	0.62	0.44	0.18
		20	88	0.49	0.43	0.07
8/19/2020		17	95	1.15	0.75	0.40
		18	95	0.89	0.63	0.26
		19	94	0.68	0.53	0.15
		20	91	0.54	0.44	0.10
8/20/2020		17*	98	1.12	0.63	0.48
		18	96	0.86	0.54	0.32

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact
		19	96	0.66	0.49	0.18
		20	93	0.52	0.40	0.12

The average difference during full event hours was 0.37 kW. The average impact during qualifying event hours was 0.61 kW. Figure 18 compares Evergreen's ex post hourly impacts with the impacts calculated by Itron. The Evergreen impact is lower in all cases, by about 0.30 kW on average. As of the end of summer 2020, there were 4,194 active small commercial devices. Thus, the average qualifying event hour aggregate impact was 2.56 MW. Adjusted for 87% operability, the aggregate impact was 2.23 MW.

Figure 18: Comparison of Evergreen 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.

5.2.1 Net Energy Savings

The Evergreen 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 1.13 kWh per device. Multiplying by the number of events (ten) and the number of active devices (4,194) yields an aggregate savings estimate of 47.4 MWh for the Small Commercial DCU segment.

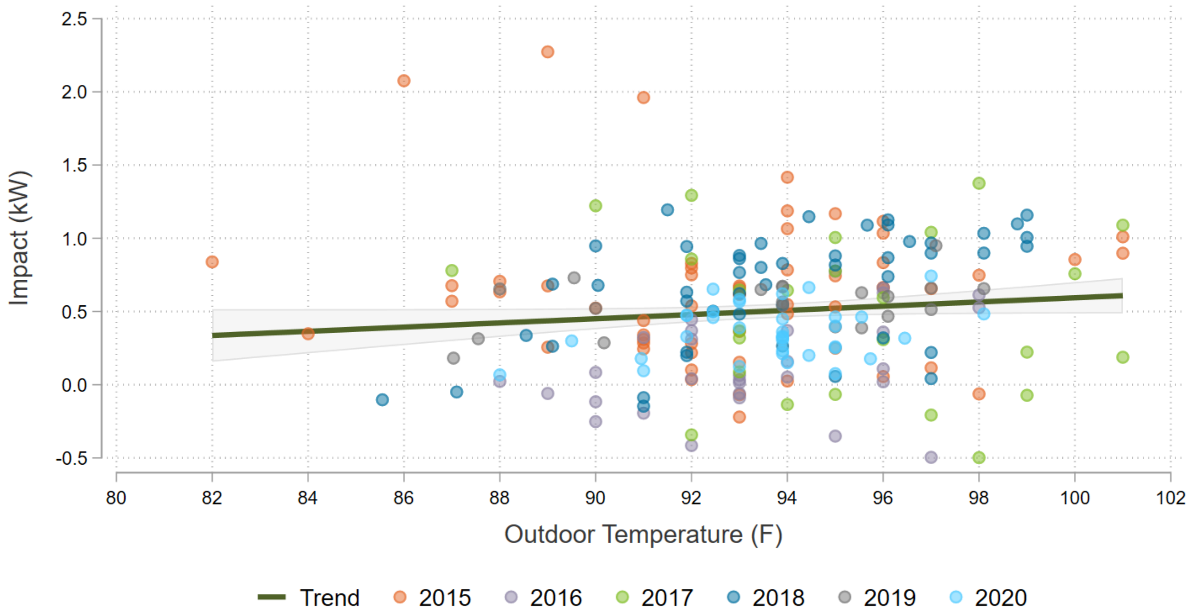
Table 23: Per Device Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/4/2020	3:00 PM	0.96	-0.63	0.34
6/25/2020	3:00 PM	1.48	-0.33	1.15
7/6/2020	3:00 PM	2.47	0.04	2.52
7/13/2020	3:00 PM	1.76	0.42	2.18
7/14/2020	3:00 PM	1.73	0.01	1.75
7/29/2020	3:00 PM	1.84	-0.97	0.87
8/14/2020	3:00 PM	1.46	-0.38	1.08
8/18/2020	4:00 PM	1.05	-0.32	0.73
8/19/2020	4:00 PM	0.91	-0.63	0.28
8/20/2020	4:00 PM	1.10	-0.68	0.43
Average		**1.48**	**-0.35**	**1.13**

5.3 Evergreen Ex Ante Impacts

Figure 19 compares 2015-2020 ex post impact estimates for each event hour with the outdoor air temperature for that hour. Weather data comes from weather station KABQ in Albuquerque. The trend in temperature is quite subtle; there are only slight increases in impact magnitude as temperature increases. To develop an ex ante impact estimate, the Evergreen team developed a regression model that estimates the ex post impact as a function of temperature and time. The specified model was shown in Section 1.5, and the results from the model are described in more detail below. Using the model, the Evergreen team predicts that the impact of a Small Commercial 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 19: 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 general, earlier hours corresponded to higher kW values, with a drop over time in impacts as less load was available to shed. It should be noted that hour 20 was relatively rare; only seven events during the past four years included a full-hour event during this period and as such, should be interpreted with care. 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. Again, hour 20 should be interpreted with caution as only seven data points were available to fit the model. Note that any coefficient with * next to it is statistically significant. Due to the small sample sizes and year-to-year variability, none of the estimates in this regression are statistically significant.

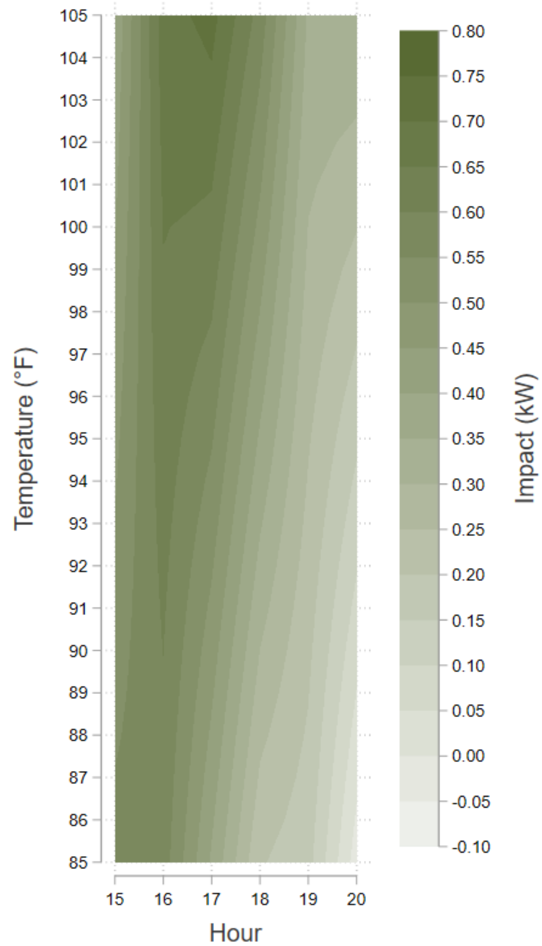
Table 24: Small Commercial Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value	95% CI
β	Temperature	-0.008	0.023	0.727	(-0.054, 0.038)
γ_h	Hour 15	(base – omitted)			
	Hour 16	-1.120	2.955	0.705	(-6.946, 4.707)
	Hour 17	-2.249	2.785	0.420	(-7.741, 3.243)
	Hour 18	-2.645	2.660	0.321	(-7.890, 2.601)
	Hour 19	-1.828	2.854	0.523	(-7.456, 3.800)
	Hour 20	-2.859	4.533	0.529	(-11.799, 6.080)
δ_h	Hour_15_x_Temp	(base – omitted)			
	Hour_16_x_Temp	0.013	0.032	0.679	(-0.050, 0.076)
	Hour_17_x_Temp	0.024	0.030	0.419	(-0.035, 0.084)
	Hour_18_x_Temp	0.027	0.029	0.352	(-0.030, 0.084)
	Hour_19_x_Temp	0.017	0.031	0.588	(-0.044, 0.078)
	Hour_20_x_Temp	0.027	0.050	0.594	(-0.072, 0.125)
α	Constant	1.257	2.115	0.553	(-2.914, 5.428)

Using the regression coefficients shown in Table 24, the Evergreen 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. These results should be interpreted with caution due to their small sample sizes. For the 5-6 PM interval at 100°F, the expected load impact is 0.49 kW. The expected load impact is lower for the 5-6 PM interval than earlier in the day because there is less naturally available load earlier in the day for curtailment.

Table 25: Small Commercial Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	0.41	0.68	0.72	0.58	0.34	0.34
104	0.41	0.67	0.70	0.56	0.33	0.33
103	0.42	0.67	0.69	0.54	0.32	0.31
102	0.43	0.66	0.67	0.52	0.32	0.29
101	0.44	0.66	0.65	0.51	0.31	0.27
100	0.45	0.65	0.64	0.49	0.30	0.25
99	0.45	0.65	0.62	0.47	0.29	0.23
98	0.46	0.64	0.60	0.45	0.28	0.21
97	0.47	0.64	0.59	0.43	0.27	0.20
96	0.48	0.63	0.57	0.41	0.26	0.18
95	0.49	0.63	0.55	0.39	0.25	0.16
94	0.49	0.62	0.54	0.37	0.25	0.14
93	0.50	0.62	0.52	0.36	0.24	0.12
92	0.51	0.61	0.51	0.34	0.23	0.10
91	0.52	0.61	0.49	0.32	0.22	0.09
90	0.53	0.60	0.47	0.30	0.21	0.07
89	0.54	0.60	0.46	0.28	0.20	0.05
88	0.54	0.59	0.44	0.26	0.19	0.03
87	0.55	0.59	0.42	0.24	0.19	0.01
86	0.56	0.58	0.41	0.22	0.18	-0.01
85	0.57	0.58	0.39	0.21	0.17	-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 2020, there were 4,194 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 2.06 MW. Adjusted for 87% operability, the aggregate impact is 1.79 MW.

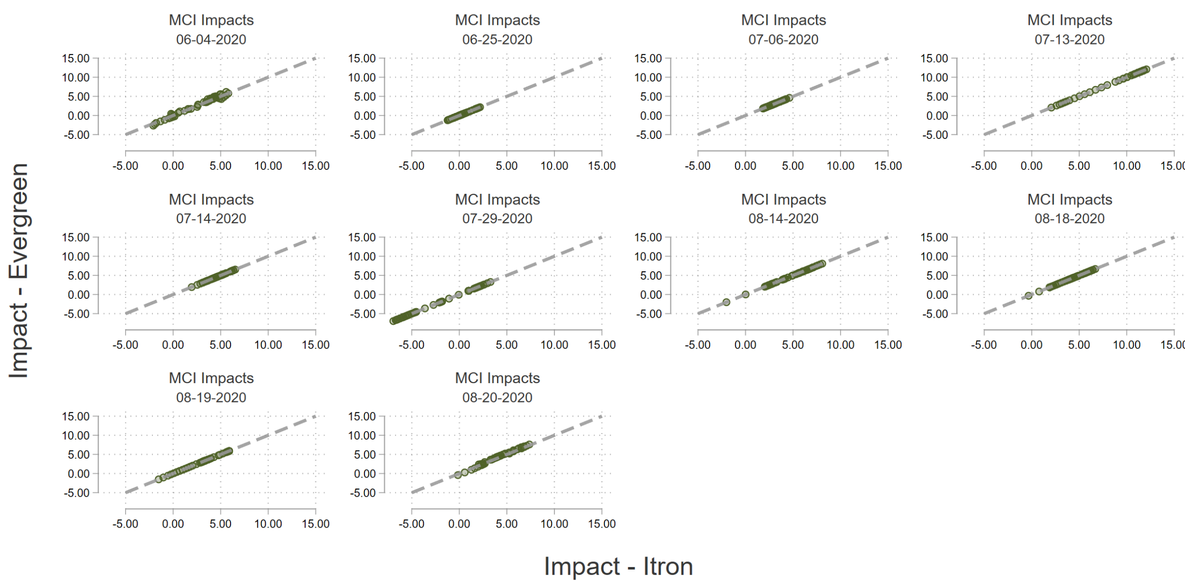
6 Medium Commercial

For the Medium Commercial program offering, usage during the curtailment event is compared to usage on high load days preceding the event. The remainder of this section provides greater detail on how the Evergreen team attempted to validate Itron's calculations and discusses ex post and ex ante impacts and baseline accuracy.

6.1 Validation of Calculations

After receiving the participant load data from Itron, the Evergreen team attempted to reproduce the impacts in Itron's Power Saver impact evaluation report. We were able to replicate impacts for the majority of the event days, including the qualifying hour event day of 7/6, but we were unable to exactly replicate the impacts for the other qualifying event day of 8/6, the date that was ultimately used for settlement purposes. Figure 20 compares impacts as calculated by Itron and by Evergreen at the 5-minute level. For reference, medium commercial impact estimates are shown in Table 26. Note that an asterisk (*) denotes a qualifying event hour. The maximum impact during qualifying event hours was 7.37 kW per facility for this class.

Figure 20: 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

Date	Hour Ending (MDT)				
	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
6/4/2020	5.81	5.58	3.64	0.15	-
6/25/2020	2.18	0.54	0.60	0.39	-
7/6/2020	4.62	3.84*	3.05	3.17	-
7/13/2020	5.57	10.88	11.77	12.07	-
7/14/2020	4.02	5.52	5.04	6.53	-
7/29/2020	3.28	1.01	-4.53	-5.37	-
8/14/2020	8.07	7.15	5.30	3.10	-
8/18/2020	-	6.68	6.39	4.36	2.89
8/19/2020	-	5.90	4.92	3.47	2.05
8/20/2020	-	7.37*	5.73	4.83	2.68

6.2 Evergreen Ex Post Impacts

As discussed in Section 1.4, the Evergreen 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 2020 DR season, Table 27 shows the estimates produced by the Evergreen team. Our methods differed from Itron's just slightly – in any place where a maximum was called for, we replaced it with the mean.

Table 27: Medium Commercial Impact Results

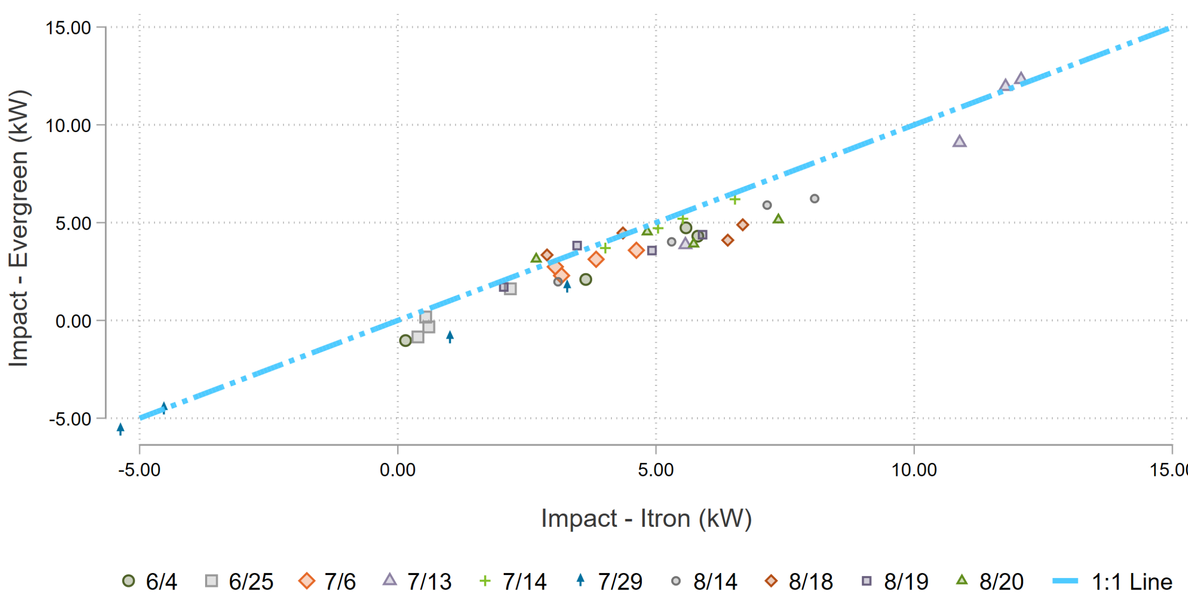
Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact (kW)
6/4/2020	52	16	94	52.91	48.61	4.31
		17	94	51.37	46.64	4.74
		18	95	47.96	45.87	2.09
		19	95	44.17	45.20	-1.03
6/25/2020	52	16	92	50.74	49.13	1.62
		17	94	48.65	48.47	0.17
		18	94	46.74	47.07	-0.33

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact (kW)
		19	94	44.75	45.59	-0.85
7/6/2020	52	16	94	56.42	52.84	3.59
		17*	97	55.72	52.59	3.13
		18	93	53.44	50.70	2.74
		19	92	51.36	49.06	2.29
7/13/2020	52	16	95	58.97	55.10	3.87
		17	79	58.51	49.42	9.09
		18	82	56.38	44.42	11.96
		19	81	54.61	42.30	12.31
7/14/2020	52	16	92	57.46	53.76	3.70
		17	93	57.01	51.81	5.20
		18	93	54.93	50.22	4.71
		19	90	53.21	47.02	6.19
7/29/2020	52	16	92	55.23	53.53	1.70
		17	94	51.87	52.76	-0.89
		18	94	46.77	51.30	-4.53
		19	94	44.73	50.34	-5.61
8/14/2020	52	16	95	65.71	59.47	6.24
		17	96	62.62	56.72	5.90
		18	94	58.10	54.07	4.02
		19	94	55.32	53.34	1.98
8/18/2020	52	17	92	60.61	55.72	4.89
		18	92	56.68	52.57	4.10
		19	91	54.64	50.17	4.47
		20	88	50.38	47.03	3.35
8/19/2020	52	17	95	61.69	57.30	4.39
		18	95	57.69	54.11	3.58
		19	94	55.62	51.78	3.83
		20	91	51.28	49.57	1.71
8/20/2020	52	17*	98	64.03	58.88	5.14
		18	96	59.88	55.97	3.91

Date	# of Curtailed Devices	Hour Ending MDT	Temp.	CBL kW	Observed kW	Impact (kW)
		19	96	57.72	53.19	4.53
		20	93	53.22	50.08	3.14

Our reduction estimate is the average of the values in the ‘Impact’ column during qualifying event hours, which is 4.14 kW, compared to 3.38 kW for all hours. Figure 21 compares Evergreen’s ex post hourly impacts with the impacts calculated by Itron. The Evergreen impact is lower in all cases, by about 0.90 kW on average. It is important to note that these impacts are per facility, not per device. Itron notes that there were 2,965 devices installed at 400 facilities at the end of the 2020 DR season, indicating there were approximately 7.41 devices per facility. Thus, Evergreen’s per-device estimate during qualifying hours is 0.56 kW and the average qualifying event hour aggregate impact was 1.65 MW. Adjusted for 87% operability, the aggregate impact was 1.44 MW.

Figure 21: Comparison of Evergreen 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.

6.2.1 Net Energy Savings

The Evergreen 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 13.38

kWh per facility. Multiplying this estimate by ten days and by the number of active facilities (400) yields an aggregate savings estimate of 53.5 MWh for the Medium Commercial program offering.

Table 28: Per Facility Energy Savings by Event Day

Date	Event Start (MDT)	Event Savings (kWh)	Snapback (kWh)	Net Savings (kWh)
6/4/2020	3:00 PM	10.11	-7.38	2.72
6/25/2020	3:00 PM	0.61	-15.54	-14.93
7/6/2020	3:00 PM	11.75	8.53	20.28
7/13/2020	3:00 PM	37.24	31.70	68.94
7/14/2020	3:00 PM	19.81	19.38	39.19
7/29/2020	3:00 PM	-9.34	-18.44	-27.78
8/14/2020	3:00 PM	18.15	-8.56	9.59
8/18/2020	4:00 PM	16.81	-1.64	15.17
8/19/2020	4:00 PM	13.52	-5.20	8.32
8/20/2020	4:00 PM	16.72	-4.44	12.29
Average		**13.54**	**-0.16**	**13.38**

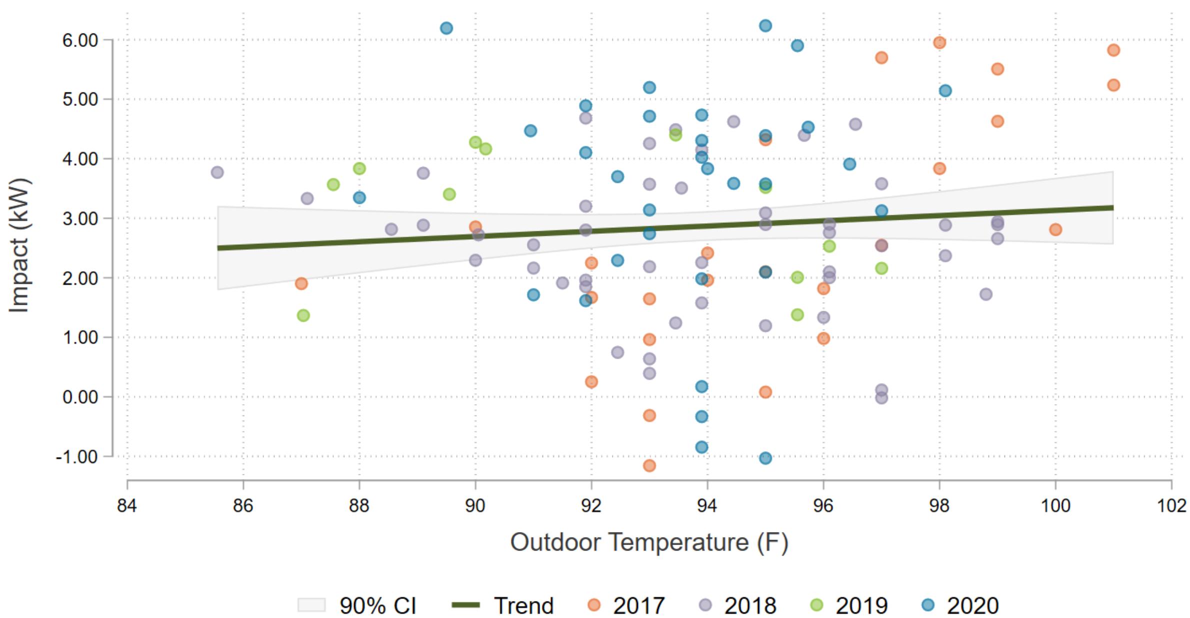
6.3 Evergreen Ex Ante Impacts

The method used by the Evergreen team to calculate ex post impacts for 2020 was the same as what was used in prior years – a baseline method. This allows us to compare impacts across years and use additional data to predict what the program can deliver in terms of load reduction under different planning scenarios. Figure 22 compares 2017-2020 ex post impact estimates for each event hour with the outdoor air temperature for that hour.[11] Weather data comes from weather station KABQ in Albuquerque. The trend in temperature is small but positive; impact magnitudes increase as temperature increases. To develop an ex ante impact estimate, the Evergreen team developed a regression model that estimates the ex post impact as a function of temperature and time. The specified model was shown in Section 1.5, and the results from the model are described in more detail below. Using the model, the Evergreen 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 2.87 kW per facility, or 0.39 kW per device.

[11] We dropped one additional day, 7/29/2020, because it had large and negative impacts caused by the top-X-of-Y baseline method.

It is interesting to note that the 2018, 2019 and 2020 load impacts did not actually demonstrate much temperature sensitivity, while 2017 impacts did, in a way that was much more dramatic than what was observed with small commercial customers. 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.

Figure 22: 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 below. There is no clear relationship between event hour and impact. It should be noted that hour 20 was extremely rare; only two events during the past three years included a full-hour event during this period. 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. Again, hour 20 should be interpreted with caution as only two data points were available to fit the model. Note that any coefficient with * next to it is statistically significant. Due to the small sample sizes and year-to-year variability, none of the estimates in this regression are statistically significant.

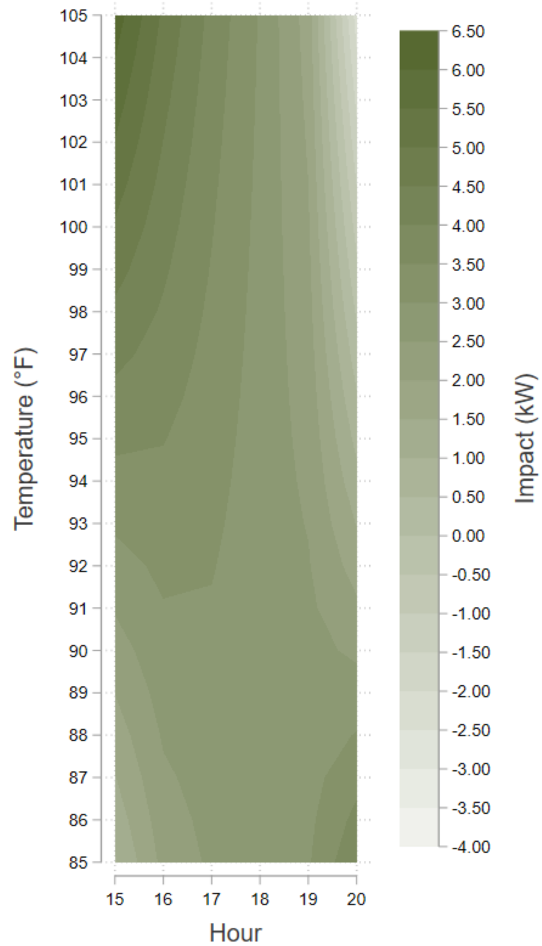
Table 29: Medium Commercial Ex Ante Regression Output

Term	Variable	Coefficient (b)	Standard Error	P-Value	95% CI
β	Temperature	0.267	0.301	0.378	(-0.331, 0.864)
γ_h	Hour 15	(base – omitted)			
	Hour 16	12.098	30.464	0.692	(-48.328, 72.523)
	Hour 17	18.952	29.698	0.525	(-39.954, 77.859)
	Hour 18	22.882	28.986	0.432	(-34.611, 80.376)
	Hour 19	29.672	28.823	0.306	(-27.497, 86.842)
	Hour 20	52.095	33.698	0.125	(-14.745, 118.936)
δ_h	Hour_15_x_Temp	(base – omitted)			
	Hour_16_x_Temp	-0.128	0.332	0.700	(-0.787, 0.530)
	Hour_17_x_Temp	-0.204	0.324	0.531	(-0.845, 0.438)
	Hour_18_x_Temp	-0.250	0.316	0.432	(-0.877, 0.377)
	Hour_19_x_Temp	-0.326	0.315	0.303	(-0.950, 0.299)
	Hour_20_x_Temp	-0.577	0.370	0.122	(-1.311, 0.156)
α	Constant	-21.719	27.518	0.432	(-76.302, 32.863)

Using the regression coefficients shown in Table 29, the Evergreen 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. Using the model, the Evergreen 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 2.87 kW per facility, or 0.39 kW per device. These results should be interpreted with caution due to their small sample sizes, especially for hour ending 20.

Table 30: Medium Commercial Time-Temperature Matrix

Temp	Hour Ending MDT					
	15	16	17	18	19	20
105	6.27	4.91	3.85	2.95	1.77	-2.26
104	6.01	4.77	3.78	2.94	1.83	-1.95
103	5.74	4.63	3.72	2.92	1.89	-1.63
102	5.47	4.49	3.66	2.90	1.94	-1.32
101	5.21	4.35	3.60	2.89	2.00	-1.01
100	4.94	4.21	3.53	2.87	2.06	-0.70
99	4.68	4.08	3.47	2.85	2.12	-0.39
98	4.41	3.94	3.41	2.83	2.18	-0.08
97	4.14	3.80	3.34	2.82	2.24	0.23
96	3.88	3.66	3.28	2.80	2.30	0.54
95	3.61	3.52	3.22	2.78	2.36	0.85
94	3.34	3.38	3.15	2.77	2.42	1.16
93	3.08	3.25	3.09	2.75	2.47	1.47
92	2.81	3.11	3.03	2.73	2.53	1.78
91	2.54	2.97	2.97	2.72	2.59	2.10
90	2.28	2.83	2.90	2.70	2.65	2.41
89	2.01	2.69	2.84	2.68	2.71	2.72
88	1.74	2.55	2.78	2.66	2.77	3.03
87	1.48	2.42	2.71	2.65	2.83	3.34
86	1.21	2.28	2.65	2.63	2.89	3.65
85	0.94	2.14	2.59	2.61	2.95	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 2020, there were 400 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 1.15 MW. Adjusted for 87% operability, this aggregate impact is 1.00 MW.

7 Recommendations

After our review of the 2020 Power Saver program, the Evergreen team offers the following recommendations:

- Ex post impacts provide a helpful look at program performance, but for planning purposes, a consistent, weather-normalized value should be used. The Evergreen 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.
- The connected load assumption used to convert air conditioner runtime to electric demand is high given the average air conditioner size. It is also higher than the assumed value in the smart thermostat protocol of the New Mexico TRM. 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. The Evergreen team recommends Itron transition to a connected load in the 3.0-3.5 kW range for 2021.

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 periods of high system load. Peak Saver was implemented by Enbala in 2020, who managed the enrollment, dispatch, and settlement with participating customers. During the summer 2020 demand response season, there were 130 participating facilities and ten demand response events. These events are summarized in Table 31.

Table 31: 2020 Peak Saver Event Summary

Date	Weekday	Participants	Start Time (MDT)	End Time (MDT)	Daily High at KABQ (F)
06/04/2020	Thursday	92	3:00 PM	7:00 PM	95
06/25/2020	Thursday	93	3:00 PM	7:00 PM	94
07/06/2020	Monday	130	3:00 PM	7:00 PM	97
07/13/2020	Monday	130	3:00 PM	7:00 PM	97
07/14/2020	Tuesday	130	3:00 PM	7:00 PM	93
07/29/2020	Wednesday	130	3:00 PM	7:00 PM	94
08/14/2020	Friday	130	3:00 PM	7:00 PM	96
08/18/2020	Tuesday	130	4:00 PM	8:00 PM	92
08/19/2020	Wednesday	130	4:00 PM	8:00 PM	95
08/20/2020	Thursday	130	4:00 PM	8:00 PM	98

After the 2020 demand response (DR) season concluded, Enbala provided the Evergreen team with one-minute interval load data for each site in the Peak Saver population, as well as some workbooks with the performance metrics (10-minute capacity, average participant capacity, participant event capacity, and energy delivered) for each site/event combination. The interval data spanned a period from May 20 to August 20. The May days were included in the data to facilitate the baseline calculation for the June 4th event. The one-minute interval load data also included a field with load impacts calculated using a customer baseline (CBL) method detailed in the contract between PNM and Enbala. A CBL is an estimate of what participant loads would have been absent the DR event dispatch. Load impacts are the difference between the CBL and the metered load during the event. The relevant CBLs were also in the one-minute load data.

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

5) Reproduce the performance estimates calculated by Enbala using the contractually agreed upon CBL method;
6) Assess the accuracy of the contract CBL method by examining its ability to predict loads on non-event weekdays; and
7) Modify the CBL methodology to reduce bias and calculate verified impacts for each event.
8) Summarize average performance and discuss key drivers.

The findings from our analysis are described in subsequent sections.

Validation of Settlement Calculations

The settlement calculations called for a "high 3-of-5" baseline with an uncapped, asymmetric day-of adjustment. The high 3-of-5 days were determined as follows:

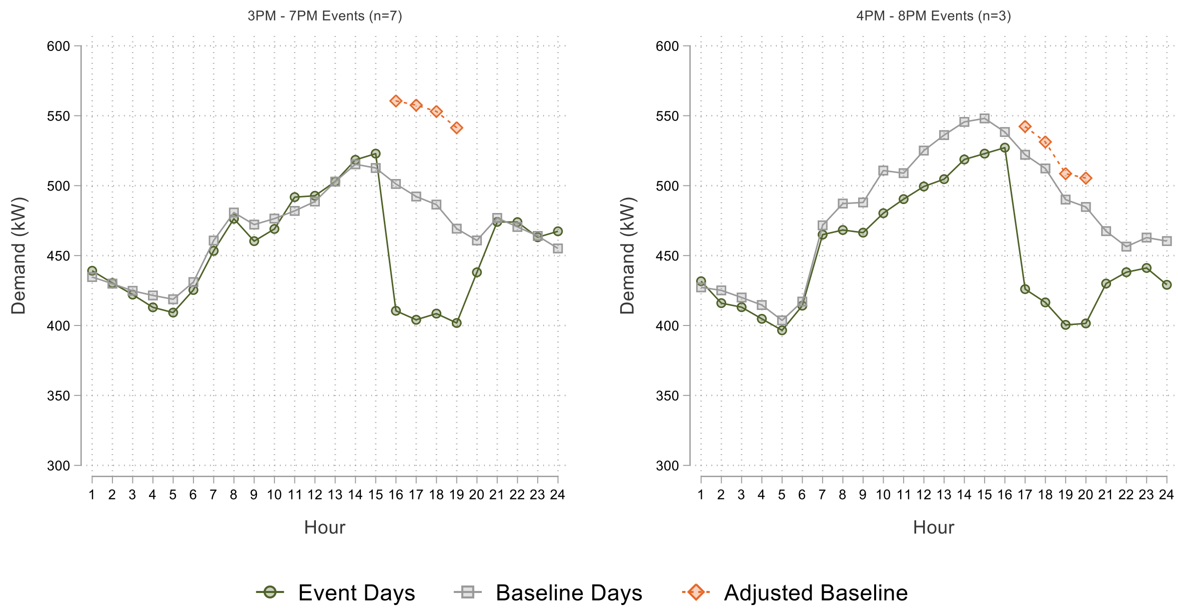
- Select the five non-holiday, non-event weekdays that immediately precede the event; and
- Out of those five days, pick the three days with the highest average demand during the hours in which the event occurred.

In the case of a tie, the day that is closer to the event day was selected as a baseline day. (This tie-breaking procedure was not laid out formally; rather, we discovered it when recreating Enbala's calculations.)

Our team was able to replicate nearly all of the settlement baselines. Across all sites and event hours, the average settlement baseline was 556.19 kW and the average Evergreen baseline was 556.18 kW. Any differences between the settlement baseline and our team's baseline were small, typically under a 0.1% difference with a couple of larger differences (between 1% and 6%). In the instances where differences were noted, there were gaps in the one-minute interval data on the baseline days. Differences in how this missing data was handled may explain the differences in the baselines.

Figure 23 shows average hourly event day loads across the full population, average hourly loads on the high 3-of-5 baseline days, and also average hourly baselines for the two different event intervals. Of the ten event days, seven had an event interval spanning from 3:00 PM to 7:00 PM (left panel). The other three events were from 4:00 PM to 8:00 PM (right panel).

Figure 23: Peak Saver Loads and Baselines



After verifying that the baselines were calculated correctly, our team moved onto the performance metric calculations. 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.

Using the settlement baselines, all performance calculations were replicated without problem, with a small caveat on the energy delivered metric. For a couple of sites, there were minor differences between the settlement calculation and our team's calculation. Upon looking further into these differences, they may also be attributable to missing one-minute interval data for the site and day combinations. Per the settlement baselines, Table 32 shows portfolio performance metrics by date.

Table 32: Peak Saver Performance Metrics by Date

Date	10-Minute Participant Capacity (kW)	Average Participant Capacity (kW)	Participant Event Capacity Performance (kW)	Energy Delivered (kWh)
06/04/2020	22,365	25,620	24,318	100,524
06/25/2020	26,369	24,511	25,254	97,751
07/06/2020	19,319	18,475	18,813	73,562
07/13/2020	19,623	17,831	18,548	71,022
07/14/2020	16,556	17,714	17,251	70,286
07/29/2020	21,936	16,563	18,712	67,368
08/14/2020	14,182	12,404	13,115	49,450
08/18/2020	18,024	15,463	16,487	61,766
08/19/2020	14,858	15,111	15,010	60,124
08/20/2020	14,944	14,397	14,616	57,314
Average	**18,818**	**17,809**	**18,212**	**70,917**

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.

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 are centered around zero, on average.

The Evergreen team used this knowledge of the central tendency of the error to assess the accuracy of the settlement CBL. By creating a set of placebo event days composed of each non-event weekday for which a site had the previous five days of data, we investigated for systematic bias. Each placebo event was assumed to start at 3:00 PM and last for four hours – these mimic the most common event interval for the 2020 DR events. Any negative impacts were not zeroed out. For each placebo event, the average CBL during the event window at each site was summed to find the aggregate CBL. The same process was used to find the aggregate metered load. Since no demand response occurred, the impact estimate (difference between CBL and metered load) should be zero and is thus labeled as error. Note that sites with solar power were removed from this analysis.[12] 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 7.7 MW of upwards bias (meaning the baseline overstated load by 7.7 MW). The average percent bias across the 50 placebo events was 14.2 percent. Since actual DR reductions are not 100 percent of load, the bias in impact estimates for actual events is necessarily greater than 14.2 percent. Three sites account for 4.0 MW of the bias (approximately 52%).

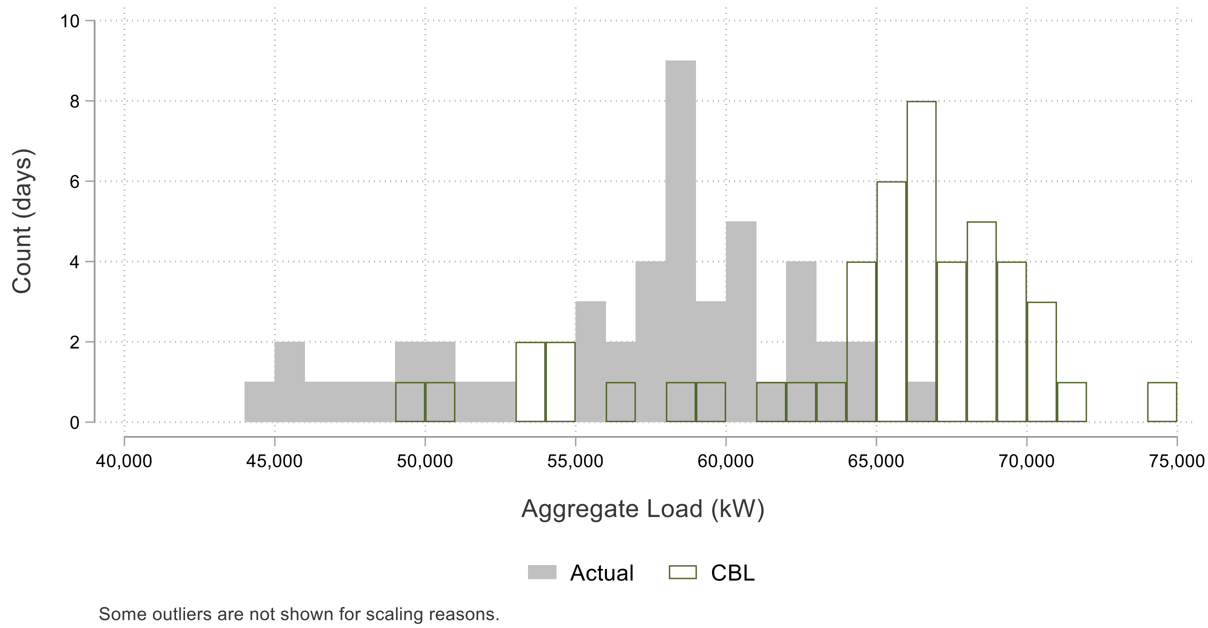
Table 33: CBL Accuracy Assessment for Placebo Events

Month	Number of Placebo Events	Avg. Daily High Temp at KABQ	Avg. Aggregate Metered Load (kW)	Avg. Aggregate CBL (kW)	Avg. Error (kW)
May	1	88	25,010	29,729	4,719
June	20	89.6	51,485	59,689	8,204
July	19	91.7	59,711	67,572	7,861
August	10	92.9	59,875	66,412	6,537
Average	**---**	**91**	**55,759**	**63,430**	**7,671**

[12] The Enbala team provided the evaluation team with a workbook that identifies sites as solar or non-solar.

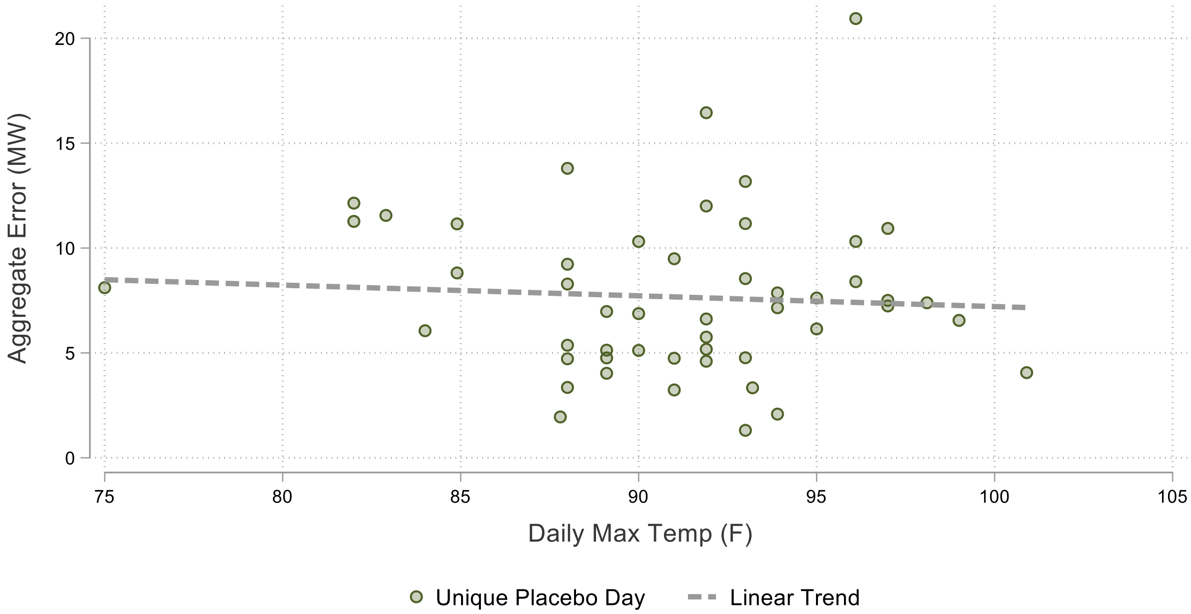
Figure 24 compares actual aggregate load from the placebo event days (gray bars) to aggregate baselines (translucent bars). Ideally, the two distributions would be approximately identical. It is clear from the distribution that the CBL is upward biased.

Figure 24: 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 25, the performance of the baseline is slightly negatively correlated with temperature. The average error on a placebo day with a maximum temperature of at least 95 degrees was nearly 7.5 MW.

Figure 25: Enbala Average Aggregate Baseline Error vs. Temperature



The Evergreen Team believes that the primary reason for such 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 other demand response markets, including PJM and ISO New England, a symmetric adjustment is employed.

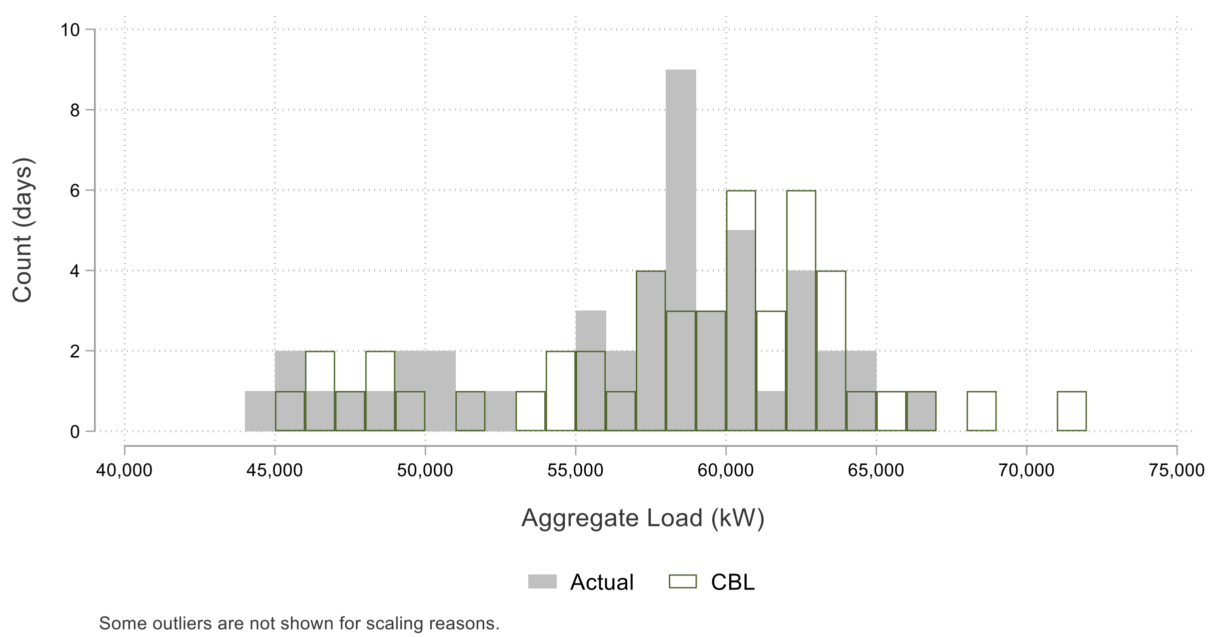
To illustrate the effect of a symmetric adjustment, we altered the CBL methodology to apply the adjustment in either direction depending on its value. Using this new adjusted baseline, we performed the same accuracy test described above. The results are displayed in Table 34. Average error for this method falls under 1.5 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)
May	1	88	25,010	23,874	-1,135
June	20	89.5	51,485	53,963	2,478
July	19	91.7	59,711	60,791	1,080
August	10	92.9	59,875	60,369	493
Average	**---**	**91**	**55,759**	**57,237**	**1,478**

Figure 26 shows the histogram as Figure 24 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 26: Histogram of Placebo Event Days – Symmetric Adjustment



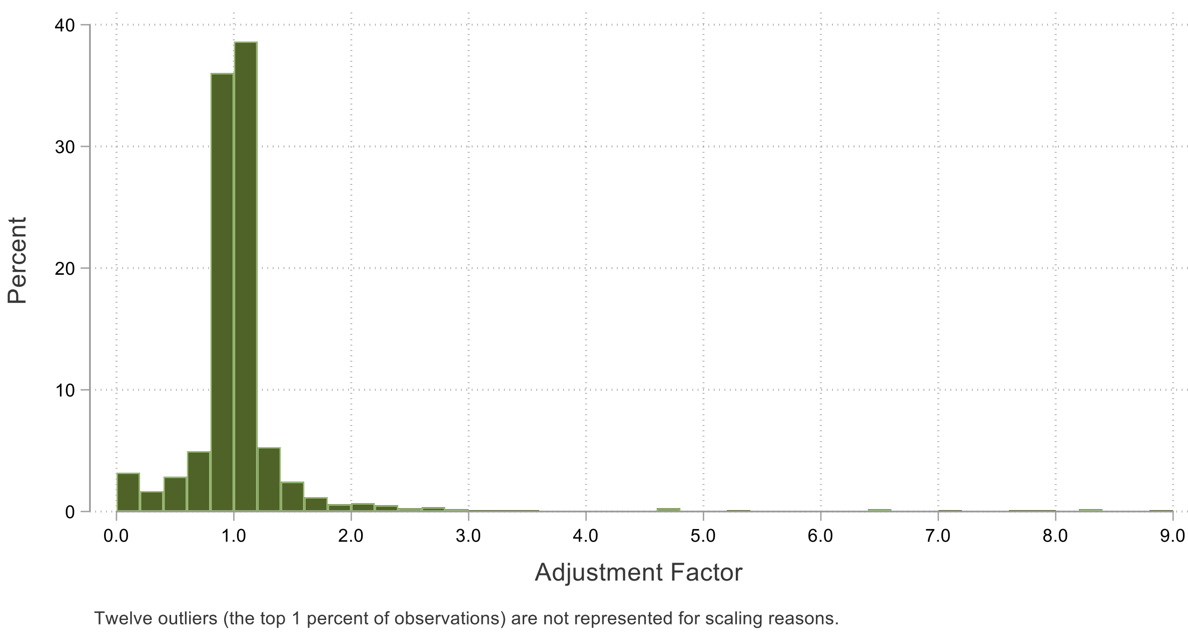
Using an asymmetric adjustment yielded an average error of 7.7 MW and an upwards bias of 14.5 percent. Using a symmetric adjustment yielded an average error of 1.5 MW and an upwards bias of 2.8 percent. While the baseline with a symmetric adjustment still overestimates on average, the distribution of errors falls on both sides of zero and the mean prediction is much closer to true load.

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 an adjustment of hundreds of kW for a large customer. The average value of the symmetric adjustment factor across event days and sites was 1.36, and 80 percent of the adjustment factors were within 30 percent of 1 (between 0.70 and 1.30). The median factor, which is unaffected by extreme values, was 1.00.

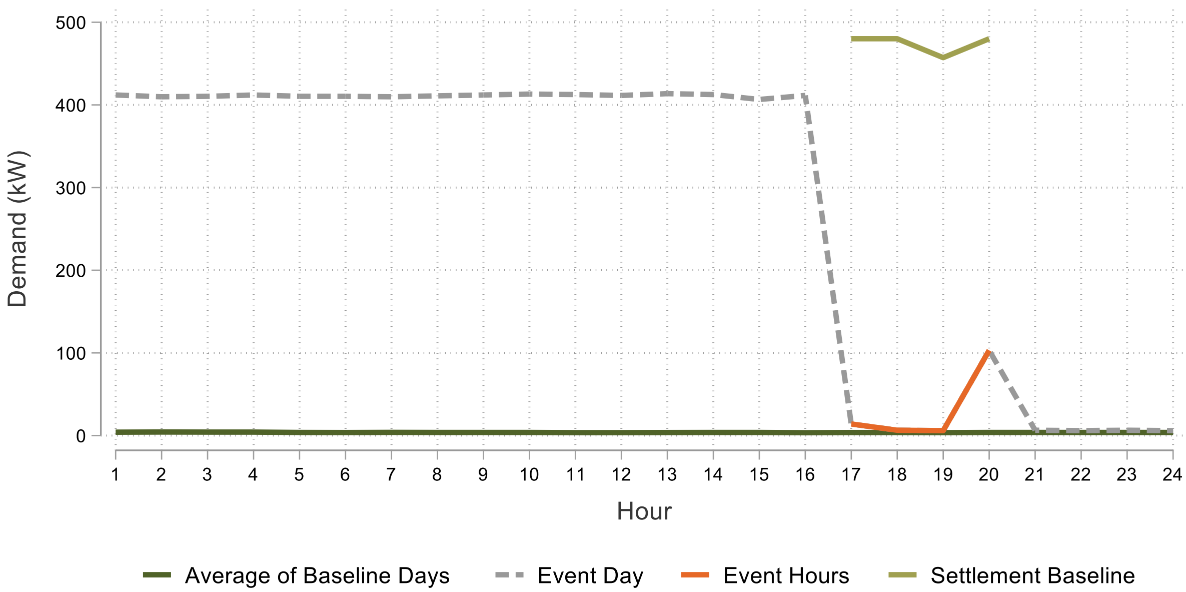
Figure 27 shows the distribution of adjustment factors (except for the top 1 percent of observations). Recall that the adjustment factors are only applied if they increase the baseline in the contract CBL. In other words, any factor less than one is rounded up to one. In the majority of cases, the adjustments 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 offset factor to a cap which prevents the adjustment factor from taking on extreme values.

Figure 27: Distribution of Adjustment Factors



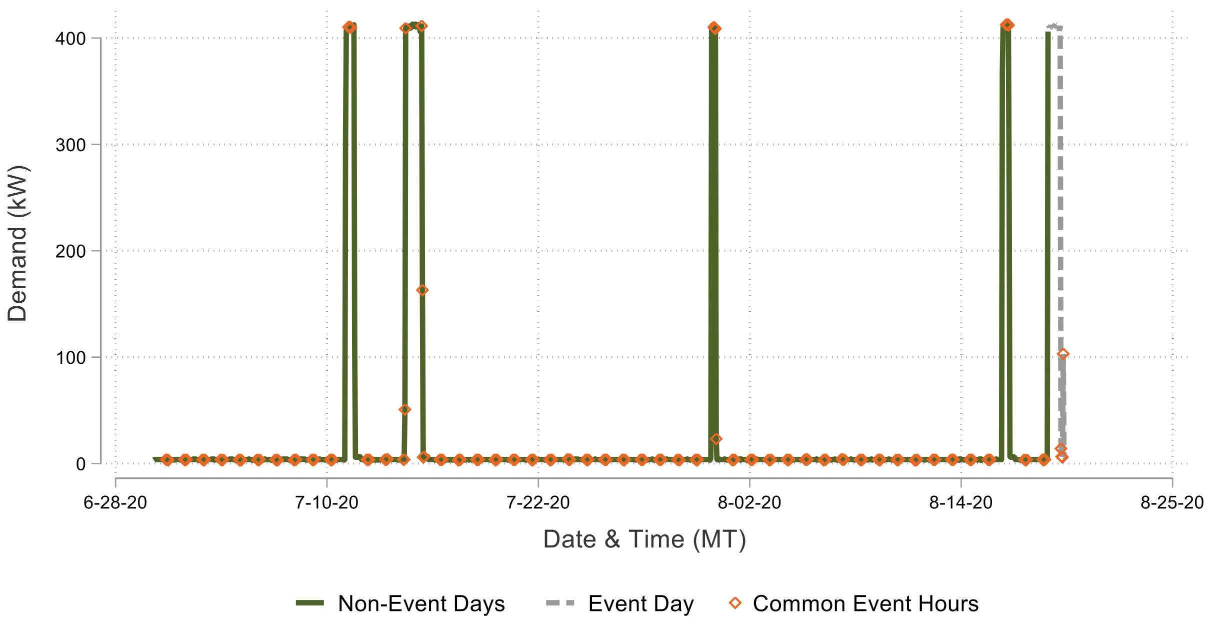
The largest adjustment factor during the 2020 DR season was 127 on 8/19. The Evergreen team investigated load at this site to see if we could determine what happened. Figure 28 shows average hourly demand for the baseline days and hourly demand for the event day in question. Average demand during the baseline days was about 3.82 kW and the maximum hourly demand was 6.48 kW. Right before the event, there was a large spike in demand. This spike, combined with the minimal load on the lookback days, resulted in a large adjustment factor. Such a spike was not atypical at this site, as evidenced by the longer time series in Figure 29. The same spike occurs multiple times, typically around the same time of the day – late morning to early afternoon. That said, the spike is never fully coincident with the event window (4:00 PM – 8:00 PM), during which average demand is 75 kW. Perhaps the site did curtail load during the event on 8/19, but it seems fair to say that a baseline of 450+ kW is unreasonable for this site during the event window. Also worth noting is that the adjustment factors for the other two event days with a 4:00 PM – 8:00 PM event window were both less than 1.2 for this site. This investigation helps to highlight the problematic nature of an uncapped adjustment in conjunction with erratic load patterns.

Figure 28: Investigating a Large Adjustment Factor



The five eligible baseline days are 8/10, 8/11, 8/12, 8/13, and 8/17.

Figure 29: Investigating a Large Adjustment Factor – Longer Time Series



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).

Evaluated Impacts

Approach

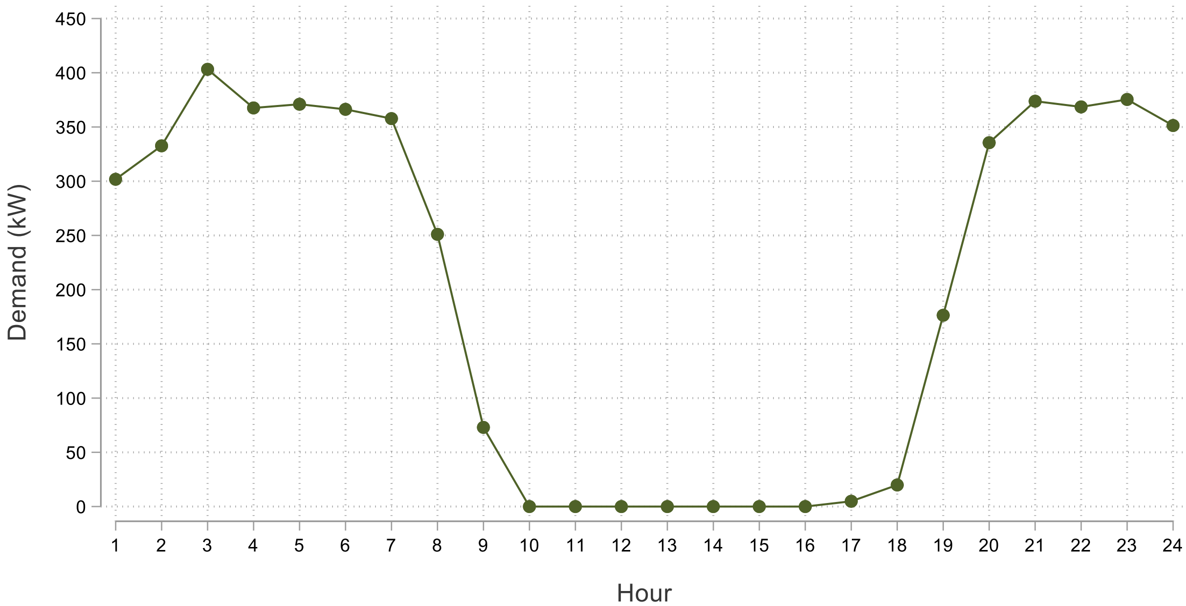
Based on our review of the contract CBL methodology used to generate the settlement baselines and impact estimates, the Evergreen team calculated the evaluated CBL (and the performance metrics they feed into) using the following methodology:

- The adjustment factor is symmetric, meaning it can increase or decrease baselines, rather than only serving to increase baselines;
- The adjustment factor is capped at 20 percent rather than uncapped;
- The 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.

Regarding weather sensitive loads, the Evergreen team estimated weather sensitivity at each site by assessing the relationship between load and temperature during the most common event hours (2:00 PM – 7:00 PM, which includes the most common adjustment window) on non-event, non-holiday weekdays during the 2020 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, 73 of the 130 sites met these criteria.

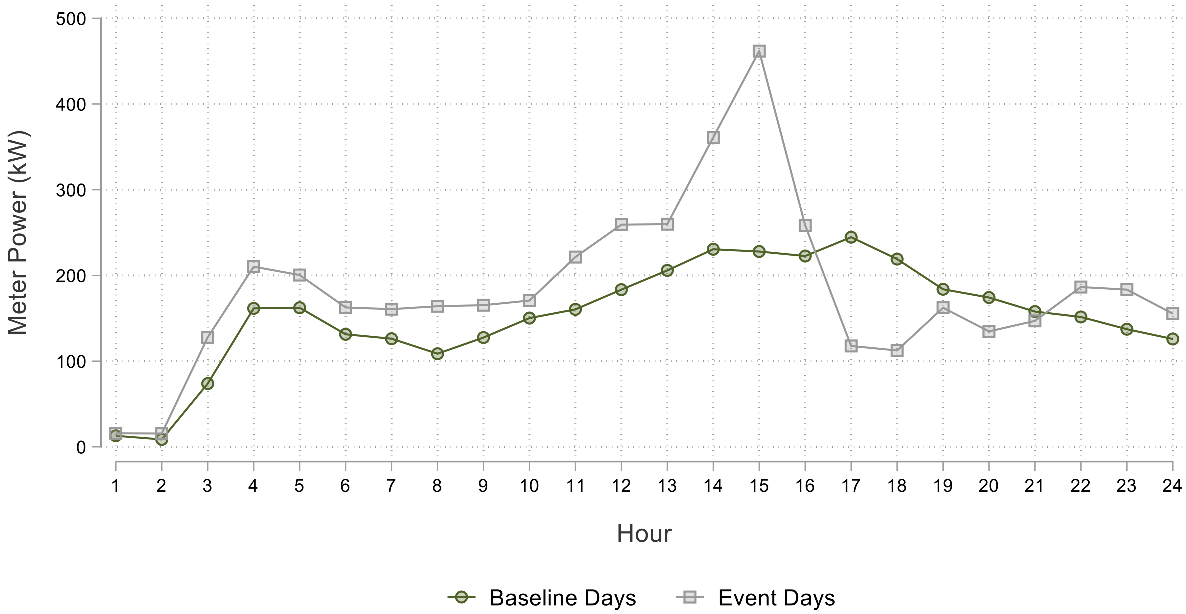
Our team reviewed hourly load profiles for the full population of program participants. Sites that showed the distinct solar profile, as in Figure 30, were treated as solar sites even if they were not identified as such in the Enbala data. In total, 13 of 130 sites were considered sites with solar power.

Figure 30: Example of Solar Load Profile



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 31 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 it inflates the baseline adjustment, which is calculated based on pre-event load. In total, only seven of 130 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 31: Example of Pre-Pumper Load Profile



When these factors are considered in tandem, the load-based adjustment factor was applied to the baselines for 68 of the 130 sites. Three other sites received a weather-based adjustment. This is an additive adjustment is similar to the weather-based adjustment used by PJM. The adjustment is calculated as:

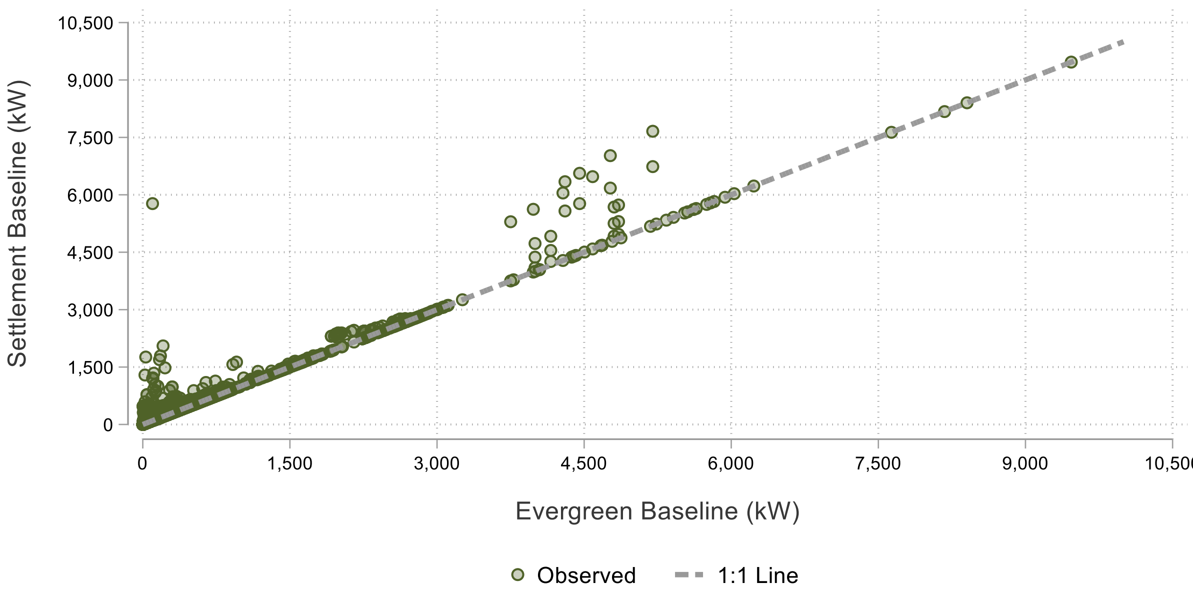
$$Adjustment = Slope * (\Delta_{Temp})$$

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 unit 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.

CBL Comparison

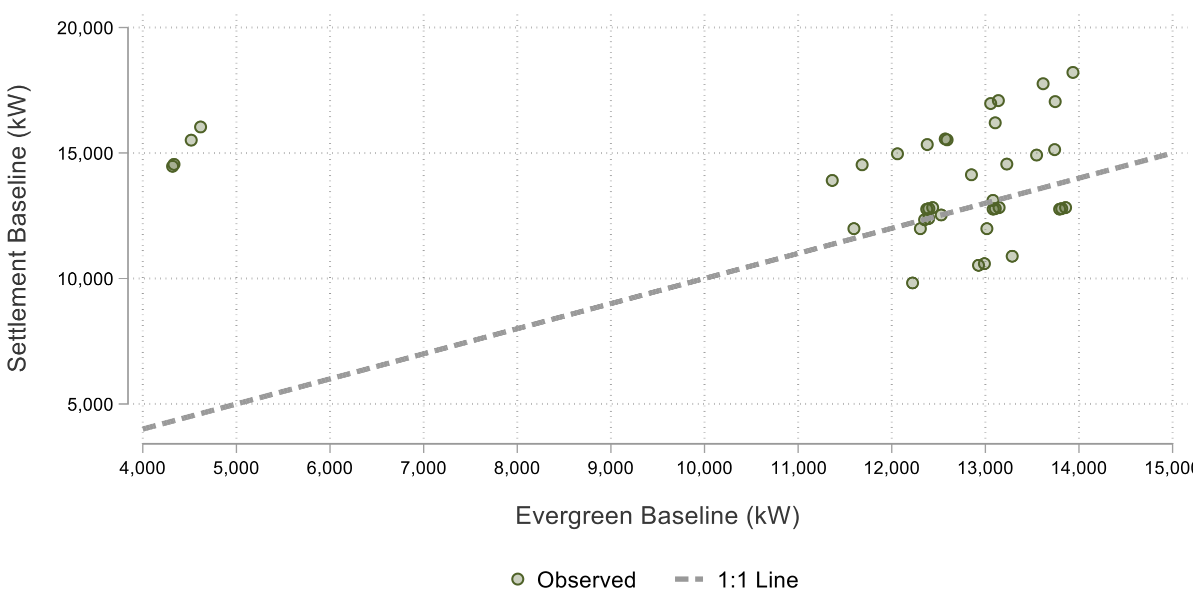
Because the Evergreen team calculated baselines in a manner that was similar to settlement baseline methodology, the baselines themselves were largely similar. This is illustrated in Figure 32, which compares the baselines our team calculated with the settlement baselines. One site, whose demand is significantly higher than the other sites, is shown in a separate figure (Figure 33). This site is the same site that was singled out in the 2019 evaluation. For this site, we do not see the same level of deviations from the settlement baseline as we have in the past. This is likely due to the fact that this site only appeared to participate in vigorous pre-pumping for the first event of the season. In the latter figure, note the difference in the scale of the Y-axis and X-axis.

Figure 32: 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 33: Baseline Comparison – Separate Site



The 1:1 line represents what the trend would look like if the two methods produced identical baselines.

By date, Table 35 and Table 36 show the average baseline under the settlement method and under the Evergreen method. Table 36 singles out the site that has significantly higher demand. (This site is not included in Table 35.) This site accounts for one-third of the differences in baselines. The settlement method is naturally going to produce a larger baseline since it uses an asymmetric adjustment mechanism.

Table 35: Baseline Comparison – All Sites but One

Date	Settlement Baseline (kW)	Evergreen Baseline (kW)	Difference (kW)
06/04/2020	38,168	34,859	3,309
06/25/2020	43,107	41,307	1,801
07/06/2020	54,057	51,814	2,243
07/13/2020	63,235	53,048	10,188
07/14/2020	57,812	51,757	6,056
07/29/2020	58,263	55,361	2,902
08/14/2020	56,308	54,314	1,994
08/18/2020	55,320	51,822	3,498
08/19/2020	55,452	51,885	3,567
08/20/2020	54,997	52,694	2,304
Average	**53,672**	**49,886**	**3,786**

Table 36: Baseline Comparison – Other Site

Date	Settlement Baseline (kW)	Evergreen Baseline (kW)	Difference (kW)
06/04/2020	15,142	4,447	10,695
06/25/2020	17,508	13,437	4,071
07/06/2020	15,671	12,702	2,969
07/13/2020	14,686	13,342	1,344
07/14/2020	15,099	12,174	2,925
07/29/2020	10,457	12,857	-2,400
08/14/2020	12,594	12.589	5
08/18/2020	12,590	12,201	389
08/19/2020	12,590	12,911	-321
08/20/2020	12,590	13,621	-1,031
Average	**13,893**	**12,028**	**1,865**

Performance Metrics

After calculating adjusted baselines and adjusted impacts, the Evergreen team calculated participant performance metrics in a manner identical to the manner in which Enbala did so with one exception: we did not zero out negative performances as a rule. Sites that did not participate in an event day were not included in either the Enbala performance metrics or these calculations. (Note that the program implementer provided the Evergreen team with a list of participants for each event; participation is *not* a function of whether or not the site delivered positive demand reductions.)

The results of the Evergreen team's 2020 Peak Saver Demand Response evaluation are shown in Table 37. For comparison, the savings produced by the program implementer are shown in Table 38. On average, the verified capacity performance estimates using the Evergreen methodology are 70 percent of the values calculated by Enbala using the settlement CBL. Section 0 described some of the drivers leading to lower estimates for the Evergreen method.

Our findings indicate the Peak Saver program is approximately a 12.9 MW capacity resource, down 20% from the 2019 estimate (16.2 MW). The 12.9 MW estimate excludes the event on 7/13, as there was a drastic drop in temperature during the event. Importantly, we'd note there was considerable variation in verified capacity performance throughout the 2020 season (ranging from 7.5 MW to 19.4 MW). A few key sources of the variation in verified capacity performance include:

1. **Demand reductions from the largest sites.** Verified capacity performance ranged from -1.7 MW to 6.3 MW for the largest Peak Saver site (in terms of average demand) and was negative for half of the 2020 events. In prior summers, verified demand reductions for this site were approximately 5 MW on average (compared to 1 MW in 2020). This site's DR commitment was 15 MW at the beginning of the summer and 1.6 MW by the end of the summer. This is a substantial drop for the largest customer in the program. If this site returns to pre-2020 reductions in the future, then our 12.9 MW estimate likely understates the magnitude of Peak Saver as a capacity resource. The second largest Peak Saver participant also had a wide range in verified capacity performance (-1.4 MW to 3.5 MW with a mean of 0.5 MW).
2. **Time of the year.** Approximately one third of the Peak Saver participants are schools. For these participants, aggregate impacts in August were around 2 MW compared to approximately 0.6 MW for the mid-July events. Schools were closed to students in August due to the pandemic, but many school offices were open.
3. **Event conditions.** Temperatures ranged from 79°F to 98°F during event hours. Demand reductions were larger when temperatures were higher, on average, though this trend is not statistically significant when the 7/13 event is removed.
4. **The COVID-19 pandemic.** Section 0 discusses the impact the pandemic had on Peak Saver reference loads and impacts. It is difficult to determine the magnitude of the effect the pandemic had on any single event, but it likely contributed to the variation in verified capacity performance given that the pool of Peak Saver participants includes a number of home improvement stores, retail stores, and a casino.

Table 37: 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)
06/04/2020	9,755	11,494	10,798	45,587
06/25/2020	20,592	18,645	19,423	74,465
07/06/2020	14,618	13,034	13,668	55,345
07/13/2020	9,948	5,890	7,513	35,426
07/14/2020	8,116	8,713	8,474	41,413
07/29/2020	21,289	15,985	18,107	66,579
08/14/2020	11,352	9,738	10,383	42,111
08/18/2020	13,819	11,549	12,457	48,155
08/19/2020	8,394	10,963	9,935	49,545
08/20/2020	12,965	12,636	12,767	53,719
Average	13,085	11,865	12,353	51,235
Average (excluding 07/13/2020)	**13,433**	**12,528**	**12,890**	**52,991**

Table 38: 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)
06/04/2020	22,365	25,620	24,318	100,524
06/25/2020	26,369	24,511	25,254	97,751
07/06/2020	19,319	18,475	18,813	73,562
07/13/2020	19,623	17,831	18,548	71,022
07/14/2020	16,556	17,714	17,251	70,286
07/29/2020	21,936	16,563	18,712	67,368
08/14/2020	14,182	12,404	13,115	49,450
08/18/2020	18,024	15,463	16,487	61,766
08/19/2020	14,858	15,111	15,010	60,124
08/20/2020	14,944	14,397	14,616	57,314
Average	**18,818**	**17,809**	**18,212**	**70,917**
Average (excluding 07/13/2020)	**18,728**	**17,806**	**18,175**	**70,905**

Table 39 presents daily energy savings. This is the aggregate difference between energy use on an event day and the baseline for all hours following the beginning of the event (including the event hours), with the adjustment factor applied to all hours. 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. On average, aggregate energy used decreased by 55.5 MWh on event days. One would expect daily energy savings to be less than event energy savings due to snapback. This was not the case for Peak Saver in 2020, as the daily energy impact exceeded the event energy impact by an average of 8.5 MWh. This is due to customers saving energy in the post-event hours (i.e., their actual load was less than their baseline).

Table 39: Daily Energy Savings – Event Hours and Post-Event Hours

Event Date	Daily Energy Impact (kWh)	Event Energy Impact (kWh)
06/04/2020	59,916	44,248
06/25/2020	54,158	74,101
07/06/2020	78,424	51,793
07/13/2020	33,148	23,534
07/14/2020	40,316	34,303
07/29/2020	75,748	64,291
08/14/2020	42,504	38,590
08/18/2020	52,944	46,008
08/19/2020	56,759	43,138
08/20/2020	60,634	50,032
Average	**55,455**	**47,004**
Average (excluding 07/13/2020)	**57,934**	**49,612**

Nominations

The following sections detail comparisons the Evergreen team made between monthly site-level DR kW commitments ("nominations"), average demand, and DR impacts. The latter section is a comparison between nominations and demand. As is often the case, this investigation spurred another: how do nominations compare with load on non-event days? Findings from this section are presented in 0. 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 will change throughout the summer for some participants. For the majority of participants, this is not the case, but some large participants do have drastic changes. (As noted elsewhere, the nomination for one participant dropped from 15 MW to 1.6 MW over the 2020 summer.) The comparisons made in Section 0 use the average nomination between June 2020 and August 2020, while Section 0 uses the actual values for each site on each participating event day.

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 34 shows the distribution of differences. A difference greater than zero implies average demand exceeds the average nomination – this is what we would expect to see for all sites (though this may get muddied for sites with solar power). Indeed, most sites fall to the right of zero, but not all do. Less than 13 percent of sites had an average demand that did not exceed the average nomination.

Figure 34: Comparing Nominations and Non-Event Demand

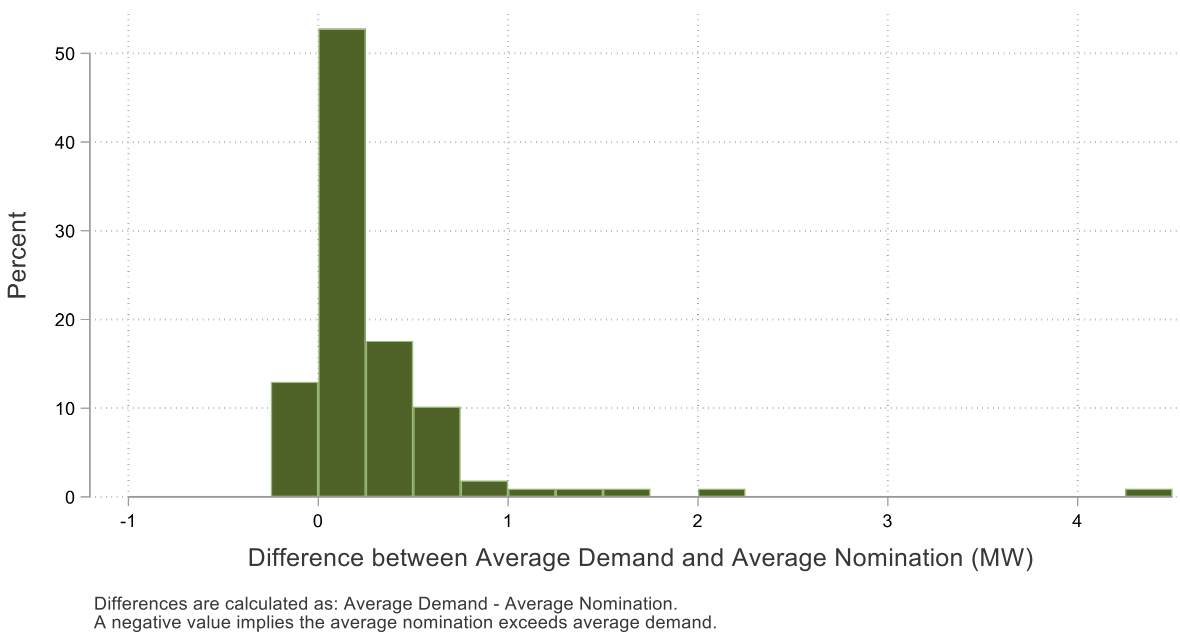


Figure 35 shows the distribution of ratios (ratio = average nomination / average demand * 100%). A value greater than 100 percent implies the average nomination exceeds average demand. For a handful of sites, the ratio was considerably greater than 100 percent. The two largest outliers, both with a ratio greater than 700, are sites with known solar power. For the largest outlier, Figure 36 shows the average nomination and average non-event weekday demand. Note that the nomination for this site was 50 kW at the beginning of the summer and 5 kW at the end of the summer. Even using the 5kW value, average load at this site on non-event weekdays is about half of the nomination (3:00 PM - 7:00 PM).

Figure 35: Nominations as a Percentage of Demand

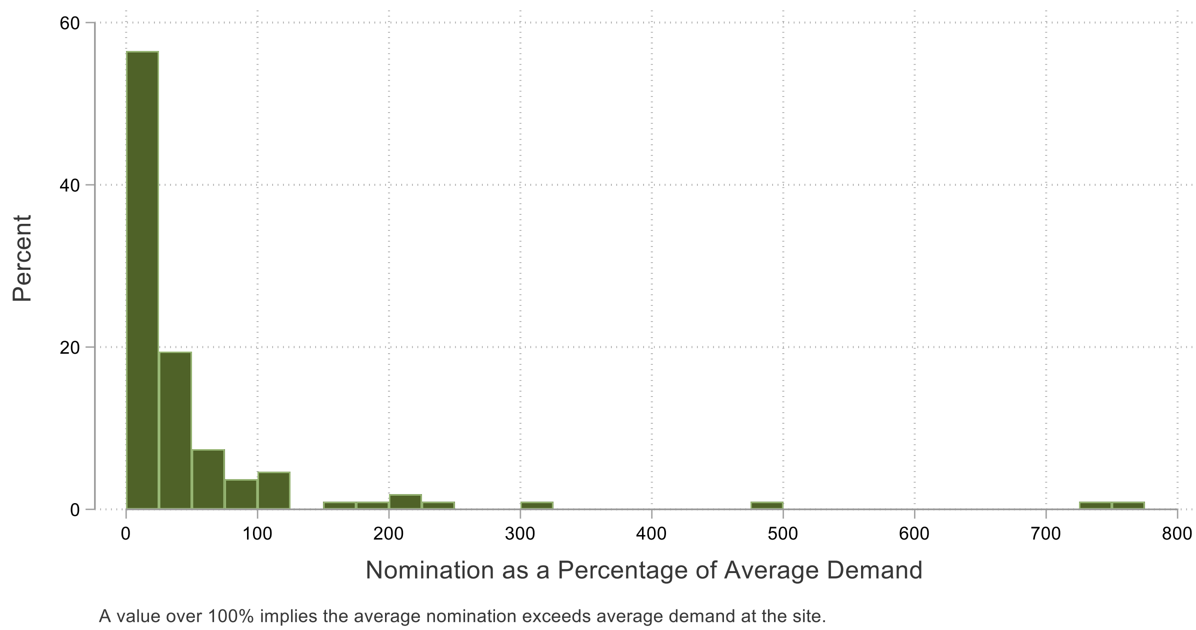
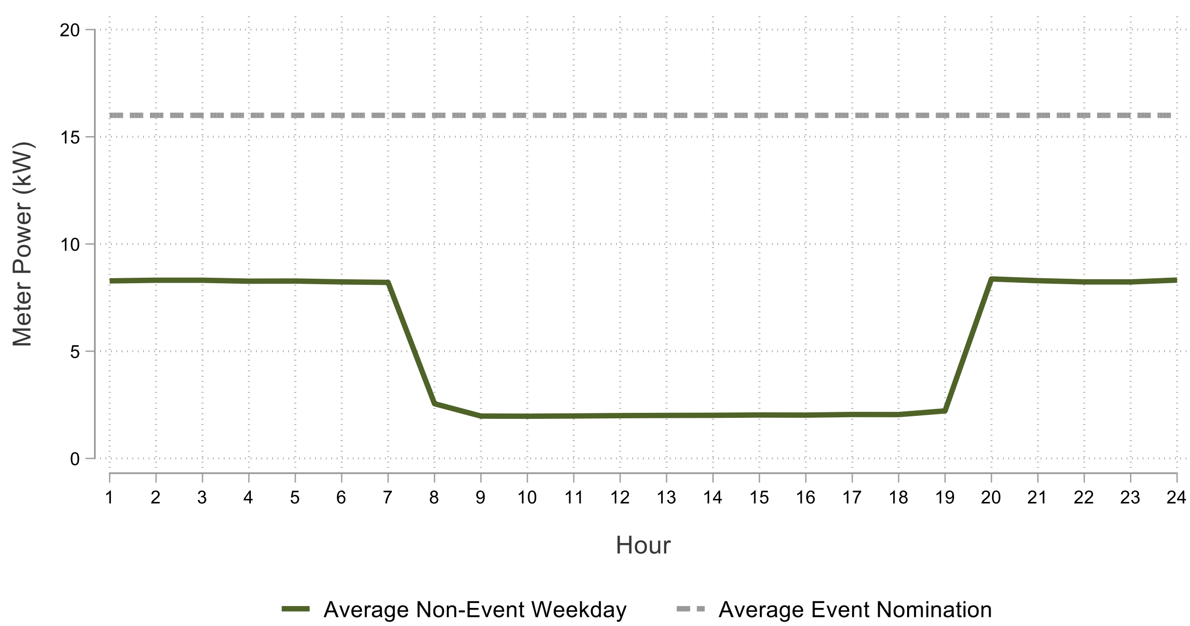


Figure 36: Investigating Nomination as a Percentage of Average Demand



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).

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 37 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 37: Distribution of Percent Differences

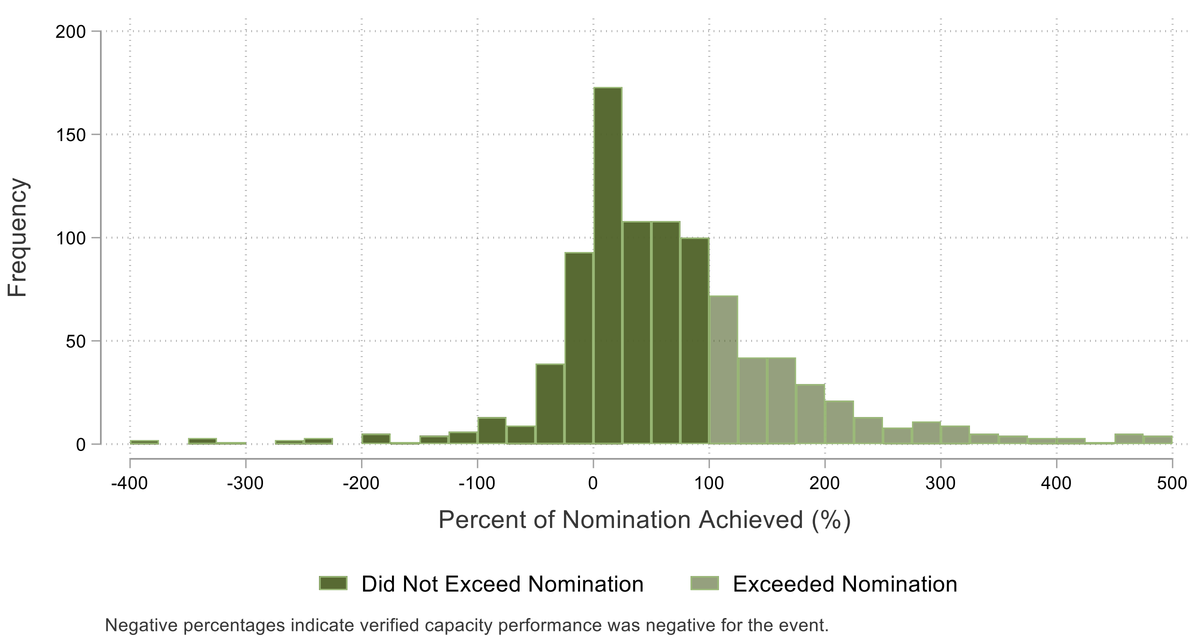


Table 40 groups participants based on how their verified reductions compared to their nominated reductions. Of the 108 participants, 27 exceeded their nomination on average.[13] Another 69 participants – accounting for roughly 85 percent of the total nominations – did not exceed their nomination but did provide demand reductions. Figure 38 shows, on average, what percentage of their nomination each site achieved. The ten participants with negative verified reductions are not included in the figure. Three of these ten sites have solar PV and six of them are schools. The three that have solar PV are also schools which had significant nomination increases in the month of August when in-person school would have begun absent the COVID-19 pandemic.

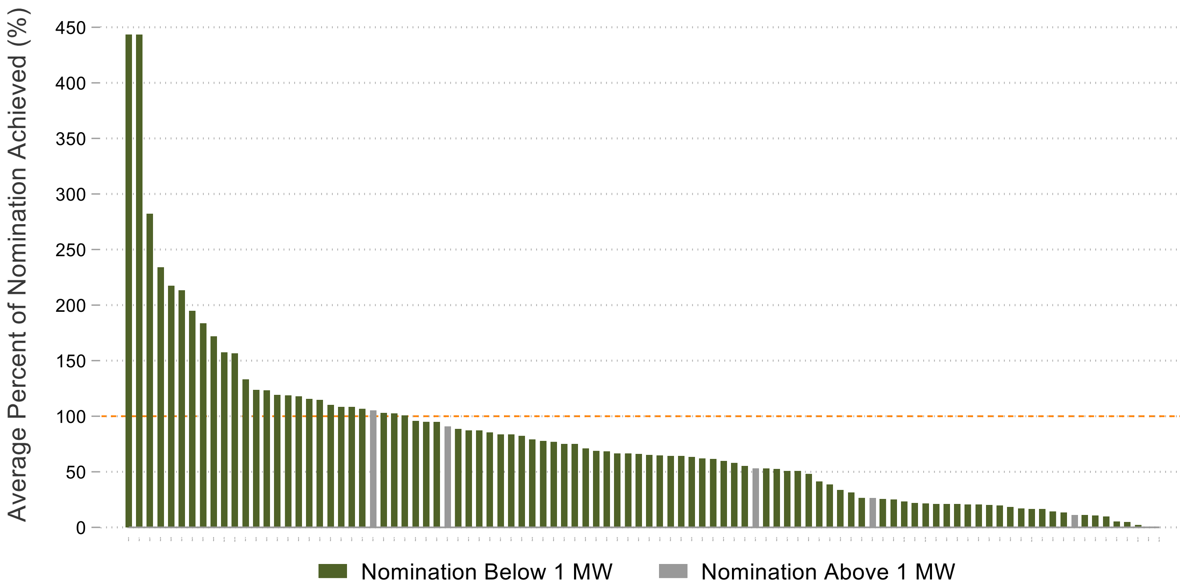
Table 40: Comparing Performance and Nominations

Result	Frequency	Aggregate Nomination (kW)[1]
Did Not Exceed Nomination	69	21,041
Exceeded Nomination	27	3,484
Negative Performance	10	475
Nomination of 0 kW	2	0
Total	**108**	**25,000**

[1] Participant-level nominations are averaged across the summer before aggregating.

[13] Recall that sites are aggregated to the participant level. Some participants had multiple sites.

Figure 38: Average Performance by Site



Each bar represents a unique participant.

Impact of COVID-19

The 2020 summer was highly unusual due to the COVID-19 pandemic. Loads at many non-residential premises dropped considerably as a result of stay-at-home or shelter-in-place orders. The 2020 summer demand response season began while New Mexico's stay-at-home order was in place. Since New Mexico was one of the few states to make early and stringent COVID-19 restrictions, this also allowed them to try to begin their re-opening process earlier than some of their neighboring states. This included the opening of indoor dining, gyms, malls, and hotels. As these non-residential re-openings began in the beginning of June, New Mexico saw a coincident uptick in cases. In response, the governor extended the stay-at-home order a number of times throughout the summer, effectively spanning the entire 2020 DR season. These new restrictions also meant that students would not report to in-person school until at least September 7 (note that a number of Peak Saver participants are schools). This section summarizes our review of the impact the pandemic had on both reference loads and demand reductions. Notably, only sites for which we have three summers of data were included.

Reference Loads

There are 78 sites for which we have summer load data from 2018 through 2020. To get a better understanding of how customer demand changed due to COVID-19, we looked into the aggregate loads for these 78 customers across all non-event days. Steps taken in aggregating the data were as follows:

* Stack 2018-2020 summer interval data for the 78 customers. Remove any event days or any days for which we do not have interval data for all customers.
* Narrow the data to the 3:00 PM – 7:00 PM window, as this is when Peak Saver events are commonly dispatched.
* For each site/day combination, calculate average demand in the window noted above.
* For each day, sum the averages calculated above.

Figure 39 compares aggregate demand for the three summers included in this investigation. It is evident that loads in June of 2020 were markedly lower than in prior summers, with an average aggregate demand of 36.7 MW. For this same period, the years of 2018 and 2019 had an average aggregate demand of 40.8 MW and 39.5 MW, respectively. This difference does not hold throughout the entirety of the season, since throughout July the trends across the three years are relatively similar. These trends begin to diverge slightly in the month of August, near the beginning of the school season. The order of these trends were maintained when the sites with solar power (13 out of 78) were removed.

Figure 39: Aggregate Demand by Year

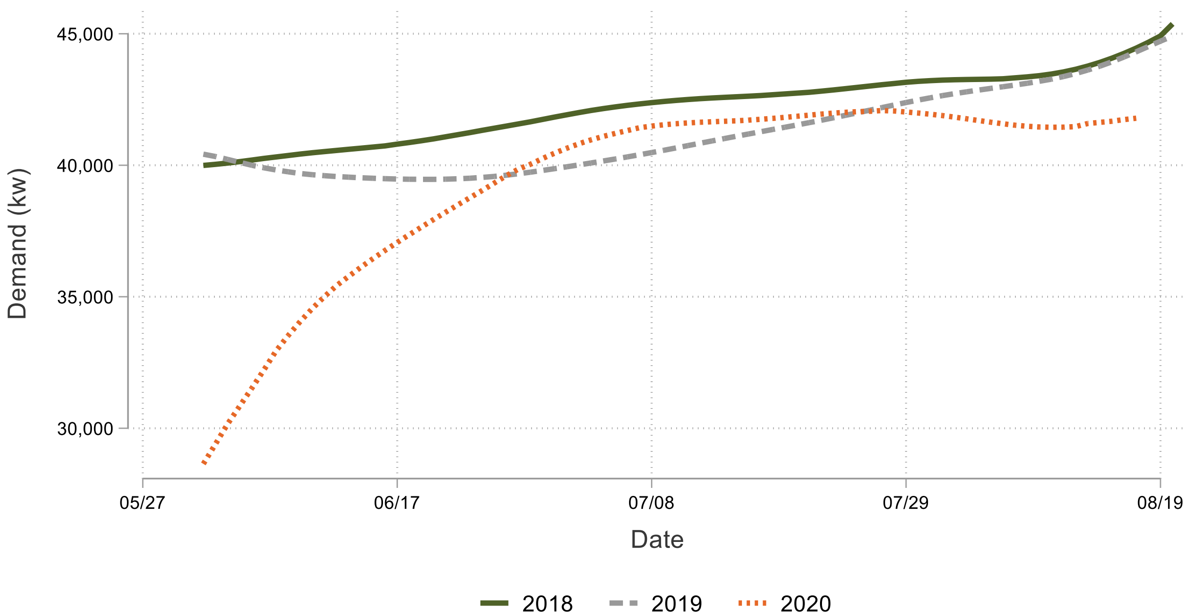


Table 41 shows how 2020 demand compared to average demand between 2018 and 2019 for each of the 78 sites. Recall that the focus of this investigation is on the 3:00 PM – 7:00 PM window. In the table, sites are binned by percent difference in load, where percent difference is calculated as:

$$Percent\ Difference = 100\% * \frac{(Average\ 2020\ Load) - (Average\ 2018\ \&\ 2019\ Load)}{(Average\ 2018\ \&\ 2019\ Load)}$$

Though a handful of sites saw increases in demand in 2020 relative to the 2018-2019 averages, nearly 75 percent of sites saw a decrease. Over forty percent of sites saw a decrease in demand of more than 20 percent. Of the six sites that saw an increase in demand above 30 percent, two have solar power, three are part of one system, and one is a generating plant. The considerable variation we see here is likely due to the nature of the sites and how they were impacted by the restrictions set by the governor.

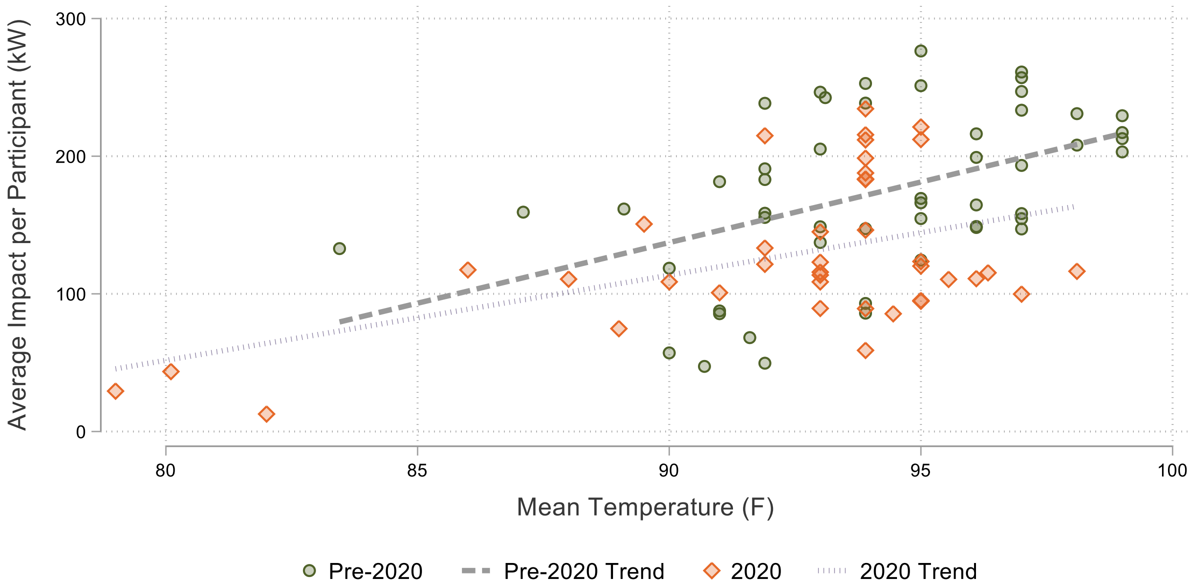
Table 41: Percent Difference in the 2020 Season

Percent Difference	Frequency
30% + Decrease	18
20% - 30% Decrease	15
10% - 20% Decrease	15
0% - 10% Decrease	10
0% - 10% Increase	10
10% - 20% Increase	3
20% - 30% Increase	1
30% + Increase	6
Total	**78**

Demand Reductions

The evaluation team was also interested in how COVID-19 affected demand reductions delivered by Peak Saver participants. For an accurate comparison of these reductions, it is important to ensure that the baseline calculations are equivalent across all comparable years. The Evergreen baseline approach is used here to reduce bias. To account for the fact that not all sites participated in each event, we calculated the average impact per participant for each event hour (rather than aggregating impacts). Figure 40 plots the demand reductions from this exercise against temperature. On average, the 2018 and 2019 events tended to have a larger demand reduction. This figure helps to show that the 2020 demand reductions were both reduced and had a slightly weaker correlation with temperature.

Figure 40: Comparing Average Impact per Participant



The outliers on the left side indicate those event hours on 7/13 where temperature drastically descreased.

Takeaways

Through investigating the impact of the COVID-19 pandemic on the 2020 demand response season, it is clear that both the reference loads and the demand reductions were affected by state-wide restrictions. The fluctuation in reference load between June and July follows a pattern similar to that in other states. While June presented a decreased load, July almost reached the normalcy of previous years. In August, the yearly trends appear to diverge, primarily because of the number of sites that are schools, which previously would see an influx of demand during this month. The last event in the 2020 season was called on August 20, over two-weeks before any students could go back to school in-person. In terms of demand reduction, the logic seems to follow that the periods with lighter overall loads would lead to less room to reduce consumption. It may also be true that the reduction of load was a secondary concern, seeing that commercial load was already reduced and COVID-19 restrictions meant an ever-fluctuating guide to daily operations.

Recommendations

After our review of the 2020 Peak Saver program, the Evergreen team offers the following recommendations:

- Make the multiplicative adjustment symmetric rather than asymmetric. As per the assessment of CBL accuracy presented in Section 0, 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.
- Add a cap to the multiplicative adjustment factor. Otherwise, baselines are apt to approach unrealistic levels.
- 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 to 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.
- Customer loads are volatile, and baselines are not perfect. When metered load is higher than the baseline, performance estimates should be recorded as negative values and not zeroed out.

Appendix H: Commercial Comprehensive Desk Review Results Summary

Project ID	PM-20-00223	PM-20-00225	PM-20-00227	PM-20-00228	PM-20-00232	PM-20-00240	PM-20-00242
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Midstream	Midstream	Midstream	Midstream	Midstream	Midstream	Midstream
Project Description	Vending Misers & cooler controls	Vending Misers	Cooler Controls	Cooler Controls	Cooler Controls	Energy efficient packaged AC units, heat pumps, and PTACs	Electric ice makers, reach-in freezer
Building Type	Retail - Single-Story Large	Retail - Single-Story Large	Retail - Single-Story Large	Retail - Single-Story Large	Retail - Single-Story Large	Other:	Restaurant - Sit-Down
Other Building Type						Various - retail, healthcare, light industrial, K-12 schools	
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	44,421	18,630	24,494	13,080	11,445	210,998	3,223
Gross Reported kW	0.00	0.00	0.00	0.00	0.00	50.11	8.26
Gross Verified kWh	36,567	15,336	17,168	13,080	11,445	179,486	3,200
Gross Verified kW	0.56	0.23	0.38	0.24	0.21	129.66	0.34
kWh Realization Rate	0.82	0.82	0.70	1.00	1.00	0.85	0.99
kW Realization Rate						2.59	0.04
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided. No information related to baseline equipment was provided.	Ex ante calculations not provided. No information related to baseline equipment was provided.
Reasons for RR(s) <> 1	The ex ante savings listed in the PNM program tracking data do not match the savings listed in column T (KWH Savings) of the PM-20 Midstream EMV Files.xlsx file that was provided to the evaluation team. The evaluation team was able to replicate the savings listed in column T of the PM-20 Midstream EMV Files.xlsx file. The evaluation team could not replicate the reported ex ante savings for this project.	The ex ante savings listed in the PNM program tracking data do not match the savings listed in column T (KWH Savings) of the PM-20 Midstream EMV Files.xlsx file that was provided to the evaluation team. The evaluation team was able to replicate the savings listed in column T of the PM-20 Midstream EMV Files.xlsx file. The evaluation team could not replicate the reported ex ante savings for this project.	The ex ante savings listed in the PNM program tracking data do not match the savings listed in column T (KWH Savings) of the PM-20 Midstream EMV Files.xlsx file that was provided to the evaluation team. The evaluation team was able to replicate the savings listed in column T of the PM-20 Midstream EMV Files.xlsx file. The evaluation team could not replicate the reported ex ante savings for this project.			Source(s) of ex-ante savings values is unknown. No information related to baseline equipment was provided. Evaluator used deemed savings values (kWh/ton and kW/ton of installed equipment, plus bonus savings where relevant) from PNM Workpapers for Air Conditioners, Heat Pumps, VRF Systems, and PTAC units. The equipment type that had the most impact on savings and realization rates is the VRF systems. As no calculations were provided with ex-ante savings estimates, the source of discrepancy between ex-ante and ex-post is unknown.	Source(s) of ex-ante savings values is unknown. No information related to baseline equipment and little information regarding retrofit equipment was provided for either of the measures. Ice machines: No savings were claimed for this measure. Utility workpaper contains savings algorithms for this measure, but the evaluator did not include them for the project total. Solid door reach-in freezer: Evaluator used deemed savings values (kWh/freezer) and assumptions (coincidence factor, 8760 operating hours) from PNM Workpaper. Verified kWh savings were within 1% of ex-ante. Peak demand savings were calculated to be significantly less than ex-ante. The source of the discrepancy is unknown, since no calculations and limited information were provided.
Include any other important observations here							

Project ID	PM-20-00246	DI 17866	DI 18350	DI 18570	DI 18580	DI 18588	DI 18590
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Midstream	Lighting	Lighting	Lighting	Lighting	Lighting	Lighting
Project Description	Electric ice makers, reach-in freezer	Direct Install Lighting Retrofit	Direct Install Lighting Retrofit	Direct Install Lighting Retrofit	Direct Install Lighting Retrofit	Direct Install Lighting Retrofit	Installation of new high-efficiency lighting fixtures.
Building Type	Restaurant - Sit-Down	Manufacturing - Light Industrial	Retail - Small	Retail - Single-Story Large	Retail - Small	Retail - Single-Story Large	Other:
Other Building Type							Warehouse
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	3,907	13,956	181,910	195,774	28,307	199,399	46,277
Gross Reported kW	10.02	1.70	41.65	44.82	8.97	45.65	14.14
Gross Verified kWh	4,005	7,618	182,207	196,301	39,555	201,031	35,484
Gross Verified kW	0.43	0.89	0.00	0.00	10.33	0.00	8.09
kWh Realization Rate	1.03	0.55	1.00	1.00	1.40	1.01	0.77
kW Realization Rate	0.04	0.52	0.00	0.00	1.15	0.00	0.57
Calculation Assessment	Ex ante calculations not provided. No information related to baseline equipment was provided.	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1	Source(s) of ex-ante savings values is unknown. No information related to baseline equipment and little information regarding retrofit equipment was provided for either of the measures. Ice machines: No savings were claimed for this measure. Utility workpaper contains savings algorithms for this measure, but the evaluator did not include them for the project total. Glass door reach-in freezer: Evaluator used deemed savings values (kWh/freezer) and assumptions (coincidence factor, 8760 operating hours) from PNM Workpaper. Verified kWh savings were within 3% of ex-ante. Peak demand savings were calculated to be significantly less than ex-ante. The source of the discrepancy is unknown, since no calculations and limited information were provided.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for Retail-Small, Warehouse, and Exterior building types to match space types in the project.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation. There are no verified peak demand savings for this project as all of the fixtures are exterior and have a CF of 0.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Warehouse building type to match space type in the project.
Include any other important observations here					1. Calculations done as per PNM Workpapers. 2. HOU as per application form considering 52.14 weeks/year 3. Interactive factors and CF used as per PNM workpapers for Retail - Small, Warehouse and Exterior as per the location in ex-post calculations. 4. Reason unknown for deviation in peak demand RR, possibly due to coincident factor(s) used. Would need ex-ante calcs in order to verify. 5. Reason unknown for deviation in kWh RR, possibly due to HOU and/or fixture wattages (i.e. ballast factors). Would need ex-ante calcs in order to verify.		

Project ID	DI 18605	DI 18606	DI 18981	PNM-19-03648	PNM-19-03660	PNM-19-03662	PNM-19-03663
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Lighting	Lighting	Lighting	Retrofit	Other	Other	Other
Project Description	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.	Chiller and 4 pump motor VFDs	Building Operator Certificate	Building Operator Certificate	Building Operator Certificate
Building Type	Other:	Other:	Health/Medical - Hospital	Assembly	Education - Community College	Education - Community College	Education - Community College
Other Building Type	Automotive Service/Repair	Automotive Service/Repair					
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	369,424	86,875	16,800	167,377	41,048	41,048	41,048
Gross Reported kW	84.57	18.63	4.83	45.38	0.00	0.00	0.00
Gross Verified kWh	367,738	84,924	14,100	111,917	41,048	10,262	10,262
Gross Verified kW	0.00	0.00	2.91	20.57	0.00	0.00	0.00
kWh Realization Rate	1.00	0.98	0.84	0.67	1.00	0.25	0.25
kW Realization Rate	0.00	0.00	0.60	0.45			
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally lower than the ex ante savings but the reason for the savings decrease is not known based on the supplied project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally lower than the ex ante savings but the reason for the savings decrease is not known based on the supplied project documentation. There are no verified peak demand savings for this project as all of the fixtures are exterior and have a CF of 0.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Medical building type to match space type in the project.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.		The discrepancy between the ex ante and ex post savings may be due to different area (square footage) assumptions as that is the only project specific input into the savings algorithm listed in the 2019 PNM workpapers	The discrepancy between the ex ante and ex post savings may be due to different area (square footage) assumptions as that is the only project specific input into the savings algorithm listed in the 2019 PNM workpapers
Include any other important observations here		1. Calculations done as per PNM Workpapers. 2. HOU as per application form (84 Hrs/Wk = 4368 hours) instead of 4192 Hours as per PNM workpaper. Assumed 52.14 weeks per year 3. Lighting is for exterior dusk-to-dawn operation, therefore peak coincident factor is 0. Verified peak kW savings are 0. 4. Reason unknown for deviation in kWh RR, possibly due to HOU and/or fixture wattages (i.e. ballast factors). Would need ex-ante calcs in order to verify.	1. Calculations are based savings equations and ballast factors from PNM Workpapers and 2019 TRM. 2. Interactive factors and CF used as per PNM workpapers for Medical. 3. Reason unknown for deviation in peak demand RR, possibly due to coincident factor(s) used. Would need ex-ante calcs in order to verify. 4. Reason unknown for deviation in kWh RR, possibly due to HOU and/or fixture wattages (i.e. ballast factors). Would need ex-ante calcs in order to verify.	Ex post savings followed Chiller and VSD NM TRM measures. Appears that ex ante savings may have been calculated using higher EFLH value from Public Assembly instead of Religious Worship, which was used in ex post savings estimate.		Ex Post does not matches Ex Ante estimates. Application lists facility sq. footage as 43,300 sq. ft., however, facility sq. footage of 173,200 was redlined off the worksheet on the Application. The discrepancy between the ex ante and ex post savings may be due to square footage assumptions.	Ex Post does not matches Ex Ante estimates. Application lists facility sq. footage as 43,300 sq. ft., however, facility sq. footage of 173,200 was redlined off the worksheet on the Application. The discrepancy between the ex ante and ex post savings may be due to square footage assumptions.

Project ID	PNM-19-03677	PNM-19-03700	PNM-19-03703	PNM-19-03704	PNM-19-03706	PNM-19-03709	PNM-19-03718
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Other	Other	Other	Other	Other	Retrofit	Retrofit
Project Description	Building Operator Certificate	Building Operator Certificate	Building Operator Certificate	Building Operator Certificate	Building Operator Certificate		
Building Type	Education - Primary School	Education - Secondary School	Health/Medical - Hospital	Health/Medical - Hospital	Health/Medical - Hospital	Education - Primary School	Retail - Small
Other Building Type							
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	71,100	71,100	59,250	32,508	25,852	139,437	2,026,925
Gross Reported kW	0.00	0.00	0.00	0.00	0.00	0.00	56.72
Gross Verified kWh	59,250	59,250	59,250	32,508	25,852	139,437	2,045,553
Gross Verified kW	0.00	0.00	0.00	0.00	0.00	0.00	54.27
kWh Realization Rate	0.83	0.83	1.00	1.00	1.00	1.00	1.01
kW Realization Rate							0.96
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1	The discrepancy between the ex ante and ex post savings may be due to different area (square footage) assumptions as that is the only project specific input into the savings algorithm listed in the 2019 PNM workpapers	The discrepancy between the ex ante and ex post savings may be due to different area (square footage) assumptions as that is the only project specific input into the savings algorithm listed in the 2019 PNM workpapers					The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation.
Include any other important observations here	Ex Post does not match Ex Ante estimates. Application lists facility sq. footage as 250,000 sq. ft.	Ex Post does not match Ex Ante estimates. Application lists facility sq. footage as 250,000 sq. ft.					

Project ID	PNM-19-03789	PNM-19-03875	PNM-19-03880	PNM-19-03886	PNM-19-03892	PNM-19-03893	PNM-19-03897
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Retrofit	Lighting	Building Tune Up	Building Tune Up	Lighting	Lighting	Lighting
Project Description		Installation of new high-efficiency lighting fixtures.	Building Operator Certification	Building Operator Certification	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.
Building Type	Office - Small	Other:	Office - Large	Office - Large	Retail - Single-Story Large	Retail - Single-Story Large	Retail - Single-Story Large
Other Building Type		Warehouse					
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	13,744	361,383	3,497	8,079	28,965	13,203	263,521
Gross Reported kW	0.00	61.99	0.00	0.00	0.00	0.00	0.00
Gross Verified kWh	13,744	355,636	3,497	8,079	28,966	13,203	269,424
Gross Verified kW	0.00	62.34	0.00	0.00	0.00	0.00	0.00
kWh Realization Rate	1.00	0.98	1.00	1.00	1.00	1.00	1.02
kW Realization Rate		1.01					
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Reported savings match Ex-Post calculations. Utility workpaper methodology seems to have been followed.	Reported savings match Ex-Post calculations. Utility workpaper methodology seems to have been followed.	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1		The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Warehouse building type to match space types in the project.					The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project for an exterior building type. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation.
Include any other important observations here		1. Calculations are based savings equations from PNM Workpapers and workbook 2019. 2.The building type = Warehouse. 3.Annual working hours = 4165 . e.	Ex Post matches Ex Ante estimates. Application lists facility sq. footage as 14,756 sq. ft. Evaluator assumes that the eligibility conditions mentioned in the workpaper and application are met.	Ex Post matches Ex Ante estimates. Application lists facility sq. footage as 14,756 sq. ft. Evaluator assumes that the eligibility conditions mentioned in the workpaper and application are met.			1. Calculations are based savings equations from PNM Workpapers and workbook 2019. 2. The building type = Retail as given in Application Form. But ExAnte and ExPost savings values and calculation based on building type as Exterior as all the retrofitting done in outside area of the given retail building. 3. Annual working hours = 4192 as per the Post Inspection Form.

Project ID	PNM-19-03901	PNM-20-03918	PNM-19-03924	PNM-19-03931	PNM-19-03945	PNM-20-03930	PNM-20-03938
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Lighting	HVAC	New Construction	Air Compressor Replacement	HVAC	Lighting	Lighting
Project Description	Installation of new high-efficiency lighting fixtures.		LED lighting High performance glazing Variable speed fans Variable speed pumps Direct evap. Cooling for mau High efficiency central plant Waste steam to hot water heating	Replacement of Air Compressor with VFD Air Compressor	Evaporative Cooling Controls	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.
Building Type	Other:	Education - University	Education - University	Manufacturing - Light Industrial	Restaurant - Fast-Food	Retail - Small	Retail - Small
Other Building Type	Health Care						
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	107,991	14,043	419,945	27,556	5,786	71,956	7,670
Gross Reported kW	27.55	3.18	185.50	2.58	0.00	0.00	0.00
Gross Verified kWh	106,930	16,761	419,945	14,982	5,786	71,935	7,646
Gross Verified kW	27.40	2.21	185.50	8.09	0.00	0.00	0.00
kWh Realization Rate	0.99	1.19	1.00	0.54	1.00	1.00	1.00
kW Realization Rate	0.99	0.69	1.00	3.13			
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided		Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally lower than the ex ante savings but the reason for the savings decrease is not known based on the supplied project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The primary discrepancy in savings for this project are attributed to the AC and motor efficiency measures.		1. In ex-ante savings, Post EE power is calculated considering CFM as in Baseline case and further adjustments are made to normalize effect due to change in capacity of Air Compressor. 2. However, Power of post EE air compressor is based on its CFM delivered (and not on base case). Thus Ex-post calculations calculate power based on CFM as per specs sheet. It further normalizes the power consumption to match base case capacity i.e. 110 psi.			
Include any other important observations here			Detailed energy model results were not provided to confirm modeled savings. Construction documents were checked to see improvements from ASHRAE standards. Exterior lighting savings were verified.	1. In ex-ante savings, Post EE power is calculated considering CFM as in Baseline case and further adjustments are made to normalize effect due to change in capacity of Air Compressor. 2. However, Power of post EE air compressor is based on its CFM delivered (and not on base case). Thus Ex-post calculations calculate power based on CFM as per specs sheet. It further normalizes the power consumption to match base case capacity i.e. 110 psi.			

Project ID	PNM-20-03949	PNM-20-03951	PNM-20-03952	PNM-20-03955	PNM-20-03959	PNM-20-03976	PNM-20-03983
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	HVAC	Custom	Custom	Custom	Custom	Retrofit	Retrofit
Project Description	Chiller Replacement and VSD on motors	Refrigeration evaporator controller	Refrigeration evaporator controller	Refrigeration evaporator controller	Refrigeration evaporator controller	Refrigerated case retrofits at big box store	Refrigerated cases replaced at four Big Lots stores
Building Type	Other:	Restaurant - Fast-Food	Restaurant - Fast-Food	Restaurant - Fast-Food	Restaurant - Fast-Food	Grocery	Retail - Single-Story Large
Other Building Type	Resort						
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	1,709,612	5,786	5,786	5,786	5,786	44,176	65,320
Gross Reported kW	181.83	0.00	0.00	0.00	0.00	3.48	7.46
Gross Verified kWh	1,822,045	5,786	5,786	5,786	5,786	44,176	28,324
Gross Verified kW	325.21	0.00	0.00	0.00	0.00	3.48	3.23
kWh Realization Rate	1.07	1.00	1.00	1.00	1.00	1.00	0.43
kW Realization Rate	1.79					1.00	0.43
Calculation Assessment	These calculations are prescriptive and were not included with the project documentation.	Appears valid and accurate given inputs; see notes on Evaluator Analysis sheet	Appears valid and accurate given inputs; see notes on Evaluator Analysis sheet	Appears valid and accurate given inputs; see notes on Evaluator Analysis sheet	Appears valid and accurate given inputs; see notes on Evaluator Analysis sheet		Methodology relies on DOE database, which is appropriate, but project baseline and proposed quantities are unreasonable
Reasons for RR(s) <> 1	The ex ante calculations were not included in the project documentation. The evaluation team used the 2019 utility workpapers and corresponding project documentation to calculate the verified savings. The discrepancy in savings is primary due to the chiller measures.						Project description calls for 2 2-door coolers per location, but ex ante calculation only accounts for 1. Ex post savings calculated with 2x 2-door units instead of 1 unit. Cubic foot reduction in ex ante calculation nearly 80%. Ex post savings calculated with (2) baseline cases instead of (3), one of each model. Cubic footage could readily be replaced at a later date.
Include any other important observations here							

Project ID	PNM-20-03998	PNM-20-04002	PNM-20-04003	PNM-20-04011	PNM-20-04020	PNM-20-04022	PNM-20-04023
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Lighting	Lighting	Lighting	HVAC	HVAC and New Construction Lighting	New Construction	Lighting
Project Description	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.	Installation of new high-efficiency lighting fixtures.	Installation of ASHP	Installation of lighting, heat pumps, and air conditioners in NC building	New Construction Lighting, HVAC	Installation of new high-efficiency lighting fixtures.
Building Type	Office - Large	Office - Large	Other:	Other:	Other:	Education - University	Other:
Other Building Type			Retail/Service	Multifamily	Multifamily		Warehouse
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	490,892	914,728	140,472	2,667	121,949	270,926	14,679
Gross Reported kW	91.00	183.57	21.28	1.50	29.29	31.18	3.30
Gross Verified kWh	487,285	957,812	111,930	5,352	157,216	346,038	13,518
Gross Verified kW	87.52	195.56	21.64	0.34	23.88	72.37	2.37
kWh Realization Rate	0.99	1.05	0.80	2.01	1.29	1.28	0.92
kW Realization Rate	0.96	1.07	1.02	0.23	0.82	2.32	0.72
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations used 1.01 W/sqft for interior LPD, which appears to be a custom value. The 2019 PNM workpapers list an LPD of 1.2 W/sqft. The ex ante calculations also use lower (more efficient) allowable baseline LPDs than the exterior values listed in the workpapers. The ex post analysis updated LPDs as per PNM workpaper/NM TRM 2020. The source of the ex-ante LPD values is unknown. AHRI docs were used to verify HVAC ratings and capacities. WSHP units were treated as custom calcs with EFLHs from PNM workpaper for University type building.	Ex ante calculations not provided
Reasons for RR(s) <> 1	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally lower than the ex ante savings but the reason for the savings decrease is not known based on the supplied project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project for an office building type. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post savings for this project are marginally higher than the ex ante savings but the reason for the savings increase is not known based on the supplied project documentation.		The evaluation team used the savings algorithms in the NM TRM for High Efficiency Unitary and Split Air-Conditioning and Heat Pump Systems to calculate the savings for this project. Neither the TRM nor the 2019 workpapers include a multifamily building type so the evaluation used residential EFLH_c hours in this calculation. The evaluation team also used the project specific inputs referenced from the project documentation. The discrepancy between the ex ante and ex post savings is not clear since the ex ante calculations were not provided.	The evaluation team used the savings algorithms in the 2019 PNM workpapers for High Efficiency Unitary and Split Air-Conditioning and Heat Pump Systems to calculate the savings for this project. Neither the TRM nor the 2019 workpapers include a multifamily building type so the evaluation used residential EFLH_c hours in this calculation. The evaluation team was not able to replicate the NC lighting savings. The evaluation team used LPD values from the 2019 PNM workpapers. The evaluation team also used the project specific inputs referenced from the project documentation. The discrepancy between the ex ante and ex post savings is not clear since the ex ante calculations were not provided.	The kWh realization rate is greater than 100% mainly due to aligning baseline LPDs with the values in the 2019 PNM workpapers. The primary drivers behind the high RR for peak demand is the interior lighting and water-source heat pump measures. It is not known how the ex-ante savings values were calculated.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Warehouse building type to match space type in the project.
Include any other important observations here	1. Calculations are based savings equations and ballast factors from PNM Workpapers and workbook 2019. 2.The building type = Office (large) 3.Annual working hours = 3710 (from post inspection excel) 4. Exterior and 24/7 spaces assumed to be 4192 and 8760 hrs	1. Calculations are based savings equations and ballast factors from PNM Workpapers and workbook 2019. 2.The building type = Office (large). 3.Annual working hours = 3710	1. Calculations are based savings equations and ballast factors from PNM Workpapers and workbook 2019. 2.The building type after Inspection has been granted as Grocery/Exterior (12hrs/day). 3.Annual working hours = 5480 (from post inspection excel) 4.ExPost evaluation based on Building type as Grocery. 5. ExPost building type = Grocery based on Post Inspection from/excel provided by the client.				

Project ID	PNM-20-04025	PNM-20-04028	PNM-20-04029	PNM-20-04030	PNM-20-04031	PNM-20-04033	PNM-20-04034
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Custom	New Construction	New Construction	HVAC and Lighting	HVAC	Refrigeration	Refrigeration
Project Description	0	New Construction Lighting, HVAC	New Construction Lighting, HVAC	Installation of heat pump and new construction lighting	Installation of new efficient Chillers, RTUs and VSDs.	Installation of new ENERGY STAR® Glass Door Reach-In Freezer	Installation of new ENERGY STAR® Glass Door Reach-In Freezer
Building Type	Office - Large	Retail - Single-Story Large	Education - Primary School	Other:	Office - Large	Retail - Small	Retail - Small
Other Building Type				Multifamily			
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	387,287	42,795	195,711	134,544	1,632,388	9,439	8,561
Gross Reported kW	30.95	7.94	66.80	32.64	206.32	2.42	2.20
Gross Verified kWh	387,287	53,519	227,474	255,653	1,552,339	8,745	8,014
Gross Verified kW	30.95	11.60	35.59	52.84	211.91	0.93	0.86
kWh Realization Rate	1.00	1.25	1.16	1.90	0.95	0.93	0.94
kW Realization Rate	1.00	1.46	0.53	1.62	1.03	0.39	0.39
Calculation Assessment	Ex ante calculations use appropriate methodology and site specific data.	Ex ante calculations used 1.28 W/sq.ft. as LPD for Retail spaces, which appears to be a custom value.	Ex ante calculations used 1.01 W/sqft for interior LPD, which appears to be a custom value. The 2019 PNM workpapers list an LPD of 1.2 W/sqft. The ex ante calculations also use lower (more efficient) allowable baseline LPDs than the exterior values listed in the workpapers. The ex post analysis updated LPDs as per PNM workpaper. The source of the ex-ante LPD values is unknown. Daylighting control savings factor assumed to be 28% as per NM TRM. AHRI docs were used to verify HVAC ratings and capacities. All values of CF, EFLH, Control Factors, HOU are based on PNM workpaper and NM TRM.	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1		The ex post savings used a baseline LPD of 1.5 while the ex ante savings used a baseline LPD of 1.28. This adjustment increased the ex post savings for the project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a retail building type to match space type in the project.	The kWh realization rate is greater than 100% mainly due to aligning baseline LPDs with the values in the 2019 PNM workpapers. The evaluation team used the 2019 PNM workpapers to calculate the peak demand savings for HVAC NC measures. Baseline was assumed to be a heat pump and corresponding min efficiency numbers were used in the savings algorithms.	The evaluation team used the savings algorithms in the NM TRM for High Efficiency Unitary and Split Air-Conditioning and Heat Pump Systems to calculate the savings for this project. Neither the TRM nor the 2019 workpapers include a multifamily building type so the evaluation used residential EFLH_c hours in this calculation. The evaluation team was not able to replicate the NC lighting savings. The evaluation team used LPD values from the 2019 PNM workpapers. The evaluation team also used the project specific inputs referenced from the project documentation. The discrepancy between the ex ante and ex post savings is not clear since the ex ante calculations were not provided.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.
Include any other important observations here				0	1. Ex post calculations are based on PNM Workpapers-2019. 2. ExPost analysis is based on building type as Office. 3. Deviation in RR may be due to different assumptions in EFLH or other variables in ExAnte calculations (which are not mentioned in the given project documents.)	1. Calculations are based on DNV GL PNM Workpapers-2019. 2. ExPost analysis is based on building type as Retail. 3. Annual Hours = 8766 assumed based on Workpaper because annual hours not given in project documents. 4. Coincidence Factor (CF)=0.937 based on Workpapers. 5. Deviation in kW savings and RR (kW value) could be due to change in annual hours in ExAnte calculations (which are not mentioned in the given project documents.)	1. Calculations are based on DNV GL PNM Workpapers-2019. 2. ExPost analysis is based on building type as Retail. 3. Annual Hours = 8766 assumed based on Workpaper because annual hours not given in project documents. 4. Coincidence Factor (CF)=0.937 based on Workpapers. 5. Deviation in kW savings and RR (kW value) could be due to change in annual hours in ExAnte calculations (which are not mentioned in the given project documents.)

Project ID	PNM-20-04038	PNM-20-04042	PNM-20-04063	PNM-20-04069	PNM-20-04070	PNM-20-04082
Utility	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	Lighting	Lighting	HVAC and interior lighting retrofit	Lighting	Custom	New Construction
Project Description	Installation of new high-efficiency lighting fixtures.	Interior lighting retrofit	Installation of AC units and interior lighting retrofit	Installation of new high-efficiency lighting fixtures.	0	New Construction Lighting, HVAC, Guest Occ Sensor
Building Type	Other:	Other:	Other:	Grocery	Retail - Small	Lodging - Hotel
Other Building Type	Warehouse	Multifamily	Multifamily			
Site Visit Being Conducted	No	No	No	No	No	No
Other General Project Info Comments						
Gross Reported kWh	456,871	37,696	95,910	684,080	163,464	123,789
Gross Reported kW	71.63	6.60	15.41	78.09	14.58	30.73
Gross Verified kWh	449,609	38,133	95,034	744,920	163,464	95,360
Gross Verified kW	78.81	1.46	24.33	72.50	14.58	26.35
kWh Realization Rate	0.98	1.01	0.99	1.09	1.00	0.77
kW Realization Rate	1.10	0.22	1.58	0.93	1.00	0.86
Calculation Assessment	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided		The implementer provided application, specs and invoices for the evaluator to examine
Reasons for RR(s) <> 1	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Warehouse building type to match space types in the project.	The evaluation team used the savings methodology for interior lighting retrofits detailed in the 2019 PNM workpapers. The ex post calculations use interactive effects values and CF for a dwelling unit. The discrepancy between the ex ante and ex post savings is not known.	The evaluation team used the savings algorithms in the NM TRM for High Efficiency Unitary and Split Air-Conditioning and Heat Pump Systems to calculate the savings for this project. Neither the TRM nor the 2019 workpapers include a multifamily building type so the evaluation used residential EFLH_c hours in this calculation. The evaluation team also used the project specific inputs referenced from the project documentation. The discrepancy between the ex ante and ex post savings is not clear since the ex ante calculations were not provided.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors for a Grocery building type to match space types in the project. The ex post calculations used 8760 annual HOUs.	1. Ex-ante calculations as performed in Post Inspection Report estimate 163,464.09 kWh and 21.13 kW Energy and Demand Savings (not Peak Demand) respectively which match exactly with ex-post calcs. Ex-post demand and energy savings also match the savings as mentioned in Application Summary document. 2. Peak Demand savings are calculated in ex-ante calculations using CF=0.69 and are estimated to be 14.58 kW. Ex-post calculations use CF=0.69 as per ex-ante calcs. However, CF=0.937 can be used as mentioned in PNM workpapers for ENERGY STAR® Solid or Glass Door Refrigerators and Freezers Measure. 3. Formulae are verified during ex-post analysis. 4. Custom method was followed for verification of the calculations.	Ex-post savings estimates for lighting measures were higher than ex-ante - this is mainly due to exterior LPD being found to be higher than reported for the baseline (0.15 W/sqft versus 0.06 W/sqft). However, the RRs are mainly driven by the PTHP improvements and guest occupancy sensors, though the specific source of discrepancy in savings estimates is unknown since no ex-ante calcs were submitted. The implementer also incorrectly claimed demand savings from exterior fixtures (which should've been 0 kW). This had a relatively minor impact on the RR.
Include any other important observations here					1. Ex-ante calculations as performed in Post Inspection Report estimate 163,464.09 kWh and 21.13 kW Energy and Demand Savings (not Peak Demand) respectively which match exactly with ex-post calcs. Ex-post demand and energy savings also match the savings as mentioned in Application Summary document. 2. Peak Demand savings are calculated in ex-ante calculations using CF=0.69 and are estimated to be 14.58 kW. Ex-post calculations use CF=0.69 as per ex-ante calcs. However, CF=0.937 can be used as mentioned in PNM workpapers for ENERGY STAR® Solid or Glass Door Refrigerators and Freezers Measure. 3. Formulae are verified during ex-post analysis. 4. Custom method was followed for verification of the calculations.	Ex-post savings estimates for lighting measures were higher than ex-ante - this is mainly due to exterior LPD being found to be higher than reported for the baseline (0.15 W/sqft versus 0.06 W/sqft). However, the RRs are mainly driven by the PTHP improvements and guest occupancy sensors, though the specific source of discrepancy in savings estimates is unknown since no ex-ante calcs were submitted. The implementer also incorrectly claimed demand savings from exterior fixtures (which should've been 0 kW). This had a relatively minor impact on the RR.

Project ID	PNM-20-04085	PNM-20-04107	PNM-20-04114	PNM-20-04116	PNM-20-04136	PNM-20-04139	PNM-20-04140
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive
Measure Type	New Construction	Other	Lighting	Refrigeration	New Construction	Building Tune Up	Building Tune Up
Project Description	New Construction Lighting, HVAC	Retrofitting 220' of existing open medium temp vertical cases with glass doors.	Interior lighting retrofit	Installation of new ENERGY STAR® Glass Door Reach-In Freezer	New Construction Lighting, HVAC	Building Operator Certification	Building Operator Certification
Building Type	Health/Medical - Hospital	Grocery	Other:	Retail - Small	Retail - Single-Story Large	Office - Large	Office - Large
Other Building Type			Multifamily				
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	84,656	134,838	38,679	3,732	258,396	47,400	47,400
Gross Reported kW	13.41	12.01	21.62	9.58	9.04	0.00	0.00
Gross Verified kWh	116,087	134,838	85,262	3,909	382,626	20,636	17,073
Gross Verified kW	23.23	11.07	11.09	0.42	33.24	0.00	0.00
kWh Realization Rate	1.37	1.00	2.20	1.05	1.48	0.44	0.36
kW Realization Rate	1.73	0.92	0.51	0.04	3.68		
Calculation Assessment	Implementer used 1.01 W/sqft for interior LPD instead of 1.2 W/sqft as per PNM workpaper. Implementer used lower LPDs for exterior areas. Ex Post analysis updated LPDs as per PNM workpaper/NM TRM 2020. AHRI docs were used to verify HVAC ratings and capacities. All values of CF, EFLH, Control Factors, HOU are based on PNM workpaper and NM TRM.	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Ex ante calculations not provided	Utility workpaper methodology seems to have been followed.	Utility workpaper methodology seems to have been followed.
Reasons for RR(s) <> 1	The energy realization rate is greater than 100% due to multiple factors, but primarily due to lower baseline LPD used by the implementer to calculate savings (lighting measures). The demand RR is exceptionally high due to discrepancy in the baseline LPDs used in Ex Ante vs. Ex Post analysis (lighting measures). The RRs for the HVAC measures are close to 100%.		The evaluation team used the savings methodology detailed in the 2019 PNM workpapers. The ex post savings used interactive effects and CF for a dwelling unit. The HOUs were custom calculated based on the project documentation.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation.	The evaluation team used the savings methodology outlined in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The ex post calculations used deemed factors and LPDs for a retail building type to match space types in the project. There are discrepancies in savings estimates between ex-ante and ex-post for the HVAC measures - though the specific sources are unknown - but they have a relatively minor impact on the overall RRs.	Building square footage was found to be less than reported. Application documents show site address is 3804 Shiloh Rd NE, which is for Cielo Azul Elementary. Based on the supplied documents, the evaluation team believes the savings should be based on 87,073 square feet. Source of the ex-ante value (200,000 sq ft) is unknown.	Building square footage was found to be less than reported. Application documents show site address is 7001 Chayote Rd NE, which is for Vista Grande Elementary. Based on the supplied documents, the evaluation team believes the savings should be based on 72,037 square feet. Source of the ex-ante value (200,000 sq ft) is unknown.
Include any other important observations here	The energy realization rate is greater than 100% due to multiple factors, but primarily due to lower baseline LPD used by the implementer to calculate savings (lighting measures). The demand RR is exceptionally high due to discrepancy in the baseline LPDs used in Ex Ante vs. Ex Post analysis (lighting measures). The RRs for the HVAC measures are close to 100%.	1. ExPost Calculation utilizes values from ARI1200 and ExAnte calculation assumptions. 2.The building type = Grocery, hence CF=0.69 3.Annual working hours = 8760. 4. RR value found to be within acceptable range.		1. Calculations are based on DNV GL PNM Workpapers-2019. 2. ExPost analysis is based on building type as Retail. 3. Annual Hours = 8766 assumed based on Workpaper because annual hours not given in project documents. 4. Coincidence Factor (CF)=0.937 based on Workpapers. 5. Deviation in kW savings and RR (kW value) could be due to change in annual hours in ExAnte calculations (which are not mentioned in the given project documents.)			

Project ID	PNM-20-04141	PNM-20-04142	PNM-20-04143	PNM-20-04149	PNM-20-04160	PNM-20-04172	Multiple (18 projects)
Utility	PNM	PNM	PNM	PNM	PNM	PNM	PNM
Program	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Commercial Comprehensive	Residential - New Home Construction
Measure Type	Building Tune Up	Building Tune Up	Building Tune Up	HVAC	Custom	HVAC	HVAC, Water Heating, Lighting & Appliances
Project Description	Building Operator Certification	Building Operator Certification	Building Operator Certification	Installation of new efficient Chiller, VSD and Motors.		Installation of new efficient Unitary and Split AC.	Installation of various measures in new residential homes.
Building Type	Office - Large	Office - Large	Office - Large	Education - University	Manufacturing - Bio/Tech	Other:	Other:
Other Building Type				College		Retail/Service	Residential
Site Visit Being Conducted	No	No	No	No	No	No	No
Other General Project Info Comments							
Gross Reported kWh	47,400	47,400	23,700	217,543	97,387	3,192	26,767
Gross Reported kW	0.00	0.00	0.00	61.46	14.40	1.70	12.89
Gross Verified kWh	100,842	93,914	23,700	214,149	97,371	2,913	26,766
Gross Verified kW	0.00	0.00	0.00	60.16	62.42	1.78	13.19
kWh Realization Rate	2.13	1.98	1.00	0.98	1.00	0.91	1.00
kW Realization Rate				0.98	4.33	1.05	1.02
Calculation Assessment	Utility workpaper methodology seems to have been followed.	Utility workpaper methodology seems to have been followed.	Reported savings match Ex-Post calculations. Utility workpaper methodology seems to have been followed.	Ex ante calculations not provided		Ex ante calculations not provided	Ex ante calculations not provided
Reasons for RR(s) <> 1	Building square footage was found to be higher than reported. Application documents show site address is 4800 Laban Rd NE, which is for Cleveland High School. Based on the supplied documents, the evaluation team believes the savings should be based on 425,495 square feet. Source of the ex-ante value (200,000 sq ft) is unknown.	Building square footage was found to be higher than reported. Application documents show site address is 301 Loma Colorado Blvd NE, which is for Rio Rancho High School. Based on the supplied documents, the evaluation team believes the savings should be based on 396,262 square feet. Source of the ex-ante value (200,000 sq ft) is unknown.		The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The discrepancy between the ex ante and ex post saving is not known.	1. Slight Deviation in Energy savings as calculated values differ when recalculated using provided data. 2. Peak demand savings not provided in Ex Ante savings. Evaluator used TMY3 data to calculate demand during peak period for both baseline and proposed scenario.	The evaluation team used the savings methodology outline in the 2019 PNM workpapers for this project. The evaluation team referenced project specific algorithm inputs from the project documentation. The discrepancy between the ex ante and ex post saving is not known.	The evaluation team review 18 projects to verify the reported savings. The evaluation team compared the REM/Rate Report to the reported savings in the program tracking data as well as reviewed the Residential Energy Analysis and Rating software to ensure it follow IECC 2009. The evaluation team found that the energy (kWh) savings match for all 18 projects; however, the team updated the verified peak demand (kW) savings for five projects to align with the supplied project reports
Include any other important observations here						1. ExPost Calculation and Analysis is based on DNV GL PNM Workpaper/book-2019. 2. ExPost analysis is based on building type as Retail/Service.	The evaluation team updated the peak demand savings for the following projects: PGNHVA1545180939, PGNHVA1544777373, PGNHVA1543148641 PGNHVA1545381224, PGNHVA1543435264,