CenterPoint Energy 2025 Demand Response Impact Evaluation

FINAL REPORT

February 20, 2026

CADMUS

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1. Executive Summary

CenterPoint Energy operates its demand response programs to reduce residential air conditioning and water-heating electricity loads during summer peak hours. With the Smart Cycle program, CenterPoint Energy can take control of selected residential central air conditioning loads via smart thermostats. With the Summer Cycler program, CenterPoint Energy uses radio communication equipment and control switches to turn off participating water heaters and to cycle air conditioner compressors during load-control events.

Cadmus conducted a demand response analysis that included Midcontinent Independent System Operator (MISO) impact forecasting[1] and energy savings analysis for its impact evaluation of CenterPoint Energy's 2025 demand response programs. In accordance with new MISO Resource Adequacy seasonal requirements, CenterPoint Energy expanded its Smart Cycle program season to include spring (March through May), summer (June through August), and fall (September through November). [2] Summer Cycler remained a summer-only program, although the summer season definition changed from that of previous years to exclude September, for consistency with MISO's new seasonal definitions.

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This section highlights the key findings from the 2025 demand response program evaluations.

Energy Savings (MWh). The total energy savings achieved among treatment groups across all Smart Cycle summer event days was 5.99 MWh. Smart Cycle achieved 1.63 MWh energy savings across the fall event days but used an additional 0.86 MWh of energy (negative savings) across the spring event days. The lower energy savings during non-summer events are attributable to lower outdoor temperatures during those months limiting possible curtailment during event hours, especially when combined with event precooling. After evaluation, Cadmus was unable to identify impacts with the necessary level of statistical significance for Summer Cycler. The program achieved 0 MWh of energy savings across all events.[3]

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1 MISO is a not-for-profit Regional Transmission Organization. MISO ensures reliable and least-cost delivery of electricity to 15 U.S. states (including Indiana) and Manitoba, Canada. MISO calls load-control events to manage system demand across the region it covers.

2 MISO. February 21, 2025. *Resource Adequacy Business Practices Manual*. https://cdn.misoenergy.org/BPM-011%20Resource%20Adequacy110405.zip?v=20251013103234

3 CenterPoint Energy reported during a project update in January 2025 that they had tested all Summer Cycler radio signals and towers, and each appeared to be functioning correctly. However, the switches installed on participants' AC units can receive signals but cannot transmit responses to indicate whether they were able to correctly carry out the event instructions they received. CenterPoint has confirmed they will do additional detailed analysis in 2026 to determine if the Summer Cycler program can achieve demand and energy savings in the future.

Potential Peak Demand Reduction (MW). Had all program participants (and not only the treatment groups) been included in the demand response events, Smart Cycle could have achieved peak demand reduction of 2.04 MW, 10.89 MW, and 11.55 MW in spring, summer, and fall, respectively (Table 1). These estimates are based on the highest single hour of demand reduction across all 2025 events for each season and event period. Likewise, Summer Cycler could have achieved 2.94 MW of peak demand reduction had all participants been treated based on its highest performing single event hour across the event season.

Table 1. Key Impact Findings: Smart Cycle and Summer Cycler Potential Peak Demand Reduction

Program and Time of Event	2025 (MW)			2024 (MW)	2023 (MW)
	Spring	Summer	Fall	Summer	Summer
Smart Cycle 2 p.m. –4 p.m. events	2.04	10.89	8.22	11.56	7.76
Smart Cycle 2:45 p.m. –4:45 p.m. events	N/A	N/A	11.55	N/A	N/A
Smart Cycle 3 p.m. –5 p.m. events	N/A	N/A	N/A	N/A	N/A
Smart Cycle 4 p.m. –6 p.m. events	N/A	N/A	N/A	N/A	N/A
Summer Cycler 2 p.m. –4 p.m. events	N/A	0.00	N/A	8.33	N/A
Summer Cycler 2:30 p.m. –4:30 p.m. events	N/A	2.94	N/A	N/A	N/A
Summer Cycler 3 p.m. –5 p.m. events	N/A	N/A	N/A	N/A	6.47
Summer Cycler 4 p.m. –6 p.m. events	N/A	N/A	N/A	N/A	3.54

N/A indicates there was not an event at that time for the specified program and season.

Actual Peak Demand Reduction (MW). The estimates shown in Table 2 are based on the highest single hour of demand reduction across all 2025 events among participants in the treatment groups. The Summer Cycler program peak demand reductions are much smaller than those of the Smart Cycle program due to the small size of the Summer Cycler treatment group and the limited evidence of demand reduction with Summer Cycler in 2025.

Table 2. Key Impact Findings: Smart Cycle and Summer Cycler Actual Peak Demand Reduction

Program and Time of Event	2025 (MW)			2024 (MW)	2023 (MW)
	Spring	Summer	Fall	Summer	Summer
Smart Cycle 2 p.m. - 4 p.m. events	0.90	4.81	3.63	5.96	2.27
Smart Cycle 2:45 p.m. - 4:45 p.m. events	N/A	N/A	5.10	N/A	N/A
Smart Cycle 3 p.m. - 5 p.m. events	N/A	N/A	N/A	N/A	N/A
Smart Cycle 4 p.m. - 6 p.m. events	N/A	N/A	N/A	N/A	N/A
Summer Cycler 2 p.m. - 4 p.m. events	N/A	0.00	N/A	0.05	N/A
Summer Cycler 2:30 p.m. - 4:30 p.m. events	N/A	0.03	N/A	N/A	N/A
Summer Cycler 3 p.m. - 5 p.m. events	N/A	N/A	N/A	N/A	0.04
Summer Cycler 4 p.m. - 6 p.m. events	N/A	N/A	N/A	N/A	0.02

N/A indicates that there was not an event at that time for the specified program and season.

Expected MISO Demand Reduction. The tables below show the demand reduction achieved per thermostat (or switch) and overall achievable demand reduction if all enrolled devices had been cycled during a MISO event for Smart Cycle (Table 3, Table 4, and Table 5 for spring, summer, and fall, respectively) and Summer Cycler (Table 6). The estimated achievable MISO demand reduction for Summer Cycler in the 2025 season was not statistically different from zero.

Table 3. Key Impact Findings: Smart Cycle Potential MISO Event Demand Reduction Forecasts: Spring

Hour of Day	March		April		May		Spring Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	0.01	0.13	0.01	0.13	0.05	0.50	**0.03**	**0.25**
1	0.01	0.13	0.01	0.13	0.03	0.32	**0.02**	**0.19**
2	0.01	0.13	0.01	0.13	0.02	0.19	**0.02**	**0.15**
3	0.01	0.13	0.01	0.13	0.01	0.12	**0.01**	**0.13**
4	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
5	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
6	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
7	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
8	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
9	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
10	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
11	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
12	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
13	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
14	0.01	0.13	0.01	0.13	0.07	0.67	**0.03**	**0.31**
15	0.01	0.13	0.01	0.13	0.15	1.44	**0.06**	**0.57**
16	0.01	0.13	0.01	0.13	0.16	1.54	**0.06**	**0.60**
17	0.01	0.13	0.01	0.13	0.16	1.47	**0.06**	**0.58**
18	0.01	0.13	0.01	0.13	0.15	1.41	**0.06**	**0.56**
19	0.01	0.13	0.01	0.13	0.13	1.21	**0.05**	**0.49**
20	0.01	0.13	0.02	0.16	0.12	1.15	**0.05**	**0.48**
21	0.01	0.13	0.02	0.16	0.11	1.05	**0.05**	**0.45**
22	0.01	0.13	0.01	0.13	0.09	0.81	**0.04**	**0.35**
23	0.01	0.13	0.01	0.13	0.07	0.61	**0.03**	**0.29**

Table 4. Key Impact Findings: Smart Cycle Potential MISO Event Demand Reduction Forecasts: Summer

Hour of Day	June		July		August		Summer Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	0.39	3.66	0.45	4.26	0.38	3.54	**0.41**	**3.82**
1	0.32	3.03	0.39	3.64	0.30	2.82	**0.34**	**3.16**
2	0.26	2.46	0.33	3.10	0.26	2.43	**0.28**	**2.66**
3	0.22	2.06	0.29	2.71	0.22	2.10	**0.24**	**2.29**
4	0.20	1.86	0.26	2.41	0.21	1.94	**0.22**	**2.07**
5	0.18	1.68	0.23	2.15	0.19	1.78	**0.20**	**1.87**
6	0.17	1.56	0.22	2.06	0.18	1.68	**0.19**	**1.77**
7	0.17	1.63	0.23	2.17	0.19	1.78	**0.20**	**1.86**
8	0.18	1.68	0.25	2.38	0.20	1.89	**0.21**	**1.98**
9	0.22	2.03	0.31	2.87	0.25	2.37	**0.26**	**2.43**
10	0.25	2.35	0.39	3.65	0.31	2.94	**0.32**	**2.98**
11	0.32	3.03	0.48	4.53	0.40	3.78	**0.40**	**3.78**
12	0.45	4.26	0.58	5.41	0.45	4.18	**0.49**	**4.62**
13	0.56	5.22	0.65	6.10	0.54	5.11	**0.58**	**5.47**
14	0.63	5.91	0.71	6.62	0.62	5.86	**0.65**	**6.13**
15	0.69	6.50	0.76	7.15	0.70	6.54	**0.72**	**6.73**
16	0.75	7.03	0.82	7.69	0.76	7.16	**0.78**	**7.29**
17	0.77	7.22	0.83	7.77	0.78	7.35	**0.79**	**7.45**
18	0.78	7.33	0.84	7.87	0.80	7.48	**0.81**	**7.56**
19	0.73	6.84	0.80	7.50	0.74	6.94	**0.76**	**7.09**
20	0.72	6.77	0.80	7.46	0.73	6.85	**0.75**	**7.03**
21	0.66	6.21	0.73	6.87	0.67	6.30	**0.69**	**6.46**
22	0.58	5.46	0.65	6.11	0.59	5.51	**0.61**	**5.69**
23	0.49	4.59	0.55	5.13	0.48	4.55	**0.51**	**4.76**

Table 5. Key Impact Findings: Smart Cycle Potential MISO Event Demand Reduction Forecasts: Fall

Hour of Day	September		October		November		Fall Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	-0.85	-7.96	0.04	0.34	0.04	0.34	**-0.26**	**-2.43**
1	0.05	0.51	0.04	0.34	0.04	0.34	**0.04**	**0.40**
2	-0.02	-0.14	0.04	0.34	0.04	0.34	**0.02**	**0.18**
3	0.08	0.76	0.04	0.34	0.04	0.34	**0.05**	**0.48**
4	0.09	0.80	0.04	0.34	0.04	0.34	**0.05**	**0.49**
5	0.07	0.68	0.04	0.34	0.04	0.34	**0.05**	**0.45**
6	0.06	0.53	0.04	0.34	0.04	0.34	**0.04**	**0.40**
7	0.04	0.37	0.04	0.34	0.04	0.34	**0.04**	**0.35**
8	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
9	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
10	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
11	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
12	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
13	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
14	0.07	0.64	0.04	0.34	0.04	0.34	**0.05**	**0.44**
15	0.16	1.50	0.04	0.34	0.04	0.34	**0.08**	**0.73**
16	0.28	2.66	0.04	0.34	0.04	0.34	**0.12**	**1.11**
17	0.41	3.88	0.08	0.75	0.04	0.34	**0.18**	**1.66**
18	0.51	4.80	0.16	1.53	0.04	0.34	**0.24**	**2.22**
19	0.43	4.03	0.26	2.46	0.04	0.34	**0.24**	**2.28**
20	0.32	2.96	0.31	2.94	0.04	0.34	**0.22**	**2.08**
21	-0.62	-5.79	0.33	3.12	0.04	0.34	**-0.08**	**-0.78**
22	-0.10	-0.96	0.27	2.49	0.04	0.34	**0.07**	**0.62**
23	-2.92	-27.40	0.11	1.07	0.04	0.34	**-0.92**	**-8.67**

Table 6. Key Impact Findings: Summer Cycler Potential MISO Event Demand Reduction Forecasts

Hour of Day	June		July		August		Summer Average	
	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)
0	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
1	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
3	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
5	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
6	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
7	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
8	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
9	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
10	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
11	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
12	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
13	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
14	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
15	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
16	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
17	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
18	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
19	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
20	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
21	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
22	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
23	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**

Per-Device Demand Reduction. The average and maximum per-device demand reduction across all 2025 events are presented in Table 7. Smart Cycle achieved higher per-device reductions in summer and fall than in spring, likely due to higher average temperatures during those seasons which allowed for greater curtailment. For example, most of the fall season's demand impacts were achieved during the September events, which had average outdoor temperatures around 90°F, versus the remaining fall events, which had much lower average outdoor temperatures (58°F and 36°F) and were more similar to

the spring events. As discussed, Summer Cycler appeared to have event execution issues in the 2025 season, and events had minimal, if any, demand impacts.

Table 7. Key Impact Findings: Smart Cycle and Summer Cycler Average and Maximum Per-Device Demand Reduction

Savings Type	Program	Group	Spring (kW)	Summer (kW)	Fall (kW)
Average per-device demand reduction	**Smart Cycle**	All thermostats	0.10	1.05	0.59
		ecobee thermostats	0.16	1.04	0.46
		Nest thermostats	0.06	1.08	0.63
		Other thermostats	0.17	0.97	0.61
	Summer Cycler	Air conditioners	N/A	0	N/A
Maximum per-device demand reduction (across both event hours of the event with the highest average savings)	**Smart Cycle**	All thermostats	0.19	1.08	0.94
		ecobee thermostats	0.26	1.14	0.92
		Nest thermostats	0.19	1.08	0.95
		Other thermostats	0.33	1.04	0.92
	Summer Cycler	Air conditioners	N/A	0.08	N/A

N/A indicates that there was not an event in that season for that program.

Total Megawatt Reduction across the 2025 Event Season. The following totals in Table 8 are the sums of the estimates of total achieved demand reductions in megawatts for all event hours (excluding pre- and post-event hours) among the treatment groups. The total achieved reduction for Summer Cycler is negative because treatment customers had marginally higher total demand than control customers during event hours; the total megawatts shown here are the sums of the total achieved program impacts per event (during event hours) reported in *Appendix C* and *Appendix D*.

Table 8. Key Impact Findings: Smart Cycle and Summer Cycler Total Demand Reduction

Program	Total Demand Reduction (MW)		
	Spring	Summer	Fall
Smart Cycle	2.60	26.13	14.94
Summer Cycler	N/A	-0.02	N/A

N/A indicates that there was not an event in that season for that program.

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Based on the findings from the 2025 demand response impact evaluation, Cadmus offers the following conclusions and recommendations.

1.2.1. Smart Cycle

Conclusion: Vp duw#F|fdn#frqwlqxhv#wr#surylgh#xevwdqwldd#dqg#frqvlvwhqw#hp dqg#hgxfwlrq#fdsdelolw|1#

Across all summer 2025 events, the average outdoor temperature was 82°F, and ecobee thermostats achieved an average demand reduction of 1.04 kW, Nest devices achieved 1.08 kW, and other devices achieved 0.97 kW. Because the majority (53%) of enrolled devices are Nest devices (ecobee and other thermostats make up the remaining 27% and 20%, respectively), the average reduction per thermostat

was 1.05 kW, which is slightly higher than results in previous years (0.94 kW in 2024, 0.95 kW in 2023, 1.0 kW in 2022, 0.92 kW in 2021, 1.1 kW in 2018, and 1.0 kW in the 2016 pilot). The newly added spring and fall events further showcased that the Smart Cycle program is capable of reducing demand during high-temperature events, and that demand reduction is difficult to achieve on lower-temperature days. Thermostats were able to achieve only 0.10 kW of demand reduction on average during the spring events, which had an average outdoor temperature of 59°F. Temperatures were higher on average during the fall events (69°F), and thermostats were able to reduce demand by 0.59 kW during those events.

With 9,384 ecobee, Nest, and other (Honeywell, Amazon, Lux Products, Sensi, Alarm.com, and Vivint GoControl) thermostats enrolled as of December 2025, the Smart Cycle program could achieve total forecasted demand savings of 6.90 MW during MISO summer load curtailment events from 2 p.m. to 6 p.m. (see Footnote 4). In recent years, MISO events have occurred on days that were cooler than average in CenterPoint Energy's Indiana service territory, and Cadmus' achievable savings forecasts for Smart Cycle take this into account. However, if future MISO events were to occur on days when local temperatures exceed 85°F, achievable savings during MISO events could exceed 10 MW. Given the lower temperatures expected in spring and fall, Cadmus predicts that the Smart Cycle program could achieve total forecasted demand savings of 0.51 MW and 0.98 MW, respectively, during MISO load curtailment events from 2 p.m. to 6 p.m. during those seasons.[4]

Recommendation: Continue building out the IT resources required to collect, store, and transmit the hourly electricity consumption data collected by AMI meters. Making AMI data available for evaluation will improve the accuracy and precision of program savings estimates and MISO event forecasts. AMI data can also ease the transfer process for evaluation data for CenterPoint Energy, as it will not need to request or collect large run-time datasets from EnergyHub.

Conclusion: Lq#frqwudvw#lwk#suhylrxv#hduv/#ghp dqg#p sdfw#huh#vlp lodu#furvv#nfrehh/#Q hw/#dqg#rwkhu# wkhup rwdw#lq#kh#5358#vhdvrq1#

Cadmus estimated average per-thermostat event demand impacts by thermostat brand for each event and season and found little variation in savings among thermostat brands. For spring events, the average event demand reduction was 0.10 kW; ecobee thermostats achieved 0.16 kW reduction, Nest thermostats achieved 0.06 kW, and other thermostats achieved 0.17 kW. For summer events, the average event demand reduction was 1.05 kW; ecobee thermostats achieved 1.04 kW, Nest thermostats achieved 1.08 kW, and other thermostats achieved 0.97 kW. For fall events, the average event demand reduction was 0.59 kW; ecobee thermostats achieved 0.46 kW, Nest thermostats achieved 0.63 kW, and other thermostats achieved 0.61 kW. This shows a marked improvement in the performance of other thermostat brands in comparison with previous years.

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[4] These forecasts are the average of the projected demand impacts for hours 14, 15, 16, and 17 for potential Smart Cycle MISO spring events (Table 3), summer events (Table 4), and fall events (Table 5), respectively. They are based on a MISO forecasting model that is separate from the Smart Cycle event impact estimates reported in Table 14.

Recommendation: Smart Cycle has been a registered MISO load-modifying resource for three seasons. CenterPoint should continue efforts to convert existing Summer Cycler participants to Smart Cycle. Nest, ecobee, and other eligible smart thermostats deliver substantial, consistent demand reduction during events. Smart Cycle delivers substantially larger per-device savings than Summer Cycler's radio-controlled switches due to differences in the demand response strategy (temperature setbacks for smart thermostats; 50% cycling for Summer Cycler switches) and provide better system reliability.

Conclusion: Wkhup rwdw#suhfrodj#q#kh#krxu#ehiruh#ndfk#hyhqw#dqg#srw0hyhqw#vqdsedfn#glg#qrw# lqfuhdvh#sdwlfsdqwv#ryhudoo#hqhuj|#frqvxp swlrq#rq#xp p hu#hyhqw#gd|v#z khq#hp shudwxuh#dqg# uhvxowlqj#hyhqw#xudlp hqw#srwhqwldo#z huh#klj k1#K rz hyhu,#vrp h#sdwlfsdqw#frqvxp hg#vdjkw|#p ruh# hqhuj|#kdq#kvxdd#rq#qrq0vxp p hu#hyhqw#gd|v#gxh#r#surs ruwrqdo|#klj khu#suhfrodj#ehiruh#hyhqw# z khq#hp shudwxuv#dqg#hvxowlqj#hyhqw#xuwdlp hqw#srwhqwldo#z huh#orz hu1#

On average, thermostats saved 0.48 kWh on each summer event day, when temperatures averaged 82°F. However, participants consumed 0.07 kWh more than usual on spring event days on average, when temperatures averaged 59°F. For fall events, when the average temperature of 69°F fell between that of the spring and summer events, results were mixed. Participants with ecobee thermostats consumed the same amount of energy as in non-event days, those with Nest thermostats saved 0.22 kWh of energy, and those with other thermostats consumed an additional 0.20 kWh of energy on average. For each case in which participants consumed additional energy during events, outside temperatures were low enough that event precooling was likely unnecessary, as homes were probably already cool. Precooling on these event days increased load prior to the events, but because of the lower outdoor temperatures, increasing the setpoint during event hours did not result in substantially reduced load during the events (despite statistical significance), resulting in an overall increase in energy consumption on these cool-weather event days. However, the billing impacts of the additional energy use should be minimal: the additional energy consumed of up to 0.20 kWh per cool-weather event day on average would cost participating customers approximately $0.03 per event—far less than the $7.50 per month incentive CenterPoint Energy offers Smart Cycle enrollees.

Recommendation: Avoid cool-weather events as much as possible within MISO requirements, and limit precooling for those events. Take advantage of hot weather days for events when possible to achieve the greatest demand reduction. In discussions with stakeholders and in customer-facing program messaging, state that most customers will not experience higher bills due to the precooling that thermostats employ in advance of Smart Cycle events. Explain that precooling shifts the load to hours before peak demand conditions, reduces the extent to which indoor temperatures rise above normal during events, and improves demand reduction performance during events. Education on these topics may encourage hesitant customers to enroll and participate in demand response programs.

1.2.2. Summer Cycler

Conclusion: Wkh#Vxp p hu#F|fdn#surjudp #wuxjjdng#wr#ihgxfh#ghp dqg#gxulqj#kh#5358#hyhqw#hdvrq1# K dugz duh#bp lwdwlrqv#ri#wkh#djlqj#Vxp p hu#F|fdn#z lfk#dhhw#p d|#kdyh#frp surp lvhg#wkh#hddeldw|#ri# wkh#surjudp #dv#d#ghp dqg#hvsrqvh#hvrxufh1#

On average across all load-control events, Summer Cycler did not achieve demand impacts statistically different from zero at the 10% level, although event temperatures averaged 80˚F.

The historical per-unit demand reduction for Summer Cycler is furthermore far lower than that estimated for Smart Cycle, and Cadmus' previous evaluations showed high rates of Summer Cycler switch failure. CenterPoint Energy's Summer Cycler switches, some of which are more than 20 years old, provide only one-way communication. There is no way to verify whether switches have received the curtailment signal during a demand response event, and there is no way of verifying the count of switches (or switch functionality) without a physical site visit. All these factors compromise both the per-unit demand reduction capabilities from Summer Cycler and the program's reliability if called upon as a MISO load curtailment resource, as seen in the 2025 evaluation.

Recommendation: Continue to target Summer Cycler program participants for enrollment in Smart Cycle, because Smart Cycle delivers much greater per-device demand impacts and reliability.

Conclusion: Orjjhu#rvvhv#zhuh#frp p rq#kq#5358/#dqg#hz hu#gdwd#orjjhuv#hqgxfhv#wkh#suhflvlrq#ri# hydoxdwhg#hvxowv1#

Because whole-home AMI meter data are not available, the evaluation relies on data loggers. Unfortunately, logger equipment frequently goes missing during the summer, further reducing an already small sample for evaluation. During summer 2025, 47 of the 243 data loggers were either lost in the field after being installed or recorded faulty data at participating households.

Recommendation: As recommended for Smart Cycle, continue building out the IT resources required to collect, store, and transmit hourly electricity consumption data generated by AMI meters. The availability of AMI data will reduce or even eliminate the cost of renting, installing, and collecting data from data loggers. AMI data will also improve the accuracy and precision of program savings estimates and MISO event forecasts by allowing much larger sample sizes (like those of Smart Cycle or larger). As noted in previous evaluations, Summer Cycler switch failures are common for water heaters, and the 2025 evaluation indicates that this is also true for air conditioners. Cadmus has applied per-unit impacts from previous evaluations for water heaters since 2019 due to the difficulty in accessing water heater data loggers installed within participants' homes. The larger evaluation sample sizes made possible by AMI will provide CenterPoint Energy with the most accurate assessment of the demand reduction performance of its existing Summer Cycler switch population.

Conclusion: Vxp p hu#F|fdn#wkrxjk#qrw#eh#hjlwhuhg#dv#d#hvrxufh#z lwk#P IVR #ru#5391#

The evaluation team was unable to identify any consistent or statistically significant impacts from the 2025 Summer Cycler event season. The team was also unable to determine why events failed to achieve impacts, as the technology utilized to evaluate events does not provide insight into the underlying event execution mechanisms. Despite a thorough review of program data, the evaluation team could not provide CenterPoint Energy with any actionable steps needed to ensure that the program executes events as designed in 2026.

Recommendation: Until CenterPoint Energy can identify the underlying causes of the apparent failure of the Summer Cycler program to achieve targeted impacts and make necessary corrections, Cadmus recommends that CenterPoint Energy not register this resource with MISO. If and when those corrections can be made, Cadmus recommends thorough testing of the program before re-registering it with MISO.

Recommendation: CenterPoint should rigorously and thoroughly test the radio communication system used to control Summer Cycler devices. This could include the testing of radio communication from dispatching antennas, confirmation from Itron that signals where received by control devices, and the ramping up of the inspection and maintenance of summer cycler switches to identify non-functioning devices. During this process, CenterPoint should also attempt to convert existing Summer Cycler customers to Smart Cycle, and if not successful, unenroll customers from Summer Cycler where switches are found to be missing or non-functioning.

2. Demand Response Program Overview

CenterPoint Energy can initiate load-control events through the Smart Cycle and Summer Cycler programs to reduce residential and small commercial electric loads for these reasons:

- Balancing utility system supply and demand
- Alleviating transmission or distribution constraints
- Conducting evaluation, measurement, and verification (EM&V)

In the summer of 2025, Summer Cycler and Smart Cycle offered additional benefits to CenterPoint Energy as loads enrolled in these programs were also registered with MISO, the regional electricity transmission grid authority, for participation in its load curtailment events. Summer Cycler, however, appeared to have event execution issues in 2025 and was generally not able to reduce load during events. Conversely, the expanded event season for Smart Cycle (March to November) allowed for more load curtailment than in previous years.

The following sections provide an overview of each program's implementation in the 2025 season.

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The Smart Cycle program uses smart thermostats to curtail residential central air conditioner loads during hours of system peak demand. Smart Cycle is implemented by EnergyHub. CenterPoint Energy notifies participants in advance of events via messages on their thermostat display and via the thermostat manufacturer's smartphone app; participants may opt out of individual events by changing the thermostat setpoint. The 2025 Smart Cycle curtailment season ran from March 1 through November 30 in accordance with new MISO seasonal requirements. Our analysis examines the spring, summer, and fall months (March through May, June through August, and September through November, respectively) separately.

Smart Cycle has two enrollment channels: direct installation by CenterPoint Energy and Bring Your Own Thermostat (BYOT) self-enrollment. In 2025, direct install participants received a free smart thermostat and installation by Schneider Electrical, while BYOT participants installed compatible smart thermostats on their own, without CenterPoint Energy's involvement, and received a one-time $75 bill credit for enrolling their device in the Smart Cycle program. All Smart Cycle participants also received a $7.50 bill credit per month for each thermostat enrolled from March through November. At the end of 2025, 5,015 (53%) Smart Cycle participants had Nest thermostats, 2,517 (27%) had ecobee thermostats, and 1,852 (20%) had other thermostats (including Honeywell, Sensi, Amazon, Alarm.com, Lux, and Vivint GoControl). In previous years, because the sample of thermostats other than Nest and ecobee was too small to yield meaningful, statistically significant comparisons of impact by brand, Cadmus recommended that CenterPoint Energy exclude these other thermostats from the evaluation until their sample size increased. In 2024, the sample of all other thermostats became large enough to yield a meaningful, statistically significant comparison, so these other thermostats are included in the evaluations for 2024 and later.

2.1.1. Smart Cycle Load-Control Event Summary

In 2025, CenterPoint Energy initiated 10 Smart Cycle load-control events for EM&V purposes. CenterPoint Energy called the load-control events primarily on days with high forecasted temperatures in its service territory (80˚F or higher), simulating days with higher system peak demand than usual. Besides these hot-weather event days, CenterPoint also ran events on cooler days in March, April, May, October, and November to meet the new MISO requirements. Table 9 lists the 2025 Smart Cycle load-control events. On average, temperatures during summer event days were similar in 2025 (82˚F) to 2024 (88˚F). The temperatures were lower on average during non-summer event days (59˚F in the spring and 69˚F in the fall). The maximum temperature across all events in 2025 was 92˚F on September 15th.

Table 9. 2025 Smart Cycle Program Load Control Events

Event	Season	Event Date	Day of the Week	Time	Average Outside Temperature during Event
1	Spring	Mar 31, 2025	Monday	2 pm - 4 pm	45˚F
2	Spring	Apr 23, 2025	Wednesday	2 pm - 4 pm	67˚F
3	Spring	May 21, 2025	Wednesday	2 pm - 4 pm	67˚F
4	Summer	Jul 16, 2025	Wednesday	2 pm - 4 pm	81˚F
5	Summer	Aug 8, 2025	Wednesday	2 pm - 4 pm	82˚F
6	Summer	Aug 15, 2025	Friday	2 pm - 4 pm	85˚F
7	Fall	Sep 12, 2025	Friday	2 pm - 4 pm	89˚F
8	Fall	Sep 15, 2025	Monday	2:45 pm - 4:45 pm	92˚F
9	Fall	Oct 28, 2025	Tuesday	2 pm - 4 pm	58˚F
10	Fall	Nov 10, 2025	Monday	2 pm - 4 pm	36˚F

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The Summer Cycler program uses radio communication equipment and control switches installed on customer equipment to cycle air conditioner compressors and turn off water heaters during load-control events. CenterPoint Energy does not notify program participants in advance of events. Residential customers qualify for the program, with customers receiving a bill credit of up to $21 (if both a water heater and an air conditioner are enrolled) per cooling season as an incentive for participation.

CenterPoint Energy has closed Summer Cycler to new enrollees and encourages would-be participants to enroll in Smart Cycle instead. However, since Smart Cycle is a newer program, Summer Cycler remains substantially larger with 23,351 customers than Smart Cycle with 9,384 thermostats. Table 10 shows the number of customers and premises enrolled in the Summer Cycler program. A single premise may have more than one air conditioner or water heater, so some premises have multiple switches installed.

Table 10. Number of Residential Customers and Premises in the 2025 Summer Cycler Program

Load Control	Customers	Premises	Switches
Air Conditioners	17,906	17,893	17,914
Water Heaters	5,445	5,433	5,447
Total	23,351	23,326	23,361

2.2.1. Summer Cycler Load-Control Event Summary

In 2025, CenterPoint Energy initiated six load-control events for EM&V purposes. Table 11 lists the load-control events in the 2025 Summer Cycler program. On average, temperatures during event days were lower in 2025 (80˚F) than they were in 2024 (95˚F), 2023 (88˚F), 2022 (90˚F), 2021 (89˚F), and 2019 (89˚F). The maximum temperature across all events was 85˚F.

Table 11. 2025 Summer Cycler Program Load Control Events

Event	Event Date	Day of the Week	Time	Average Outside Temperature during Event
1	July 16, 2025	Wednesday	2 pm - 4 pm	81°F
2	July 31, 2025	Thursday	2 pm - 4 pm	82°F
3	August 5, 2025	Tuesday	2:30 pm - 4:30 pm	77°F
4	August 8, 2025	Friday	2 pm - 4 pm	82°F
5	August 15, 2025	Friday	2 pm - 4 pm	85°F
6	August 21, 2025	Thursday	2 pm - 4 pm	73°F

3. Methodology

This section describes the methodology Cadmus used to estimate 2025 demand impacts and energy savings from CenterPoint Energy load-control events. Both the Smart Cycle and Summer Cycler programs were implemented as randomized controlled trials. For each program, Cadmus randomly selected treatment and control customers—those who would experience load curtailment during load-control events and those who would not—in advance of the summer 2025 event season. Treatment groups received load curtailment during the events, and control groups did not.

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3.1.1. Participant Assignment

Prior to the beginning of the summer 2025 event season, Cadmus randomly assigned half the participants enrolled in Smart Cycle to a treatment group and half to a control group. Cadmus used historical billing data to divide the population into lowest, low, medium, high, highest, and unreported strata according to the home's average daily consumption during the summer months. Cadmus then randomly assigned homes within each stratum to the treatment or control group for each brand of thermostat. If customers had multiple thermostats enrolled, Cadmus assigned all of their enrolled thermostats to the same treatment or control group.

3.1.2. Data Collection and Preparation

Cadmus collected program tracking data from CenterPoint Energy, thermostat run-time data from EnergyHub, and local hourly weather data for the Evansville Regional Airport from the National Oceanic and Atmospheric Administration (NOAA).

Cadmus compared CenterPoint Energy's customer database to the pre-season treatment and control group assignments and to EnergyHub's run-time data to determine if the data were complete or if significant amounts of data were missing. Table 12 shows the sample populations (number of thermostats). Note that the total analyzed population size is smaller than the population reported in CenterPoint Energy's program tracking data. Due to EnergyHub's thermostat run-time data anonymization, Cadmus could not verify from the tracking data whether the devices included in EnergyHub's run-time data maintained active enrollment in a CenterPoint Energy program. When estimating total program potential, Cadmus used CenterPoint Energy's tracking data rather than EnergyHub's total population.

Table 12. 2025 Smart Cycle Analysis Sample Size

Group Assignment	Type of Thermostat	EnergyHub Run-Time Data Population	Analyzed Population
Treatment	ecobee	1,060	1,015
	Nest	2,601	2,489
	Other	806	642
	Total	**4,467**	**4,146**
Control	ecobee	1,006	965
	Nest	2,520	2,406
	Other	834	760
	Total	**4,360**	**4,131**
Total	ecobee	2,066	1,980
	Nest	5,121	4,895
	Other	1,640	1,402
	Total	**8,827**	**8,277**

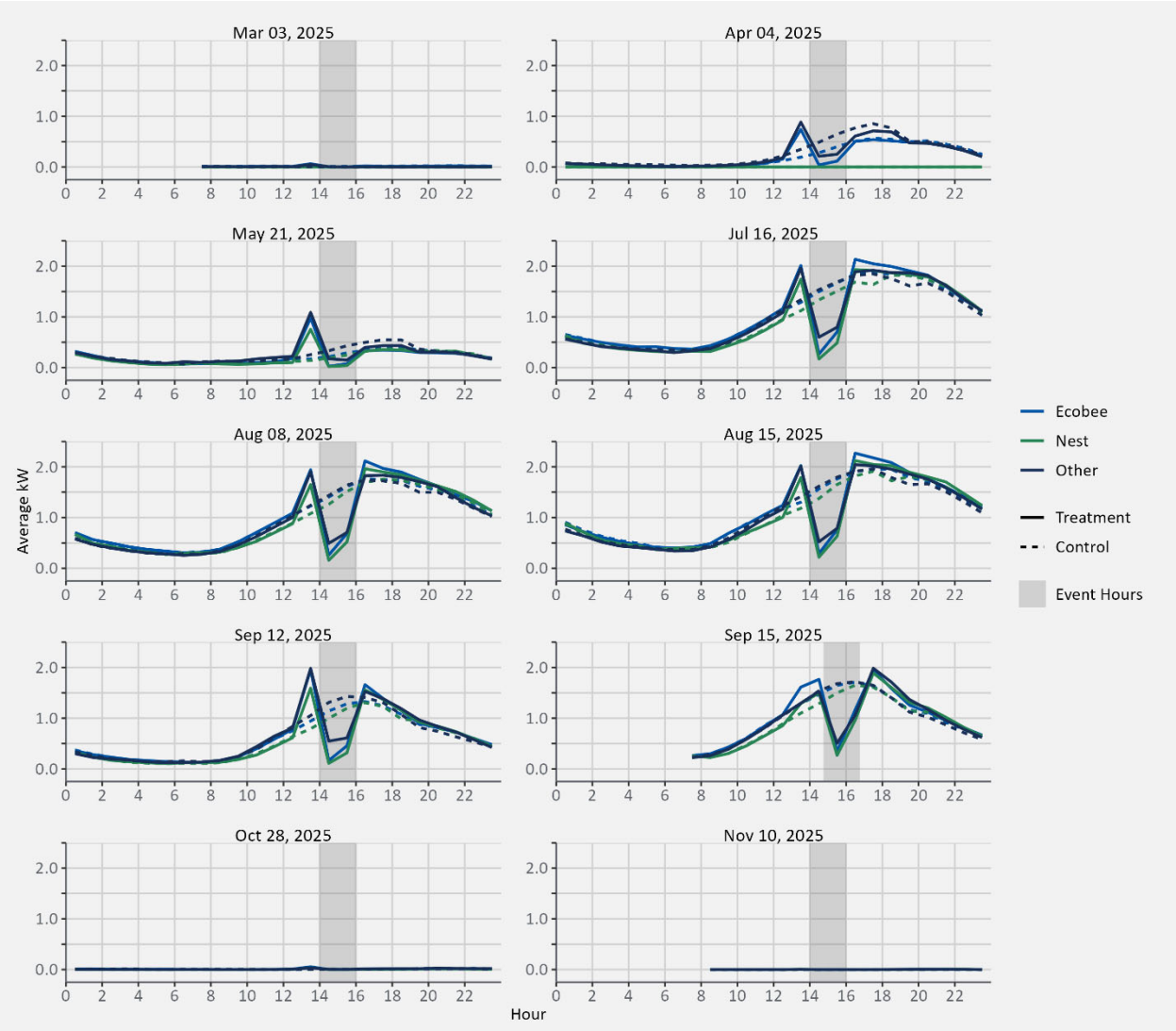
Conversion of Run Time to Kilowatt-Hours

To estimate impacts from load-control events, Cadmus used an engineering formula to convert run-time minutes per hour to average kilowatts per hour for each central air conditioner.[5] For full details of this calculation, refer to *Appendix A*.

Before proceeding with the impact analysis, Cadmus reviewed the average hourly energy consumption for each event day, as shown in Figure 1. Reductions in demand among the treatment groups due to load-control events were visible in months when temperatures were high enough for customers to have their thermostats on. In cooler shoulder months, small precooling effects can be seen even when curtailment was not visible, confirming that the event list CenterPoint Energy provided was accurate and that the program's summer 2025 events had proceeded as planned. Only the November 10 event showed no event-related thermostat activity, likely due to the very cold temperatures (average 36°F) that day.

[5] Cutler, D., et al. January 2013. *Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations.* NREL Technical Report, NREL/TP-5500-56354. http://www.nrel.gov/docs/fy13osti/56354.pdf

Figure 1. Smart Cycle Average Hourly Air Conditioning Energy Consumption by Event Day, Thermostat Manufacturer, and Treatment Group



3.1.3. Demand Reduction Estimation

Cadmus used a post-only regression model to estimate average demand impacts per thermostat for the hours before, during, and after each event. Regression analysis is a means of modeling savings by comparing the energy consumption of treatment and control customers while controlling for exogenous factors, such as weather. Refer to *Appendix A* for more details about Cadmus' specific regression analysis variables.

3.1.4. Energy Savings Estimation

Cadmus estimated energy savings from Smart Cycle air conditioning load-control events by aggregating the hour interval kilowatt-hours to daily kilowatt-hours for each thermostat and then estimating a regression model for daily kilowatt-hours. Cadmus controlled for fixed effects by capturing effects specific

to a day. The daily regression models include an indicator for treatment customer event days to estimate possible event day kilowatt-hour savings. *Appendix A* describes the regression model specification and estimation procedures.

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3.2.1. Participant Assignment

At the beginning of summer 2025, CenterPoint Energy's installation contractor (Schneider Electrical) installed end-use meters (loggers) on a representative sample of residential air conditioners in the Summer Cycler program. Cadmus randomly assigned customers with air conditioners in the logger analysis sample to a treatment or control group, first by dividing the sample into lowest (lowest 10%), low (10% to 25%), low-mid (25% to 50%), mid-high (50% to 75%), and high (75% to 100%) strata according to the home's air conditioning energy use on non-event weekday afternoons in 2023 (using logger data from the 2023 evaluation), then by randomly assigning customers within each stratum to the treatment or control group. Cadmus assigned the loggers with no available logger data from 2023 to an unreported stratum. Approximately half of the metered air conditioner customers were assigned to the treatment group and half to the control group. Because some customers have multiple air conditioners, this resulted in more loggers in each group than premises.

Due to difficulty accessing water heaters for data logger installation and retrieval in previous evaluations (which was exacerbated by the COVID-19 pandemic), Cadmus did not plan to conduct a water heater field experiment in 2025. Instead, Cadmus decided to apply fixed per-unit demand and energy savings for water heaters. This methodology was supported by the results of Cadmus' previous Summer Cycler evaluations, which showed that water heater savings were stable and consistent across program years and load-control events. For this reason, the following sections on the Summer Cycler methodology concern the evaluation of only air conditioners. For water heaters, Cadmus applied fixed values demand and energy savings values from the 2019 evaluation. However, given the apparent event execution failures of the Summer Cycler air conditioner switches, it is possible that similar issues could arise with the water heater switches and decrease achievable energy savings during load-control events.

3.2.2. Data Collection and Preparation

To prepare for data analysis, Cadmus first cleaned the logger data provided by CenterPoint Energy. The analyzed treatment and control groups were not identical in size as some loggers were damaged, missing, or inaccessible for data collection after the summer event season concluded. Table 13 presents the attrition of the logger data (based on the loggers Cadmus originally assigned to treatment and control groups before the summer season began). Twenty-six of the originally assigned loggers went missing after installation at participating homes in 2025. Eighteen did not record any data or recorded an insufficient amount of data for inclusion in the analysis. Three did not record any data within the analysis date period.

Table 13. 2025 Summer Cycler Analysis Sample Size

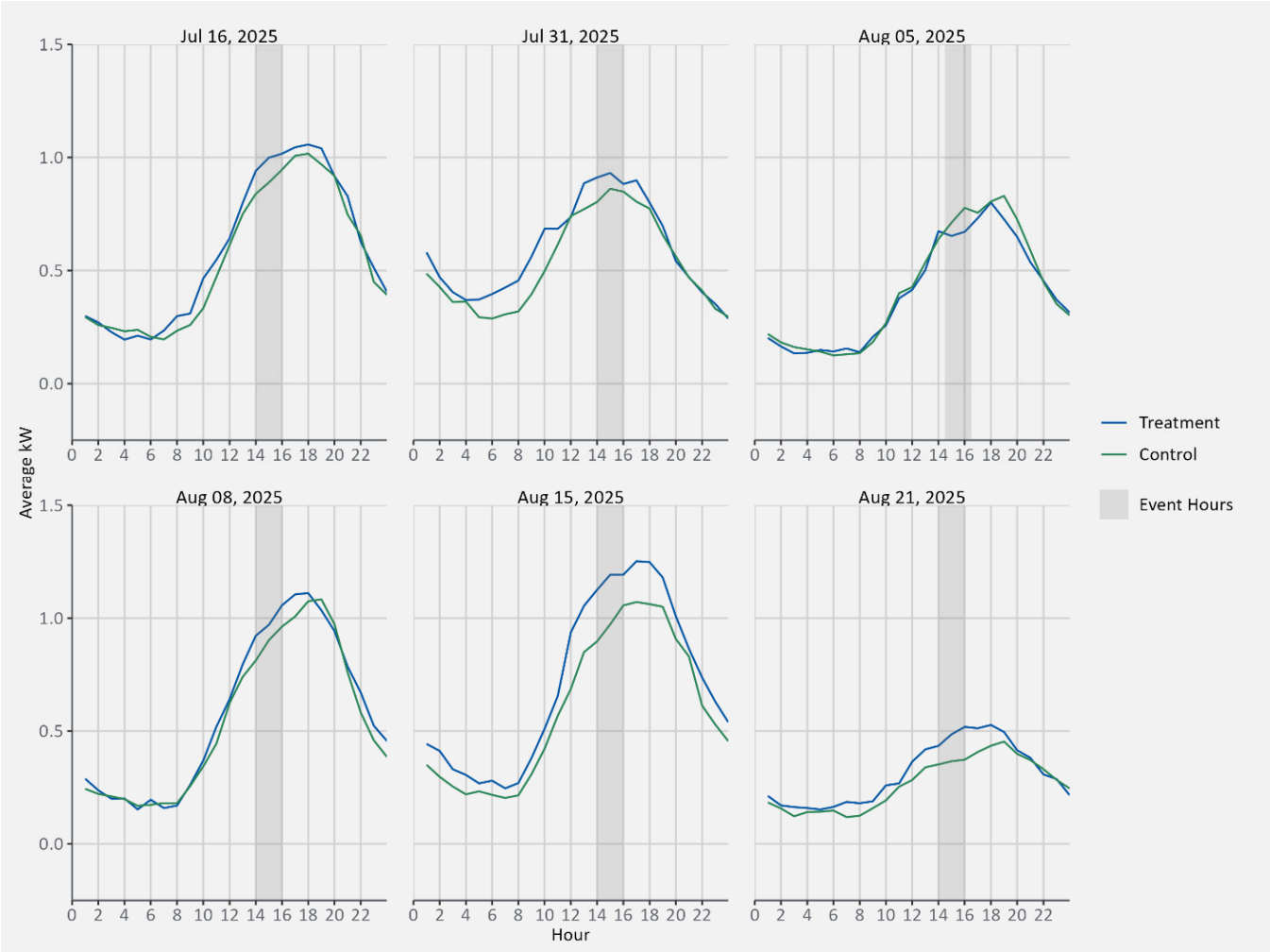
Sample Group/Logger Status	Air Conditioner Loggers		
	Treatment	Control	Total
Randomized	**132**	**111**	**243**
Out of Date Range[a]	0	3	3
Bad[b]	11	7	18
Can't Access	0	0	0
Gone	16	10	26
Analyzed	**105**	**91**	**196**

[a] Loggers that did not have any usage data available between June 1, 2025, and September 1, 2025.

[b] A logger was defined as "bad" if it had only negative or extreme consumption (greater than 6 kWh per hourly reading), less than two weeks of usage data, or no usage data on at least one event day.

Before proceeding with the impact analysis, Cadmus reviewed the average hourly energy consumption for each event day (Figure 2). Demand reductions for the treatment group during load-control events were not observed for any event (though the August 5th event showed borderline savings in the early modeling phase), indicating that the program's summer 2025 events had not proceeded as planned. As part of our quality control process, Cadmus reviewed hourly energy consumption for the days before and after reported event days, for participant consumption strata, and individual logger-day device reads, but found no consistent or statistically significant evidence of demand reductions during events. CenterPoint Energy confirmed the event dates and noted that event dispatch system tests indicated that the systems appeared to be functioning, though test data was limited by the one-way communicating switches' inability to provide feedback to cell towers and CenterPoint staff. Despite a thorough review of all available data, neither Cadmus nor CenterPoint Energy could determine the cause of the assumed device event participation failures.

Figure 2. Summer Cycler Average Hourly Air Conditioning Energy Consumption by Event Day and Treatment Group



3.2.3. Demand Reduction Estimation

Cadmus estimated demand reduction from CenterPoint's Summer Cycler program using data from the logger analysis sample. The methodology included these steps (*Appendix B* provides more details):

- Pooling logger electricity-demand data and estimating a model for air conditioning end use
- Defining the analysis sample period as June 1, 2025, to August 31, 2025, and using data for all loggers and hours during this period

- Estimating demand reduction from air conditioning load control as a post-only model of demand per hour, which effectively compared the change in demand between event and non-event hours of treatment and control group units[6]

Cadmus modeled demand per hour as a function of hour of the day, average non-event day usage, and indicators for hours during and after events. The air conditioner demand impact model specification allowed the effects of hour of the day and average non-event day usage to differ between treatment and control units.[7]

3.2.4. Energy Savings Estimation

Cadmus estimated energy savings from air conditioning load control by aggregating the hour interval kilowatt-hours to daily kilowatt-hours for each air conditioner unit and then estimating a regression for daily kilowatt-hours. Cadmus controlled for fixed effects by capturing effects specific to a day. The daily regression models include an indicator for treatment customer event days to estimate possible event day kilowatt-hour savings. *Appendix B* describes the regression model specification and estimation procedures.

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[6] The post-only analysis offered two benefits: it resulted in more precise impact estimates than standard regression analysis, and it controlled for non-program energy-use impacts correlated with events.

[7] This is not necessary for the water heater demand impact model as water heating load curtailment is not dependent on outdoor temperatures.

4. Detailed Smart Cycle Impact Evaluation Findings

This section presents Cadmus' detailed findings from the 2025 Smart Cycle program impact evaluation. Table 14 summarizes the 2025 Smart Cycle impacts—a negative impact indicates a reduction in energy usage (and therefore savings). Demand reduction was greater for summer events when outdoor temperatures were higher than in spring and fall events when outdoor temperatures were lower, on average.

Across the three summer events, the average outdoor temperature was 82°F, the average demand reduction across all devices was 1.05 kW, and the average event day energy savings were 0.48 kWh per device. Note that despite the increase in consumption due to precooling in the hour before the events, the summer events still produced daily energy savings on average. This is because savings from the higher thermostat setpoints during the summer events more than compensated for the increase in consumption due to precooling. On average, each summer event reduced total demand by 4,357 kW and produced energy savings of 1,998 kWh. Had all enrolled thermostats been curtailed during load-control events (instead of just the treatment group), Smart Cycle could have achieved an average demand reduction of 9,861 kW and energy savings of 4,523 kWh per event day.

Across the three spring events, the average demand reduction across all devices was 0.10 kW, but devices consumed an additional 0.07 kWh of energy on event days because precooling demand impacts outweighed event curtailment. This is attributable to the very low average outdoor temperature during spring events (59°F). Across the four fall events, the average outdoor temperature was 69°F, the average demand reduction across all devices was 0.59 kW, and the average event day energy savings were 0.10 kWh per device. On average, fall events reduced total demand by 2,440 kW and produced energy savings of 407 kWh. Had all enrolled thermostats been curtailed during events, the program could have achieved an average demand reduction of 5,523 kW and energy savings of 922 kWh.

Table 14. 2025 Smart Cycle Program Evaluated Demand Impacts and Energy Savings

Season	Impact Estimate	Ecobee	Nest	Other	Average	Total Achieved Program Impact (n=4,146)[a]	Total Achievable Program Impact (n=9,384)[b]
Spring	**Average Event kW Impact**	**-0.16**	**-0.06**	**-0.17**	**-0.10**	**-425**	**-962**
	Average Event kW Hour 1	-0.14	-0.05	-0.13	**-0.09**	**-366**	**-829**
	Average Event kW Hour 2	-0.17	-0.07	-0.22	**-0.12**	**-484**	**-1,094**
	Average Precooling kW Impact	0.46	0.20	0.51	**0.31**	**1,301**	**2,944**
	Average Post-Event Hour 1 kW Impact	0.00	0.00	-0.08	**-0.01**	**-62**	**-140**
	Average Event Energy kWh Savings	**0.14**	**0.06**	**0.00**	**0.07**	**286**	**648**
Summer	**Average Event kW Impact**	**-1.04**	**-1.08**	**-0.97**	**-1.05**	**-4,357**	**-9,861**
	Average Event kW Hour 1	-1.16	-1.14	-0.99	**-1.12**	**-4,639**	**-10,501**
	Average Event kW Hour 2	-0.93	-1.01	-0.95	**-0.98**	**-4,074**	**-9,221**
	Average Precooling kW Impact	0.79	0.60	0.63	**0.65**	**2,695**	**6,100**
	Average Post-Event Hour 1 kW Impact	0.34	0.27	0.10	**0.26**	**1,064**	**2,408**
	Average Event Energy kWh Savings	**-0.40**	**-0.66**	**0.00**	**-0.48**	**-1,998**	**-4,523**

Season	Impact Estimate	Ecobee	Nest	Other	Average	Total Achieved Program Impact (n=4,146)[a]	Total Achievable Program Impact (n=9,384)[b]
Fall	**Average Event kW Impact**	**-0.46**	**-0.63**	**-0.61**	**-0.59**	**-2,440**	**-5,523**
	Average Event kW Hour 1	-0.65	-0.77	-0.73	**-0.73**	**-3,042**	**-6,885**
	Average Event kW Hour 2	-0.27	-0.50	-0.49	**-0.44**	**-1,839**	**-4,162**
	Average Precooling kW Impact	0.17	0.25	0.20	**0.22**	**921**	**2,084**
	Average Post-Event Hour 1 kW Impact	0.16	0.19	0.19	**0.18**	**746**	**1,688**
	Average Event Energy kWh Savings	**0.00**	**-0.22**	**0.20**	**-0.10**	**-407**	**-922**

[a] Number of thermostats in the assigned treatment group.

[b] Number of thermostats enrolled in the Smart Cycle program (including control customers) as of the end of 2025.

Table 15 lists historical per-unit air conditioner savings from Smart Cycle load-control events. Negative numbers indicate demand or energy savings. Smart Cycle's summer 2025 demand impact estimates are consistent with those of previous seasons, though full-day energy savings were lower than in 2023 and earlier years, likely due to larger precooling impacts in 2025 and 2024 in comparison with earlier years. Demand reductions and energy savings were lower in spring and fall of 2025 than in previous years due to cooler outdoor temperatures.

Table 15. Historical Smart Cycle Program Evaluated Energy and Demand Savings

Load-Control Event Impacts per Thermostat	2018[a]	2021[a]	2022[a]	2023[a]	2024[a]	2025[b]		
						Spring	Summer	Fall
Average Event Temperature	89˚F	92˚F	88˚F	89˚F	88˚F	59˚F	82˚F	69˚F
Average Event kW Impact	-1.1	-0.9	-1.0	-0.95	-0.94	-0.10	-1.05	-0.59
Average Post-Event Hour 1 kW Impact	0.37	0.22	0.28	0.20	0.20	-0.01	0.26	0.18
Average Event Energy kWh Impact	-0.88	-0.75	-0.71	-0.74	-0.42	0.07	-0.48	-0.10

[a] Summer (June-September) only.

[b] Spring covers March through May, summer covers June through August, and fall covers September through November. These season definitions differ from seasons in previous years because of new MISO season requirements.

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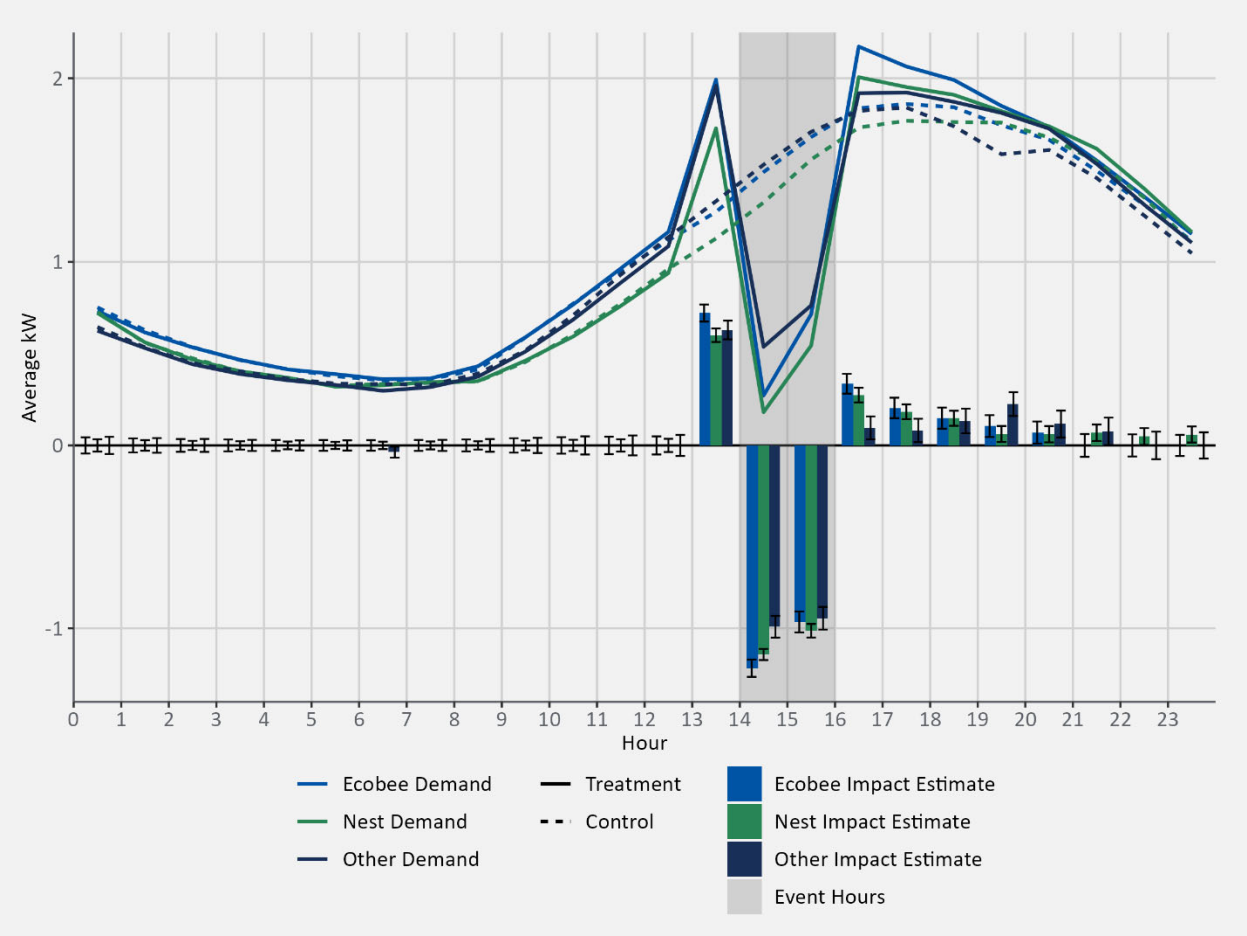
Across the three 2025 Smart Cycle summer events, the average demand reduction per thermostat was 1.12 kW in the first event hour and 0.98 kW in the second event hour, for an average of 1.05 kW reduction per thermostat across the two event hours. The estimated average demand reduction for each event hour was statistically different from zero at the 90% confidence level. Precooling caused a 0.65 kW demand increase per thermostat, which was statistically significant at the 90% confidence level. Rebound of air conditioning loads for these events was modest (0.26 kW per thermostat on average in the first hour after the events) but statistically significant. Estimated rebound impacts decreased for each hour after the event.

Figure 3 shows the average load shapes and impact estimates by thermostat manufacturer and control and treatment groups for summer 2025 events (all of which were from 2 p.m. to 4 p.m.). The columns

beneath the load shape show hourly impacts for each brand of thermostat. Each column's error bars show the 90% confidence intervals for each impact estimate. Customers with ecobee thermostats consumed more energy on average than customers with Nest thermostats.[8] Customers with other thermostats had consumption similar to customers with ecobee thermostats prior to events and similar to customers with Nest thermostats after events. During the hour before the event, ecobee thermostats showed larger precooling impacts (0.79 kW versus 0.60 kW for Nest and 0.63 kW for Other) and larger post-event impacts than Nest and other thermostats (0.34 kW versus 0.27 kW for Nest and 0.10 kW for Other). During the events, all thermostat brands showed considerable demand reduction during the first hour and slightly smaller reduction in the second hour. Nest and other thermostats had somewhat better persistence in demand reduction between the two event hours than ecobee thermostats. These findings of slightly higher reduction for ecobee thermostats than for Nest thermostats, and slightly higher reduction in the first hour of each event, are generally consistent with Cadmus' findings from other utilities that offer Nest and ecobee smart thermostat demand response programs.

[8] This may be due to the smaller sample of ecobee and other devices relative to Nest devices rather than systematic differences in air conditioning consumption by those households. However, this pattern has held constant across all recent previous Smart Cycle impact evaluations.

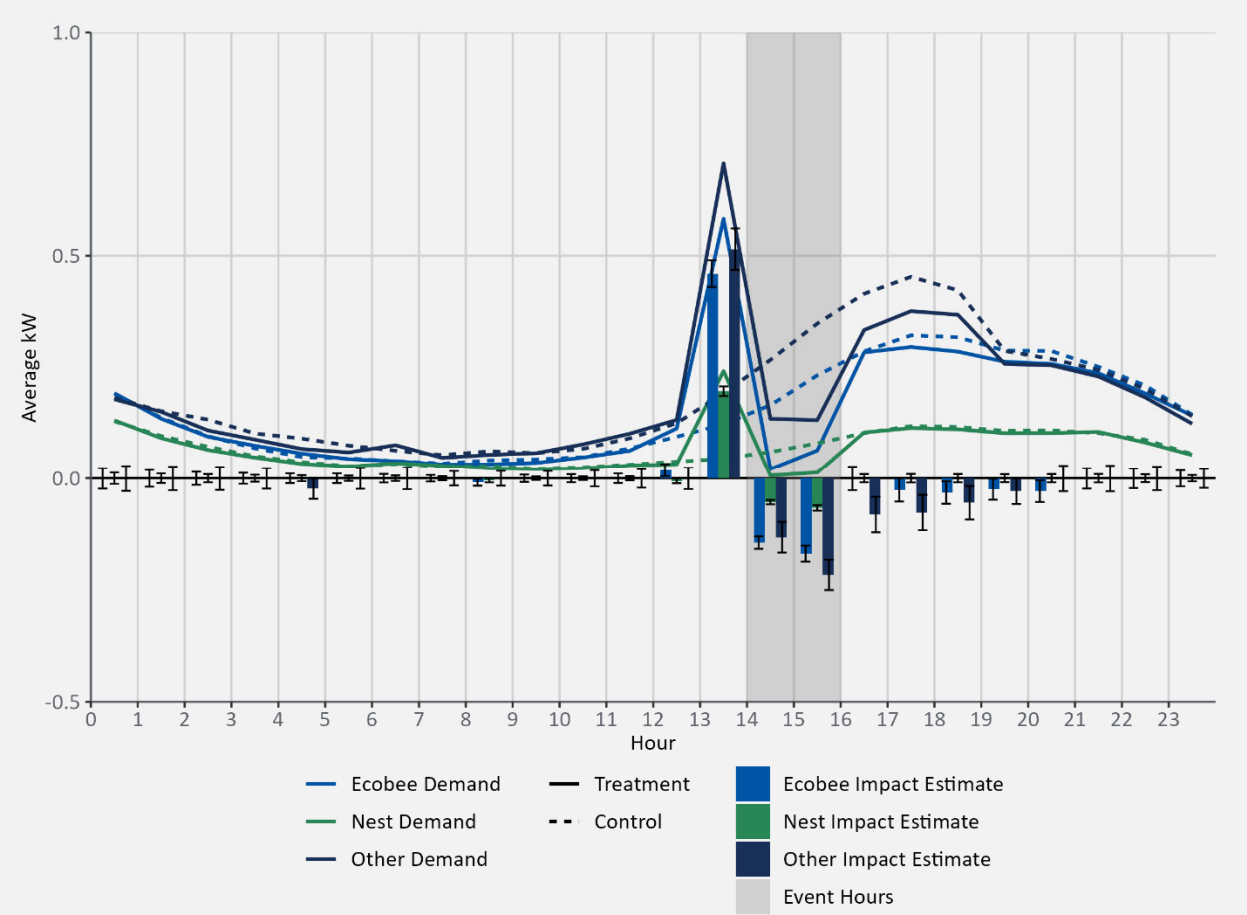
Figure 3. 2025 Smart Cycle Average 2 p.m. Summer Event Day Load Shapes and Impact Estimates



Across the three 2025 Smart Cycle spring events, the average demand reduction per thermostat was 0.09 kW in the first event hour and 0.12 kW in the second event hour, for an average of 0.10 kW reduction per thermostat across the two event hours. The estimated average demand reduction for each event hour was statistically different from zero at the 90% confidence level. The precooling impact was a 0.31 kW demand increase per thermostat, which was statistically significant at the 90% confidence level. Rebound of air conditioning loads for these events was statistically insignificant for ecobee and Nest thermostats, and other thermostats continued to reduce demand by 0.08 kW on average in the first hour after events.

Figure 4 shows the average load shapes and impact estimates for spring 2025 events (all of which were from 2 p.m. to 4 p.m.). Similar to the summer events, customers with Nest thermostats consumed less energy on average than customers with ecobee or other thermostats. During the hour before the event, ecobee and other thermostats showed much larger precooling impacts (0.46 kW and 0.51 kW, respectively) than Nest thermostats (0.20 kW). Demand reduction was similar across the two event hours (0.09 kW in the first hour and 0.12 in the second hour, on average), but Nest thermostats achieved less demand reduction on average during events (0.06 kW) than ecobee or other thermostats (0.14 kW and 0.17 kW, respectively).

Figure 4. 2025 Smart Cycle Average 2 p.m. Spring Event Day Load Shapes and Impact Estimates



Across the four 2025 Smart Cycle fall events, the average demand reduction per thermostat was 0.73 kW in the first event hour and 0.44 kW in the second event hour, for an average of 0.59 kW reduction per thermostat across the two event hours. The estimated average demand reduction in each event hour was statistically different from zero at the 90% confidence level. The precooling impact was a 0.22 kW increase per thermostat, which was statistically significant at the 90% confidence level for ecobee (0.17 kW) and Nest (0.25 kW) thermostats. Rebound of air conditioning loads for these events was modest (0.18 kW per thermostat on average in the first hour after the events) but statistically significant for Nest and other thermostats (0.19 kW each). Estimated rebound impacts decreased with each hour after the event.

Figure 5 and Figure 6 show the average load shapes and impact estimates for 2 p.m. and 2:45 p.m. events, respectively, in fall 2025. Outdoor temperatures were much higher during the 2:45 p.m. event (92°F) than the 2 p.m. events (61°F, on average), which created greater opportunity for load curtailment during event hours for that event. Average demand impacts during the first event hour were about twice as large during the 92°F event than the remaining events. On average, Nest thermostats continued to consume less energy than ecobee and other thermostats during the hours after the event.

Figure 5. 2025 Smart Cycle Average 2 p.m. Fall Event Day Load Shapes and Impact Estimates

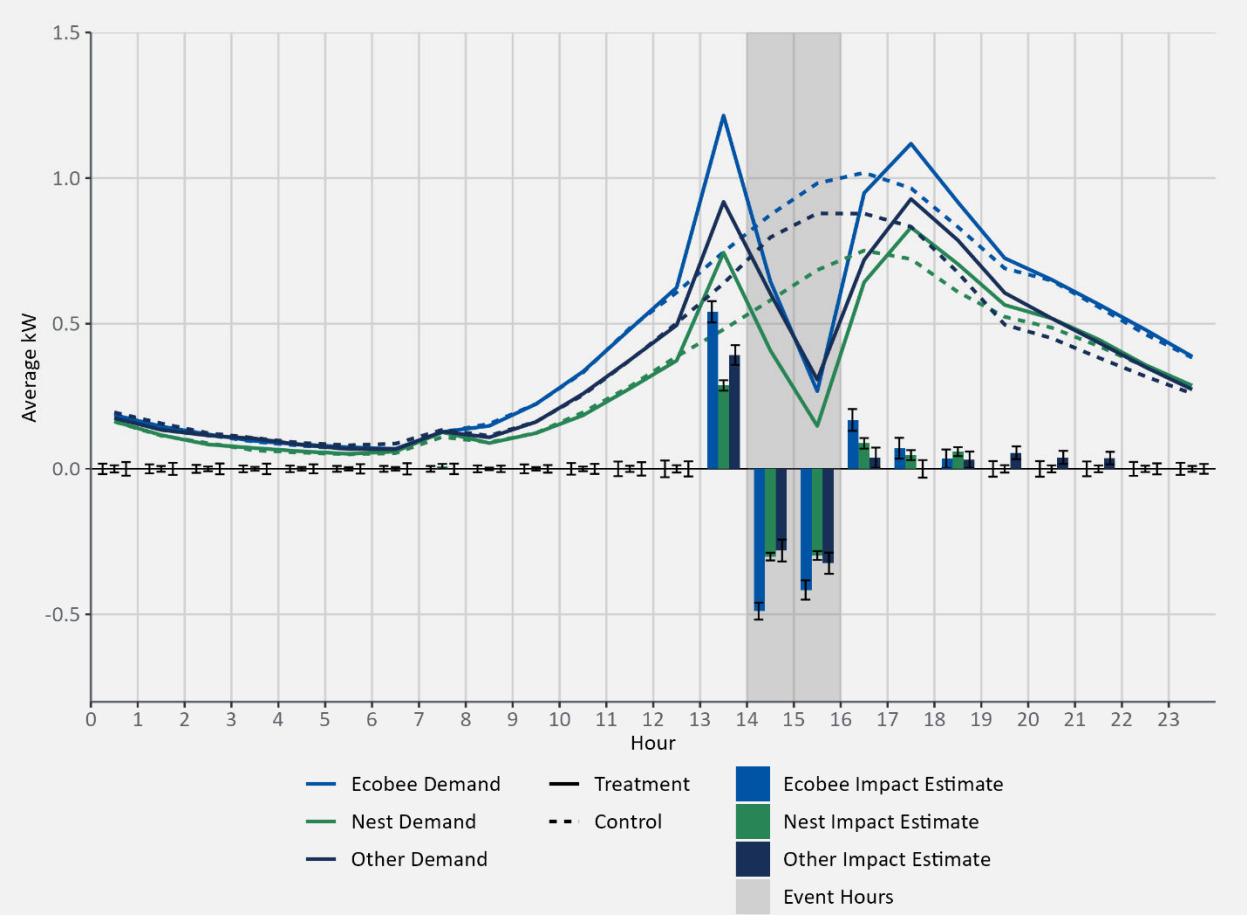


Figure 6. 2025 Smart Cycle Average 2:45 p.m. Fall Event Day Load Shapes and Impact Estimates

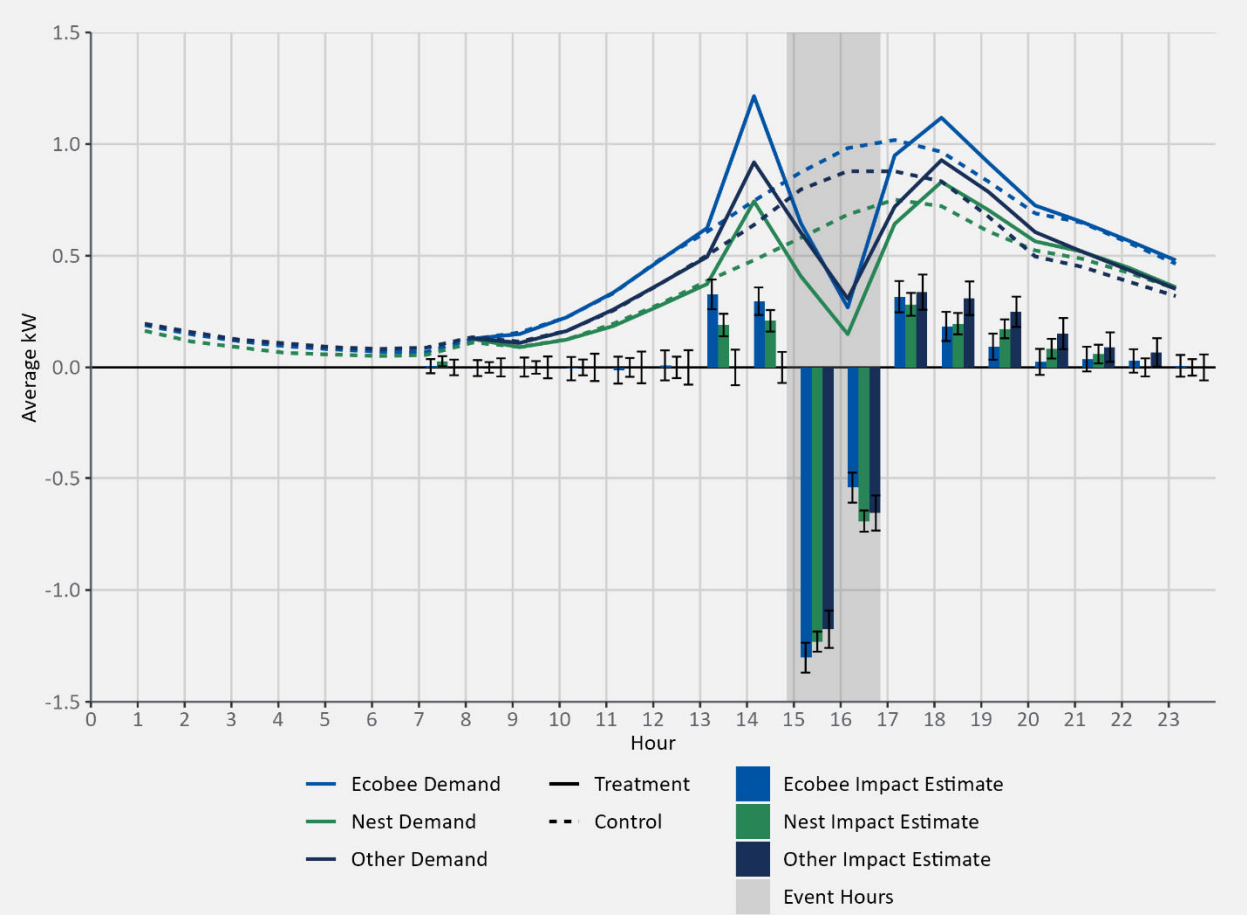


Table 16 shows the average seasonal hourly demand reduction across the ten evaluated Smart Cycle events in the 2025 season with 90% confidence intervals. Within seasons, impacts are similar across thermostat brands for each event hour, and no clear pattern emerges for a single brand outperforming the rest. Average demand impacts are highest in the summer when outdoor temperatures are highest, on average, and decrease across seasons as temperature decreases.

Table 16. 2025 Smart Cycle Average Event Demand Reduction

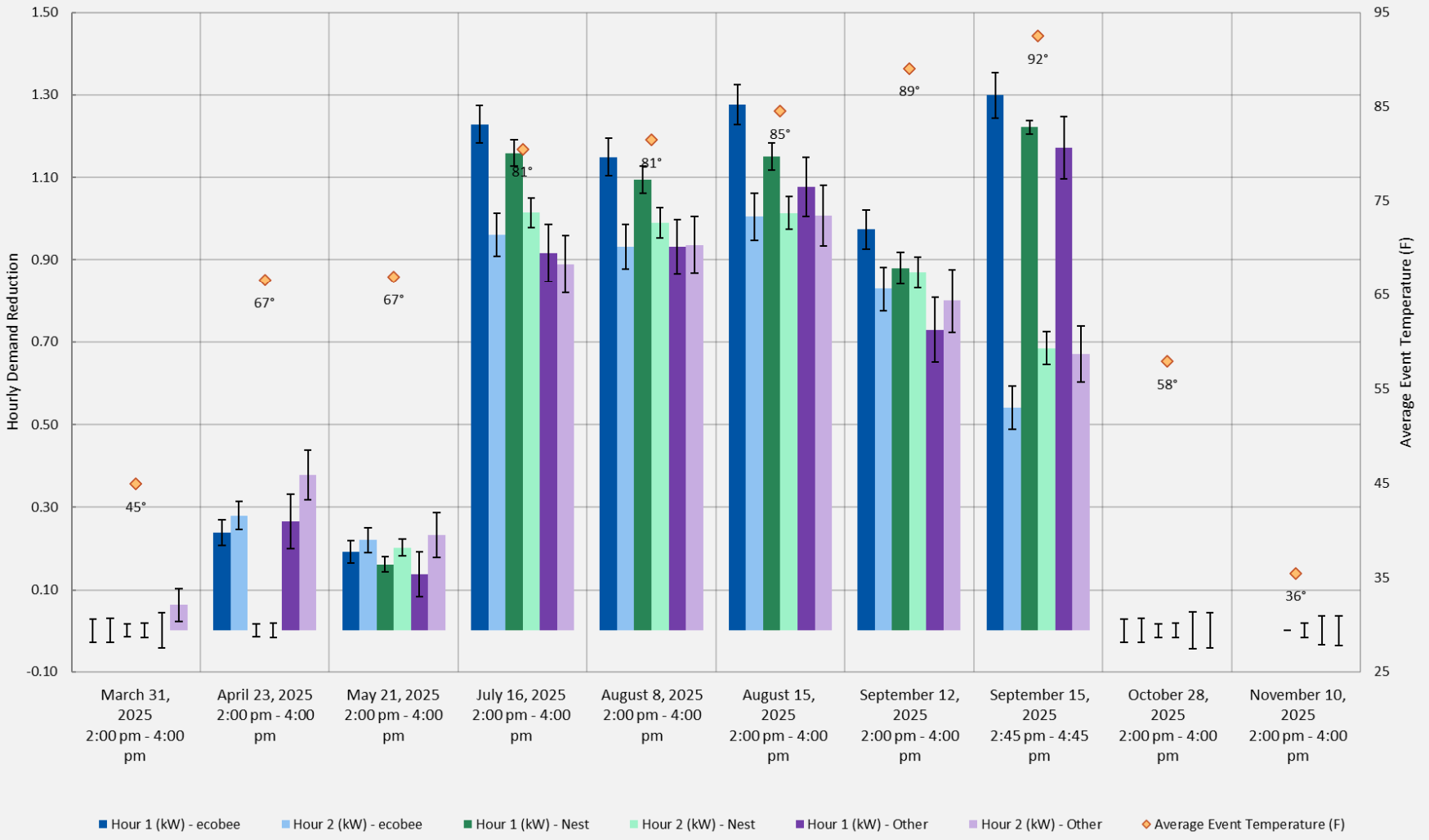
Season	Event Hours	Number of Events	Average Event Temperature	Thermostat Type	Hour Beginning	Impact per Thermostat (kW)	90% Confidence Intervals (kW)		Total Achievable Program Impact[a] (kW)
							Lower Bound	Upper Bound	
Spring	2 p.m.–4 p.m.	3	59°F	Ecobee	Event hour 1	-0.14	-0.16	-0.13	-363
				Ecobee	Event hour 2	-0.17	-0.19	-0.15	-425
				Nest	Event hour 1	-0.05	-0.06	-0.05	-269
				Nest	Event hour 2	-0.07	-0.07	-0.06	-334
				Other	Event hour 1	-0.13	-0.17	-0.10	-245
				Other	Event hour 2	-0.22	-0.25	-0.18	-400
				Average	**Event hour 1**	**-0.09**	**-0.10**	**-0.08**	**-829**
				Average	**Event hour 2**	**-0.12**	**-0.13**	**-0.10**	**-1,094**
Summer	2 p.m. – 4 p.m.	3	82°F	Ecobee	Event hour 1	-1.16	-1.20	-1.11	-2,912
				Ecobee	Event hour 2	-0.93	-0.99	-0.88	-2,345
				Nest	Event hour 1	-1.14	-1.17	-1.11	-5,729
				Nest	Event hour 2	-1.01	-1.05	-0.98	-5,082
				Other	Event hour 1	-0.99	-1.05	-0.93	-1,837
				Other	Event hour 2	-0.95	-1.01	-0.88	-1,751
				Average	**Event hour 1**	**-1.12**	**-1.16**	**-1.08**	**-10,501**
				Average	**Event hour 2**	**-0.98**	**-1.03**	**-0.94**	**-9,221**
Fall	2 p.m. – 4 p.m., 2:45 p.m. – 4:45 p.m.	4	69°F	Ecobee	Event hour 1	-0.65	-0.69	-0.62	-1,642
				Ecobee	Event hour 2	-0.27	-0.31	-0.24	-687
				Nest	Event hour 1	-0.77	-0.80	-0.74	-3,844
				Nest	Event hour 2	-0.50	-0.53	-0.46	-2,485
				Other	Event hour 1	-0.73	-0.79	-0.67	-1,349
				Other	Event hour 2	-0.49	-0.55	-0.43	-909
				Average	**Event hour 1**	**-0.73**	**-0.77**	**-0.70**	**-6,885**
				Average	**Event hour 2**	**-0.44**	**-0.48**	**-0.41**	**-4,162**

Note: A negative impact indicates a reduction in usage (and therefore savings).

[a] Total achievable program impact lists savings for all thermostats currently enrolled in the Smart Cycle program (including control customers) as of the end of 2025 (9,384 thermostats).

Figure 7 shows the estimated demand savings for each event hour and the average outdoor temperature (°F) during each event. Error bars show the 90% confidence interval for each impact estimate. For some spring and fall event hours, the estimated impacts are not statistically different from zero at the 10% level and no estimate bar appears (error bars appear and cross zero).

Figure 7. 2025 Smart Cycle Average Air Conditioning Demand Reduction by Event and Hour



As with previous Smart Cycle evaluations, ecobee devices achieved higher first-hour savings than Nest devices across all events. Previous Smart Cycle evaluations also showed that demand reductions increased with outdoor temperature, which the 2025 evaluation supports. In 2025, the hottest event (92°F on September 15, 2025) had the highest single-hour average demand reductions (1.30 kW per ecobee thermostat, 1.22 kW per Nest thermostat, and 1.17 kW per other thermostat in the first hour), while events on colder days in the spring and fall (most notably March 31, October 28, and November 10, which had average temperatures of 45°F, 58°F, and 36°F, respectively), produced little to no demand impacts.

In addition to demand reduction during the two hours of each program event, the events affected energy consumption in the hours following each event. Figure 3, Figure 4, Figure 5, and Figure 6 show the average event day load shapes for each thermostat type during summer 2 p.m. events, spring 2 p.m. events, fall 2 p.m. events, and fall 2:45 p.m. events, respectively. A visible rebound effect follows the summer and falls event hours for all three thermostat types, as the treatment group required more electricity than the control group to realign indoor temperatures with the thermostat setpoint. The rebound effect persisted for several hours following events, but the magnitude of the rebound effect was low. Spring events showed little to no rebound effect after event hours, as homes were likely already cool due to the colder outdoor temperatures. As shown, Nest devices typically had lower post-event impacts than ecobee and other devices. Other thermostats typically had relatively lower post-event impacts, but these impacts persisted for longer after the events than impacts for ecobee and Nest thermostats. *Appendix C* shows average hourly impacts for six hours before and after the event start time by thermostat brand for each event.

4.1.1. Potential MISO Impact

CenterPoint Energy registered Smart Cycle with MISO on February 1, 2025. To provide CenterPoint Energy with accurate forecasts for its annual Smart Cycle MISO registration, Cadmus assessed what the program's potential impacts would be if it were called upon by MISO for a load curtailment event. Table 17, Table 18, and Table 19 show the expected savings per thermostat per month and hour for potential spring, summer, and fall MISO events, respectively. Positive numbers reflect savings (demand reductions). In assessing potential MISO event savings forecasts, Cadmus used average (rather than peak) weather conditions, so the resulting forecasts are much lower than the typical EM&V event results reported previously as CenterPoint Energy calls EM&V events on the summer's hotter days. However, MISO rarely calls upon Smart Cycle, and the few events it has called in the past five years were not on hot days. Therefore, the MISO event savings forecasts provide conservative estimates so that CenterPoint Energy's MISO registration will not overstate savings should MISO events be called on days when air conditioning demand is relatively modest. Note that these savings estimate assume MISO events last four hours. In practice, Smart Cycle events produce slightly higher savings in the first event hour than in the second event hour.

Table 17. Smart Cycle Potential Spring MISO Event Savings Forecasts

Hour of Day	March		April		May		Spring Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	0.01	0.13	0.01	0.13	0.05	0.50	**0.03**	**0.25**
1	0.01	0.13	0.01	0.13	0.03	0.32	**0.02**	**0.19**
2	0.01	0.13	0.01	0.13	0.02	0.19	**0.02**	**0.15**
3	0.01	0.13	0.01	0.13	0.01	0.12	**0.01**	**0.13**
4	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
5	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
6	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
7	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
8	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
9	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
10	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
11	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
12	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
13	0.01	0.13	0.01	0.13	0.01	0.13	**0.01**	**0.13**
14	0.01	0.13	0.01	0.13	0.07	0.67	**0.03**	**0.31**
15	0.01	0.13	0.01	0.13	0.15	1.44	**0.06**	**0.57**
16	0.01	0.13	0.01	0.13	0.16	1.54	**0.06**	**0.60**
17	0.01	0.13	0.01	0.13	0.16	1.47	**0.06**	**0.58**
18	0.01	0.13	0.01	0.13	0.15	1.41	**0.06**	**0.56**
19	0.01	0.13	0.01	0.13	0.13	1.21	**0.05**	**0.49**
20	0.01	0.13	0.02	0.16	0.12	1.15	**0.05**	**0.48**
21	0.01	0.13	0.02	0.16	0.11	1.05	**0.05**	**0.45**
22	0.01	0.13	0.01	0.13	0.09	0.81	**0.04**	**0.35**
23	0.01	0.13	0.01	0.13	0.07	0.61	**0.03**	**0.29**

Table 18. Smart Cycle Potential Summer MISO Event Savings Forecasts

Hour of Day	June		July		August		Summer Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	0.39	3.66	0.45	4.26	0.38	3.54	**0.41**	**3.82**
1	0.32	3.03	0.39	3.64	0.30	2.82	**0.34**	**3.16**
2	0.26	2.46	0.33	3.10	0.26	2.43	**0.28**	**2.66**
3	0.22	2.06	0.29	2.71	0.22	2.10	**0.24**	**2.29**
4	0.20	1.86	0.26	2.41	0.21	1.94	**0.22**	**2.07**
5	0.18	1.68	0.23	2.15	0.19	1.78	**0.20**	**1.87**
6	0.17	1.56	0.22	2.06	0.18	1.68	**0.19**	**1.77**
7	0.17	1.63	0.23	2.17	0.19	1.78	**0.20**	**1.86**
8	0.18	1.68	0.25	2.38	0.20	1.89	**0.21**	**1.98**
9	0.22	2.03	0.31	2.87	0.25	2.37	**0.26**	**2.43**
10	0.25	2.35	0.39	3.65	0.31	2.94	**0.32**	**2.98**
11	0.32	3.03	0.48	4.53	0.40	3.78	**0.40**	**3.78**
12	0.45	4.26	0.58	5.41	0.45	4.18	**0.49**	**4.62**
13	0.56	5.22	0.65	6.10	0.54	5.11	**0.58**	**5.47**
14	0.63	5.91	0.71	6.62	0.62	5.86	**0.65**	**6.13**
15	0.69	6.50	0.76	7.15	0.70	6.54	**0.72**	**6.73**
16	0.75	7.03	0.82	7.69	0.76	7.16	**0.78**	**7.29**
17	0.77	7.22	0.83	7.77	0.78	7.35	**0.79**	**7.45**
18	0.78	7.33	0.84	7.87	0.80	7.48	**0.81**	**7.56**
19	0.73	6.84	0.80	7.50	0.74	6.94	**0.76**	**7.09**
20	0.72	6.77	0.80	7.46	0.73	6.85	**0.75**	**7.03**
21	0.66	6.21	0.73	6.87	0.67	6.30	**0.69**	**6.46**
22	0.58	5.46	0.65	6.11	0.59	5.51	**0.61**	**5.69**
23	0.49	4.59	0.55	5.13	0.48	4.55	**0.51**	**4.76**

Table 19. Smart Cycle Potential Fall MISO Event Savings Forecasts

Hour of Day	September		October		November		Fall Average	
	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)	Per Thermostat (kW)	Achievable (MW)
0	-0.85	-7.96	0.04	0.34	0.04	0.34	**-0.26**	**-2.43**
1	0.05	0.51	0.04	0.34	0.04	0.34	**0.04**	**0.40**
2	-0.02	-0.14	0.04	0.34	0.04	0.34	**0.02**	**0.18**
3	0.08	0.76	0.04	0.34	0.04	0.34	**0.05**	**0.48**
4	0.09	0.80	0.04	0.34	0.04	0.34	**0.05**	**0.49**
5	0.07	0.68	0.04	0.34	0.04	0.34	**0.05**	**0.45**
6	0.06	0.53	0.04	0.34	0.04	0.34	**0.04**	**0.40**
7	0.04	0.37	0.04	0.34	0.04	0.34	**0.04**	**0.35**
8	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
9	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
10	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
11	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
12	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
13	0.04	0.34	0.04	0.34	0.04	0.34	**0.04**	**0.34**
14	0.07	0.64	0.04	0.34	0.04	0.34	**0.05**	**0.44**
15	0.16	1.50	0.04	0.34	0.04	0.34	**0.08**	**0.73**
16	0.28	2.66	0.04	0.34	0.04	0.34	**0.12**	**1.11**
17	0.41	3.88	0.08	0.75	0.04	0.34	**0.18**	**1.66**
18	0.51	4.80	0.16	1.53	0.04	0.34	**0.24**	**2.22**
19	0.43	4.03	0.26	2.46	0.04	0.34	**0.24**	**2.28**
20	0.32	2.96	0.31	2.94	0.04	0.34	**0.22**	**2.08**
21	-0.62	-5.79	0.33	3.12	0.04	0.34	**-0.08**	**-0.78**
22	-0.10	-0.96	0.27	2.49	0.04	0.34	**0.07**	**0.62**
23	-2.92	-27.40	0.11	1.07	0.04	0.34	**-0.92**	**-8.67**

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In addition to demand impacts, Cadmus evaluated the energy savings resulting from the load-control events (Table 14), which depended on the relative magnitudes of event-hour demand savings, precooling energy consumption, and the post-event rebound in energy demand.

Cadmus aggregated the hour interval kilowatt-hours to daily kilowatt-hours for each thermostat and then used the aggregated daily kilowatt-hours in a regression analysis of daily energy savings. *Appendix A* describes the regression model specification and estimation procedures.

Smart Cycle achieved average 2025 summer event-day energy savings of 0.40 kWh for ecobee thermostats and 0.66 kWh for Nest thermostats, both of which were statistically significant at the 90% confidence level, while the event-day energy savings of other thermostats were not statistically different from zero. Increased consumption due to precooling in the hour before each event and the reduction in demand during events resulted in an overall decrease in daily energy consumption on event days for Nest and ecobee thermostats and resulted in no change in overall daily consumption for other thermostats.

Therefore, precooling before summer events is not expected to increase participants' electricity bills. However, results were mixed for spring and fall events when outdoor temperatures were lower. Participants with ecobee and Nest thermostats consumed an additional 0.14 kWh and 0.06 kWh, respectively, during spring events due to precooling, but the daily energy consumption of participants with other thermostats was not statistically different on event days from energy consumption on non-event days. In the fall, the daily energy consumption of participants with ecobee thermostats was not statistically different on event days than non-event days, participants with Nest thermostats saved 0.22 kWh of energy on average, and participants with other thermostats used an additional 0.20 kWh of energy on average.

Daily energy impacts reflect precooling (which increases energy consumption in the hour before an event but may increase the demand reduction during the event and can mitigate some of the snapback in demand following events), the demand reduction during the event, and the extent of the snapback following events. The other thermostat category includes a wide range of thermostat manufacturers, and some thermostat types may have differences in demand response algorithm frameworks (including the duration or amount of precooling, and the setback during the event) that they allow the demand response implementer to control, resulting in different energy savings for different thermostat types.

5. Detailed Summer Cycler Impact Evaluation Findings

This section presents Cadmus' detailed findings from the 2025 Summer Cycler program impact evaluation. Table 20 summarizes the 2025 Summer Cycler program impacts—a negative impact indicates a reduction in usage (or increase in savings). Due to the Summer Cycler air conditioning load control event execution issues in 2025, Cadmus was not able to find evidence of demand impacts from these events. Based on the 2019 water heater load control event analysis, Cadmus estimates that CenterPoint Energy could have achieved 567 kW of demand reduction had all enrolled devices been treated in an event. However, in light of the air conditioning event performance failures, it is probable that the water heater switches may have experienced similar issues and were not able to generate demand impacts as a result.

Table 20. 2025 Summer Cycler Program Evaluated Energy and Demand Savings during Standard Load-Control Events

Impact Estimate	Air Conditioners		Water Heaters	
	Per Unit	Total Achievable Program Impact[a]	Per Unit	Total Achievable Program Impact[a]
Average Event kW Impact	**0**	**0**	**N/A**	**-566.49**
Average Event kW Hour 1	0	0	N/A	-476.61
Average Event kW Hour 2	0	0	N/A	-656.36
Average Post-Event Hour 1 kW Impact	0	0	N/A	552.87
Average Event Energy kWh Impact	**0**	**0**	**N/A**	**-1,470.69**

[a] The total achievable program impact represents possible program savings if CenterPoint Energy had cycled all Summer Cycler customers instead of just the treatment group of the program (17,914 air conditioners; 5,447 water heaters).

Table 21 lists historical per-unit air conditioner savings from Summer Cycler load-control events.

Table 21. Historical Summer Cycler Program Evaluated Energy and Demand Savings

Load-Control Event Impacts per Air Conditioner	2017	2019	2021[a]	2022	2023	2024	2025
Average Event Temperature (F)	91˚F	89˚F	89˚F	90˚F	88˚F	95°F	80°F
Average Event kW Impact	-0.5	-0.3	-0.3	-0.3	-0.2	-0.2	0
Average Post-Event Hour 1 kW Impact	0	0	0	0.10	0.13	0	0
Average Event Energy kWh Impact	0	0	N/A	0	0	0	0

This table has been updated to replace estimates that are statistically insignificant at the 10% level with 0.

[a] Cadmus used historical data to predict demand impacts for the 2021 evaluation because the randomized-control experiment failed to execute.

From the results of the impact analysis, Cadmus made the following observations:

- **Demand savings.** Cadmus could not find evidence of demand savings from most air conditioning load control events in 2025. Only the August 5th event showed marginal demand savings statistically significant at the 10% level.
- **Energy savings.** The program primarily targets demand reduction. Similar to previous program years, the 2025 Summer Cycler load-control events did not produce any statistically significant energy savings.

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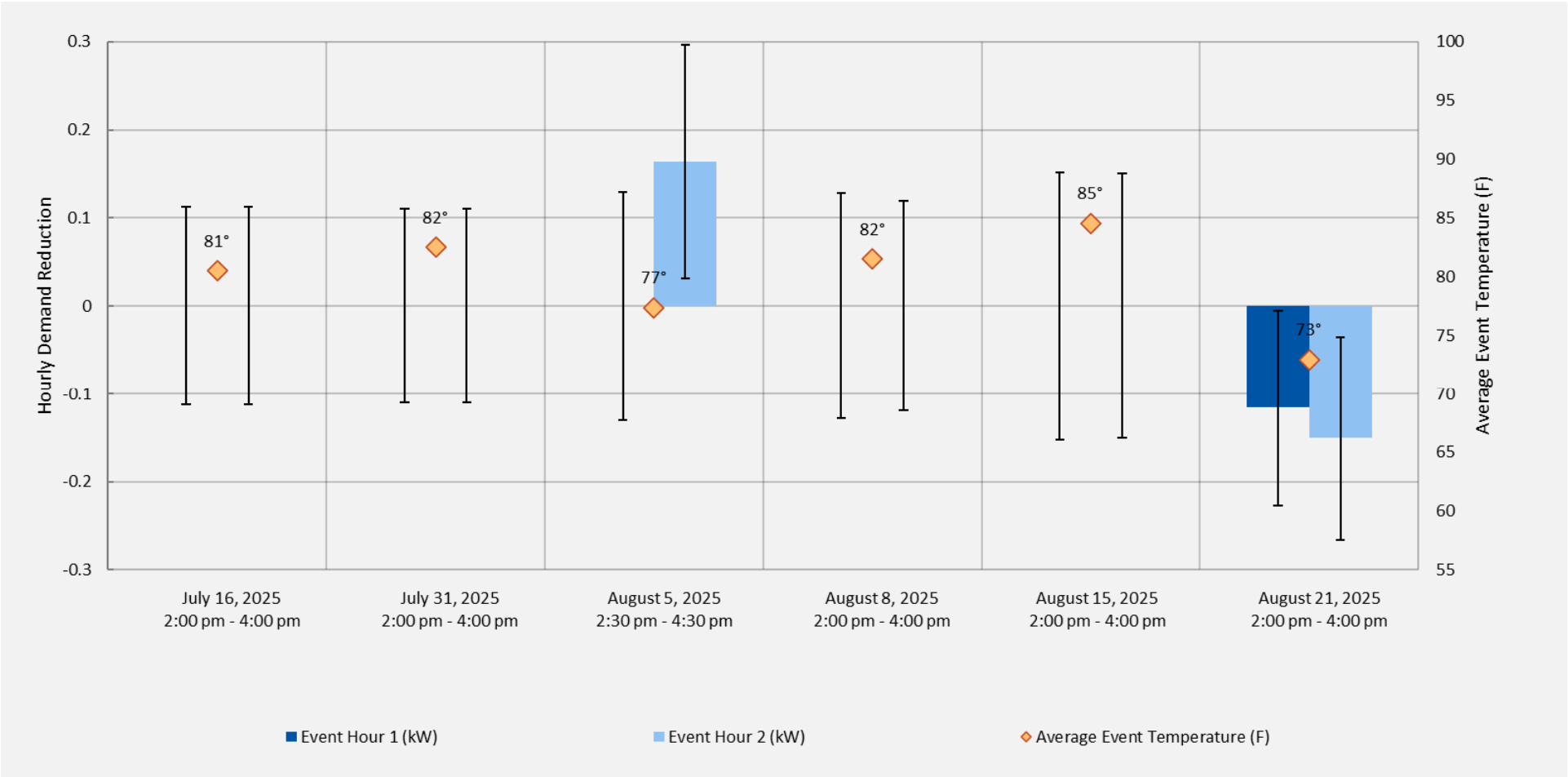
Cadmus evaluated demand reduction from the 2025 Summer Cycler load-control events for air conditioners and water heaters.

5.1.1. Air Conditioners

Figure 8 shows the estimated demand impacts and error bars for each event hour and the average outdoor temperature during each event. Positive impacts reflect demand reduction (decreased usage during events), while negative impacts reflect negative reduction (increased usage during events). For most event hours, the estimated impacts are not statistically different from zero at the 10% level and no estimate bar appears (error bars appear and cross zero). The second event hour for August 5th resulted in 0.16 kW estimated demand reduction, while the August 21st event resulted in -0.12 kW and -0.15 kW demand reduction (increased usage) during the first and second event hours, respectively.

Figure 8. 2025 Summer Cycler Average Air Conditioning Demand Reduction by Event and Hour



Standard Load-Control Events

Table 22 lists estimates of the average kilowatt impact per air conditioner during the standard load-control events. A negative impact indicates a reduction in usage (or savings). Average demand reductions were not statistically different from zero for the 2 p.m. events. For the 2:30 p.m. event, average demand reductions ranged from 0 kW in the third event hour (4 p.m. to 5 p.m.) to 0.12 kW in the first event hour (2 p.m. to 3 p.m.) and 0.17 kW in the second event hour (3 p.m. to 4 p.m.), for an average of 0.10 kW across the entire event. Note that while the first two event hours are statistically significant at the 10% level, because the third event hour is not (and the first event hour is just barely significant), the event average is also not significant at the 10% level. However, had all Summer Cycler air conditioners been treated in the 2:30 p.m. event, the program could have achieved around 1,700 kW of demand reduction.

Table 22. Average Summer Cycler Air Conditioning Demand Reduction during Standard Load-Control Events

Event Hours	Number of Events	Average Event Temperature	Hour Beginning	Impact per Air Conditioner (kW)	90% Confidence Intervals (kW)		Total Achievable Program Impact[a] (kW)
					Lower	Upper	
2 p.m. - 4 p.m.	5	80°F	Event hour 1	0.00	-0.06	0.06	0
			Event hour 2	0.00	-0.06	0.06	0
			Average	**0.00**	**-0.06**	**0.06**	**0**
2:30 p.m. - 4:30 p.m.	1	77°F	Event hour 1	-0.12	-0.23	-0.002	-2,070
			Event hour 2	-0.17	-0.29	-0.05	-3,038
			Event hour 3	0.00	-0.12	0.12	0
			Average	**-0.10[b]**	**-0.21**	**0.02**	**-1,703**

[a] The total achievable program impact represents possible program savings if CenterPoint Energy had cycled all Summer Cycler customers instead of just the treatment group of the program (17,914 air conditioners).

[b] The 90% confidence interval for the three-hour average contains zero, meaning the estimate is not statistically significant at the 10% level. However, because the event spans two half-hour segments (2:30 p.m. to 3 p.m. and 4 p.m. to 4:30 p.m.) and two of the three component event estimates are significant at the 10% level, Cadmus reported the estimate (rather than a zero) anyway for an approximation of event potential.

Potential MISO Impact

The Summer Cycler program was enrolled with MISO in 2025 for demand reduction. Though no MISO events were called in 2025, Cadmus assessed its potential impacts to give CenterPoint Energy accurate forecasts should the program be called upon by MISO in the future. Table 23 shows the expected savings per switch per month and hour as well as the seasonal average for a MISO event. Because the average demand and energy savings across all 2025 Summer Cycler events were zero, Cadmus was unable to project non-zero potential savings for future MISO events.

Table 23. Summer Cycler Potential MISO Event Demand Reduction Forecasts

Hour of Day	June		July		August		Summer Average	
	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)	Per Switch (kW)	Achievable (MW)
0	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
1	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
2	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
3	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
5	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
6	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
7	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
8	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
9	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
10	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
11	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
12	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
13	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
14	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
15	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
16	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
17	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
18	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
19	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
20	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
21	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
22	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**
23	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**

5.1.2. Water Heaters

Due to historical difficulty accessing water heaters for data logger installation and retrieval (which was exacerbated by the COVID-19 pandemic), Cadmus did not conduct a water heater field experiment in 2025. Instead, Cadmus applied fixed per-unit demand reduction and energy savings for water heaters estimated from the 2019 summer evaluation (and applied in 2024, 2023, 2022, and 2021). This methodology is supported by the results of Cadmus' previous Summer Cycler evaluations, which showed that water heater savings were stable and consistent across program years and load-control events. In 2019, Cadmus estimated an average per water heater impact of 0.12 kW from 3 p.m. to 5 p.m. and 0.09 kW from 4 p.m. to 6 p.m. Cadmus used these impacts for the summer 2025 evaluation to estimate an average total achievable program impact of 566.49 kW for water heaters. Due to the assumed device performance issues for air conditioners in 2025, however, Cadmus cautions that the same issues could arise for water heater switches, which would prevent events from achieving these potential savings.

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Energy impacts from the 2025 Summer Cycler events depended on the relative magnitude of event hour demand impact and the post-event rebound in energy demand. Because the average estimated demand impacts across all Summer Cycler events for both event hours and the post-event rebound hours were not statistically significant at the 10% level, the total energy savings were likewise not statistically different from zero.

Appendix A. Detailed Smart Cycle Analysis Methodology

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To estimate the load impacts from Smart Cycle demand response for each air conditioner, Cadmus used a standard engineering formula to convert EnergyHub air conditioner run time per hour to kilowatt-hours per hour. [9] The formula estimates the instantaneous kilowatts for the unit, including power for the unit's condenser and evaporator fans and compressor, as a function of unit size (tonnage), efficiency, and indoor wet-bulb and outdoor dry-bulb temperatures. Cadmus assumed an indoor wet-bulb temperature of 67°F, which is the Air Conditioning, Heating, and Refrigeration Institute (AHRI) standard, as indoor wet-bulb temperatures were not available in the thermostat data. Cadmus used outdoor dry-bulb temperatures collected from the Evansville Regional Airport weather dataset, as the thermostats did not collect home-specific outdoor temperatures and EnergyHub's thermostat data were anonymized for Nest devices (and not linkable to CenterPoint Energy customer data or premise zip codes for more-granular weather mapping).

$$Instantaneous\ System\ kW = \frac{(Tons * 12{,}000 * CAP * \frac{3.413}{EER} * EIR)}{3413}$$

Where:

Tons =Tonnage of central air conditioner (assumed to be 2.42 based on primary data collection from direct install participants in previous evaluations)

12,000 =Conversion factor to convert tons to Btu

EER = Energy efficiency rating of central air conditioner unit (assumed to be 10.035 based on primary data collection from direct install participants in previous evaluations)

$$CAP = a_{CAP} + (b_{CAP} * EWB) + (c_{CAP} * EWB^2) + (d_{CAP} * ODB) + (e_{CAP} * ODB^2) + (f_{CAP} * EWB * ODB)$$

$$EIR = a_{EIR} + (b_{EIR} * EWB) + (c_{EIR} * EWB^2) + (d_{EIR} * ODB) + (e_{EIR} * ODB^2) + (f_{EIR} * EWB * ODB)$$

In the CAP (total capacity) and EIR (energy input ratio) equations above, terms *a* through *f* are standardized performance curve coefficients obtained from the Cutler study.[10] Terms ODB and EWB are the outdoor dry-bulb and indoor (entering) wet-bulb temperatures, respectively.

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[9] Cutler, D., et al. January 2013. *Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations.* NREL Technical Report, NREL/TP-5500-56354. http://www.nrel.gov/docs/fy13osti/56354.pdf

[10] Cutler, D., et al. January 2013. *Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations.* NREL Technical Report, NREL/TP-5500-56354. http://www.nrel.gov/docs/fy13osti/56354.pdf

For each hour, Cadmus multiplied the central air conditioner run time by the instantaneous kilowatts to estimate the unit's kilowatt-hours per hour.

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Cadmus estimated demand reduction from load-control events by performing the following regression of hourly electricity use in kilowatt-hours of central air conditioners for each season. Cadmus estimated the model as post-only, including only data from event days in the model (but controlling for non-event day average hourly consumption with an explanatory variable):

$$kWhit = aih + tt + bTesti * Datetimet + eit$$

Where:

kWh_{it} = Hourly electricity use of central air conditioner *i*, *i*=1, 2, …, N, in datetime *t*, *t*=1, 2, …T of the estimation period.

α_{ih} = Observable average hourly, customer-specific non-event day electricity use for central air conditioner *i* and hour of the day *h*, *h*=1, 2, …24.

τ_t = Hour of the analysis sample fixed effect. This variable captures effects specific to an hour, such as weather on central air conditioner electricity use.

$Test_i$ = Indicator variable for whether central air conditioner *i* is in the treatment group. $Test_i$ equals 1 if central air conditioner *i* is in the treatment group and equals 0 if it is in the control group.

$Datetime_t$ = Indicator variable for date-hour. This variable equals 1 for each datetime *t* and equals 0 otherwise.

β = Average impact of an event on hourly electricity use of central air conditioners.

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Cadmus estimated energy savings from load-control events by aggregating hour-interval kilowatt-hours to daily kilowatt-hours for each thermostat and performing the following regression of daily electricity use of central air conditioners for each season:

$$kWh_{id} = \alpha_i + \tau_d + \beta Test_i * Event_d + \varepsilon_{id}$$

Where:

kWh_{id} = Daily electricity use of central air conditioner *i*, i=1, 2, …N, on day *d*, *d*=1, 2, …D of the estimation period.

α_i = Unobservable, time-invariant average electricity use for central air conditioner *i*. These effects are controlled for with central air conditioner fixed effects (i.e., the regression includes a separate indicator variable for each central air conditioner).

τ_d = Day of the analysis sample fixed effect. This variable captures effects specific to a day, such as the effect of weather on central air conditioner electricity use.

$Test_i$ = Indicator variable for whether central air conditioner *i*' is in the treatment group. $Test_i$ equals 1 if central air conditioner *i*' is in the treatment group and equals 0 if it is in the control group.

$Event_d$ = Indicator variable for an event day. This variable equals 1 if day *d* is an event day and equals 0 otherwise.

β = Average impact of an event day on daily electricity use of central air conditioners.

Appendix B. Detailed Summer Cycler Analysis Methodology

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Cadmus estimated demand reduction from load-control events by estimating the following regression of hourly electricity (kWh) use of central air conditioners. Cadmus estimated the model as post-only, including only data from event days in the model (but controlling for non-event day average hourly consumption with an explanatory variable):

$$kWh_{it} = \alpha_{ih} + \tau_t + \beta Test_i * Datetime_t + \varepsilon_{it}$$

Where:

kWh_{it} = Hourly electricity use of central air conditioner *i*, i=1, 2, …N, in datetime *t*, *t*=1, 2, …T of the estimation period.

α_{ih} = Observable hourly, customer-specific - electricity use for central air conditioner *i* and hour of the day *h* *h*=1, 2, …24.

τ_t = Hour of the analysis sample fixed effect. This variable captures effects specific to an hour, such as weather on central air conditioner electricity use.

$Test_i$ = Indicator variable for whether central air conditioner *i* is in the treatment group. $Test_i$ equals 1 if central air conditioner *i* is in the treatment group and equals 0 if it is in the control group.

$Datetime_t$ = Indicator variable for date-hour. This variable equals 1 for each datetime *t* and equals 0 otherwise.

β = Average impact of an event on hourly electricity use of central air conditioners.

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Cadmus estimated energy savings from load-control events by aggregating hour-interval kWh to daily kWh for each thermostat and estimating the following regression of daily electricity (kWh) use of central air conditioners:

$$kWh_{id} = \alpha_i + \tau_d + \beta Test_i * Event_d + \varepsilon_{id}$$

Where:

kWh_{id} = Daily electricity use of central air conditioner *i*, *i*=1, 2, …N, on date *d*, *d*=1, 2, …D of the estimation period.

α_i = Unobservable, time-invariant electricity use for central air conditioner *i*. These effects are controlled for with central air conditioner fixed effects (i.e., the

regression includes a separate indicator variable for each central air conditioner).

τ_d = Day of the analysis sample fixed effect. This variable captures effects specific to a day, such as weather on central air conditioner electricity use.

$Test_i$ = Indicator variable for whether central air conditioner *i* is in the treatment group. $Test_i$ equals 1 if central air conditioner *i* is in the treatment group and equals 0 if it is in the control group.

$Event_d$ = Indicator variable for an event day. This variable equals 1 if day *d* is an event day and equals 0 otherwise.

β = Average impact of an event day on daily electricity use of central air conditioners.

Appendix C. Smart Cycle Thermostat Kilowatt Impacts

The following tables show the estimates of the demand impacts for Smart Cycle air conditioners during each event hour and each of the six post-event hours. Table C-1 shows estimates of the demand impacts for the spring season, defined as March, April, and May. Table C-2 shows the estimates of the demand impact for the summer season, defined as June, July, and August. Table C-3 shows the estimates of the demand impact for the fall season, defined as September, October, and November.

Table C-1. Spring Season Smart Cycle Demand Impact Estimates for Each Event Hour

Event Date	Hour Beginning	Hour Type	Ecobee	Nest	Other	Average	Total Achieved Program Impact (MW) (n=4,427)	Total Achievable Program Impact (MW) (n=8,589)
March 31, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	12	Pre-Event Hour 2	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	13	Pre-Event Hour 1	0.05	0.00	0.00	0.01	0.05	0.12
March 31, 2025	14	Event Hour 1	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	15	Event Hour 2	0.00	0.00	-0.04	-0.01	-0.03	-0.06
March 31, 2025	16	Post-Event Hour 2	0.00	0.00	-0.04	-0.01	-0.03	-0.07
March 31, 2025	17	Post-Event Hour 2	0.00	0.00	-0.03	-0.01	-0.02	-0.05
March 31, 2025	18	Post-Event Hour 3	0.00	0.00	-0.02	0.00	-0.02	-0.04
March 31, 2025	19	Post-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	20	Post-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
March 31, 2025	21	Post-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	12	Pre-Event Hour 2	0.03	0.00	0.00	0.01	0.03	0.07
April 23, 2025	13	Pre-Event Hour 1	0.55	0.00	0.54	0.22	0.92	2.08
April 23, 2025	14	Event Hour 1	-0.24	0.00	-0.27	-0.10	-0.43	-0.97
April 23, 2025	15	Event Hour 2	-0.28	0.00	-0.39	-0.13	-0.55	-1.25
April 23, 2025	16	Post-Event Hour 2	0.00	0.00	-0.16	-0.03	-0.12	-0.27
April 23, 2025	17	Post-Event Hour 2	0.00	0.00	-0.15	-0.03	-0.11	-0.24
April 23, 2025	18	Post-Event Hour 3	0.00	0.00	-0.08	-0.01	-0.06	-0.13
April 23, 2025	19	Post-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	20	Post-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
April 23, 2025	21	Post-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
May 21, 2025	8	Pre-Event Hour 6	-0.02	-0.02	0.00	-0.01	-0.06	-0.13
May 21, 2025	9	Pre-Event Hour 5	-0.02	0.00	0.00	-0.01	-0.02	-0.05
May 21, 2025	10	Pre-Event Hour 4	0.00	0.00	0.04	0.01	0.03	0.07
May 21, 2025	11	Pre-Event Hour 3	0.00	0.00	0.05	0.01	0.04	0.08

Event Date	Hour Beginning	Hour Type	Ecobee	Nest	Other	Average	Total Achieved Program Impact (MW) (n=4,427)	Total Achievable Program Impact (MW) (n=8,589)
May 21, 2025	12	Pre-Event Hour 2	0.03	-0.02	0.04	0.00	0.01	0.03
May 21, 2025	13	Pre-Event Hour 1	0.80	0.61	0.84	0.70	2.89	6.54
May 21, 2025	14	Event Hour 1	-0.19	-0.17	-0.15	-0.17	-0.70	-1.57
May 21, 2025	15	Event Hour 2	-0.22	-0.21	-0.25	-0.22	-0.90	-2.04
May 21, 2025	16	Post-Event Hour 1	0.00	0.00	-0.08	-0.01	-0.06	-0.14
May 21, 2025	17	Post-Event Hour 2	-0.05	0.00	-0.10	-0.03	-0.12	-0.27
May 21, 2025	18	Post-Event Hour 3	-0.06	0.00	-0.10	-0.03	-0.14	-0.31
May 21, 2025	19	Post-Event Hour 4	-0.05	0.00	-0.07	-0.02	-0.10	-0.22
May 21, 2025	20	Post-Event Hour 5	-0.03	0.00	0.00	-0.01	-0.03	-0.07
May 21, 2025	21	Post-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00

Table C-2. Smart Cycle Demand Impact Estimates for Each Event Hour

Event Date	Hour Beginning	Hour Type	Ecobee	Nest	Other	Average	Total Achieved Program Impact (MW) (n=4,427)	Total Achievable Program Impact (MW) (n=8,589)
July 16, 2025	8	Pre-Event Hour 6	0.03	0.00	0.00	0.01	0.03	0.07
July 16, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
July 16, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
July 16, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
July 16, 2025	12	Pre-Event Hour 2	0.00	0.00	0.00	0.00	0.00	0.00
July 16, 2025	13	Pre-Event Hour 1	0.72	0.63	0.67	0.66	2.73	6.19
July 16, 2025	14	Event Hour 1	-1.23	-1.15	-0.90	-1.12	-4.66	-10.55
July 16, 2025	15	Event Hour 2	-0.96	-1.01	-0.89	-0.97	-4.04	-9.14
July 16, 2025	16	Post-Event Hour 1	0.30	0.26	0.00	0.22	0.92	2.09
July 16, 2025	17	Post-Event Hour 2	0.19	0.28	0.00	0.21	0.85	1.93
July 16, 2025	18	Post-Event Hour 3	0.16	0.00	0.10	0.05	0.23	0.51
July 16, 2025	19	Post-Event Hour 4	0.10	0.00	0.24	0.07	0.28	0.63
July 16, 2025	20	Post-Event Hour 5	0.11	0.04	0.15	0.08	0.32	0.73
July 16, 2025	21	Post-Event Hour 6	0.09	0.00	0.12	0.04	0.17	0.39
August 8, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
August 8, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
August 8, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
August 8, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
August 8, 2025	12	Pre-Event Hour 2	0.00	0.00	0.00	0.00	0.00	0.00
August 8, 2025	13	Pre-Event Hour 1	0.70	0.58	0.70	0.63	2.61	5.90
August 8, 2025	14	Event Hour 1	-1.15	-1.09	-0.92	-1.07	-4.45	-10.07
August 8, 2025	15	Event Hour 2	-0.93	-0.98	-0.94	-0.96	-3.99	-9.04
August 8, 2025	16	Post-Event Hour 1	0.35	0.29	0.00	0.25	1.03	2.33

August 8, 2025	17	Post-Event Hour 2	0.21	0.14	0.08	0.15	0.62	1.40
August 8, 2025	18	Post-Event Hour 3	0.16	0.10	0.08	0.11	0.45	1.02
August 8, 2025	19	Post-Event Hour 4	0.14	0.08	0.19	0.11	0.47	1.06
August 8, 2025	20	Post-Event Hour 5	0.11	0.07	0.11	0.09	0.35	0.80
August 8, 2025	21	Post-Event Hour 6	0.08	0.05	0.00	0.05	0.20	0.45
August 15, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
August 15, 2025	9	Pre-Event Hour 5	0.00	0.04	0.00	0.03	0.11	0.25
August 15, 2025	10	Pre-Event Hour 4	0.00	0.00	-0.04	-0.01	-0.03	-0.07
August 15, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
August 15, 2025	12	Pre-Event Hour 2	0.06	0.00	0.00	0.01	0.06	0.13
August 15, 2025	13	Pre-Event Hour 1	0.71	0.61	0.65	0.64	2.66	6.02
August 15, 2025	14	Event Hour 1	-1.28	-1.14	-1.07	-1.16	-4.81	-10.89
August 15, 2025	15	Event Hour 2	-1.01	-1.01	-1.01	-1.01	-4.17	-9.45
August 15, 2025	16	Post-Event Hour 1	0.36	0.31	0.09	0.28	1.18	2.66
August 15, 2025	17	Post-Event Hour 2	0.22	0.13	0.00	0.13	0.53	1.20
August 15, 2025	18	Post-Event Hour 3	0.13	0.28	0.13	0.22	0.92	2.08
August 15, 2025	19	Post-Event Hour 4	0.11	0.08	0.20	0.11	0.45	1.03
August 15, 2025	20	Post-Event Hour 5	0.08	0.05	0.08	0.06	0.26	0.60
August 15, 2025	21	Post-Event Hour 6	0.07	0.08	0.09	0.08	0.33	0.75

Table C-3. Smart Cycle Demand Impact Estimates for Each Event Hour

Event Date	Hour Beginning	Hour Type	Ecobee	Nest	Other	Average	Total Achieved Program Impact (MW) (n=4,427)	Total Achievable Program Impact (MW) (n=8,589)
September 12, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
September 12, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
September 12, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
September 12, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
September 12, 2025	12	Pre-Event Hour 2	0.00	0.00	0.00	0.00	0.00	0.00
September 12, 2025	13	Pre-Event Hour 1	1.01	0.81	0.96	0.88	3.65	8.27
September 12, 2025	14	Event Hour 1	-0.97	-0.88	-0.74	-0.88	-3.63	-8.22
September 12, 2025	15	Event Hour 2	-0.83	-0.87	-0.80	-0.85	-3.52	-7.96
September 12, 2025	16	Post-Event Hour 1	0.33	0.26	0.11	0.25	1.04	2.34
September 12, 2025	17	Post-Event Hour 2	0.14	0.14	0.07	0.13	0.53	1.21
September 12, 2025	18	Post-Event Hour 3	0.08	0.17	0.11	0.14	0.57	1.29
September 12, 2025	19	Post-Event Hour 4	0.00	0.00	0.14	0.03	0.10	0.24
September 12, 2025	20	Post-Event Hour 5	0.00	0.04	0.10	0.04	0.16	0.36
September 12, 2025	21	Post-Event Hour 6	0.00	0.00	0.10	0.02	0.07	0.16
September 15, 2025	9	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
September 15, 2025	10	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
September 15, 2025	11	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
September 15, 2025	12	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
September 15, 2025	13	Pre-Event Hour 2	0.33	0.20	0.00	0.19	0.79	1.79

Event Date	Hour Beginning	Hour Type	Ecobee	Nest	Other	Average	Total Achieved Program Impact (MW) (n=4,427)	Total Achievable Program Impact (MW) (n=8,589)
September 15, 2025	14	Pre-Event Hour 1	0.30	0.22	0.00	0.20	0.82	1.86
September 15, 2025	15	Event Hour 1	-1.30	-1.22	-1.17	-1.23	-5.10	-11.55
September 15, 2025	16	Event Hour 2	-0.54	-0.68	-0.67	-0.65	-2.69	-6.09
September 15, 2025	17	Post-Event Hour 1	0.32	0.29	0.33	0.30	1.25	2.82
September 15, 2025	18	Post-Event Hour 2	0.19	0.19	0.30	0.21	0.88	1.99
September 15, 2025	19	Post-Event Hour 3	0.11	0.18	0.25	0.17	0.71	1.62
September 15, 2025	20	Post-Event Hour 4	0.05	0.09	0.15	0.09	0.36	0.82
September 15, 2025	21	Post-Event Hour 5	0.05	0.06	0.09	0.06	0.26	0.58
September 15, 2025	22	Post-Event Hour 6	0.04	0.00	0.07	0.02	0.09	0.21
October 28, 2025	8	Pre-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	9	Pre-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	10	Pre-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	11	Pre-Event Hour 3	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	12	Pre-Event Hour 2	0.00	0.01	0.00	0.01	0.03	0.07
October 28, 2025	13	Pre-Event Hour 1	0.05	0.04	0.00	0.03	0.14	0.32
October 28, 2025	14	Event Hour 1	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	15	Event Hour 2	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	16	Post-Event Hour 1	0.00	0.00	-0.04	-0.01	-0.03	-0.07
October 28, 2025	17	Post-Event Hour 2	0.00	0.00	-0.05	-0.01	-0.04	-0.09
October 28, 2025	18	Post-Event Hour 3	0.00	0.00	-0.03	-0.01	-0.03	-0.06
October 28, 2025	19	Post-Event Hour 4	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	20	Post-Event Hour 5	0.00	0.00	0.00	0.00	0.00	0.00
October 28, 2025	21	Post-Event Hour 6	0.00	0.00	0.00	0.00	0.00	0.00
November 10, 2025	8	Pre-Event Hour 6	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	9	Pre-Event Hour 5	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	10	Pre-Event Hour 4	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	11	Pre-Event Hour 3	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	12	Pre-Event Hour 2	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	13	Pre-Event Hour 1	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	14	Event Hour 1	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	15	Event Hour 2	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	16	Post-Event Hour 1	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	17	Post-Event Hour 2	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	18	Post-Event Hour 3	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	19	Post-Event Hour 4	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	20	Post-Event Hour 5	N/A	0.00	0.00	0.00	0.00	0.00
November 10, 2025	21	Post-Event Hour 6	N/A	0.00	0.00	0.00	0.00	0.00

N/A estimates indicate that no thermostats of that brand recorded runtime data during that time.

Appendix D. Summer Cycler Air Conditioner Kilowatt Impacts

Table D-1 shows estimates of the demand impacts for Summer Cycler air conditioners during each event hour and the six hours following each event. The 2025 evaluation found statistically significant impacts (additional air conditioning energy consumption due to curtailment during events) after the event hours for several events. As such, Cadmus estimated and reported impacts for those hours following 2025 events.

Table D-1. Summer Cycler Demand Impact Estimates for Each Event Hour

Event Date	Hour Type	Hour Beginning	Average Temperature	Average Impact per Air Conditioner (kW)	Total Achieved Program Impact (MW)	Total Achievable Program Impact (MW)
July 16, 2025	EventHour1	14	79°F	0	0	0.00
July 16, 2025	EventHour2	15	82°F	0	0	0.00
July 16, 2025	PostHour1	16	86°F	0	0	0.00
July 16, 2025	PostHour2	17	88°F	0	0	0.00
July 16, 2025	PostHour3	18	89°F	0	0	0.00
July 16, 2025	PostHour4	19	91°F	-0.11	-0.02	-2.00
July 16, 2025	PostHour5	20	92°F	0	0	0.00
July 16, 2025	PostHour6	21	92°F	-0.11	-0.02	-1.94
July 31, 2025	EventHour1	14	82°F	0	0	0.00
July 31, 2025	EventHour2	15	83°F	0	0	0.00
July 31, 2025	PostHour1	16	83°F	0	0	0.00
July 31, 2025	PostHour2	17	85°F	0	0	0.00
July 31, 2025	PostHour3	18	84°F	0	0	0.00
July 31, 2025	PostHour4	19	86°F	0	0	0.00
July 31, 2025	PostHour5	20	86°F	0	0	0.00
July 31, 2025	PostHour6	21	84°F	0	0	0.00
August 5, 2025	EventHour1	14	75°F	0	0	0.00
August 5, 2025	EventHour2	15	77°F	-0.16	-0.03	-2.94
August 5, 2025	PostHour1	17	80°F	0	0	0.00
August 5, 2025	PostHour2	18	81°F	-0.15	-0.03	-2.76
August 5, 2025	PostHour3	19	82°F	-0.14	-0.02	-2.45
August 5, 2025	PostHour4	20	83°F	0	0	0.00
August 5, 2025	PostHour5	21	84°F	0	0	0.00
August 5, 2025	PostHour6	22	85°F	0	0	0.00
August 8, 2025	EventHour1	14	79°F	0	0	0.00
August 8, 2025	EventHour2	15	84°F	0	0	0.00
August 8, 2025	PostHour1	16	87°F	0	0	0.00
August 8, 2025	PostHour2	17	88°F	0	0	0.00
August 8, 2025	PostHour3	18	90°F	-0.13	-0.02	-2.28
August 8, 2025	PostHour4	19	91°F	0	0	0.00
August 8, 2025	PostHour5	20	91°F	0	0	0.00

Event Date	Hour Type	Hour Beginning	Average Temperature	Average Impact per Air Conditioner (kW)	Total Achieved Program Impact (MW)	Total Achievable Program Impact (MW)
August 8, 2025	PostHour6	21	89°F	0	0	0.00
August 15, 2025	EventHour1	14	82°F	0	0	0.00
August 15, 2025	EventHour2	15	87°F	0	0	0.00
August 15, 2025	PostHour1	16	90°F	0	0	0.00
August 15, 2025	PostHour2	17	91°F	0	0	0.00
August 15, 2025	PostHour3	18	93°F	0	0	0.00
August 15, 2025	PostHour4	19	93°F	0	0	0.00
August 15, 2025	PostHour5	20	94°F	0	0	0.00
August 15, 2025	PostHour6	21	94°F	0	0	0.00
August 21, 2025	EventHour1	14	72°F	0.12	0.02	2.08
August 21, 2025	EventHour2	15	74°F	0.15	0.02	2.70
August 21, 2025	PostHour1	16	76°F	0	0	0.00
August 21, 2025	PostHour2	17	78°F	0	0	0.00
August 21, 2025	PostHour3	18	78°F	0	0	0.00
August 21, 2025	PostHour4	19	78°F	0	0	0.00
August 21, 2025	PostHour5	20	79°F	0	0	0.00
August 21, 2025	PostHour6	21	79°F	0	0	0.00

Appendix E. Summer Cycler Water Heater Kilowatt Impacts

Due to historical difficulty accessing water heaters for data logger installation and retrieval, Cadmus did not conduct a water heater field experiment in 2025. Instead, Cadmus historically applied fixed per-unit demand and energy savings for water heaters. This methodology is supported by the results of Cadmus' previous Summer Cycler evaluations, which showed that water heater savings were stable and consistent across program years and load-control events. However, the issues observed in 2025 with air conditioning events raised concerns whether water heater switches continued to function as expected or potentially also experienced issues.