Key finding: For several projects the EM&V team was unable to determine the cause of the savings gap between the claimed and evaluated savings after various attempts. One reason for this would be that savings calculations are not required and therefore not typically provided in the documentation.

- **Recommendation:** Consider including savings calculations in the documentation package requested for sampled projects to ensure transparency in calculations as well as aid in determining the potential cause in differences between claimed and evaluated savings.

7.3.2 Residential SOPs and MTPs

Project savings adjustments for residential SOPs were primarily driven by *appliance* measure discrepancies in appliance specifications as well as issues with documentation.

Project savings adjustments for residential MTPs were primarily driven by *HVAC* measure discrepancies in system specifications.

7.3.3 Hard-to-Reach Programs

Project savings adjustments were primarily driven by *envelope* and *appliance* measure discrepancies in appliance specifications as well as issues with electric resistance documentation.

7.3.4 Low-Income Programs

Project savings adjustments were primarily driven by *HVAC* and *envelope* measure issues with discrepancies in equipment specifications, *duct sealing* test results, and installation verification documentation.

7.4 MEASURE OPPORTUNITY ANALYSIS

This section presents measure opportunities in multifamily *heat pumps* and *insulation*.

7.4.1 Multifamily Heat Pumps

Key Finding: The majority of new construction projects assume the baseline type for *HVAC* is the same as the as-built system. This means that when a *heat pump* is installed through the program, the assumed baseline is a federal standard *heat pump*. However, reports from Texas market actors implementing new construction projects suggest that multifamily new construction projects as-built trends favor electric resistance furnaces installation rather than *heat pumps* when the primary heating fuel is electricity[50].

Currently utilities have the option to submit documentation to the EM&V team for approval to use an alternative baseline such as electric resistance furnace for multifamily *heat pump* projects on a case-by-case basis. A baseline study could inform updates to the PY2026 TRM 13.0 to include a separate market baseline for multifamily new construction projects eliminating the additional burden of treating these projects on a case-by-case basis to potentially increase the participation.

[50] See TRM Project No. 56768 Item 10 and Item 11. Interchange - Filings

- **Recommendation:** Explore the potential for a separate multifamily new construction HVAC baseline in the TRM Working Group, specifically engaging the HPWG.

7.4.2 Insulation

Key Finding: *Insulation* is an important measure for long term contributions towards demand reduction and energy savings as part of a diverse measure mix across all utilities. A recent trend of increased *insulation* savings in the IOU programs reversed in PY2024.

In PY2024, *insulation* measures included *wall insulation*, *ceiling* or *attic insulation*, and *floor insulation*. *Ceiling* and *attic insulation* made up a significant majority of the *insulation* savings each year. *Insulation* measures were installed across all utilities. As Figure 38 shows in MW, the IOU programs trend of increased *insulation* savings from PY2021 started to reverse in PY2024.

Figure 38. Demand Reductions (MW) from Residential Insulation PY2021–PY2024

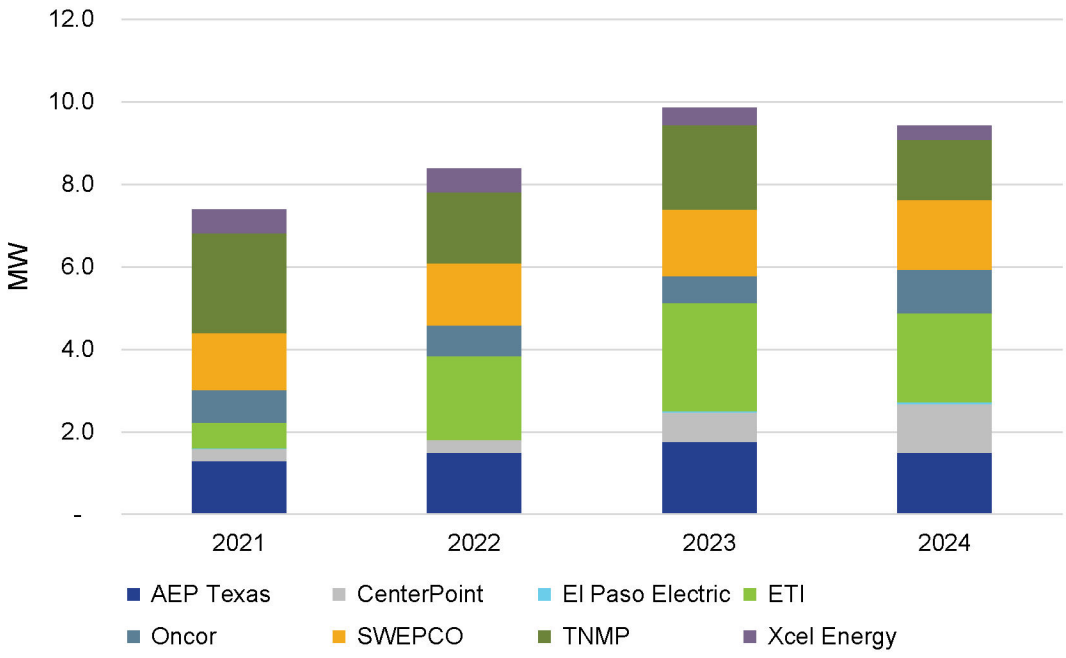
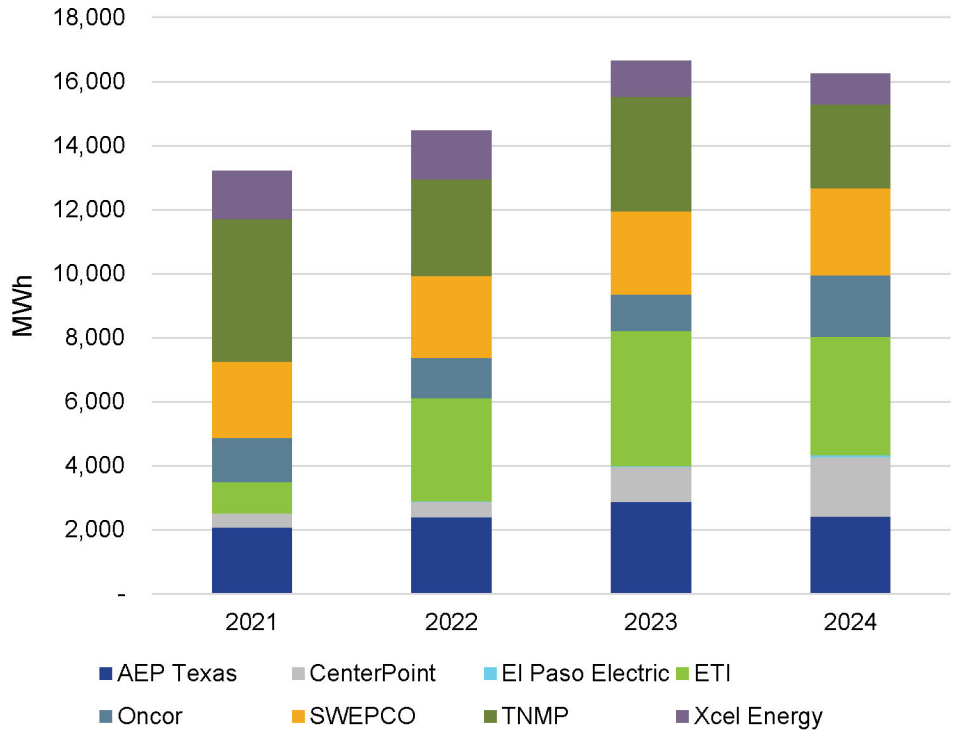


Figure 39 shows the energy savings from PY2021-PY2024, which follow a similar trend as the demand reduction from *insulation*.

Figure 39. Energy Savings (MWh) from Residential Insulation PY2021−PY2024



Insulation measure participation has increased with supply chain normalizing after pandemic shortages. However, recent inflation has increased costs across all IOU territories. The PY2023 consumption analysis saw favorable results since the implementation of TRM recommendations coming out of the PY2020 consumption analysis. Though the results varied by utility, some IOUs achieved realization rates of over 100 percent of the TRM savings. The EM&V team has recommended those utilities work with the EM&V team on opportunities to increase participation and savings based on real consumption results.

All IOUs have an opportunity to increase *insulation* measure participation—particularly *wall* and *floor insulation*. Historically, *wall* and *floor insulation* participation has been low, likely due to difficulty insulating existing homes (walls already in place). However, new methods, such as blowing in insulation from the exterior are less intrusive to the homeowner. Implementing whole home insulation reduces overall HVAC load and also increases r potential for higher savings through early HVAC retirement and rightsizing.

8.0 LOAD MANAGEMENT PROGRAMS

This section presents load management summary analysis, followed by key findings and recommendations from PY2024 EM&V activities---interval meter data analysis, residential deemed savings review as applicable, and cooperation rate analysis (the ratio of enrolled sites compared to sites that were able to curtail).

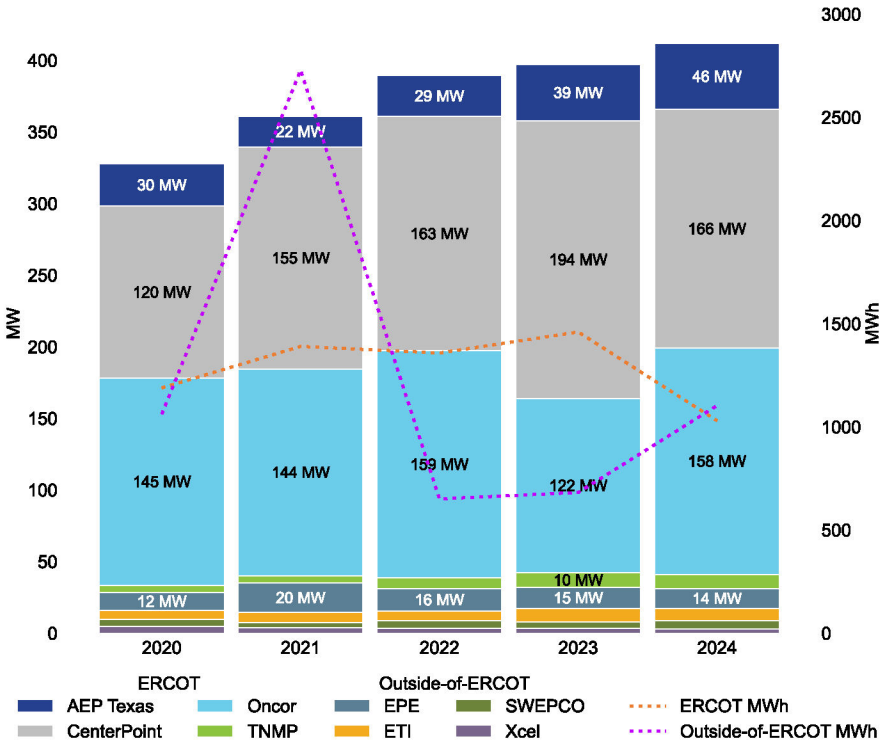
8.1 SUMMARY ANALYSIS

The total savings[51] of the programs were:

- 411,941 kilowatts (kW) (demand reduction) and
- 2,133,597 kilowatt-hours (kWh) (energy savings).

Demand reductions from load management has continued to increase over the years. Since PY2023, increase in load management is due to the growth in winter load management programs. (Figure 40).

Figure 40. Total IOU Demand Reduction (MW) and Energy Savings (MWh) by Program Year—Load Management Programs PY2020–PY2024[52]



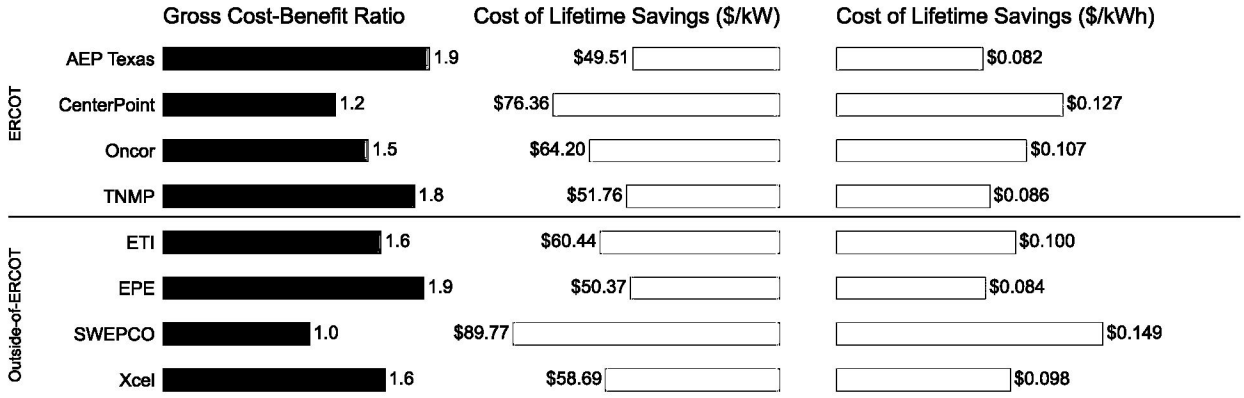
[51] The total savings do not include ETI's Residential Demand Solutions, which was claimed as a component of the Residential Solutions MTP in PY2024. ETI's Residential Demand Solutions component achieved 2,564 kW demand reduction and 7,693 kWh energy savings. ETI is included in the cooperation rate analysis.

[52] The following data points consist of the megawatt savings values that were unable to make it on the graph due to limited space: TNMP: PY2019, 3.667 MW; PY2020, 5.004 MW; PY2021, 5.078 MW; PY2022, 7.306 MW; PY2023, 10.278 MW. SWEPCO: PY2019, 6.319 MW; PY2020, 4.889 MW; PY2021, 3.837 MW; PY2022, 5.261 MW; PY2023, 4.555 MW. Xcel: PY2019, 3.417 MW; PY2020, 4.922 MW; PY2021, 3.771 MW; PY2022, 3.282 MW; PY2023, 3.275 MW.

8.1.1 Cost-Effectiveness

Figure 41 summarizes the cost-effectiveness of each utility's energy efficiency portfolio based on savings of all load management programs in PY2024. All portfolios were cost-effective, ranging from 1.0 to 1.9. The average lifetime (1 year measure life for load management) cost per kW ranged from $49.51 to $89.77, and the cost per kWh ranged from $0.082 to $0.149.

Figure 41. Cost-Benefit Ratio and Cost of Lifetime Savings—Load Management Programs PY2024 ERCOT utilities followed by Outside-of-ERCOT Utilities



8.2 COMMERCIAL LOAD MANAGEMENT

This section overviews the programs followed by key findings and recommendations. Then participation and impact results are discussed.

8.2.1 Background

Commercial summer load management programs are designed to manage load during summer peak demand periods. Most utility programs define summer peak demand as weekdays between 1:00 p.m. and 7:00 p.m., June 1 through September 30. Load management programs are performance based offer incentives to participating customers for voluntarily curtailing load on notice.

While each utility operates a unique load management program, there are many similarities among them. In general, a dispatch event may be called at the utility's discretion 30 to 60 minutes in advance of a curtailment event, which generally lasts one to four hours. In most cases, the utility reserves the right to call a certain number of curtailment events per season, ranging from 5 to 12, based on the utility. Customers must meet several eligibility requirements, including but not limited to (1) taking service at the distribution level, (2) meeting minimum demand requirements, and (3) being equipped with interval data recorder metering. Customers cannot simultaneously participate in other load management programs using the same curtailable loads (to prevent double-dipping).

Similarly, commercial winter programs offered by ERCOT IOU programs are designed to manage load during winter peak demand periods—defined as 6:00 a.m. to 10:00 a.m. and 6:00 p.m. to 10:00 p.m., December 1 through the end of February.

Participants in load management programs curtail their contracted load during the event or opt out if they do not wish to participate. Participants receive an incentive based on the kilowatts they curtail during the event. kW and kWh claimed savings are calculated by following the methodology described in PY2024 TRM 11.0. IOU program provides incentives based on kW reduced. This incentive amount is specified in an agreement with the utility when enrolling in the program. Participating customers can receive up to $50 per kW. Commercial customers who meet utility eligibility criteria participate directly in the load management program or through an aggregator or other third party.

It is to be noted the ERCOT IOU load management programs have never been called to deploy for a system emergency.

8.2.2 Key Findings and Recommendations

Table 40 summarizes the PY2024 participation for summer and winter programs.

Overall, participation in PY2024 slightly decreased for summer programs (from 1,884 sites in PY2023 to 1,878 in PY2024) and increased for winter programs (from 175 in PY2023 to 255 in PY2024).

Table 40. PY2024 Commercial Customer Participation Summary by Utility

Utility		Number of sites Summer	Number of sites Winter
ERCOT	AEP Texas	345	13
	CenterPoint	345	181
	Oncor	852	41
	TNMP	122	20
Outside-of-ERCOT	EPE	17	-
	ETI	183	-
	SWEPCO	8	-
	Xcel	6	-
Overall		**1,878**	**255**

Key Finding: Overall, commercial load management programs continue to increase in terms of number of participants (2,133 participants in PY2024 compared to 2,059 in PY2023) with all ERCOT IOUs offering winter load management programs in addition to summer programs.

- The participant increase was mainly driven by the winter load management programs (255 participants in PY2024 compared to 175 in PY2023),

- participation in the summer programs remained about the same (1,878 participants in PY2024 compared to 1,884 in PY2023).

Key Finding: The average level of cooperation[53] with curtailment events remains relatively high at around three-quarters of participants with a slightly higher cooperation rate for ERCOT summer programs than winter programs. Outside-of ERCOT IOU programs have a higher cooperation rates than ERCOT IOUs.

The cooperation rate slightly increased to 77 percent in PY2024 (78 percent for summer programs and 73 percent for winter programs) from 75 percent in PY2023 (74 percent for summer programs and 82 percent for winter programs).

In PY2024, outside-of-ERCOT utilities achieved a higher cooperation level for the summer programs compared to ERCOT utilities (85 percent and 77 percent, respectively).

Among the eight summer programs, Xcel had the highest cooperation rate of 100 percent, followed by ETI (85 percent), EPE (81 percent), and Oncor (78 percent).

Among the four winter programs (ERCOT only), TNMP had the highest cooperation rate of 100 percent, followed by Oncor (95 percent) and AEP Texas (85 percent). CenterPoint had a lower cooperation rate of 64 percent.

- **Recommendation:** IOUs should follow up with participants who underperform during curtailment events, including aggregators, to determine if future program participation or program-contract estimates of available demand reduction need to be revised. Recommendations at the IOU program-level are included in Volume 2 and Volume 3 for programs with less than a 90 percent cooperation rate.

Key Finding: Demand reductions decreased in PY2024 compared to PY2023 by seven percent (from 325.6 MW in PY2023 to 303 MW in PY2024).

Despite the growth in demand reduction of winter load management programs, the decrease in demand reduction from the summer programs (mainly driven by the ERCOT utilities) resulted in an overall decrease in savings across all commercial programs.

Key Finding: Utilities continue to demonstrate strong capabilities to apply the TRM calculation method to savings. However, clarification is needed for the *High 8 of 10* method for the winter programs.

PY2024 is the ninth year in which utilities and the EM&V team have applied the demand reduction algorithm for commercial summer load management programs described in the TRM, the third year for Oncor's commercial winter load management program, and the second year for the other three ERCOT commercial winter load management programs. The utilities and EM&V team were largely in agreement on final demand reduction calculations. Some differences occurred between claimed and evaluated savings for two winter load management programs that require additional guidance in the TRM.

- Recommendation: For winter load management programs which allow a varying baseline around the curtailment event, IOUs should apply the high 8 of 10 baseline calculation method consistently at the event level, not the customer level. The TRM should be updated to add more clarity to the *High 8 of 10* baseline calculation method for winter load management programs.

[53] The ratio of enrolled sites compared to sites that were able to curtail (excluding sites with zero or negative savings). In some cases, not being able to curtail during an event may be due to a meter or technical issue as opposed to non-performance.

8.2.3 Impact Evaluation Results

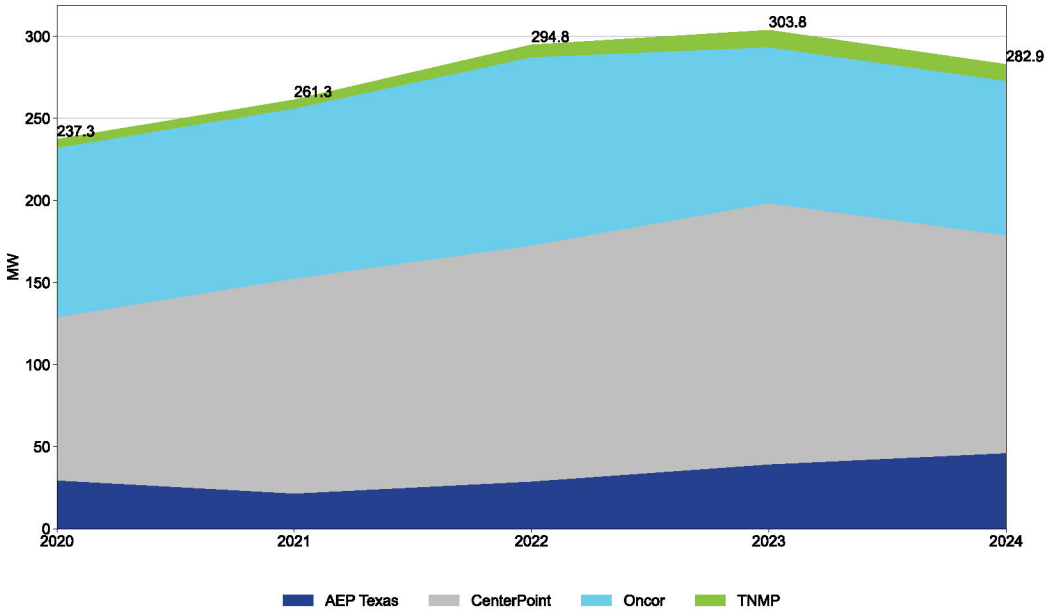
The PY2024 savings of summer and winter commercial load management programs are outlined in Table 41.

Table 41. PY2024 Commercial Demand Reduction (kW) and Energy Savings (kWh)

Utility type	Summer		Winter		Overall	
	kW (demand reduction)	kWh (energy savings)	kW (demand reduction)	kWh (energy savings)	kW (demand reduction)	kWh (energy savings)
ERCOT total	205,356	530,884	77,531	205,509	282,887	736,393
Outside-of-ERCOT total	20,152	171,834	N/A	N/A	20,152	171,834
Overall	**225,507**	**702,718**	**77,531**	**205,509**	**303,038**	**908,227**

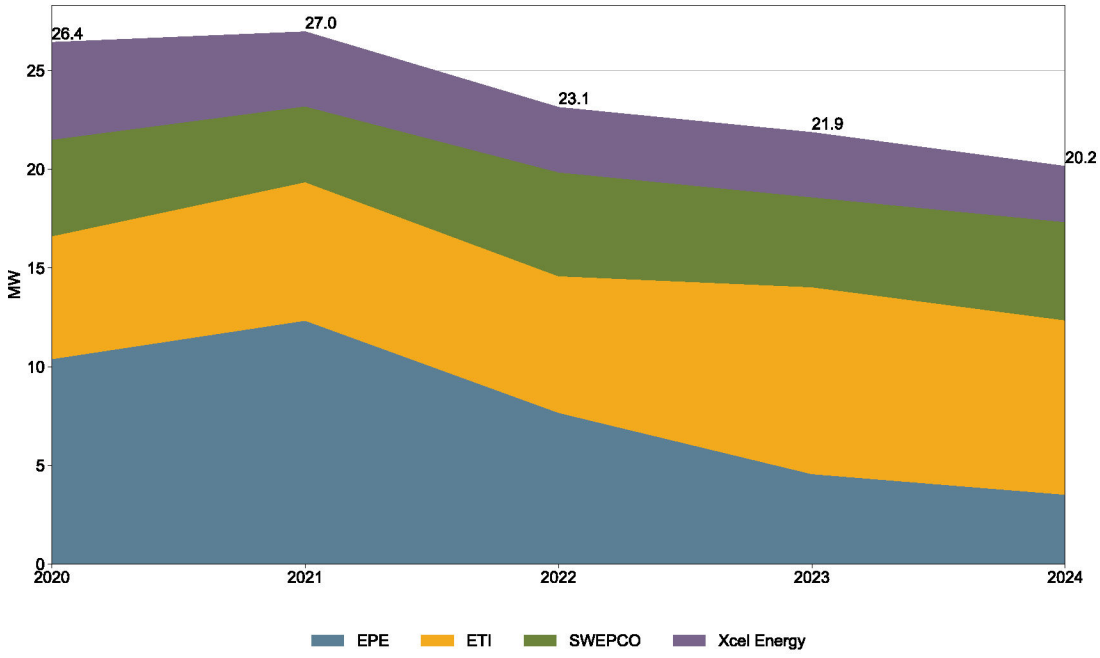
Figure 42 shows overall demand reduction from ERCOT IOUs' commercial load management programs by program year.

Figure 42. Demand Reduction (MW) of ERCOT IOU Commercial Load Management Programs PY2020–2024



Demand reduction from outside-of-ERCOT IOUs' commercial load management programs has been trending downward (Figure 43).

Figure 43. Demand Reduction (MW) of Outside-of ERCOT IOU Commercial Load Management Programs PY2020–2024



Demand reduction for most claimed savings aligned with the evaluation calculations, indicating that the EM&V team and the utilities follow the TRM algorithm for savings calculation similarly.

Four commercial load management programs (offered by three utilities) adjusted their savings to match the evaluated savings. The adjustments were due to data entry and calculation errors. Also, two utilities followed a conservative approach by not setting savings to zero in cases where the calculation methodology produced negative savings. Per PY2024 TRM 11.0, in cases where the savings algorithm produces negative savings, the negative savings can be set to zero. The three utilities accepted the evaluated results and matched the claimed savings to those of the evaluated savings. As a result, commercial load management programs received a realization rate of 100.0 percent for kW and 100.0 percent for kWh.

For two of the winter load management programs, the *High 8 of 10* baseline calculation method to yield the highest savings was used at the customer level instead of the event level. Therefore, different baseline days (prior and/or after the event) were used for each event. The EM&V team accepted the claimed savings due to lack of clarity in the TRM but identified the need to update the TRM for PY2026.

8.3 RESIDENTIAL LOAD MANAGEMENT

This section overviews the residential load management programs followed by key findings and recommendations. Then participation and impact results are discussed.

8.3.1 Background

Five Texas utilities (CenterPoint, EPE, ETI, Oncor, and SWEPCO) offer residential load management programs. ETI first piloted its summer residential load management program in PY2023, and SWEPCO first piloted its program in PY2024.

In PY2024, Oncor also piloted its winter residential load management program (the first *winter* residential program).

TNMP and AEP Texas are considering pilot summer programs. Xcel offers a residential summer demand response program, but not as part of its energy efficiency portfolio.

Three utilities (CenterPoint, ETI, and Oncor) calculated savings using interval meter data following the *High 3 of 5* method; the other two utilities (EPE and SWEPCO) used the deemed savings method.

Residential load management programs are designed to manage load during summer and winter peak demand periods. The PUCT's substantive rule § 25.181, relating to the energy efficiency goal, defines the summer control period as June 1 to September 30, within the window of 1:00 p.m. to 7:00 p.m. on non-holiday weekdays for ERCOT utilities and 2:00 p.m. to 8:00 p.m. on non-holiday weekdays for outside-of-ERCOT utilities. Although a utility can call events outside of these defined periods for grid or system reliability needs, the rule currently only counts demand reduction occurring during the defined peak periods towards a utility's demand reduction goal. ERCOT has never called for the deployment of utility load management programs.

In PY2024, five of the eight Texas utilities offered their customers a summer residential load management program, and only Oncor offered a winter residential load management program. Of the five utilities, CenterPoint, ETI, and Oncor programs utilize a *smart thermostat* control strategy. EPE and SWEPCO use direct load control devices. Incentives for these programs differ by whether or not the utility's service territory is part of the ERCOT market. ERCOT utilities pay an incentive based on the kilowatt demand reductions achieved during the load control season. Since ERCOT has never called for a load management event, participants are paid for deploying during test events. EPE and SWEPCO, on the other hand, pay a flat enrollment incentive and a flat incentive per program year. Participants may opt out of a load control event.

Participants in CenterPoint and Oncor's residential load management programs are evaluated individually using the *High 3 of 5 Baseline with Day-of Adjustment* method described in PY2024 TRM 11.0 Volume 4 (M&V). EPE is evaluated using the deemed savings value measured specifically for the utility (see TRM, Volume 2, Smart Thermostat Load Management), and SWEPCO is evaluated using the statewide deemed savings value calculated in 2023. In the past years, the availability of advanced metering infrastructure (AMI) meters has dictated a utility's methodology to calculate savings. SWEPCO completed deploying AMI meters in its territory and plans to transition to the M&V method in PY2025 (using interval meter data and the *High 3 of 5* method). EPE plans to complete the AMI rollout in 2025 and will transition to the M&V method in PY2026. Therefore, the deemed savings method will be discontinued in the PY2026 TRM.

8.3.2 Key Findings and Recommendations

PY2024 participation is summarized in Table 42 for summer programs. Overall, participation in PY2024 increased for summer programs (from 63,169 in PY2023 to 76,368 in PY2024).

Table 42. PY2024 Summer Residential Customer Participation Summary by Utility

Utility		Number of participants (targeted devices)
ERCOT	CenterPoint	27,653
	Oncor	39,252
Outside-of-ERCOT	EPE	10,201
	ETI	1,694
	SWEPCO	754
Overall		**76,368**

Key Finding: Overall, the summer residential load management programs saw significant increases in participation in PY2024, primarily driven by Oncor.

Key Finding: The first residential winter program was launched in PY2024.

Oncor is the only IOU that also had a residential winter program with 42,082 participating devices.

- **Recommendation:** The TRM should be updated with a *residential* winter load management M&V methodology with the expansion of winter load management to residential customers as well as commercial.

Key Finding: Average level of cooperation remains relatively high; it slightly increased to 80 percent in PY2024 from 77 percent in PY2023.

In PY2024, ERCOT utilities achieved a slightly higher cooperation level for the summer programs compared to outside-of-ERCOT utilities (80 percent and 76 percent, respectively). Oncor's winter load management, in its first year, had a lower cooperation rate of 69 percent.

In PY2024, the residential programs achieved a significant increase in demand reduction as well. After the continued increase since PY2019, demand reduction slightly decreased in PY2022 and PY2023. However, demand reduction in PY2024 increased by over 50 percent (from 71.5 MW in PY2023 to 111.5 MW in PY2024).

- **Recommendation:** IOUs should follow up with participants who underperform during curtailment events and determine if available demand reduction need to be revised. Recommendations at the IOU program-level are included in Volume 2 and Volume 3 for programs with less than a 90 percent cooperation rate.

Key Finding: While utilities continue to demonstrate strong capabilities to apply the TRM calculation method to savings, more clarification is needed in the TRM for residential load management.

PY2024 is the ninth year in which Oncor and CenterPoint and the EM&V team have applied the M&V approach for residential summer load management programs described in the TRM, the

seventh year for EPE's summer residential program using the deemed approach, the second year for ETI's summer residential program using the M&V approach, and the first year for SWEPCO's summer residential program using the deemed approach. PY2024 was also the first year for Oncor's *winter* residential program. The utility companies, implementers, and EM&V team were largely in agreement on final demand reduction calculations. Some differences occurred between claimed and evaluated savings for one summer load management program that requires additional guidance in the TRM.

- **Recommendation** In the *High 3 of 5* method, when the *uncapped additive adjustment* is negative, IOUs should use the *additive adjustment* used to calculate the *final baseline* should be negative. The TRM should be updated with an example to describe the calculation steps in the case where the *uncapped additive adjustment* is negative.

8.3.3 Impact Results

The PY2024 savings for the residential load management programs (CenterPoint, EPE, ETI, Oncor, and SWEPCO) are outlined in Table 43.

Table 43. PY2024 Residential Demand Reduction (kW) and Energy Savings (kWh)

	Summer		Winter		Overall	
Utility type	kW (demand reduction)	kWh (energy savings)	kW (demand reduction)	kWh (energy savings)	kW (demand reduction)	kWh (energy savings)
ERCOT total	81,388	244,163	16,577	49,731	97,965	293,894
Outside-of-ERCOT total	13,502	939,169	N/A	N/A	13,502	939,169
Overall	**94,889**	**1,183,332**	**16,577**	**49,731**	**111,467**	**1,233,063**

Figure 44 show overall demand reduction capability from ERCOT IOUs' residential load management programs by program year. Oncor's residential load management program increased substantially from PY2023 to PY2024 while CenterPoint's leveled off between PY2023 and PY2024. Both IOUs have grown their residential load management programs since PY2020.

Figure 44. Demand Reduction (MW) of ERCOT IOU Residential Load Management Programs PY2020–2024[54]

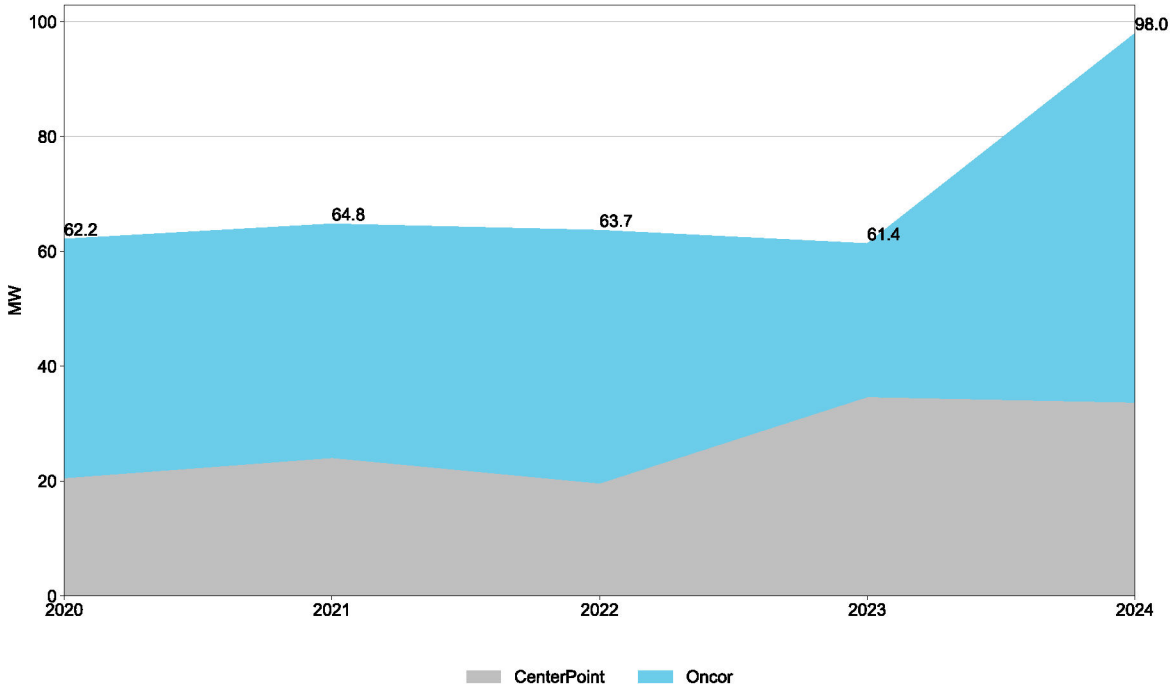
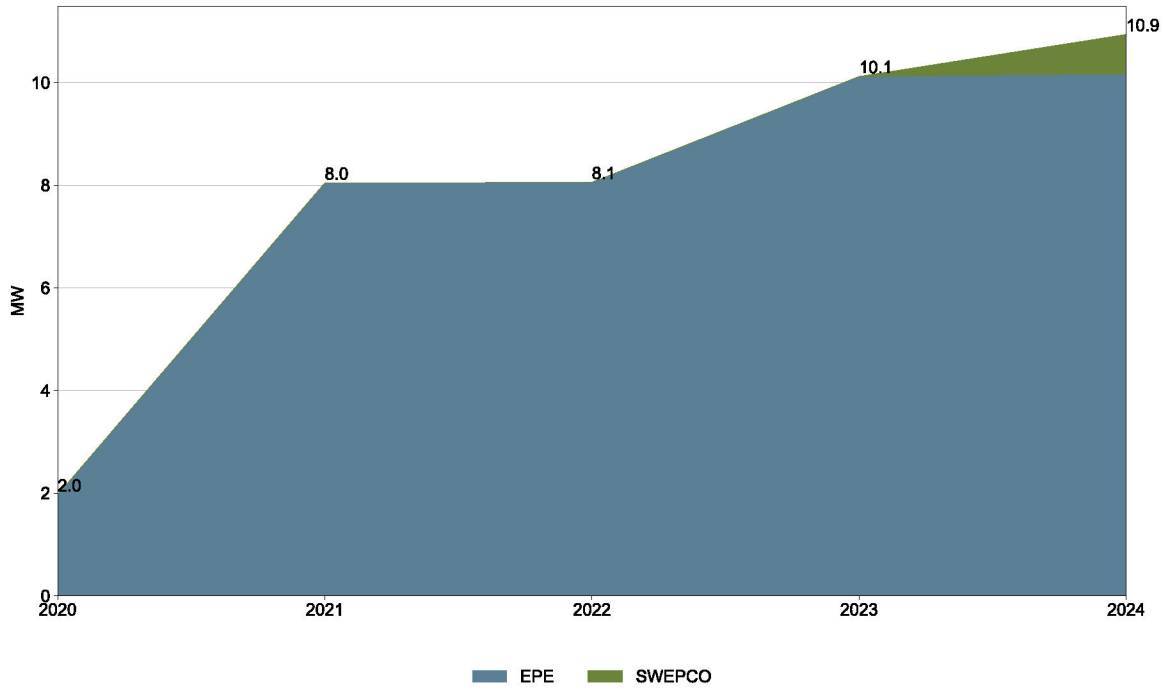


Figure 45 shows overall demand reduction from outside-of-ERCOT IOUs' residential load management programs by program year, with EPE levelling off residential load management growth between PY2023 and PY2024 and SWEPCO launching its first residential load management pilot in PY2024.

[54] Savings include Oncor's winter residential load management program, which achieved 16,577 kW demand reduction and 49,731 kWh energy savings.

Figure 45. Demand Reduction (MW) of Outside-of-ERCOT IOU Residential Load Management Programs PY2020–2024[55]



Demand reduction for most utilities aligned with the evaluation calculations, indicating that the EM&V team, and the utilities follow the TRM algorithm for savings calculation similarly.

Two residential load management programs adjusted their savings to match the evaluated savings. One adjustment was due to the calculation of the *additive adjustment* value. When the *uncapped additive adjustment* is negative, the *additive adjustment* used to calculate the *final baseline* should be negative. This was not the case in the utility's calculations, as the *additive adjustment* was always positive. The other adjustment was related to the deemed savings approach. The number of participating devices was adjusted for a few events, resulting in a small decrease in savings.

[55] Savings do not include ETI's residential load management program (Residential Demand Solutions) since it is claimed as a component of the Residential Solutions MTP.

APPENDIX A: HVAC TUNE-UP CONSUMPTION ANALYSIS

This appendix outlines the methodology and results for the PY2024 residential and commercial HVAC tune-up consumption analysis, expanding on the key findings and recommendations included in Section 5.1.2 of this report. The goal of the consumption analysis was to estimate the impact of the residential and commercial HVAC tune-ups during cooling hours.[56] All participating utilities,[57] regardless of program or sector, used the same tune-up implementation technology. Tune-up measures completed between September 1, 2023, and July 31, 2024, were included in the PY2024 consumption analysis.

A.1 DATA SOURCES

Data sources for the consumption analysis included the following:

1. **Program Tracking Data**: Account numbers, measure details, installation dates, addresses, and reported savings.
2. **Meter/Consumption Data**: Most participating utilities sent 15-minute interval meter data containing account number, timestamp, and kWh consumption for each period from January 1, 2023, to January 1, 2025.
3. **Temperature Data**: One-hour temperature data retrieved across 211 stations covering Texas as part of the Automated Surface Observing System (ASOS) network[58] from January 1, 2023, to January 1, 2025.

A.2 METER FILTERING AND EXCLUSIONS

Some of the Advanced Metering Infrastructure (AMI) meter data provided by utilities could bias results due to data transfer issues between the meter and the utility, a premises vacant for an extended period of time, power outages, or software issues. Any meter that could bias results was excluded from the analysis if it met one of the following criteria:

- inability to match meter data to EM&V tracking data,
- more than 20 percent of overall meter readings are at zero kWh,
- missing at least one week (10,080 minutes) of continuous meter readings, or
- lacking sufficient data to construct a fully robust weather-normalized pre- or post-installation period.

The EM&V team and utilities developed the criteria for the residential retrofit consumption analysis in PY2023. For the PY2024 tune-up consumption analysis, the EM&V team met with the utilities to refine the criteria.

The tune-up consumption analysis focused on cooling savings measured only during the summer months (June, July, August, and September), when air conditioners (AC) are presumed to be used the most.

[56] Summer months of June, July, August, and September—when air conditioners are presumed to be used the most.
[57] AEP Texas, CenterPoint, Entergy, Oncor, SWEPCO, and TNMP.
[58] The Texas weather stations in the ASOS network can be found at https://mesonet.agron.iastate.edu/request/download.phtml?network=TX_ASOS.

Table 44 outlines utility-specific meter data with applicable filtering criteria and the resulting number of meter counts by utility used for analysis. All participating utilities retained over 95 percent of the meters for the consumption analysis, except for AEP Texas (94 percent).

Table 44 - Meters Matching Filtering Criteria

Utility	AEP	CenterPoint	Entergy	Oncor	SWEPCO	TNMP
Total Number of Meters	3,647	9,155	536	4,657	4	450
Reasons for Exclusion						
No Tracking Data	-	-	1	-	-	-
>20% Zero kWh Readings	220	277	4	114	-	2
Missing Data	-	42	1	-	-	-
Analysis Meters						
Analysis Meters after Exclusions	3,427	8,837	530	4,543	4	448
Percentage Retained	94.0%	96.5%	98.9%	97.6%	100.0%	99.6%
A single meter could match multiple filtering criteria; therefore, the number of analysis meters may not be the difference between the total meters and the sum of the number excluded.						

Forty-three meters were excluded for missing large amounts of data, and only one meter could not be matched to the tracking data. The retention rate improved over the PY2023 residential retrofit consumption analysis, especially due to the decrease in periods of missing data. Weather-normalized pre- or post-installation analysis (Table 45) shows excluded meters for insufficient data during summer months in either the pre- or post-installation period. For CenterPoint, in particular, tune-ups that were performed near the beginning or end of the analysis period resulted in meters not having sufficient summer data for either a pre- or post-installation period.

Table 45 - Weather-normalized Analysis - Meter Counts by Utility and Sector

Utility	AEP	CenterPoint	Entergy	Oncor	SWEPCO	TNMP
Residential						
Total Number of Analysis Meters	2,774	8,443	495	4,543	-	441

Analysis Meters after Final Exclusions	2,763	7,358	493	4,543	-	441
Percentage Retained	99.6%	87.1%	99.6%	100.0%	-	100.0%
Commercial						
Total Number of Analysis Meters	653	394	35	-	4	7
Analysis Meters after Final Exclusions	649	320	30	-	4	7
Percentage Retained	99.4%	81.2%	85.7%	-	100.0%	100.0%

A.3 METHODOLOGY

After filtering the meters, the EM&V team resampled the data to one-hour intervals, attached hourly temperature data from the nearest weather station, and normalized the data to identify the effect that weather has on consumption. The team then analyzed the differences between the normalized consumption during cooling hours in the period before the tune-up and the period after the tune-up.

A.3.1 Weather Normalization

The EM&V team downloaded and cleaned the temperature data for each Texas ASOS network station to ensure that every hour had an associated temperature. For each meter, the EM&V team identified the weather station geographically closest to the meter address in the ASOS network and attached the temperature to the consumption data. Once the data were cleaned, the next step was to identify a single cooling setpoint used with each meter.

For each hour and for each meter, the EM&V team calculated the cooling degree hours (CDH) for multiple set-points.[59]

a. Given a cooling set-point x, for each hour, the temperature t_h is compared against the set-point. CDH is defined as $CDH_h = t_h - x$ if $t_h - x > 0$, and zero otherwise. This measures the number of degrees (Fahrenheit) that the outside temperature exceeds the cooling set-point.
b. The EM&V team then set up the following regression for each meter and each potential cooling set-point x:

$$Consumption_h = \alpha_h + \beta_1 * CDH_{h,x} + \sum_i \beta_i * Hour_i + \varepsilon_h$$

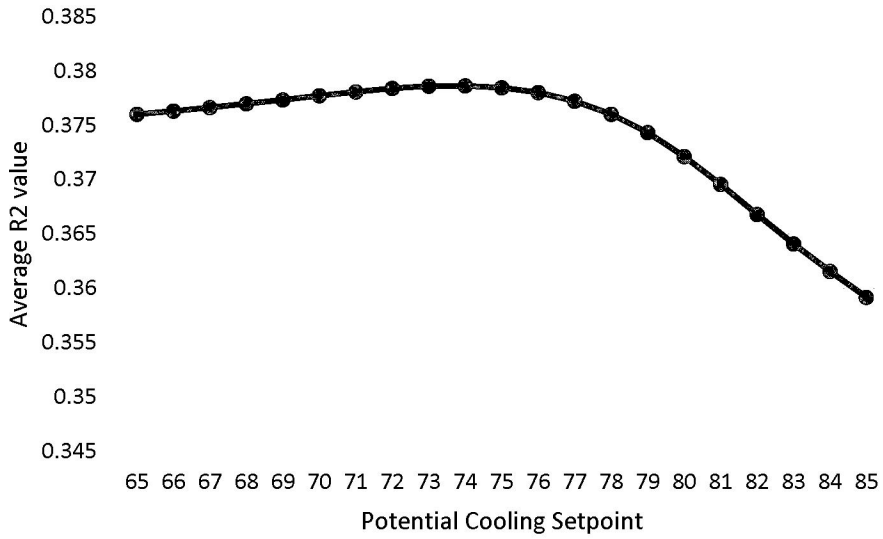
[59] Each regression did not include heating degree hours.

Here, for each hour h, $Consumption_h$ is the hourly consumption of the participant, α_h is the intercept, which corresponds to the average consumption at hour zero. $CDH_{h,x}$ is the cooling degree hour, assuming a cooling set-point of x. The coefficient β_1 is the model cooling slope, representing the average change in hourly usage resulting from an increase of one CDH. Finally, $Hour_i$ is an indicator variable indicating the hour of the day (ranging from 1 to 23), and their coefficients β_i are the average kWh baseloads at each hour. The error term ε_h encapsulates any variance that occurs.

c. The regression analysis for every meter was performed using the available summer data up to three days before the HVAC tune-up to meter for a potential lag in recording tune-up data.
d. For each meter, the regression with the best R^2 value was selected and coefficients and cooling set-point were recorded.
    - The average best cooling set-point (all meters) is 73.98 degrees Fahrenheit
    - The median set-point is 74 degrees Fahrenheit

To further confirm that 74 degrees Fahrenheit is a reasonable choice for the cooling setpoint, the average R^2 value[60] for each potential setpoint was compared. Figure 46 shows the average R^2 values. The maximum R^2 value occurs at a cooling setpoint of 74, with an average R^2 value of 37.9 percent. After normalization, the average cooling setpoint for PY2023's residential retrofit consumption analysis was 71.

Figure 46 - R^2 Values for Potential Cooling Setpoints



Finally, using the cooling setpoint of 74, the EM&V team performed the regression analysis for every meter on the post-tune-up summer consumption data.[61] The team recorded the

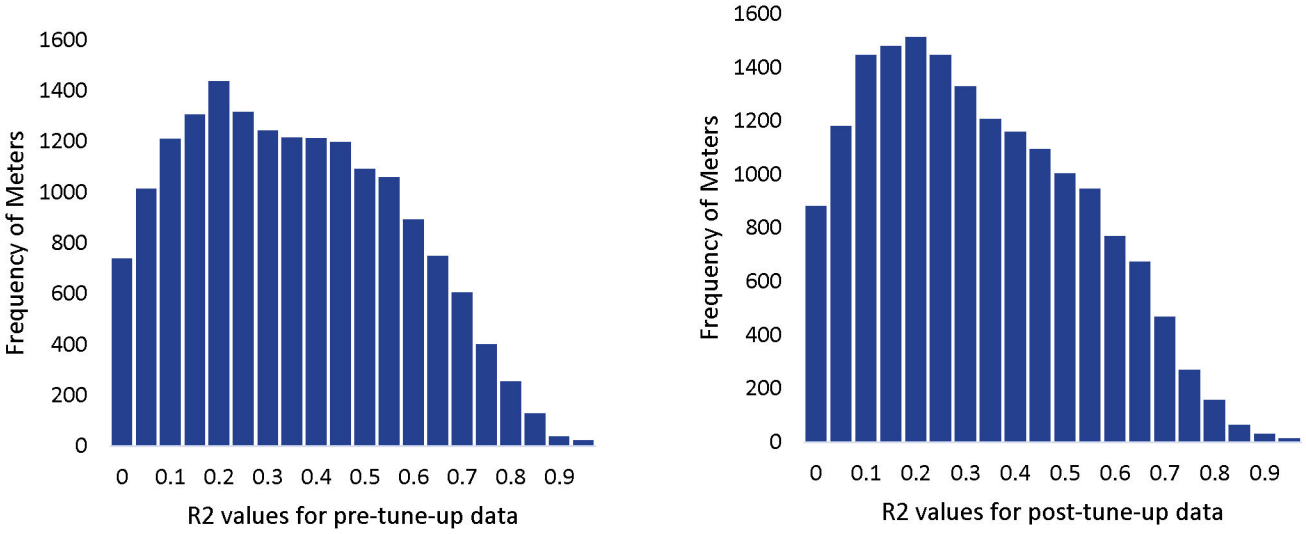
[60] The R^2 value for a regression measures the percentage of variation in the modeled variable that the model explains.

[61] Post-tune consumption data included at least three days after tune-up was performed at the participant site.

regression coefficients for the pre- and post-tune-up values and applied them to the TMYx[62] weather file for each meter's particular climate zone.

For the cooling setpoint of 74, the average R^2 value for individual normalization regressions in the pre-tune-up period is 37.8 percent and post-tune-up period is 34.9 percent. Figure 47 displays the distribution of R^2 values for the pre-installation period and the post-installation period.

Figure 47 - R^2 Distributions in the Pre- and Post-Tune-Up Periods



A.3.2 Calculating Cooling Savings

For each meter, the EM&V team used a TMYx set of temperatures for the appropriate climate zone to calculate cooling consumption based on both the pre-tune-up data and post-tune-up data. For both the pre- and post-periods, and for hours where the exterior temperature in the TMYx was above 74 degrees Fahrenheit, the cooling consumption for that hour was the respective regression coefficients applied to the hour and TMYx temperature. Then, the cooling consumption was summed over the cooling degree hours for the entire year, creating a pre-tune-up cooling consumption and a post-tune-up cooling consumption.

The cooling savings attributable to the tune-up were calculated as the difference between the pre-tune-up cooling consumption and the post-tune-up cooling consumption.

A.4 RESIDENTIAL RESULTS

This section presents the evaluated savings estimates for the residential HVAC tune-ups. The results are first presented at the program level, then at the IOU level, and finally at the climate zone level.

[62] The Typical Meteorological Year (TMY) is generated from historical weather measurements. The TMYx file develops a typical year based on the previous 20 years of weather readings at the station.

A.4.1 Overall Results

On average across all IOUs, the residential HVAC tune-ups demonstrated savings when compared to normalized cooling consumption. For the 15,598 meters in the analysis set, the average cooling savings were 281 kWh per meter, with a standard error of 15 kWh.

A.4.2 Results by Utility

Each of the IOUs demonstrated savings on average, ranging from 144 kWh for Oncor to 766 kWh for Entergy. Each of these savings averages are statistically significant at the 90 percent confidence level. The average savings, standard error, and 90 percent confidence intervals are shown in Table 46.

Table 46 - Residential HVAC Tune-Up Average Savings

IOU	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Overall	**15,598**	**281**	**15**	**256**	**306**
AEP Texas	2,763	196	36	137	255
CenterPoint	7,358	372	22	335	409
ETI	493	766	82	632	901
Oncor	4,543	144	27	100	188
TNMP	441	171	67	61	282

A.4.3 Claimed Savings Methodology

Using tracking data provided by the utilities, the EM&V team compiled claimed savings from the reviewed tune-up projects. During PY2024, all participating IOUs claimed tune-up savings using calculations by following the PY2024 TRM Volume 4 Measure 2.1.2 (Vol. 4 savings) M&V methodology along with inputs provided by the implementation contractor.

Per PY2024 TRM Vol. 4, savings are determined from the collection of the prescriptive HVAC replacement parameters (equivalent full-load hours, tonnage, coincidence factor) with the efficiency of the tune-up unit.

A.4.3.1 Tune-Up Measurements

Following the tune-up, HVAC efficiency is calculated using on-site measurements, generally following the International Performance Measurement and Verification Protocol Option A, Retrofit Isolation, Key Parameter Measurement. These measurements include

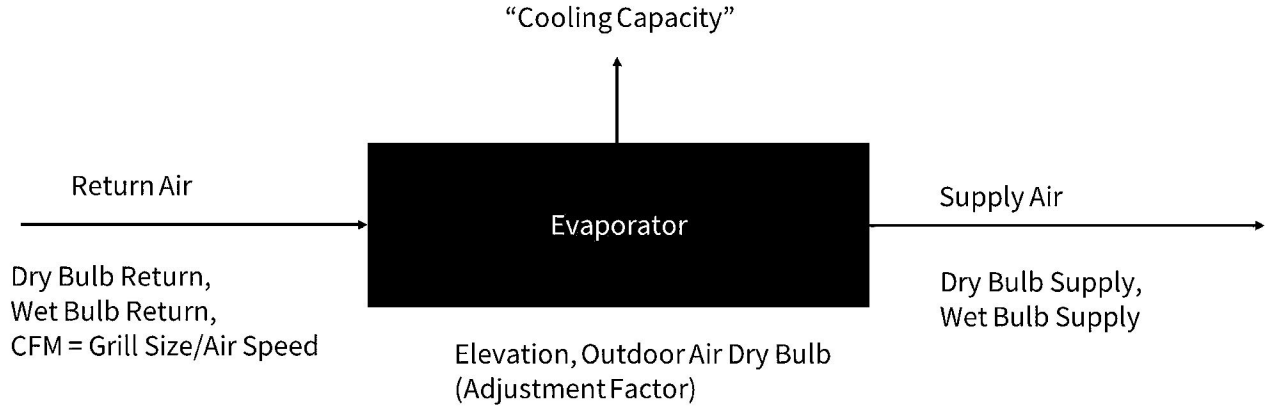
- power measurements (voltage, amperage, motor type) of the condenser and blower,
- the outdoor dry bulb temperature, and
- dry and wet bulb temperatures of supply and return air measured at the grills.

Airflow measurement has been historically determined via two methods: a direct airflow measurement at the return air grill using a vane anemometer, and the implementation contractor's confidential fan charts correlating airflow with static pressure in the air handler and

blower power. The EM&V team does not have access to the underlying data of the fan charts and has no visibility or methods to understand when the fan chart dataset was compiled, HVAC fan models included, quantity of fans analyzed to develop the fan charts, biases in fan selection, or the quality of the regression equations used. Starting in PY2025, the EM&V team updated the TRM to disallow the use of generic fan charts in savings calculations or the efficiency loss calculation (described in further detail below).

A.4.3.2 Tune-Up Savings Algorithm

The measurements collected by implementation technicians and the assumptions outlined in the implementer's M&V plan are used to identify the cooling capacity of the HVAC unit. The diagram below illustrates the energy balance around the evaporator coil of the HVAC unit, highlighting the relationship between the parameters.



$$Cooling\ Capacity = \left(h_{Return\ Air} - h_{Supply\ Air}\right) \times (Mass\ Flow\ Rate)$$

The cooling capacity is calculated by multiplying the enthalpy difference between the return and supply air streams by the mass flow rate. The enthalpy difference is derived by ASHRAE Fundamental equations, using the measured supply dry bulb, supply wet bulb, return dry bulb, and return wet bulb temperatures. The mass flow rate is determined from the airflow divided by the specific volume of air, calculated from the return air conditions.

The cooling capacity is then divided by the measured total power of the unit to determine the Energy Efficiency Ratio (EER).

$$EER = \frac{Cooling\ Capacity}{Net\ Power}$$

The energy savings for a tune-up are calculated using the difference between EERpost and EERpre in the standard cooling energy savings equation.

$$Energy\ Savings\ (kWh) = Nominal\ Tonnage * 12 * EFLH_{cooling} * \left(\frac{1}{EERpre} - \frac{1}{EERpost}\right)$$

A.4.3.3 Efficiency Loss Factor

Only EERpost is measured directly by the tune-up contractor for all tune-ups. EERpre is calculated by applying the average efficiency improvement (or efficiency loss) from a sample of HVAC tune-ups from the prior three years (for PY2024, PY2021 through PY2023).

$$EERpre = EERpost * (1 - Efficiency\ Loss)$$

The tune-up implementer allows the tune-up technicians to self-select a sample of 10 percent of all *tune-ups* in a program year to determine the average efficiency improvement (or efficiency loss). For those self-selected 10% of *tune-ups*, technicians collect both pre-tune-up and post-tune-up measurements.[63] For the remaining 90% of *tune-ups*, technicians collect only post-tune-up measurements.[64]

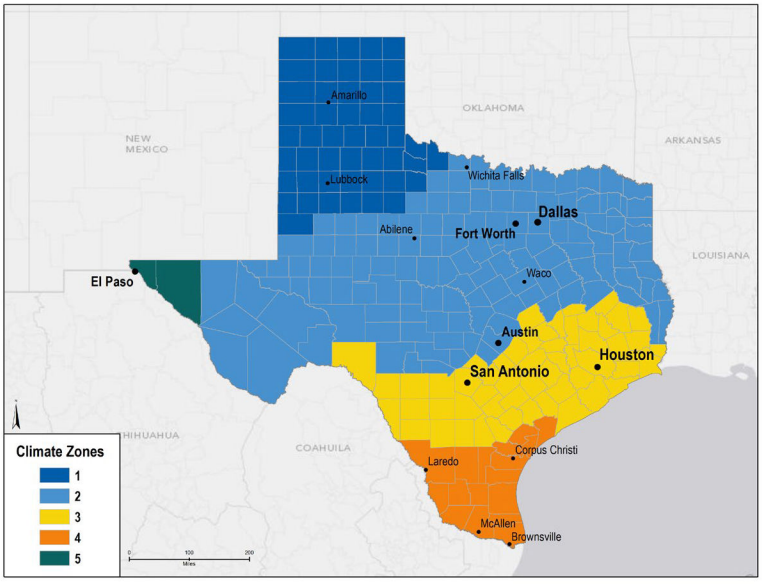
Four efficiency loss values are established ahead of each program year, for

1. residential units receiving a refrigerant charge adjustment as part of the *tune-up*,
2. residential units that do not receive a refrigerant charge adjustment as part of the *tune-up*,
3. commercial units receiving a refrigerant charge adjustment as part of the *tune-up*,
4. commercial units that do not receive a refrigerant charge adjustment as part of the *tune-up.*

A.5 RESULTS BY CLIMATE ZONE

The TRM includes five climate zones to list the energy savings differences for HVAC and envelope measures by different weather conditions. Therefore, claimed measure savings are dependent on the location. Figure 48 shows the TRM climate zones defined by county. The EM&V team analyzed the meters in climate zones 2 through 4.[65] In this section, the results are separated by climate zone.

Figure 48 - Map of TRM Climate Zones



[63] This was labeled in the tracking data as "M&V."
[64] This was labeled in the tracking data as "Modeled" or "Stipulated."
[65] There were no meters in climate zones 1 or 5.

Climate zones 2-4 showed significant savings at the 90 percent confidence level. The average kWh cooling savings are almost twice as high in Climate Zone 3 as they are in Climate Zones 2 and 4. Table 47 displays the average savings and confidence intervals for residential meters in these three climate zones.

Table 47 - Residential HVAC Tune-Up Average Savings per Meter by Climate Zone

Climate Zone	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Climate Zone 2	4,548	145	27	101	189
Climate Zone 3	8,377	383	21	349	417
Climate Zone 4	2,673	192	37	132	253

A.6 COMMERCIAL RESULTS

Commercial participants typically have higher electricity consumption and higher-capacity HVAC systems, which result in higher savings per meter and increased variability between meters. Fewer numbers of commercial tune-ups resulted in higher standard errors and wider confidence intervals. In particular, the only IOU whose confidence interval does not include zero was SWEPCO, with four participants. The small sample sizes result in estimates susceptible to single locations with large consumption differences (positive and negative).

Table 48 - Commercial HVAC Tune-Up Average Savings per Meter

IOU	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Overall	1,010	-887	2,014	-4,200	2,427
AEP Texas	649	1,931	2,465	-2,124	5,985
CenterPoint	320	-6,846	3,826	-13,139	-553
ETI	30	7,604	7,270	-4,354	19,563
SWEPCO	4	13,567	6,922	2,180	24,954
TNMP	7	-34,294	17,446	-62,992	-5,596

A.7 QUALITATIVE RESULTS AND DISCUSSION

To conduct the consumption analysis, the EM&V team requested all tracking data related to the sampled HVAC tune-up projects. The tracking data had significant variations across different IOUs, including information such as tune-up date, sector, whether tune-up projects received

both pre- and post-tune-up measurements or only post-tune-up measurements, equipment size, and contractor name. Some parameters, such as equipment age, collected by the implementer (and provided for the annual efficiency loss determination), were not provided in the IOU tracking data. Table 49 below shows the list of variables provided by each IOU.

Table 49 - Tune-Up Variables Present in Tracking Data Provided

Parameter	AEP	CenterPoint	ETI	Oncor	SWEPCO	TNMP
Install Date	X	X	X	X	X	X
Sector	X	X	X	X	X	X
Building Type	X		X	X		X
Equipment Type (AC vs Heat Pump)	X		X	X		X
Equipment Type (Split vs Packaged)	X		X	X	X	X
Equipment Size (tonnage)	X	X	X	X	X	X
Equipment Age						
Refrigerant Charge Adjustment (Y/N)	X		X	X	X	X
Refrigerant Charge Adjustment (oz added)	X		X	X		X
Refrigerant Charge (Nominal Charge)	X		X	X		X
Tune-Up Method (M&V/Measured vs Modeled/Stipulated)	X	X	X	X		X
Post Tune-Up Blower Power	X		X			X
Post Tune-Up Condenser Power	X		X			X
Post Tune-Up Capacity – Unadjusted	X		X			X

A.7.1 Residential M&V vs. Modeled

As mentioned in Section 1.4.3.3 above, M&V tune-ups are the 10% of *tune-ups* where technicians collect both pre-tune-up and post-tune-up measurements. Modeled or stipulated tune-ups are the remaining 90% of *tune-ups*, where technicians collect only post-tune-up measurements.

Table 50 shows the estimates and confidence intervals for the residential meters analyzed. A statistically significant difference was not found between the measured and modeled groups due to the overlap in confidence intervals. This is represented by a *p*-value of 0.191 for the difference and overlapping confidence intervals.

Table 50 - Average Residential kWh Savings for Measured and Modeled Evaluations

Evaluation Method	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Total Projects	15,598				
Measured	915	343	60	244	442
Modeled	6,783	260	88	115	404
Data received after this analysis	7,900				

The detailed data required for this comparison were not immediately available in the utility tracking data for all projects; therefore, 7,900 meters were excluded from this analysis. Once the additional data were received for 5,033 of the 7,900 meters, this analysis was not recompleted.

A.7.2 Residential Multifamily vs. Single Family

The EM&V project team studied the cooling savings differences between multifamily units and single-family residences.

Table 51 highlights the estimates and confidence intervals for the two housing types. The difference between the housing types was statistically significant and has a confidence level of 90 percent, statistically represented by the *p*-value of 0.074. Average cooling savings were higher for the multifamily residences.

Table 51 - Average Residential kWh Savings for Multifamily and Single-Family Residences

Residence Type	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Multifamily	8,690	305	20	272	338
Single-Family	6,908	251	23	213	288

A.7.3 Analysis of commercial tune-ups

Although the commercial tune-up cooling savings data are qualitatively interesting, analysis of them did not result in robust statistical significance. This section describes the analysis of the provided data.

A.7.3.1 Commercial Tonnage

Tonnage information was in the utility tracking data for 666 of the 1,1010 commercial meters analyzed.

- Only 4 of the 666 meters were larger than 20 tons, indicating a need for more data for analysis.

A.7.3.2 Split vs. Packaged

For residential meters,

- eight residences had packaged AC, and
- most of the data provided was unspecified or split AC.

For commercial meters,

- 359 locations had split AC, and
- 287 had packaged AC.

Table 52 highlights that for packaged AC, the average normalized cooling consumption savings after tune-ups is -2,608 kWh, meaning that, on average, commercial meters with packaged AC increased their energy consumption by 2,608 kWh after the tune-up measure.

Commercial meters with split AC saved 5,292 kWh after tune-up measures were performed. Both types of AC had 90 percent confidence intervals that included zero, and the *p*-value of the difference was 0.111, indicating no statistical difference between the two groups.

Table 52 - Average Commercial kWh Savings by Air Conditioning Type

Air Conditioner Type	n	Average kWh Savings	Standard Error	Lower 90% Confidence Interval	Upper 90% Confidence Interval
Packaged	287	-2,608	3,694	-8,684	3,468
Split	359	5,292	6,180	-4,874	15,457

APPENDIX B: COMMERCIAL PARTICIPANT SURVEY METHODOLOGY

This appendix provides details on the methodology and response rate of the PY2024 commercial customer participant surveys.

The participant surveys were used to inform the process and net-to-gross (NTG) evaluation of the commercial SOP and MTP programs. These surveys investigated program awareness, participation experience, program satisfaction, and firmographics. The surveys also included questions to estimate NTG, specifically inquiring about customer energy efficiency behavior in the absence of utility program incentives and influence.

Data collection techniques

Tetra Tech's in-house Survey Research Center (SRC) conducted the participant survey by phone from May 5, 2025, to June 6, 2025.

Table 53 shows the response rate for the participant survey. SRC interviewed 160 participating customers who provided feedback on 370 of the 1,559 sampled projects (23.7 percent). The 370 projects included a total of 435 measures.

Table 53. Participant Survey Response Rate

Disposition	Overall
Sample	**1,559**
Residential line	0
Not a utility customer	0
Eligible sample	**1,559**
Does not recall participating	96
Ineligible - respondent has moved	0
Ineligible - recently surveyed	1
Refusal	30
Incompletes (partial surveys)	8
Language barrier	9
Bad number	18
Called out	0
Attempted but not completed[66]	385
Not completed- subsequent cases for projects with multiples[67]	642

[66] These were cases where calls were made, but the customer was unreachable.
[67] These were cases that were not called because a respondent who could complete the survey for the multiple projects was unreachable.

Disposition	Overall
Completes (projects)	**370**
Response rate	
Response rate (completed projects/ eligible sample)	**23.7%**

Table 54 summarizes the sample frame size, survey completes, and response rates by program type (SOP and MTP), utility group, and utility. Outside-of-ERCOT IOUs had higher response rates for SOPs. MTP response rates were more similar across utility groups.

Table 54. Sample Sizes and Survey Response by Utility and Utility Group

Program type	Utility group	Utility	Sample frame size	Completed surveys	Response rate
SOP	ERCOT	AEP Texas	137	32	23.4%
		CenterPoint	152	39	25.7%
		Oncor	203	49	24.1%
		SOP ERCOT Total	**492**	**120**	**24.4%**
	Outside-of-ERCOT	SWEPCO	8	4	50.0%
		Xcel	21	8	38.1%
		SOP Outside-of-ERCOT Total	**29**	**12**	**41.4%**
SOP Total			**521**	**132**	**25.3%**
MTP	ERCOT	AEP Texas	337	77	22.8%
		CenterPoint	332	57	17.2%
		TNMP	92	24	26.1%
		MTP ERCOT Total	**761**	**158**	**20.8%**
	Outside-of-ERCOT	EPE	70	6	8.6%
		ETI	149	52	34.9%
		SWEPCO	33	15	45.5%
		Xcel	25	7	28.0%
		MTP Outside-of-ERCOT Total	**277**	**80**	**28.9%**
MTP Total			**1,038**	**238**	**22.9%**

Comparison with similar studies

Table 55 shows that the PY2024 commercial participant survey had a response rate of 23.7 percent, which is above average compared to recent commercial participant surveys conducted in other states.[68]

Table 55. Comparison of Response Rates: Texas IOU Commercial Participant Survey to Other Recent IOU Commercial Participant Surveys

Survey study	PY2024 commercial survey	Recent commercial surveys implemented in other states for commercial energy efficiency programs			
State or Region/Timeframe	Texas IOU/ May 2025	Northeast IOU/ June 2024	South central IOU/ October 2024	New England IOU/ December 2024	Mid-Atlantic IOU/ June 2025
Eligible sample frame size	**1,559**	1301	402	1,829	917
Completes	**370**	167	179	346	139
Response rate (Completed/ eligible sample)	**23.7%**	12.8%	30.6%	18.9%	15.2%
Average survey length (min)	**23.3**	20.7	11.7	20.3	18.4
Average number of attempts	**8.1**	12.8	4.9	7.5	6.1
Average productivity (number of completes/ total interviewer hours)	**0.24**	0.09	0.50	0.18	0.09
Incentive provided for survey completion	**No**	Yes	No	No	No

Recommendations to improve data quality and data collection efforts

The PY2024 commercial participant survey sampled 1,559 cases. Of these,

- 131 (8.4 percent) were missing a contact name,
- 369 (23.7 percent) lacked a company name,
- 22 (1.4 percent) did not include a phone number,
- two included an incomplete address, and
- none contained information on the Energy-Efficiency Service Provider (EESP).

These data gaps resulted in challenges for survey outreach and accurate targeting. Additionally, some of the phone numbers provided were generic, such as main corporate lines or reception desks, rather than direct lines to individuals familiar with the program. This made it difficult to

[68] The average response rate across four recent comparable commercial participant telephone surveys conducted was 19.4 percent.

reach the appropriate person and often required navigating through gatekeepers who were not aware of participation in the program. This may explain the high number of cases that were attempted but not completed or do-not-recall cases (Table 1).

To improve future data collection efforts, to better understand the quality of energy efficiency programs offered to the utility customers, and to increase the response rate, the EM&V team recommends improving data collection protocols for contact information. IOUs should emphasize collecting complete and specific commercial customer contact details. IOUs must establish data protocols with implementers to enhance respondent accessibility. EM&V recommendations for tracking systems should include:

- EESP information for each record, and
- customer contact details, such as:
  - complete address served by EESP
  - company name
  - contact details (including specific names, direct phone numbers) of the decision maker, or the individual most familiar with program participation.

APPENDIX C: NET-TO-GROSS METHODOLOGY

This appendix provides details on the net-to-gross (NTG) methodology and calculations for PY2024 commercial MTPs and SOPs NTG ratios. The NTG ratio is calculated as:

$$NTG = 1 - \text{free-ridership}^{69\ 70}$$

Calculating free-ridership—Commercial participant survey

For free-ridership (FR) assessment, Tetra Tech used rigorous and standardized self-report approach (SRA) survey batteries. The *self-report approach (SRA)* involves asking the decision-maker a series of closed and open-ended questions about their motivations for installing program-eligible equipment. The focus is on what they would have done in the absence of the program incentive and other services, and questions that attempt to rule out rival explanations for the installation. Consistency check questions are included to increase analysis reliability in instances where a respondent's answers are contradictory.

All sampled commercial participants of Commercial SOP, SCORE City Smart, Retro-commissioning SOP, Commercial Solutions, and Solar PV, CoolSaver Tune-Up programs were asked the free-ridership survey batteries for each installed measure. The survey batteries mainly include the following questions:

[69] A *free rider* refers to a program participant who would have made some program-rebated energy-efficient improvements if the program had not been offered.

- *Non-free riders* (0 percent free rider rate) would not have made any energy efficiency improvement without the program's assistance.
- *Pure free riders* (100 percent) would have installed the exact same efficiency and quantity of the measure at that same time in the absence of the program.

A program's free-ridership rate is the percentage of program savings attributed to free riders.

[70] Starting PY2024, *spillover* is not included in the NTG calculation because Texas IOU claimed savings are based on gross savings. To assess the effectiveness of minimizing *free-ridership* in programs, NTG does not include spillover. *Spillover* refers to additional energy-efficient equipment installed by a customer due to program influences but without any financial or technical assistance from the program.

CORE COMMERCIAL PARTICIPANT FREE RIDERSHIP QUESTIONS

N2 Did you hear about the incentive and assistance available through <UTILITY> for this <MEAS> BEFORE or AFTER you decided to purchase or implement the <MEAS>?

01 Before
02 After
03 At the same time
88 Don't know
99 Refused

N2a [SKIP IF N1A = 03, customer purchased and installed the <MEAS> because they received technical assistance] Did you receive any kind of technical assistance such as an energy assessment, study, training, education, planning support, communications support or assistance with the identification of energy-efficiency projects from <UTILITY> for the <MEAS>?

[IF NEEDED: This may have included a feasibility study, facility assessment, facility benchmarking, or energy master planning.]

01 Yes
02 No
88 Don't know
99 Refused

N2b [ASK IF N2A=01] Who provided the technical assistance for the <MEAS>? [SELECT ALL THAT APPLY]

01 <UTILITY>
02 [IF EESP IS NOT BLANK SHOW "<EESP> or" ELSE SHOW "The contractor that supported you with program participation"]
03 Other contractor or vendor [SPECIFY]
04 Other [SPECIFY]
88 Don't know
99 Refused

N3 I'm going to ask you to rate the importance of factors that might have influenced your decision-making process.

Using a 0 to 10 scale, where 0 means "not at all important" and 10 means "very important", please rate the importance of each of the following in your decision to purchase or implement the <MEAS> (IF EFF=1 where efficiency level is applicable, SHOW "above standard efficiency").

N3A [ASK IF I8=01, customer reported that the <MEAS> received replaced an existing <MEASCAT>] the age or condition of the old equipment?
N3B [ASK IF INC=01, customer reported that they received a financial incentive, a rebate, or a markdown on the price of the <MEAS> from <UTILITY>] the availability of the <UTILITY> markdown or financial assistance?
N3C [ASK IF (N1A=03 or N2A=01)] the information provided through a study, energy assessment, or other technical assistance sponsored by [IF EESP IS NOT BLANK SHOW "<EESP> or" ELSE SHOW "your contractor"]?
N3D the recommendation from a vendor or supplier?
N3E the previous experience with [IF EESP IS NOT BLANK SHOW "<EESP> or" ELSE SHOW "your contractor"] or <UTILITY> energy-efficiency project?
N3F the information from a training course or seminar provided by [IF EESP IS NOT BLANK SHOW "<EESP> or" ELSE SHOW "your contractor"]?
N3G the information from <UTILITY> program informational materials?
N3H the standard practice or corporate policy in your business regarding equipment installation?
N3I the payback on investment?
N3J general concerns about the environment?
N3K the financial assistance or rebate from **another** organization other than <UTILITY>?
N3L the information or recommendations provided to you by <UTILITY> or [IF EESP IS NOT BLANK SHOW "<EESP> or" ELSE SHOW "your contractor"]?

N3MASK Is there anything else that influenced your decision to purchase or implement the <MEAS> that I haven't mentioned?

01 Yes [SPECIFY]
02 No

N4 [SLOW DOWN] Now, I'd like to understand the importance of the <UTILITY>'s energy-efficiency program in your decision relative to deciding factors not related to the program. Keep in mind that the program can include rebates, energy assessment, technical assistance, and informative marketing materials.

Other factors include things such as <SHOW HIGHEST RATED OF N3h, N3i, N3j, or N3k, IF TIE SHOW MULTIPLE RESPONSES>.

Now, consider that you have 100 points. How many points would you give to the importance of the program, and then how many points would you give to the importance of the other factors so that, when combined, they total 100? [IF NEEDED: Provide a response between 0 and 100 for each, which when added should total 100].

[IF NEEDED: Please provide a response between 0 and 100 for each category; when summed, they should total 100.]

N4_PSC ___ What number would you give the importance of the <u>program</u>
N4_OSC ___ What number would you give the importance of the <u>most important *other* factor</u>
888 Don't know

N5a Now I would like you to think about the action you would have taken if the <UTILITY> services had not been available.

Using a 0 to 10 scale, where 0 is "not at all likely" and 10 is "extremely likely," how likely is it that you would have purchased or implemented the <MEAS> (IF EFF=1: over a standard efficiency <MEASCAT>) if the <UTILITY> service had not been available?

00 Not at all likely
01
02
03
04
05
06
07
08
09
10 Extremely likely
88 Don't know [SKIP TO NEXT SECTION]
99 Refused [SKIP TO NEXT SECTION]

N5b [ASK IF N1B=02 OR N1C=01], customer reported that there is no on-going service agreement in place before the project OR would have ended the on-going service agreement when it came time to renew, in the case of not receiving the financial assistance from <UTILITY>] You just stated that there was a "<N5a response> in 10" likelihood that you would have entered into a service agreement if the <UTILITY> services had not been available. If the services were not available, would you have entered into a service agreement at the same time?

01	Yes	[SKIP TO NEXT SECTION]
02	No	[SKIP TO N6b]
88	Don't know	[SKIP TO N6b]
99	Refused	[SKIP TO N6b]

N6a [ASK IF N5a=01,02,03,04,05,06,07,08,09,10] You said that there was a "<N5a response> in 10" likelihood that you would have purchased or implemented the <MEAS> [IF EFF=1: over a standard efficiency <MEASCAT>] if the <UTILITY> services had not been available. When do you think you would have purchased or implemented the <MEAS>?

[INTERVIEWER: PLEASE ANSWER IN MONTHS]

__	[0-60] Number of months later
0	At the same time
77	Never
88	Don't know
99	Refused

N6b [ASK IF N5b =02,88,99 AND N5a=01,02,03,04,05,06,07,08,09,10] When do you think you would have entered into a service agreement?

(INTERVIEWER: PLEASE ANSWER IN MONTHS)

__	[0-60] Number of months
0	At the same time
77	Never
88	Don't know
99	Refused

PARTIAL FREE RIDERSHIP BATTERY

P1A Now I would like you to think one last time about what action you would have taken if the <UTILITY> services had not been available.

Supposing that you had not received any assistance from <UTILITY> or received information and expertise about purchasing or implementing the <MEAS>, which of the following alternatives would you have been **MOST** likely to do?

[READ LIST, OPTIONS 1-7 ARE RANDOMIZED]

01 Install or implement fewer <MEAS>s
02 [SHOW IF EFF=1] Install standard efficiency equipment or whatever required by code
03 [SHOW IF EFF=1] Install equipment more efficient than code, but less efficient than what we installed through the program
04 Repair or refurbish the existing equipment
05 Do nothing or keep the existing equipment as is
06 Install the exact same equipment
07 Conduct project with another service provider or sponsor
08 Or something else [SPECIFY]
88 [DO NOT READ] Don't know
99 [DO NOT READ] Refused

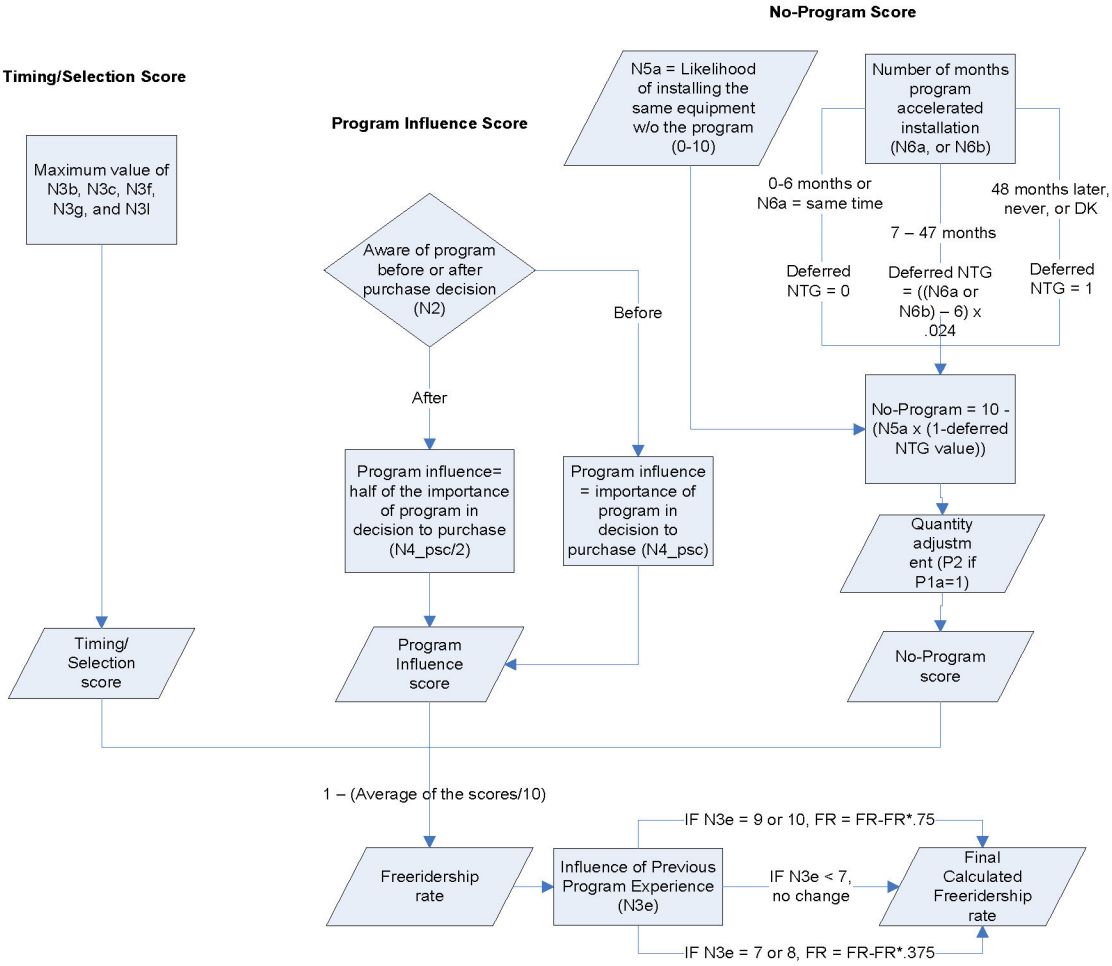
P2 [ASK IF P1A=01] What percentage of <MEAS>s would you have installed or implemented if the <UTILITY> or energy-efficiency program services had not been available? [RECORD PERCENTAGE OF UNITS ACTUALLY INSTALLED]

___ [0-100] Percentage of units would have installed
888 Don't know
999 Refused

P4 In your own words, please describe what impact, if any, the assistance you received through <UTILITY> had on your decision to implement the <MEAS> project at the time you did?

[RECORD RESPONSE VERBATIM]
77 None
88 Don't know

The algorithm used to calculate customer-reported FR is illustrated in the flowchart below.



Example of commercial participant free-ridership calculation for one measure

Responses to free-ridership questions:

N3b = 4

N3c = 3

N3f = 7

N3g = 7

N3l = 5

Maximum = 7
Timing/Selection Score = 7

N2 = before

N4_psc = 8

Program Influence Score = 8

N5a = 2

N6a = 18

Deferred NTG = (18-6)(.024)
Deferred NTG = 0.288

No-Program Score = 10-(N5a)(1-Deferred NTG)
No-Program Score = 10-(2)(1-0.288)
No-Program Score = 8.576

$$\text{FR Rate} = 1 - \left[\frac{\left(\frac{7+8+8.576}{3}\right)}{10}\right]$$

FR Rate = 0.2141

N3e = 6 *(NO FURTHER ADJUSTMENT REQUIRED FOR PAST PARTICIPATION)*

FR_{FIN} = 0.2141

This final free-ridership rate is one example of how free-ridership is calculated for one measure in one project based on the survey responses. Free-ridership is calculated for all sampled projects and measures before combining the free-ridership into weighted averages, as discussed in the following section.

Participant free-ridership weighting methodology

The following Table 56 is an example of initial weights applied to a sample stratified by measure category and sample priority for a given program. *Population of savings* lists the measure-related savings in the program tracking system database. *Surveyed savings* are the corresponding savings accounted for by completed surveys.

$$Measure\ weight = \frac{\text{Population of savings (kWh)}}{\text{Surveyed savings (kWh)}}$$

Table 56. Examples of Weighting Calculations Using Five Measure Categories

Measure category	Population of savings (kWh)	Surveyed savings (kWh)	Measure weight
Custom & other	36,770,421	3,433,121	10.71
HVAC equipment	25,595,446	5,585,928	4.58
HVAC tune-up	17,244,332	999,691	17.25
Lighting	64,344,830	7,418,017	8.67
Solar	642,587	544,811	1.18

Step 1: Calculating initial measure weights (as described above) at the measure category level to correct disproportional sampling and non-responses to the survey. The initial measure weights in Table 1 are paired with the corresponding survey responses based on the measure received. In this example, all of those with a lighting measure would have a measure weight of 8.67.

Step 2: To extrapolate the measure weight to the expected savings, it is multiplied by the energy savings per surveyed measure to get weighted savings. To ensure the weighted savings are correct, the EM&V team verifies that their sum is equal to the total population savings. Applying these weights to the aggregated free-ridership calculations gives us the best representation of the population based on savings.

Step 3: The savings weights are multiplied by the free-ridership calculation to get the weighted savings attributed to free-ridership.

Step 4: Then the weighted savings attributed to free-ridership are summed across all measures. Similarly, the total weighted savings are summed across all measures.

Step 5: Finally, the sum of weighted savings attributed to free-ridership is divided by the total weighted savings to get the weighted free-ridership rate.

The following table uses examples of two measures to illustrate the preparation procedures and the effect of the procedures using two cases, weighting for kWh. The same process was also implemented for kW.

Case A:	Case B:
Situation	
Participated in an MTP Program	Participated in an MTP Program
Received a *Lighting* measure	Received an *HVAC equipment* measure
Has a free-ridership rate of 75%	Has a free-ridership rate of 25%
Recorded a savings of 1,000 kWh	Recorded a savings of 10,000 kWh
Step 1: Determine measure weights (discussed in the prior section)	
Measure weight = 8.67	Measure weight = 4.58
Step 2: Compute measure category-weighted kWh	
Adjusted kWh=1,000*8.67 = 8,670	Adjusted kWh = 10,000*4.58 = 45,870
Step 3: Calculate kWh associated with the free ridership based on the measure category weighted kWh, calculated in Step 2	
FR savings = 8,670*.75 = 6,502.5	FR savings = 45,870*.75 = 11,467.5
Step 4: Sum the free-ridership attributed savings and population savings.	
Total FR attributed savings: 6,502.5 + 11,467.5 = 17,970 kWh Population savings: 8,670 + 45,870 = 54,540 kWh	
Step 5: Divide the Total FR attributed savings by population savings to determine free-ridership rate.	
Net free-ridership rate = 17,970 / 54,540 = 32.9%	

APPENDIX D: IOU PROGRAM BUDGETS

This appendix shows PY2024 energy efficiency program costs totaled just under $250 million across the eight IOUs. A little over half of the costs were incentives, with the remainder covering administrative and related costs as well as the performance bonus earned by utilities (Table 57).

Table 57. PY2024 Utility Program Costs[71]

Utility	Incentive amount	Administrative, R&D, and EM&V costs[72]	PY2024 performance bonus earned	Total PY2024 costs
AEP Texas	$16,424,834	$2,099,091	$10,006,302	$28,530,228
CenterPoint	$41,870,681	$4,331,613	$40,313,445	$86,515,739
ETI	$7,624,056	$695,220	$6,968,540	$15,287,816
EPE	$4,040,344	$147,182	$0	$4,244,106
Oncor	$52,707,737	$6,669,212	$32,560,930	$91,937,879
SWEPCO	$3,738,550	$653,533	$3,605,072	$7,997,155
TNMP	$4,625,033	$1,003,980	$2,518,347	$8,147,360
Xcel SPS	$3,804,595	$483,590	$802,978	$5,091,163
Total	**$134,835,830**	**$16,083,421**	**$96,775,614**	**$247,751,446**

[71] These numbers are subject to change based on Commission adoption of final orders for the EECRF cases and not final.
[72] EECRF and other case proceeding expenses are not included.

Public Utility Commission of Texas

Volume 2. ERCOT Utility-Specific Energy Efficiency Report Program Year 2024—DRAFT

TETRA TECH

TEXAS ENERGY ENGINEERING SERVICES, INC. (www.teesi.com)

September 2025

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GLOSSARY: ACRONYMS/ABBREVIATIONS/DEFINITIONS

Acronym	Description
AC	Air conditioner
AEP Texas	American Electric Power Texas
AHRI	Air Conditioning, Heating, and Refrigeration Institute
C&I	Commercial and industrial
CF	Coincidence factor
CMTP	Commercial market transformation program
CNP	CenterPoint Energy Houston Electric, LLC
CSOP	Commercial standard offer program
DHP	Ductless heat pump
DI	Direct install
DLC	DesignLights Consortium
ECM	Energy conservation measure
EECRF	Energy efficiency cost recovery factor
EEIP	Energy Efficiency Implementation Project
EEPR	Energy Efficiency Plan and Report
EESP	Energy efficiency service provider
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, measurement, and verification
EPE	El Paso Electric Company
ER	Early replacement
ERCOT	Electric Reliability Council of Texas
ERS	Emergency Response Service
ESCO	Energy service company
ESIID	Electric service identifier ID
ESNH	ENERGY STAR® New Homes
ETI	Entergy Texas, Inc.
EUL	Estimated useful life
EUMMOT	Electric Utility Marketing Managers of Texas
GSHP	Ground-source heat pump
GW	Gigawatt
GWh	Gigawatt-hour
HCIF	Heating/cooling interactive factor
HOU	Hours of use
HTR	Hard-to-reach
HVAC	Heating, ventilation, and air conditioning
IECC	International Energy Conservation Code
IPMVP	International Performance Measurement and Verification Protocol
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light emitting diode

Acronym	Description
LI	Low-income
LI/HTR	Low-income/hard-to-reach
LM	Load management
M&V	Measurement and verification
mcf	1,000 cubic feet
MF	Multifamily
MTP	Market transformation program
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-gross
Oncor	Oncor Electric Delivery Company LLC
PUCT	Public Utility Commission of Texas
PV	Photovoltaics
PY	Program year
QA/QC	Quality assurance/quality control
QPL	Qualified Products List
RCx	Retro-commissioning
RFP	Request for proposal
RMTP	Residential market transformation program
ROB	Replace-on-burnout
RSOP	Residential standard offer program
SEM	Strategic energy management
SIR	Savings-to-investment ratio
SOP	Standard offer program
SRA	Self-report approach
SWEPCO	Southwestern Electric Power Company
TEESI	Texas Energy Engineering Services, Inc.
TMY	Typical meteorological year
TNMP	Texas-New Mexico Power Company
TRM	Technical reference manual
WACC	Weighted average cost of capital
Xcel SPS	Xcel Energy Southwest Public Service, Inc.

1.0 INTRODUCTION

This document presents the third-party evaluation, measurement, and verification (EM&V) for the ERCOT utilities – specifically, the impact evaluation results for energy efficiency portfolios implemented in program year 2024 (PY2024)[1]. Each section begins with a past five-year trend analysis for the utility energy efficiency portfolio in order to provide additional context for PY2024 results.

The PY2024 scope includes targeted impact evaluations of the savings for the least certain results from the prior year or changes in programs or technologies. Targeted impact evaluations focus on certain commercial and residential programs, including different end-use measures (e.g., *HVAC*, *lighting*, *refrigeration*). Interval meter data analysis and tracking system reviews provide a due diligence verification of claimed savings of each utility's portfolio.

The reviews also independently assess claimed savings and verify the program data's accuracy. The following program documentation and data were reviewed:

- tracking data,
- interval meter data,
- project files,
- energy savings calculations (including a review of input assumptions and algorithms to verify claimed program savings), and
- the utilities' existing measurement and verification (M&V) information.

The EM&V plans[2] for PY2024 were based on EM&V prioritization of programs of a similar type across utilities. Programs were reviewed by type and prioritized (*high*, *medium,* or *low*) based on the following considerations:

- magnitude of savings—the percentage contribution of the programs' impact to the total utility portfolio (e.g., more than ten percent of portfolio savings are from a measure or program),
    - *high or medium* priority assigned to programs or measures with larger savings
- level of relative uncertainty in estimated savings
    - *high or medium* priority assigned to programs with savings uncertainty
- quality assurance/quality control (QA/QC), and verification data from on-site inspections completed by utilities or by their contractors,
    - *high or medium* priority assigned to programs or measures when QA/QC or verification data improvements were identified
- program or subprogram stage (e.g., pilot, early implementation, mature),
    - *high or medium* priority assigned to mature programs and programs moving from pilot to early implementation
- importance to future portfolio performance (may be a significant contributor to savings in the future),

[1] Volume 3 presents similar data for the outside-of-ERCOT utilities.

[2] Public Utility Commission of Texas EM&V Plans for ERCOT Utilities' Energy Efficiency and Load Management Portfolios—Program Year 2024, February 2025. Project No. 38578, item 154. Interchange - Documents

    - *high or medium* priority assigned to programs or measures important to future portfolio performance
- priorities for PUCT and utilities, prior EM&V results, and upcoming changes in the markets.
    - *high or medium* priority assigned to programs or measures identified as priorities

Section 1.1 describes the Impact Evaluation methodology, with detailed methodology available in Appendix A.

Section 2.0 through Section 5.0 presents the utility-specific portfolio EM&V results.

Appendix A contains a visual representation of the EM&V database import, review, and validation process. Appendix B contains the cost-effectiveness calculations methodology used for the program administrator cost test (PACT[3]), which is the cost-effectiveness test used by Texas EM&V. Appendix C contains the quality assurance plan for the reported evaluated savings.

1.1 IMPACT EVALUATION METHODOLOGY OVERVIEW

The EM&V database with complete PY2024 program tracking data requested from the utilities was the foundation for the evaluation process. The EM&V database allowed the EM&V team to complete the following:

- due diligence verification of all claimed savings,
- program tracking system reviews, and
- efficient sampling across utilities and programs engineering desk reviews.

The EM&V team performed a tracking system review and a series of desk reviews for an initial assessment of the claimed savings' reasonableness. Program documentation and primary data were then collected for sampled projects to assess the accuracy of the claimed savings further.

The EM&V team assigned a program documentation score of *good*, *fair*, or *limited* based on the level of program documentation provided to complete a third-party due diligence review of claimed savings. See Appendix A for details.

1.1.1 Net Savings

Net-to-gross (NTG) ratios, which are applied to claimed savings to calculate net savings, are researched for each IOU portfolio at the sector and program level. The NTG ratio is calculated as 1-free-ridership. For example, an IOU commercial MTP with a free-ridership rate of 20% would have an NTG ratio of 80%. Free-ridership represents energy savings that would have occurred in the absence of the programs.

NTG ratios researched prior to PY2024 reflect average NTG ratios across the applicable IOU program type and include spillover estimates. While NTG ratios starting in PY2024 are more conservative because they exclude spillover, IOUs' claimed savings are based on gross savings in Texas. Therefore, NTG ratios of 1-free-ridership are more useful to the objectives of the NTG research in Texas, which is to assess the effectiveness of programs in minimizing free-ridership.

[3] Also known as the utility cost test (UCT).

1.1.2 Cost-Effectiveness

The EM&V team conducts cost-effectiveness testing using the PACT using actual results except for LI programs, as discussed below. IOU program cost-effectiveness tests compare the benefits of the programs to the costs—a ratio over 1.0 representing a cost-effective program. The EM&V team conducts cost-effectiveness tests separately using verified claimed savings and net savings as determined by an NTG ratio discussed in 1.1.1 above.

All benefits and costs are expressed in PY dollars. Benefits resulting from energy savings occurring in future years are net-to-PY dollars using the utility's weighted average cost of capital (WACC) as the discount rate.

When tests are conducted at a more disaggregated level than where data are available, allocations are made proportionate to costs. For example, the utility performance incentive is calculated for the overall portfolio and allocated to individual programs proportionate to the programs' costs associated with meeting demand and energy goals. Program costs include program administrative and incentive costs; portfolio-level costs include the utility performance earned for that PY; and EM&V, administrative, and R&D costs.

LI programs are evaluated using the savings-to-investment ratio (SIR). This model only includes net incentive payments compared to program costs. Only LI programs are evaluated using the SIR methodology.

Portfolio-level cost-effectiveness analyses are based on the PACT and shown both including and excluding LI programs.

The calculations used for the PACT cost-effectiveness methodology are in Appendix B.

In addition, the EM&V team calculates the average cost per lifetime kilowatt-hour (kWh) and kilowatt (kW); this is calculated by attributing costs to energy savings and avoided demand based on their portion of total benefits and then applying that proportion to the total program costs.

2.0 AMERICAN ELECTRIC POWER TEXAS

2.1 KEY FINDINGS AND RECOMMENDATIONS

In addition to Volume 1 recommendations that apply to all IOUs, Table 1 below summarizes Volume 2 key findings and recommendations specific to American Electric Power Texas (AEP Texas). Key findings that do not have a recommendation illustrate the type of program information to highlight in future EEPRs.

Table 1. AEP Texas Key Findings and Recommendations

Report Section	Key finding	Recommendation
2.2.2 Commercial Savings	AEP diversified its commercial measure mix; *HVAC* contributed the largest percentage of energy savings, while *custom M&V* projects and *envelope* measures increased.	
	The Commercial Standard Offer Program (CSOP) free-ridership rate was higher at around a third of the savings. AEP's *HVAC* project free-ridership in CSOP was higher than Commercial Market Transformation Program (CMTP) and other ERCOT IOUs' CSOP.	Respond to this report with program strategies to minimize CSOP free-ridership.
2.2.3 Residential Savings	Low-income (LI)/hard-to-reach (HTR) savings have decreased compared to the prior years.	Respond to this report with opportunities to increase participation in the LI and HTR programs.
2.4.2 Program Funding and Cost-Effectiveness Results	The cost-effectiveness of the Commercial Foodservice Pilot MTP was below 1.0 in its first year.	Identify program changes to increase the cost-effectiveness of the Commercial Foodservice Pilot MTP in the next program year.
2.6 Commercial Impact Evaluation Results	A new construction *lighting* project was missing key documentation to verify savings.	Provide construction drawings, plans, or as-builts for new construction projects to document the interior and exterior lighting areas and specific equipment quantities and models.
	No AMI meter data was utilized for one strategic energy management (SEM) project to determine peak demand reduction.	Use AMI meter data and the TRM peak demand calculation method to determine the peak demand reduction for SEM projects.

2.8 Load Management Impact Evaluation Results	Winter load management evaluated savings did not match the savings provided for most sites.	Apply the *High 8 of 10* baseline calculation method to yield consistent savings at the event level, not the customer level, for the varying winter load management baseline.
	The cooperation rates[4] for the Commercial Load Management SOP and the Winter Load Management MTP were less than 90 percent. 90 percent or higher has been achieved in the past or by other IOUs for commercial load management.	Respond to this report with an action plan to increase cooperation rates.

AEP Texas's PY2024 highlights:

- Continues to meet legislated demand reduction goal with energy efficiency,
- Most demand reduction is through its load management program (66.8 percent),
- Achieved most energy savings through Commercial MTP, followed by Residential MTP, then Commercial SOP,
- Commercial SOP savings increased from PY2023,
- Although it exceeded its energy savings goal in PY2024, AEP Texas saw its lowest performance-against-goal compared to the previous four years, and
- LI/HTR savings have decreased compared to prior years.

[4] The cooperation rate is the percent of load management program participating customers who curtailed during a curtailment event.

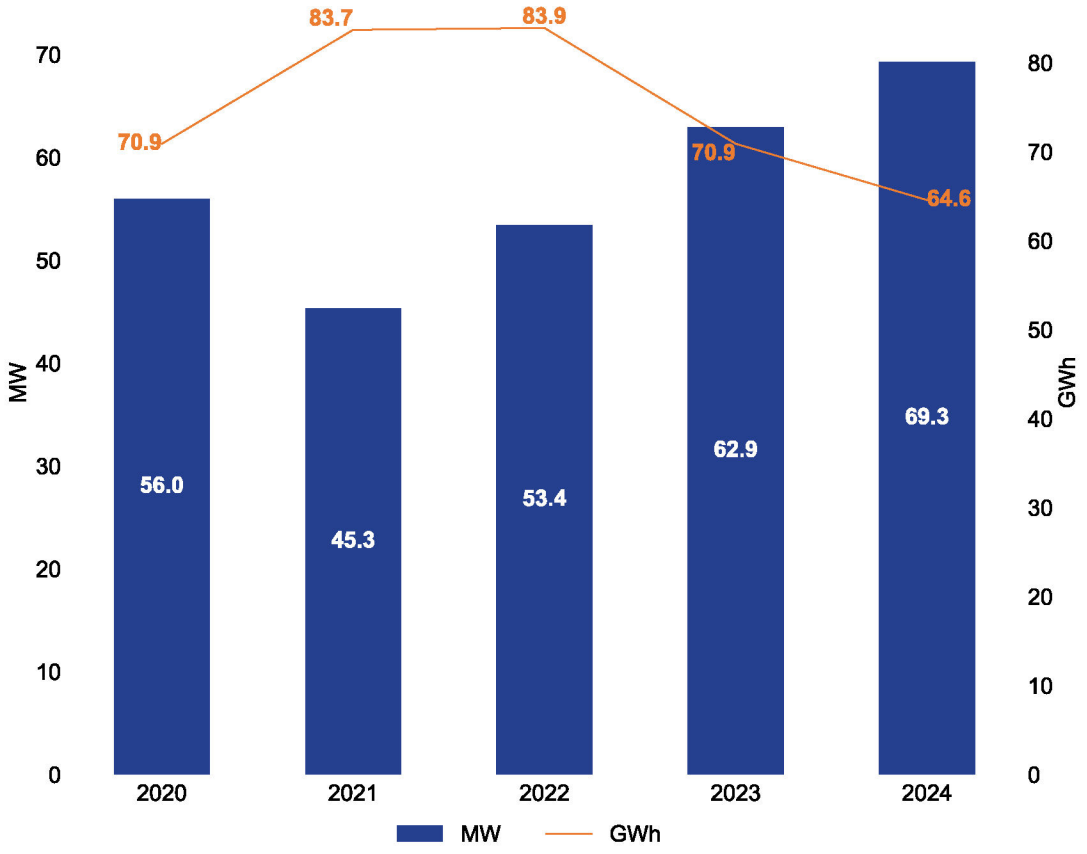
2.2 PY2020 THROUGH PY2024 COMPARISONS

2.2.1 Portfolio Key Findings

PY2024 saw a slight increase in demand reduction but a decrease in energy savings across AEP Texas's portfolio (Figure 1).

- Increased load management is the primary driver of the increased demand reduction, and
- AEP Texas's demand reduction has been trending higher since PY2021, but its energy savings have been trending lower since PY2022.

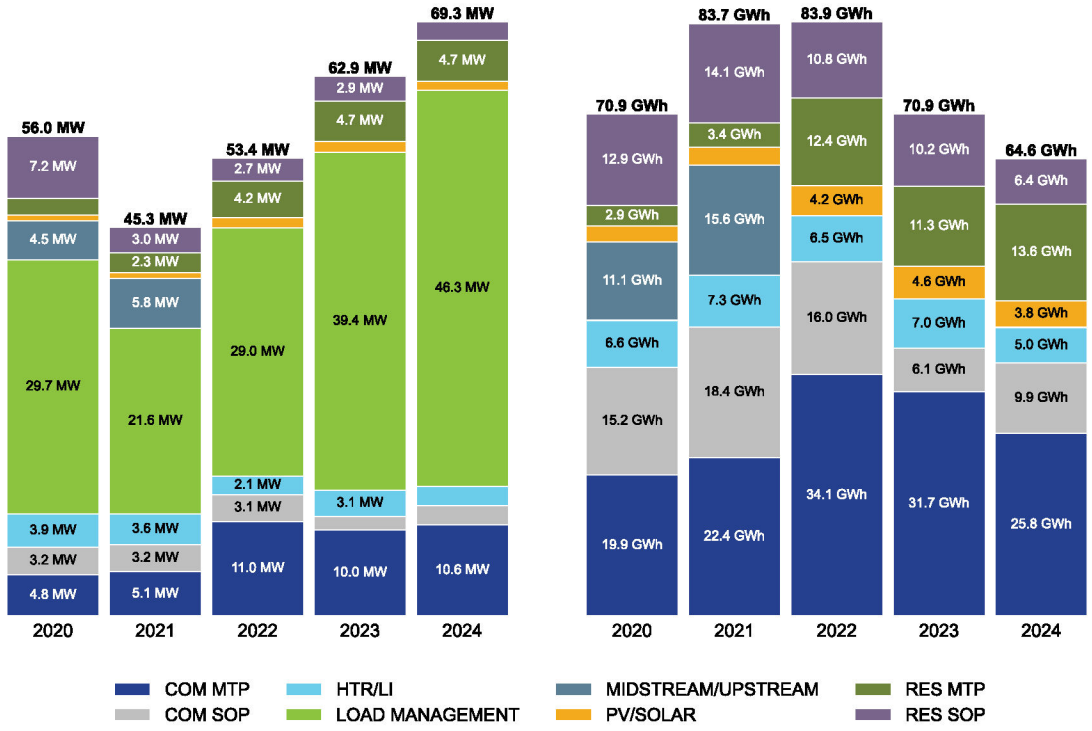
Figure 1. AEP Texas's Demand Reductions (MW) and Energy Savings (GWh) PY2020-PY2024



In PY2024, AEP Texas's Commercial MTP achieved the most energy savings (Figure 2, right graph), followed by residential MTP, and commercial SOP.

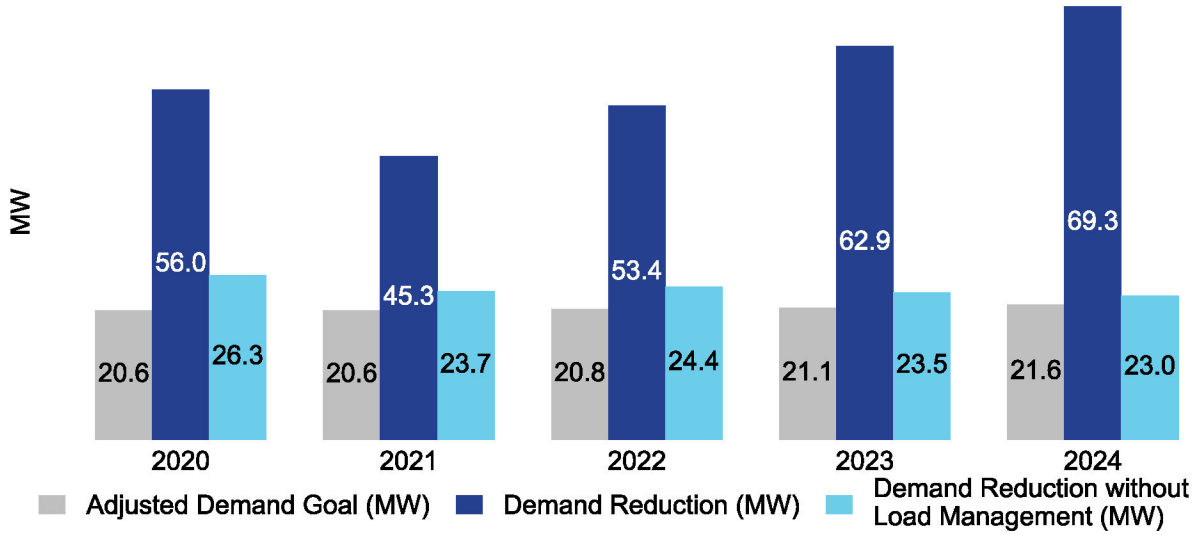
These were also the programs delivering the most demand reduction from energy efficiency (Figure 2, left graph).

Figure 2. AEP Texas's Demand Reductions (MW) and Energy Savings (GWh) by Program Type PY2020-PY2024



AEP Texas distinguishes itself by consistently meeting its legislated demand reduction goal with energy efficiency programs (Figure 3).

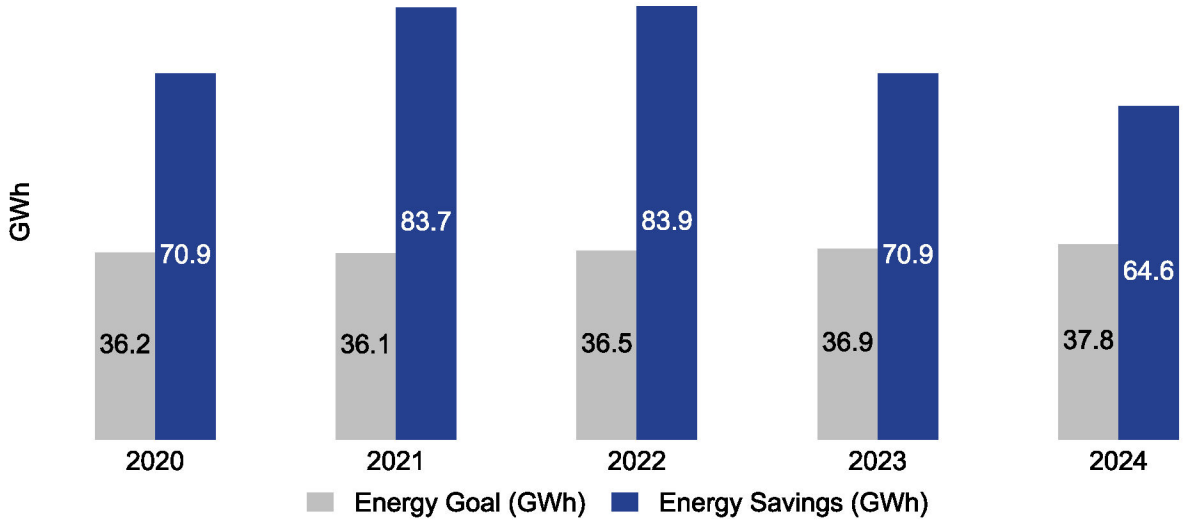
Figure 3. AEP Texas's Legislated Demand Reduction (MW) Goal PY2020–PY2024



AEP Texas exceeded its energy goals for the past five years (Figure 4), but with a decreasing trend since PY2022.

- In PY2024, AEP Texas exceeded its PY2024 energy goal by approximately 70.9 percent.

Figure 4. AEP Texas's Energy Savings (GWh) Goal PY2020–PY2024



2.2.2 Commercial Savings

The PY2024 gross savings from AEP Texas's commercial sector programs were the following:

- Demand reduction of 13.0 MW, and
- Energy savings of 36.3 GWh.

Figure 5 shows an increase of 1.2 MW in demand reduction from PY2023. In contrast, energy savings decreased by 2.3 GWh from PY2023.

Figure 5. AEP Texas's Demand Reduction (MW) and Energy Savings (GWh) by Program Year—Commercial Programs Excluding Load Management, PY2020–PY2024

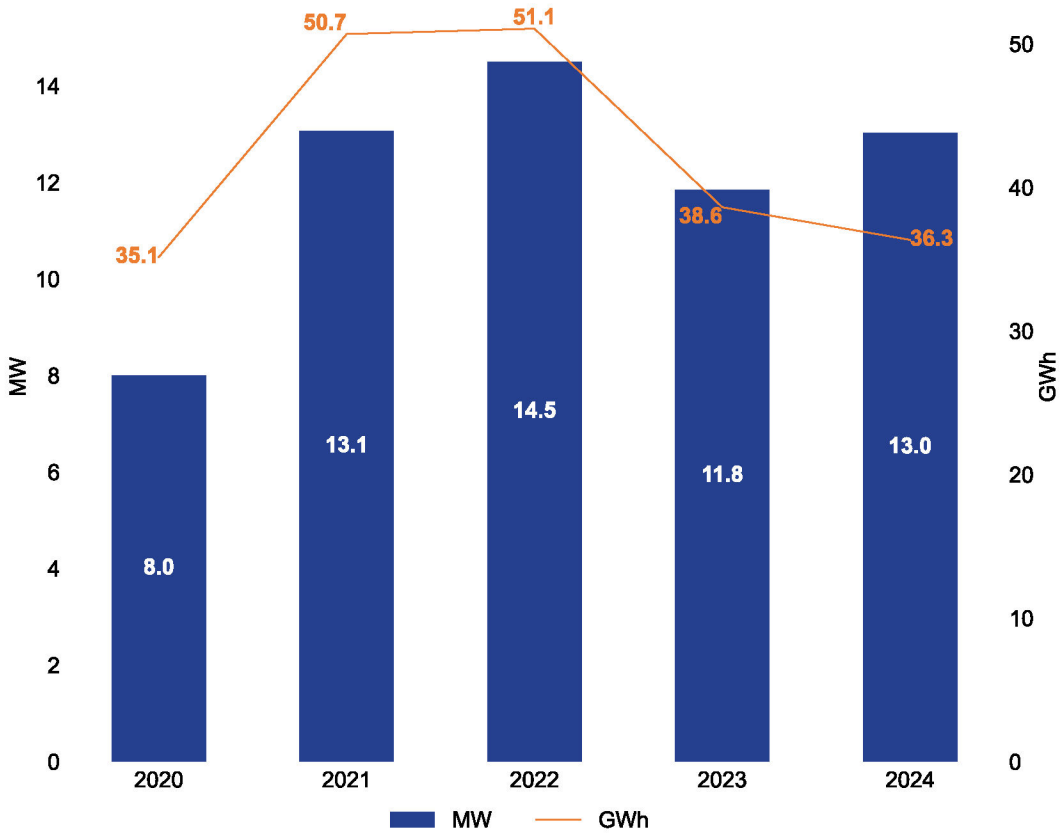
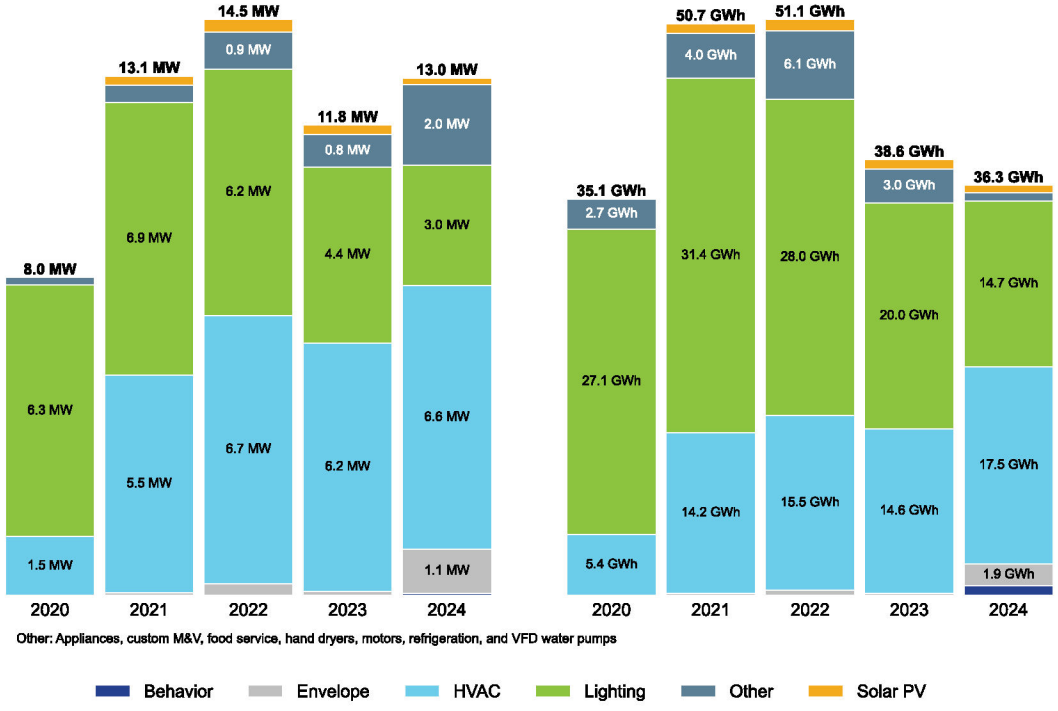


Figure 6 shows the proportion of demand reduction and energy savings by measure categories. Notable highlights are the following:

- The demand reduction (Figure 6, left graph) and energy savings (Figure 6, right graph) from *HVAC* measures have been increasing.
    - *HVAC* made up the largest percentage of demand reduction (51 percent) and energy savings (48 percent)
- The measure category of the most notable growth in demand reductions is *other*, which is largely composed of *custom M&V* projects, followed by *envelope*.

Figure 6. Distribution of AEP Texas's Demand Reduction (MW) and Energy Savings (GWh) by Measure Category—Commercial Programs Excluding Load Management PY2020–PY2024



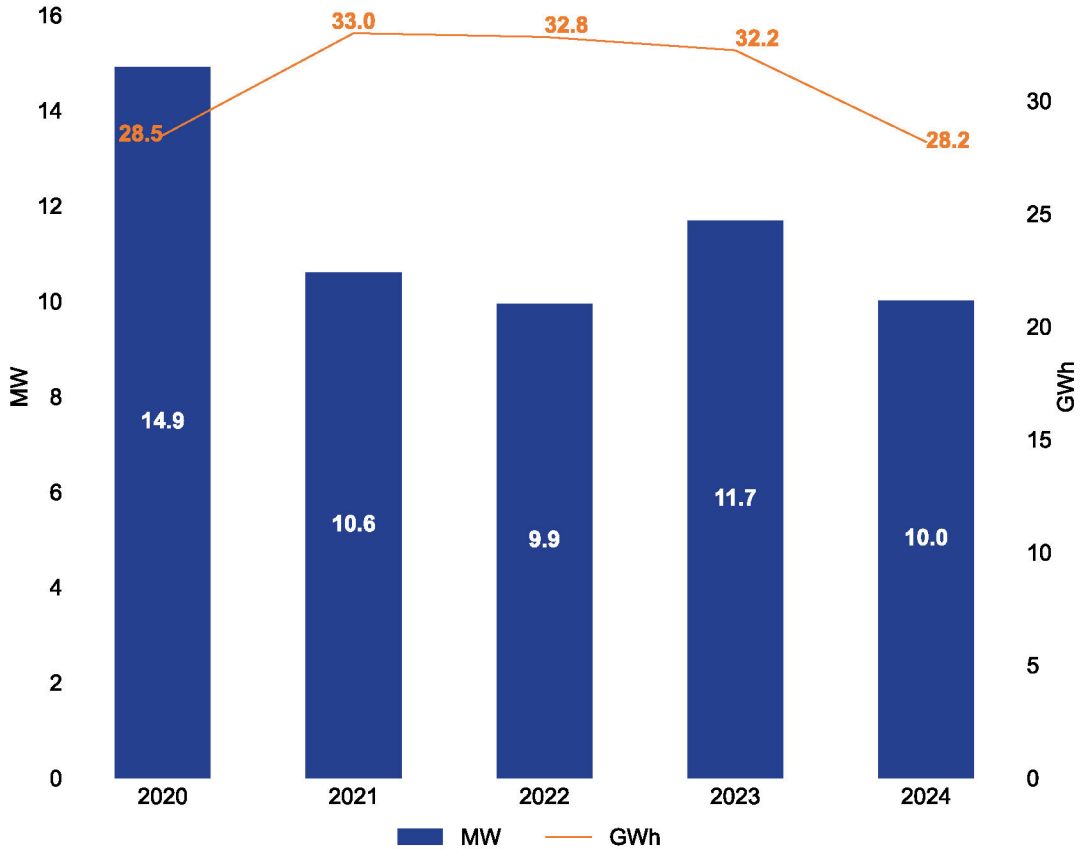
2.2.3 Residential Savings

The PY2024 gross savings from AEP Texas's residential sector programs (excluding load management) were the following:

- Demand reduction of 10.0 MW, and
- Energy savings of 28.2 GWh.

Figure 7 shows a decrease in the residential demand reduction and energy savings from energy efficiency compared to PY2023.

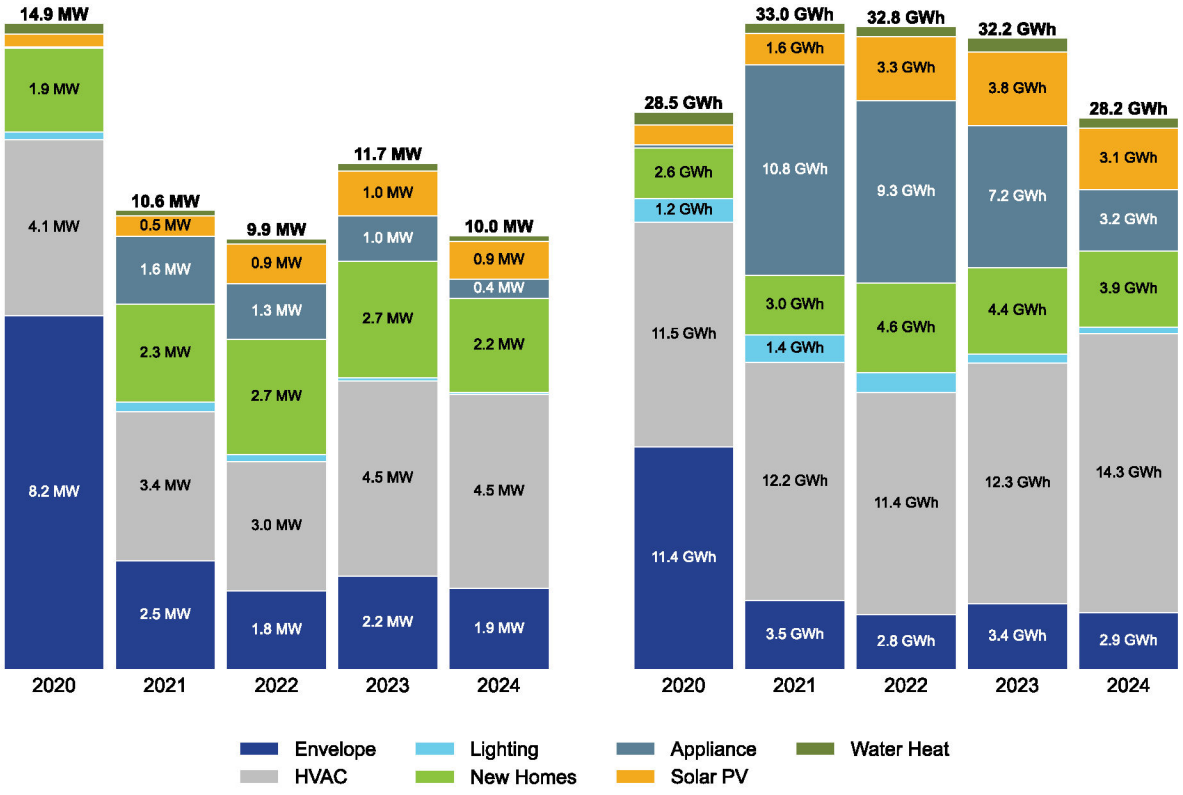
Figure 7. AEP Texas's Demand Reduction (MW) and Energy Savings (GWh) by Program Year—Residential Programs PY2020–PY2024



For PY2024, AEP Texas's residential demand reductions (Figure 8, left graph) and energy savings (Figure 8, right graph) were primarily derived from *HVAC* measures.

- The *envelope* measure has stayed relatively steady since PY2021; the PY2021 TRM baseline for insulation increased, decreasing claimed savings from this measure,
- *New homes* and *solar PV* measure categories stayed relatively steady over the past years.

Figure 8. Distribution of AEP Texas's Demand Reduction (MW) and Energy Savings (GWh) by Measure Category—Residential Programs PY2020–PY2024



2.2.4 Load Management Savings

The PY2024 gross savings from AEP Texas's load management programs were the following:

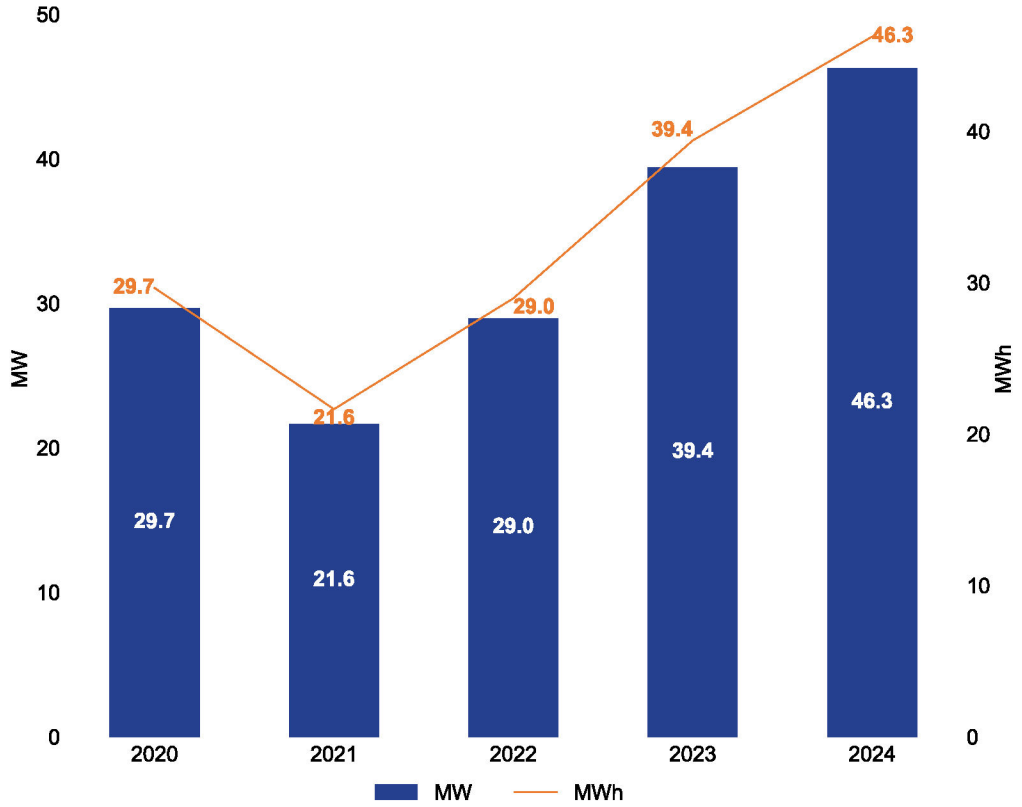
- Demand reduction of 46.3 MW, and
- Energy savings of 46.3 MWh.

Demand reduction from load management of 46.3 MW was more than twice the combined demand reduction of commercial and residential energy efficiency programs (total of 23 MW).

Figure 9 summarizes the demand reduction and energy savings for AEP Texas's load management programs for the past five years, showing fairly consistent growth in megawatts since PY2021. However, the cooperation rates for the commercial load management SOP and the winter load management MTP programs were less than 90 percent. Methods to increase the cooperation rate should be explored.

Energy savings depend upon the number of curtailment events called each year and their duration. Energy savings have followed the demand reduction pattern over the past few years.

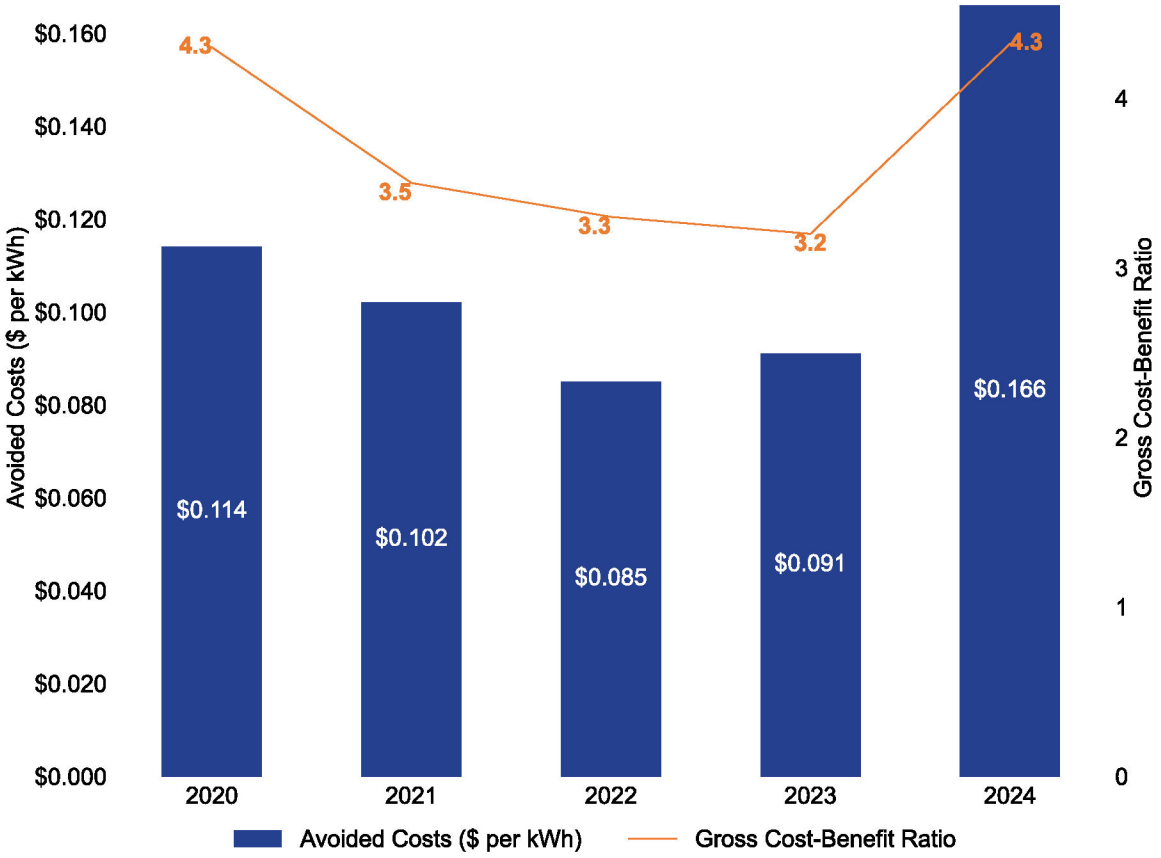
Figure 9. AEP Texas's Demand Reduction (MW) and Energy Savings (MWh) by Program Year—Load Management Programs PY2020–PY2024



2.3 COST-EFFECTIVENESS

Figure 10 shows the avoided costs for all investor-owned utilities and AEP Texas's cost-effectiveness ratios over the last five years. The overall cost-effectiveness ratio has consistently remained above 3.0 for AEP Texas. In PY2024, the cumulative cost-effectiveness of AEP Texas's programs was 4.3. The significant increase in cost-benefit ratio from PY2023 to PY2024 is due to the increased avoided cost of energy in the ERCOT market.

Figure 10. AEP Texas's Gross Cost-Benefit Ratio and Avoided Cost by Program Year



2.4 PY2024 IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for AEP Texas's energy efficiency portfolio. The key findings are summarized first, followed by details for each program with a *high* or *medium* evaluation priority. Finally, a list of programs with a *low* evaluation priority for which claimed savings were verified through the EM&V database is included.

2.4.1 Evaluated Savings

AEP Texas's evaluated savings for program year PY2024 were 69,290 kW in demand reduction and 64,571,869 kWh in energy savings. The overall kW and kWh portfolio realization rates are approximately 100 percent. AEP Texas adjusted claimed savings based on EM&V results (see Table 6), supporting healthy realization rates.

Table 2 shows the claimed and evaluated demand reduction for AEP Texas's portfolio and broad customer sector and program categories. Residential and load management results are based on census reviews; therefore, precision calculations are not applicable. For both Table 2 and Table 3, the review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and level of load curtailment for each event for all participants. Total portfolio numbers may not equal the sum of all program sector totals due to rounding.

Table 2. AEP Texas's PY2024 Claimed and Evaluated Demand Reduction (kW)

Level of analysis	Percentage portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)
Total portfolio	100.0%	69,290	69,290	100.0%
Commercial	18.8%	13,019	13,019	100.0%
Residential	12.9%	8,916	8,916	100.0%
Low-income	1.6%	1,101	1,101	100.0%
Load management	66.8%	46,254	46,255	100.0%

Table 3 shows the claimed and evaluated energy savings for AEP Texas's portfolio and broad customer sector and program categories for PY2024.

Table 3. AEP Texas's PY2024 Claimed and Evaluated Energy Savings (kWh)

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Total portfolio	100.0%	64,571,868	64,571,869	100.0%
Commercial	56.3%	36,348,347	36,348,347	100.0%
Residential	40.3%	26,008,508	26,008,508	100.0%
Low-income	3.4%	2,168,759	2,168,759	100.0%
Load management	0.1%	46,254	46,255	100.0%

Program-level realization rates are discussed in the detailed findings subsections. However, these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

Program-level realization rates also include a qualitative rating of *good*, *fair*, and *limited* associated with the level of program documentation received from the utility.

- AEP Texas received *good* documentation scores for the Commercial SOP, Commercial MTP, Residential SOP, Hard-to-Reach SOP, Targeted Low-Income Energy Efficiency program, and load management evaluated programs.
- AEP Texas received a *fair* documentation score for the SCORE/City Smart MTP
    - **Recommendation**: Improve programs with a *fair* documentation score. See project and program-specific recommendations in program impact results.

2.4.2 Program Funding and Cost-Effectiveness Results

AEP Texas's total portfolio funding for PY2024 was $18,041,191, excluding research and development, EM&V, and its performance bonus; based on the PACT, its portfolio had a cost-effectiveness score of 4.3, or 4.8 when excluding low-income programs.

The most cost-effective programs were the Commercial Solutions MTP and the residential SMART Source Solar PV MTP programs; the least cost-effective programs were the Winter Load Management SOP and the Commercial Foodservice Pilot MTP program. All of AEP Texas's programs were cost effective except for the Commercial Foodservice Pilot MTP. The Commercial Foodservice Pilot MTP program was first implemented in Q3 of 2023. AEP Texas reported minimal projects associated with this MTP for PY2024; therefore, the cost-effectiveness was below 1.0[5].

Recommendation*:* Reduce the program level incentive dollars per Peak kW/kWh metric for the Commercial Foodservice Pilot MTP to be more in line with other midstream programs.

The lifetime cost of evaluated savings was $0.026 per kWh and $16.61 per kW. Cost per lifetime is calculated by attributing costs to energy savings and avoided demand based on their portion of total benefits and applying that proportion to the total program costs.

[5] No projects were completed in PY2023.

Table 4. AEP Texas's Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	**4.32**	**4.32**	**3.38**
Total portfolio excluding low-income programs	**4.75**	**4.75**	**3.68**
Commercial	**5.96**	**5.96**	**4.62**
Commercial Solutions MTP	8.26	8.26	6.82
Commercial SOP	6.75	6.75	4.57
Commercial Foodservice MTP	0.16	0.16	0.13
CoolSaver A/C Tune-Up MTP	6.71	6.71	6.11
Open MTP	4.06	4.06	3.15
SCORE/CitySmart MTP	5.47	5.47	4.25
SMART Source Solar PV MTP	6.35	6.35	5.13
Residential	**4.27**	**4.27**	**3.20**
Residential SOP	2.64	2.64	2.14
CoolSaver A/C Tune-Up MTP	4.56	4.56	3.65
High-Performance New Homes MTP	8.20	8.20	4.02
Multifamily Smart Thermostat SOP	4.20	4.20	3.15
SMART Source Solar PV MTP	9.11	9.11	7.84
Hard-to-Reach SOP	2.60	2.60	2.60
Low-income*	**2.39**	**2.39**	**2.39**
Targeted Low-Income Energy Efficiency Program*	2.39	2.39	2.39
Load management	**1.90**	**1.90**	**1.90**
Commercial Load Management SOP	2.03	2.03	2.03
Winter Load Management SOP	1.57	1.57	1.57

* The low-income program is evaluated using the Savings-to-Investment Ratio (SIR).

2.4.3 Net-to-Gross Results

Starting with the PY2024 EM&V scope, NTG ratios, which are applied to claimed savings to calculate net savings, are assessed at the IOU program level. NTG ratios researched prior to PY2024 reflect average NTG ratios across the applicable IOU program type.

AEP Texas's NTG ratio was updated for its CSOP and Commercial Solutions MTP in PY2024 through participant surveys.

AEP Texas's CSOP NTG ratio is 67.7 percent for kWh and 64.3 percent for kW, calculated as 1-free-ridership (excluding spillover). The CSOP NTG ratio is the lowest of the PY2024 researched programs with high free-ridership for HVAC tune-ups and equipment.

AEP Texas's Commercial Solutions MTP NTG ratio is 82.7 percent for kWh and 80.2 percent for kW, calculated the same as SOP.

AEP Texas's free-ridership rate for SOP of 32.3 percent for kWh and 35.7 percent for kW is significantly increased from the PY2021 commercial SOP NTG free-ridership estimate of 23 percent for kWh and 22 percent for kW. AEP Texas's free-ridership rate for MTP of 17.3 percent for kWh and 19.8 percent for kW slightly decreased from the PY2021 commercial MTP NTG free-ridership estimate of 19 percent for kWh and 20 percent for kW.

Table 5 shows AEP Texas's free-ridership results by program and end-use. While the small number of completed surveys for some measure types is qualitative, end-use free-ridership provides useful insight for IOU's program design considerations. Commercial Solutions MTP HVAC *tune-up* and *custom* measures had the lowest free-ridership rate.

Table 5. AEP Texas's Free-Ridership by Program and End-Use

Program and end-use	Completed Survey	kWh free-ridership	kW free-ridership
Commercial SOP			
Lighting	19	22.4%	22.0%
HVAC tune-up	8	40.2%	41.1%
HVAC equipment	5	43.9%	46.1%
Total	**32**	**32.3%**	**35.7%**
Commercial Solutions MTP			
Lighting	34	20.7%	20.2%
HVAC tune-up	33	14.5%	15.3%
Solar	5	19.2%	22.2%
HVAC equipment	4	20.5%	44.5%
Custom & other	3	14.1%	20.8%
Total	**79**	**17.3%**	**19.8%**

2.5 SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. This section summarizes savings differences identified by the EM&V team, which AEP Texas used to adjust its claimed savings. The EM&V team requests that utilities adjust projects when evaluated and claimed savings differ by more than five percent. AEP Texas adjusted claimed savings for all projects with any differences found by the EM&V team and included these adjustments in its June 1 filing.

Table 6. AEP Texas's Claimed Demand Reduction (kW) and Energy Savings (kWh) Adjustments by Program

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
Commercial SOP	1.30	-7,684.00
Commercial Solutions MTP	-27.44	-151,877.00
SCORE/CitySmart MTP	-22.927	-57,948.00
Residential SOP	-0.079	-503.228
Hard-to-Reach SOP	-0.029	-215.606
Total	**-49.174**	**-218,227.834**

2.6 DETAILED FINDINGS—COMMERCIAL

2.6.1 Commercial Solutions MTP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
2.2%	1,526	1,526	100.0%	10.5%	6,798,657	6,798,657	100.0%	Good

Completed desk reviews*
6

* Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Commercial Solutions MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for three of the projects. Two projects had adjustments greater than five percent, while one project had an adjustment less than five percent. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for the three projects; therefore, the final program realization rate is 100 percent for demand reduction (kW) and energy savings (kWh). Further details of the EM&V findings are provided below.

Participant ID 11-1-1-1-1679: A new hospital installed *LED lighting* and three *water-cooled chillers*. During the desk review, the EM&V team adjusted the installed wattage of one light fixture to match the tested electrical performance in the DLC database. This adjustment increased peak demand reduction (kW) slightly and resulted in a realization rate that rounded to 100 percent. The adjustments also increased energy savings (kWh) and resulted in a realization rate that rounded to 100 percent.

Participant ID 11-1-1-1-6130: A car dealership installed exterior *LED lights* to replace existing lighting. During the desk review, the EM&V team adjusted the baseline fixture wattage to match a typical baseline wattage for a parking lot, as no documentation was available to support the reported baseline wattage. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate of 50 percent. The adjustment also decreased energy (kWh) savings and resulted in a realization rate of 50 percent.

Participant ID 11-1-1-1-8961: A building for religious services installed *LED lighting* through a midstream delivery channel. During the desk review, the EM&V team adjusted the baseline fixture wattage to incorporate a ballast factor for a one-lamp, 32-watt T8 fluorescent tube baseline. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate of 93 percent. The adjustment also decreased energy (kWh) savings and resulted in a realization rate of 94 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the eight projects that underwent desk reviews completed because sufficient documentation was provided for the sites. Most of these were lighting projects where documentation included invoices, QPL qualifications, equipment specifications, pre-installation and post-installation inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Documentation and rationale of the baseline wattage should be provided for all midstream delivery projects. Overall, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good*.

2.6.2 Commercial SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.2%	2,242	2,242	100.0%	15.3%	9,893,714	9,893,714	100.0%	Good

Completed desk reviews*[6]
4

* Confidence intervals are not reported at the utility program level due to the small sample sizes.

[6] Two projects were located on the same campus and were sampled separately, although they are reported under one EM&V participant.

The PY2024 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for all four projects. The four projects had adjustments of less than five percent compared to the originally claimed savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for the six projects; therefore, the final program realization rate is 100 percent for kW and kWh. Further details of the EM&V findings are provided below.

Participant ID 11-4-1-1-3235: A warehouse installed *LED lighting* to replace existing lighting. During the desk review, the EM&V team adjusted the fixture wattage of one LED fixture to match DLC-listed values. This adjustment slightly increased peak demand reduction (kW) and resulted in a realization rate of 101 percent. The adjustment also slightly increased energy (kWh) savings and resulted in a realization rate that rounded to 100 percent.

Participant ID 11-4-1-1-5053: A middle school installed four scroll *air-cooled chillers* to replace the existing HVAC AC DX units and installed *VFDs* on 20 supply fans for 20 AHU units. During the desk review, the EM&V team adjusted the savings methodology for the *VFD* calculation to follow TRM algorithms. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate that rounded to 100 percent. The adjustment also decreased energy (kWh) savings and resulted in a realization rate of 98 percent.

Participant ID 11-4-1-1-5667: A high school installed *energy-efficient air conditioners* and *air-cooled chillers* with *VFDs* to replace existing equipment in four campus buildings. During the desk review, the EM&V team adjusted the capacities of the installed HVAC units to the full load capacity at AHRI conditions. One *VFD* was also found to control a water pump rather than an air handler fan. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 102 percent. The adjustments decreased energy (kWh) savings and resulted in a realization rate that rounded to 100 percent.

Participant ID 11-4-1-1-9438: A retail car dealership installed *LED lighting* to replace interior and exterior fluorescent lighting. During the desk review, four additional fixtures were added to the exterior inventory based on the lighting plans. The baseline fixture type for six quantities was adjusted based on the photo documentation provided. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 101 percent. These adjustments also increased energy (kWh) savings and resulted in a realization rate of 101 percent.

Documentation Score

The EM&V team verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the four projects that underwent desk reviews completed because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-installation and post-installation inspection notes, project savings calculators, and photographic documentation of existing and new equipment. Details on *VFD* measures, including calculation parameters and algorithms, were missing from a few projects reviewed. Overall, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good*.

2.6.3 SCORE/CitySmart MTP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.6%	2,490	2,490	100.0%	8.3%	5,348,159	5,348,159	100.0%	Fair

Completed desk reviews*
6

* Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 SCORE/CitySmart MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for two projects. Both projects had an adjustment of greater than five percent on energy savings. AEP Texas accepted the evaluated results and matched the claimed savings to those of the evaluations for the two projects with significant adjustments. Therefore, the final program realization rate is 100 percent for kW and kWh. Further details of the EM&V findings are provided below.

Participant ID 11-1-1-1-8957: A new construction university student center installed *LED lighting*, a *chiller*, *VFD controls* on the air handler unit, and water pumps where *premium efficiency motors* were claimed. During the desk review, the EM&V team removed the savings associated with the *VFD*, as the prescriptive measure is not eligible for use in new construction applications. The savings associated with the *premium efficiency motor* were also removed, as no *premium efficiency motors* were installed on the project. Finally, the quantities and wattages of installed lights were adjusted based on the lighting plans and specification sheets provided. These adjustments decreased peak demand reduction (kW) slightly and resulted in a realization rate that rounded to 100 percent. The adjustments also decreased energy (kWh) savings and resulted in a realization rate of 90 percent.

Participant ID 11-1-1-1-9035: A university completed strategic energy management (SEM) programs throughout the year to claim M&V savings. During the desk review, the EM&V team utilized a new downloaded weather file from the NASA POWER online portal and completed a new regression analysis on the consumption data. In the results of the EM&V regression, parameters were simplified to single units, and the demand calculation was determined using a university load shape and the PDPF tables to create a fraction of the annual savings from the top 20 peak hours. Overall, these adjustments decreased peak demand reduction (kW) and resulted in a realization rate of 72 percent. The adjustments also decreased energy (kWh) savings and resulted in a realization rate of 93 percent.

Documentation Score

The EM&V team was able to mostly verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications, and AHRI certifications) for the six projects that underwent desk reviews because sufficient documentation was provided for the sites. Project documentation included invoices, QPL qualifications, equipment specifications, pre-inspection notes, project savings calculators, and photographic documentation of existing and

new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. The interior area of a new construction lighting project could not be verified, as no area drawing was provided. In addition, no AMI meter data were utilized for the SEM project to determine peak demand reduction. Due to the documentation shortfalls, the EM&V team assigned a program documentation score of *fair*.

- **Recommendation:** Provide construction drawings, plans, or as-builts for new construction projects to document the interior and exterior lighting areas and specific equipment quantities and models.
- **Recommendation***:* Complete the strategic energy management project analysis using the AMI meter data available. Utilize the PDPF peak demand calculation method to determine the peak demand reduction.

2.6.4 Commercial Foodservice MTP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.0%	7	7	100.0%	0.1%	46,586	46,586	100.0%	N/A

The PY2024 Commercial Foodservice MTP evaluation was planned to be evaluated, although there was not a sufficient quantity of projects to complete a sample. The EM&V team did not assess ex ante claimed energy savings and demand reduction, or the documentation.

2.7 DETAILED FINDINGS—RESIDENTIAL

2.7.1 Residential SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.1%	2,172	2,172	100.0%	9.9%	6,395,451	6,395,451	100.0%	Good

Completed desk reviews*
3

*Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Residential SOP evaluation efforts focused on desk reviews. The number of completed desk reviews for this program is listed above.

Three desk reviews were completed to check that the measure data and documentation collected by contractors aligned correctly with that in the tracking system, and savings were calculated in accordance with the TRM.

The EM&V team adjusted the total claimed savings for all three projects. One project had adjustments of less than five percent compared to the originally claimed savings, while the other two projects had adjustments of greater than five percent compared to the originally claimed savings. AEP Texas adjusted to match the evaluated savings for all three projects. Therefore, the final program realization rate is 100.0 percent for kW and kWh. Further details of the EM&V findings are provided below.

Participant ID 6307: The project included the implementation of *LED lighting*, *air purifiers*, *advanced power strips (APS)*, *duct efficiency improvements*, and a *low-flow showerhead*. During the desk review, the EM&V team adjusted the clean air delivery rate (CADR) for the new *air purifier* to match the ENERGY STAR (ES) certification. Overall, the adjustments resulted in project-level realization rates of 95.0 percent for demand reduction (kW) and 93.6 percent for energy savings (kWh).

Participant ID 6653: The project included the implementation of *LED lighting*, *air purifiers*, a *smart thermostat*, and *duct efficiency improvements*. During the desk review, the EM&V team adjusted the CADR for the *air purifier* measure based on the provided ES certificate. Overall, the adjustments resulted in project-level realization rates of 80.3 percent for demand reduction (kW) and 86.8 percent for energy savings (kWh).

Participant ID 8589: The project included the implementation of *LED lighting*, *air purifiers*, *APS*, *duct efficiency improvements*, a *low-flow faucet aerator*, and a *low-flow showerhead*. During the desk review, the EM&V team adjusted the lighting savings to follow the methodology outlined in the TRM. However, the EM&V team was not able to determine the discrepancy with the documentation provided. Overall, the adjustments resulted in project-level realization rates of 100 percent for kW and kWh.

Documentation Score

The EM&V team was able to verify most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that underwent desk reviews. Project documentation included customer agreements, field data collection, photos, spec sheets, and certifications. Overall, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good*.

2.7.2 Hard-to-Reach Solutions SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
1.6%	1,136	1,136	100.0%	4.4%	2,862,448	2,862,448	100.0%	Good

Completed desk reviews*
2

* Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Hard-to-Reach SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for one project. AEP accepted the evaluated results and matched the claimed savings for the one project with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings and adjustments are provided below.

- **Participant ID 8061**: The energy efficiency project included the implementation of an *advanced power strip (APS)*, an *air purifier*, and *LED lighting*. During the desk review, the EM&V team found that the clean air delivery rate (CADR) was different between the ENERGY STAR (ES) certificate compared to the field data sheet. Also, the EM&V team updated the interactive effects factor (IEF) from 1.15 to 1.0. Overall, the adjustments resulted in project-level realization rates of 86.8 percent for demand reduction (kW) and 83.4 percent for energy savings (kWh).

Documentation Score

The EM&V team was able to verify most key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that underwent desk reviews. Project documentation included customer agreements, invoices, income eligibility forms, and certifications. However, one project was missing the customer invoice, customer agreement, and photos confirming duct efficiency improvements. Overall, despite the documentation shortfalls, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good.*

2.8 DETAILED FINDINGS—LOW-INCOME

2.8.1 Targeted Low-Income Energy Efficiency Program

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
1.6%	1,101	1,101	100.0%	3.4%	2,168,759	2,168,759	100.0%	Good

Completed desk reviews*
2

* Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Targeted Low-Income Energy Efficiency Program evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above. The EM&V team made no adjustments to the original claimed savings. Therefore, the final program realization rate is 100.0 percent for both demand and energy savings.

Documentation Score

The EM&V team was able to verify key inputs and assumptions, including the project scope, baselines, and equipment specifications for all sampled projects that underwent desk reviews.

Project documentation included customer agreements, eligibility forms, invoices, income eligibility forms, and certifications. However, one project did not specify the condition of the existing equipment, so the evaluation team could not confirm if the replacement type was early retirement or replace-on-burnout. Since the level of sufficient documentation remained above 90 percent, the EM&V team assigned a program documentation score of *good.*

2.9 DETAILED FINDINGS—LOAD MANAGEMENT

2.9.1 Commercial Load Management SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
51.0%	35,348	35,348	100.0%	0.1%	35,348	35,348	100.0%	Good

Completed desk reviews*
N/A

*The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the AEP Texas Commercial Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. In PY2024, load management events occurred on the following dates and times shown by AEP Texas's Southern and Northern territories:

- Southern territory (coastal and the valley with Corpus Christi the primary urban area):
  - June 4, 2024, from 4:00 p.m. to 5:00 p.m. (scheduled), and
  - August 15, 2024, from 2:00 p.m. to 3:00 p.m. (scheduled).

- Northern territory (Panhandle with Abilene the primary urban area):
  - June 4, 2024, from 4:00 p.m. to 5:00 p.m. (scheduled).

There were no unscheduled events in PY2024. The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for the nineteen sponsors across 345 sites. Eighty-four sites did not participate in any of the scheduled events. All sponsors had at least one site that curtailed during each event.

- The cooperation level was 76 percent.
- **Recommendation**: Increase cooperation to above 90 percent.

After the EM&V team applied the *High 5 of 10* baseline calculation method, it was found that the evaluated savings matched the savings provided for all sites. The kW savings for each participating site corresponded to the kW reductions that occurred during the scheduled event (no averaging was necessary because each participating site participated in only one event). The kWh savings for each participating site were calculated by multiplying the kW reductions by

the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows the EM&V team (evaluated), and AEP Texas's (claimed) calculated kW and kWh savings. No adjustments were made to the program savings; however, a negligible difference in kW and kWh was a result of different rounding practices during calculations. The realization rate for kW and kWh is 100 percent, with a documentation score of *good.*

2.9.2 Winter Load Management SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
15.7%	10,907	10,907	100.0%	0.0%	10,907	10,907	100.0%	Good

Completed desk reviews*
N/A

*The review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and the resulting level of load curtailment achieved for each event for all participants.

The EM&V team evaluated the AEP Texas Winter Load Management SOP by applying the TRM calculation methodology to interval meter data. The meter data was supplied in 15-minute increments. One load management event occurred on the following date and time:

December 5, 2023, from 9:00 a.m. to 10:00 a.m. (scheduled)

There were no unscheduled events in PY2024. The EM&V team received the interval meter data and a spreadsheet that summarized the event-level savings for six sponsors across 13 sites. Two sites did not participate in the scheduled event. All sponsors had at least one site that curtailed during the event.

- The cooperation level was 85 percent.
- **Recommendation**: Increase cooperation to above 90 percent.

After the EM&V team applied the *High 8 of 10* baseline calculation method optimized for the event across all sites, it was found that the evaluated savings did not match the savings provided for most sites. The claimed savings were calculated using the scenario that yields the highest savings at the customer level, not the event level. In this case, different baseline days (prior and/or after the event) were used for the event. The EM&V team decided to accept the claimed savings and update the TRM for PY2026 to add more clarity to the *High 8 of 10* baseline calculation method for winter load management programs. The update will specifically state that savings should be a result of the scenario that yields consistent savings at the event level.

The kW savings for each participating site corresponded to the kW reductions that occurred at the scheduled event (no averaging was necessary because each participating site participated in only one event). The kWh savings for each participating site were calculated by multiplying

the kW reductions by the total number of event hours. Program-level savings were calculated by adding all site-level savings.

The table above shows the EM&V team (evaluated) and AEP Texas's (claimed) calculated kW and kWh savings. As discussed above, the claimed program savings were accepted with no adjustments. Therefore, the realization rate for kW and kWh is 100 percent, with a documentation score of *good*.

- **Recommendation**: Apply the *High 8 of 10* baseline calculation method at the event level, not the customer level. In other words, use the same baseline days to be used across all sites for the same event.
- The EM&V team will add guidance to the TRM for PY2026 to the *High 8 of 10* baseline calculation method for winter load management programs to apply at the event-level instead of the customer-level.

2.10 DETAILED FINDINGS—CROSS-SECTOR

2.10.1 CoolSaver A/C Tune-Up MTP

Sector	Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
Residential	3.3%	2,277	2,277	100.0%	11.9%	7,664,703	7,664,703	100.0%	Good
Commercial	6.7%	4,633	4,633	100.0%	15.6%	10,088,344	10,088,344	100.0%	Good

Completed desk reviews*
N/A

The PY2024 CoolSaver A/C Tune-Up MTP evaluation had no desk reviews as it was included in the HVAC tune-up consumption analysis. The documentation score of *good* is based on the AMI data provided to measure savings.

2.11 SUMMARY OF TRACKING-SYSTEM-ONLY EVALUATED PROGRAMS

Table 7 summarizes claimed savings for AEP Texas's *low* evaluation priority programs in PY2024. *Low* evaluation priority programs' claimed savings were verified against the final PY2024 tracking data provided to the EM&V team for the EM&V database.

Table 7. AEP Texas's PY2024 Claimed Savings (Tracking-System-Only Evaluated Programs)

Program	Contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Open MTP	2.80%	1,952	1,952	100.00%	5.50%	3,530,300	3,530,300	100.00%
SMART Source Solar PV MTP (commercial)	0.20%	169	169	100.00%	1.00%	642,587	642,587	100.00%
High-Performance New Homes MTP	3.60%	2,466	2,466	100.00%	7.70%	4,954,129	4,954,129	100.00%
Multifamily Smart Thermostat SOP (Pilot)	0.00%	0	0	100.00%	1.60%	1,008,735	1,008,735	100.00%
SMART Source Solar PV MTP (residential)	1.20%	866	866	100.00%	4.80%	3,123,041	3,123,041	100.00%

3.0 CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

3.1 KEY FINDINGS AND RECOMMENDATIONS

In addition to Volume 1 recommendations that apply to all IOUs, Table 8 below summarizes Volume 3 recommendations specific to CenterPoint. Key findings that do not have a recommendation illustrate the type of program information to highlight in future EEPRs.

Table 8. CenterPoint Key Findings and Recommendations

Report Section	Key finding	Recommendation
3.2.1 Portfolio Key Findings	CenterPoint achieved its legislative demand goal with energy efficiency programs alone for the first time and nearly doubled its energy savings goal.	Share best practices to increase demand reduction through energy efficiency at a future Energy Efficiency Implementation Project (EEIP) meeting.
3.2.2 Commercial Savings	CenterPoint diversified its commercial measures beyond *lighting*, particularly with *HVAC* and *solar PV* projects.	
3.2.3 Residential Savings	CenterPoint saw decreased LI/HTR demand reduction and savings in PY2024.	Respond to this report with opportunities to increase participation in the LI and HTR programs.
3.2.4 Load Management Savings	Lower cooperation level in the Commercial Load Management SOP.	Respond to this report with an action plan to increase cooperation rates.
3.6 Commercial Impact Evaluation Results – Commercial High-Efficiency Foodservice MTP	ENERGY STAR identification numbers were provided in place of copies of the certificates as required by the TRM.	Provide required documentation.
	The savings calculations were completed by an electronic TRM (eTRM) and not accessible to the evaluation team, leading to an unknown variation in the evaluated savings.	Calculation code should be provided.
3.7 Residential Impact Evaluation Results	Insufficient documentation was provided to verify project savings.	Program Tracking Data and TRM Evaluation Requirements section for each measure and should be provided for evaluation.
3.8 Load Management Impact Evaluation Results	Less than 90 percent cooperation rates for commercial load management programs. 90 percent or higher has been achieved in the past or by other IOUs for commercial load management.	Respond to this report with program strategies to increase the average cooperation rate.
	The residential load management cooperation rate was above 80 percent (82% for PY2024), a reasonable cooperation rate for residential load management programs.	

Report Section	Key finding	Recommendation
	Different days were used to calculate the baselines for a small number of meters.	Follow the TRM guidance –select days with the five highest loads closest to the event.

CenterPoint's PY2024 portfolio highlights:

- CenterPoint achieved its legislative demand reduction goal with energy efficiency programs alone for the first time in the past five years,
- CenterPoint's commercial and residential programs saw improved performance in demand reduction from energy efficiency,
- CenterPoint nearly doubled its estimated energy savings goal in PY2024,
- Both Commercial and Residential MTPs had the highest demand reductions (in five years) and energy savings (in PY2024), and
- CenterPoint continues to successfully diversify its measure mix
    - Commercial – significant increases in *HVAC* and *solar PV* projects.
    - Residential programs –*HVAC* projects, *new homes* and *water heating* projects continue to provide demand reduction and energy savings.

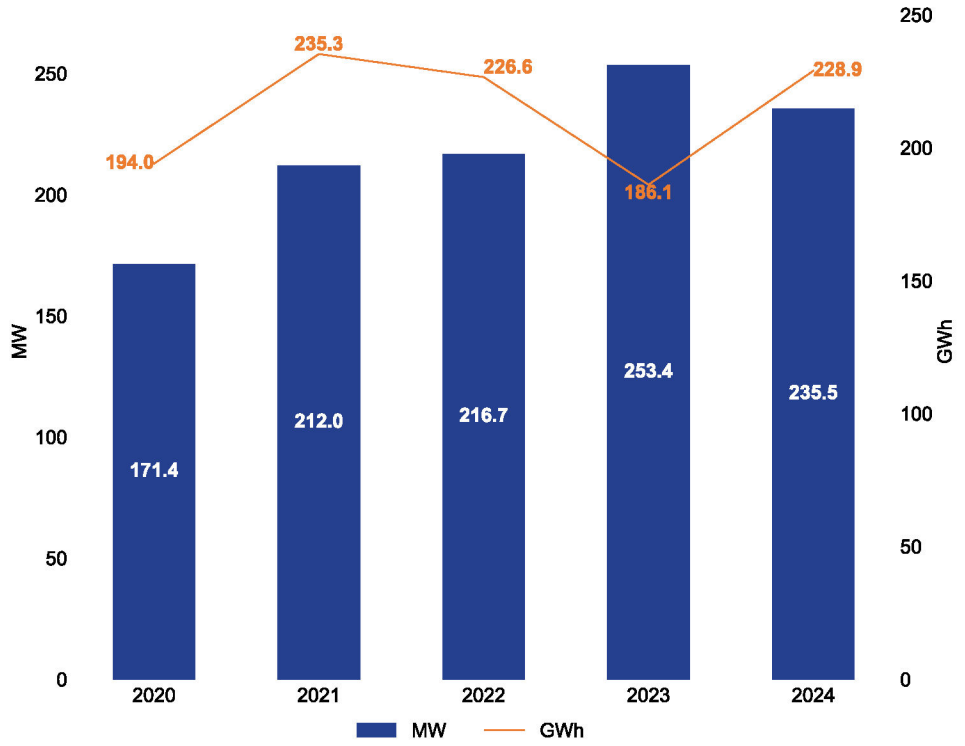
3.2 PY2020 THROUGH PY2024 COMPARISONS

3.2.1 Portfolio Key Findings

PY2024 saw a decrease in demand reduction but increased energy savings across CenterPoint's portfolio (Figure 11).

- The decrease in demand reduction from the Commercial Load Management SOP primarily accounts for the overall decrease in demand reduction.

Figure 11. CenterPoint's Demand Reductions (MW) and Energy Savings (GWh) PY2020-PY2024



In PY2024, CenterPoint's Residential MTP achieved the most energy savings (Figure 12, right graph), followed by Commercial MTP. These were also the programs delivering the most demand reduction from energy efficiency (Figure 12, left graph).

Figure 12. CenterPoint's Demand Reductions (MW) and Energy Savings (GWh) by Program Type PY2020-PY2024

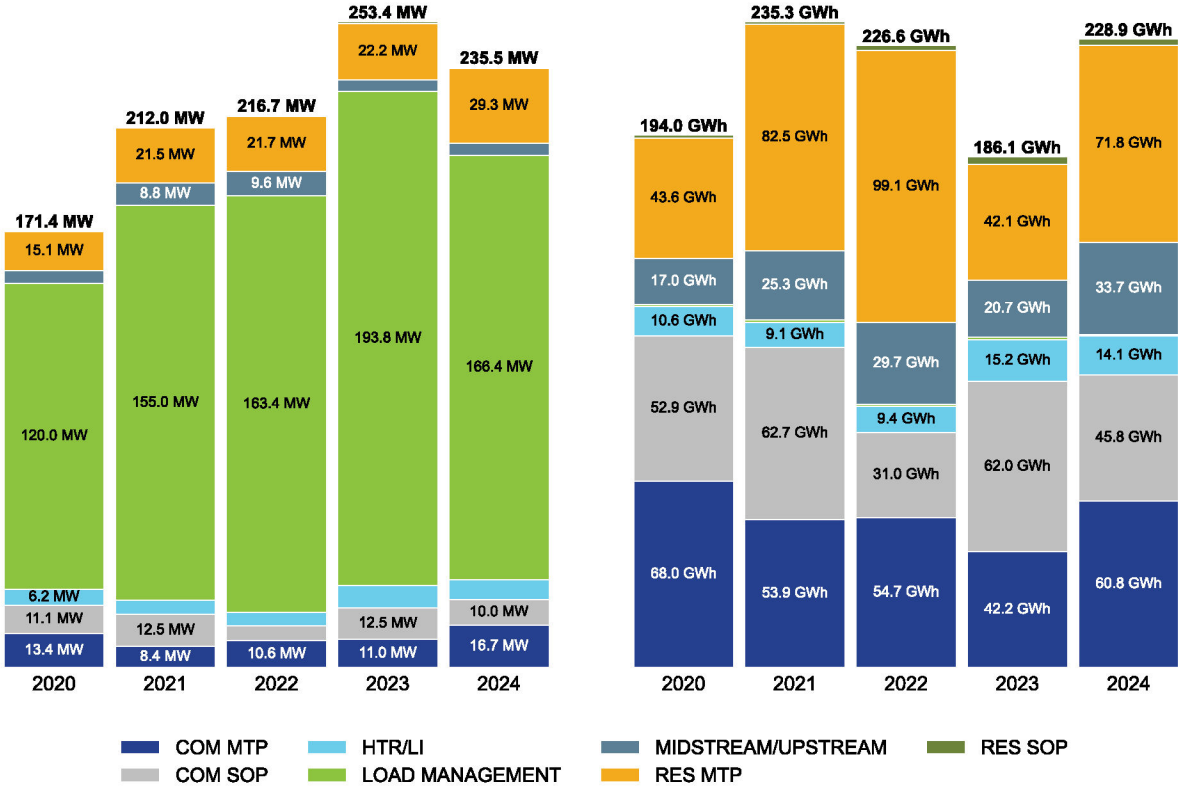
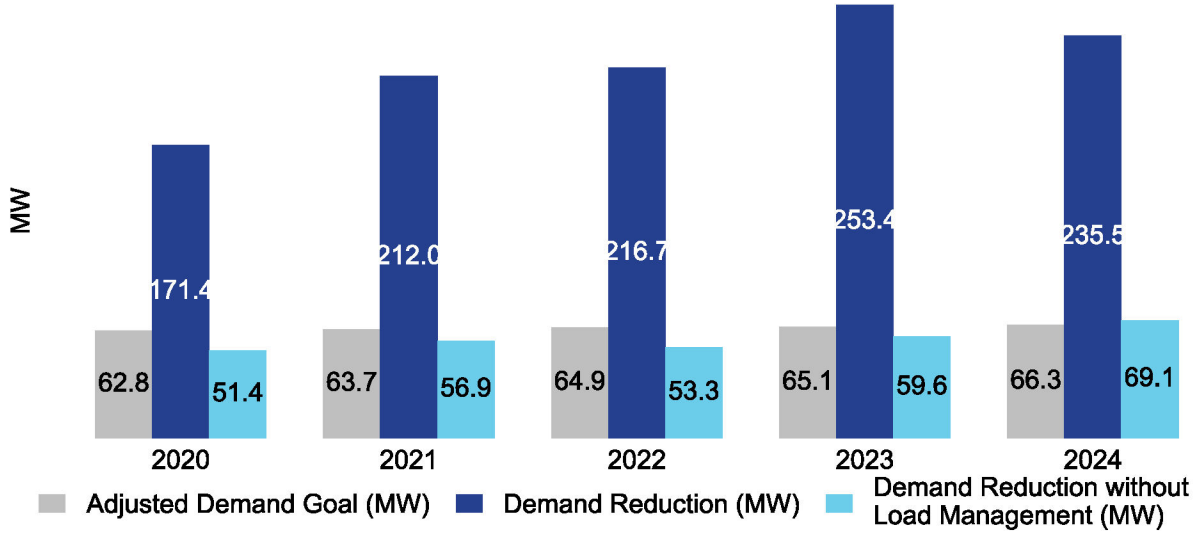


Figure 13 below shows CenterPoint exceeded its legislated demand reduction goal with energy efficiency programs for the first time in PY2024.

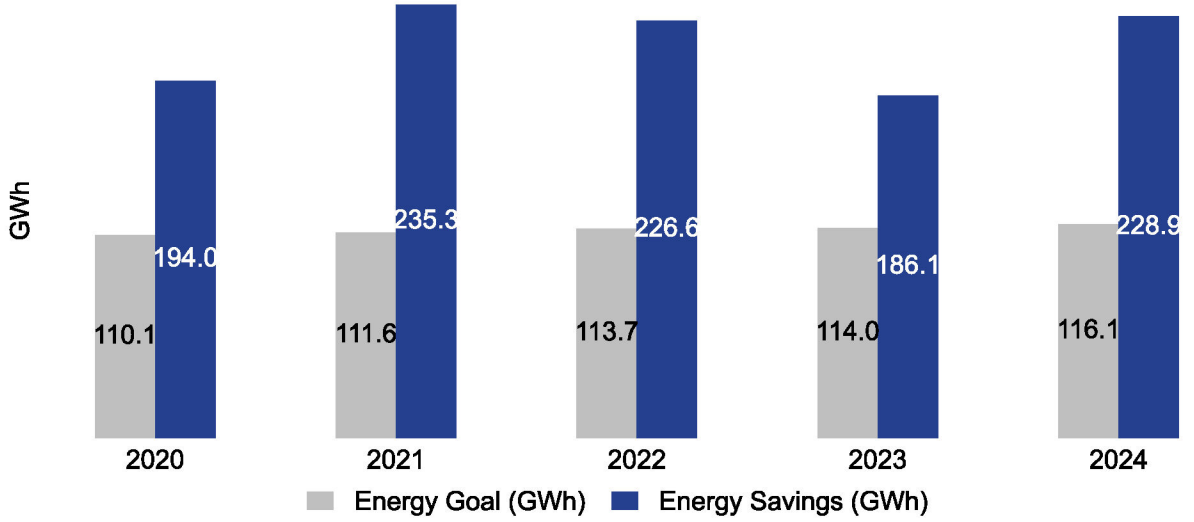
Figure 13. CenterPoint's Legislated Demand Reduction (MW) Goal PY2020–PY2024



CenterPoint's energy goals are shown in Figure 14.

- CenterPoint's energy savings nearly doubled its PY2024 energy goal (achieved 97 percent over its energy goal).

Figure 14. CenterPoint's Energy Savings (GWh) Goal PY2020–PY2024



3.2.2 Commercial Savings

The PY2024 claimed savings from CenterPoint's commercial sector were the following:

- Demand reduction of 27.1 MW, and
- Energy savings of 109.2 GWh.

Figure 15 provides the five-year trend of CenterPoint's commercial demand and energy savings, which reveals a slight increase in both demand reduction and energy savings in PY2024.

Figure 15. CenterPoint's Demand Reduction (MW) and Energy Savings (GWh) by Program Year—Commercial Programs Excluding Load Management, PY2020–PY2024

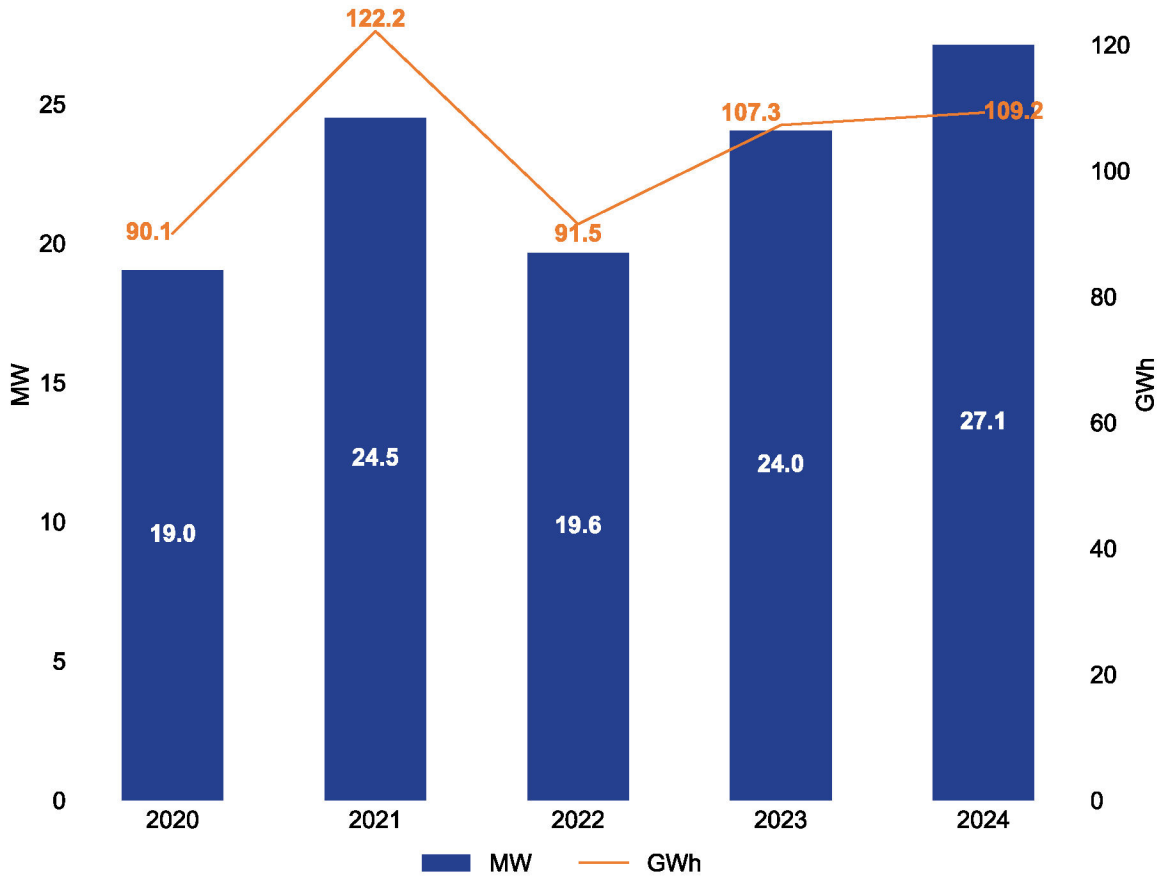
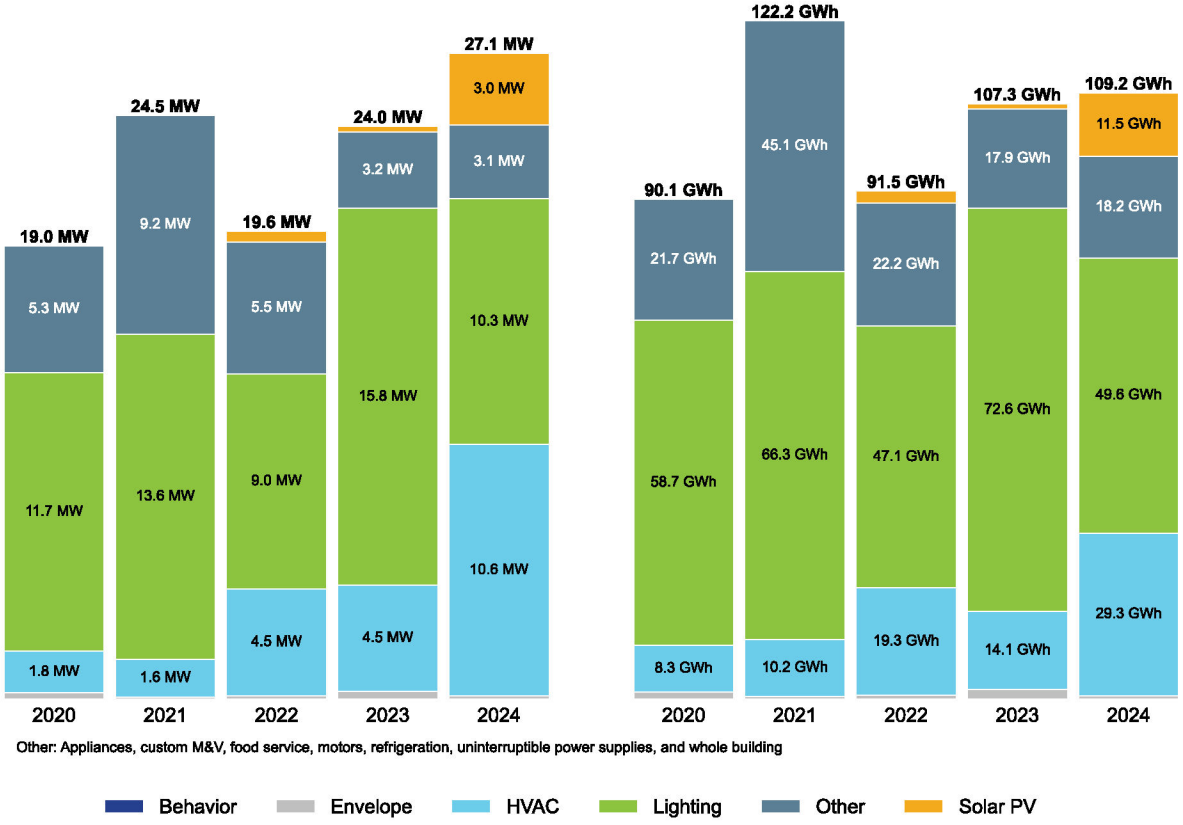


Figure 16 highlights the demand reduction and energy savings breakdown of commercial measures.

- CenterPoint continues to improve its commercial measure mix,
  - *HVAC* and *lighting* measures contributed a similar amount of demand reduction (Figure 16, left graph), and
  - *lighting* continues to be the largest contributor to energy savings (Figure 16, right graph).
- The *HVAC* measure had the most significant growth in PY2024, achieving the most demand reduction and the second-highest energy savings, and
- CenterPoint also increased *solar PV* measures.

Figure 16. Distribution of CenterPoint's Demand Reduction (MW) and Energy Savings (GWh) by Measure Category—Commercial Programs Excluding Load Management PY2020–PY2024



3.2.3 Residential Savings

The PY2024 gross savings from CenterPoint's residential sector programs (excluding load management) were the following:

- Demand reduction of 42.0 MW, and
- Energy savings of 119.2 GWh.

Figure 17 shows the residential demand reduction continues to improve, achieving its highest demand reduction total in five years. Additionally, energy savings rebounded to their second-highest total in the last five years.

Figure 17. CenterPoint's Demand Reduction (MW) and Energy Savings (GWh) by Program Year—Residential Programs PY2020–PY2024

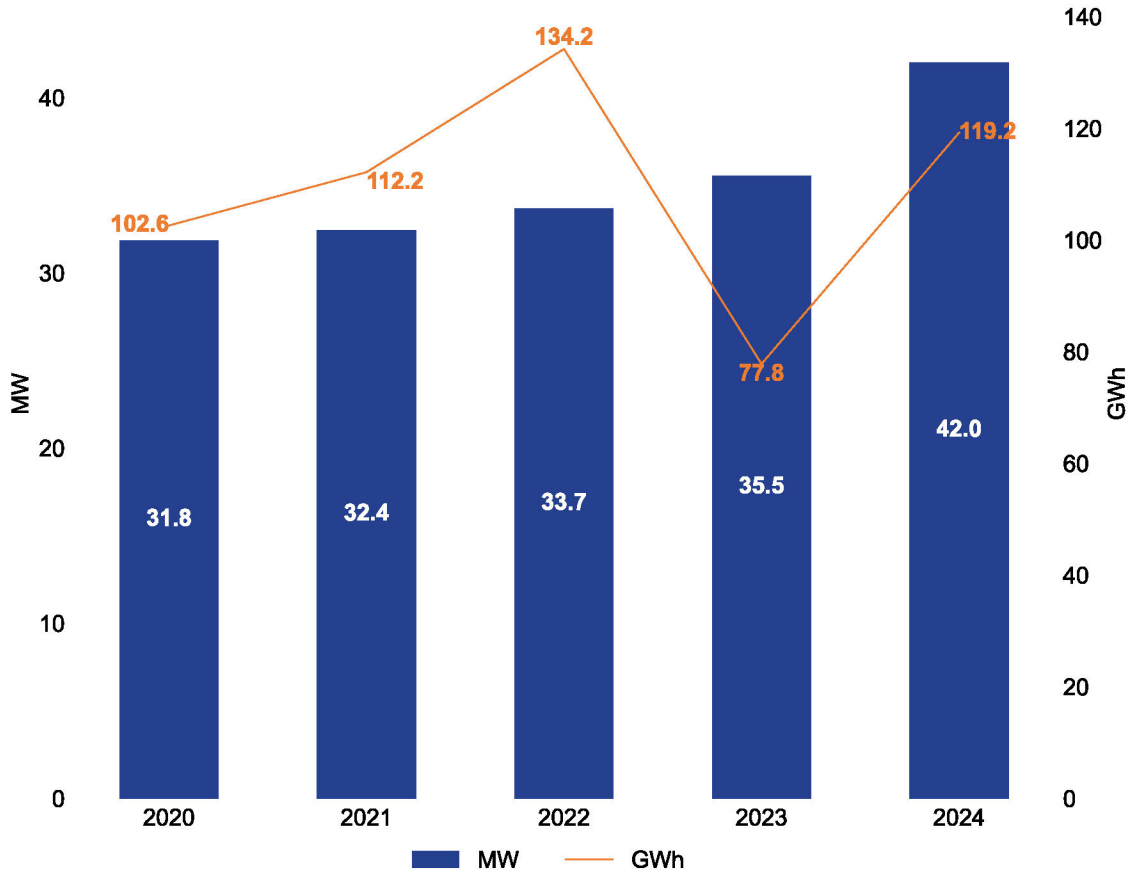
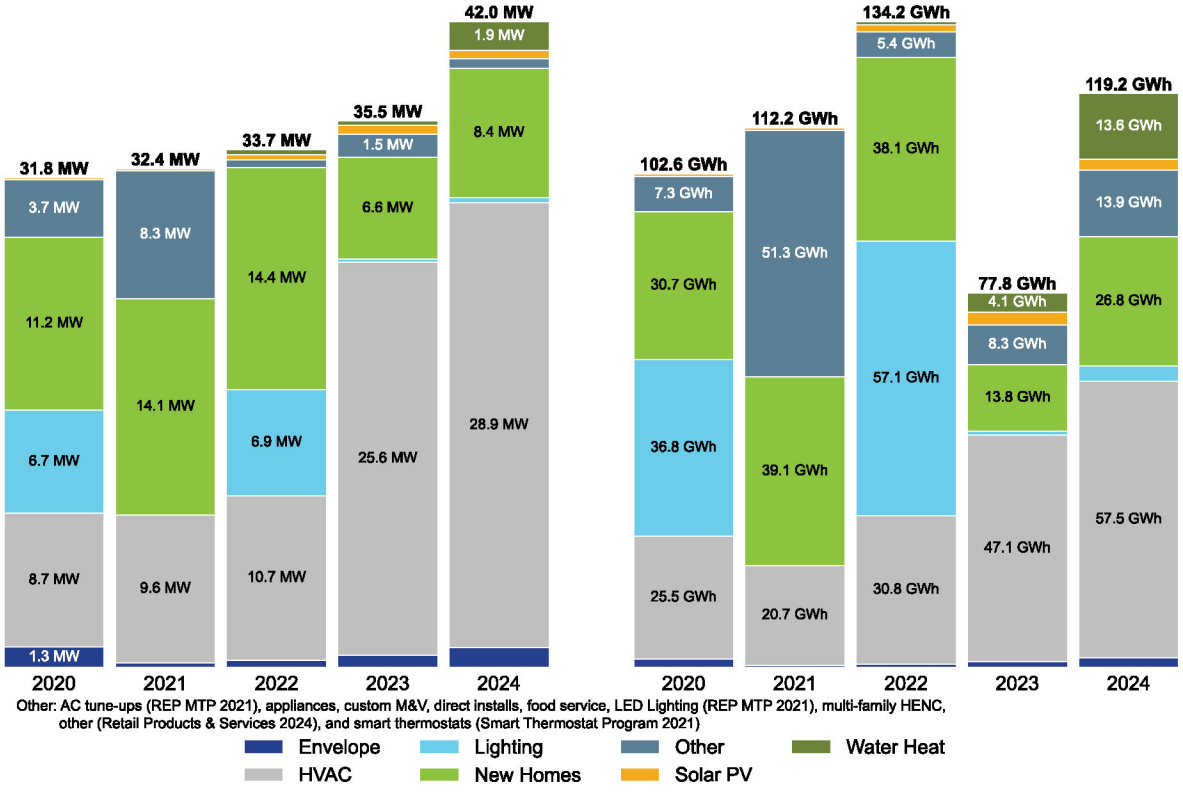


Figure 18 shows the demand reduction and energy savings breakdown of residential measures.

- CenterPoint has continued to diversify its residential measure mix,
  - *HVAC* measures continue to dominate the savings—70 percent of demand reduction (Figure 18, left graph), and almost half of energy savings (Figure 18, right graph),and
- *Water heating* and *other* measures also had significant increases in demand and energy savings
  - *Other* measures consisted of *AC tune ups* from the Residential Efficiency Products in PY2021, *appliances*, *custom M&V*, *direct installs*, *food service*, *lighting, smart thermostats* in the PY2021 Smart Thermostat Program, and multifamily *high-efficiency new construction (HENC)* measures.

Figure 18. Distribution of CenterPoint's Demand Reduction (MW) and Energy Savings (GWh) by Measure Category—Residential Programs PY2020–PY2024



3.2.4 Load Management Savings

The PY2024 gross savings from CenterPoint's load management programs were the following:

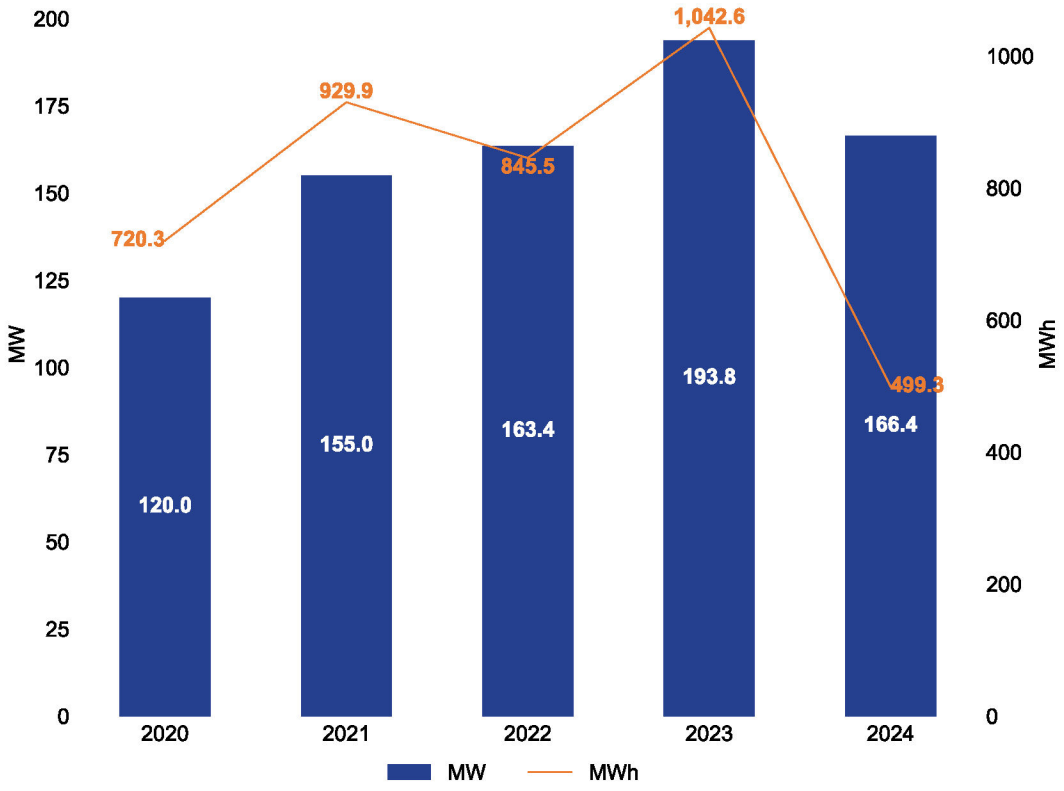
- Demand reduction of 166.4 MW, and
- Energy savings of 499.3 MWh.

Demand reduction from load management of 166.4 MW was more than twice the combined demand reduction from commercial and residential energy efficiency programs (total of 69.1 MW).

Figure 19 the demand reduction and energy savings for CenterPoint's load management programs for the past five years. Load management programs also saw a significant decrease in energy savings in PY2024.

Reduction in the cooperation level for the Commercial Load Management SOP decreased PY2024 results. The Residential Load Management SOP slightly increased due to program participation.

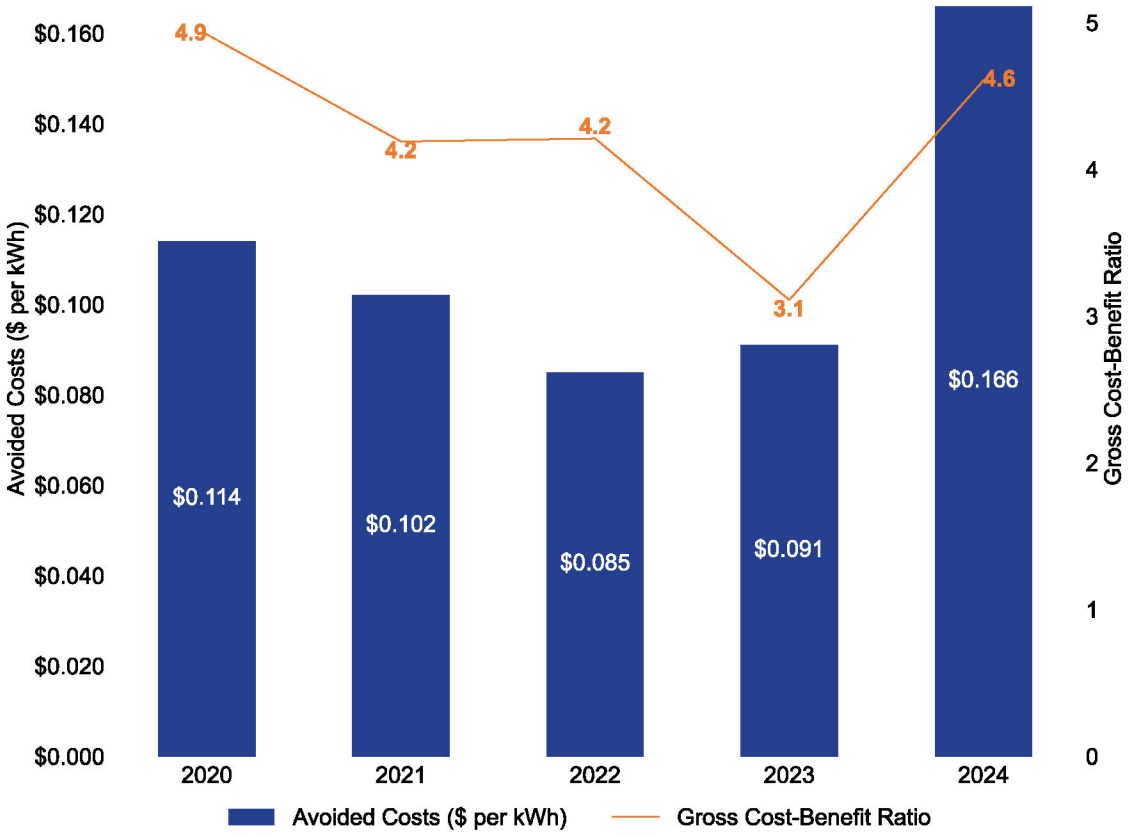
Figure 19. CenterPoint's Demand Reduction (MW) and Energy Savings (GWh) by Program Year—Load Management Programs PY2020–PY2024



3.3 COST-EFFECTIVENESS

Figure 20 shows the five-year avoided costs for all IOUs and cost-effectiveness ratios for CenterPoint. The overall cost-effectiveness ratio for CenterPoint has consistently remained above 3.0. The cumulative cost-effectiveness of CenterPoint's programs was 4.6 in PY2024 (high 4.9 in PY2020). Increased avoided cost of energy in the ERCOT market has contributed to the increase in cost-benefit ratio and cost-effectiveness ratio.

Figure 20. CenterPoint's Gross Cost-Benefit Ratio and Avoided Cost by Program Year



3.4 PY2024 IMPACT EVALUATION RESULTS

This section presents the evaluated savings and cost-effectiveness results for CenterPoint's energy efficiency portfolio. The key findings are summarized first, followed by details for each program with a *high* or *medium* evaluation priority. Finally, a list of programs with a *low* evaluation priority for which claimed savings were verified through the EM&V database is included.

3.4.1 Evaluated Savings

CenterPoint's evaluated savings for program year PY2024 were 235,543 kW in demand reduction and 228,948,732 kWh in energy savings. The overall kW and kWh portfolio realization

rates are approximately 100 percent. CenterPoint adjusted claimed savings based on EM&V results (see Table 13), supporting healthy realization rates.

Table 9 shows the claimed and evaluated demand reduction for CenterPoint's portfolio and broad customer sector and program categories. Table 10 shows the claimed and evaluated energy savings for CenterPoint's portfolio and broad customer sector and program categories for PY2024. Residential and load management results are based on census reviews; therefore, precision calculations are not applicable. For both Table 9 and Table 10, the review for the load management program included a census review of equations and interval meter data to estimate the baseline usage and level of load curtailment for each event for all participants. Also, total portfolio numbers may not equal the sum of all program sector totals due to rounding.

Table 9. CenterPoint's PY2024 Claimed and Evaluated Demand Reduction (kW)

Level of analysis	Percentage portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)
Total portfolio	100.0%	235,544	235,543	100.0%
Commercial	11.5%	27,116	27,116	100.0%
Residential	15.0%	35,242	35,242	100.0%
Low-income	2.9%	6,766	6,766	100.0%
Load management	70.7%	166,421	166,420	100.0%

Table 10. CenterPoint's PY2024 Claimed and Evaluated Energy Savings (kWh)

Level of analysis	Percentage portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)
Total portfolio	100.0%	228,948,734	228,948,732	100.0%
Commercial	47.7%	109,227,673	109,227,673	100.0%
Residential	46.9%	107,428,893	107,428,893	100.0%
Low-income	5.2%	11,792,907	11,792,907	100.0%
Load management	0.2%	499,262	499,260	100.0%

Program-level realization rates are discussed in the detailed findings subsections. However, these results should only be viewed qualitatively due to the small sample sizes at the utility program level.

Program-level realization rates also include a qualitative rating of *good*, *fair*, and *limited* associated with the level of program documentation received from the utility.

- CenterPoint received *good* documentation scores for the Commercial SOP, Commercial MTP (SCORE, Healthcare, Data Center), Residential SOP, Multifamily MTP Hard-to-Reach, and load management programs, and
- CenterPoint received a *fair* documentation score for the Commercial High-Efficiency Food Service program, Hard-to-Reach SOP, and the Targeted Low-Income MTP.
    - **Recommendation**: Improve programs with *fair* documentation scores. See Commercial and Residential project and program-specific recommendations in program impact results.

3.4.2 Program Funding and Cost-Effectiveness Results

CenterPoint's total portfolio funding for PY2024 was $45,447,299, excluding research and development, EM&V, and its performance bonus; its portfolio had a cost-effectiveness score of 4.6, or 5.1, excluding low-income programs, based on the PACT.

The most cost-effective programs based on claimed and evaluated savings were the Commercial SOP and the Residential and Small Commercial (SC) SOP programs; the least cost-effective programs were the Commercial Load Management SOP and Commercial Winter Load Management (Pilot) programs. All of CenterPoint's programs were cost-effective in PY2024.

The lifetime cost of evaluated savings was $0.025 per kWh and $16.38 per kW. Cost per lifetime is calculated by attributing costs to energy savings and avoided demand based on their portion of total benefits and applying that proportion to the total program costs.

Table 11. CenterPoint's Cost-Effectiveness Results

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Total portfolio	**4.61**	**4.61**	**3.52**
Total portfolio excluding low-income programs	**5.05**	**5.05**	**3.79**
Commercial	**6.83**	**6.83**	**5.51**
Commercial MTP (SCORE, Healthcare, Data Center)	6.02	6.02	5.25
Commercial SOP	9.61	9.61	7.14
Commercial High-Efficiency Foodservice	3.47	3.47	2.95
Retro-commissioning MTP	2.20	2.20	1.56
Retail Products and Services MTP	5.71	5.71	5.20
Residential	**4.92**	**4.92**	**3.35**
Residential and Small Commercial (SC) SOP	8.81	8.81	7.14
Midstream MTP (HVAC and Pool Pump Distributor)	2.73	2.73	1.38
Retail Products and Services MTP	5.52	5.52	4.35
Multifamily Market Rate MTP	7.20	7.20	5.36
High Efficiency Homes MTP	5.19	5.19	2.54

Level of analysis	Claimed savings results	Evaluated savings results	Net savings results
Hard-to-Reach SOP	2.71	2.71	2.72
Multifamily MTP Hard-to-Reach	2.64	2.64	2.64
Low-income *	**3.17**	**3.17**	**3.17**
Targeted Low-Income MTP (Agencies in Action)*	3.17	3.17	3.17
Load management	**1.23**	**1.23**	**1.23**
Commercial Load Management SOP	1.15	1.15	1.15
Commercial Winter Load Management (Pilot)	1.64	1.64	1.65
Residential Load Management SOP	1.20	1.20	1.20

* The low-income program is evaluated using the Savings-to-Investment Ratio (SIR).

3.4.3 Net-to-Gross Results

CenterPoint's NTG ratio was updated for its CSOP as well as Commercial Solutions MTP in PY2024 through participant surveys. CenterPoint's CSOP NTG ratio is 74.2 percent for kWh and 74.0 percent for kW, calculated as 1-free-ridership (excluding spillover). CenterPoint's Commercial Solutions MTP NTG ratio is 82.1 percent for kWh and 85.9 percent for kW.

CenterPoint's free-ridership rate for CSOP of 25.8 percent for kWh and 26.0 percent for kW increased slightly from the PY2021 commercial SOP NTG free-ridership estimate of 23 percent for kWh and 22 percent for kW.

CenterPoint's free-ridership rate for MTP of 17.9 percent for kWh and 14.1 percent for kW slightly decreased from the PY2021 Commercial MTP NTG free-ridership estimate of 19 percent for kWh and 20 percent for kW.

Table 12 shows CenterPoint's free-ridership results by program and end-use. While the small number of completed surveys for some measure types is qualitative, end-use free-ridership provides useful insight for IOU's program design considerations. Commercial Solutions MTP *lighting* measures had the lowest free-ridership rate.

Table 12. CenterPoint's Free-Ridership by Program and End-Use

Program and end-use	Completed surveys	kWh free-ridership	kW free-ridership
Commercial SOP			
Custom & other	36	18.7%	15.3%
Lighting	32	17.3%	17.3%
HVAC equipment	1	39.3%	39.3%
Solar	1	22.9%	22.9%
Total	**70**	**25.8%**	**26.0%**

Program and end-use	Completed surveys	kWh free-ridership	kW free-ridership
Commercial Solutions MTP			
Custom & other	45	21.4%	14.4%
HVAC equipment	21	13.9%	13.8%
Lighting	4	6.0%	6.0%
Total	**70**	**17.9%**	**14.1%**

3.5 SAVINGS DIFFERENCES

As discussed above, utilities are provided the opportunity to adjust savings at the project level based on interim EM&V findings. This section summarizes the claimed savings adjustments identified by the EM&V team. The EM&V team requests that utilities adjust projects when evaluated and claimed savings differ by more than five percent. CenterPoint adjusted claimed savings for all projects with any differences found by the EM&V team and included these adjustments in its June 1 filing.

Table 13. CenterPoint's Claimed Demand Reduction (kW) and Energy Savings (kWh) Adjustments by Program

Program	EM&V demand claimed savings adjustments (kW)	EM&V energy claimed savings adjustments (kWh)
CHEF: Commercial High Efficiency Food Service	-	-38
Commercial and Industrial Standard Offer	131.63	902,093
Commercial MTP (SCORE, Healthcare, Data Center)	-228.19	-732,386
Residential & Small Commercial Standard Offer Program	0.30	-
Hard-to-Reach Standard Offer Program	-0.27	-309
Targeted Low-Income MTP (Agencies in Action)	-3.29	-6,279
Winter Load Management Pilot	21.36	64
Total	**-78.46**	**162,875**

3.6 DETAILED FINDINGS—COMMERCIAL

3.6.1 Commercial MTP (SCORE, Healthcare, Data Center)

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
3.4%	7,946	7,946	100.0%	17.7%	40,457,738	40,457,738	100.0%	Good

Completed desk reviews*
13

*Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Commercial MTP (SCORE, Healthcare, Data Center) evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for four projects. Two adjusted projects had adjustments of greater than five percent compared to the originally claimed savings, while two had less than five percent adjustments. CenterPoint accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1-2-1-1-12605: A courthouse installed *LED lighting* to replace metal halide and fluorescent lighting. During the desk review, the EM&V team adjusted the installed lighting wattages to the DLC-certified values. The EM&V team also adjusted baseline fixture type for two LED tube fixtures and retrofit quantities to match provided photo documentation and one-for-one replacement conventions. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate of 98 percent. The adjustments also decreased energy (kWh) savings and resulted in a realization rate of 98 percent.

Participant ID 1-2-1-1-13954: A park and ride bus station installed *LED lighting* to replace exterior metal halide and high-pressure sodium lighting. During the desk review, the EM&V team adjusted the baseline lighting wattages to match photo documentation and installed lighting wattages to match the DLC-certified values. These adjustments decreased peak demand reduction (kW) and resulted in a realization rate of 98 percent. The adjustment also decreased energy (kWh) savings and resulted in a realization rate of 98 percent.

Participant ID 1-2-1-1-14763: A new construction elementary school installed interior and exterior *LED lighting*. During the desk review, the EM&V team added 100 watts of tradeable wattage to the outdoor parking areas and drives and subtracted it from the outdoor building facades. This allowed all space types to meet codes and allow for exterior lighting energy savings. The EM&V team also adjusted the quantity of fixtures and interior gross lighted area to match engineering drawings. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 105 percent. The adjustments also increased energy (kWh) savings and resulted in a realization rate of 109 percent.

Participant ID 1-2-1-1-16814: An outdoor athletic field installed *LED lighting* to replace existing metal halide fixtures. During the desk review, the EM&V team adjusted the quantity of baseline fixtures to match the engineering drawings and retrofit plans from the quantity shown on the photometric plans for different regions of the athletic area. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate of 31 percent. The adjustments also decreased energy (kWh) savings and resulted in a realization rate of 31 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the 13 projects that underwent desk reviews because sufficient documentation was provided for the sites. Project documentation included M&V plans, invoices, QPL qualifications, pre-inspection and post-inspection notes, project savings calculators, and photographic documentation of existing and new equipment, which are significant efforts by the utility to verify equipment conditions and quantities. Site-specific or project-specific invoices were not provided for some projects reviewed. Overall, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good*.

3.6.2 Commercial SOP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
4.3%	10,032	10,032	100%	20.0%	45,827,827	45,827,827	100.0%	Good

Completed desk reviews*
15

*Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Commercial SOP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for six projects. Four projects had adjustments of greater than five percent compared to the originally claimed savings. Two projects had adjustments of less than five percent compared to the originally claimed savings. CenterPoint accepted the evaluated results and matched the claimed savings to those of the evaluations for the nine projects; therefore, the final program realization rate is 100 percent for kW and kWh. Further details of the EM&V findings are provided below.

Participant ID 1-2-1-1-14618: A jet aviation hangar installed *LED lighting* retrofit for interior and exterior lighting. During the desk review, the EM&V team adjusted the controls on two interior line items from Institutional Tuning to Occupancy Sensor. This adjustment slightly decreased peak demand (kW) and energy (kWh) savings, and the realization rate rounded to 100 percent.

Participant ID 1-2-1-1-15049: A city hall building installed *solar PV* panels. During the desk review, the EM&V team adjusted the total pitch of the panels to include the pitch of the roof on which the array was set. This adjustment increased energy (kWh) savings and resulted in a realization rate of 102 percent.

Participant ID 1-2-1-1-16714: A new construction warehouse installed interior and exterior *LED lighting* and *controls*. During the desk review, the EM&V team adjusted the exterior lighting zones, types, and areas to match information from satellite photos. The inclusion of the loading dock area had the biggest impact on savings. The quantities for two fixture types were also adjusted to match the lighting plan counts. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 121 percent. The adjustments also increased energy (kWh) savings and resulted in a realization rate of 132 percent.

Participant ID 1-2-1-1-17204: A new construction warehouse installed interior and exterior energy-efficient *lighting*. During the desk review, the EM&V team adjusted the exterior areas to include the parking drive and loading dock areas. The installed wattage for one light was also adjusted to match its ENERGY STAR certified wattage. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 134 percent. The adjustments also increased energy (kWh) savings and resulted in a realization rate of 153 percent.

Participant ID 1-2-1-1-18762: A new construction warehouse installed interior and exterior energy-efficient *lighting*. During the desk review, the EM&V team adjusted the exterior areas to include the parking drive and loading dock areas. One set of canned lights was moved from the interior to exterior inventory based on the inspection photos. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 136 percent. The adjustments also increased energy (kWh) savings and resulted in a realization rate of 155 percent.

Participant ID 1-2-1-1-24730: A new construction warehouse installed interior and exterior *LED lighting*. During the desk review, the EM&V team adjusted the exterior areas to include the parking drive and loading dock areas. The installed wattage for one light fixture was also adjusted to match the ENERGY STAR certified wattage. These adjustments increased peak demand reduction (kW) and resulted in a realization rate of 118 percent. The adjustments also increased energy (kWh) savings and resulted in a realization rate of 126 percent.

Documentation Score

The EM&V team mostly verified key inputs and assumptions (e.g., equipment quantity, equipment capacity, QPL qualifications) for the 15 projects that underwent desk reviews because sufficient documentation was provided for the sites. Project documentation at these sites included invoices, QPL qualifications, pre-install and post-install inspection notes, project savings calculators, specification sheets, and photographic documentation of existing and new equipment. The specification sheet for one *solar PV* project, used to verify efficiency, was not provided. Overall, despite the documentation shortfalls, the level of sufficient documentation remained above 90 percent, and the EM&V team assigned a program documentation score of *good*.

3.6.3 Commercial High-Efficiency Foodservice MTP

Program contribution to portfolio savings (kW)	Claimed demand reduction (kW)	Evaluated demand reduction (kW)	Realization rate (kW)	Program contribution to portfolio savings (kWh)	Claimed energy savings (kWh)	Evaluated energy savings (kWh)	Realization rate (kWh)	Program documentation score
0.2%	409	409	100.0%	1.1%	2,611,750	2,611,750	100.0%	Fair

Completed desk reviews*
3

*Confidence intervals are not reported at the utility program level due to the small sample sizes.

The PY2024 Commercial High-Efficiency Foodservice MTP evaluation efforts focused on desk reviews. The sample of completed desk reviews for this program is listed above.

The EM&V team adjusted the claimed savings for one project. That project had an adjustment of less than five percent compared to the originally claimed savings. CenterPoint accepted the evaluated results and matched the claimed savings to those of the evaluations for the projects with significant adjustments; therefore, the final program realization rate is 100 percent. Further details of the EM&V findings are provided below.

Participant ID 1-2-1-1-18752: A café purchased *ENERGY STAR ice makers* and *reach-in refrigerators*. During the desk review, the EM&V team identified the same inputs, but had different energy savings for the *ice maker*. It appears the program calculator rounds the duty cycle value before finalizing the calculation. This adjustment decreased peak demand reduction (kW) and resulted in a realization rate of 98 percent. The adjustment also decreased energy (kWh) savings and resulted in a realization rate of 94 percent.

Documentation Score

The EM&V team was able to verify key inputs and assumptions (e.g., equipment quantity, QPL qualifications) for the two of the three projects that underwent desk reviews because sufficient documentation was provided for the sites. Project documentation was minimal as a result of this being a midstream program. However, ENERGY STAR identification numbers were provided in place of copies of the certificates required by the TRM. The demand control ventilation equipment had sufficient equipment and design documents to provide energy savings