Public Utility Commission of Texas

Volume 1. Statewide Energy Efficiency Portfolio Report Program Year 2022

TETRA TECH

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ACRONYMS

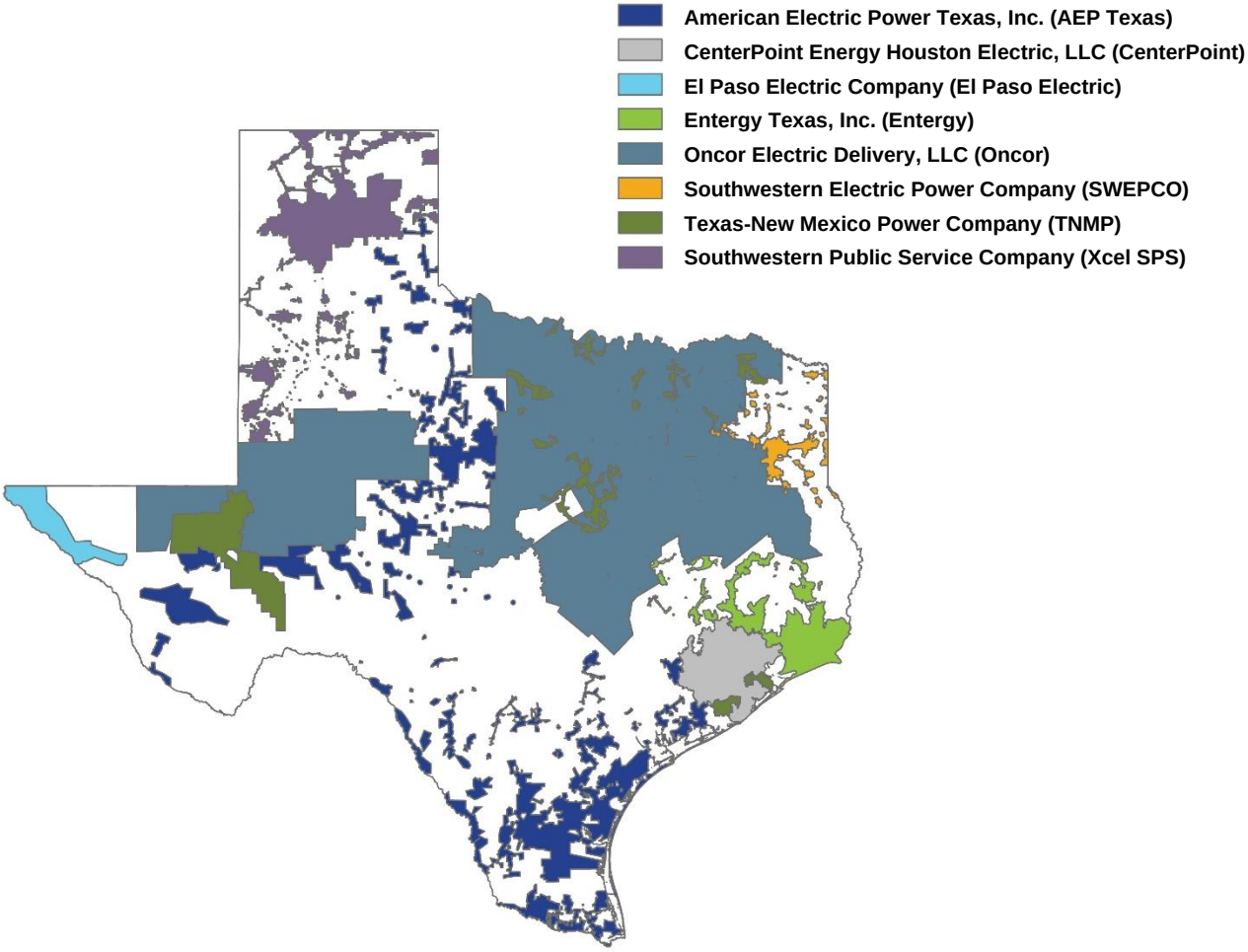
AEP	American Electric Power
C&I	Commercial and industrial
CNP	CenterPoint Energy Houston Electric, LLC
CSOP	Commercial standard offer program
DI	Direct install
EEIP	Energy efficiency implementation project
EECRF	Energy efficiency cost recovery filing
EEPR	Energy efficiency plan and report
EESP	Energy efficiency service provider
EM&V	Evaluation, measurement, and verification
Entergy	Entergy Texas, Inc.
EPE	El Paso Electric Company
EUL	Estimated useful life
HTR	Hard-to-reach
kW	Kilowatt
kWh	Kilowatt-hour
LI	Low-income
LM	Load management
M&V	Measurement and verification
mcf	1,000 cubic feet
MTP	Market transformation program
NTG	Net-to-gross
PUCT	Public Utility Commission of Texas
PV	Photovoltaic
PY	Program year
QA/QC	Quality assurance/quality control
Recommissioning	RCx
RFP	Request for proposals
RSOP	Residential standard offer program
SOP	Standard offer program
SWEPCO	Southwestern Electric Power Company
TEESI	Texas Energy Engineering Services, Inc.
TNMP	Texas-New Mexico Power Company
TRM	Technical Reference Manual
Xcel Energy SPS	Xcel Energy Southwest Public Service, Inc.

1.0 EXECUTIVE SUMMARY

1.1 OVERVIEW

The Public Utility Commission of Texas (PUCT) oversees the energy efficiency programs delivered by the state's eight investor-owned electric utilities. Four of the utilities are fully deregulated and operate as part of the Electric Reliability Council of Texas (ERCOT)[1]: American Electric Power Texas, Inc. (AEP Texas), CenterPoint Energy Houston Electric, LLC (CenterPoint), Oncor Electric Delivery, LLC (Oncor) and Texas-New Mexico Power Company (TNMP). The other four utilities—Entergy Texas, Inc. (Entergy); El Paso Electric Company (El Paso Electric); Southwestern Electric Power Company (SWEPCO); and Southwestern Public Service Company (Xcel SPS)—are vertically-integrated and operate as part of the Midwest Independent System Operator or the Southwest Power Pool. The utilities' service territories' boundaries are shown in Figure 1.

Figure 1. Territories of Investor-Owned Electric Utilities in Texas



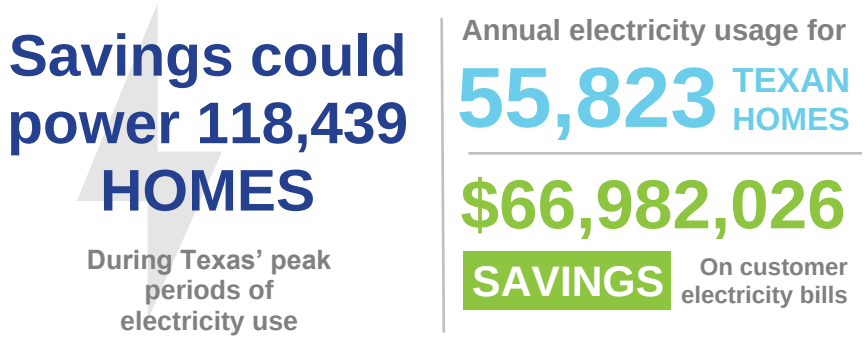
[1] ERCOT is the grid operator for about 90 percent of the Texas power load, www.ercot.com

Texas electric utilities administer a variety of programs that improve the energy efficiency of residential and commercial customers' homes and businesses, reducing both peak demand on the electric grid and annual electric use. Standard offer programs (SOP) develop the infrastructure of service providers (e.g., contractors) and provide financial incentives to deliver higher efficiency products and services. Utilities select implementation firms to run market transformation programs (MTP). MTPs provide additional outreach, technical assistance, and education to customers in harder-to-serve markets (e.g., small business, education, health care, data centers, and local governments) or for select technologies (e.g., recommissioning, air conditioner (AC) tune-ups, pool pumps). SOPs and MTPs are offered to residential and commercial customers. Within both MTPs and SOPs, a growing trend in program delivery is midstream or upstream offerings, where the primary program strategy is to work with distributors and retailers to discount equipment. The discounts are then intended to be carried through to the customers. All utilities provide energy efficiency offerings to low-income (LI) customers[2] through hard-to-reach (HTR) programs that are delivered similarly to the residential SOPs. The ERCOT utilities also offer targeted LI programs that coordinate with the existing federal weatherization program. Finally, the utilities manage load management programs, which are designed to reduce peak demand for a specified amount of time (typically two to four hours) if needed for either grid or system reliability. All utilities offer summer commercial load management programs; the ERCOT utilities offer both winter and summer commercial load management programs as part of their energy efficiency portfolio. Three of the utilities also offer summer residential load management programs.

1.2 PY2022 ENERGY EFFICIENCY SUMMARY RESULTS

In program year (PY) 2022 (PY2022), the Texas electric utilities reported statewide demand reductions of 592,192 kilowatts (kW), equating to powering 118,439 homes during Texas' peak periods of electricity use.[3] The peak demand reductions were achieved at a lifetime cost of $13.70 per kW[4].

The utilities reported statewide electricity savings of 732,844,925 kilowatt-hours (kWh), equivalent to meeting the typical annual electricity needs of 55,823[5] Texan homes. The savings were achieved at a lifetime cost of $0.014 per kWh. In total, customers are estimated to see electricity bill savings of $66,982,026[6] in PY2022 as a result of the programs.

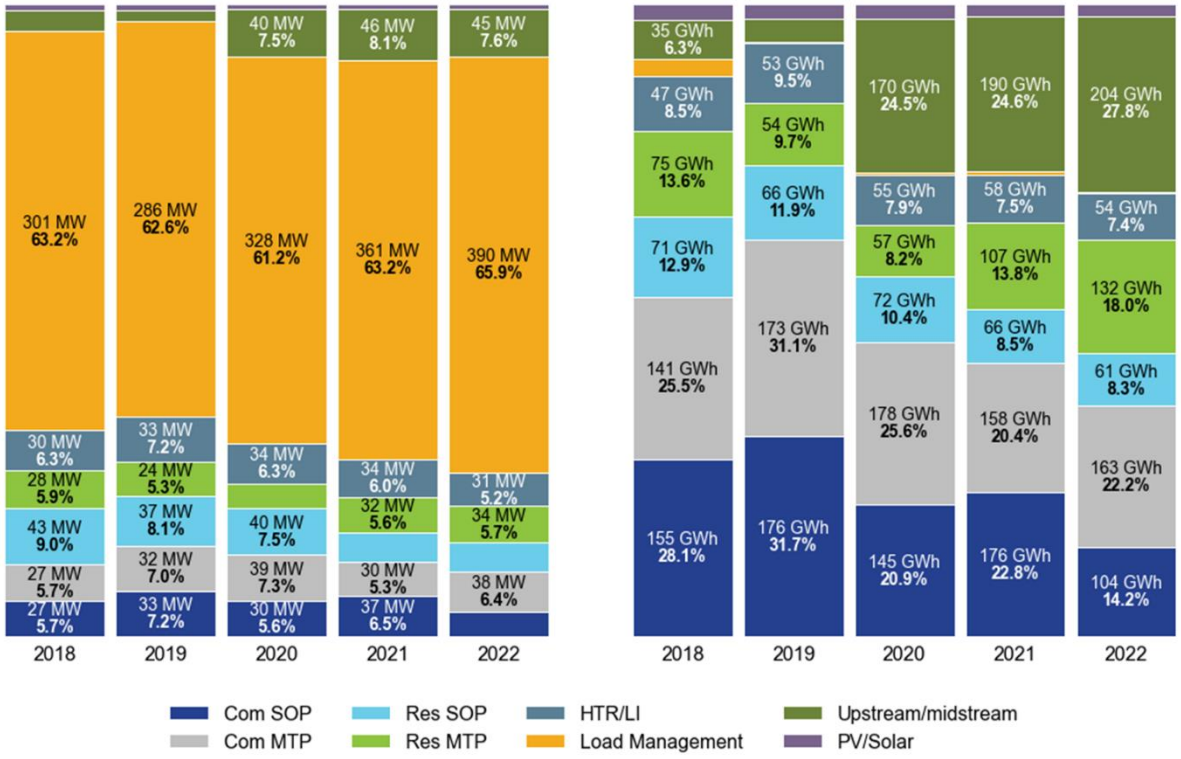


[2] Low-income is defined as households at 200 percent of the federal poverty level (FPL) or below.
[3] "1 MW of electricity can power about 200 Texas homes during periods of peak demand," ERCOT_Fact_Sheet.pdf, June 2023.
[4] Lifetime cost per kW and kWh is calculated by the EM&V team as another representation of program cost-effectiveness. See Section 2 of the full report for more details.
[5] Based on average Texas home annual electric use of 13,128 kWh, https://www.eia.gov/electricity/state/.
[6] Based on the average Texas electric retail rate of 9.14 cents/kWh, https://www.eia.gov/electricity/state/.

1.2.1 Savings and Program Participation

In PY2022, 163,691 residential households and 55,612 commercial customers participated in a program, not including energy efficiency measures delivered through retailer point-of-purchase discounts. As shown in Figure 2, load management programs consistently account for the majority of the statewide demand reductions (megawatts, MW), compromising approximately two-thirds of statewide megawatts in PY2022. Growth in commercial load management participants and the addition of winter load management are the main drivers of the increase from prior years[7]. Upstream/midstream program savings have continued to grow, becoming the program delivery strategy resulting in the most savings in PY2022. For this program delivery model, residential customers are primarily served through upstream retailer programs, while commercial customers are more often served through midstream distributor programs. In contrast to the growth in upstream/midstream, there has been a substantial decrease in the percentage of statewide savings from commercial SOPs at 14.2 percent in PY2022 compared to around one-quarter of statewide savings in prior years. This is partly driven by more commercial customers being served through the midstream model as HVAC, food services, and refrigeration midstream programs have expanded rapidly in utility portfolios.

Figure 2. Demand Reduction and Energy Savings by Program Type[8]

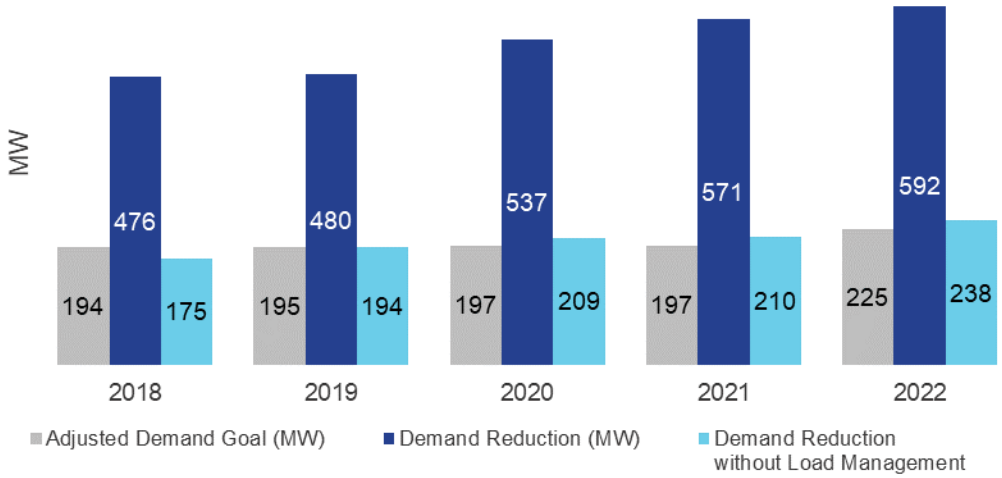


[7] While PY2022 includes one ERCOT utility winter load management program, all ERCOT utilities have winter load management programs in PY2023, and therefore another increase is expected next year.

[8] PY2022 savings are based on utility-reported savings, which Tetra Tech has fully verified through program tracking data. There is one small discrepancy between utility-reported savings and the verified reported savings in this report due to CenterPoint not claiming 225,472 kWh and 15 kW of its retro-commissioning program savings. Trend analysis prior to PY2022 is based on evaluated savings, which vary slightly from utility-reported savings due to the application of realization rates.

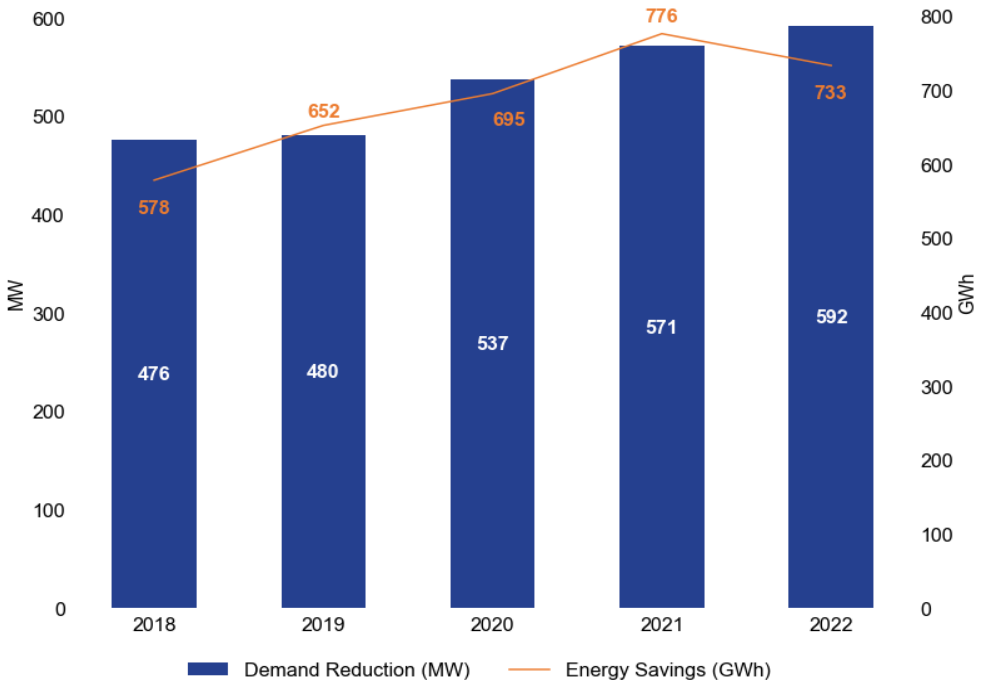
As shown in Figure 3, the utilities are significantly exceeding their legislated demand reduction goals. While historically, this was primarily due to the load management programs, in more recent years, utilities have met the legislated demand reduction goals without load management programs.

Figure 3. PY2018–PY2022 Legislated Goals and Demand Reduction



PY2022 saw the largest demand reductions, though energy savings decreased slightly (Figure 4), primarily due to the growth in commercial load management mentioned above.

Figure 4. Total Statewide Portfolio—Gross Demand Reduction and Energy Savings by Program Year



Energy savings and demand reductions from the energy efficiency programs persist beyond the program year. The duration of savings is based on the type of energy efficiency improvement made and how long it typically lasts. The cumulative savings the utilities have achieved since PY2012—when the PUCT evaluation, measurement, and verification (EM&V) effort began—are shown in Figure 5 (demand reduction) and Figure 6 (energy savings). Demand reductions and energy savings are expected to continue through 2051.

Figure 5. PY2012–PY2051 Lifecycle Demand Reduction by Sector (MW)

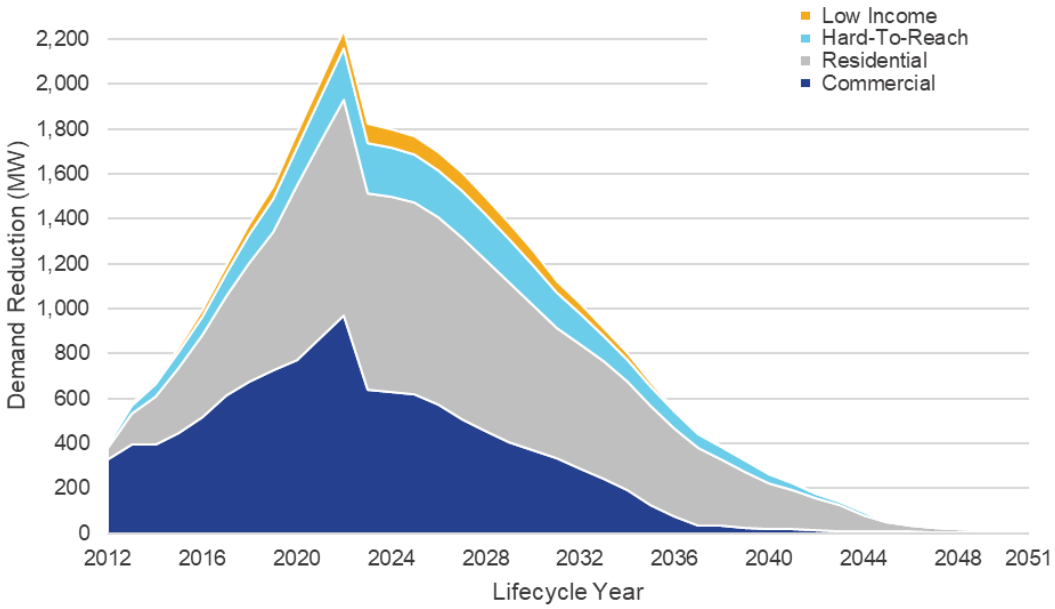


Figure 6. PY2012–PY2051 Lifecycle Energy Savings by Sector (GWh)

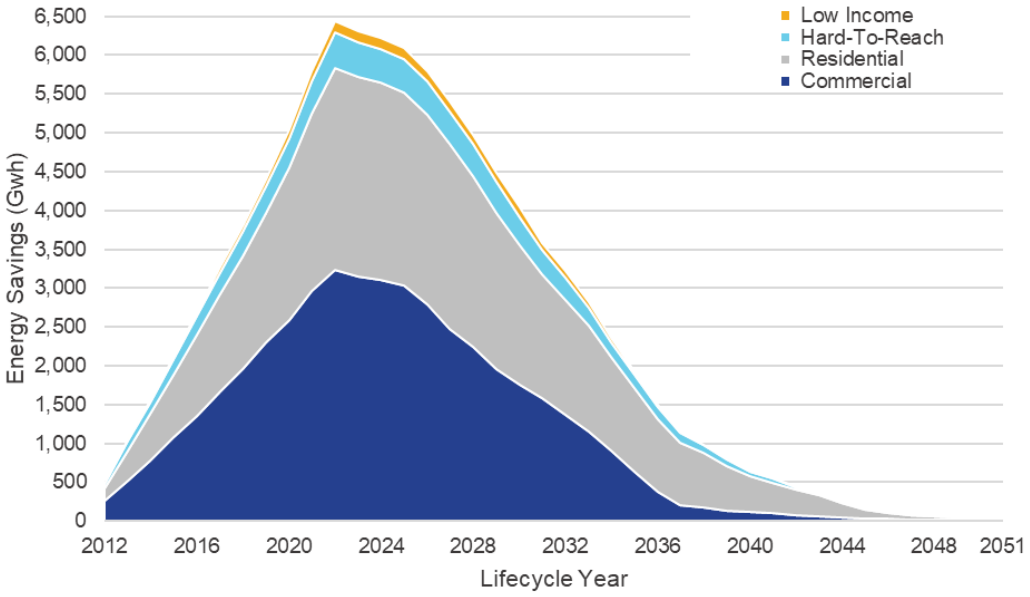


Figure 7 and Figure 8 show the types of measures installed through the programs and how they contribute to lifecycle savings. *Lighting*, *HVAC*, and *building shell* improvements continue to deliver the most savings over time. Load management delivers demand reductions only in the program year and accounts for the spike and drop-off after PY2022.

Figure 7. PY2012–PY2051 Lifecycle Demand Reduction by Measure Category (MW)

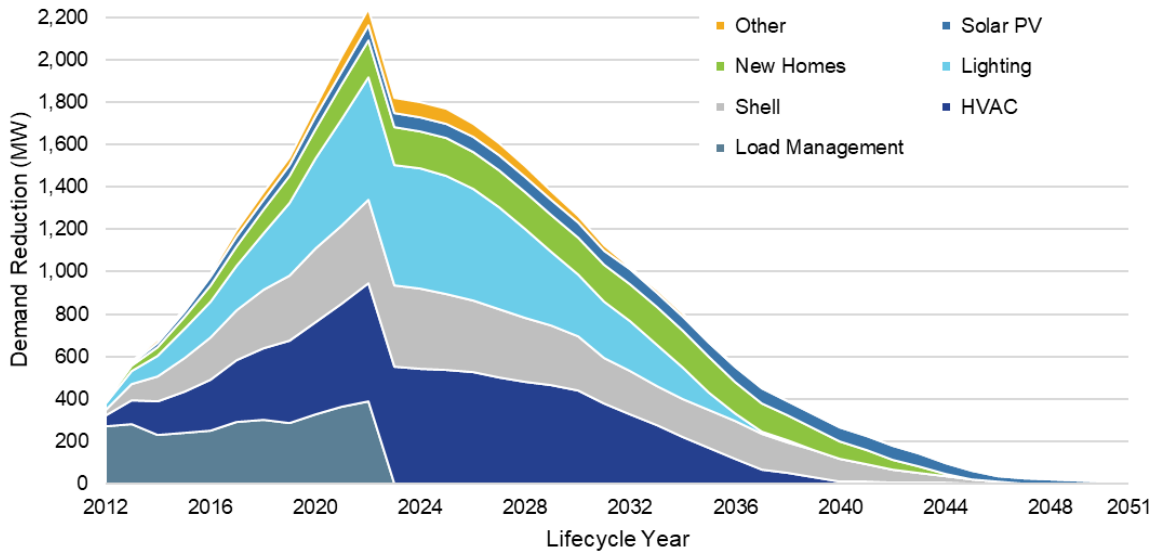
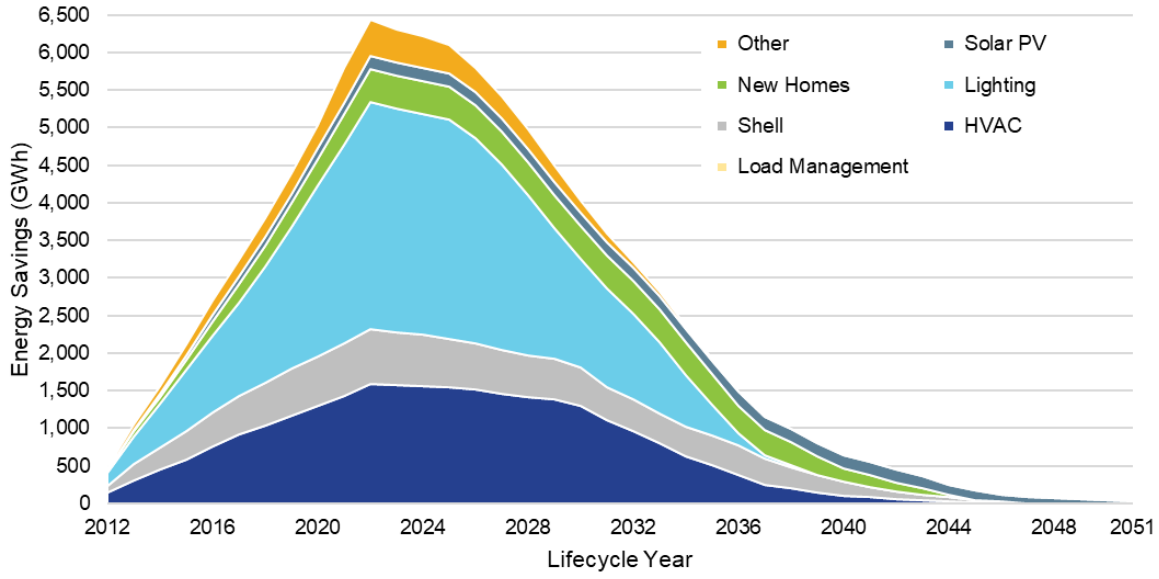


Figure 8. PY2012–PY2051 Lifecycle Energy Savings by Measure Category (GWh)



1.2.2 Program Costs and Cost-Effectiveness

PY2022 energy efficiency program costs totaled just under $178 million across the eight IOUs. Approximately two-thirds (63.6 percent) of the costs were incentives, with the remainder covering administrative and related costs as well as the performance bonus earned by utilities. See Table 1.

Table 1. PY2022 Utility Program Costs

Utility	Incentive amount	Administrative, R&D, and EM&V costs[9]	PY2022 performance bonus earned	Total PY2022 costs
AEP Texas	$15,079,134	$2,141,566	$6,077,493	$23,298,193
CenterPoint	$32,787,006	$3,263,171	$16,123,776	$52,173,953
Entergy	$6,506,082	$749,004	$2,739,819	$9,994,905 *
EPE	$4,358,749	$143,790	$1,643,800	$6,146,339
Oncor	$43,679,123	$6,003,071	$20,545,284	$70,227,478
SWEPCO	$3,244,182	$652,869	$1,112,532	$5,009,583*
TNMP	$4,157,391	$793,263	$1,208,349	$6,159,003
Xcel SPS	$3,325,492	$422,746	$1,054,471	$4,802,709
Total	**$113,137,159**	**$14,169,480**	**$50,505,524**	**$177,812,163**

*Good cause exception granted to customer rate caps set in 16 TAC §25.182(d)(7).

Figure 9 overviews the avoided costs and statewide cost-effectiveness ratios over the last five years (PY2018 to PY2022). The statewide cost-effectiveness has consistently remained above the 2.0 ratio using the *program administrator cost test* (benefits divided by costs). While PY2020 saw a high of 4.0, the statewide cost-effectiveness remains very healthy at 3.7 in PY2022. The higher cost-effectiveness ratios over the last three years have been largely due to the higher avoided costs of energy, with the growth in upstream/midstream program delivery also contributing to increased cost-effectiveness. The PY2022 avoided costs were slightly lower than PY2021, contributing to the slight decrease in overall cost-effectiveness.

[9] EECRF and other case proceeding expenses are not included.

Figure 9. Statewide Gross Cost-Benefit Ratio and Avoided Cost by Program Year

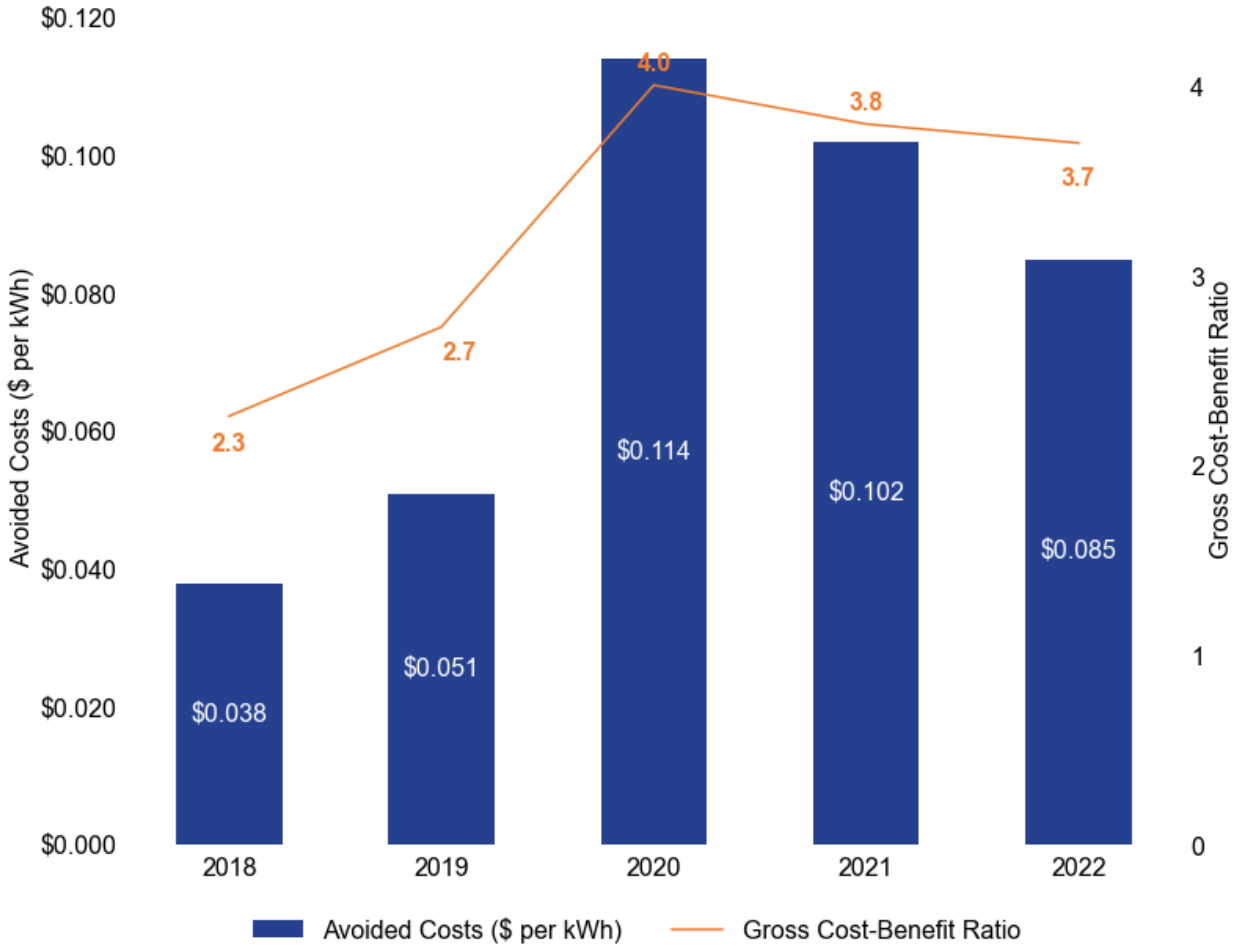
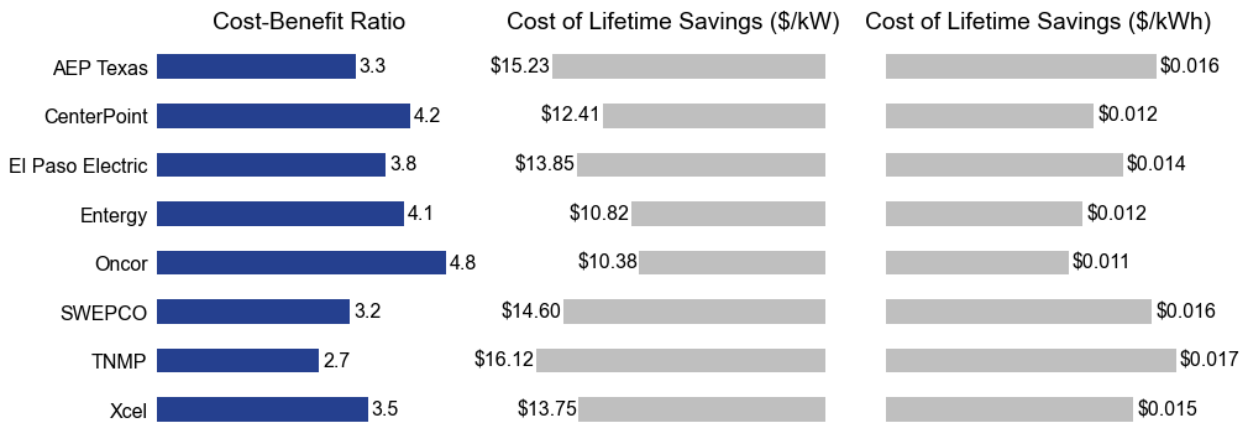


Figure 10 summarizes the cost-effectiveness of each utility's energy efficiency portfolio. All portfolios were cost-effective, with ratios ranging from 2.7 to 4.8. The lifetime cost per kilowatt ranged from $10.38 to $16.12 across utility portfolios; the lifetime cost per kilowatt-hour ranged from $0.011 to $0.017. These lifetime costs provide an alternate way of describing the cost-effectiveness of a portfolio of programs. Portfolios with a higher cost-effectiveness ratio will have a lower cost to acquire savings and vice versa.

Figure 10. PY2022 Savings Cost-Benefit Ratio and Cost of Lifetime Savings



1.3 EVALUATION, MEASUREMENT, AND VERIFICATION OVERVIEW

In 2011, the Texas Legislature enacted Senate Bill (SB) 1125, which required the PUCT to develop an EM&V framework that promotes effective program design and consistent and streamlined reporting. The EM&V framework is embodied in the PUCT's substantive rule § 25.181, relating to the energy efficiency goal.

The PUCT selected an independent, third-party EM&V contractor for the PY2020–PY2023 programs through the Request for Proposals 473-20-0002, Project No. 51021. The selected EM&V team is led by Tetra Tech and includes Texas Energy Engineering Services, Inc. (TEESI) and Energy Bees.

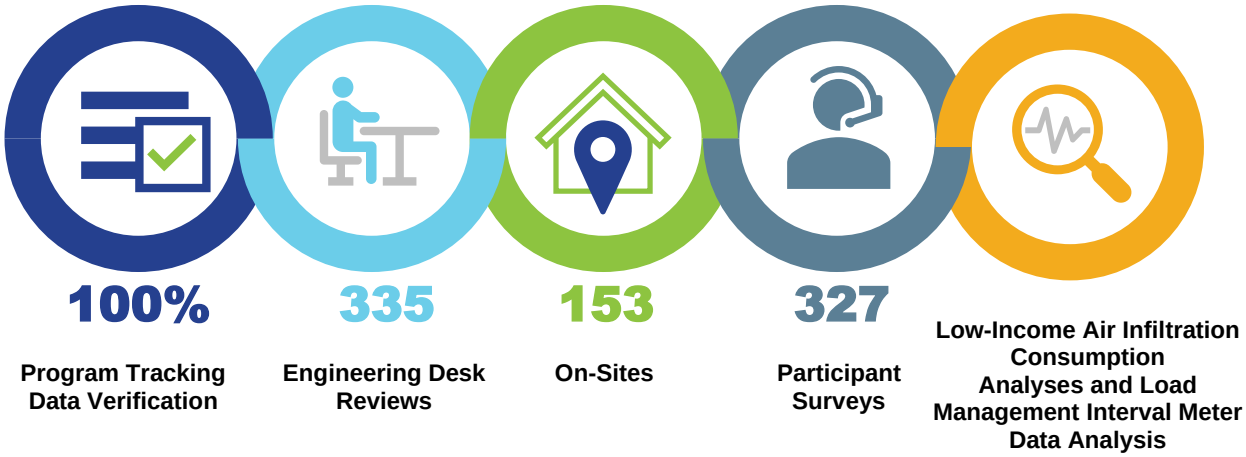
The objectives of the EM&V effort are to:

- document gross and net energy and demand impacts of utilities' individual energy efficiency portfolios;
- determine program cost-effectiveness;
- provide feedback to the PUCT, utilities, and other stakeholders on program portfolio performance; and
- prepare and maintain a statewide technical reference manual (TRM).

This Statewide Energy Efficiency Report presents the PY2022 EM&V findings and recommendations, looking across all eight electric utility portfolios. The report (1) addresses gross and net energy and demand impacts and program cost-effectiveness, and (3) provides feedback on program portfolio performance. The EM&V findings and recommendations inform annual updates to the TRM.

The PUCT's EM&V contractor independently verifies utility-claimed savings across all programs through program tracking data. Additional EM&V activities (engineering desk reviews, on-site measurement and verification (M&V), interval meter data analysis, consumption analysis, participant surveys, and in-depth interviews) are conducted based on annual evaluation prioritization of *high*, *medium*, or *low* by program type. PUCT staff and the EM&V team revisit the prioritization each year based on considerations such as the magnitude and uncertainty of savings, the stage of the program, the importance to future portfolio performance, PUCT and Texas utilities' priorities, prior EM&V results, and changes in the markets in which programs operate.

Figure 11. PY2022 Evaluation, Measurement, and Verification Activities



The utilities have demonstrated a willingness to work with PUCT staff and the EM&V team to improve the accuracy of claimed savings. This includes (1) adjusting claimed savings in response to EM&V findings, (2) requesting M&V reviews or additional technical assistance throughout the program year, and (3) implementing TRM or program changes. Utilities fully responded to all PY2022 EM&V recommended savings adjustments to claimed savings, as identified in Table 2.

Table 2. PY2022 EM&V Savings Adjustments to Utility Claimed Savings

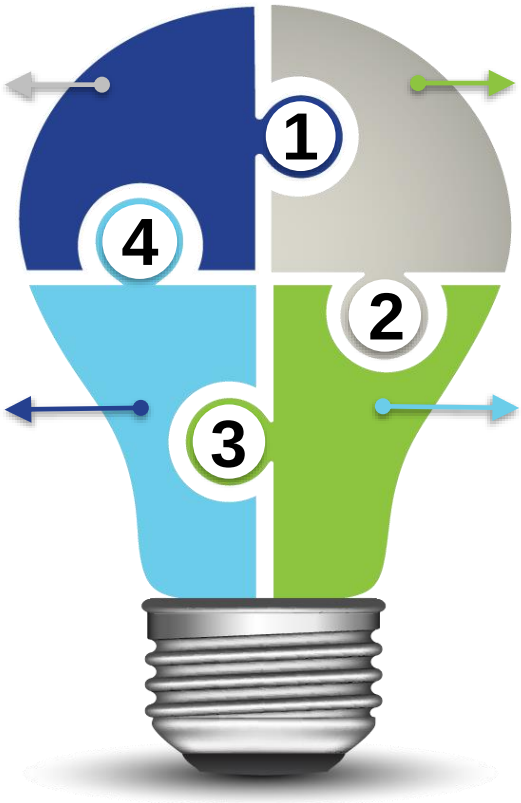
Utility	kW		kWh	
AEP Texas	↑	123	↑	939,557
CenterPoint	↓	-277	↓	-2,488,400
El Paso Electric	↓	-33	↓	-86,818
Entergy	↓	-343	↓	-1,611,828
Oncor	↑	17	↓	-87,613
SWEPCO	↓	-13	↓	-377,608
TNMP	↑	75	↑	268,630
Xcel Energy	↓	-383	↓	-2,091,043
Overall	↓	**-834**	↓	**-5,535,122**

1.4 KEY FINDINGS

PY2022 saw many successes. Expanded commercial load management resulted in the highest available program year demand reductions to date. Utilities diversified program measures with a specific focus on *HVAC* delivered through both contractor and distributor channels, doubling the number of *residential heat pumps* and *commercial HVAC* installed compared to prior program years. Utilities began tracking *variable speed heat pump* projects to provide additional savings data to inform a future TRM update. Efforts to reach different segments continued, such as food services, industrial strategic energy management, and a variety of custom projects, including *monitoring-based commissioning* and *HVAC tune-ups* for multifamily. A recent re-design of the LI program eligibility process has expanded its reach, coupled with specific utility strategies. Research to support future efforts also occurred: one utility conducted an analysis to identify less-served areas in its service territory, while another is assessing the potential for *commercial fleet electric-vehicle-managed charging*. Portfolio trend analysis in response to American Consortium for an Energy Efficient Economy (ACEEE) strategies for the Texas market found all the identified strategies are in progress, with momentum already building or a foundation to build upon. Finally, an unprecedented level of stakeholder engagement through the Energy Efficiency Implementation Project (EEIP) Working Groups identified priority issues for future rulemaking and developed desired program best practices.

To support continued energy efficiency accomplishments, the EM&V team identified opportunities for improvement encapsulated in 46 recommendations, discussed next. The PY2022 EM&V reviews resulted in more project-level savings adjustments than in prior program years, indicating the need for renewed quality assurance/quality control (QA/QC) and training efforts for common sources of discrepancies. Load management participant surveys found high awareness of the programs amongst commercial customers, but most residential customers were unaware. Waste and potable water treatment plants were identified as a largely untapped segment with comprehensive energy savings opportunities. While *heat pump water heaters* (*HPWH*) have seen slow market adoption due to a number of identified barriers, a PY2023 TRM change to support midstream delivery of this measure and bundling the utility incentive with the federal tax credit may help gain traction in the market. A number of TRM updates will better support custom projects, *food service* and *refrigeration* measures, new homes, and residential demand response programs. The TRM Working Group is planning an *HVAC*-specific working group to solicit broad input from manufacturers, distributors, contractors, and others who can provide valuable data from the field. Recommendations are presented for the commercial sector (16), residential sector (7), load management (11), and at the portfolio-level (12).

Figure 12. PY2022 Energy Efficiency Accomplishments



Delivered the most peak demand reductions to date as a result of increased load management participants and new winter 24/7 offerings. A solid demand response infrastructure is in place that could be quickly expanded if needed.

Increased Stakeholder Input Organized Energy Efficiency Implementation Project (EEIP) Stakeholder Working Groups that prioritized key issues to achieve desired best practices.

Targeted strategies to under-tapped measures and segments continued to reach less-served segments such as food services and multifamily, residential heat pump, and commercial HVAC project savings doubled from prior years.

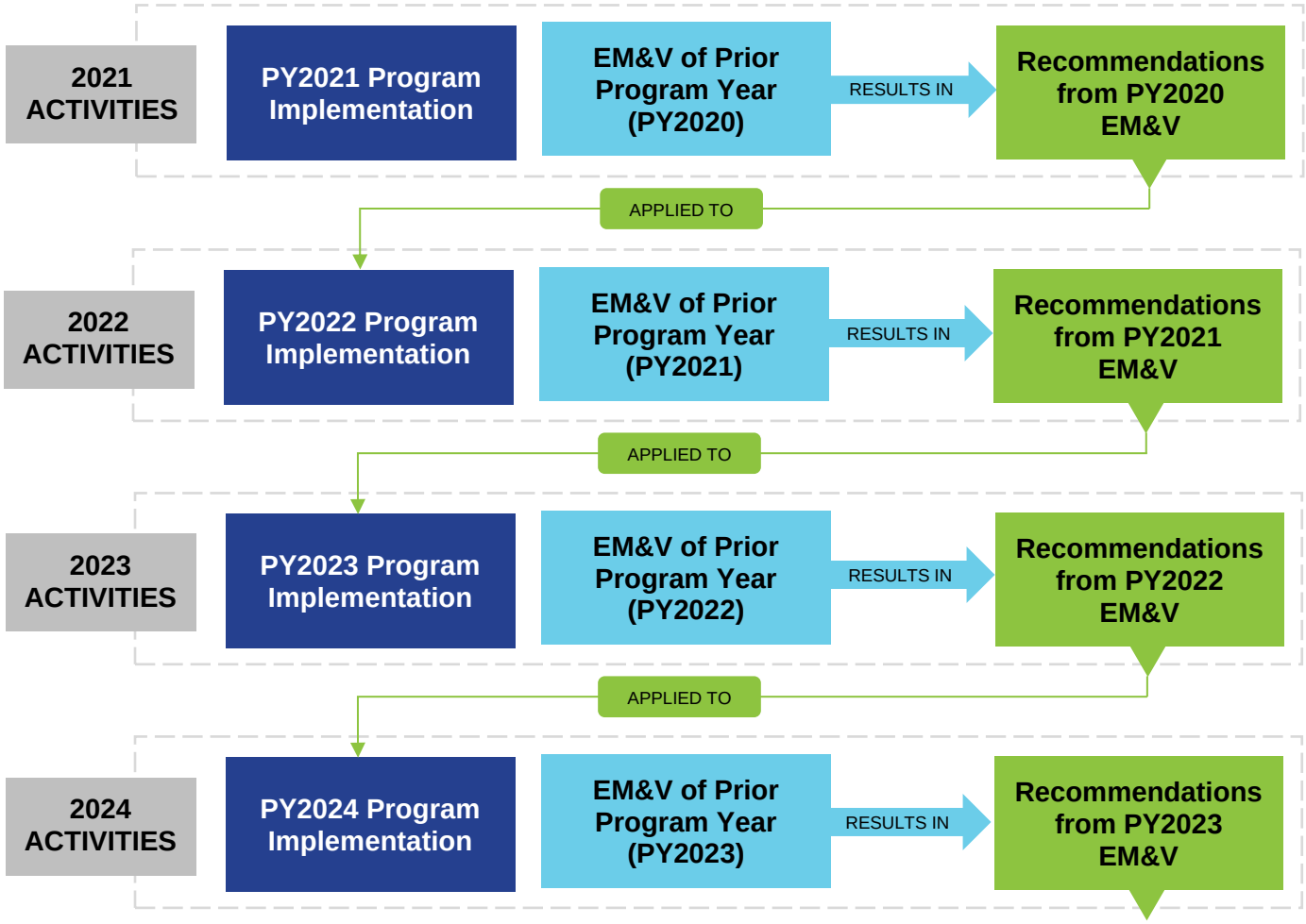
Conducted research to inform future offerings identifying less-served areas in service territories, tracking variable speed heat pump projects, and assessing the potential for commercial fleet electric-vehicle-managed charging.

1.4.1 Recommendations

The PUCT's EM&V recommendations are to facilitate more accurate, transparent, and consistent savings calculations and program reporting across the Texas energy efficiency programs and provide feedback that can lead to improved program design and delivery.[10] PUCT staff and the EM&V team discuss with the utilities to agree on utilities' responses to recommendations; these are referred to as *action plans*. Recommendations and action plans are also vetted with the EEIP (the statewide collaborative group). Utilities then use these action plans to respond to program savings, design, and implementation recommendations within the next program year, consistent with § 25.181(q)(9). Recommendations made based on PY2020 evaluation research—completed in 2021—were expected to be implemented in PY2022; therefore, recommendation status is reported in this PY2022 report. Similarly, recommendations resulting from the PY2022 EM&V completed in 2023 are expected to be implemented in PY2024 (see Figure 13). First, we report on utility progress in meeting recommendations that were to be implemented in PY2022. Then we summarize recommendations from the PY2022 EM&V research to be implemented in PY2024.

[10] The EM&V team recognizes that there may be a trade-off between the objectives of the recommendations, program administration costs, and program participation barriers. The EM&V team strives to recognize these trade-offs by making feasible recommendations and working with the utilities to agree upon reasonable action plans in response to recommendations.

Figure 13. Recommendations Timeline



1.4.1.1 Prior EM&V Recommendations

Table 3 through Table 6 summarize the status of the 29 PY2020 EM&V recommendations that utilities were to implement in PY2022. Utilities have been responsive to recommendations, with the majority of recommendations (23 of 29) *complete*. Most recommendations were addressed through TRM updates, utility QA/QC, and reporting practices. The six *in-progress* recommendations relate to commercial custom projects, income verification processes for LI program eligibility, and participant awareness of residential demand response. Next, we review the status of prior EM&V recommendations for commercial, residential, and load management programs, followed by portfolio and cross-sector recommendations.

Commercial recommendations addressed custom projects, M&V projects, recommissioning (RCx) projects, lighting projects, and consumption analysis. (Table 3). Custom project and one of the RCx recommendations are noted as *in progress* since some discrepancies were found in the PY2022 EM&V. Six of the nine recommendations are noted as *complete* due to improvement seen in the PY2022 EM&V or a completed TRM update or EM&V activity.

Table 3. Commercial Program Recommendations for PY2022 Implementation

Category	Recommendation	Implementation	Status
Custom projects	Claimed peak demand calculations inconsistently use the *top 20 hours* method. The Texas TRM has developed a peak demand calculation based on the identification of utility peak demand periods for summer and winter peaks for five different climate zones.	Increased education for implementers and participants regarding the peak demand calculation method in the TRM and engaging the EM&V team as needed to review upfront have helped address these issues. This is *in progress* as improvement is still needed, then for this to become standard practice.	 In progress
	Custom calculation documentation lacks detail to understand assumptions and operating conditions. The EM&V team found that while the custom calculation methods were technically sufficient, the documentation of operating conditions and other assumptions in the equation was limited.	Several new implementers responsible for custom calculation are implementing programs and projects in Texas. Utility guidance for documentation and upfront engagement of the EM&V team in technical assistance has helped improve the condition quickly; it is still *in progress* because it is not yet standard practice.	 In progress
M&V projects	The COVID-19 pandemic created a long period of adjusted operating conditions for many businesses. A simplified way to account for the operating condition variability was needed.	Utilities worked with the EM&V team to adjust savings calculated from metered pre-installation and post-installation energy consumption for pandemic-related operating changes.	 Complete
	M&V analysis could enhance the accuracy of energy savings calculations. The EM&V team found that a range of assumptions and modeling could be improved.	Volume 4 of the PY2022 TRM was updated to increase the consistency of the calculation process and the accuracy of savings for M&V claimed savings.	 Complete
RCx programs	The interactive effects of RCx activities are not always considered when calculating savings. RCx projects include multiple energy-saving adjustments to control HVAC and other systems within a facility.	Interactive effects adjustments were included in RCx savings calculations if a whole facility M&V was not completed. This is *in progress* as improvement is still needed, then for this to become standard practice.	 In progress
	Equipment that is turned off with a switch that can be inadvertently turned on in the future is not acceptable for post-installation energy efficiency savings, which applies to any project that is claiming energy savings from the non-operation of existing equipment.	The PY2022 TRM 9.0 Volume 3 and 4 were updated to clarify that existing equipment must be demolished, removed, disconnected, or included in the control infrastructure to claim energy efficiency savings for non-operation.	 Complete

Category	Recommendation	Implementation	Status
Lighting projects	*LED lighting* certification does not include all the installation options. The manufacture of *LED lighting* is continuing to become more flexible and customizable; some lighting can be cut to custom lengths during installation.	The PY2022 TRM was updated to provide guidance on energy savings calculations for qualified *LED* products to allow for custom lengths.	 Complete
	The lighting savings calculations had a significant number of wattage adjustments for installed lighting equipment.	This is marked as *complete* as the use of third-party verified wattages for installed equipment and half-watt increment rounding improved. As adjustments still occur, QA/QC should continue.	 Complete
Consumption analysis	The first year of the consumption analysis had limited conclusive findings due to several factors, one of which was the pandemic changed operating profiles and limited the business types that could be included.	The PY2021 EM&V scope included additional consumption analysis that concluded the TRM commercial algorithms are estimating savings accurately.	 Complete

Residential recommendations are categorized by deemed savings, HTR/LI programs process assessment, and smart thermostats (Table 4). Eight of the nine recommendations are noted as c*omplete* through TRM updates and the collaborative re-design of the LI qualification process. The one recommendation still *in progress* is the process to verify self-reported income when used since the majority of participants are now qualifying through other channels.

Table 4. Residential Program Recommendations for PY2022 Implementation

Category	Recommendation	Implementation	Status
Residential deemed savings	The *envelope* measures include an allowance for customers participating in HTR/LI programs to claim reduced cooling savings for homes cooled by room air conditioner(s) by applying an adjustment to deemed savings.	The PY2022 TRM incorporated guidance to clarify how to apply the adjustment factors.	 Complete
HTR/LI programs process assessment	Expanding the list of other qualifying LI programs and services that qualify for the energy efficiency HTR/LI programs could provide more opportunities for streamlined participation.	The PY2022 TRM HTR/LI program eligibility forms included an expanded list of qualifying programs and services.	 Complete

Category	Recommendation	Implementation	Status
	Only individually-metered multifamily units have been eligible since master-metered units are in a commercial rate class.	The individual meter requirement was removed from the PY2022 TRM HTR/LI program eligibility forms.	Complete
	Geographic location information such as Housing and Urban Development (HUD) LI-qualified census tracts could provide streamlined participation and improve outreach to HTR/LI customers.	The PY2022 TRM HTR/LI program eligibility forms included a geographic location qualifier category.	Complete
	Many community action agencies and social services organizations throughout Texas are already experienced in qualifying LI households for programs and services.	A section for a community action agency or social service organization was included to verify program eligibility in the PY2022 TRM HTR/LI program eligibility forms.	Complete
	Without verification of self-reported income for those who chose to qualify for the program through this option, there is the potential for program services to go to non-LI customers.	Processes to verify income eligibility prior to participation for customers who use self-reported income are still *in progress*, as the above recommendations have made this less needed.	In progress
Smart thermostats	The review of store invoices, aggregate customer data, quantity purchased, and model numbers found sufficient program documentation.	Continue internal processes as they are working well in producing verifiable results and correct input parameters.	Complete
	The EM&V team has provided guidance on calculating and allocating savings at the sector level for upstream lighting to account for the cross-over between small commercial and residential applications.	The TRM Working Group discussed ways of expanding the sector allocation guidance to all measures sold through upstream and midstream programs where the installation location is unknown.	Complete
	The upstream/midstream delivery model used for *smart thermostats* is highly cost-effective. The EM&V team calculated results for these programs between 6.2 and 12.1 ratios for the residential sector and higher for the commercial sector.	Utilities continued to explore additional measure offerings for upstream and midstream programs, with this type of program seeing the most growth, comprising one-third of PY2022 total savings.	Complete

For load management programs, the PY2020 EM&V had two minor recommendations for calculating impacts and clarifying program eligibility, which were addressed through TRM updates. Two process recommendations remain in progress regarding the role of load management in portfolios as well as low awareness of residential programs (see Table 5).

Table 5. Load Management Program Recommendations for PY2022 Implementation

Category	Recommendation	Implementation	Status
Overall	Load management programs have grown in recent years. Explore both the role of load management in energy efficiency opportunities and opportunities to increase the value of the peak load relief available through the programs year-round in future rulemaking.	The 2023 Stakeholder Working Groups discussed ways to increase the value of load management and if the percentage of kilowatts from load management in energy efficiency portfolios should be limited. These issues were identified to discuss in a future rulemaking.	 In progress
Commercial	The annual test event is important to gauge program processes and available load relief. Of the 807 participants enrolled in the PY2020 programs, only 711 were able to curtail. Many customers were not able to participate because of the pandemic, including some customers who needed to operate at full capacity (e.g., hospitals).	The PY2022 TRM updated participant eligibility requirements to non-critical load customers; some utilities are using the results of the annual test event to modify program-contract estimates of available demand reduction.	 Complete
Residential	For the *deemed savings* method, there was some confusion on how to claim savings for *smart thermostat* devices sold through an online marketplace and enrolled in the Residential Load Management program.	The PY2022 TRM updated guidance on claiming load management savings for *smart thermostat* devices delivered through another program.	 Complete
	While not specific to the utility programs, recent news articles have called into question residential customers' awareness of participating in a load management program.	The PY2022 Participant Survey found low awareness of load management programs. Utilities should continue to consider the benefits of increased customer understanding of program participation during the annual participation renewal process.	 In progress

Portfolio and cross-sector recommendations included program tracking, meter data, project documentation, photovoltaic (PV), and pandemic recommendations at the portfolio level. For program tracking and project documentation, all recommendations are noted as *complete* due to process improvements put in place. PV was noted as *complete* due to utility program improvement. Pandemic considerations are *complete* as utilities adopted best practices and achieved goals.

Table 6. Portfolio and Cross-Sector Recommendations for PY2022 Implementation

Category	Recommendation	Implementation	Status
Program tracking	The EM&V team recommended utilities should clearly associate tracking data and records with subprograms; they are also to report savings and budgets for distinct subprograms.	A data request for this level of reporting in PY2022 improved the ability to correctly verify and roll up subprogram savings. The EM&V team will need this level of information each program year.	 Complete
	The EM&V team found several fields across multiple utility programs that were not provided to support TRM savings calculations for several measures.	The inclusion of all key parameters for calculating savings as specified in the *Program Tracking Data and Evaluation Requirements* Sections for each measure in the TRM improved from the PY2020 EM&V to the PY2022 EM&V.	 Complete
Meter data	AMI meter data transfers can be more complicated than program tracking data transfers.	Including a Meter Data Specialist has been important in fulfilling meter data requests. While noted as *complete* due to improvement, the PY2023 EM&V includes a full residential consumption analysis, which will necessitate a large number of records.	 Complete
	Twenty-four months of meter consumption data limited the scope and applicability of the commercial consumption analysis.	While only 24 months of metered data are required to be kept, some utilities have expanded the time periods of metered data beyond 24 months, facilitating less frequent requests. The EM&V team can also schedule meter data requests for those with only 24 months.	 Complete
Project documentation	Programs use application programming interfaces (API) to access external calculators and databases. The streamlined process does not create standard documentation because it eliminates the intermediate step of downloading information to be entered into the tracking database.	The *solar PV* TRM entries were updated to allow API access to PV wattages to determine calculated energy production values and provide sufficient documentation for quality assurance.	 Complete

Category	Recommendation	Implementation	Status
Solar PV	Post-installation inspection results were not consistently used to update claimed energy savings. This finding was identified in the last evaluation of the solar PV programs in the PY2017 evaluation.	Processes were implemented to ensure that claimed savings represent the system installed.	Complete
COVID-19 considerations[11]	A number of strategies and best practices were recommended based on the process evaluation of utilities' response to the COVID-19 pandemic.	Utilities employed recommended strategies and best practices such as a hybrid of remote/on-site QA/QC, follow-ups with customers regarding health and safety satisfaction, and using a variety of delivery channels.	Complete

1.4.1.2 PY2022 Recommendations

Next, the EM&V team provides the PY2022 recommendations for the commercial, residential, and load management programs at the statewide level as well as portfolio-level considerations. Action plans to respond to the EM&V recommendations are also presented. Unless otherwise noted, action plans refer to utilities; however, some action items are for the EM&V team, the TRM Working Group, or a combination thereof.

1.4.1.2.1 Commercial Programs

PY2022 saw increased EM&V savings adjustments compared to prior program years. The adjustments were extensive in some cases. Therefore, a number of the recommendations call for improved training and QA/AC reviews to address commonly found discrepancies. A literature review and program tracking data analysis found that wastewater treatment plants (WWTP) and potable water treatment (PWTP) are fairly untapped segments with comprehensive energy efficiency project opportunities. Commercial recommendations are categorized by:

- lighting (4),
- HVAC equipment and tune-ups (5),
- M&V and custom (4),
- food services and refrigeration (2),
- PV (2 also applies to the residential sector)
- project documentation (1, also applies to the residential sector), and
- segment opportunities (1).

[11] The PY2020 EM&V had three specific COVID-19 recommendations, which were collapsed for reporting, given that they were all implemented.

Table 7. Commercial Program Recommendations and Action Plans

Category	Key finding and recommendation	Action plan
Lighting	While wattage adjustments have improved, inconsistencies in assumptions, participant conditions, or equipment have increased, especially for *air conditioning type*, *refrigeration type*, *non-qualified lighting*, *lighting controls*, *LED categorization* (tube vs. fixture), and incorporation of post-installation verification results. Training and increased QA/QC of these commonly adjusted factors is recommended.	Increase training and conduct detailed reviews of the line-item assumptions and specifications that led to adjustments; put processes in place to incorporate post-installation verification results in tracking data.
	Data entry errors were common in savings calculations for equipment that remained in place and equipment that was removed and not replaced (de-lamping). Entering the post-retrofit inventory with a one-watt LED fixture with a quantity of zero will typically match a de-lamping condition. Entering the post-retrofit inventory with a matching fixture and quantity to the pre-retrofit inventory will typically match a fixture left in place.	Provide additional training and QA/QC on the calculations to confirm expected energy savings from lighting remaining in place and lighting removed and not replaced.
	As in PY2021, new construction projects continued to have unpredictable timelines. The energy-efficient calculations did not consistently match construction timelines. Most commonly, new construction projects were constructed in phases, and the calculations assumed the entire project was completed.	Verify new construction project timelines between the actual constructed components and the submitted calculations and documentation.
	New construction projects require the participant to determine the baseline code compliance based upon a scale from *undeveloped* to *downtown area*. The PY2023 TRM was adjusted to reduce the uncertainty for that component, but the definition of the exterior areas is limited in many submittals, with many calculations generalized to one type of exterior area. The new construction calculation requires an accurate accounting of the lighted area and all exterior lighting fixtures to determine savings accurately.	Within lighting savings calculators, complete detailed accounting of exterior lighting area types, excluding non-lighted areas, and all fixtures installed for new construction projects.
HVAC	The HVAC calculation efficiency and capacity did not consistently match Air-Conditioning, Heating, and Refrigeration Institute (AHRI) documentation.	Confirm calculations match the AHRI documented certificate or documented performance at AHRI conditions for the calculation.
	Single-packaged vertical air conditioners or *heat pumps* (*SPVAC* or *SPVHP*) are not included in the TRM.	The TRM Working Group will incorporate *SPVAC* and *SPVHP* into the PY2024 TRM.

Category	Key finding and recommendation	Action plan
HVAC tune-ups	The individual unit tune-up and participant tracking system differs from the utility project tracking system.	Require implementers to provide participant-level information.
	The predominant building type is not consistently identified at the building level for the HVAC units tuned up. Over one-third of the evaluated building types required an adjustment.	Increase QA/QC on the building type to verify it matches the building served by the unit serviced.
	Unit capacity in not consistently captured. Approximately one-third of the evaluated projects required a capacity adjustment to match the nominal capacity of at least some of the units in the project.	Increase QA/QC of the unit capacity.
M&V and custom savings	M&V plans and custom calculations consistently document calculation processes but have more limited documentation of assumptions.	The PY2024 TRM will provide example documentation for calculation processes, assumptions, and operating characteristics for M&V and custom calculations.
	While the use of the peak demand probability factor (PDPF) *top 20 hours* method for custom savings calculations improved, the PDPF factors were not consistently used for weighting the identified peak demand reductions. In addition, many projects attempted to identify the weekdays in the PDPF dates matching the normalized year. The selection of the weekdays is not possible for a normalized analysis.	Increase QA/QC of M&V and custom-calculated peak demand calculations to check that the PDPF factors are used in averaging the peak demand reduction and that weekday determination matches an actual year.
	Custom calculations did not consistently isolate prescriptive deemed savings projects included in the TRM.	The TRM Working Group will update the PY2024 TRM on how to claim deemed TRM measures within custom projects.
	On-site power generation through combined heat and power plants, solar PV arrays, or other on-site systems is becoming more common. The on-site generation impacts the amount of energy reduced from the electrical grid for an energy efficiency project.	The TRM Working Group will discuss guidance to include in the PY2024 TRM for claimed savings when on-site generation is present.

Category	Key finding and recommendation	Action plan
Food services and refrigeration	Residential-rated food services and refrigeration appliances used in commercial facilities are addressed inconsistently in the TRM.	The TRM Working Group will adjust the PY2024 TRM to allow residential-type food service and refrigeration equipment to use the requirements and savings from Volume 2 of the TRM when installed in master-metered multifamily locations.
	Some commercial food service equipment uses the hot water supply in a building along with supporting energy input sources. The energy savings is determined based on the displaced hot water supply, and it is required to know the type of water heating.	Document the building-level hot water supply for commercial food service equipment measures.
Project documentation (applies to residential also)	ENERGY STAR® qualification does not document delisted equipment, although the Department of Energy (DOE) regularly updates the listing with new products and the delisting of old products.	Document equipment third-party certification requirements at the time of submittal or by downloading ENERGY STAR or equivalent qualified products list (QPL) at the beginning of the program year.
Segment opportunities	Significant projects for *WWTPs* and *PWTPs* are not being completed through the programs statewide. To date, programs have appeared to deliver *lighting retrofit* and *HVAC tune-ups* to these facilities, but the majority of the energy consumption is related to pumping and treating. The Texas TRM has several immediately applicable measures to support energy efficiency in this segment, such as *high-efficiency motors*, *VFD controls on air compressors*, and *behavioral* measures. The EM&V team has also identified a number of *custom* measures in this report.	Assess opportunities to deliver comprehensive energy efficiency improvements to *WWTPs* and *PWTPs*. A facility energy assessment is a good first step to identifying a range of needs at these facility types.
PV (applies to residential also)	Projects contain multiple solar PV arrays with individual azimuths and tilts.	Provide separate analysis for solar PV arrays with unique azimuth and tilt combinations.
	For several solar PV projects, the PVWatts[12] energy generation results were modeled using custom loss factors such as shading adjustment. However, documentation was not provided to verify the custom factors.	Provide documentation verifying custom inputs or revert to the default factors listed in the PVWatts software.

[12] PVWatts is the Department of Energy tool to calculate savings for solar PV.

1.4.1.2.2 Residential Programs

While most residential recommendations include TRM clarifications, electric resistance heating documentation for HVAC and envelope measures remains a persistent issue, as does air infiltration savings. Residential key findings and recommendations are summarized in Table 8 for the following categories:

- HVAC (2),
- in-service rates (1),
- program documentation (1),
- new homes (2),
- air infiltration measure (1), and
- HTR/LI programs (1).

Table 8. Residential Program Recommendations and Action Plans

Category	Key finding and recommendation	Action plan
HVAC	Rightsizing equipment refers to properly sizing equipment capacity to optimize energy efficiency and customer comfort. The PY2022 TRM allows for upsizing and downsizing if requirements are met. The TRM describes how to claim savings for these rightsizing scenarios but does not clearly define when these requirements are applied.	The TRM Working Group will update the PY2024 TRM with guidance on the rightsizing threshold and required documentation.
	There are different rounding practices for the *HVAC* measures, such as simple midpoint, industry, and other rounding.	The TRM Working Group will update the PY2024 TRM with rounding guidance.
In-service rates	In some cases, the EM&V site visit staff observed measures, such as *air purifiers*, that either had not been installed by contractors or were uninstalled by the resident.	The TRM Working Group will discuss in-service rates for applicable measures and different program delivery types for the PY2024 TRM.
Program documentation	The identification of electric resistance heating in residential retrofits has improved, but cases continue where the electric resistance heating documentation is limited. The EM&V site visits confirmed the heating type as a *heat pump* for a few projects where the heating type was tracked as *electric resistance* with missing documentation. This documentation issue was also found in desk reviews where backup documentation showed *heat pumps*, but the tracking system savings used *electric resistance*.	The TRM Working Group will determine an adjustment factor to be added to the PY2024 TRM for *envelope* and *HVAC* projects claiming *electric resistance* but without supporting documentation. The EM&V team proposes a 0.75 adjustment factor.

Category	Key finding and recommendation	Action plan
New homes	Documentation was incomplete or not readily available for all components of the projects. Some projects claimed deemed savings for additional prescriptive measures along with the modeled new home savings. However, documentation and tracking data for these measures were inconsistent with the TRM requirements.	Work with implementation contractors to ensure all measures are tracked individually and documentation for *prescriptive* measures follows the TRM.
	Baseline conditions for the building system (e.g., envelope materials, fenestration characteristics) are set according to relevant codes and standards. However, the TRM allows for using baseline studies that demonstrate standard practice different from the statewide energy code.	The TRM Working Group will discuss relevant timelines to update baseline studies and incorporate guidance.
Air infiltration	A consumption analysis of *air infiltration* projects did not find meaningful savings for this measure as the savings continue to be normally distributed around zero, as found in the PY2019 EM&V. Only two utilities had sufficient projects to be included in the consumption analysis. Their project-level results were provided to investigate individual projects that are over- and under-performing.	Continue to assess how to improve the quality of *air infiltration* implementation to produce meaningful savings.
HTR/LI programs process assessment	Self-reported income to qualify for the programs was common prior to the LI eligibility redesign. However, non-verified self-reported income has the potential for program services to go to non-LI customers. Utilities were to pilot processes to verify income eligibility for customers who use self-reported income in PY2022. This process can vary by utility, program, and customer type (single-family/multifamily).	Given the expanded use of multiple pathways to verify customer eligibility, self-reported income has not been widely used. Therefore, continue to implement and assess processes to verify income.

1.4.1.2.3 Load Management Programs

Key findings and recommendations are presented in Table 9 for load management by commercial and then residential programs. While calculating impacts are well-established, PY2022 saw a decrease in the curtailment event cooperation rate with commercial customers. Developing a statewide demand response deemed value may also streamline participation with residential customers. In addition, participant surveys identified opportunities for program improvement. Residential participants had low program awareness. Increasing energy efficiency education and program communications coupled with cross-marketing other energy efficiency programs could increase participant satisfaction. Commercial participants could benefit from curtailment event follow-up to understand performance and also provide additional information about incentive calculations.

Table 9. Load Management Program Recommendations and Action Plans

Category	Key finding and recommendation	Action plan
Commercial	Participants increased (1,348 in PY2022 compared to 825 in PY2021) while the average level of cooperation with curtailment events has decreased (81 percent in PY2022 compared to 90 percent in PY2021). Certain businesses account for the majority of the decrease in cooperation.	Follow up with participants who underperform during curtailment events to understand causes and if future program participation or contract estimates of available demand reduction need to be revised. Include an indicator for participants with no savings due to a meter or other technical issue as opposed to a performance issue.
	The utilities applied the *high 5 of 10* method correctly, with one minor discrepancy. When selecting baseline days, there was a tie between two days. The EM&V adjusted the savings calculation to use the five highest loads closest to the event,	The EM&V team will update the TRM to better clarify guidance when there is a tie between the days used to calculate the baseline.
	There is considerable stakeholder interest in the utilities' load management programs. Utilities should provide online access to program manuals and update these manuals annually to foster a clear understanding of the program operations.	Update program manuals annually and have them available on program websites.
	Both program awareness and satisfaction are high among participants. Some participants would like to understand more about incentive calculations, when and why events are called, and other program options, such as a winter program.	Continue communications resulting in high awareness and satisfaction while assessing the benefits of additional information, especially following curtailment events or as part of re-enrollment.
	Additional program designs appear feasible. Interest in winter load management and/or a geographically focused program is high, with average rankings over 4 on a 5-point scale. There is less interest in a 24/7 program (average ranking of 3). Most participants report curtailing 50 percent or less of their total load, 68 percent report reductions are at least partially automated, and 79 percent reported no loss in comfort or productivity during curtailments.	Continue to assess the role of commercial load management programs as part of the utility's overall energy efficiency portfolio and within the context of grid and system reliability. If applicable, discuss program changes with PUCT staff, the EM&V team, and ERCOT. Update memorandums of understanding (MOU) with ERCOT as needed to reflect new programs or program design and delivery changes.

Category	Key finding and recommendation	Action plan
Commercial and residential	Program tracking data tended to lack complete participation information when assembled by a third party, making it difficult to complete participant surveys to collect program feedback.	Work with third parties to improve participant tracking data so that program feedback and satisfaction can be collected periodically from participants.
Residential	Due to budget and participation limits in utilities' PY2022 plans compared to prior years, savings and participants slightly decreased. However, the potential for growth, if needed, is available. About two-thirds of the surveyed participants who recall participating indicated they plan to continue to participate, and over one-half would participate if the program was expanded to winter or year-round.	Continue to explore cost-effective ways to increase participation and savings for the residential load management programs within the context of grid and system reliability. Options to expand include less-served segments, such as multifamily; additional devices beyond smart thermostats, such as water heaters; and expanded control seasons.
	While a deemed savings method using runtime data and a deemed value instead of interval meter data can streamline participation, it is still critical to identify participating thermostats. Given the amount of program data available for the ERCOT utilities, an additional deemed value could be developed, employing the same participation documentation requirements established for the non-ERCOT utility.	Explore the development of a statewide residential demand response value given the substantial ERCOT utilities' data available and the deemed value experience for a non-ERCOT utility. If a deemed value is added to the TRM, participant documentation and a clear definition of each data field should also be outlined.
	Participants' program awareness and understanding is low. Many survey respondents were uncertain how they heard about the program or were not aware that they were even participating. Of those who remember events were called, about 85 percent did not know the actual number of events that occurred in summer 2022.	Assess communication with participants and the benefits of additional education through multiple channels (text, email, phone calls, mailers) outside of called events. Communication could enhance program awareness, participation, and overall program satisfaction, especially during re-enrollment.
	The primary motivation for program participation was supporting the grid and/or doing the right thing. Participants with the lowest satisfaction reported the program was marketed as saving energy and money, but they did not see those results. While one-quarter of participants rated their home as the highest efficiency, of the other three-quarters of respondents, 60 percent were interested in other energy efficiency programs.	Consider marketing messages of supporting the grid and upfront details on expected incentives coupled with additional education on energy efficiency tips to save money and referrals to other programs to support a more positive customer experience and long-term participation.

1.4.1.2.4 Portfolio-Level

The PUCT has been actively engaging a broad range of stakeholders for their input on ways energy efficiency can best benefit Texans. In its oversight role, the PUCT supports continuous improvement of the IOU programs through the EM&V process and feedback from the statewide collaborative group, the EEIP. The energy efficiency rule, 16 TAC § 25.181(q), outlines the role of EEIP, including developing best practices. PUCT staff launched an EEIP stakeholder input process resulting in working groups that identified priority issues and developed desired best practices (see Section 3).

In addition, the ACEEE identified ten strategies for the Texas market in a recent paper[13]. The EM&V team conducted a portfolio trend analysis to characterize IOU programs in relation to these ten strategies. Overall, the identified strategies are all in progress. While *heat pumps*, *attic insulation*, and *smart thermostats* have become well-established, in contrast, *HPWHs* have seen slow market adoption due to a number of identified barriers. A PY2023 TRM change to support midstream delivery of this measure and bundling the utility incentive with the federal tax credit are opportunities to gain traction. While all utilities serve LI customers, a recent re-design of the eligibility process has expanded reach coupled with specific utility outreach efforts to community organizations. Coordination with other funding sources, such as the federal tax credits and future state energy programs funded through the Inflation Reduction Act (IRA), are additional opportunities to comprehensively serve this customer segment even more. Commercial offerings also include ACEEE strategies, such as expanded programs to small business and industrial customers, supporting monitoring-based commissioning, and assessing the potential for commercial fleet electric-vehicle-managed charging. A solid demand response infrastructure is in place; programs and technologies could quickly be expanded if needed.

Portfolio key findings and recommendations are summarized in Table 10 below, summarizing the portfolio trend analysis related to ACEEE strategies.

Table 10. Portfolio-Level Recommendations and Action Plans

Category	Key finding and recommendation	Action plan
Portfolio trend analysis in relation to ACEEE strategies (**bolded**).	**Replace electric furnaces with heat pumps**. *Heat pump* projects have doubled over the last five years. All eight utilities incentivize *central* or *mini-split heat pumps*. The most common existing heating equipment replaced is an *electric resistance furnace*. The programs collectively saved 22 MW and 40,849 MWh in PY2022, the most to date. The TRM allows for conditions above the standard replacement savings, such as early retirement and right-sizing, designed to increase participation and savings potential within programs.	Continue to collaborate to increase *heat pump* opportunities, including the ongoing work on *variable-speed heat pumps*.

[13] Energy Efficiency and Demand-Response: Tools To Address Texas' Reliability Challenges: Summary, Steve Nadel, Jennifer Amann, and Hellen Chen, ACEEE, May 2023.

Category	Key finding and recommendation	Action plan
	Attic insulation and sealing. *Attic insulation* and *air sealing* are high-saving weatherization measures—49 percent and 35 percent of demand and energy savings, respectively—for LI customers in PY2022. Due to TRM changes and new barriers, savings have decreased by about 50 percent since PY2020. *Insulation* has seen rising costs of materials and supply chain shortages. Diagnostic testing and contractor training barriers persist. Specific to *air sealing*, two recent EM&V analyses have shown insignificant savings for this measure. Therefore, effective implementation strategies to improve *air sealing* savings are needed to deliver tangible savings.	Continue to assess quality implementation strategies to improve *air sealing* savings. The TRM Working Group should discuss the strategy of a combined *attic insulation/air sealing* measure after the PY2023 consumption analysis.
	Heat pump water heaters. Although utilities offer incentives for *HPWHs*, adoption has been slow. In PY2022, 71 *HPWHs* were installed, saving 34 kW and 127,336 kWh annually. Identified barriers include limited consumer and contractor knowledge and upfront costs. The PY2023 TRM added a midstream delivery option to help provide another pathway.	Packaging the *HPWH* federal tax credit with utility incentives can help address upfront cost barriers. Explore the midstream delivery option now available.
	Smart thermostat incentive program (both as an efficiency and demand response opportunity). All utilities offer *residential smart thermostats*, and delivery channels include upstream, midstream, online marketplaces, and direct installations. Customers can receive an incentive for energy savings as well as demand response. *Smart thermostats* quickly gained traction during the first years of implementation. While growth slowed between PY2021 and PY2022, small business is an additional segment with considerable potential for *smart thermostats*. *Commercial smart thermostat* deemed savings were added to the TRM for PY2023.	Continue to explore avenues to synergize *smart thermostats* for energy efficiency and as a demand response tool. Add *smart thermostats* to small business offerings.
	Low-income homeowners and renters, including low-cost kits distributed by community groups and more comprehensive whole-home retrofit programs for single-family homes and multifamily apartments. All utilities serve LI customers, working to better reach customers through a variety of program design and delivery methods, including conducting outreach to underserved segments such as multifamily and rural areas; increasing *HVAC* measures implementation in addition to traditional *weatherization* measures; expanding partnerships with community organizations; and redesigning the qualification process.	Continue community partnerships, and coordinate with other funding sources, such as federal tax credits and future state energy office programs, to expand reach to customers and comprehensiveness of measures provided.

Category	Key finding and recommendation	Action plan
	Small business and industrial. Utilities provide small commercial and industrial businesses enhanced administrative, technical, and incentive support through dedicated small business programs (six utilities) or within other commercial programs (two utilities). Midstream programs also provide accessibility to incentives through their normal purchasing at a commercial distributor. Upstream programs are assumed to also support small businesses. Outside of the dedicated small business programs, a participant type indicator for small businesses is not tracked, so the EM&V team cannot determine the complete historical participation.	Continue expanding the comprehensiveness of small business offerings, including demand response opportunities through the new *commercial smart thermostat* deemed value. Consider tracking small business participation across all programs as a metric of interest.
	Monitoring-based commissioning (MBCx), a process that maintains and continuously improves building performance over time, is delivered through utility programs in various ways. MBCx often follows up on RCx services to tune the building to operate more efficiently and identify and fix individual equipment that may have failed. Two utilities have dedicated RCx programs; two other utilities have energy management programs. These four programs offer variations on MBCx through technical support to develop a plan to alter operations, controls, and behaviors to create sustainable annual energy savings. Outside the four dedicated programs, other utilities have offered similar assistance through custom projects.	Consult the EM&V team as needed to adjust program design to support claiming energy for MBCx and other similar efforts.
	Central air conditioner with smart thermostat control for demand response. Three of the eight Texas utilities offer residential demand response programs utilizing *smart thermostats*. The infrastructure is in place to quickly ramp up if needed. A statewide residential demand response deemed value is also being considered.	Continue to assess the role of demand response in utility energy efficiency portfolios within the broader grid and system reliability context.
	Water heater for demand response. Expanding the residential demand response programs to include other measures, including *water heaters*, can be supported by the existing M&V approach outlined in the TRM.	
	Electric vehicles (EV) managed charging. While EV chargers are included in the TRM, in PY2022, only one utility installed 19 residential EV chargers, saving a total of 469 kWh annually. Utilities report that the high first cost of the measure is hard to offset with financial incentives due to lower savings. Another utility is implementing a managed EV charging study in 2023 to determine the viability of a peak demand or energy consumption reduction strategy through commercial fleet EV charging.	The EM&V team will continue to work closely with the utility conducting the commercial fleet study as an initial step to integrate additional managed charging opportunities into the energy efficiency portfolios.

2.0 INTRODUCTION

This Statewide Energy Efficiency Report presents the program year (PY) 2022 (PY2022) evaluation, measurement, and verification (EM&V) findings and recommendations, looking across all eight electric utilities' portfolios. The report addresses gross and net energy and demand impacts, program cost-effectiveness, and performance feedback. It includes findings and recommendations to inform updates to the PY2024 Technical Reference Manual (TRM) and PY2024 program design and delivery.

First, we overview the EM&V methodology. Section 3 discusses portfolio-level results related to portfolio trends, the stakeholder input process, program tracking, and program documentation. Sections 4 through 6 present the commercial, residential, and load management program results. A separate volume (Volume 2) of this report details PY2022 impact results for each utility's portfolio.

2.1 EVALUATION, MEASUREMENT, AND VERIFICATION METHODOLOGY

2.1.1 Overview

The EM&V methodology is based on the prioritization for the EM&V effort that includes both PY2022 and the four-year contract period. The EM&V team identified program types across utilities with similar program design, delivery, and target markets. We reviewed each program type and prioritized (*high*, *medium*, *low*) based on the following considerations:

- the magnitude of savings—the percentage of contribution to the portfolio of programs' impacts,
- level of relative uncertainty in estimated savings,
- stage of the program or programmatic component (e.g., pilot, early implementation, mature),
- importance to future portfolio performance and PUCT and Texas utilities' priorities,
- prior EM&V results, and
- known and anticipated changes in the markets in which the programs operate.

We conduct a streamlined EM&V effort that couples broad due diligence verification of savings for all programs with targeted in-depth activities. These activities include engineering desk reviews, on-site measurement and verification (M&V), interval meter data analysis, benchmarking research and interviews, and consumption analyses based on the prioritization of the programs.

We carefully developed PY2020–PY2023 EM&V scopes across the four-year contract period that prioritize EM&V activities where they provide the greatest value. To continue the significant progress that the PUCT staff, utilities, and EM&V team have made while working together to improve programs and the TRM, we implement targeted in-depth impact evaluations for particular programs and end-uses, as summarized in Table 11 through Table 14. We couple this with tracking system verification of claimed savings across all programs. This approach maximizes both the cost-effectiveness and the value of the proposed EM&V activities. We have prioritized evaluation efforts regarding the level of effort they may receive as *high*, *medium*, or *low* for utility programs each year.

Commercial. The commercial sector has the largest savings programs; commercial standard offer programs (CSOP) and the largest savers of the commercial market transformation programs (CMTP) are at least a *medium* priority across the four program years. These programs represent the largest percentage of statewide savings and plan to explore new customer segments and technologies. While prior EM&V generally found evaluated savings similar to the utilities' claimed savings, it also resulted in several recommendations for changes to reported claimed savings and recommendations. Therefore, a *medium* priority is justifiable across the four program years due to the savings contributions, the heterogeneity of projects and customer types, and the associated levels of uncertainty in savings. For PY2020 and PY2021, we placed a *high* priority on the largest commercial savers to conduct consumption analyses. The consumption analyses gauge the effectiveness of the TRM for *lighting* for key building types. The CSOPs and largest CMTPs were also a *high* priority in PY2021 to update the net-to-gross (NTG) information and collect key information identified in the PY2020 consumption analysis through participant surveys. Small business programs are designated a *medium* priority twice in the four years (PY2021 and PY2023). While these programs are not large contributors to statewide savings, small businesses are recognized as an important sector to serve. This sector traditionally faces more barriers to energy efficiency program participation than other commercial sectors, and utilities have been trying to expand the range of measures offered.

Residential. We have categorized the residential standard offer programs (RSOP), hard-to-reach (HTR), and low-income (LI) programs as *high* evaluation priorities in PY2021 and PY2023. These programs comprised a substantial percentage of overall statewide portfolio savings in the last five years and responded to TRM updates to the *heat pump* and *envelope* measures in PY2021. The programs were evaluated via desk reviews, on-sites, a targeted consumption analysis for PY2021, and a full consumption analysis in PY2023. We conduct RSOP participant surveys to update NTG information, collect key process information, and confirm measure installation in PY2021. The HTR and LI programs implemented new eligibility processes in PY2022; therefore, these programs were also a *high* priority in PY2022 to support this process improvement. Residential new construction programs were *medium* in PY2022, preparing for a *high* evaluation priority in PY2023; a new statewide baseline code is expected, and these programs will need to continue to push the market in future program years. Residential upstream and midstream programs have grown in utility portfolios and are given a *high* evaluation priority in PY2023 to update process and NTG information. In addition, high-impact measures (i.e., *air conditioners*, *heat pumps*) delivered through midstream programs may also be included in the PY2023 consumption analysis.

Upstream, Midstream, and Pilot MTPS. Upstream and midstream programs are a growing part of utility portfolios and are designated a *high* priority in 2023. The evaluation activities to be conducted include in-depth interviews, benchmarking research, possible consumption analyses, or desk reviews for high-impact measures depending on the level of participation in each of these MTP programs. In PY2022, the Strategic Energy Management pilot was a *medium* priority, but due to the complexity of this program and the size of projects, we have designated it as a *medium* priority again in PY2023. Any other pilot programs in their second or third year of implementation are designated a *medium* priority, and we will provide feedback about whether these pilots are viable options for full programs. All other MTP program types are *low* priorities for evaluation because they are small contributors to portfolio savings, have little uncertainty in savings, have homogenous projects, and have already been designated as a *medium* evaluation priority once in the four-year evaluation cycle.

Cross-Sector. Load management programs are designated a *medium* priority in most years due to their significant contribution to capacity (kilowatt) savings. In PY2022, the programs were designated a *high* priority to collect program performance information through participant surveys. In PY2023, AC tune-ups and photovoltaic (PV) programs are low priority since they were a *medium* priority in PY2022.

2.1.2 Prioritization Tables

The tables below summarize prioritization and EM&V level of effort by program type over the four-year EM&V contract period.

Table 11. Evaluation Prioritization Summary—Commercial Sector

	Program type			
	Commercial SOP	Commercial MTPs, excluding small business	Small business MTPs	Other MTPs, pilots
Percentage of PY2019 savings statewide (kilowatt/kilowatt-hour)	7 percent of statewide demand reductions and 27 percent of statewide energy savings	6 percent of statewide demand reductions and 23 percent of statewide energy savings	1 percent of statewide demand reductions and 3 percent of statewide energy savings	Medium/TBD
PY2020 evaluation priority and activity	High: desk reviews, telephone verification of measures, process and NTG participant survey (delayed due to winter storms), targeted consumption analyses		Low: tracking system review and verification	
PY2021 evaluation priority and activity	High: desk reviews and on-site M&V, targeted consumption analyses, and process and NTG participant surveys		Medium: desk reviews and on-site M&V	
PY2022 evaluation priority and activity	Medium: desk reviews and on-site M&V		Low: tracking system review and verification	
PY2023 evaluation priority and activity	Medium: desk reviews, on-site M&V, possible targeted consumption analyses		Medium: desk reviews and on-site M&V	

Table 12. Evaluation Prioritization Summary—Residential Sector

	Program type		
	Residential SOP	HTR/LI	New homes MTP
Percentage of PY2019 savings statewide (kilowatt/kilowatt-hour)	8 percent of statewide demand reductions and 10 percent of statewide energy savings	7 percent of statewide demand reductions and 8 percent of statewide energy savings	4 percent of statewide demand reductions and 6 percent of statewide energy savings
PY2020 evaluation priority and activity	Medium: telephone verification on measures, and process and NTG participant surveys (delayed due to winter storms)	Low: tracking system review	Low: tracking system review

	Program type		
	Residential SOP	**HTR/LI**	**New homes MTP**
PY2021 evaluation priority and activity	High: desk reviews and on-site M&V, targeted consumption analyses of updated measures, residential participant surveys, LI/HTR process improvement interviews		Low: tracking system review and verification
PY2022 evaluation priority and activity	Medium: desk reviews and on-site M&V	High: desk reviews and on-site M&V, LI/HTR process improvement interviews	Medium: desk reviews (statewide baseline code change being considered)
PY2023 evaluation priority and activity	High: consumption analyses[14] of updated measures		High: desk reviews, builder and rater interviews

Table 13. Evaluation Prioritization and Summary—Upstream, Midstream, Pilots, Other

	Program type	
	Upstream or midstream MTPs	**Other MTPs, pilots**
Percentage of PY2019 savings statewide (kilowatt/kilowatt-hour)	6 percent of statewide demand reductions and 16 percent of statewide energy savings	1 percent of statewide demand reductions and 1 percent of statewide energy savings
PY2020 evaluation priority and activity	Low: tracking system review	Low or medium/TBD
PY2021 evaluation priority and activity	Low: tracking system review	Low or medium/TBD
PY2022 evaluation priority and activity	Low: tracking system review	Low or medium/TBD
PY2023 evaluation priority and activity	High: in-depth interviews, benchmarking research, and possible consumption analyses, or desk reviews for high-impact measures	Low or medium/TBD – Oncor Strategic Energy Management pilot will continue as a *medium* priority

[14] The residential consumption analyses will include utilities with interval meter data given the importance of measuring kilowatt impacts. However, utilities that do not have interval meter data may be included in PY2023 if both the utility and PUCT staff determine there is sufficient value in doing so.

Table 14. Evaluation Prioritization and Summary—Load Management and Cross-Sector

	Program type		
	Load management programs (residential and nonresidential)	**AC tune-ups (residential and nonresidential)**	**Photovoltaic (PV)**
Percentage of PY2019 savings statewide (kilowatt/kilowatt-hour)	60 percent of statewide demand reductions and <1 percent of statewide energy savings	2 percent of statewide demand reductions and 3 percent of statewide energy savings	<1 percent of statewide demand reductions and 2 percent of statewide energy savings
PY2020 evaluation priority and activity	Medium: census interval meter-data analysis	Low: tracking system review and verification	Medium: review of M&V calculations
PY2021 evaluation priority and activity	Medium: census interval meter-data analysis	Low: tracking system review and verification	Low: tracking system review
PY2022 evaluation priority and activity	High: census interval meter-data analysis, aggregator interviews, and participant surveys (70 residential and 70 commercial)	Medium: census review of M&V data and desk reviews	Medium: review of M&V data and desk reviews (PV storage change)
PY2023 evaluation priority and activity	Medium: census interval meter-data analysis	Low: tracking system review and verification	Low: tracking system review

*Table 10 through Table 14 may not sum to 100 percent due to rounding.

2.1.3 PY2022 Activities

EM&V activities:

- confirm that the measures installed are consistent with those listed in the tracking system;
- verify that the claimed savings estimates in the tracking system are consistent with the savings calculated in the deemed calculation tools or tables in accordance with the PY2022 TRM 9.0 or M&V methods used to estimate project savings;
- review savings assumptions and, when available, utility M&V reports gathered through the supplemental data request for sampled projects and EM&V team on-site M&V;
- recommend updates to project-level claimed savings if EM&V results indicate a variation in savings of at least ±5 percent; and
- inform updates for the PY2024 TRM 11.0.

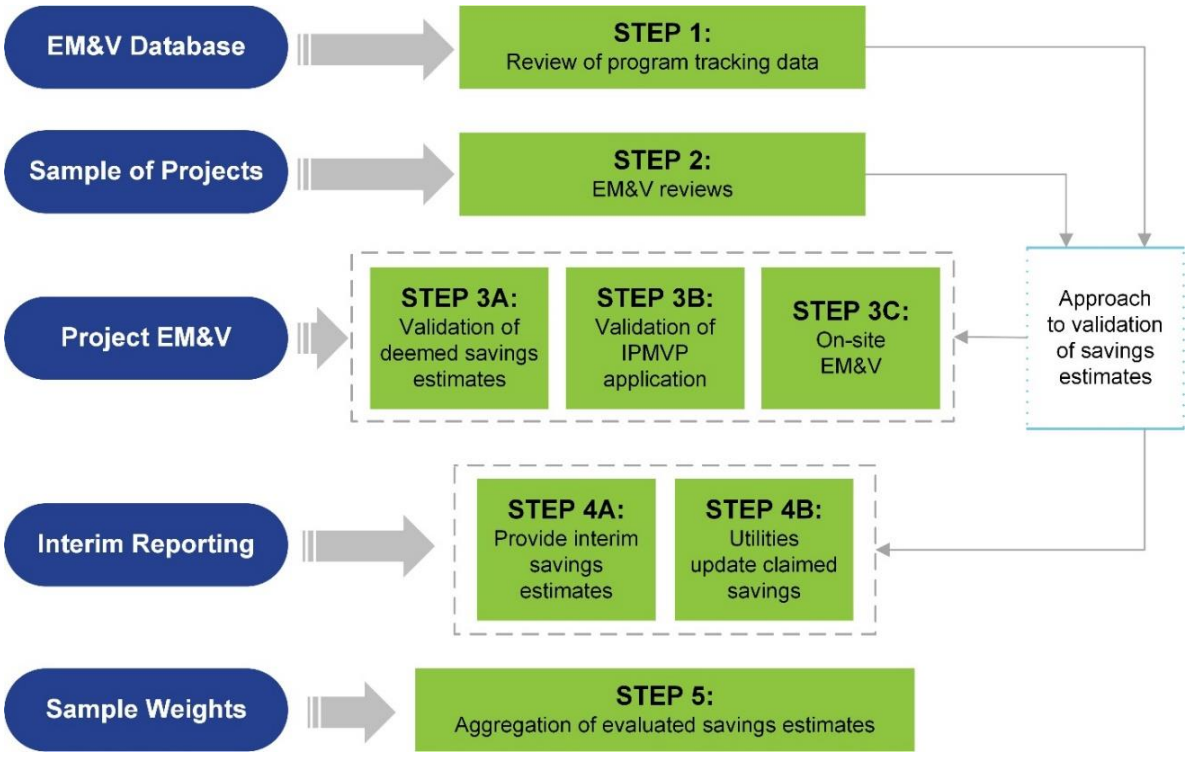
Table 15 shows the EM&V activities completed by program type and evaluation priority.

Table 15. PY2022 Evaluation, Measurement, and Verification Priorities and Activities

Program type	Evaluation priority	Claimed savings verification approach	Project desk reviews	On-sites	Participant surveys	Interval meter/ consumption data analysis
Commercial SOPs, commercial MTPs, and SCORE MTPs	Medium	Sampled (see desk reviews)	154	74	N/A	Completed on individual sampled projects
Commercial pilots and retro-commissioning (RCx)	Medium	Sampled (see desk reviews)	20	12	N/A	Completed on individual sampled projects
HVAC tune-ups	Medium	Sampled (see desk reviews)	13	6	N/A	N/A
Solar PV	Medium	Sampled (see desk reviews)	9	4	N/A	N/A
Commercial load management	Medium	Census	N/A	N/A	52	Census
Residential load management	Medium	Census	N/A	N/A	275	Census
Residential SOPs, HTR, LI	Medium	Sampled (see desk reviews)	139	57	N/A	Targeted consumption analyses for HTR/LI *air infiltration* measure
All other programs	Low	Census	N/A	N/A	N/A	N/A

Savings reported in Volume 1 are the utilities' claimed savings that have been verified by the EM&V team. Volume 2 also includes evaluated savings based on project-level realization rate calculations weighted to represent program-, sector-, and portfolio-level realization rates. These realization rates incorporate any adjustments for the incorrect application of deemed savings values and any equipment details determined through the tracking system reviews, desk reviews, and primary data collected by the EM&V team. For example, baseline assumptions for hours of use may be corrected through the evaluation review and thus affect the realization rates. A flow chart of the realization rate calculations is illustrated in Figure 14. Realization rates for utility portfolios and utility programs can be found in Volume 2 of this report. Because utilities voluntarily adjust claimed savings for most evaluated savings, in practice, realization rates sit at or very close to 100 percent across programs and portfolios.

Figure 14. Realization Rate Flowchart



A complementary component of the realization rate is the sufficiency of program documentation provided to estimate evaluated savings—this was used to determine an overall program documentation score for each program with a *medium* or *high* evaluation priority in a utility's portfolio.

The EM&V team conducted cost-effectiveness testing using the *program administrator cost test* for savings results. LI programs were calculated using the *savings-to-investment ratio*.

3.0 PORTFOLIO FINDINGS

This section presents portfolio trend analysis and the Energy Efficiency Implementation Project (EEIP) Stakeholder Working Groups' input process and results.

3.1 PORTFOLIO TRENDS

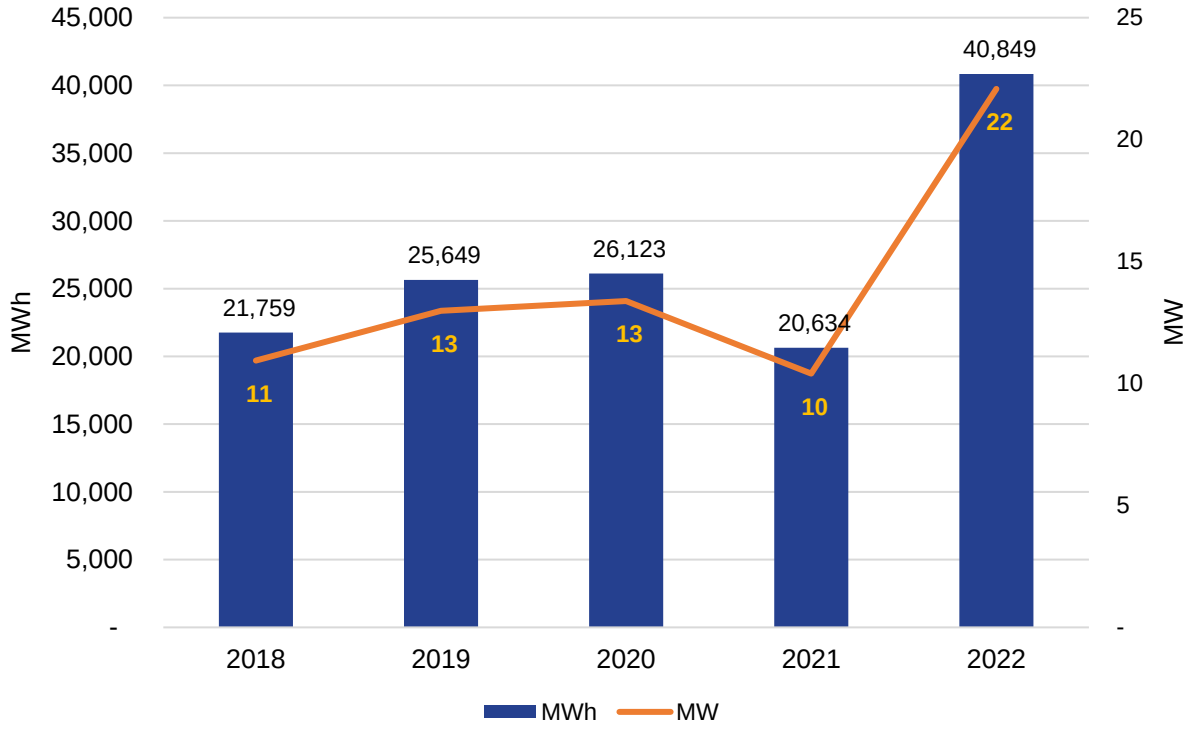
First, we overview the investor-owned utility's portfolio trends to provide insight into the progress and challenges in relation to the ten specific retrofit and demand response strategies identified by American Consortium for an Energy Efficient Economy (ACEEE) for the Texas market.

3.1.1 Replace Electric Furnaces with Heat Pumps

Key Finding: *Heat pump* continues to be a top savings measure in residential programs.

In program year (PY) 2022 (PY2022), all eight utilities installed *central* or *mini-split heat pumps* under residential retrofit programs where the most common existing heating equipment replaced is an *electric resistance furnace*. Program-incentivized *heat pumps* collectively saved 22 megawatts (MW) and 40,849 megawatt-hours (MWh) in PY2022. PY2022 saw a steep uptick in *heat pump* retrofit projects as utilities continued to target *HVAC* installations through new programs and delivery methods, such as HVAC distributor programs. The PY2022 Technical Reference Manual (TRM) allows for additional conditions above the standard replacement savings, such as early retirement and right-sizing, designed to increase participation and savings potential within programs.

Figure 15. Historical Heat Pump Project Savings

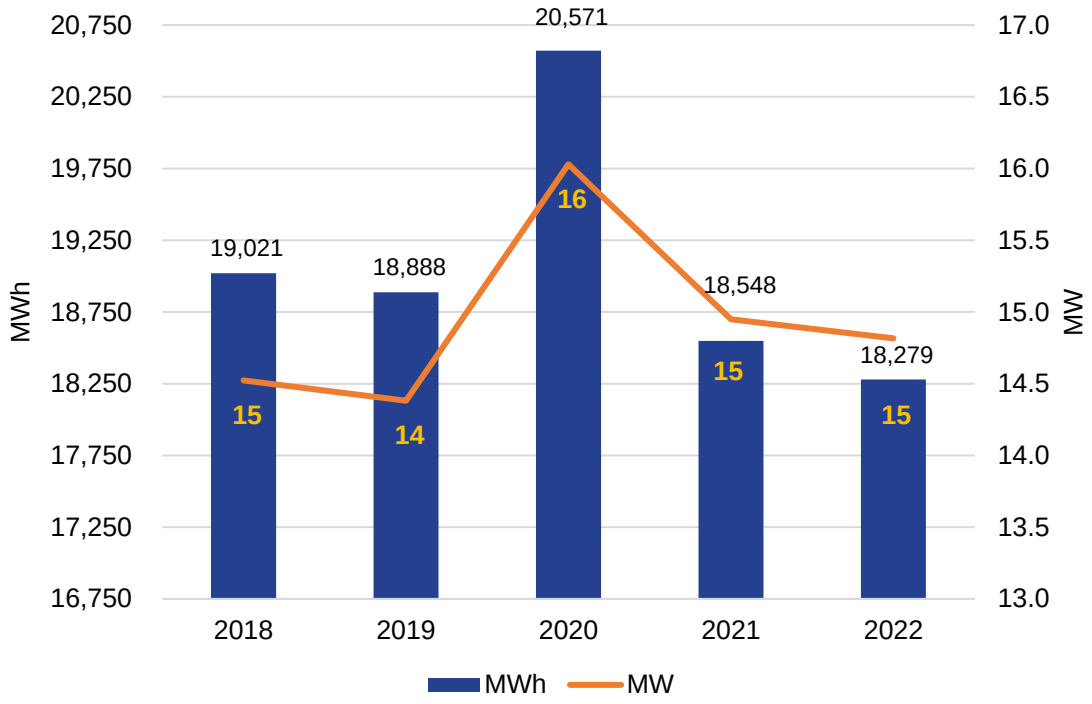


3.1.2 Attic Insulation and Sealing

Key Finding: *Attic insulation* and *air sealing* make up a substantial portion of the low-income (LI) and hard-to-reach (HTR) program savings.

Attic insulation and *air sealing* are high-saving weatherization measures that made up 49 percent and 35 percent of demand and energy savings, respectively, for the LI sector as served through either LI or HTR programs in PY2022. Savings declined after PY2020 primarily due to changes to the deemed savings in the TRM as a result of the findings from the evaluation, measurement, and verification (EM&V) consumption analysis. Figure 16 shows how the savings have changed due to TRM updates, the COVID-19 pandemic, and market barriers. Utilities reported additional market barriers to implementation for *ceiling insulation* and *air infiltration* in 2021 and 2022, detailed below.

Figure 16. Historical HTR/LI Air Infiltration and Ceiling Insulation Savings



For *insulation*, utilities have reported rising costs of materials and supply chain shortages as barriers they have had to work through. While national supply chain shortages have been improving, rising costs have been persistent. Utilities report additional barriers to diagnostic testing and contractor training for *attic insulation* and *air sealing*. Specific to *air sealing*, two recent EM&V analyses of interval meter data (one conducted in 2020 and a second in 2022) have shown savings for this measure at the meter are not significant. Savings have been normally distributed around zero. Therefore, effective implementation strategies to improve *air sealing* savings are needed. One specific IOU program strategy proposed is a combined *attic insulation/air sealing* measure.

A larger ongoing statewide discussion has been on how to best support the development of a skilled clean energy workforce. According to the US Bureau of Labor Statistics, nearly eight million skilled-labor jobs were lost from the labor force during the pandemic. About one-half have been filled, but about four million vacancies remained in industries responsible for most transportation, construction, and mechanical needs nationwide.[15] With the addition of the Inflation Reduction Act (IRA) rebates and tax credits, more people are expected to look for contractors, such as electricians, plumbers, HVAC technicians, home builders, etc., to complete energy-efficient home improvements in homes and businesses. Regional organizations, such as the South-Central Partnership for Energy Efficiency as a Resource (SPEER), are one type of organization that is working on clean energy workforce issues. Collaboration on this issue across the IOUs, the two large Texas municipal utilities (Austin Energy and CPS Energy), as well as other municipal and cooperative utilities, would be beneficial.

3.1.3 Heat Pump Water Heaters

Key Finding: Although some Texas utilities offer incentives for *heat pump water heaters (HPWH)*, widespread adoption has been slow.

In PY2022, 71 HPWH installations occurred, saving 34 kW and 127,336 kWh annually. Although major efficiency improvements have been incorporated into HPWHs over the last decade and have been available in the marketplace for over 40 years, they are still not widely used. In addition, the warmer Texas climate makes HPWHs a solid opportunity for homeowners to save energy. The Texas utilities identified the following barriers that will need to be overcome before the widespread adoption of HPWHs occurs:

Program Sponsor Education: When a water heater fails, and a contractor is called, it is common in the marketplace for customers to be sold a version of what they already have and know rather than the contractor educating the customer on a more efficient replacement option available to them, such as HPWHs. Often, if the unit needing to be replaced is old to begin with, the newer replacement unit will be more efficient and pose the least path of resistance for the customer involved and the contractor installing the unit. Replacement on failure often results in lost opportunities to educate customers on HPWHs and is likely impacting the overall adoption rate of this measure.

Consumer Education and Marketing: Many customers have never heard of an HPWH or even realized this option exists; this results in a repeat purchase of conventional water heaters even though there is an opportunity to adopt a more efficient option. Better education and marketing to consumers on the value of this equipment could help increase adoption rates. Tools could help consumers and project sponsors compare choices, performance, and operating costs. Education and marketing from multiple sources are likely to be the most effective, with manufacturers, project sponsors, and utilities providing consistent messaging on how installing HPWHs can improve their comfort and reduce energy bills. Ideally, this education would happen before project sponsors quote a replacement option that includes the installation of an HPWH.

Cost and Installation: HPWHs can cost three times more than traditional water heater options upfront; this poses a barrier for low- and moderate-income program participants. In addition, HPWHs may not be a cost-effective choice for homeowners replacing traditional water heaters with limited space for installation. HPWHs also require additional regular maintenance to continue to operate at maximum efficiency. HPWHs that are ENERGY STAR®-certified are

[15] Skilled labor workforce sees severe nationwide shortage | Fox Business

eligible for federal tax credits of up to $2,000[16] that could help offset this additional cost, especially when combined with the utility financial incentive.

Skilled Workforce Shortage: This barrier mentioned above applies particularly to the installation of HPWHs. Expanding the skilled workforce through training and education of contractors is critical to ensure proper installation and maintenance of the improved heat pump and HPWH technology.

For PY2023 TRM, the *HPWH* measure was updated to accommodate a midstream program delivery to help increase participation with the measure. Midstream program delivery can allow the utilities to work together to reach more distributors and have more of an impact on the market as well as provide a streamlined path to customers' homes.

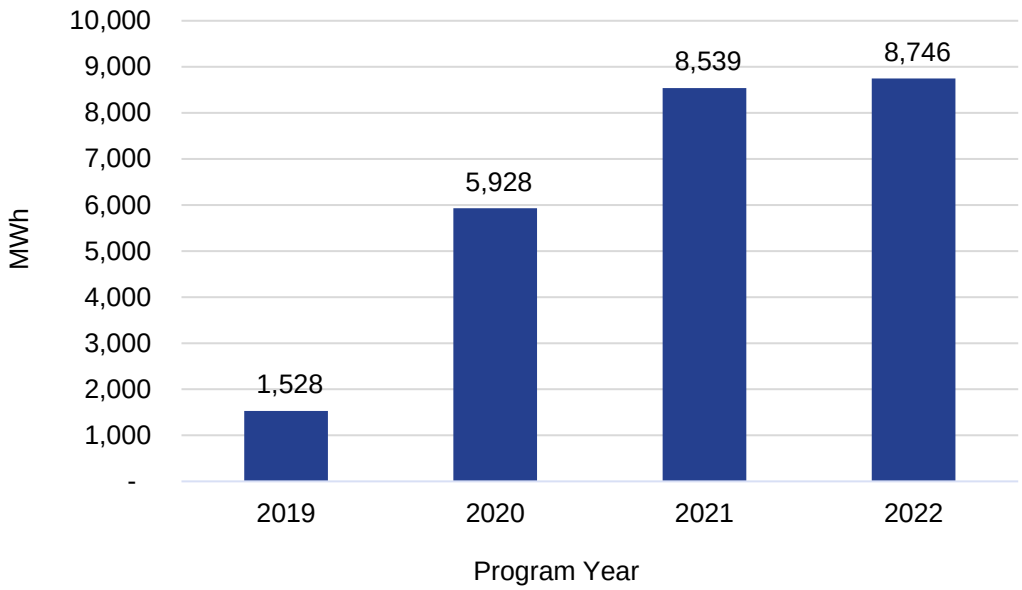
3.1.4 Smart Thermostat Incentive Program (Both an Efficiency and Demand Response)

Key Finding: *Smart thermostats* were installed across all utilities utilizing several different program delivery types such as upstream, midstream, online marketplaces, and direct installations.

In PY2022, residential energy efficiency programs installed over 9,000 smart thermostats across eight utilities, saving 8,746 MWh. The majority of energy savings can be attributed to upstream retailer programs. Upstream delivery is highly cost-effective, and smart thermostats are relatively easy for customers to install themselves, making the measure a good candidate for upstream programs. Some utilities have focused on smart thermostat programs, while others have incorporated them into their existing retailer programs. While growth in residential smart thermostats leveled off from PY2021 to PY2022, the measure was quickly able to gain traction in its first years of implementation as it was added to the TRM and program offering in PY2019. It was identified that an additional segment with considerable potential for smart thermostats is small businesses. Therefore, a *commercial smart thermostat* deemed savings was developed and is available for use starting with the PY2023 TRM. Therefore, we may see another bump in savings growth as this new customer segment is added.

[16] Heat Pump Water Heaters Tax Credit | ENERGY STAR

Figure 17. Historical Smart Thermostat Energy Savings



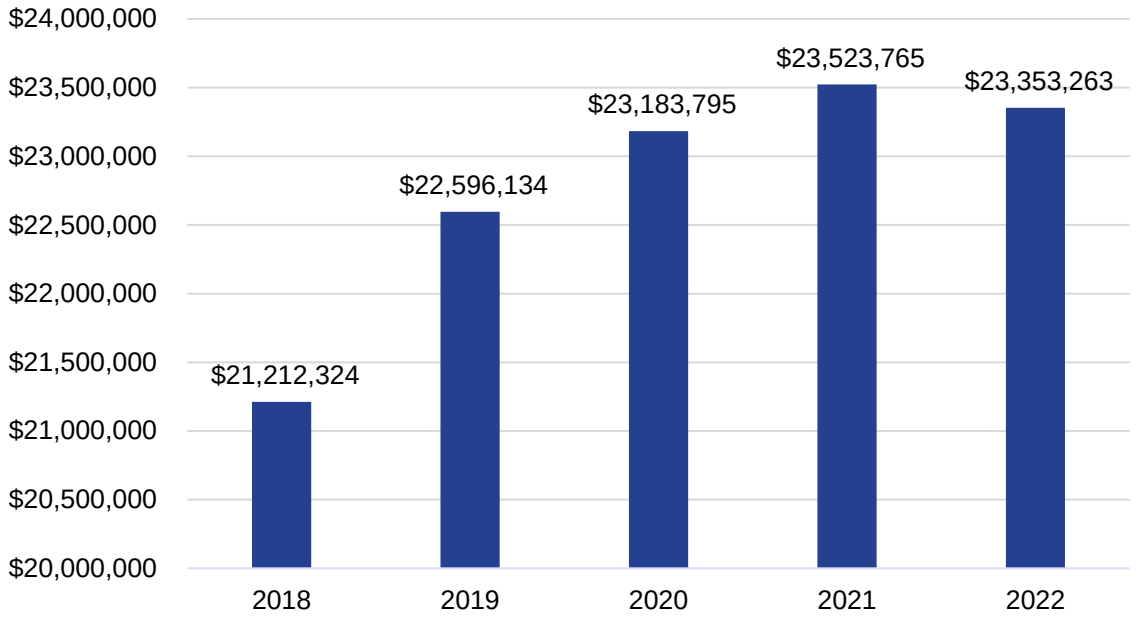
Some utilities are also including smart thermostats in their online marketplaces with the opportunity to purchase smart thermostats directly and enroll in the utility residential load management program at the point of purchase. In this case, the customer receives an energy efficiency incentive and additional incentives if they participate in the residential load management events. Residential load management programs include smart thermostats incentivized by programs and existing smart thermostats.

3.1.5 Low-Income and Hard-to-Reach Programs

Key Finding: All utilities serve LI customers, working to better reach customers through a variety of program design and delivery methods, including (1) conducting outreach to better facilitate the participation of underserved segments such as multifamily; (2) increasing HVAC implementation in addition to traditional *weatherization* measures; (3) expanding partnerships with community organizations; and (4) redesigning the program qualification process.

Investor-owned utilities (IOU) are required to achieve no less than five percent of their total demand reduction goal through programs serving HTR customers (16 TAC § 25.181(e)(3)(F)). In addition, the Electric Reliability Council of Texas (ERCOT) utilities are required to spend no less than ten percent of each program year's energy efficiency budget on a targeted LI efficiency program (16 TAC § 25.181(r)). The qualifying income level of 200 percent of the federal poverty level (FPL) is the same for HTR and LI programs, though the programs are implemented differently. In PY2022, the eight utilities collectively spent $23,353,263 on incentives across all offered LI weatherization and HTR programs. While some utilities increased incentive spending in 2022 from 2021, the overall incentive spending was slightly lower in 2022 but higher than in 2020. Figure 18 below shows the historical incentive spending for HTR and LI programs from PY2018 to PY2022.

Figure 18. Historical HTR/LI Incentive Spending for PY2018−2022



All of the utilities worked with PUCT staff and the EM&V team to implement new program qualification processes starting in PY2021 that have expanded the avenues to program participation as well as streamlined qualification through the US Department of Housing and Urban Development (HUD) geographic data. One utility developed a tool that contractors can use in the field to automatically qualify homes with the HUD geographic data.

Several utilities have implemented strategies to increase participation in HTR segments. Some LI and HTR programs have targeted offerings within comprehensive retrofit programs to reach segments within the LI customer sector that have experienced substantial barriers to energy efficiency, such as multifamily homes. In addition, *HVAC* measures have historically been more difficult to implement through the programs, and there has been a concerted effort to increase *HVAC* in addition to *weatherization* measures that have traditionally been the majority of program savings. Some utilities have developed community partnerships, such as working with food banks to distribute energy efficiency kits or Habitat for Humanity to reach neighborhoods.

Another avenue to improve program reach is through stakeholder feedback and coordination with other funding sources. PUCT staff tasked their EM&V contractor to facilitate Stakeholder Working Groups (see Section 3.2) with one specific working group focused on LI and underserved segments. An outcome of this working group was to re-visit the definition of LI from the current FPL to average median income (AMI) as a more equitable metric. In addition, the working group discussed other funding sources, such as federal tax credits and future state energy conservation office (SECO) programs, that could complement IOU offerings. SECO is receiving IRA energy efficiency program funds that are available through September 30, 2031, with approximately $690 million allocated to Texas through the Home Efficiency and Home Electrification Rebate programs.[17] While SECO is waiting on Department of Energy (DOE)

[17] Biden-Harris Administration Announces State And Tribe Allocations For Home Energy Rebate Program | Department of Energy.

guidance before fully designing the programs, they are planning programs that improve the energy efficiency of low- and moderate-income residential customers through directly rebated equipment installed in homes and through point-of-purchase discounts available through retailers. Types of rebated equipment can include electric heat pump clothes dryers; electric panel and wiring upgrades; electric stoves, cooktops, ranges, or ovens; heat pumps for space heating and cooling; HPWHs; air and duct sealing; insulation; materials to improve ventilation; and potentially other energy-saving technologies. Many of these measures are also included in the IOU programs. SECO would like to start program implementation in 2024. PUCT staff have started informal conversations with SECO to provide information that could facilitate cooperation between future SECO programs and the IOU programs. Cooperation can benefit Texans through more comprehensive offerings and expanded reach through coordinated IOU and SECO offerings.

3.1.6 Small Commercial and Industrial Retrofit Program

Key Finding: Utilities provide small commercial and industrial businesses enhanced administrative, technical, and incentive support through dedicated small business programs or within other commercial programs.

Six utilities provide a dedicated small business program (sometimes called the “Open” program), and the remaining two utilities provide small business services through the standard program offerings. The addition of the midstream programs to the commercial portfolio also provides accessibility to program incentives to increase energy efficiency through their normal purchasing at a commercial distributor. Upstream programs are also assumed to support the small business sector. Outside the dedicated small business programs, the participants are not tracked as small businesses, so the EM&V team cannot determine the historical participation or benefit provided to small commercial and industrial customers across all utilities.

The dedicated small business programs typically offer a limited set of measures that are applicable to most businesses. The offerings primarily include a lighting retrofit with limited HVAC, controls, shell, and refrigeration offerings. *Commercial smart thermostat* deemed savings was also added to the PY2023 TRM, opening up demand response participation opportunities. It is critical to connect these customers with the additional program offerings in standard offer programs (SOP), market transformation programs (MTP), and pilots to expand small business participation. Midstream programs are effective in expanding small businesses' energy efficiency by incorporating the incentives into the normal sales process through their local distributor; the most effective are HVAC, food service, and refrigeration midstream programs, which are expanding rapidly in utility portfolios.

3.1.7 Monitoring-Based Commissioning Program for Large Commercial Buildings

Key Finding: Monitoring-based commissioning (MBCx) is currently delivered through utility program implementers in various ways.

MBCx is a process that maintains and continuously improves building performance over time. It typically begins with a standard retro-commissioning, which will adjust the building to operate more like it was intended in the original design of the systems. MBCx follows retro-commissioning with follow-up services to tune the building to operate more efficiently and identify and fix individual equipment that may have failed.

Two utilities have dedicated retro-commissioning programs, and two other utilities offer more targeted energy management programs. These four programs offer variations on MBCx through technical support to develop a plan to alter operations, controls, and behaviors to create sustainable annual energy savings. The programs claim energy savings through the TRM Volume 4 measures: *nonresidential measurement and verification* or *behavioral measure overview*, which require monitoring of energy consumption in the 12 months prior to the improvement and 12 months after the completed adjustment. Some projects continue to adjust year after year and build energy savings over time.

Outside the four dedicated programs, other utilities have offered similar custom project implementation that uses the measurement and verification (M&V) approach through their MTP programs. However, the projects in these programs do not typically have an opportunity to complete the ongoing support services associated with MBCx-type services. The EM&V team provides technical assistance to utilities expanding custom projects or implementing M&V projects, starting in the planning stages to an evaluated result, which has supported the diversification of implementation contractors and project contractors. Utilities can consult with the EM&V team to adjust program design to support claiming energy for MBCx projects and other similar efforts at commercial and industrial facilities.

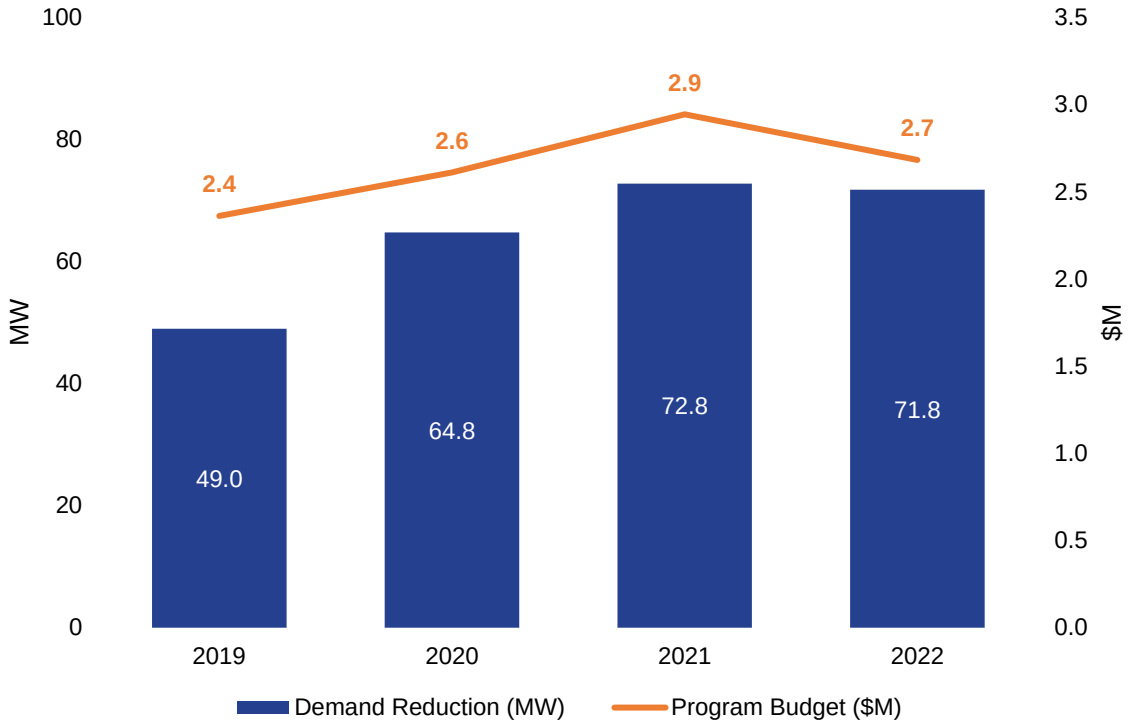
3.1.8 Central Air Conditioner with Smart Thermostat Control for Demand Response

Key Finding: Three of the eight Texas utilities offer residential load management programs. The programs have seen significant increases in participation and savings until PY2021. Lower participation levels and capped program budgets have contributed to a slight decrease in savings in PY2022.

Residential load management programs are designed to manage kilowatt usage during summer peak demand periods. Of the three Texas utilities that offer their customers a residential load management program, two programs utilize a smart thermostat control strategy, and the other program utilizes direct load control devices.

Since PY2019, the number of targeted residential thermostat devices has been increasing across the three residential load management programs. Figure 19 shows the total megawatt savings (demand reduction) and program costs of the residential load management programs by program year from 2019. Despite the increased number of targeted thermostat devices, lower participation levels and capped program budgets have contributed to a slight decrease in savings in PY2022.

Figure 19. Total Statewide Gross Demand Reduction and Program Budget by Program Year—Residential Load Management Programs PY2019–PY2022



3.1.9 Water Heater for Demand Response

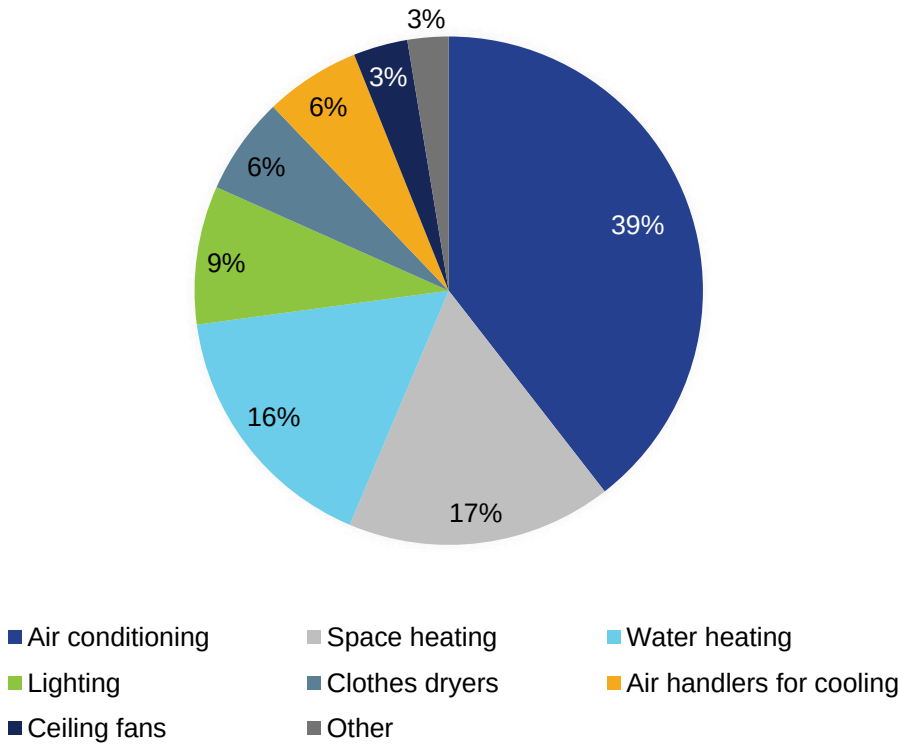
Key Finding: Texas residential load management programs use *smart thermostats* to manage kilowatt usage during summer peak demand periods. The current M&V approach in the TRM can support expanding the programs to include other measures, such as *water heaters*.

Three of the eight Texas utilities that offer residential load management programs solely use thermostat devices to reduce electricity load from air conditioning during summer peak demand periods. However, there is considerable potential to expand the programs by including *water heaters*. Figure 20 shows that, based on the 2020 Residential Energy Consumption Survey (RECS)[18], *air conditioning* is responsible for 39 percent of residential electricity end-use consumption in the West South-Central region, followed by *space heating* (17 percent) and *water heaters* (16 percent).

Expanding the residential load management programs to include other measures, including *water heaters*, can be supported by the current M&V approach outlined in the TRM.

[18] US Energy Information Administration (EIA) 2020 RECS Survey Data, Table CE5.1a Detailed household site electricity end-use consumption, part 1 - totals

Figure 20. Residential Energy Consumption in West South-Central (2020 RECS)



3.1.10 Electric-Vehicle-Managed Charging

Key Finding: Due to the high cost of the measure and low savings potential, the residential sector has seen limited participation in the *electric vehicle (EV) charger* measure. However, managed charging of privately- owned commercial fleet charging provides an opportunity for peak demand management.

In PY2022, one utility installed 19 residential *EV chargers,* saving a total of 469 kWh annually. The savings rate on the ability to claim energy efficiency savings is small and will have a limited impact on the overall portfolio.

One utility is implementing a managed EV Charging Research and Development (R&D) study in 2023 to determine the viability of a peak demand or energy consumption reduction strategy through commercial fleet EV charging. The data collection will focus on the behaviors associated with commercial fleet charging management, the expected growth of EVs in commercial fleets, and the ability to gather data analytics from currently operating EV fleets. The goal of the research is to identify a viable calculation process for managed EV charging. This study is an initial step to integrate managed charging opportunities into the energy efficiency program portfolios.

3.2 STAKEHOLDER INPUT SUMMARY

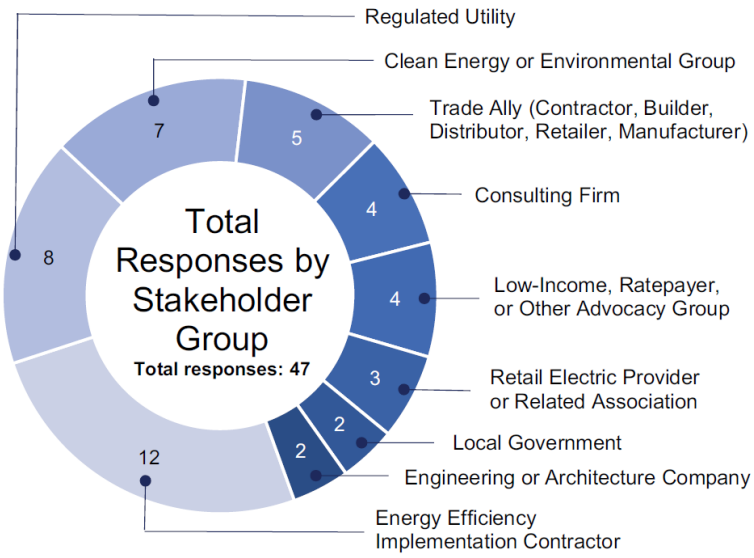
In its oversight role, the PUCT supports the continuous improvement of the programs through feedback from the statewide collaborative group, the EEIP. The PUCT's energy efficiency rule, 16 TAC § 25.181(q), outlines the role of EEIP and includes a requirement that the PUCT use the EEIP to develop best practices. In addition to year-round communications via the EEIP listserv and filing materials in EEIP Project No. 38578, the PUCT hosts biannual EEIP meetings. In response to stakeholder interest in the IOU's energy efficiency programs, PUCT staff launched a stakeholder input process at the October 2022 EEIP meeting.

Based on the ideas generated at this EEIP meeting, PUCT staff tasked Tetra Tech—in its role as the EM&V contractor—to develop a survey for the EEIP with the goal of forming and facilitating stakeholder working groups around priority topics.

Key results from the working groups include the working group's best practices, overarching themes, and key issues that could be addressed by legislation, future rulemaking, and/or process improvements. These were summarized at the March 2023 EEIP meeting with detailed results filed in Project No. 38578. The detailed results can also be found in this report's appendix.

3.2.1 Survey Responses and Working Group Participants

Forty-seven companies and organizations completed the survey, and 44 participated in one of the four working groups outlined below.



Represented companies and organizations included implementation contractors (firms that manage program delivery and outreach and train trade allies); IOUs; clean energy, environmental, and consumer advocates; retail electric providers (REP); trade allies (firms that promote the sale of and/or install energy efficiency measures); consulting firms; and local governments.

The four working groups included:

- **PROGRAM PLANNING** discussed the program planning cycle, avoided costs, cost-effectiveness, performance incentives, and REP participation.
- **PROGRAM GOALS** that discussed peak demand goals, energy savings goals, and considerations that affect goals (marketing, industrial opt-outs, cost caps).
- **LOW-INCOME AND UNDERSERVED SEGMENTS** discussed LI and HTR programs, other underserved sectors, and coordination with other programs and funding sources.
- **DEMAND RESPONSE/LOAD MANAGEMENT** discussed the role of the programs in the energy efficiency portfolio, including peak kilowatt contributions, peak periods, and best practices.

Next, this summary includes the best practices developed by the working groups, overarching themes, and key issues to be addressed in a legislative change, future rulemaking, and/or process improvements.

3.2.2 Best Practices

The working groups developed best practices to serve as guiding principles for future programs.

- **Focus on the customer by providing tangible value (energy savings, demand reductions, increased affordability, and resiliency) with multiple options to participate in a "big tent" approach to meet and engage the customer where they are.**
    - Programs should be easy to understand and participate in and include customer education.
    - Coordinate across multiple market actors to reach and engage customers.
    - Offer multiple technologies/measures as options for program participation.
- **Integrate energy efficiency and demand response when feasible.**
    - Capturing the value of demand response and energy efficiency together is good for customers and the grid.
    - For residential customers, understanding the readiness of the home in terms of its energy efficiency is important.
    - For commercial customers, offering choices that consider their risk/reward tolerance is important so that their production or operations are not seriously impacted.
- **Complement other offerings (i.e., ERCOT programs) and coordinate with other market actors (i.e., REPs, service providers) and data sources (i.e., Texas Department of Housing and Community Affairs).**
    - Coordinate to bridge the gap to access data so implementors can make it simple to evaluate and be broad in the solicitation of programs.
    - An example of complementing other program offerings is an IOU pre-screening the customer to ensure their home is smart-thermostat-ready through an audit or weatherization program or based on new construction.
- **Improve grid resiliency and reliability (i.e., geotargeting (using location data), distributed energy resources (DER) integration, and seasonal needs)**
    - "*It is important to understand the problem we are trying to solve.*" Historically, it has been summertime afternoon system demand. However, issues are changing and different for each utility service territory, whether bulk system issues, market issues, or distribution levels; having the flexibility of geotargeting is important.
    - There is an excellent opportunity for each IOU to study their local distribution- and transmission-related needs and assign a value to them.

- **Tap into potential across all eligible customer segments.**
    - All customers (excluding industrial opt-outs) are paying for these programs, yet not all are realizing the benefits.
    - HTR goals should include all underserved customer segments to further encourage realizing the potential across all eligibility segments.
- **Employ consistency with the flexibility to adapt to different markets and local system needs.**
    - While recognizing the need to adapt to each unique utility service territory, programs could run more efficiently by involving relevant market actors in the program design phase and looking at ways to run multi-year and statewide programs to the extent possible.
    - There is an opportunity for each IOU to study its local distribution- and transmission-related needs to identify how bundled energy efficiency and demand response can help meet system needs.
- **Accurately reflect the value of the demand response and energy efficiency to the grid.**
    - Legacy energy efficiency portfolios typically only have rules to evaluate the cost-effectiveness of energy efficiency products and demand reductions during peak periods. As needs evolve, portfolios need more flexible products and tools to implement best practices to realize the value they bring to the grid.

3.3 OVERARCHING THEMES

Common themes emerged across working groups:

- **Changes to the statute and regulatory framework, coupled with increased transparency and coordination, could be instrumental in improving energy efficiency services to customers.** To implement identified energy efficiency best practices, changes to the energy efficiency rules (16 TAC § 25.181 and § 25.182) and legislative changes to the statute are likely needed. However, process improvements can also be accomplished through more transparent and/or better-organized reporting, performance metrics, and increased coordination with REPs and other market actors.
- **A myriad of issues affects the feasibility of future goals, some of which could be addressed in the regulatory framework.** Understanding the comprehensive landscape is critical to making any rule changes. Definitions, process timelines, calculations, legislative changes, etc., are all interdependent and will require a holistic view when making any adjustments. Discussed issues include customer cost recovery caps, administrative and R&D cost caps, marketing needs, how rigidly goals are set, how avoided costs and program cost-effectiveness are calculated, rate class designations, the role of demand response in the energy efficiency portfolio, and utility performance bonuses. External issues include rising baselines, other programs/funding sources, and markets.

- **Benefits from the energy efficiency portfolios can be better captured and conveyed.** If reasonable methodologies are identified, avoided cost calculations could include grid and transmission and distribution (T&D) benefits and/or cost-effectiveness testing could be modified to include grid, T&D benefits, and/or non-energy benefits. In addition, more comprehensive reporting across the entire state (i.e., IOUs, cooperative and municipal utilities, industrial opt-outs) could better measure where the state is in energy efficiency and where it should go.
- **Complexity adds barriers and costs; streamlining and flexibility foster success.** The programs have multiple objectives, some of which are reflected in separate goals: peak demand reductions, energy savings, and serving LI and HTR customers. Objectives and goals do not work in isolation; they need to be considered comprehensively and allow flexibility across different service territories to meet different needs.

3.4 KEY ISSUES

Key issues across the working groups are assigned a priority level (*high, medium, low*) based on whether a change in statute or rule is required. A *high* priority indicates statute or rule changes are needed. *Medium* priority items had either areas of agreement or a statute or rule change may not be needed. A *low* priority indicates that statute or rule language is adequate, but a process improvement is needed to facilitate change.

- **High priority**
  - peak kilowatt and kilowatt-hour goals,
  - role of demand response,
  - peak period definitions,
  - LI and HTR definitions,
  - avoided cost of energy and capacity,
  - cost-effectiveness calculations,
  - customer cost caps,
  - planning cycle, and
  - performance bonus calculations.
- **Medium priority**
  - LI and HTR goals,
  - geotargeting,
  - identification of underserved segments,
  - use of demand response in the energy efficiency portfolio,
  - program design,
  - calculation of goals,

- performance bonus best practices, and
- marketing outside of administrative costs.

- **Low priority**
  - stakeholder engagement,
  - EM&V and TRM cycles,
  - the relative importance of peak kilowatt and kilowatt-hours,
  - program design,
  - collaboration with other funding sources and market actors,
  - transparent reporting of key metrics, and
  - savings-to-investment ratio retail energy used for LI programs.

4.0 COMMERCIAL ENERGY EFFICIENCY PROGRAMS

4.1 SUMMARY RESULTS

This section presents statewide summary results, followed by key findings and recommendations from all relevant evaluation, measurement, and verification (EM&V) activities.

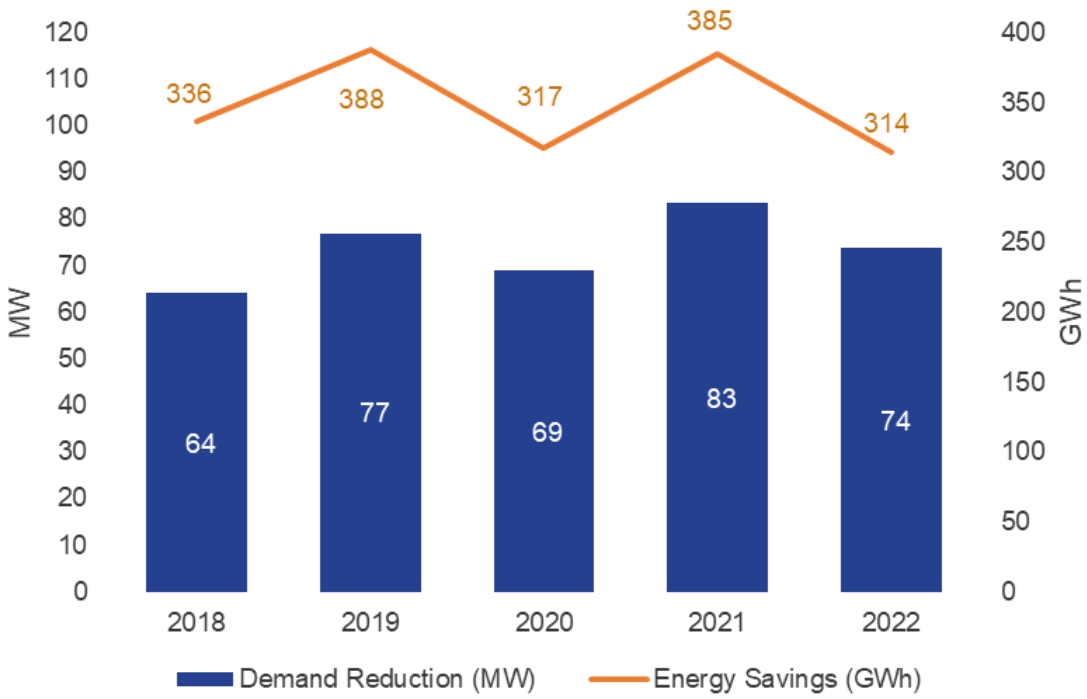
4.1.1 Savings

The statewide program year (PY) 2022 (PY2022) gross savings from commercial sector programs were:

- 73,742 kilowatts (kW) (demand reduction), and
- 314,315,702 kilowatt-hours (kWh) (energy savings).

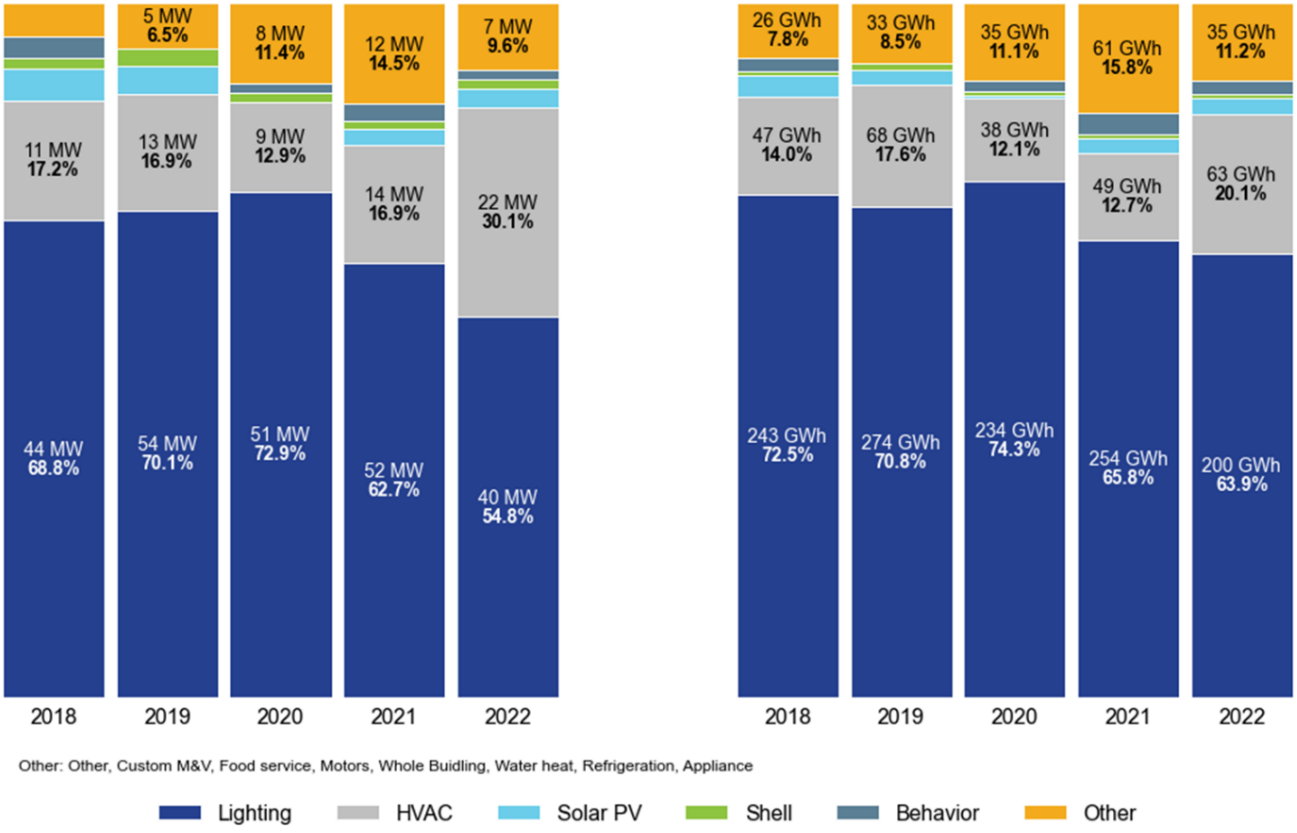
As shown in Figure 21, demand reduction results reflected a decrease from PY2019 to PY2020 (77 megawatts (MW) to 69 MW, respectively) but rebounded in PY2021 to 83 MW. Similar results occurred with energy savings; there was a decrease from PY2019 to PY2020 (388 gigawatt-hours (GWh) to 317 GWh, respectively) and an increase from PY2020 to PY2021 (317 GWh to 385 GWh, respectively). From PY2021 to PY2022, demand savings dipped again from 83 MW to 74 MW, and energy savings were reduced from 385 GWh to 314 GWh.

Figure 21. Total Statewide Demand Reduction and Energy Savings by Program Year—Commercial Programs PY2018–PY2022



As indicated in Figure 22, *lighting* measures, while still accounting for the majority of the demand reduction (55 percent) and energy savings (64 percent), have decreased. *HVAC* has substantially increased to 30 percent of demand reductions and 20 percent of energy savings, almost double the prior-year savings.

Figure 22. Distribution of Statewide Demand Reduction and Energy Savings by Measure Category—Commercial Programs Excluding Load Management PY2018–PY2022[19]



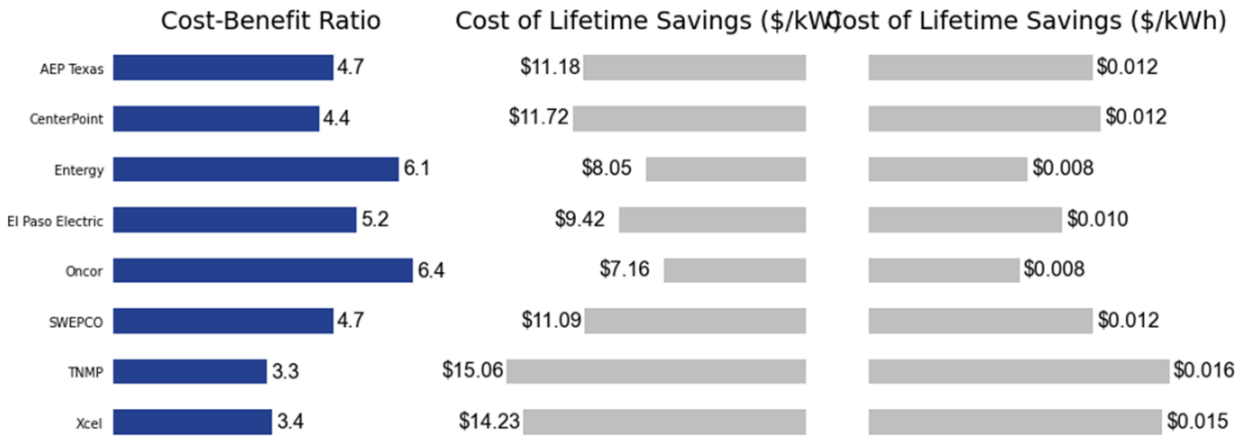
4.1.2 Cost-Effectiveness

Figure 23 summarizes the cost-effectiveness of each utility's commercial energy efficiency portfolio. Commercial sector programs were the most cost-effective, with an overall cost-effectiveness of 4.8 statewide. There is variation in the utilities' results in the commercial sector because of the diversity of program designs offered by the utilities.

Figure 23 also summarizes the cost of lifetime kilowatt-hours and kilowatts for each utility's commercial sector programs. The cost per kilowatt-hour ranges from $0.008 to $0.016, and the cost per kilowatt ranges from $7.16 to $15.06. These costs provide an alternate way of describing the cost-effectiveness of a portfolio of commercial programs; portfolios with a higher cost-effectiveness ratio will have a lower cost to acquire savings and vice versa.

[19] Values less than five percent have been suppressed for visualization purposes.

Figure 23. Cost-Benefit Ratio and Cost of Lifetime Savings—Commercial Programs PY2022



4.2 COMMERCIAL PROGRAMS

4.2.1 Program Overviews

This section summarizes the key findings and recommendations from the PY2022 evaluation of commercial energy efficiency projects. All commercial energy efficiency programs except midstream and small business market transformation programs (MTP) were a *medium* evaluation priority in PY2022. The utilities will consider the recommendations for PY2024 implementation and incorporate them into the PY2024 Texas Technical Reference Manual (TRM) 11.0 as appropriate.

The EM&V team conducted a streamlined EM&V effort that couples broad due diligence verification of savings for the commercial programs with targeted in-depth activities, including engineering desk reviews, on-site verification, and interval meter data analysis based on the prioritization of the programs.

The EM&V team evaluated the commercial energy efficiency programs described below. There are two program types: standard offer programs (SOP) and MTPs. An SOP is a program under which a utility administers standard offer contracts between the utility and energy efficiency service providers (EESP). These contracts specify standard payments based on energy and peak demand savings achieved through energy efficiency measures, measurement and verification (M&V) protocols, and other terms and conditions. An MTP is a strategic program intended to induce lasting structural or behavioral changes in the market, resulting in increased adoption of energy-efficient technologies, services, and practices.[20] SOP and MTP programs continue to represent the most significant percentage of statewide savings.

[20] PUCT Order, Chapter 25: Substantive Rules Applicable to Electric Service Providers.

Commercial SOP: The Commercial SOP provides new construction and retrofit installation incentives for various measures that reduce demand and save energy in nonresidential facilities. Incentives are paid to EESPs (project sponsors) based on deemed savings or verified demand and energy savings at eligible commercial customers' facilities. The utility has a limited group of participating project sponsors, determined through a selection process. This selection process is based on meeting minimum eligibility criteria, complying with all program rules and procedures, submitting documentation describing their projects, and entering into a standard agreement with the investor-owned utility.

Commercial Solutions MTP: The Commercial Solutions MTP targets commercial customers that do not have the in-house expertise to (1) identify, evaluate, and undertake energy efficiency improvements; (2) properly evaluate energy efficiency proposals from vendors; or (3) understand how to leverage their energy savings to finance projects. Assistance from the program includes communications support and technical assistance to identify, assess, and implement energy efficiency measures. Financial incentives are provided for eligible energy efficiency measures installed in new or retrofit applications, resulting in verifiable demand and energy savings. Commercial Solutions MTPs can include midstream programs that offer incentives at the distribution point to installation contractors who intend to install the equipment for eligible commercial or industrial customers. Specialty midstream programs are implemented using the Commercial Solutions MTP framework but are operated separately within utilities.

SCORE MTP: The SCORE MTP helps educational facilities (public and private schools, K–12, and higher education) and local government institutions to lower their energy use; this is done by providing education and assistance with integrating energy efficiency into their short- and long-term planning, budgeting, and operational practices. Lowering energy use is also completed through energy master planning workshops; energy performance benchmarking; and identifying, assessing, and implementing energy efficiency measures. Energy efficiency improvements include capital-intensive projects and implementing operational and maintenance practices and procedures. Financial incentives are provided for energy efficiency measures that reduce peak electricity demand.

Recommissioning MTP: The Recommissioning MTP offers commercial customers the opportunity to make operational performance improvements in their facilities based on low-cost/no-cost measures identified by engineering analysis. Financial incentives are provided to facility owners and retro-commissioning (RCx) agents to implement energy efficiency measures and projects completed by approved project deadlines. This program is evaluated as part of the M&V and custom energy savings.

Strategic Energy Management MTP: The Strategic Energy Management (SEM) MTP is a pilot program offering commercial and industrial participants technical support to make operational adjustments, equipment adjustments, or maintenance improvements to reduce the energy consumption of existing activities. Technical support and financial incentives are provided to facility owners to implement energy efficiency measures and projects completed by approved project deadlines. This program is evaluated as part of the M&V and custom energy savings.

Commercial High Efficiency Food Service MTP: The Commercial High Efficiency Food Service MTP provides midstream financial incentives through food equipment dealers. The incentives reduce the initial cost of ENERGY STAR®-certified commercially rated equipment purchased by restaurants and other commercial kitchens. This program is evaluated as part of the food service and refrigeration energy savings.

HVAC Tune-Up MTP: The HVAC Tune-Up MTPs are dedicated programs that directly implement HVAC system tune-ups. The program typically serves residential and commercial participants through the same service network. The programs have various names and are often included under the MTP programs.

Solar Photovoltaic (PV) MTP and SOP: The Solar PV programs are both MTP- and SOP-type programs, depending on the utility. These dedicated programs provide financial incentives for commercial customers to install solar PV on-site power generation systems and use the electricity to offset electricity consumption on the electrical grid. The programs have various names, and solar PV projects are also included under other MTP or SOP.

Small Business MTP: The Small Business MTP is sometimes referred to as the Open MTP by Texas utilities. It is designed to assist small business customers with identifying and implementing cost-effective energy efficiency solutions at their workplace. The program typically offers limited measures that are applicable to most small businesses. Small business customers are defined as business customers that do not have the in-house capacity or expertise to (1) identify, evaluate, and undertake energy efficiency improvements; (2) properly evaluate energy efficiency proposals from vendors; or (3) understand how to leverage their energy savings to finance projects.

4.2.2 Commercial Market Transformation Programs

This section presents the Commercial Solutions and SCORE program results, which were a *medium* evaluation priority, and the Retro-Commissioning program, which was also a *medium* evaluation priority in PY2022.

Utilities also provide specialty programs for food service equipment, solar PV installations, and HVAC tune-ups. When equivalent measures to these specialty programs are included in the more general MTP or SOP programs, the findings are identified under the specialty programs.

The EM&V team conducted desk reviews and on-site verification visits for a sample of projects from the *medium*-priority commercial MTP programs. For the desk reviews, the EM&V team applied the method prescribed in the PY2022 TRM 9.0 to verify energy savings and demand reduction for each project sampled. Comparing the evaluated savings to the original utility-claimed savings (ex-ante) showed agreement in about one- third of the cases; this is lower than previous evaluations. Some individual projects reviewed had extensive adjustments when evaluated. Table 16 presents the range of evaluated project-adjusted savings for MTP projects when comparing evaluated ex-post savings to ex-ante savings. The range identifies the variability in evaluated results for various MTP programs and provides additional context for the key findings and recommendations.

Table 16. Range of Evaluated Adjusted Savings for Market Transformation Program

Program	Evaluated adjusted savings comparison (kW)	Evaluated adjusted savings comparison (kWh)
Commercial Solutions MTP	8%-291%	6%–273%
SCORE MTP	10%–988%	10%–338%
M&V and Custom MTP	6%–125%	5%–120%

Based on the evaluation results, the EM&V team has outlined key findings and recommendations below.

4.2.2.1 Key Findings and Recommendations

All key findings and recommendations outlined for the commercial MTPs (Commercial Solutions and SCORE) are equally relevant to the SOP programs. The SOP programs include many of the same deemed and prescriptive calculations as the MTP programs; the SOP programs also use custom calculations and M&V methodology to claim savings for projects.

4.2.2.1.1 Lighting Energy Savings

Key Finding #1: The lighting calculation assumption did not consistently match participant conditions or detailed equipment specifications.

The lighting savings calculations continue to require small wattage adjustments for installed lighting equipment. However, the other calculation assumptions, which in past years have required minimal adjustments, required a significant increase in adjustments due to inconsistencies between the calculation and actual conditions. EM&V was able to identify the inconsistencies in both the documentation review and on-site verification. The following calculation assumptions increased the frequency of adjustments:

- *Air conditioning type:* The *air conditioning type* was commonly not adjusted per lighting equipment installed; this was most common in facilities with an air-conditioned office space and an unconditioned workspace.
- *Baseline lighting equipment:* The pre-retrofit lighting equipment was identified in several projects to have a different number of T8 lamps per fixture or use a different ballast than the lighting calculation. Since the equipment is unavailable for inspection post-installation, the adjustments were documented through submitted pre-installation photos.
- *Building type adjustments:* Adjustments continued to be required to match the building operation to the TRM building type. The most common adjustments were from *stand-alone retail* to *strip mall retail* and various types to *public assembly*.
- *Post-installation verification:* Several projects required calculation adjustments identified during the post-installation verification. These adjustments were made in the final calculator, although the tracking system did not reflect the adjusted savings.

Recommendation #1: Address increased lighting savings calculation adjustments by completing a detailed review of the claimed savings calculations, individual line-item assumptions, and specifications and training on the most frequent sources of adjustments.

Key Finding #2: New construction project calculation assumptions did not match actual construction.

New construction projects should be verified between the constructed components and the submitted calculations and documentation. As identified in the last evaluation, new construction projects are being completed in phases, and the program calculations are required to claim partial projects that are significantly smaller than the initial project calculation for the entire site. However, the evaluation identified multiple projects where the *total interior area*, *total exterior area*, and *area types* were incorrectly identified in the initial and final calculations and could not be attributed to phasing. These adjustments significantly adjusted savings for PY2022 programs.

Recommendation #2: New construction projects should be verified between the actual constructed components and the submitted calculations and documentation.

Key Finding #3: *New construction exterior lighting* requires judgment to determine the proper baseline assumptions.

The previous evaluation identified the ambiguity of selecting Climate Zone 1 through 4 for a new construction project. The TRM was adjusted to reduce the uncertainty for that component. However, the definition of the *exterior areas* is also limited in many submittals. The TRM and code allow for the definition of various exterior area types (*parking*, *walkway*, *building façade*, etc.) to determine the code baseline allowable lighting wattage for the project. The exterior lighting calculations found many calculations were generalized to one type of exterior area. Further, some calculations did not include lighting fixtures that did not directly serve a purpose for that area and included areas with no lighting allowance, such as ponds. The new construction calculation requires an accurate accounting of the lighted area and all exterior lighting fixtures to determine savings accurately.

Recommendation #3: Provide a detailed accounting of *exterior lighting area types*, excluding non-lighted areas and all fixtures installed for new construction projects.

Key Finding #4: Data entry for *de-lamping* and *lighting equipment that was not retrofitted* can inadvertently adjust savings.

While utilities' lighting calculators are based on the TRM, they work in different ways, and understanding how the savings are calculated is critical to determining savings. Several projects claimed increased or decreased savings because of the data entry of de-lamped lighting fixtures and lighting fixtures that remained in place. Most commonly, the pre-retrofit fixture was entered into the inventory, but the post-retrofit fixture was left blank for both conditions. In this condition, some calculators calculated savings that matched de-lamping, and others calculated zero savings, which did not always match the project. Entering the post-retrofit inventory with a one-watt LED fixture with zero quantity will typically match a de-lamping condition. Entering the post-retrofit inventory with a matching fixture and quantity to the pre-retrofit inventory will typically match a fixture left in place.

Recommendation #4: Review the lighting savings calculator to ensure an understanding of savings calculated for lighting fixtures left in place and lighting fixtures de-lamped.

4.2.2.1.2 HVAC Energy Savings

Key Finding #1: The HVAC calculation efficiency and capacity did not consistently match Air Conditioning, Heating & Refrigeration Institute (AHRI) documentation.

The TRM identifies that HVAC calculation should use the installed equipment's AHRI conditions and published efficiency and capacity. Projects still included the nominal or incorrect efficiency or capacity values in the HVAC calculation.

Recommendation #1: Confirm calculations match the AHRI documented certificate or match the documented performance at AHRI conditions for the calculation.

Key Finding #2: Single-packaged vertical air conditioners or heat pumps (SPVAC or SPVHP) are not included in the TRM.

The DOE provides a required efficiency level for SPVAC or SPVHP. The TRM does not incorporate this equipment or the baseline efficiency levels for energy savings calculations. At a minimum, the DOE-specified minimum performance level should be used as the baseline efficiency level.

Recommendation #2: Incorporate SPVAC and SPVHP into PY2024 TRM 11.0, Volume 3.

4.2.2.1.3 M&V Methodology and Custom Energy Savings

The M&V methodology claims energy savings for RCx, behavioral, operational, controls, or custom energy projects. In addition, custom energy savings calculations can be used to determine the energy savings from projects that can better be addressed by calculating savings. The M&V methods provide a framework for high-quality verified savings for projects that cannot be readily isolated through engineering equations or modeling and provide significant energy savings. The M&V methodology identifies and claims savings from more complicated projects. Custom engineering calculations are used to determine energy savings associated with projects. The custom calculation is used where projects are easily defined and do not require long-term monitoring to identify savings but also do not meet the conditions in the TRM. Overall, the evaluation found that the M&V and custom calculated projects had agreement with the original utility claimed (ex-ante) savings about half the time, which was more frequent than the prescribed projects.

Key Finding #1: M&V plans and custom calculations consistently document calculation processes but have more limited documentation of assumptions.

M&V projects and custom calculations need to make engineering decisions on calculation processes and assumptions to approximate the equipment and operating characteristics best to determine an accurate representation of the energy consumption adjustments. Most projects reviewed documented the calculation processes with references or discussion on the choice. Some projects documented the operating characteristics and other assumptions at the same level and included written justification. Although, there were some projects reviewed that only identified assumptions or required a detailed review of the calculation process to determine the assumptions created.

Clear identification and a written description of the calculations, assumptions, and other operating characteristics are required for M&V and custom calculations to be reproducible. The EM&V team is accessible in a technical assistance role to work with utilities and the project implementers to review preliminary or final analysis plans, documentation, and calculations.

Recommendation #1: Provide clear documentation for calculation processes, assumptions, and operating characteristics for all M&V and custom calculations.

Key Finding #2: The claimed peak demand calculation improperly used the peak demand probability factor (PDPF) to determine custom savings calculations.

The *top 20 hours* method is consistently used to determine peak kilowatt savings from M&V and custom-calculated projects; this matches the comments from previous evaluations. The PY2022 evaluation found that the PDPF factors were not consistently used for weighting the identified peak demand reductions. In addition, many projects attempted to identify the weekdays in the PDPF dates matching the normalized year. The selection of the weekdays is not possible for a normalized analysis because the dates do not represent an actual year.

Recommendation #2: Complete quality assurance on M&V and custom-calculated peak demand calculations to ensure that the PDPF factors are used in averaging the peak demand reduction and that the weekday determination matches an actual year.

Key Finding #3: Custom calculations did not consistently isolate prescriptive savings projects.

Many custom calculation projects include project components that match TRM-prescribed projects. The savings from the prescribed projects were sometimes claimed and subtracted from the custom-calculated savings and sometimes incorporated into the custom savings. The TRM does not provide guidance for a consistent process.

Recommendation #3: Update the PY2024 TRM 11.0 to provide guidance on the custom-calculated process to claim savings when measures in the TRM are included.

Key Finding #4: On-site power generation is not typically included as a factor in energy savings calculations.

On-site power generation through combined heat and power plants, solar PV arrays, or other on-site systems is becoming more common. The on-site generation impacts the amount of energy reduced from the electrical grid for an energy efficiency project. The TRM does not currently address how on-site power generation will impact energy savings. However, there is the opportunity for incentives or payment-for-power to be provided for both energy efficiency and on-site generation.

Recommendation #4: Update the PY2024 TRM 11.0 to provide guidance for claimed savings when on-site generation is present.

4.2.3 Commercial Standard Offer Program

This section presents the Commercial SOP program results that were a *medium* evaluation priority in PY2022.

The EM&V team conducted desk reviews and on-site verification visits for a sample of projects from the *medium*-priority Commercial SOP program. For the desk reviews, the EM&V team applied the method prescribed in PY2022 TRM 9.0 to verify energy savings and demand reduction for each project sampled. Comparing the evaluated savings to the utility-claimed savings showed agreement in about half of the cases; this is much lower than previous evaluations. Some individual measures reviewed had extensive adjustments, including one that reduced the savings to zero. Although, the adjustments do not adjust the overall program realization rates. The evaluated measures adjusted savings for the Commercial SOP projects between 3 percent and 132 percent, outside of the project that eliminated savings. The range of values identifies the variability in evaluated results for the Commercial SOP program and provides additional context for the key findings and recommendations.

The Commercial SOP key findings and recommendations do not restate the key findings and recommendations for other programs. However, since measures and program delivery occur across the programs, the findings and recommendations from other commercial programs also apply to the Commercial SOP program.

4.2.3.1 Key Findings and Recommendations

The key findings and recommendations for the Commercial SOP program are included in the Commercial MTP program and the targeted measure-specific food service and refrigeration programs, HVAC tune-up programs, and the solar PV programs.

4.2.4 Food Service and Refrigeration MTP

This section presents the food service and refrigeration measures which are located either in Commercial High Efficiency Food Service MTP programs or incorporated into other generalized MTP programs. These programs and measures were a *medium* evaluation priority in PY2022.

The EM&V team conducted desk reviews and on-site verification visits for a sample of projects from the *medium*-priority food service and refrigeration MTP programs. For the desk reviews, the EM&V team applied the method prescribed in the PY2022 TRM 9.0 to verify energy savings and demand reduction for each project sampled. Comparing the evaluated savings to the utility-claimed savings showed agreement in about two-thirds of the cases. Some individual measures reviewed had extensive adjustments because the savings were eliminated based on equipment non-qualification, but project-level savings remained relatively constant between 89 percent and 101 percent.

The food service and refrigeration MTP programs' key findings and recommendations do not restate the key findings and recommendations for other programs. However, since measures and program delivery occur across the programs, the findings and recommendations from this program also apply to *food service* and *refrigeration* measures in other commercial programs.

Based on the evaluation results, the EM&V team has outlined key findings and recommendations described below.

Key Finding #1: Residential-rated food services and refrigeration appliances used in commercial facilities are addressed inconsistently in the TRM.

The TRM identifies that residential-rated refrigerators can claim the commercial level of energy savings if located in a commercial setting, including master-metered multifamily buildings. The TRM excludes residential-rated dishwashers from claiming savings if installed in a commercial location, including master-metered multifamily buildings.

Recommendation #1: Adjust the TRM to allow residential-type food service and refrigeration equipment to use the requirements and savings from Volume 2 of the TRM when installed in master-metered multifamily locations.

Key Finding #2: Commercial food service documentation did not consistently identify the building's hot water source.

Some commercial food service equipment uses the hot water supply in a building along with supporting energy input sources. The energy savings is determined based on the displaced hot water supply, and it is required to know the type of water heating.

Recommendation #2: Document the building-level hot water supply for commercial food service equipment measures.

4.2.5 HVAC Tune-Up MTP

This section presents the *HVAC tune-up* measures located either in HVAC Tune-Up MTP programs or incorporated into other generalized MTP programs. These programs and measures were a *medium* evaluation priority in PY2022.

The EM&V team conducted desk reviews and on-site verification visits for a sample of projects for *HVAC tune-up* measures from the *medium*-priority HVAC Tune-Up MTP programs. For the desk reviews, the EM&V team applied the method prescribed in the PY2022 TRM 9.0 to verify energy savings and demand reduction for each project sampled. Comparing the evaluated savings to the utility-claimed savings showed agreement in about ten percent of the cases; this is much lower than previous evaluations. Some individual measures reviewed had extensive adjustments, ranging from 83 percent to over 117 percent. The range of values identifies the variability in evaluated results for the HVAC Tune-Up MTPs and provides additional context for the key findings and recommendations.

The HVAC Tune-Up MTP programs' key findings and recommendations do not restate the key findings and recommendations for other programs. However, since measures and program delivery occur across the programs, the findings and recommendations from this program also apply to *HVAC tune-up* measures in other commercial programs.

Based on the evaluation results, the EM&V team has outlined key findings and recommendations described below.

Key Finding #1: The individual unit tune-up and participant tracking system differs from the utility project tracking system.

For example, the projects selected from the sample identified an individual participant in the tracking system; however, it represented a collection of participants that were submitted to the utility at the same time by the implementation contractor. The implementation contractor tracking system included information regarding the participant and the units serviced through the program. This standard tracking system can easily be used, although the utility tracking system is expected to contain participant-level information per project.

Recommendation #1: Project implementers should provide documentation to the utility to track participant-level information.

Key Finding #2: The prescribed *building type* selected did not match predominant building operations.

The predominant *building type* is not consistently identified at the building level for the tuned-up HVAC units. Over one-third of the evaluated *building types* required an adjustment. Most of the adjustments involved the implementer using the *service building* type, although there were two conditions where the incorrect *school* type was selected. It appears the *building type* was not always adjusted when the unit serviced was located in another building.

Recommendation #2: Provide a quality assurance review to verify the *building type* matches the building served by the unit serviced in the energy efficiency calculations.

Key Finding #3: The capacity of the units *tracked* did not match the capacity of the units.

The units tuned-up require a capacity to determine energy savings in the calculation. Measurements are collected, but the calculation is typically completed using the unit nominal capacity. Approximately one-third of the evaluated projects required a capacity adjustment to match the nominal capacity of at least some of the units in the project.

Recommendation #3: Provide a quality assurance review to verify unit capacity for the calculation.

4.2.6 Solar PV MTP and SOP

This section presents the *solar PV* measures located either in a dedicated Solar PV MTP or Solar PV SOP program or incorporated into other generalized MTP or SOP programs. These programs and measures were a *medium* evaluation priority in PY2022. These results apply to commercial and residential programs.

The EM&V team conducted desk reviews and on-site verification visits for a sample of projects from the *medium*-priority Solar PV MTP and SOP programs. For the desk reviews, the EM&V team applied the method prescribed in the PY2022 TRM 9.0 to verify energy savings and demand reduction for each project sampled. Comparing the evaluated savings to the utility-claimed savings showed agreement in most reviewed cases, and the adjustments were relatively small. The range of values identifies the variability in evaluated results for the Solar PV MTPs and SOPs and provides additional context for the key findings and recommendations.

The Solar PV MTP and SOP programs' key findings and recommendations do not restate the key findings and recommendations for other programs. However, since measures and program delivery occur across the programs, the findings and recommendations from this program also apply to *solar PV* measures in other commercial programs.

Based on the evaluation results, the EM&V team has outlined key findings and recommendations described below.

Key Finding #1: Projects contain multiple solar PV arrays with individual azimuths and tilts.

Solar PV projects can contain multiple arrays which have different azimuths and tilts depending on conditions. The calculations for the solar PV array should include savings calculations for each azimuth/tilt combination and sum the results for the project total. The TRM-prescribed calculation method does not allow for a combined estimated azimuth and tilt. Solar PV installations tend to have variations from the design plan that slightly adjust savings; the TRM provides bins for calculations that allow for these slight variations.

Recommendation #1: Provide a separate analysis for solar PV arrays with unique azimuth and tilt combinations.

4.2.7 Program Documentation

Tetra Tech collected and reviewed project documentation from individual sampled projects for programs with *high* and *medium* evaluation priorities in PY2022. The review is completed to review the completeness of documentation, identify discrepancies between the tracking system and the installed measure, and review the energy savings calculations for compliance with the TRM. Based on this work, the EM&V team offers the following key findings and recommendations:

Key Finding #1: ENERGY STAR qualification does not document delisted equipment.

The DOE provides a listing and certification for products that meet or exceed ENERGY STAR minimum requirements. The DOE regularly updates the listing with new products and the delisting of old products. When a product is delisted, there is no documentation of the date of delisting. The evaluation found equipment that had been delisted and was also awarded an incentive. The date of delisting could not be identified; therefore, the equipment was assumed to be delisted before the incentive.

Recommendation #1: Program documentation should document equipment that meets third-party certification requirements at the time of submittal or by downloading the ENERGY STAR or equivalent qualified products list (QPL) at the beginning of the program year.

4.3 SEGMENT OPPORTUNITY ANALYSIS

4.3.1 Wastewater and Water Treatment Plants

Wastewater treatment plants (WWTP) and potable water treatment plants (PWTP) are currently not completing significant projects within SCORE programs statewide. Many of the facilities are publicly owned, although there is a potential for private facilities to also benefit from increased energy efficiency efforts for this segment. To date, the SCORE programs have appeared to deliver *lighting retrofit* and *HVAC tune-ups* to the facilities, but the majority of the energy consumption is related to *pumping and treating*. The PY2023 TRM 10.0 has several immediately applicable measures to support energy efficiency in this segment, such as *high-efficiency motors* and installing *VFD control on air compressors.*

However, the plants are unique in municipal operations because of the industrial process type operation, and therefore, the improvements in the treatment process require a little more support than a standard industrial facility project. The best practice is to provide support in a multi-step process to support the identification, decision-making, and implementation of energy efficiency projects.

Facility energy assessments: An energy assessment will identify energy efficiency opportunities for the facility and process. The facility improvements include the *HVAC* and *lighting* improvements of the site, but the assessment should also include the review of the process systems to identify more efficient equipment or improved controls which will reduce energy consumption per gallon treated. An annual energy survey is essential for water and wastewater systems to identify and prioritize opportunities for energy efficiency improvements and renewable energy options.

Behavior changes: The facility energy assessment will start an effort at the utility to improve through no-cost or low-cost improvements by changing how the facility uses energy. The PY2023 TRM 10.0 includes a measure that details the measurement, verification, and analysis procedure to claim the energy efficiency identified through these activities. Even if unclaimed, the identification actions typical of the effort reduce operating costs to treat the potable water or wastewater. Typical behavior changes are identified in Table 17 below.

Implementing Measures: The most important considerations for implementation of projects at a wastewater or potable water treatment plant is to ensure the improvement does not impact water quality and allocating capital in municipal budgeting. This requirement increases the time it takes to implement measures that should be accounted for in the utility programs.

The tables below detail opportunities to support the energy efficiency of potable water and wastewater treatment facilities broken out by the ease of implementation using PY2023 TRM 10.0 published for use in PY2023.

Table 17. PWTP/WWTPs Savings Measures with High Ease of Implementation

Measure	Description	EM&V considerations
Behavior changes (PWTP/WWTP)	Behavior changes that reduce energy consumption can include turning off non-essential equipment during peak-power demand, managing seasonal/tourist peaks, flexible sequencing of basin use, sequencing backwash cycles, maintaining motors, dampers, and fans, and replacing ventilation air filters. Additional opportunities are also available while review operations and schedules to determine if any equipment is optional or can be adjusted to a lower energy use setting, such as adjusting a thermostat to a higher setting.	Available to claim at a facility level through Measure 2.5.1 in Volume 4 of the PY2023 TRM 10.0.
Electric motors: install high-efficiency motors (PWTP/WWTP)	Survey existing motors for replacement with high-efficiency ones. Use energy-efficient motors on new equipment and create an emergency motor replacement program.	Available to claim per motor through Measure 2.7.6 in Volume 3 of the PY2023 TRM 10.0.
Electric motors: variable frequency drives applications (PWTP/WWTP)	VFDs can save energy by matching motor speed to load and avoiding full power. VFDs are best for applications with high peak demand and partial loads.	Available to claim per motor through Measure 2.7.8 in Volume 3 of the PY2023 TRM 10.0, or an M&V or custom calculation can be completed.
Industrial lubricants (PWTP/WWTP)	Gear lubricants and hydraulic oils reduce friction for the pumping equipment and therefore increase the pump's energy efficiency.	Available to claim per motor through Measure 2.7.10 and 2.7.11 in Volume 3 of the PY2023 TRM 10.0.
Ultraviolet (UV) disinfection options (PWTP/WWTP)	Use low-pressure UV systems for energy efficiency. Adjust lamp intensity based on the flow rate or water quality and clean lamps regularly.	M&V or custom calculations are required.

Measure	Description	EM&V considerations
UV disinfection: install dose pacing (PWTP/WWTP)	Consider adding a dose-pacing system to an existing UV system to vary UV dose based on flow and/or UV transmittance.	M&V or custom calculations are required.
Compressed air upgrades (WWTP)	Reducing air compressor discharge pressure, reducing leaks, installing advanced sensors and controls can save energy and improve system performance.	Available to claim at a system level either through Measure 2.5.1 Behavior or Measure 2.5.3 M&V in Volume 4 of the PY2023 TRM 10.0.
Install VFD control on air compressors (WWTP)	Baseline air compressors use an inlet modulation with an unloading mode that can be replaced by a VFD. The VFD-controlled rotary-screw air compressor can save energy by better matching part-load operation.	Available to claim at a system level through Measure 2.5.2 in Volume 4 of the PY2023 TRM 10.0 for pumps less than 75 horsepower. However, compressors may benefit from an M&V approach to calculate savings.
Variable blower airflow rate (WWTP)	Use variable air supply rate blowers to match system demands, replacing a typical baseline system that throttles airflow discharge.	M&V or custom calculations are required.
Install solar photovoltaic generation system (PWTP/WWTP)	Solar photovoltaic (PV) electricity systems can provide a reliable source of renewable electricity generation; when coupled with electricity storage, they can provide a stable source of renewable electricity independent of other treatment operations.	Available to claim at a system level through Measure 2.4.2 in Volume 4 of the PY2023 TRM 10.0.

Table 18. PWTP/WWTPs Savings Measures that can be Implemented with Limited Additional Work

Measure	Description	EM&V considerations
Clean lamps and fixtures (PWTP/WWTP)	Dirt on process lamps and fixtures can decrease light output by 50 percent; clean fixtures and lamps regularly with proper cleaning solutions. The frequency of cleaning depends on the environment.	The cleaning can be included in the behavior-based measure, but TRM can explore the opportunity for PWTP/WWTP disinfection tune-ups.
Fine-bubble aeration (WWTP)	Fine-bubble aeration for activated sludge treatment facilities will increase the efficiency of aeration. Combining it with dissolved oxygen monitoring and control will also limit the amount of aeration supplied.	M&V or custom calculations are required.
Replace centrifuge with screw press (WWTP)	Replacing the sludge dewatering centrifuge with a screw press significantly reduces the energy needed for dewatering.	M&V or custom calculations are required.

Measure	Description	EM&V considerations
Replace centrifuge with gravity belt thickener (WWTP)	Replacing the centrifuge with a gravity belt thickener significantly reduces the energy needed for sludge thickening.	M&V or custom calculations are required.
Optimize ventilation system control strategies (WWTP)	Controlling ventilation based on occupancy at WWTPs will reduce energy consumption by decreasing the ventilation rates to six air changes per hour (ACH) during unoccupied periods. The sensor will automatically increase ventilation rates when someone enters the building.	M&V or custom calculations are required.

Table 19. PWTP/WWTPs Savings Measures that Require Higher Levels of Coordination to Implement

Measure	Description	EM&V considerations
System leak detection and repair (PWTP)	Operations and maintenance practices, such as pipe or meter inspection and maintenance programs, are critical. New technology, such as automatic meter-reading technology and computerized maintenance management software, can also be useful in identifying water loss.	Difficult to document and attach energy savings.
Supervisory control and data acquisition (SCADA) (PWTP/WWTP)	SCADA systems allow remote monitoring and control of treatment plants. SCADA can also be used to monitor energy use and manage peak demand.	M&V or custom calculations are required.
Reduce pumping flow and/or head (PWTP/WWTP)	To reduce energy usage in pumps, reduce flow, minimize head losses, and avoid throttling valves.	M&V or custom calculations are required.
Sequence well operation (PWTP)	Review well-specific data, including energy consumption, to optimize well operations. Prioritize energy-efficient wells and sequence operations accordingly.	M&V or custom calculations are required.
Staging of treatment capacity (WWTP)	Wastewater system personnel and designers should work together to develop a plan that effectively and efficiently meets current and projected conditions. Staging upgrades can help optimize system response to demand and reduce energy costs.	M&V or custom calculations are required.
Optimize grit removal system (WWTP)	Use energy-efficient designs, cycle grit pumps, and optimize blower output to reduce energy consumption in grit removal systems.	M&V or custom calculations are required.

Measure	Description	EM&V considerations
Optimize aeration system (WWTP)	Assess aeration system efficiency, compare performance indicators, and consider improvements such as fine-bubble aeration, dissolved oxygen control, and variable airflow rate blowers.	M&V or custom calculations are required.
Dissolved oxygen control (WWTP)	Consider using dissolved oxygen (DO) monitoring and control technology to maintain DO levels at a preset control point.	M&V or custom calculations are required.
Chemically enhanced primary settling (CEPS) (WWTP)	CEPS is a process that adds chemicals to primary settling tanks to improve sedimentation and remove more organics and solids, reducing the energy requirements of secondary operations.	M&V or custom calculations are required.
Post-aeration: cascade aeration (WWTP)	Consider cascade aeration for post-aeration. It's a topography-friendly technology that re-aerates effluent without electricity.	M&V or custom calculations are required.
Improve solids capture in dissolved air flotation (DAF) system (WWTP)	Optimize the DAF system by adjusting the air-to-solids ratio, feeding high solids content, continuously operating thickeners, and adding polymers.	M&V or custom calculations are required.
Biosolids mixing options in aerobic digesters and/or anaerobic digesters (WWTP)	Evaluate biosolids mixing options, choose the most efficient technology, and consider a combination of methods allowing periodic system shutdown.	M&V or custom calculations are required.
Reduce freshwater consumption/final effluent recycling (WWTP)	Use fresh effluent instead of potable water for process applications and tank washdown to reduce potable water consumption and save energy. Include a pressure tank, pump control system, and inline filter for additional applications.	M&V or custom calculations are required.
Residential or commercial landscape irrigation reduction measures (PWTP)	Implementing landscape irrigation reduction can reduce electricity by reducing the amount of water consumption.	Requires irrigation reduction measures in the TRM and research to determine the amount of electricity saved per unit of reduced consumption.

Measure	Description	EM&V considerations
Generate energy from biosolids (WWTP)	Biogas from anaerobic digesters can generate electricity, provide thermal energy, or fuel vehicles. Common use is in a combined heat and power (CHP) plant.	Requires custom calculation. The Southcentral CHP Technical Assistance Partnership (CHP TAP) offers complimentary screenings, technical assistance, and expert advice to help determine if CHP is a good fit for the site.
Install wind generation system (PWTP/WWTP)	Wind turbines can provide site-generated electricity.	M&V or custom calculations are required.

5.0 RESIDENTIAL ENERGY EFFICIENCY PROGRAMS

5.1 SUMMARY RESULTS

This section presents statewide summary results, followed by key findings and recommendations from all relevant evaluation, measurement, and verification (EM&V) activities.

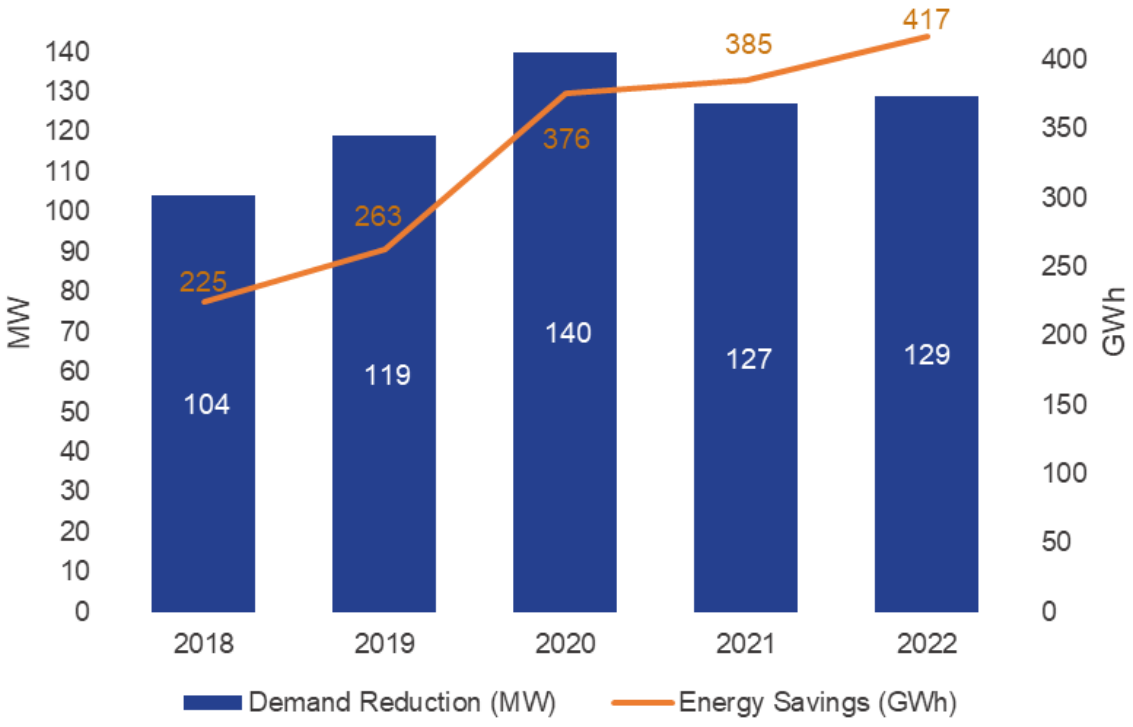
5.1.1 Savings

The statewide program year (PY) 2022 (PY2022) gross savings from residential sector programs (excluding load management) were:

- 128,768 kilowatts (kW) (demand reduction); and
- 416,519,806 kilowatt-hours (kWh) (energy savings).

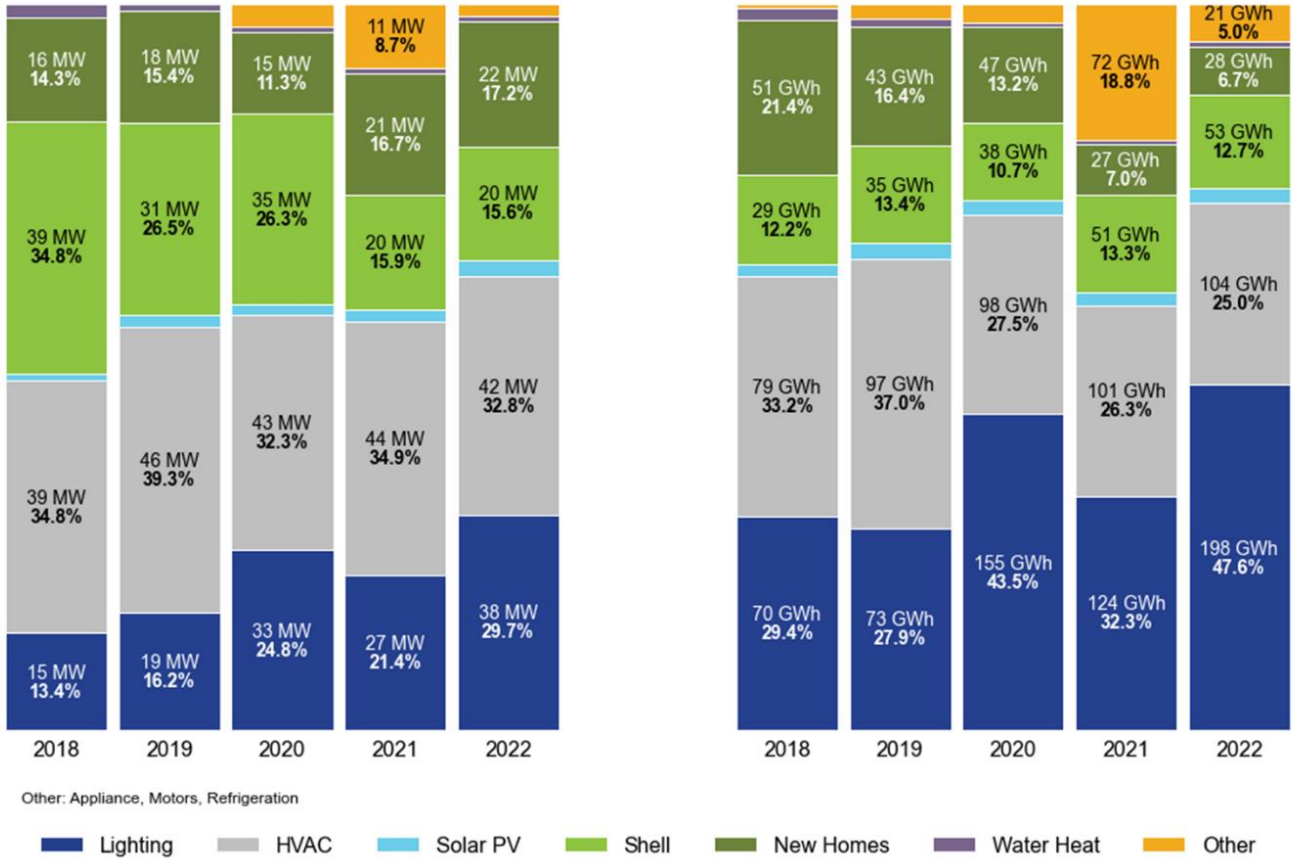
As seen in Figure 24, the demand reduction achieved in PY2022 rose slightly higher than in PY2021 to 129 MW. Energy savings continue to increase yearly, primarily driven by upstream lighting increases. PY2022 is the last year of residential lighting savings not affected by the Energy Independence and Security Act (EISA) backstop. Residential lighting savings are expected to decrease significantly in PY2023.

Figure 24. Total Statewide Demand Reduction and Energy Savings by Program Year—Residential Programs PY2018–PY2022



For PY2022, most residential demand savings (excluding load management) were derived from *lighting* and *HVAC* measures. Figure 25 presents the breakdown of savings by measure category and demonstrates that the utilities have successfully diversified their measure mix for residential savings.

Figure 25. Distribution of Statewide Demand Reduction and Energy Savings by Measure Category—Residential Programs PY2018–PY2022[21]



5.1.2 Cost-Effectiveness

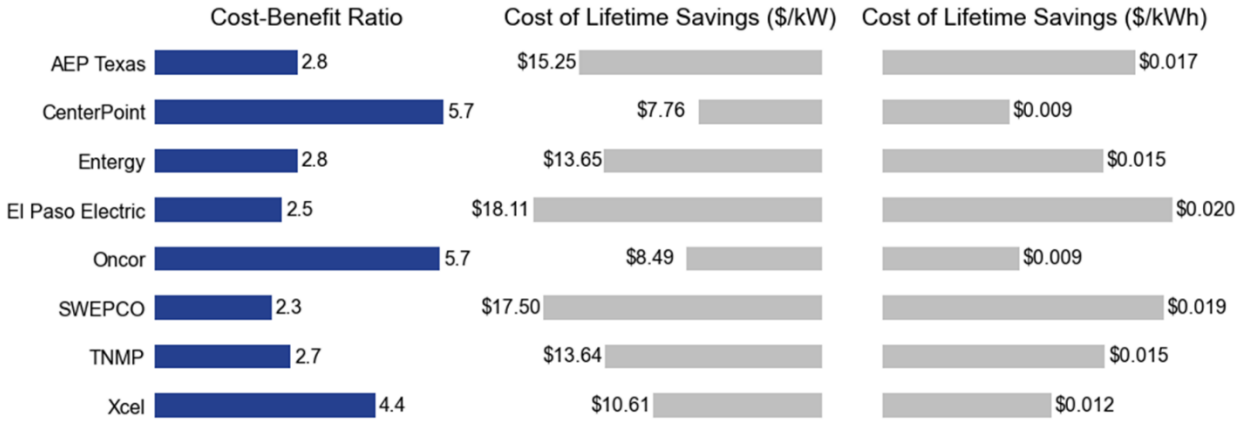
Residential sector programs' cost-effectiveness statewide is 3.6 based on gross claimed savings. Like the commercial sector, the residential sector's cost-effectiveness varied among utilities, with cost-effectiveness results ranging from 2.3 to 5.7; similarly, this is partly due to the differences in the types of programs offered by different utilities.

Figure 26 summarizes the cost-effectiveness of each utility's residential energy efficiency portfolio and the cost of lifetime kilowatt-hours and kilowatts for each utility's residential sector programs. The cost per kilowatt-hour ranges from $0.009 to $0.019, and the cost per kilowatt ranges from $7.76 to $17.50. These costs provide an alternative way of describing the cost-

[21] Values less than four percent have been suppressed for visualization purposes.

effectiveness of a portfolio of residential programs. Those portfolios with a higher cost-effectiveness ratio will have a lower cost to acquire savings and vice versa.

Figure 26. Cost-Benefit Ratio and Cost of Lifetime Savings—Residential Programs PY2022



5.2 PROGRAM OVERVIEWS

This section summarizes the key findings and recommendations from the PY2022 evaluation of residential energy efficiency projects. The residential standard offer programs (RSOP), hard-to-reach (HTR), low-income (LI) programs, and certain residential market transformation programs (RMTP) were *high* or *medium* evaluation priorities. The recommendations are to be considered by the utilities for PY2024 implementation and will also be incorporated into the PY2024 Texas Technical Reference Manual (TRM) 11.0 as appropriate.

The EM&V team evaluated the residential energy efficiency programs described below. Like the commercial energy efficiency programs, there are RSOPs and market transformation programs (MTP). The RSOPs provided by the Texas utilities offer standard incentives for a wide range of measures that are bundled together as a project to reduce system peak demand, energy consumption, and energy costs. The residential MTPs offered in Texas are designed as a strategic effort to make lasting changes in the market that result in increased adoption of energy-efficient technologies, services, and practices. MTPs are designed to overcome specific market barriers that prevent energy-efficient technologies from being accepted. HTR and LI programs are also offered to provide comprehensive energy efficiency retrofits for single-family and multifamily customers who meet the program's income guidelines on the residential side.

Residential SOP: The Residential SOP provides incentives to project sponsors for a wide range of retrofit measures that reduce demand and save energy, targeting retrofit measures for residential customers in single-family and multifamily buildings. Incentives are paid to project sponsors for qualifying measures that provide verifiable demand and energy savings. The program is open to all qualifying energy efficiency measures, including but not limited to *air conditioning*, *duct sealing*, *weatherization*, *ceiling insulation*, *water-saving* measures, and *ENERGY STAR® windows*.

Hard-to-Reach SOP: The Hard-to-Reach SOP provides incentives to project sponsors for a wide range of retrofit measures that reduce demand and save energy in residential buildings. This program is available to customers whose annual total household income is at or below 200 percent of current FPL. Incentives are paid to project sponsors for qualifying installed measures such as *air conditioning*, *air conditioner tune-ups*, *duct sealing*, *weatherization*, *ceiling insulation*, *water-saving* measures, and *ENERGY STAR windows*.

Residential Solutions MTP: The Residential Solutions MTP provides incentives to customers—through participating contractors—for a wide range of retrofit and new construction measures that reduce demand and save energy in residential buildings. The program also provides technical assistance and education on energy efficiency measures. This program is operated by one utility and is included in this section as it operates similarly to an RSOP.

Residential New Construction MTP: The Residential New Construction MTP provides incentives to builders to increase the efficiency of new homes above minimum code efficiency. The utilities partner with raters on this program, who inspect homes and provide energy models to describe the program-sponsored homes. The utilities compare these energy models with code to estimate energy savings.

Residential Upstream/Midstream MTP: The Upstream and Midstream MTPs provide incentives to residential and small commercial customers through in-store discounts at participating retailers and distributors or through an online marketplace for qualifying high-efficacy *LED lighting*, *smart thermostats*, *energy-efficient appliances*, and *other efficient equipment*. Offering and delivery vary by utility.

Hard-to-Reach Solutions MTP: The Hard-to-Reach Solutions MTP provides incentives to customers—through participating contractors—whose annual total household income is at or below 200 percent of current FPL. Incentives are provided for a wide range of retrofits and new construction measures that reduce demand and save energy in residential buildings. The program also provides technical assistance and education on energy efficiency measures. This program is operated by one utility and is included in this section as it operates similarly to an HTR SOP.

Targeted Low-Income Solutions: The Targeted Low-Income Solutions program offers an energy audit to qualified LI residents of Texas. Alternatively, the program offers a review of the home's energy efficiency and the installation of weatherization measures to increase the home's energy efficiency. A household qualifies if the income is at or below 200 percent of the FPL, and their home must be able to benefit from being weatherized. Then, after the audit is completed, the program gives financial and installation assistance to improve the home's energy efficiency.

5.2.1 Residential Standard Offer, Hard-to-Reach, and Low-Income Programs

Key Finding #1: Rightsizing HVAC equipment refers to properly sizing HVAC equipment capacity to optimize energy efficiency and comfort of the customer. The PY2022 TRM 9.0 allows for upsizing and downsizing if specific requirements are met. Downsizing measures allow for an increase in savings due to the lower capacity of the new equipment compared to the existing equipment. Upsizing is allowed but generally must use the more conservative new construction baseline to account for the higher capacity and efficiency gains of the new system. The TRM describes how to claim savings for these rightsizing scenarios but does not clearly define when these requirements are applicable.

Recommendation #1: Update the PY2024 TRM 11.0 to incorporate guidance on when the rightsizing threshold is triggered and to clarify what documentation is required for each scenario.

Key Finding #2: The utilities are following different rounding practices for the *HVAC* measures, including simple midpoint rounding, industry rounding, and others. Different rounding methods could cause inconsistencies in capacity or capacity bins used for calculations for different measures.

Recommendation #2: Update the PY2024 TRM 11.0 to incorporate guidance on which rounding practices to use and how to apply them to each measure.

Key Finding #3: In some cases, the EM&V site visit staff observed measures, such as *air purifiers*, that either had not been installed or were uninstalled by the resident.

Recommendation #3: Update the PY2024 TRM 11.0 to include in-service rates for applicable measures and different program delivery types.

Key Finding #4: While there has been an improvement in documentation, the EM&V team continues to find some cases where the e*lectric resistance heating* documentation is limited.

The EM&V site visit staff confirmed the heating type as a *heat pump* for a few projects where the heating type was tracked as *electric resistance*, but there was no documentation of *electric resistance heating*.

In addition, the EM&V team found during desk reviews where *electric resistanc*e was the tracked heating type, and documentation was provided, that in some cases, the documentation showed the heating type was a *heat pump*.

Recommendation #4a: For *envelope* and *HVAC* projects where *electric resistance* documentation is missing, the EM&V team will apply an adjustment factor to energy and demand savings. The adjustment factor will be determined in coordination with the TRM Working Group for PY2024 TRM 11.0.

Recommendation #4b: Increase quality assurance/quality control for *envelope* and *HVAC* projects where the tracked existing heating type is *electric resistance* to ensure all documentation is available and model numbers are legible for verification.

5.2.2 Residential New Construction MTPs

Key Finding #1: Documentation was incomplete or not readily available for all components of the projects. Some projects claimed deemed savings for additional prescriptive measures along with the modeled new home savings. However, documentation and tracking data for these measures were not consistent with the requirements in the prescriptive Residential TRM 9.0, Volume 2.

Recommendation #1: Ensure all measures are tracked individually, and documentation for additional prescriptive measures follows the *Program Tracking Data and Evaluation Requirements* Section in TRM Volume 2 under each measure.

Key Finding #2: Broadly, baseline conditions for the building system (e.g., envelope materials, fenestration characteristics) are set according to relevant codes and standards. However, the TRM allows for the use of baseline studies that demonstrate standard practice different than the statewide energy code.

Recommendation #2: Ensure baseline studies used to claim a different baseline than the code or standard are updated periodically to current market conditions.

5.2.3 Low-Income Verification Process Assessment

Starting in 2020, the EM&V team, PUCT staff, and utilities began collaborating to improve the verification process for the LI programs. This work culminated as part of the PY2021 EM&V effort to start implementation in PY2022. It was agreed that the objective of the process assessment was to "*Revise low-income/hard-to-reach eligibility verification to increase the confidence program services are going to intended customers, improve program outreach, address participation barriers, and develop efficient administration processes*." This objective was presented at the March 2021 EEIP meeting, and resulting TRM changes were presented at the October 2021 EEIP meeting. This section summarizes the process assessment recommendations, which utilities began implementing in PY2022. The PY2022 EM&V effort provides feedback on lessons learned from the first year.

5.2.3.1 Background

Texas utilities provide energy efficiency services to LI customers through a combination of HTR and LI programs as specified in 16 Tex. Admin. Code (TAC) § 25.181, relating to the energy efficiency goal. All regulated Texas electric utilities are required to achieve no less than five percent of their total demand reduction goal through programs serving HTR customers (16 TAC § 25.181(e)(3)(F)). In addition, the Electric Reliability Council of Texas (ERCOT) utilities are required to spend no less than ten percent of each program year's energy efficiency budget on a targeted low-income efficiency program (16 TAC § 25.181(r)). The qualifying income level of 200 percent of the FPL is the same for HTR and LI programs though the programs are implemented differently.

The utilities use program-eligibility certification forms maintained by the PUCT on their website. The forms differ for single-family and multifamily, but both include a way to qualify for the programs through other LI programs and services (Category 1) as well as through self-reported income (Category 2). The multifamily form requires documentation for qualifying programs under Category 1, but this documentation requirement is not included in the single-family form Category 1 instructions. On both forms, Category 2 self-reported income is signed by the customer under penalty of perjury and is subject to a PUCT audit.

The PUCT has revised the income eligibility annually based on updated FPL information, but the forms have not had major changes for over a decade. Due to the importance of these forms in determining program eligibility, PUCT staff and the EM&V team agreed to incorporate the forms into Volume 5 of the PY2022 TRM 9.0. As part of integrating the eligibility certification forms into the TRM, PUCT staff and the EM&V team worked with the utilities to perform an in-depth review of the forms and certification processes. The research and recommendations in this section are part of this in-depth review that informed the TRM additions.

EM&V team interviews with the utilities and property managers, comparisons of current practices with other LI programs, and a study commissioned by Oncor and conducted by the Texas Energy Poverty Research Institute (TEPRI) indicated an opportunity to increase the confidence level that the program services are going to the intended LI recipients. These activities also identified that verification requirements should be as streamlined as possible to avoid negatively affecting participation. The EM&V team worked collaboratively with PUCT staff and the utilities to revise the forms to include a number of expansions: (1) additional qualifying programs and services for Category 1 to provide more options to qualify for the program; (2) all

multifamily units with qualifying residents regardless of whether they are individually- or master-metered (3) allowing participants to qualify via geographic location through US Housing and Urban Development (HUD) LI information, and (4) allowing community action agencies and social services organizations throughout Texas already qualifying LI programs for other services to qualify customers for the programs. Even with expanded options, it was determined that an option to participate via income verification is still needed. Each utility was given the flexibility to verify Category 2 self-reported income before program approval in a more applicable manner for their programs.

5.2.3.2 Progress Update

In August 2023, the EM&V team interviewed utility staff to obtain feedback on how the new eligibility verification process was working. While utility staff reported that it was difficult to transition from self-reported income, the new geographic qualification has been helpful in addressing any barriers resulting from the transition as well as streamlining the qualification process. The geographic qualification is the most used criteria for customers to enter the program. The expanded list of programs and services was also reported as helpful, but it was also recognized that an exhaustive list is not possible and EM&V approval of "other" will still be needed. The most difficult pathway to qualification is Category 2 that uses income and supporting documentation is needed. While utilities are consistently requiring personal identifying information (PII) to be redacted by contractors, Category 2 remains the most difficult qualification process to implement and verify and best practices are still needing to be identified. A persistent area of identified improvement is if the IOUs could access the Texas Department of Housing & Community Affairs (THDCA) low-income customer list to qualify customers. While access to the THDCA list is in statute and therefore unable to be addressed directly by the EM&V team or Commission, it is noted that the IOUs believe this would be helpful to identify and serve more low-income customers.

5.2.4 Air Infiltration Consumption Analysis

We performed a consumption analysis for houses in the LI/HTR sector that had an *air infiltration* measure installed in the first half of 2021, with the goal of determining if the installed measure had an impact on the kilowatt-hour consumption for these homes. We had meter data from three utilities: AEP Texas, Entergy, and Oncor. After filtering the meters to ones with enough high-quality data, we analyzed almost 4,000 meters from AEP and Oncor. We found no significant difference in the weather-normalized consumption before and after the *air infiltration* measure was installed.

5.2.4.1 Filtering the Data

We had meter data for 11,875 meters across the three utilities. To ensure a robust analysis, we excluded meters that were either (1) missing data needed for the analysis or (2) containing erroneous data. The four criteria we used to remove meters were:

- the data has a starting date after 1/6/2020 or an ending date before 6/30/2022 (310 meters),
- the data has a negative kilowatt-hour reading (3 meters),
- the data has a gap greater than eight hours (7873 meters), and
- tracking data not available (49 meters).

After these exclusions, 3,862 meters remained that we were able to analyze.

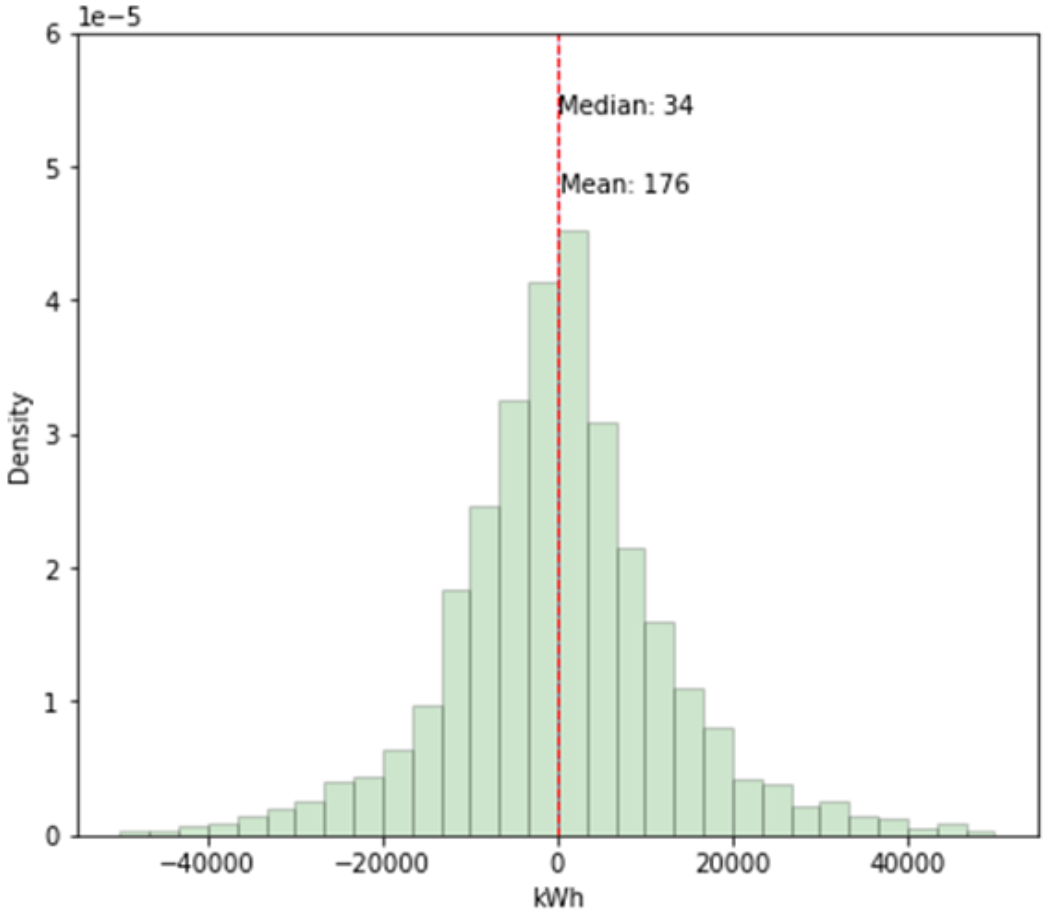
5.2.4.2 Weather Normalization

For each of the remaining meters, the kilowatt-hour consumption was normalized to remove the influence that temperature has on the consumption and to allow comparison between the consumption prior- and post-installation of the *air infiltration* measure. For each meter, the nearest weather station was located, the most probable heating and cooling setpoints were computed for that meter, and a model was determined to find the kilowatt-hour consumption as a function of temperature relative to the heating and cooling setpoints and the hour of the day. These models are computed separately prior- and post-installation of the measure to accurately capture the change resulting from the installation.

5.2.4.3 Results

The difference between the weather-normalized kilowatt-hour consumption before installation of the *air infiltration* measure and the weather-normalized kilowatt-hour consumption after installation was computed for each meter. The collection of all of the differences can be seen in the figure below.

Figure 27. Weather-Normalized Air Infiltration kWh Consumption Before and After Installation



As can be seen from the figure, the savings associated with the *air infiltration* measure for individual meters varied widely, with some meters having large differences (both positive and negative). Overall, though, the average savings associated with installing the *air infiltration* measure is not significantly different from zero. This result did not change when the data were separated into the two utilities we analyzed. Neither AEP Texas nor Oncor showed savings that were significantly different from zero.

A 90 percent confidence interval was computed to verify that the *air infiltration* measure did not have a significant impact on the analyzed meters. We found that the average impact of the installation was between losing 22,600 kWh and gaining 23,486 kWh with 90 percent confidence, meaning that the impact is not significantly different from zero.

6.0 LOAD MANAGEMENT PROGRAMS

6.1 SUMMARY RESULTS

This section presents statewide summary results, followed by key findings and recommendations from all relevant evaluation, measurement, and verification (EM&V) activities.

6.1.1 Savings

The total savings of the programs[22] were:

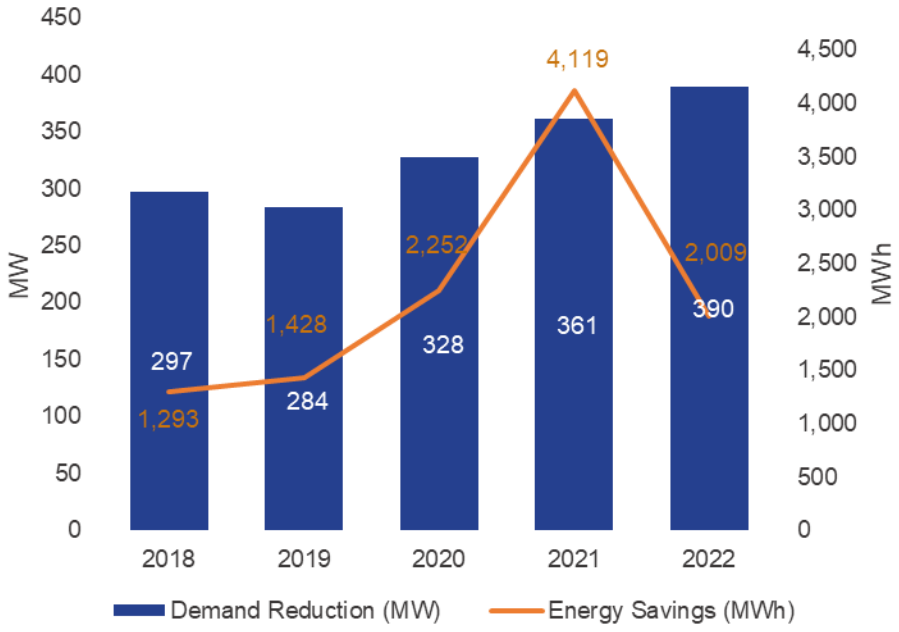
- 389,682 kilowatts (kW) (demand reduction), and
- 2,009,417 kilowatt-hours (kWh) (energy savings).

The load management programs demand reductions increased from PY2019 through PY2021. While we see a similar increase again in PY2022, this is primarily due to a new winter load management program as opposed to growth in the existing programs as in prior years. In response to Senate Bill (SB) 3 passed in the 2021 legislative session (87 R), the ERCOT utilities developed winter load management programs. Oncor included their winter load management program in its energy efficiency portfolio in PY2022. In PY2023, all four ERCOT utilities included winter load management programs in their energy efficiency portfolios. Therefore, demand reductions are expected to grow.

Figure 28 summarizes the megawatt and megawatt-hour savings of all load management programs from PY2018 to PY2022, with fairly consistent growth in megawatts from year-to-year. PY2021 saw a peak in energy savings due to incentivized smart thermostat savings being claimed in the program that year. In response to SB 1699 passed in the 2023 legislative session (88 R), residential load management may also grow in utilities' energy efficiency portfolios. As a result of SB 3 and SB 1699, both commercial and residential load management programs will see growth in PY2023, and likely subsequent years as discussed more below. Plans reported by the utilities to the EM&V team are summarized in *Section 6.3: Residential Load Management* appearing later in this report chapter.

[22] PY2022 total claimed savings include 34,722 kW demand reduction and 104,165 kWh energy savings from Oncor's Winter Commercial Emergency Load Management Pilot program.

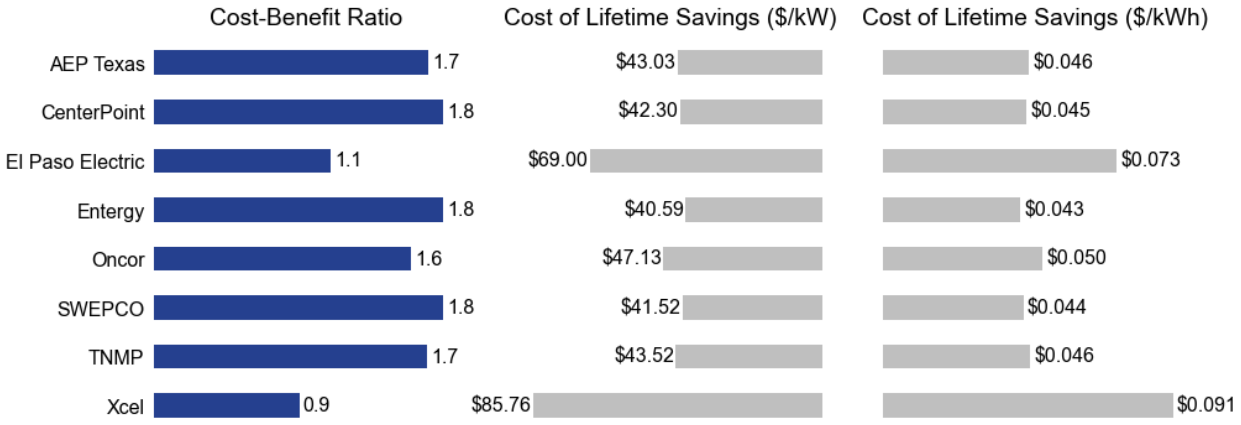
Figure 28. Total Statewide Demand Reduction and Energy Savings by Program Year—Load Management Programs PY2018–PY2022



6.1.2 Cost-Effectiveness

Figure 29 summarizes the cost-effectiveness of each utility's energy efficiency portfolio based on savings of all load management programs in PY2022. Most portfolios were cost-effective, ranging from 0.9 to 1.8. The cost per kilowatt ranged from $40.59 to $85.76, and the cost per kilowatt-hour ranged from $0.043 to $0.091. These costs provide an alternate way of describing the cost-effectiveness of a portfolio of programs. Those portfolios with a higher cost-effectiveness ratio will have a lower cost to acquire savings and vice versa.

Figure 29. Cost-Benefit Ratio and Cost of Lifetime Savings—Load Management Programs PY2022



6.2 COMMERCIAL LOAD MANAGEMENT

This section summarizes the key findings and recommendations from the PY2022 evaluation of the commercial load management programs offered by the eight Texas utilities.

The EM&V team applied the savings calculation methodology prescribed in PY2022 Technical Reference Manual (TRM) 9.0 on a census of records to calculate energy savings and demand reductions from interval meter data.

6.2.1 Programs Overview

Commercial load management programs are designed to manage kilowatt usage during summer peak demand periods. These periods are defined in most utility programs as 1:00 p.m. to 7:00 p.m., weekdays, June 1 through September 30. These programs are based on performance and offer incentive payments to participating customers for voluntarily curtailing electrical 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 (i.e., *double-dipping*).

Participants can either curtail their contracted load during a load control event or opt-out if they wish not to participate. Participants receive an incentive based on the kilowatts they curtail during the event. Savings for kilowatts and kilowatt-hours are calculated by following the methodology described in PY2022 TRM 9.0, and an incentive is given to a participant based on the amount of kilowatts saved. This incentive amount is specified in an agreement with the utility when enrolling in the program. Participating customers can receive up to $50 per kilowatt saved. Commercial customers who meet eligibility criteria for the utility can participate directly in the load management program or through an aggregator or other third party. PY2022 participation by site is summarized in Table 20 below. The percentage of commercial customers participating through an aggregator or a third party varies by utility. The majority of commercial load management participants in Oncor's programs are through an aggregator, in contrast to Entergy and SWEPCO, where all customers participate directly.

Table 20. PY2022 Commercial Customer Participation Summary by Utility

Utility		Number of sites	Number of sites served by aggregators or third party	Percentage
ERCOT	AEP Texas	15	7	47%
	CenterPoint	34	14	41%
	Oncor	496	433	87%
	TNMP	9	3	33%

Utility		Number of sites	Number of sites served by aggregators or third party	Percentage
Non-ERCOT	El Paso Electric	11	1	9%
	Entergy	8	0	0%
	SWEPCO	6	0	0%
	Xcel	7	1	14%
Overall		**586**	**459**	**78%**

6.2.2 Key Findings and Recommendations

Key Finding #1: Commercial load management programs continue to increase in terms of number of participants (1,348[23] participants in PY2022 compared to 825 in PY2021; 63 percent increase). While the average level of cooperation with curtailment events remains relatively high, it did drop (81 percent in PY2022 from 90 percent in PY2021).

As measured by the number of customers, participation has been steadily increasing since PY2018, thus resulting in higher savings. Of these participants, the majority (81 percent) curtailed load when requested for a curtailment event (1,094 of the 1,348 participants). The level of cooperation (ratio of enrolled participants compared to participants that were able to curtail) in PY2022 dropped for a few utilities resulting in an average level of cooperation lower than PY2021 (81 percent in PY2022 compared to about 90 percent in PY2021). The EM&V team determines this percentage based on sites with zero or negative savings. In some cases, this may be due to a meter or technical issue as opposed to non-performance. Two utilities, in particular, accounted for much of the decrease. A chain store account also accounted for many of the nonparticipating sites.

Recommendation #1: Follow up with participants who underperform during curtailment events to determine if future program participation or program-contract estimates of available demand reduction need to be revised. Include an indicator for participants with no savings due to a meter or other technical issue as opposed to a performance issue.

Key Finding #2: Utilities demonstrated strong capabilities to apply the TRM calculation method to savings.

PY2022 is the seventh year in which utilities and the EM&V team have applied the demand savings algorithm for commercial load management programs described in TRM 9.0. There is a mutual understanding of the *high 5 of 10* approach. The utility companies, implementers, and EM&V team were largely in agreement on final demand savings calculations.

Overall, the utilities applied the *high 5 of 10* method correctly to savings and matched the EM&V team's evaluated savings. The EM&V team noted, however, a minor discrepancy in one instance. When selecting baseline days using the *high 5 of 10* method for a few sites, the wrong day was selected as part of the baseline days because of a tie between two days. The EM&V adjusted the savings calculation to use the five highest loads closest to the event as baseline days.

[23] Number of participants includes 34 participants of Oncor's Winter Commercial Emergency Load Management Pilot program, which was launched in PY2022.

Recommendation #2a: Continue implementing the demand savings algorithm described in the TRM and keep active communications with the EM&V team to resolve minor discrepancies in savings calculations. These recommendations will ensure consistency across utilities and enhance overall accuracy and transparency.

Recommendation #2b: In case of a tie between the days used to calculate the baseline, follow the TRM guidance of selecting the five highest loads closest to the event. Additional clarification will be added to the TRM.

Key Finding #3: There is considerable stakeholder interest in utility load management programs; information on the programs and participants could be improved for easier public consumption.

Not all utilities have program manuals detailing the program processes on their websites, and not all program manuals are updated annually.

Recommendation #3: To foster a clear understanding of the program operations, provide easy online access to program manuals, update these manuals annually, and consider a summary of key metrics**.**

Key Finding #4: Program tracking data tended to lack complete participation information when assembled by a third-party program partner.

Recommendation #4: Work with third-party program partners as needed to improve participant tracking data.

Key Finding #5: Participants' familiarity with the program, as well as program satisfaction, are high, with some interested in learning more about certain aspects such as incentives, when and why events are called, including coordination with ERCOT, and other program options such as a winter load management program.

At least ninety percent of respondents indicated they are *somewhat* or *very familiar* with program components. When asked what they wish they understood better about the program, some participants indicated learning more about (1) savings and incentives calculations, (2) factors used to determine when to call a curtailment event, (3) the winter load management program, and (4) alignment with ERCOT events.

Satisfaction among customers is also high. Over 70 percent of the respondents rated overall experience and satisfaction with their utility and program a 9 or more on a 10-point scale. To improve the program, some customers suggested a post-event follow-up. Curtailment event feedback could collect information on how customers responded to events, educate participants on ways to respond, and answer any questions on incentive calculations.

Recommendation #5: Assess communication with program participants and the benefits of additional communication and education following curtailment events and as part of re-enrollments.

Key Finding #6: The potential for additional commercial load management program designs appears to be available as interest in participating in a winter load management program and/or a geographically focused program is high; average rankings for both are over 4 on a 5-point scale. There is less interest in a 24/7 program, which received an average ranking of 3.

When asked to rate their interest in other load management programs, on a 1 to 5 scale, where 1 was *not at all interested*, and 5 was *very interested* in participating, interest in a winter load management program scored highest with a mean score of 4.5. Interest in programs designed to reduce demand at certain locations based on electric system needs resulted in a mean score of 4.4. There was less interest in participating in a program that is 24/7 designed to reduce demand at certain locations based on electric system needs, with a mean score of 3.0.

Over half of the respondents who curtailed load indicated that demand reductions were either fully automated (27 percent) or partially automated (41 percent). Seventy-nine percent of respondents who participated in PY2022 curtailment events reported no loss in "personal comfort or productivity" for themselves or the building occupants because of demand reduction actions.

Recommendation #6: Continue to assess the role of commercial load management programs as part of the utility's overall energy efficiency portfolio within the context of grid and system reliability.

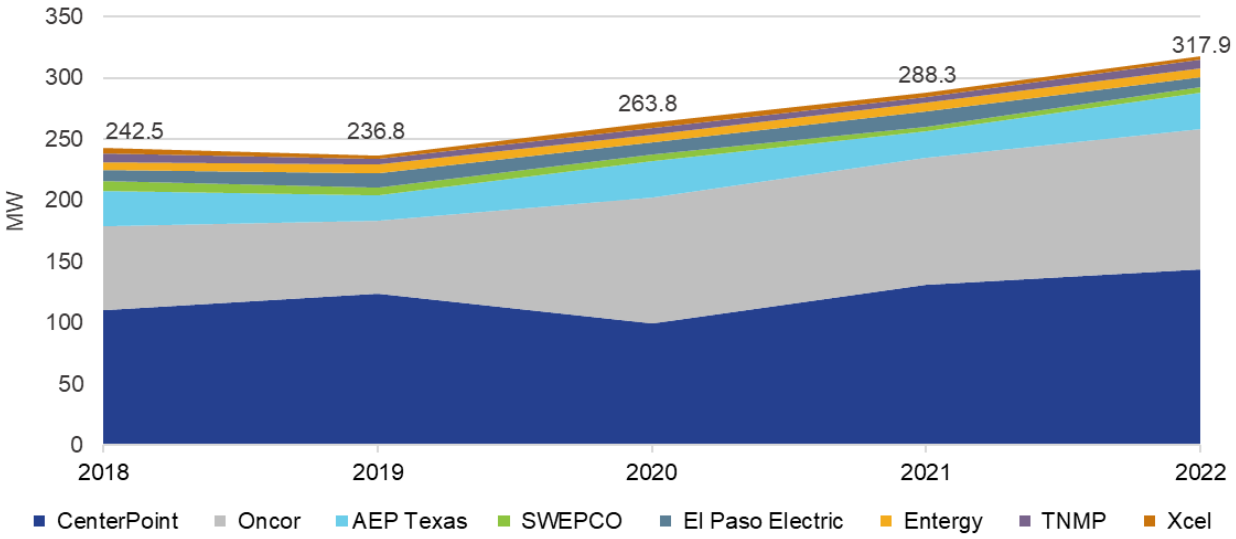
6.2.3 Impact Results

The total PY2022 savings of all commercial load management programs[24] were:

- 317,931 kW (demand reduction), and
- 1,325,637 kWh (energy savings).

The PY2022 savings show a continued increase from PY2021 by roughly 30 MW. CenterPoint has significant savings among the utilities' commercial load management programs; however, the addition of Oncor's winter load management program is a main driver of the growth in the statewide demand reductions from PY2021 to PY2022. Figure 30 shows total kilowatt savings from commercial load management programs by program year.

Figure 30. Demand Savings of Commercial Load Management Programs PY2018–2022



[24] PY2022 total savings include 34,722 kW demand reduction and 104,165 kWh energy savings from Oncor's Winter Commercial Emergency Load Management Pilot program.

Demand savings calculations for most utilities were calculated the same as the evaluation calculations, indicating that the EM&V team, the implementer, and the utilities follow the TRM algorithm for savings calculation similarly. Only two commercial load management programs adjusted their savings to match the evaluated savings. The reason for one of the adjustments is that, when comparing individual meter savings for one of the commercial load management programs, it was found that the utility was following a conservative approach by not setting savings to zero in cases where the calculation methodology produced negative savings. Per PY2022 TRM 9.0, in cases where the savings algorithm produces negative savings, the negative savings can be set to zero. The other adjustment was due to a discrepancy in the calculations for one of the commercial load management programs when a tie occurred between two baseline days. Both 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 kilowatts and 100.0 percent for kilowatt-hours.

6.2.4 Participant Survey Results

The EM&V team completed a telephone survey with commercial load management program participants to provide process insights for these programs. This section summarizes the survey findings from this survey effort. Below, we describe the study objectives and methodology and detailed findings.

Study Methodology

This process study assessed program participants' experiences with the program. Specifically, the evaluation aimed to characterize the customer experience in the following areas:

- program awareness and knowledge,
- curtailment process,
- energy management systems (EMS),
- customer satisfaction,
- suggestions for improvement, and
- interest in other types of load management programs.

The sample for the telephone survey was drawn from the list of customers in the PY2022 tracking databases. Texas utilities were responsive to the EM&V team's data request for this customer survey; however, the quality of the tracking data varied. While some utilities were able to provide detailed tracking data, including key contact names for customers enrolled in load management programs, other utilities provided less complete tracking data; this was especially true when a utility relied on a third party to implement its program.

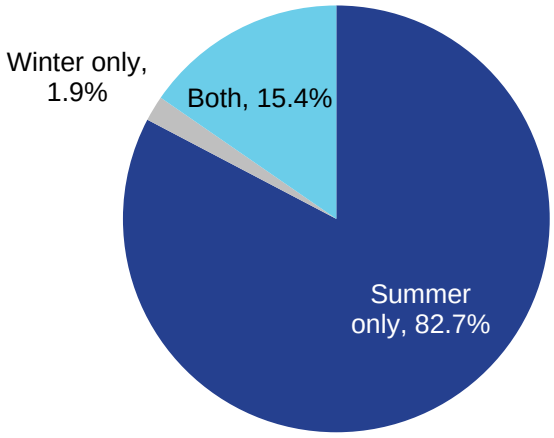
The EM&V team completed telephone surveys with a total of 52 commercial load management participants. The survey was conducted from June 13 through June 30, 2023, at Tetra Tech's in-house Survey Research Center in its Madison, Wisconsin office. Emails and letters were sent the week of June 5, 2023, to provide advance communication regarding the survey. Reminder emails were sent the following week. Table 21 documents the number of completed surveys by utility.

Table 21. Number of Surveys Completed

Utility	Number of total respondents
AEP Texas	2
CenterPoint	14
El Paso Electric	5
Entergy	4
Oncor	18
SWEPCO	3
TNMP	4
Xcel Energy	2
Total	**52**

In addition, the survey asked respondents about both summer and winter demand response programs when applicable. Eighty-three percent of respondents participated in the summer program only, 15 percent in both winter and summer programs, and two percent in the winter program only. Figure 31 shows the breakdown of participants by program type.

Figure 31. Participants by Program Type (n=52)

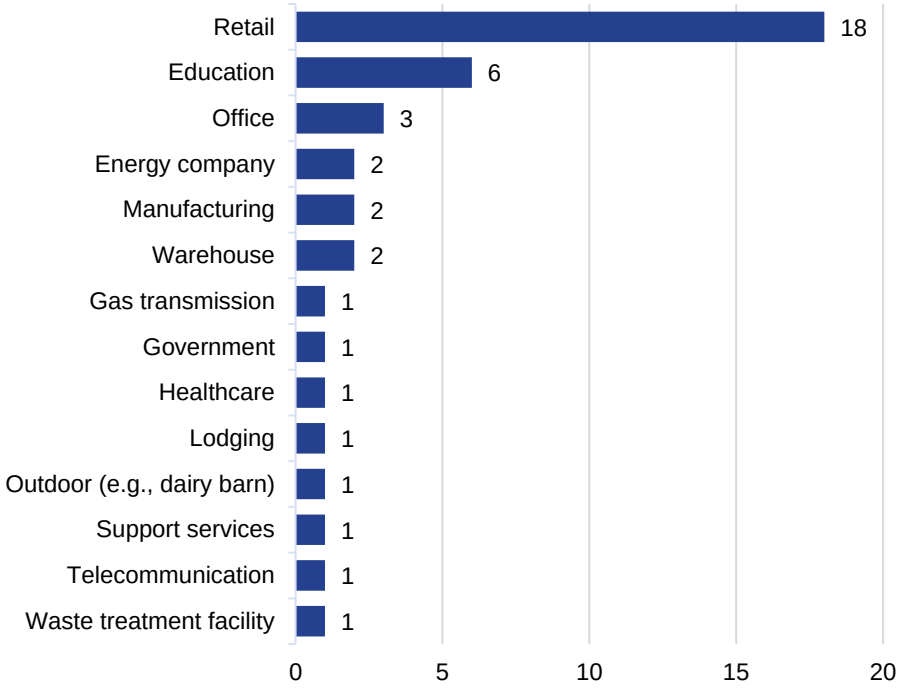


The evaluation revealed several positive findings, such as high satisfaction with the utilities. However, reaching program participants was deemed challenging despite multiple attempts (an average of 11 attempts across all program participants).

Participant Description

The survey respondent data were composed of accounts from various businesses. Figure 32 provides a breakdown of the business segments represented.

Figure 32. Respondents by Business Segment (n=41)



Source: Question FIRM1. *Don't know* responses are excluded.

Seventy-four percent of respondents surveyed operate modern facilities, defined within this analysis as operating a facility that was built after 1980. Customer buildings varied in size—for those customers who knew the square footage of their facility, 18 percent of respondent facilities were larger than 100,000 square feet, and 81 percent of respondent facilities were between 2,000 and 100,000 square feet.

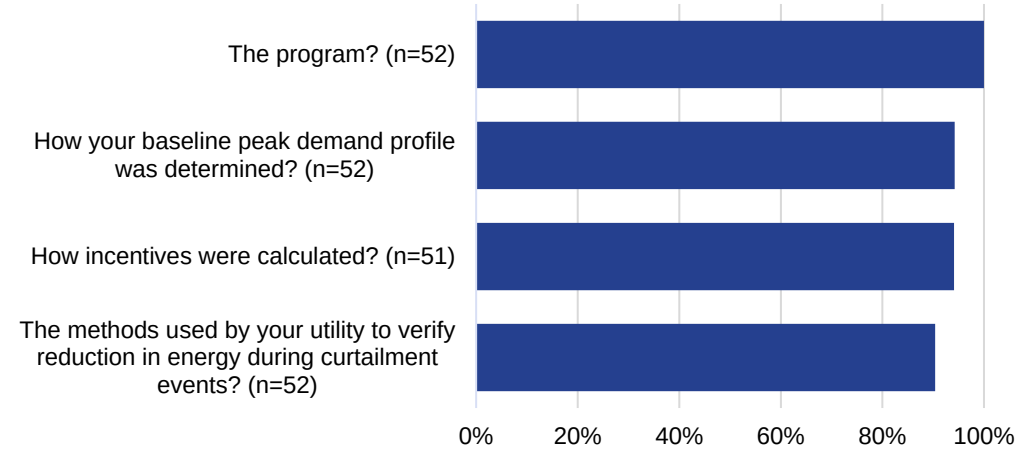
Most respondents (73 percent) reported operating hours from Monday through Friday with consistent hours, 18 percent reported a 24/7 operation, and 8 percent reported various operating hours. Over one-quarter of respondents (28 percent) indicated that their operation schedule varied according to the season or production cycle.

Program Awareness and Understanding

The survey gathered information about program awareness and understanding. Nearly all respondents attributed their program awareness to one of four main sources (multiple sources were allowed): a previous participant (58 percent), their utility (19 percent), their third-party aggregator or energy service company (ESCO) (6 percent), or the utility website (6 percent).

Familiarity with the program and program components is high. Surveyed respondents were asked to rate their familiarity with the program and program components using *very familiar*, *somewhat familiar*, or *not at all familiar*. All respondents expressed some level of familiarity with load management programs. Respondents were slightly less knowledgeable in their understanding of other program details. Specifically, a portion of respondents said they were *not at all familiar* with the calculation of incentives (six percent), determination of baselines (six percent), and verification of demand reduction during curtailment events (ten percent). Figure 33 shows the percentage of respondents who were either *very* or *somewhat familiar* with the program and program components.

Figure 33. Percentage of Respondents Who Were *Very* or *Somewhat Familiar* with the Program and Program Components



Source: Questions A2, A3, A3a, and A4. *Don't know* and *refused* are excluded.

When asked what they wish they understood better about the program, 32 respondents said *nothing*. Among the remaining 20 participants, the top four answers included how savings and incentives are calculated (n=8), how the utility determines to call a curtailment event (n=4), more information about winter load management (n=3), and how the program can align with ERCOT events (n=2).

The Curtailment Process

Respondents were asked how they were notified of curtailment events in PY2022 (they could provide answers for more than one notice method). Forty-eight percent of respondents said they received program emails, 25 percent received texts, and 35 percent received phone calls. All 47 respondents who could recall the event notifications said the communications were *very* or *somewhat effective*.

Fifty percent of respondents said that they were able to reduce their energy usage for all program events. The actual amount of curtailable load reported by respondents varied and ranged anywhere from 0 to 99 percent of peak load. Table 22 displays the range of answers presented by the surveyed respondents. Just over one-third of respondents (36 percent) who could recall the amount of load shed during PY2022 events indicated they shed between 26−50 percent of their load.

Table 22. Average Percentage of Peak Energy Demand Load Shed During PY2022 Curtailment Events

Average percentage shed	Percentage of respondents
0%	5%
1 to 10%	5%
11 to 25%	18%
26 to 50%	36%
51 to 75%	9%
76 to 99%	5%
100%	0%
Respondents (n)	**17**

Source: Question PA0. Only respondents who were able to curtail load were included in this table. *Don't know* and *refused* responses are excluded.

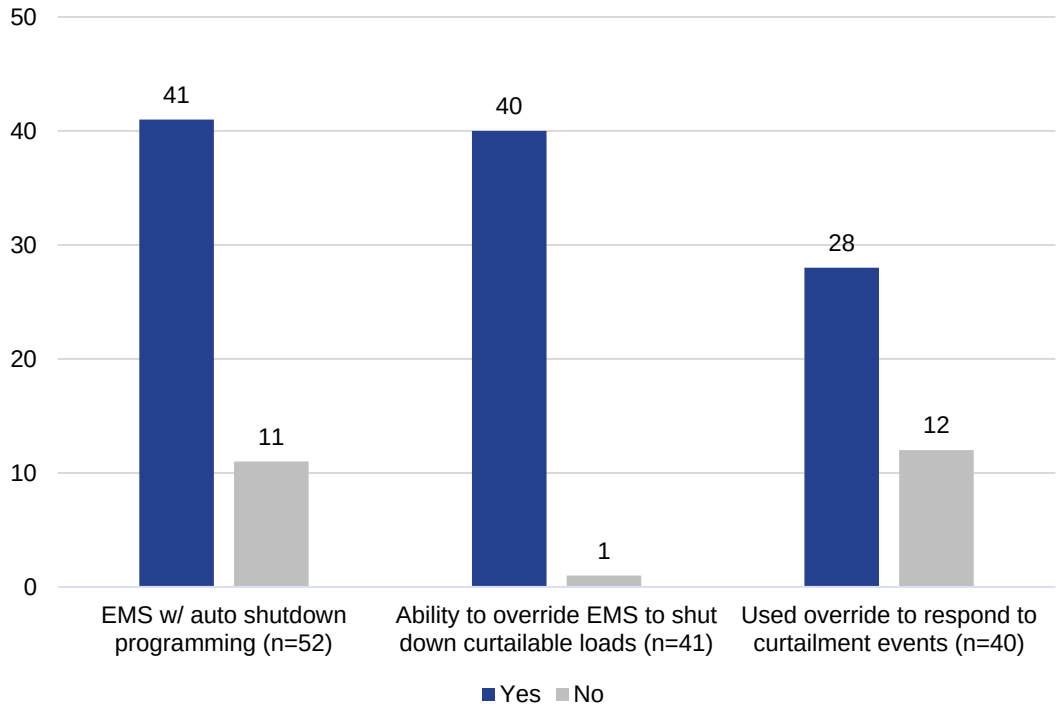
Nearly one-third of respondents (32 percent) who curtailed load indicated that demand reductions were manually operated; others indicated that such reductions were either fully automated (27 percent) or partially automated (41 percent). Seventy-nine percent of respondents who participated in PY2022 curtailment events reported no loss in *personal comfort or productivity* for themselves or the building occupants because of demand reduction actions. In comparison, 12 percent confirmed they did experience some loss or discomfort due to program participation. When probed to understand the program impacts, three respondents who confirmed some loss or discomfort due to program participation categorized it as feeling warm and/or uncomfortable; one respondent indicated a loss in production.

Most respondents (70 percent) recalled experiencing one to three curtailment events during the season. More than one-half of respondents (60 percent) reported that the number of events met expectations, 37 percent indicated there were fewer events than expected, and 3 percent of respondents reported that the number of events was more than expected.

Energy Management Systems

The EM&V team included several questions to understand if program participants have energy management systems (EMS) and how they are used during curtailment events. Figure 34 illustrates the respondents' capabilities using their EMS during curtailment events. Seventy-nine percent of respondents indicated that their facility has an EMS that can be programmed to automatically shut down certain operations during scheduled times. Of those respondents with EMS systems, 98 percent had the ability to override their EMS to shut down curtailable loads for the events called by the utility program. Seventy percent of respondents with override capability indicated they used override during an event. Although 70 percent (28 respondents) indicated they used the override function, only 7 respondents were able to remember how many events they used override to curtail. Six respondents indicated they used the override function for all events, and one indicated using it for only one event.

Figure 34. Participant Energy Management System (EMS) Capabilities



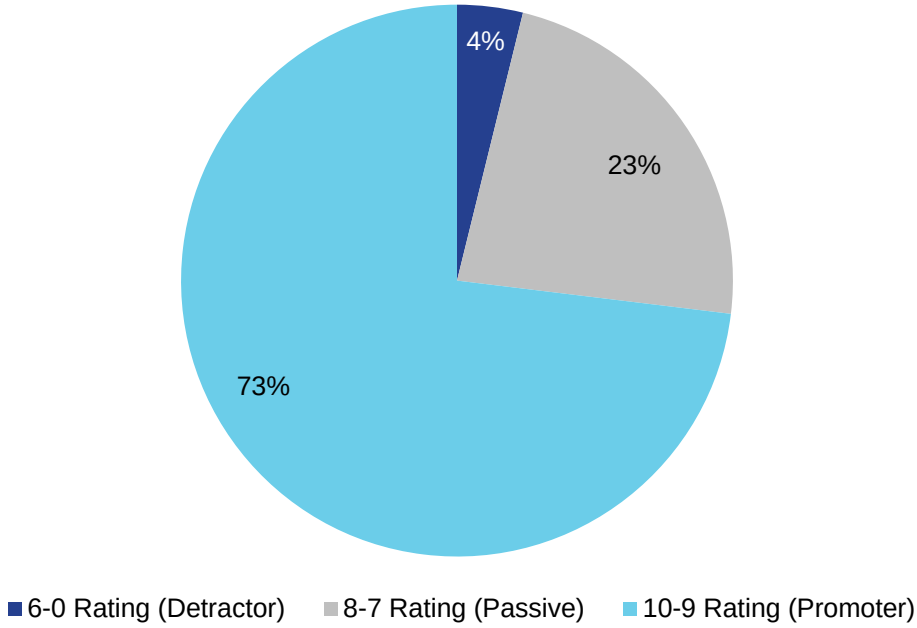
Source: Questions EM1, EM2, and EM3. *Don't know*, *refused*, and *not applicable* responses are excluded.

Customer Satisfaction

Satisfaction with the electric utility as an energy provider is high. Respondents were asked to rate their overall experience and satisfaction with their electric utility (not just with the program) on a scale of 0 to 10, where 0 was *very dissatisfied*, and 10 was *very satisfied*. Seventy-six percent of the respondents rated their overall experience and satisfaction with their utility a 9 or more. The overall mean satisfaction score with the utility was 9.3 on the 10-point scale. The lowest score (a score of 5) was provided by one respondent. When asked to provide a reason for the low score, the respondent mentioned that they lost their point of contact and that power is still out in certain areas.

Surveyed respondents were also pleased with the commercial load management program, and overall program satisfaction was high. Seventy-three percent rated their overall program satisfaction a 9 or more, resulting in an overall mean satisfaction score of 9.2 on a scale of 0 to 10, where 0 was *very dissatisfied,* and 10 was *very satisfied*. Figure 35 provides an overview of program satisfaction. The lowest score (a score of 5) was provided by one respondent. When asked to provide a reason for the low score, the respondent did not provide an answer.

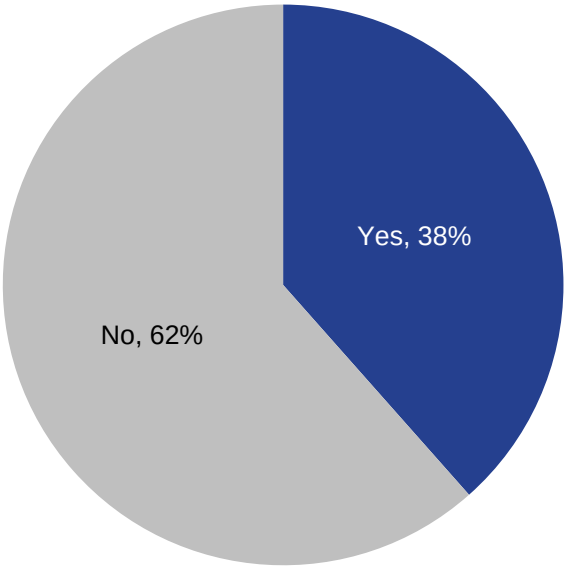
Figure 35. Overall Program Satisfaction (n=52)



Source: Question SAT2.

While there was high utility and program satisfaction, less than one-half (38 percent) of respondents have recommended the program to others, as presented in Figure 36.

Figure 36. Percentage of Respondents that Recommended Program to Others (n=52)



Source: Question SAT5.

Suggestions for Improvement

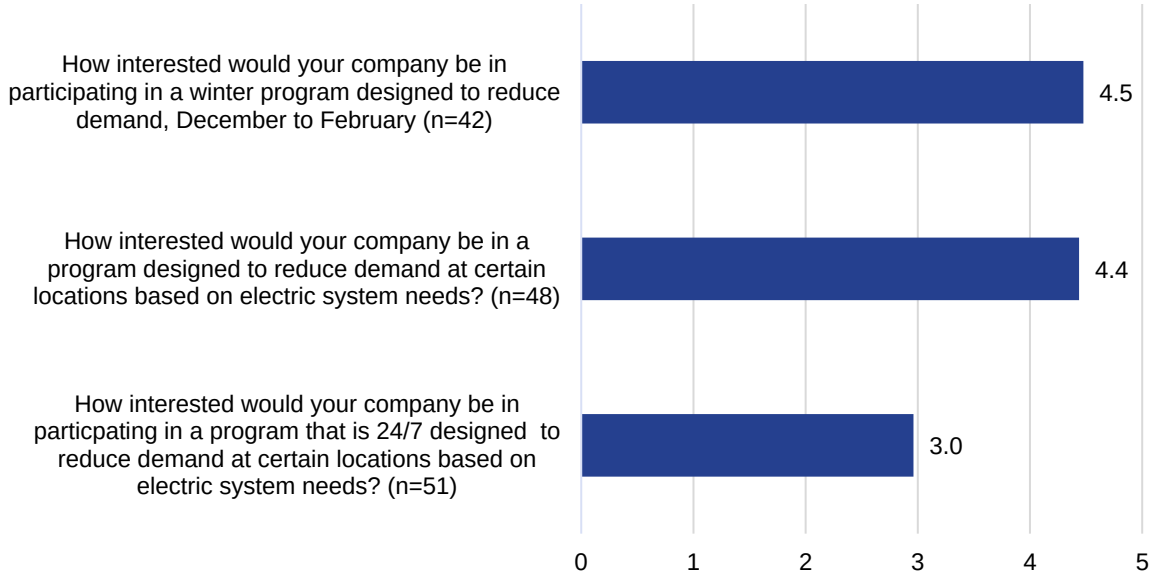
Surveyed respondents were asked for suggestions on how to improve the program. Sixty-five percent of respondents indicated that they did not have program feedback for change. One-third (33 percent) of respondents offered constructive feedback (multiple responses were allowed); their comments are summarized in the paragraphs below. These suggestions reflect the statements from respondents surveyed and are not necessarily endorsed by the EM&V team.

- *Program Communication.* When asked about the aspects of the program that should be changed, communication around events and enrollment was mentioned by six respondents. Two provided clarifications explaining they would like more advanced notification of events. Additionally, three comments centered on better communication on the timing of enrollment for the program and how the program aligns with "other" programs. One respondent complemented the communication, "*Please keep up the great work*."
- *Change to Curtailment Events.* Curtailment events may last up to four hours, and start and stop times can vary. Two respondents indicated they would like changes to the events themselves. Among those who expanded on their sentiment, one respondent would like events to have shorter duration but happen more frequently. The other comment indicated they would like events called "*more spread out*" versus clustered in one or two weeks of each other.
- *Increased Incentives/Expand the Program.* Six respondents provided comments that were themed around increased incentives and program expansion. One respondent specifically suggested paying more money per event and expanding the program to include more buildings.
- *Post-Event Follow-Up.* With interest in expanding programs and offering new load management program types, the EM&V team would like to highlight the requests from several participants in past surveys, including the Oncor Winter Load Management Pilot program customer interviews, analysis, and write-up that indicated customers would like post-event follow-up. Event feedback could be helpful to both the program—by helping to educate their participants on how to get the most out of each event—and to participants, as they gain the satisfaction of curtailing to the maximum amount possible for them and collecting the highest incentive amounts for their efforts.

Interest in Other Types of Load Management Programs

Survey respondents were asked a series of questions about their interest in participating in other load management programs (Figure 37). Respondents were asked to use a 1 to 5 scale, where 1 was *not at all interested*, and 5 was *very interested* in participating. Overall, interest is high in expanding load management program types. Interest in a winter load management program scored highest, with a mean score of 4.5. Interest in programs designed to reduce demand at certain locations based on electric system needs resulted in a mean score of 4.4. There was less interest in participating in a program that is 24/7, designed to reduce demand at certain locations based on electric system needs, with a mean score of 3.0.

Figure 37. Interest in Participating in Other Types of Load Management Programs



Source: Question SAT6, SAT7, and SAT8. *Don't know*, *refused,* and *not applicable* responses are excluded.

Respondents were asked to expand on why they were or were not interested in participating in each program type. Their responses were analyzed for common themes and categorized; Table 23 below outlines the top three categorized responses for each program type.

Table 23. Interest in Participating in Other Types of Load Management Programs (High/Low) and Reason

Program type	Three most frequent responses	Number of respondents
Winter program designed to reduce demand from December to February	High–no significant impacts on business	18
	High–positive financial impacts	9
	Low–uncertain about the ability to reduce demand	3
A program designed to reduce demand at certain locations based on electric system needs	High–no significant impacts on business	19
	High–positive financial impacts	11
	Low–need to evaluate impacts	3
24/7 program designed to reduce demand at certain locations based on electric system needs	Low–not a 24/7 operation	24
	Low–negative financial/business impacts	9
	High–positive financial impacts	5

Source: Question SAT6a, SAT7a, and SAT8a.

6.3 RESIDENTIAL LOAD MANAGEMENT

This section summarizes the key findings and recommendations from the PY2022 evaluation of three Texas utilities' residential load management programs (Oncor, CenterPoint Energy, and El Paso Electric). Entergy is piloting a residential load management program in 2023, and TNMP, AEP, and SWEPCO are considering a 2024 pilot. Xcel offers a residential demand response program but not as part of its energy efficiency portfolio.

Two utilities calculated savings using interval meter data following the *high 3 of 5* method; the third utility used the *deemed savings* method from PY2022 TRM 9.0.

6.3.1 Program Overviews

Residential load management programs are designed to manage kilowatt usage during summer peak demand periods. Three of the eight Texas utilities offer their customers a residential load management program. Of the three, two programs utilize a smart thermostat control strategy, and the other program utilizes direct load control devices. Incentives for these programs differ by whether or not the utility's service territory is part of the Electric Reliability Council of Texas (ERCOT) market. Utilities in the ERCOT market receive an incentive based on the kilowatt savings achieved during the load control season; in contrast, non-ERCOT utilities pay a flat enrollment incentive and a flat incentive per program year. Participants are allowed to opt out of a load control event.

Participants in two of the three residential programs are evaluated individually using the *high 3 of 5* method described in PY2022 TRM 9.0. In contrast, the other residential program is evaluated using the deemed savings value measured specifically for the utility (see TRM 9.0, Volume 2, Smart Thermostat Load Management). The availability of advanced metering infrastructure meters dictates a utility's methodology to calculate savings.

All utilities define their control seasons as June 1 to September 30, with possible load control events happening 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 non-ERCOT utilities.

6.3.2 Key Findings and Recommendations

Key Finding #1: The three residential load management programs had seen significant increases in participation. Due to budget and participation limits in utilities' PY2022 plans, savings and participation slightly decreased. However, if needed, the potential for growth appears to be available. About two-thirds of the surveyed participants who recall participating indicated that they plan to continue to participate in the program, and over one-half would also participate if the program were to expand to winter months or year-round.

About two-thirds (62 percent) of respondents plan to continue participating in the residential load management programs in 2023. Twenty-two percent of participants indicated they would not be participating, while 16 percent did not know. Respondents who answered *no* or *don't know* (n=28) were asked to clarify their answers. The most frequently mentioned reasons for not wanting to participate were wanting to have control over their thermostat (n=7) and moving or switching energy providers (n=5).

When asked if they would participate if the program was to expand to the winter months or year-round, 39 of the 75 respondents (52 percent) said *yes*, while only three said *no*, three did not know, and 30 did not provide an answer.

Recommendation #1: Continue to explore cost-effective ways to increase participation and savings for the residential load management programs if needed in the portfolios, including expanding into underserved segments such as multifamily homes, additional devices beyond smart thermostats such as water heaters, and expanded control periods beyond summer as needed for grid or system reliability.

Key Finding #2: Due to the unique aspect of the *deemed savings* method (using runtime data and a deemed savings value instead of interval meter data), the approach used to identify participating thermostat devices is critical. TRM language related to the *deemed savings* method has been improved in the past few years, and there is now a mutual understanding of the approach. The utility, implementer, and EM&V team agreed on a final demand savings calculation. In PY2022, documentation for participating thermostat devices has been improved, resulting in only minor savings adjustments. Given the amount of prior program year data available for the ERCOT utilities using census interval meter calculations, a deemed value could also be developed to streamline residential participation for additional utilities, employing the same participation documentation requirements established for the non-ERCOT utility.

Recommendation #2: Explore the development of a residential demand response value beyond the one utility, given the prior program year participation data available for the other two utilities. If additional utilities employ a *deemed savings* method, participation documentation and a clear definition of each data field will still be needed for EM&V reviews.

Key Finding #3: Program tracking data tended to lack complete participation information when assembled by a third-party implementation contractor.

Recommendation #3: Work with third-party program implementation contractor to improve participant tracking data.

Key Finding #4: Participants' program awareness and understanding is low. Many respondents were uncertain how they heard about the program or were not aware that they were even participating. Of those who remember events were called, about 85 percent did not know the actual number of events that occurred in summer 2022.

Recommendation #4: Assess communication with program participants and the benefits of additional communication and education through multiple channels (text, email, phone calls, mailers) outside of called events. Communication could enhance program awareness, participation, and overall program satisfaction and should occur at least annually during re-enrollment.

Key Finding #5: Overall, the most frequently mentioned motivation for program participation was supporting the grid and/or doing the right thing.

For those participants who rated their overall program satisfaction scores as the lowest, most claimed that the program was marketed to them as saving energy and money, but those results were not always realized.

For participating customers, understanding the incentives they would receive proved to be the most confusing part of the program. In some cases, customers claim they never received an incentive.

While one-quarter of participants rated their home as the highest efficiency level, of the other respondents, 60 percent were interested in additional energy efficiency offerings through a utility program.

Recommendation #5: Leveraging the marketing messages of supporting the grid and being upfront on expected incentives—coupled with additional education on energy efficiency tips to save money—may support a more positive customer experience and long-term participation. There is also an opportunity to cross-market energy efficiency programs with demand response participants.

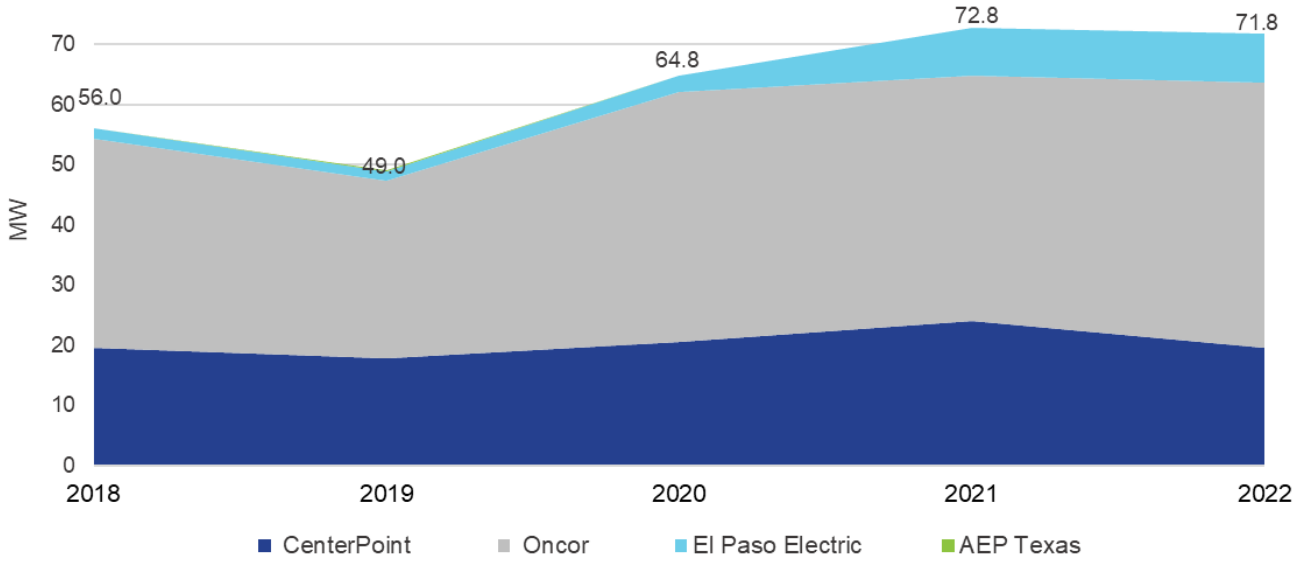
6.3.3 Impact Results

The total PY2022 savings for the four utilities (CenterPoint, Oncor, El Paso Electric, and AEP Texas) were:

- 71,750 kW (demand reduction), and
- 683,779 kWh (energy savings).

After the continued increase since PY2019, the PY2022 savings show a slight decrease from PY2021 by roughly 1 MW. Figure 38 shows total megawatt savings from residential load management programs by program year (note that AEP Texas discontinued its residential load management program after 2017). Since PY2018, Oncor has had the most significant savings amongst the utilities' residential programs, followed by CenterPoint.

Figure 38. Demand Savings of Residential Load Management Programs PY2018–2022



6.3.4 Participant Survey Results

The EM&V team completed a telephone survey with residential load management program participants to provide process insights for these programs. This section summarizes the survey findings from this survey effort. Below, we describe the study objectives, methodology, and detailed findings.

Study Methodology

This process study assessed program participants' experiences with the program. Specifically, the evaluation aimed to characterize the customer experience in the following areas:

- program awareness and motivation,
- participation process,
- program experience,
- customer satisfaction,
- suggestions for improvement, and
- future program interest.

The sample for the telephone survey was drawn from the list of customers in the PY2022 tracking databases. Texas utilities were responsive to the EM&V team's data request for this customer survey; however, the contact information was limited: about one-third of CenterPoint and Oncor's sampled participants and less than 15 percent of El Paso Electric's sampled participants did not have telephone contact information.

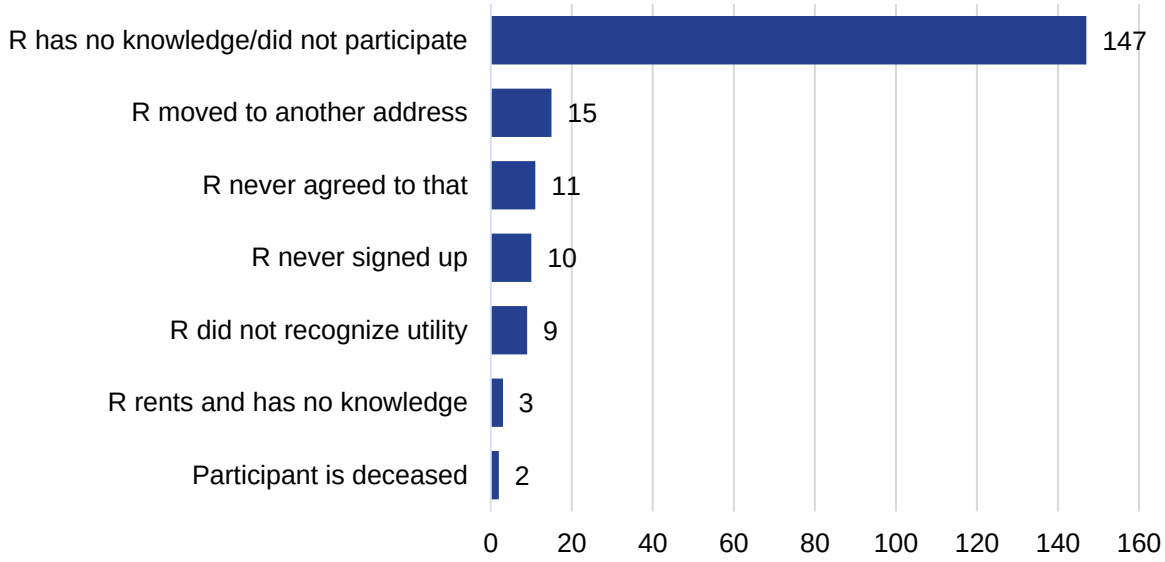
The EM&V team completed telephone surveys with a total of 275 residential load management participants. The survey was conducted from June 7 through June 28, 2023, at Tetra Tech's in-house SRC in its Madison, Wisconsin office. Emails and letters were sent the week of June 5, 2023, to provide advance communication regarding the survey. Reminder emails were sent the following week. Table 24 documents the number of completed surveys by utility.

Table 24. Number of Surveys Completed

Utility	Number of respondents who recalled participating in the program	Number of respondents who did not recall participating in the program	Total number of respondents
CenterPoint	28	64	92
El Paso Electric	5	4	9
Oncor	42	132	174
Total	**75**	**200**	**275**

The evaluation revealed several positive findings, such as high satisfaction with the utilities. However, a relatively large number of respondents (almost three-quarters) did not recall participating in the program (n=200), indicating low program awareness. Survey respondents were asked additional open-ended probing questions to ascertain the reasons for not remembering the program. Figure 39 illustrates themes from the open-ended responses, with the most common theme being that the respondent (R) had no knowledge of the program and reported not participating (n=147).

Figure 39. Explanation for Not Recalling Program Participation (n=197)



Source: Question INTRO and call notes. *Refused* responses are excluded.

The following sections illustrate survey results from customers who recalled participating in the program (n=75).

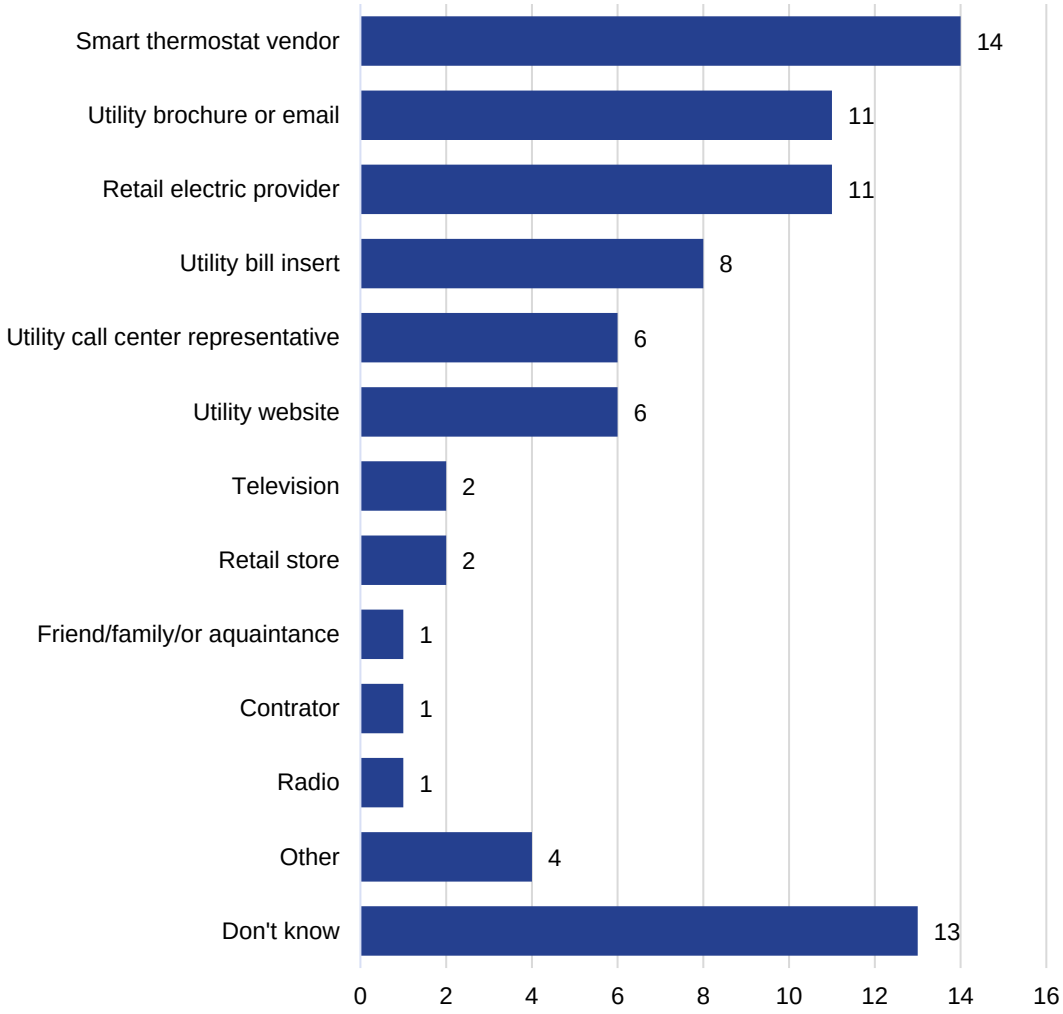
Participant Description

The telephone survey respondent data were composed mostly of homeowners, with 93 percent of the survey respondents saying they owned their home and 7 percent saying they rented. Most respondents (93 percent) lived in single-family, detached homes; roughly half of the homes were built before or in 1995 and are 2,000 square feet or less. Over one-third of the survey respondents reported using electricity as the primary fuel for heating and water heating. Over two-thirds live in homes. Nearly half (46 percent) of the respondents have lived in their homes for five years or less.

Program Awareness and Motivation

The survey gathered information about program awareness, motivation to participate, and interest in other energy efficiency programs. Survey respondents were asked how they learned about the program (Figure 40). The top three sources to which respondents attributed their program awareness were (1) their smart thermostat vendors, such as Nest and Ecobee (14 of 75 respondents); (2) a utility brochure or email (n=11); and (3) their retail electric provider, such as Reliant and Chariot Energy (n=11).

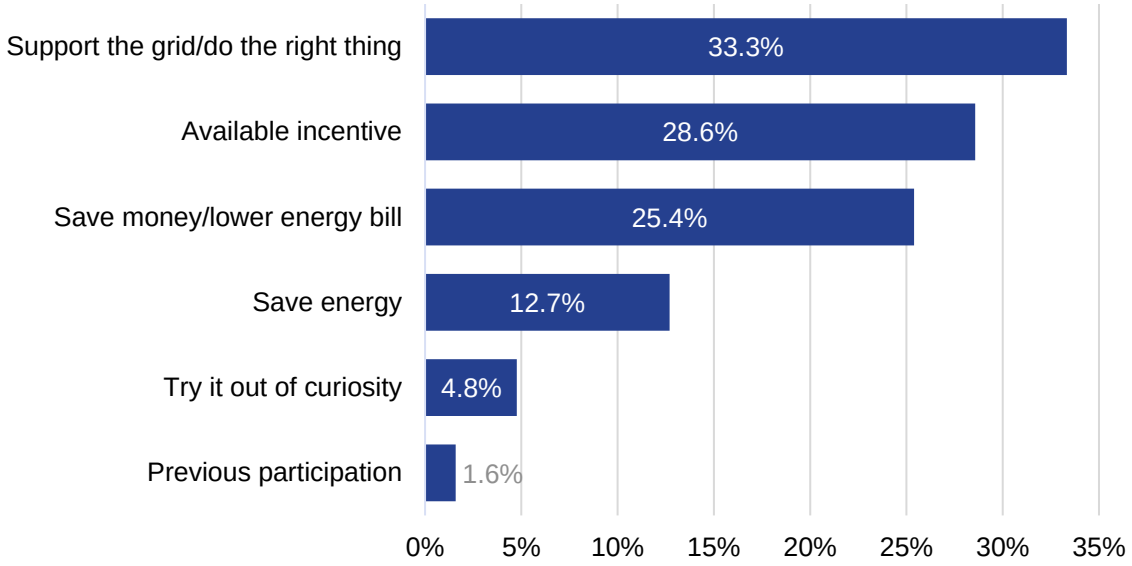
Figure 40. Sources of Awareness (n=75)



Source: Question PA1. Multiple responses were allowed.

When asked to share their main reason for participating in the program, respondents' reasons for participation varied (Figure 41). Supporting the grid and/or doing the right thing was named by one-third of the respondents as their main reason for participating in the program, followed by the available incentive (29 percent). Respondents also named saving money or lowering their energy bill (25 percent), saving energy (13 percent), or trying the program out of curiosity (4 percent) as key motivators for participating.

Figure 41. Main Motivation to Participate (n=63)

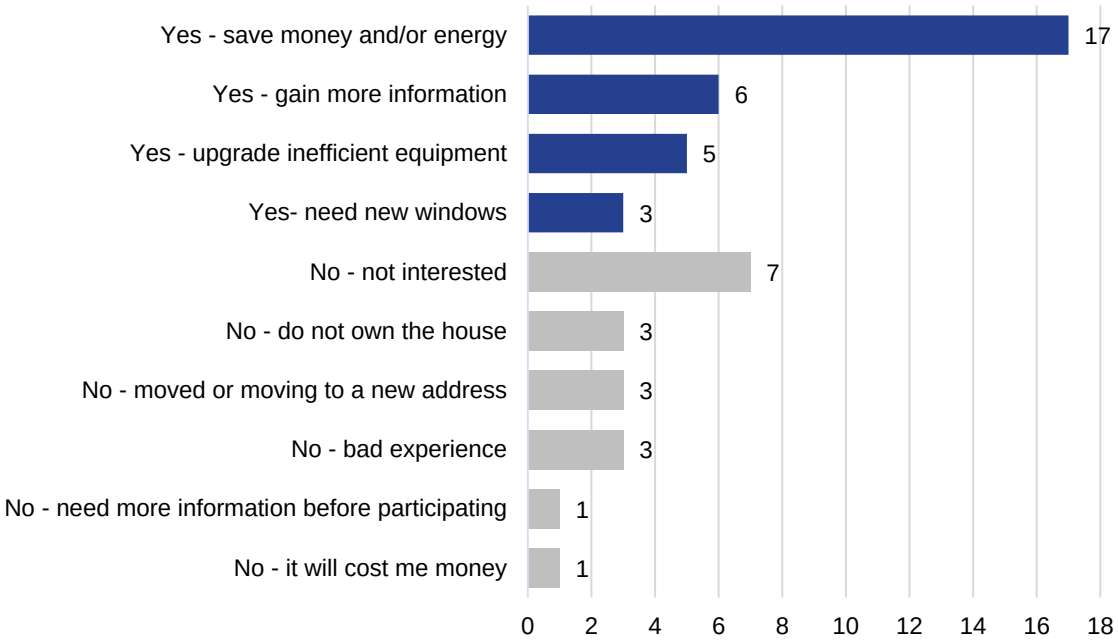


Source: Question PA2. Multiple responses were allowed. *Don't know* responses are excluded.

Customers were asked additional questions to assess their interest in other energy efficiency programs. When asked to rate the efficiency of their home on a scale of 1 to 5, where 1 is *not at all energy efficient*, and 5 is *very energy efficient*, 28 percent rated their home efficiency a 5, two-thirds rated their home efficiency a 4 or 3, and the remaining 5 percent rated their home efficiency less than 3. Survey respondents who provided a home efficiency rating of 4 or less (n=53) were asked if they would be interested in participating in a program sponsored by their utility that would provide financial incentives and technical assistance to improve the efficiency of their home, 31 respondents said *yes* (60 percent), 18 respondents said *no* (35 percent), and three respondents did not know.

When asked to expand as to why they would (*yes*) or would not participate (*no*) in a program sponsored by their utility, responses varied. Figure 42 details the themes that emerged from categorizing respondents' answers (n=49). The most common reason for participating was saving money and energy and/or improving comfort in their homes (n=17). The most common reasons for not participating were not being interested (n=7) or needing more information (n=7).

Figure 42. Interest in Participating in Other Programs Sponsored by Utility (Yes/No) and Reason (n=49)



Source: Questions D9 and D10.

Participation Process

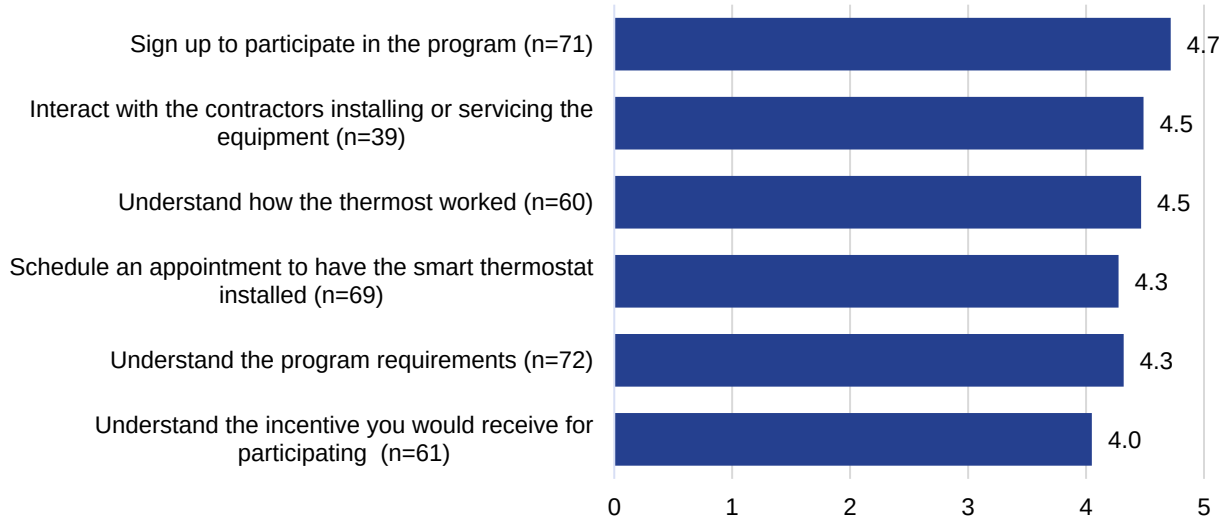
The survey asked customers to rate the ease with various aspects of the residential load management programs. Figure 43 details respondents' ease with various program components. Respondents were asked to use a 1 to 5 scale, where 1 was *very difficult*, and 5 was *very easy* program interaction. All program components scored an average mean of 4 or above.

Overall, respondents found it *very easy* (n=55) or *easy* (n=12) to sign up to participate in the program. Of those respondents who interacted with contractors to install or service the equipment, 62 percent indicated it was *very easy* (n=24). Ninety-one percent of respondents found it *very* easy (n=34) or *easy* (n=21) to understand how the thermostat works. When scheduling an appointment to install the smart thermostat, 91 percent of respondents indicated it was *very easy* (n=27) or *easy* (n=36). Seventy-nine percent of respondents found the program requirements *very easy* (n=40) or *easy* (n=17) to understand, while 21 percent were *neutral* (n=11) or found the program requirements *difficult* (n=2) or *very difficult* (n=2) to understand.

Based on survey results, the most difficult experience in the program was understanding the incentives received for participating, with 41 percent of respondents indicating it was *very easy* (n=25) and 15 percent indicating it was *very difficult* (n=9).

Although signing up for the program is viewed as simple, understanding and/or remembering the requirements, incentives, and benefits will help encourage ongoing participation. Utilities may consider ongoing education to remind customers of the program requirements, incentives, and benefits to Texas.

Figure 43. Ease with Various Aspects of the Residential Load Management Programs—Mean Scores



Source: Questions P1A through P1F. *Don't know*, *refused*, and *not applicable* responses are excluded.

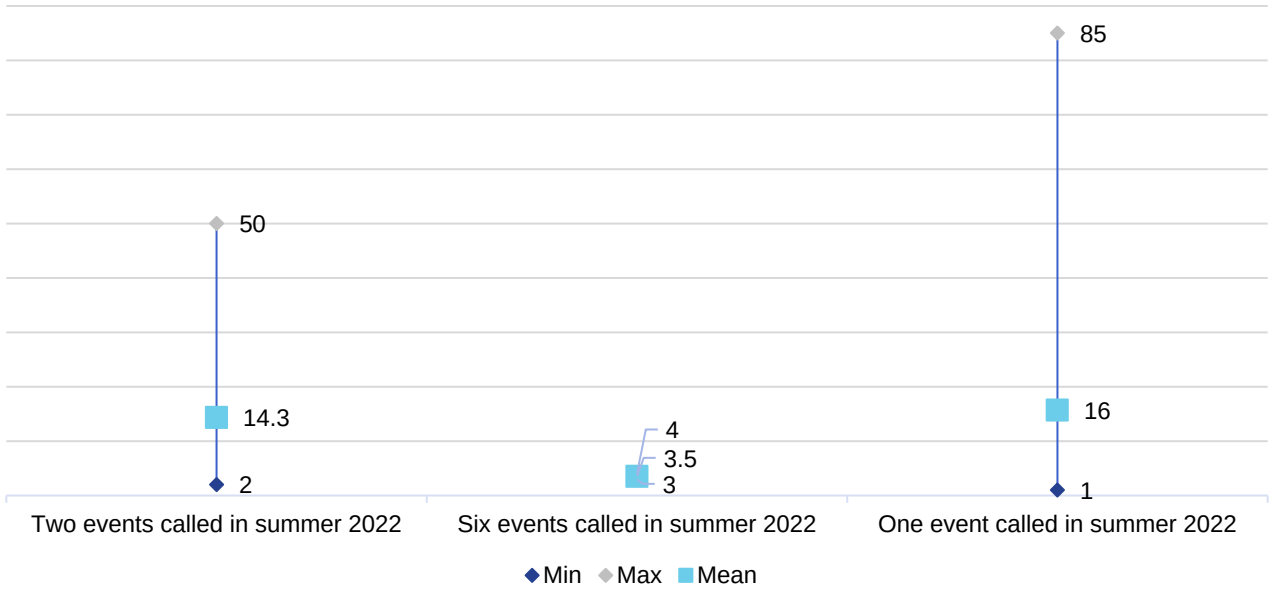
Eighty-eight percent of survey respondents said they had no initial concerns about participating in the program. Among those who did (n=12), five expressed concerns about allowing the utility control of their home's energy systems during program events, three said that they thought the temperature increase would be uncomfortable during events, two indicated that they had an installation concern, and in particular, was worried the program wasn't legit, or they would not be able to change if they didn't like participating. One participant was concerned about understanding the equipment, and one participant was worried it would damage their central cooling system.

Program Experience

To help understand the perceptions of program events, survey respondents were asked to quantify how many cycling events they thought were called during the PY2022 summer season (between 0 and 85). About one-half of the respondents answered *don't know* (n=34), and three indicated there were no events. Responses from the remaining customers (n=38) varied, as outlined in Figure 44. Customers of utilities that scheduled one or two events consistently reported a value much higher than the actual number of cycling events for their utility territory. Overall, about 85 percent (n=33) did not report the actual number of events that were called in the summer months of 2022.

Regardless of the respondent's perceptions about the number of events, the overall program experience appears to have a limited impact on the customers. That is, when respondents who could recall events were asked to report how a cycling event impacted them, 38 percent said the event had no effect. Among survey respondents who did say cycling events impacted them, the most mentioned response was that the temperature of their residence increased (36 percent). Other responses included *"we had to adjust the temperature setting"* (14 percent) and *"we used fans"* (2 percent) or *"we left the house"* (2 percent).

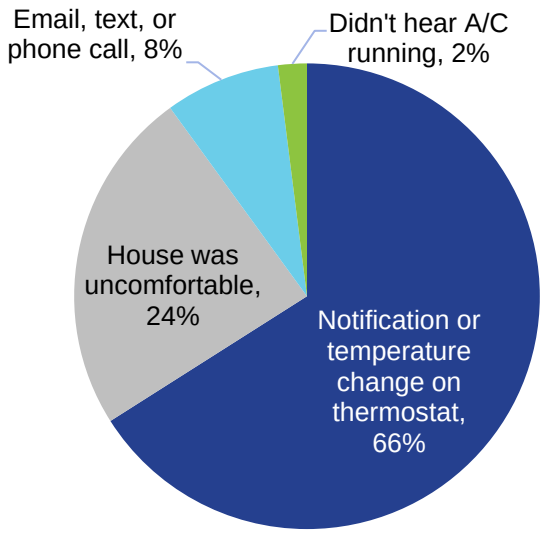
Figure 44. Perception of Number of Events Called (n=38)



Source: Question PE1. *Don't know* and *zero event responses* are excluded.

The 38 respondents who could recall an event being called were asked how they knew an event was taking place. They were not limited to one answer. As shown in Figure 45, 66 percent of respondents learned of the event from their thermostats, whether they noticed the temperature had increased or there was a notification directly on the thermostat.

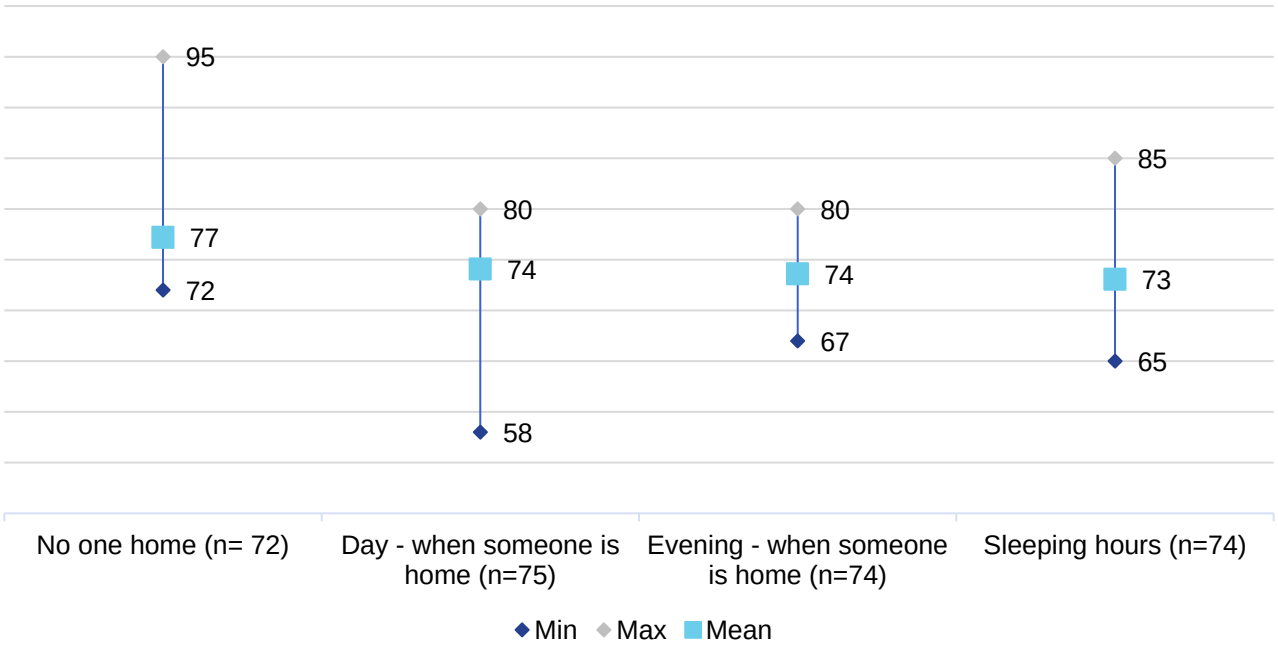
Figure 45. Knowledge of Event (n=50)



Source: Question PE2. *Don't know* responses are excluded.

Respondents were asked at what temperature they usually set their air conditioner in the summer. Figure 46 represents the minimum, maximum, and mean temperatures provided for each time-of-day category. On average, program participants set their thermostats to 77 degrees when they are not at home, 74 degrees when they are at home, and 73 degrees during sleeping hours.

Figure 46. Minimum, Maximum, and Mean Temperature Settings



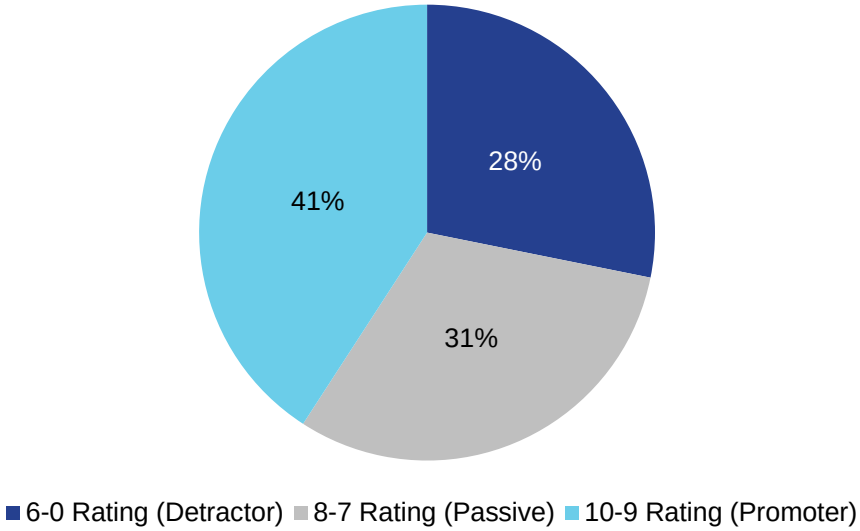
Source: Question P16 through P16D. *Don't know* or *turn off* responses are excluded.

When asked if they contacted their utility company about the program in 2022, only 2 out of 75 respondents indicated they had called the utility. One respondent indicated they called because their air conditioning was not cooling their home, and they wanted to know if it was because of the program. They also indicated they would like to have someone come out to their house to check the equipment as their bill was higher than normal. The other respondent called to cancel participation in the program. These two respondents also indicated they were *very dissatisfied* or *somewhat dissatisfied* with the response from the utility to their inquiry.

Customer Satisfaction

Satisfaction with the electric utility as an energy provider is high. Respondents were asked to rate their overall satisfaction with their electric utility in general (not just with the program) on a scale of 0 to 10, where 0 was *very dissatisfied*, and 10 was *very satisfied*. Twenty-nine respondents rated their experience a 9 or higher (41 percent), 22 respondents rated their satisfaction between a 7 and 8 (31 percent), and 20 respondents rated their satisfaction a 6 or less (28 percent), resulting in an overall mean satisfaction score of 7.3 on the 10-point scale, as shown in Figure 47.

Figure 47. Overall Utility Service Provider Satisfaction (n=71)

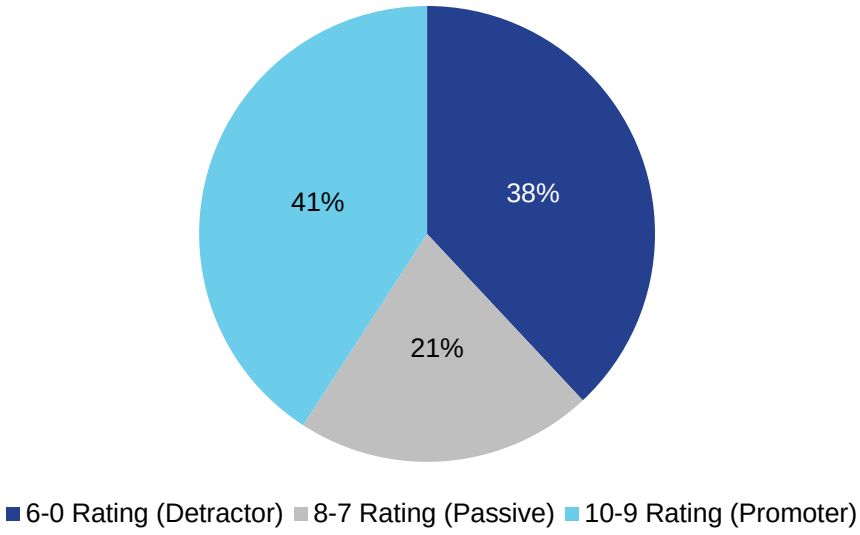


If respondents provided a score of 5 or less (n=17), they were asked to provide a reason as to why they rated their overall satisfaction that way. The most common reasons included power outages and high bills. For example:

> *"Lots of power outages in the neighborhood."*
>
> *"Because they raise the price [of] energy too high, and I don't use but very little energy. Now [I] pay over 200 dollars on my bill."*

Respondents were also asked to rate their satisfaction with their overall experience with the residential load management programs on a scale of 0 to 10, where 0 was *very dissatisfied,* and 10 was *very satisfied*. Twenty-nine respondents rated their experience a 9 or higher (41 percent), 15 respondents rated their experience between a 7 and 8 (21 percent), and 27 respondents rated their overall program satisfaction a 6 or less (38 percent), resulting in an overall mean satisfaction score of 7 on the 10-point scale, as shown in Figure 48.

Figure 48. Overall Program Satisfaction (n=71)



Source: Question SAT1. *Don't know* responses are excluded.

If respondents provided a score of 5 or less (n=23), they were asked to provide a reason as to why they rated their overall satisfaction that way. The most common responses included the house becoming too uncomfortable (n=6) and not seeing a benefit from the program and/or experiencing higher electricity bills (n=5). Other respondents claimed to have never received the rebate or incentives (n=3), while others were looking for more support from the program.

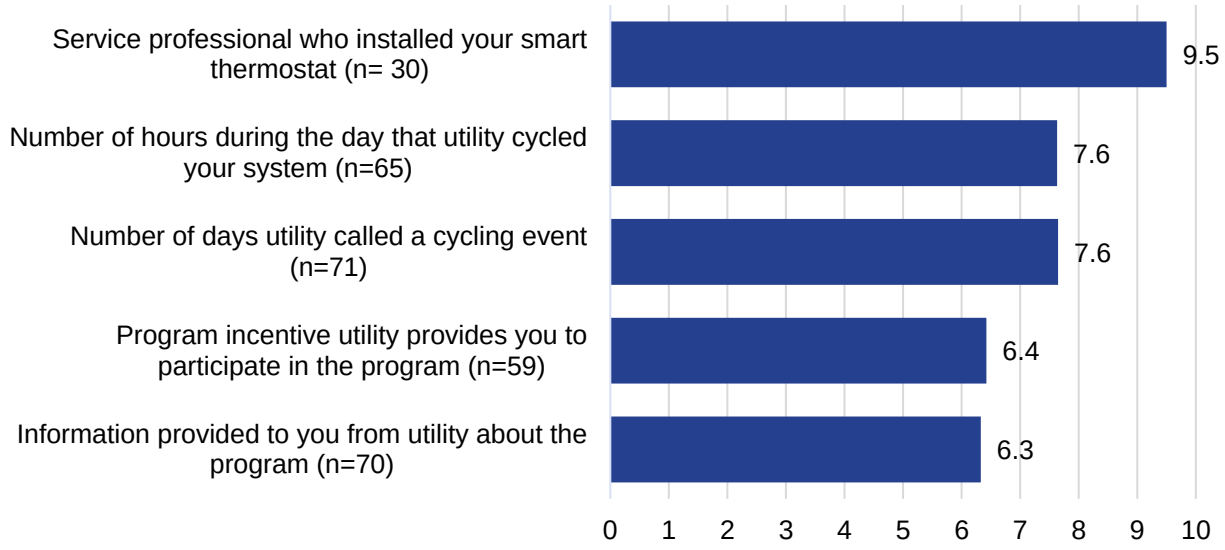
Comments from customers who rate overall program satisfaction a 5 or less included the following:

> *"It's inconvenient when you work from home. I could see the benefit if you worked outside the home during the day."*
>
> *"First, I did not receive the incentive promised. Second, I haven't been able to un-enroll myself from the program because they make it too hard to understand."*
>
> *"My main interest [was] to see a slight decrease in my bill, and I haven't been seeing that lately."*

When asked to rate their satisfaction with various aspects of the residential load management programs on a scale of 0 to 10, where 0 was *very dissatisfied*, and 10 was *very satisfied*, satisfaction with the service of professionals installing their thermostats received the highest score (mean score of 9.5), as illustrated in Figure 49. Areas of passive scores (scores between 8−7) include hours during the day the program cycles their air conditioning system and the number of events called, which received a mean score of 7.6. Areas with the lowest mean scores include the incentives provided by the utility (mean score of 6.4) and information about the program provided by the utility (mean score of 6.3).

Respondents were also asked if they had recommended the program to others. Only 13 percent of respondents (n=11) said they had recommended the program to others, while 85 percent (n=62) indicated they had not recommended the program to others.

Figure 49. Satisfaction with Residential Load Management Programs Components—Mean Scores



Source: Questions SAT3A through SAT3E. *Don't know*, *refused*, and *not applicable* responses are excluded.

Future Program Interest

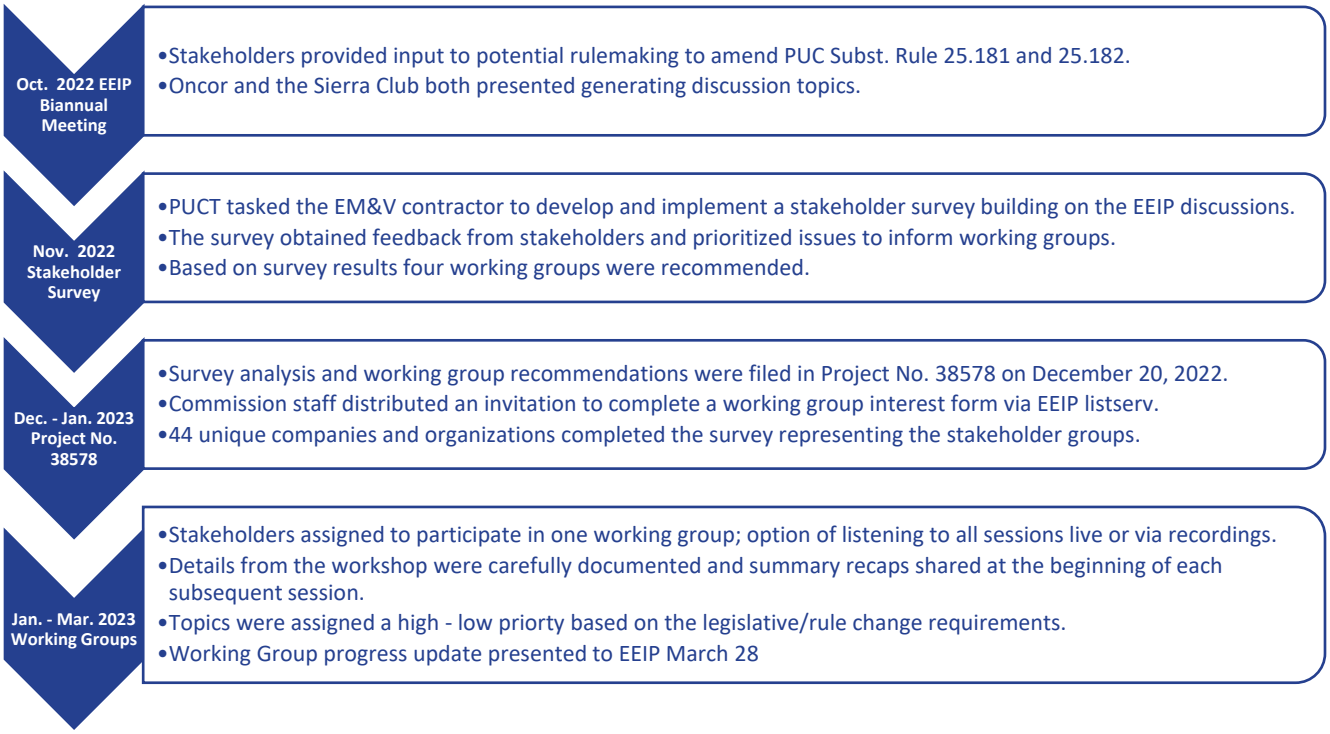
Survey respondents were asked a series of questions about future program participation interest. Over one-half (62 percent) of respondents plan to continue their participation in the residential load management programs in 2023. Twenty-two percent of participants indicated they would not be participating, while 16 percent did not know. Respondents that answered *no* or *don't know* (n=28) were asked to clarify their answer. The most frequently mentioned reasons for not wanting to participate were wanting to have control over their thermostat (n=7) or moving or switching energy providers (n=5).

When asked if they would participate if the program was to expand to winter months or year-round, 39 of the 75 respondents (52 percent) said yes, while only 3 said *no*, 3 did not know, and 30 did not provide an answer.

APPENDIX A: EEIP STAKEHOLDER INPUT DETAILS

This appendix provides detailed results on the EEIP Stakeholder Input Process summarized in Section 2. The figure below provides the timeline of Stakeholder Input activities that occurred from October 2022 through March 2023.

Figure. Stakeholder Input Activities to Date[25]



The workshop objectives were to identify salient issues for investor-owned utility (IOU) energy efficiency programs and organize stakeholder feedback for the Commission's consideration in a future rulemaking. The EM&V team served as facilitators keeping discussions on track, on time and enabling active dialogue and listening to understand, capture and document different viewpoints of energy efficiency in Texas.

Next, we provide detailed summary tables for each Working Group. The EM&V team prepared summary tables and gave all Working Group participants 10 days to review the summaries and provide edits and feedback.

[25] In response to concerns of limiting participation to one working group for those who preferred to participate in two or more working groups, a listen-in only option was made available upon request (as a muted live attendee or via recording). Those requesting a listen only option were able to send additional ideas separately to the working group facilitator.

6.4 PROGRAM GOALS

6.4.1 Session 1 January 23rd, 2023—Peak Demand Reduction (kW) Goals Discussion

The table below summarizes the key issues identified and places a priority/level of effort for addressing this issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Level of goals	PURA first established long-term goals in 1999 for the IOUs. Since 2013, "floor" of 30% of demand growth or 4/10 of 1% of summer peak. "Floor" means that goals cannot be less than prior year goals even if demand growth becomes negative. Larger utilities are tracking to 4/10 of 1% summer peak and others are tracking at 30% demand growth.	**High Priority:** Many stakeholders believe the goals are outdated and too low as all utilities are meeting, even exceeding, the set goals. For example, Sierra Club and Texas Consumer Advocacy suggested increasing the peak demand goal and requiring utilities to meet both a winter and summer peak. Utilities voiced some concern about increasing goals without understanding how Load Management programs will be tracked as they are not meeting current peak kW goals excluding load management. Utilities also note increased codes and standards that just came into effect.
Peak kW Definition	16 TAC §25.181 defines Winter (Dec – Feb) and Summer (May – Sept) Peak periods and that utilities can only claim winter or summer peak for each measure.	**High Priority:** Many different ideas on how to define a kW to capture the value in measures with additive savings for both a summer and winter peak reduction along with the duration of the benefit.
Claiming/valuing savings	In 16 TAC §25.181 kW Peak Demand definition a measure can only claim winter or summer peak savings but not both.	**High Priority:** All stakeholders seem to agree that there is value in both winter and summer kW peak savings.
Geotargeting	Geotargeting energy efficiency and demand response programs trending nationwide to address issues of: T&D congestion, energy equality, and capacity shortages. Some utilities are already doing some geotargeting in their territories, specific examples are reaching rural territories.	**Medium Priority:** Stakeholders both utility and others agree that Geo Targeting is worthwhile and valuable to consumers and the Texas grid. Many agree they are already using these methods and are looking to advance them.
Calculation of goals	Currently goals are calculated using the past five-year average load growth or the five-year average peak to calculate kW Peak Demand goal. 16 TAC §25.181(e)(1)-(3).	**Medium Priority:** Stakeholders seemed to agree that averaging was right. More discussion on whether the average or trending over a certain number of years was most appropriate.

Issue	Summary	Working Group priority and why
Priority of kW demand goal	In Texas the focus is on reduction of kW peak demand with kWh as a secondary goal set in relation to kW goal.	**Low Priority:** All stakeholders in the working group indicated that the focus on peak kW brings the most value to Texas grid and consumers though it is important to deliver kWh savings, in particular to low-income and hard-to-reach sectors. There is more interest in how peak kW is calculated seasonally and setting the right goals. Many stakeholders expressed support for including a specific energy savings goal, particularly for residential consumers.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Level of goals	Need to understand where Load Management Programs[26] will reside and be "claimed" to determine feasible kW goals	Perspective 1: Goals are set too low – Need to set "stretch goals"[27] to foster innovation. Perspective 2: With rising baselines due to codes and standard changes and load growth, current goals are stretch goals. Perspective 3: Need to consider measure cost effectiveness when setting goals – with code changes, measures will be more expensive with less savings. Perspective 4: There are more benefits to rate payers due to grid reliability and resiliency with increased goals whether they participate or not.	Yes, 16 TAC §25.181(e)(1)(A)(B)(C)(D) Since 2013, "floor"* of 30% of demand growth or 4/10 of 1% of summer peak. Larger utilities are tracking to 4/10 of 1% summer peak and others are tracking at 30% of demand growth. *floor=a program year's goals cannot be lower than previous years	

[26] At the time of the working groups, the legislature is in session. Therefore, participants do not know if legislation will require any changes to PURA § 39.905 that would effect load management.

[27] Stretch goals are understood to be a deliberately challenging or ambitious aim or objective.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Peak kW definition	Understanding where load management programs will be "claimed" is crucial to the conversation. Winter and Summer Peak both provide intrinsic value.	Perspective 1: Would like to define energy efficiency kW separately from demand response kW. Perspective 2: There are program costs savings with program administration synergies to running EE and DR programs together. If siloed opportunities and innovation may be hindered. Perspective 3: Defining the value of a kW (annual, winter, summer, additive) is important and needs to be considered.	Yes, 16 TAC §25.181(c)(44)(45)(46) and (e)(3)(G) Changing definition will impact: Peak Demand, Peak Demand Reduction, Peak Period definitions.	The complexity of achieving different goals was discussed and a possible solution may be reporting, performance metrics or "stretch goals". One discussed example was to leave one peak kW goal, but track and report both summer and winter peak contributions or limit percent of load management in peak kW goal. This applied and was discussed across each definition, claiming/valuing savings and geotargeting issues.
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	
Claiming/ valuing savings	Winter and summer peak kW are both important and should be tracked and claimed, there may be better methods to recognize this value	Perspective 1: Include separate summer and winter peak goals Perspective 2: increased total kW goals, still flexibility in how met through summer and winter Perspective 3: adding Both a Winter and Summer Peak goal adds complexity Perspective 4: Annual valuing could re-design peak kW value/savings	Yes. Current rule limits claimed savings to winter **or** summer. 16 TAC §25.181(c)(44) and (e)(3)(G)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	
Geotargeting	Geotargeting is a nationwide trend and valuable program strategy for grid resiliency	Perspective 1: Potentially add a goal around Geo Targeting – perhaps for Low-Income and/or Grid Resilience Perspective 2: Additional complexity if geotarget goals are added and utilities are already doing some of this Perspective 3: More transparency is needed in metrics on who is served.	Current rule does not address Geotargeting.	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Calculation of goals	All agreed on a multi-year basis for program stability.	Perspective 1: Using the 5 years past average provides enough lead time for utilities to ramp up new programs and adjust programs as needed. Perspective 2: Using the 5 years past average may not accurately capture load growth – discuss pros/cons of trend analysis vs. averaging Perspective 3: A 3-year period for averaging or trending may be more accurate than 5-year average	Yes, 16 TAC §25.181(e)(3)(A)(B)(D) (3)(A) “The Utility Shall calculate the average growth rate for the prior five years.” Or under (3)(B), apply “the percentage goal to the utility’s summer weather-adjusted five-year average peak demand.”	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Priority of kW demand goal	kW Peak Demand Goal is the priority of Texas and makes sense for the Texas grid	Perspective 1: Peak kW is a hard concept for consumers/public to understand. Perspective 2: By focusing on peak kW demand from energy efficiency, you will also receive the value of kWh. Perspective 3: While peak demand goal is the priority, having separate energy savings goals -- or increasing the current load factor from 20 percent to a higher amount - assures that the savings will be enjoyed throughout the year, which is especially important for residential consumers.	Yes, PURA and 16 TAC §25.181(e)(1)(A)(B)(C)(D) 16 TAC §25.181s is focused on peak kW demand	

6.4.2 Session 2 February 6th, 2023-Energy savings (kWh) goals discussion

Session 2 discussion on kWh savings. The table below summarizes the key issues identified and places a priority/level of effort for addressing this issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Level of kWh goals	PURA first established long-term goals in 1999 for the IOUs. Since 2013, "floor" of 30% of demand growth or 4/10 of 1% of summer peak. PURA does not have energy savings (kWh) goals.	**High Priority:** Some Stakeholders voiced that the kWh goal is set too low. However, this may not require setting a new separate goal, rather adjusting the Energy Conservation Load Factor (ECLF). Others discussed that if the peak kW goal is increased or if the percentage of peak kW from load management contributions is limited, this would also result in increased kWh savings.
How kWh savings are defined	16 TAC §25.181 includes energy savings (kWh) goals in relation to demand savings (kW) goals through a "conservation load factor," which is currently set at .2.	**High Priority:** Stakeholders voiced the need to understand where the .2 conservation load factor originally came from in 2012 to determine if it is in fact the "right factor." Follow up was posted in chat as it was a compromise. Sierra Club, Public Citizen and SEED Coalition opined that .2 was too low and suggested .25 or .3 and that it is applied to the entire program demand savings and not just the

Issue	Summary	Working Group priority and why
		minimum peak demand goal. The Cities Serving Oncor recommended proscribing actual energy savings for each program if not costly to do rather than the conservation load factor.
Geotargeting	Same as discussed for peak kW.	
Calculation of kWh goal.	The conservation load factor is used to determine a utility's energy savings (kWh) goal for the year. To calculate the utility's energy savings goal, a utility's demand goal (kW) is first multiplied by the number of hours in the year (8760) and then multiplied by the conservation load factor.	**Medium Priority: Stakeholders** voiced the need to not add complexity while also recognizing energy savings impacts residential, low Income and HTR customer in a unique way. An out of the box new concept was introduced that piqued interest from many stakeholders, "assigning value to each hour of the year."
Priority of kWh Savings	In Texas the focus is on reduction of kW peak demand with kWh as a secondary goal set in relation to kW goal.	**Low Priority:** Stakeholders voiced agreement that kW Demand savings is a priority in Texas however utilities are providing kWh savings programs and recognize it as a combined effort.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Level of kWh Goals	Stakeholders agree that there are many interrelated moving parts. The Group must understand how kW Demand Definitions and Demand Response programs will be "claimed" before revising kWh goals.	Perspective 1: kWh goals are set too low. Getting 1% energy savings over several years would put Texas in the middle of the "pack" compared to other states. SPEER has a report that shows the percent saved of annual savings for Texas IOUs. Perspective 2: Residential home energy bills are based on kWhs not kW demand. Most customers don't understand the demand for savings. We need to set goals/targets to help them realize savings and understand the benefits to them.	No legislative changes – the legislation does not address kWh so this can be addressed in a rulemaking.	Stakeholders seem to agree that there may be other options than creating a new kWh goal such as increasing the conservation load factor or assuring energy savings through other goals (i.e., low-income and hard-to-reach or load management caps).

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		Perspective 3: Targeting kWh savings to low income, small businesses, hard to reach customers should be the "deliberate" focus of the kWh goal. Perspective 4: Rising program costs (due to code changes affecting lighting and HVAC measures) will have an impact on traditional customers and HTR segments – achieving kWh savings will become more expensive and harder to achieve. Perspective 5: If options are implemented to recognize changes in efficiency standards, it is important to keep in mind that these changes will be felt over time rather than all at once, so program changes can likewise be made incrementally over time rather than all at once.		
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 2: Energy Conservation Load Factor (ECLF)	The ECLF concept is to measure kWh achievement relative to kW demand achievement. Stakeholders agree the .2 used in the ECLF should be reconsidered.	Perspective 1: Per Commission (Summarized Response) in Project No. 39674 keeping .2 tied to Peak Demand Goal: 1. The ECLF establishes the minimum kWh savings a utility must acquire. 2. Utilities are "awarded" a performance bonus for exceeding the minimum while staying below cost caps.	16 TAC §25.181(c)(6) definition of Conservation Load Factor History: Oncor counsel & Sierra Club provided Project No. 39674 Amendment to	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		3. Increasing the ECLF will increase program costs. .2 balances the benefits of energy savings with the costs of the program. Perspective 2: The ECLF should be increased as .2 is just too low. (Suggestions have ranged from 25%-40%) Perspective 3: The ECLF should be applied to the peak demand achieved rather than the peak demand goal. Perspective 4: Given changing baselines .2 and applying it to the Peak Demand Goal seems to be the right level. Changing this may have unintended consequences. We really need to do more analysis if we are going to adjust it. Perspective 5: This is a unique way of setting an energy savings goal. In some ways it really streamlines the process avoiding a costly potential/goal study that can falsely overstate how one technology will achieve those goals.	16 TAC §25.181(2012) PG 81 of 283 Discusses *subsection (e)(4) Conservation Load Factor*	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 3: Priority of kWh Savings	Stakeholders agree that kW demand reductions are the most important goal and agree	Perspective 1: If there was a transition to focus on kWh savings it is important to recognize that program costs will go up. Prior program years had the		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
	that there are kWh savings that follow Peak demand reductions, but that kWh savings are most important to customer	benefit of lighting and HVAC measures that will be harder with code/baseline changes. Perspective 2: If the goal goes up it will be even more important that cost effectiveness is looked at "program vs. portfolio, "so those higher cost measures/offerings can be included.		
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 4: Calculation of kWh goal.	Several stakeholders voiced interest in the concept of "assigning a value to every hour of the year." This was a new concept that piqued interest (showcased in Perspectives 2-4)	Perspective 1: kW is the most important goal for the grid: Cost, reliability, resiliency. kWhs are an equity issue and saving kWhs has a bigger impact on affordability for low-income populations. This relates to how kWhs are calculated not a goal. Perspective 2: Rather than use an ECLF, you could assign a value for every hour of the year so you can amplify the value in those peak savings periods. In addition, you can also assign appropriate value to the rest of the hours of the year so you can capture those energy savings (kWh) impacts. Using this method, you can capture interventions that drive peak savings but also achieve energy savings the other times of year, so you balance and value both. Perspective 3: *Out of the Box Thinking* Perhaps the	16 TAC §25.181(c)(6) definition of Conservation Load Factor 16 TAC §25.181(e)(4) Annual EE goals.	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		"savings goals" are transitioned to "budget goals" in that You may have a fixed amount of budget to go get the value that was defined in Perspective 2 above. This perspective is about establishing a budget to achieve the demand reductions at the time of the year you want them. Perspective 4: *Related to Out of the Box Thinking:* Take the Value stream and calibrate how much budget to achieve the statutory goal and potentially layer an energy savings goal that is aligned with different seasons or include an adder for capturing different parts of the market that otherwise wouldn't have been served.		

6.4.3 Session 3 and 4 February 24th and March 6th, 2023: Goals Considerations

Session 3 and Session 4 discussion on Goal Considerations. The table below summarizes the key issues identified and places a priority/level of effort for addressing this issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Cost Caps – Administrative, R&D and EECRFs	16 TAC §25.181(1) cost of administration not to exceed 15% of a utility's total program costs. The cost of R&D not to exceed 10% of a utility's total program costs for costs. The total of both cannot exceed 20%. 16 TAC §25.181(f) Energy Efficiency Cost Recovery Factor (EECRF) (f)(2) Costs directly assigned to each rate class that receives services and combine smaller and similar rate classes through good cause exception. 25.182 (d)(7) Cost Caps for 2019 and after increases by CPI. 2018 base is $0.001263 per kWh; for commercial $0.000790 per kWh. PURA Sec. 39.905 Goals for Energy Efficiency (e) An electric utility may use money approved by the commission for energy efficiency programs to perform	**High Priority:** Stakeholders voiced that many of the smaller IOUs are limited by the Cost Caps and have even requested a "good cause exception." With the increased cost of electricity and the rising costs of measures, cost caps should be reviewed.

Issue	Summary	Working Group priority and why
	necessary energy efficiency research and development to foster continuous improvement and innovation in the application of energy efficiency technology and energy efficiency program design and implementation. Money the utility uses under this subsection may not exceed 10 percent of the greater of: (1) the amount the commission approved for EE programs in the utility's most recent full rate proceedings or (2) the commission-approved expenditure by the utility for EE in the previous year.	
Issue 2: Specific program types of contributions to goals	The percentage of kW reduction from load management programs varies by utility, but over 60% of statewide energy efficiency portfolio kW reductions are typically from LM programs each year. 5% of the total demand reduction goal must come from the HTR sector and is 25.181. 10% of ERCOT budgets to LI and is in PURA	**High Priority:** Stakeholders voiced the need to review and potentially expand the HTR definition. Understanding where load management will be captured is required to understand how these goals should be adjusted.
Issue	**Summary**	**Working Group priority and why**
Issue 3: Cost Effectiveness	The cost-effectiveness standard is the Utility Cost Test (UCT) and is conducted at the program-level except for ERCOT LI which is the savings-to-investment ratio (SIR).	**High Priority**: A program is deemed cost effective if the cost of the program to the utility is less than or equal to the benefits of the program. Stakeholders voiced the need to review portfolio cost effectiveness vs. program cost effectiveness or quantifiable additional benefits
Issue	**Summary**	**Working Group priority and why**
Issue 4: Opt Outs	16 TAC §25.181(w) allow industrial customers to opt out of energy efficiency program cost recovery.	**Low Priority:** Stakeholders voiced agreement that if industrial customers opt out, it would be beneficial if they reported energy efficiency savings to the State Energy Conservation Office (SECO) or the PUC as this value is not being captured in Texas.
Issue	**Summary**	**Working Group priority and why**
Issue 5: Marketing/ What roles can REPS Play	PURA and 16 TAC §25.181 require ERCOT utilities to use its best efforts to encourage and facilitate	**Low Priority:** Stakeholders agree there is an opportunity for better

Issue	Summary	Working Group priority and why
	involvement of retail electric providers (REPs) in delivery of EE and DR programs.	communication, however barriers exist given budget constraints. (i.e., REPs may want to work with larger TDUs). No rule change is needed for increased REP coordination
Issue 6: Performance Bonus	PURA section 39.905 (b)(2) requires Commission to establish performance bonuses for utilities that exceed the minimum goals. Section 25.18 (e) Utility that exceeds 100% of its demand and energy reduction goals receive a bonus equal to 1% of net benefits for every 2% that the demand reduction goal has been exceeded – capped at 10% of utility's total net benefits. Performance bonuses are included in program costs when calculating Net Benefits.	**Medium Priority:** Stakeholders voiced agreement that performance bonus or revenue recovery is needed to support EE programs. A future rule change may be more around the calculation of the performance bonus.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Cost Caps – Administrative, R&D and EECRFs	IOUs shouldn't have to bump up against the cost cap every year – if this is the case they need to be adjusted. (Example discussed was SWEPCO as the smallest IOU that has submitted a "Good Cause Exception" for the cost caps.)	Perspective 1: In Sierra Clubs filing they requested cost caps be raised from $1.20-$1.40 per customer to $2.50 as their basis for residential and proposed nearly doubling it for commercial as well. This reflects the level of spending at Austin Energy and CPS Energy. Perspective 2: $1.25 to $1.50 is probably the right place for us to have those costs. But maybe they are adjusted for the smaller IOUs who bump up against them every year. Perspective 3: The cost of electricity has increased significantly so the value of EE has risen significantly. The IOUs indicated that the cost of measures/programs will be increasing with "Low-hanging fruit" already being captured. Increasing the cost cap is	PURA Sec. 39.905 Goals for Energy Efficiency (e) 25.182 (d)(7) Cost Caps for 2019 and after increases by CPI. 2018 base is $0.001263 per kWh; for commercial $0.000790 per kWh.	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		necessary. Let's not treat the cost cap as a limit. Perspective 4 RE- Admin/R&D Caps: Is it necessary to increase the R&D Cap when many other states and EE labs, etc. can provide solid real-life examples through their testing etc.? Also – why does Texas put this burden on IOUs when many other states have regional collaborative organizations to do this (i.e., NEEA/SPEER). Are we requiring them to conduct duplicative efforts? Perspective 5 RE- Admin/R&D Caps: IOUs may use that R&D money to research those solid real-life examples from other states to determine if they are viable options in Texas. It takes resources to research, vet and prioritize new measures to bring into Texas. Some R&D money currently does fund organizations like SPEER. There is a need to vet measures to individual climate zones. What works in Dallas may not work in Houston or El Paso. Perspective 6 – Admin/R&D Caps: If R&D is capped at 10% in PURA then adding combined cap really isn't assuring it will be spent on R&D. you may just be increasing the admin budgets. Perspective 7 – Admin/R&D Caps: We need to take a long-term view; we need to provide flexibility in the Caps for utilities as we only get a rule making change once in a 10-year span. Perspective 8: Section 25.182(7)(c) sets a base cost cap and allows for escalation of the cost caps every year based		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		on inflation adjustments. It is, therefore, important to note that the cost caps are not a static number.		
Issue 2: Specific program types of contributions to goals	Stakeholders agreed that reviewing and potentially expanding the HTR definition makes sense. Perhaps LI may become a subset of HTR customers.	Perspective 1: Our focus should be on expanding our existing programs and creating new programs to increase energy efficiency. Focusing on that versus trying to adjust goals, we will be in a better spot at the end of the day. Perspective 2: We would like the definition of HTR expanded (right now it basically means LI). We believe it should be expanded to include geography, socioeconomics, or other barriers to participation. Perspective 3: The energy efficiency goals should be separate from load management goals for LI and the HTR community. Peak demand reduction should be the primary goal for all other programs and reporting the energy efficiency that is obtained through those measures.		
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 3: Cost Effectiveness		Perspective 1: Cost effectiveness should be at the portfolio level vs. program level. Perspective 2: Programs should stand on their own and cost effectiveness calculated at the program level.		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		Perspective 3: Pilots should be given a longer period to achieve cost effectiveness and show progress. HTR and LI should be calculated differently given they are bound to be more expensive.		
Issue 4: Opt-Outs	Stakeholders agree that Industrial Opt-outs reporting their energy efficiency efforts is worthwhile for Texas, but it would require a legislative change and that would be difficult.	Perspective 1: If the industrial customers opt out, they should be reporting their EE to SECO so the state can capture the EE they are contributing to the State. Perspective 2: A This was introduced by Sierra Club for Austin Energy and received pushback from the industrials. So, while it is a good idea, it may not happen.		
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 5: Marketing / What roles can REPS Play		Perspective 1: Hitting the admin cost cap can cause barriers to market or including REPs as the budget just isn't available. Perspective 2: REPs may not want to get involved with some of the smaller utility programs as the budget isn't worth their time getting involved. Perspective 3: More consistent, streamlined programs ERCOT-wide would help REPs get more involved.		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 6: Performance Bonuses		Perspective 1: We support the performance bonus for utilities that exceed their goals; however, take issue with the way it is calculated and rolled into future program year budgets. Perhaps the performance bonus should be calculated as a maximum percent of the program spend. (i.e., 10%-15%)		
Issue 7: Program Barriers		Perspective 1: We must streamline program delivery. Contractors are not willing to complicate their processes to participate in the programs when they can stay busy without us. Perspective 2: Perhaps we set up a focus group to discuss how EEPRs can be improved to make them easier to understand and provide more transparent reporting. Information may be in there, but we can't find it. Perspective 3: Innovation will be on the EE programs but will be more expensive with HVAC and lighting baseline changes.		

6.5 LOW-INCOME AND UNDERSERVED SEGMENTS

Session 1 January 24, 2023: Low-Income and Hard-to-Reach Programs

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Definition Low-Income and Hard-to-Reach (HTR)	16 TAC §25.181 defines low-income and hard-to-reach annual household income as at or below 200% of the Federal Poverty guideline	High Priority: All stakeholders supported expanding or broadening the definition of Low-Income and HRT customers. Doing so has the potential to expand/streamline program delivery options and provide services to a broad group of LI and/or HTR customers, such as moderate-income customers and serving rural areas.
Issue 2: Low–Income and HTR Programs Level of Goals	PURA requires the Commission to ensure not less than 10% of ERCOT utility's EE budget is utilized by targeted low-income programs. 16 TAC §25.181 requires at least 5% of each utility's total demand reduction comes from HTR customers	Medium Priority: If the definition of Low-Income and HTR customers changes, goals must also be reviewed and potentially adjusted as appropriate. Stakeholders voiced that aligning goals with population, geographic location, standard data set, and workforce availability is important.
Issue	**Summary**	**Working Group priority and why**
Issue 3: Low-Income and HTR Program Cost-effectiveness Standard	Savings-to-Investment Ratio (SIR) is used for targeted low-income programs, while Utility Cost Test (UCT) used for hard-to-reach programs	High Priority: Stakeholders voiced adjusting the cost-effectiveness standards from program to portfolio will promote program innovation, expand measures, and streamline overall program delivery.
Issue	**Summary**	**Working Group priority and why**
Issue 4: Low-Income and HTR Program Design	PURA requires coordination between targeted low-income and federal weatherization programs. Targeted low-income programs must comply with the same audit requirements as federal programs	Medium Priority: Stakeholders voiced adjusting program design requirements could positively impact access to programs, streamline validation processes and improve communication between stakeholder groups (County, City, REPS, Implementors, Advocacy Groups, and Utilities)

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Definition Low - Income and Hard-to-Reach (HTR)	Expanding the definition will have a positive impact on Texas in both rural and urban	Perspective 1: Combine Low-Income and HTR definitions. (Low-income defined in statute and HTR defined in Rule)	16 TAC §25.181(c)(27) PURA 39.905 (f)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
	populations and allow for a greater number of program opportunities	Perspective 2: Combining Low-Income and HTR definitions may be more difficult for the ERCOT utilities vs. the non-ERCOT utilities. (Due to PURA low-income specifics) Perspective 3: Broaden the "200% at or below Federal Poverty" guideline to include the moderate-income group. Perspective 4: Use a percentage based on a calculated area Average Median Income (AMI). AMI will also account for the difference in cost of living within the eight utilities' service territories and each utility's service territory		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 2: Low–Income and HTR Programs Level of Goals	Stakeholders voiced the importance of understanding if/how the definition of Low-Income or HRT may change to ensure the goal is set at an appropriate level	Perspective 1: If the definition has no expansion, the goal is appropriate. Perspective 2: More research into the Texas population and demographics is needed to appropriately set goals by utility service territory. Perspective 3: Using a standardized shared data set to identify Low-Income / HTR customers would help utilities validate and achieve goals. (i.e., census data, list of qualified customers from agencies, such as TDHCA	PURA 39.905(f) 16 TAC §25.181(p)(1) and (e)(3)(F)	Additional information was provided and available in the Materials Provided folder on Teams

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 3: Low-Income and HTR Program Cost-effectiveness Standard	Stakeholders voiced transitioning from program-level cost-effectiveness to portfolio cost-effectiveness would have a positive impact on Low-Income and HTR programs Non-ERCOT Stakeholders voiced the importance of having the option to use their own T&D avoided costs I the future, even if the option is not being used today.	Perspective 1: Moving to portfolio cost-effectiveness may allow a greater number of innovation/pilots, increased measure bundling and cross-program delivery mechanisms, enhanced incentives (kicker for low-income participants), staffing/contractor stabilization, and improve customer access. Perspective 2: If portfolio cost-effectiveness is not an option, would ratepayer segmentation (residential and commercial portfolios) be an alternative? Stakeholders voiced any flexibility would be welcomed over stand-alone program cost-effectiveness. Perspective 3: Incorporating additional benefits beyond electricity savings (NEBs - carbon, water) into the program cost-effectiveness calculations will more accurately reflect the program's impact on Low-Income and HTR customers. Perspective 4: Different Cost-effectiveness calculations for different low-income programs and measures allow for trade-offs between the number of participants served and the depth of services provided. A good option for when you have a larger set of the populations trying to be several by the programs. Perspective 5: (Received via email after the call - discussed in	16 TAC §25.181(p)(2)	EM&V Process change could address and possibly documented in TRM guidance

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		Workshop #2) Create a methodology for determining the retail energy cost before starting a program year to be used by all utilities and EM&V in SIR calculations.		
Issue 4: Low-Income and HTR Program Design	Stakeholders agree serving rural communities is a challenge. Stakeholders agree that streamlining the validation process will improve program delivery, and having a standardized data set provided to utilities may help reduce the documentation requirements	Perspective 1: Coordination and collaboration among community agencies have proven difficult. There are competing priorities and "pools" of money. Perspective 2: More coordination and communication with REPs, who have access to Low-Income and HTR customers, is an untapped asset. Perspective 3: The large REP population impedes comprehensive and fair communication and coordination. Perspective 4: Being able to validate program eligibility based on geographic location (Geotargeting), such as zip code, would help streamline delivery. Perspective 5: Some participants may not qualify who receive benefits under the current definition if just using geotargeting. Perspective 6: For new construction – better coordination between county/city permitting agencies will help developers improve awareness of utility programs and the efficiency of homes and buildings.	PURA 39.905(f)	Consider setting up formal committees or communication channels for interested stakeholders to improve collaboration and coordination between groups with the same interests.

Session 2 February 7, 2023: Identification of underserved segments

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group Priority and Why
Issue 1: Definition of Underserved Segments	16 TAC §25.181 defines HTR annual household income as at or below 200% of Federal Poverty guidelines, and savings from HTR customers shall be at least 5% of each utility's demand reduction goal.	**High Priority:** Stakeholders voiced a definition may be necessary, but taking into consideration how rigid the definition is also important to not exclude those that will benefit from these programs.
Issue	**Summary**	**Working Group Priority and Why**
Issue 2: Identifying Underserved Segments	16 TAC §25.181 requires each utility's energy efficiency plan and report (EEPR) to include a list of counties that were underserved in the prior year by the energy efficiency program.	**Low Priority:** This issue seemed to overlap with defining underserved segments.
Issue	**Summary**	**Working Group Priority and Why**
Issue 3: Program Design	Stakeholders agree a consistent method should be used to calculate the Avoided Retail Energy Value used in the SIR calculation to avoid confusion and timing issues with a fluctuating market.	**High Priority:** Stakeholders voiced that aligning the timing or discussing a consistent method to be used will help eliminate confusion and discrepancies
Issue	**Summary**	**Working Group Priority and Why**
Issue 4: Cost - Effectiveness Standard	Since 2010, the cost-effectiveness standard, UCT, has evolved around avoided costs of capacity and avoided costs of energy for HTR programs. The SIR is used for Targeted Low-Income Programs. Cost-effectiveness is conducted at the program-level	**High Priority:** Stakeholders voiced that with rising baselines come rising costs. Discussing options to calculate cost-effectiveness will spur innovation and increase the reach of HTR, Underserved, and Low-Income Programs.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Definition of Underserved Segments	Stakeholders agree expanding the definition of HTR and *maybe* creating or combining the definition to include the underserved is appropriate as there are many customers on the "fringes" that the programs cannot help.	Perspective 1: If the definition changes (or is created), we must review the goals for serving underserved / HTR segments. Perspective 2: Including a range in the definition may provide the flexibility the programs require to help those that need it most and may be on the "fringe." Perspective 3: Expanding the HTR definition to include moderate-income or underserved customers is important; however, we also need to understand how that may cannibalize the budget for truly low-income customers. (Concern that combining budgets will not be used across all sectors included in the definition)	Currently, there is no definition of "underserved"; there is only a definition for 16 TAC §25.181(c)(27) HTR.	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 2: Identifying Underserved Segments	Stakeholders agree serving rural communities is a challenge and is often identified as "underserved."	Perspective 1: Adding a definition may help provide "parameters" for what should be included in the EEPR. As programs mature, it is important that we track underserved customers/communities/segments. Perspective 3: Regarding serving rural communities – providing a travel stipend to motivate project sponsors to go to rural areas is something that is being explored.	16 TAC §25.181(l)EEPR Reporting 16 TAC §25.181(f) Incentive Payments may be different for "areas that have historically be underserved" ….	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 3: Program Design	Stakeholders agree to discuss the Avoided Retail energy value in Program Design. Stakeholders agree that a consistent method should be used to calculate Avoided Retail Energy Value used in the SIR calculation to avoid confusion and timing issues with a fluctuating market.	Perspective 1: Using public sources to inform the avoided retail energy value used in the SIR calculation may help, but the timing may still produce discrepancies. Perspective 2: Having a shared avoided retail energy value would provide value to eliminate confusion Perspective 3: Documentation and the lack of standardization of documentation requirements across service territories is a burden. Figuring out how to streamline that to alleviate the distrust and burden.	16 TAC §25.181(c)(50) SIR Definition 16 TAC §25.181(p)(2) Targeted Low-Income EE Program 16 TAC §25.181(f) Incentive Payments may be different for "areas that have historically be underserved by the utilities EE programs or for other appropriate reasons."	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 4: Cost Effectiveness Standard	General agreement that the UCT at the program level provides less flexibility regarding measures for underserved segments.	Perspective 1: HTR/Low-Income/Underserved communities, often the burden is getting the home/business to a health and safety standard baseline so home/building can "accept" an energy efficiency intervention. It is hard to help these customers due to the current design and cost-effectiveness requirements. Perspective 2: Perhaps adding a benefit or value for reducing energy burden to those in the most vulnerable populations for these programs. Perspective 3: Are we appropriately valuing peak reduction related to the	16 TAC §25.181(d) Cost-effectiveness standard	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		low-income housing stock – appropriate valuing EE?		

Session 3 February 21, 2023: Cross-collaboration of funding sources discussion

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Identification of other funding Sources	Section 39.911 regards the State Energy Conservation Office (SECO) to solicit gifts, grants, and other financial resources available to fund energy efficiency improvements and renewable energy systems for public and private facilities in the state.	**Low Priority:** The group identified the importance of leveraging funds through other sources. No rule change would be required, just cross-collaboration between organizations.
Issue 2: Utilization of other funding sources	See above Section 39.911 – SECO is the likely source of how IRA funds will be distributed in Texas. SECO, Texas Department of Housing and Community Affairs (TDHCA), Community Action Agencies (CAAs), Non-Profit organizations, and DOE have programs supporting EE for Low-Income and Underserved communities.	**Medium Priority:** The group agrees leveraging and utilizing funds from other sources is important; however, barriers do exist, such as the one-year planning/reporting program cycle.
Issue 3: Partnerships and program development	Section 39.905 (f) requires coordination between targeted low-income and federal weatherization programs. It also requires targeted low-income programs to comply with the same audit requirements that apply to federal weatherization programs.	**Low Priority:** The group agrees partnerships and collaboration in program development is important; however, barriers exist, such as staffing, competing priorities, and timing.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Identification of other	Stakeholders identified there is additional funding for low-income weatherization.	Perspective 1: IRA funding is capturing attention right now; however, a lateral alignment	No Changes	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
funding sources	Stakeholders identified potential funding sources for both low-income and underserved segments: Inflation Reduction Act (IRA), Infrastructure Investment and Jobs Act (IIJA), Property Assessed Clean Energy Program (PACE), Housing and Economic Recovery Act (HERA), and HOME program, 25c Tax Credits.	may negatively impact low-income programs as there are requirements that may create barriers to participation. Perspective 2: Some organizations have utilized community service block grants to conduct baseline repairs to ready low-income homes for weatherization.		
Issue 2: Utilization of other funding sources	Partnerships/collaborations with other organizations exist now (i.e., Utilities partnering with organizations like Habitat for Humanity).	Perspective 1 (More Around Program Design Collaboration): One utility has the option of a Low-Income qualifier that eliminates the "basic customer charge" from their monthly utility bill. This data is being considered a potential screening tool to identify low-income participants in their Marketplace EE program to eliminate the taboo income questions and claim these savings through low-income programs. Perspective 2: Project Bravo (Community Action Agency) for El Paso County, Large-Scale Low-Income Project example. Non-profits and CAAs are not held to the same regulatory requirements and planning cycles as utilities create a challenging collaborative environment. Utilities are unable to rely on annual savings to achieve goals. Perspective 3: Utilizing 25c Tax Credits requires a tax liability which many low-income households do not have.	25.182 (d) Reporting – Each electric utility shall file by April 1st of each program year an annual energy efficiency plan and report.	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 3: Partnerships and program development	Stakeholders voiced that many of the "new" SECO funding sources, such as IRA, do not yet have defined requirements and/or rules.	Perspective 1: Given each funding source's rules and/or constraints, Collaborative customer education will be important to help them navigate programs. Perspective 2: For new construction, targeting the HERA and HOME program by working with developers to incentivize new equipment installation may be a low-barrier (easier) route for partnerships and collaboration. Perspective 3: There is an opportunity for third-party organizations to collaborate with other organizations (Municipal utilities, water, natural gas) to find additional funding and bring program benefits to other utilities vs. focusing all the burden on electric utilities.		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issues 2 – 3 Specific to Underserved (Not Income Qualified)	Stakeholders indicated a big challenge to partnerships is the timing of project completion. Participating in community events, such as school or small business association events, are excellent communication and engagement channels for program education.	Perspective 1: There are opportunities for the Utilities to cross-collaborate with other organizations/programs such as Better Building Initiative, Green Building Grants, PACE, TDHCA, etc. Perspective 2: Past experiences of committing significant resources to apply for grants and collaborating with outside organizations with unsuccessful results cause hesitancy to move forward. Perspective 3: Due to a lack of response and staffing, some seek third-party implementors to act as an agency for underserved rural communities.		

Session 4 March 8th, 2023, Low Income and Underserved Segments Working Group

The Low Income and Underserved Segments working group discussed the Best Practices and Overarching Themes that emerged during all the workshops, including any wordsmithing and/or comments gathered for each presented. In addition, the facilitator discussed the session summary tables and review process for the EEIP progress update.

6.6 DEMAND RESPONSE/LOAD MANAGEMENT

6.6.1 Session 1 January 25, 2023, Role of Demand Response in Energy Efficiency Portfolios

The table below summarizes the key issues identified and places a priority for addressing this issue in a rulemaking or other avenue.

Issue	Summary	Working Group priority and why
Load Management (LM) Program Purpose in Energy Efficiency Portfolio	Senate Bill 3, PURA § 39.905(a)(2): "goal of legislature that all customers, in all customer classes, will have a choice of and access to energy efficiency alternatives and other choices from the market that allow each customer to reduce energy consumption, summer and winter peak demand, or energy costs." All eight IOUs have commercial summer load management programs; Oncor added a winter load management (WLM) program in 2022; the other ERCOT utilities are piloting WLM programs in 2023. These WLM programs include 24/7 options. Oncor, CenterPoint and El Paso also offer residential LM programs. These residential programs have been growing; with participation often capped below customer interest.	**High Priority:** Stakeholders voiced the importance of LM in meeting peak kW goals, others discussed the original purpose of energy efficiency was to address market failures, incentivize behaviors and equipment that would not otherwise move forward at the individual level for a public benefit. Another viewpoint was the program should complement the competitive market in ERCOT.
Issue	**Summary**	**Working Group priority and why**
Demand Response Coordination	PURA and 16 TAC §25.181 require ERCOT utilities to use its best efforts to encourage and facilitate involvement of retail electric providers (REPs) in delivery of EE and DR programs.	**Low Priority:** Stakeholders discussed an opportunity for more coordination with changes to the ERCOT ERS program, more coordination with REPs, coordination at the state level with the inflation reduction act and infrastructure bills in particular to do more integrated Energy Efficiency/Demand Response.
Issue	**Summary**	**Working Group priority and why**
LM Goal Contribution	The percentage of kW reductions from load management programs varies by utility, but over 60% of statewide energy efficiency portfolio kW reductions are typically from LM programs each year.	**Medium Priority:** Stakeholders voiced if load management goals are changed whether adding a summer and winter peak, or separating them out from EE programs all together, goals will need to be adjusted.

Issue	Summary	Working Group priority and why
Use of LM Programs	16 TAC § 16 TAC §25.181(c)(36) "load control activities that result in a reduction in peak demand, or a shifting of energy usage from a peak to an off-peak period or from high-price periods to lower price periods. “Load management is used synonymously with demand response (DR) as DR is not defined in 25.181. Can be called for grid emergency or system reliability	**Medium Priority:** Demand response provides benefits beyond energy efficiency including grid resiliency and flexibility.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Load Management (LM) Program Purpose	The original purpose of Energy efficiency programs was to incentivize behaviors and equipment that would not otherwise move forward at the individual level for a public benefit.	Perspective 1: The purpose of DR programs is to add resiliency to the grid and help ERCOT out with load management. Bundled utilities also use for these needs. Perspective 2: Some Commercial customers have been participating in the utility load management programs for a decade, they know the drill and should be moving over to the ERS program whereas new participants could be introduced to LM through the utility programs. Perspective 3: There should be consistency between utility programs so one residential customer isn’t at a disadvantage based on which service territory they live in. Perspective 4: It is important to tie the incentive for the device and taking the behavioral step to install the device and participate in the program together.	§16 TAC §25.181(a)(1)(2)(3)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Demand Response Coordination	There are opportunities for more coordination between stakeholders: IOUs, Reps, ERCOT, Implementors and Advocacy groups, energy efficiency programs.	Perspective 1: More coordination can be done with REPs. Perspective 2: Messaging demand response to Texans hasn't been done well. People outside the industry do not understand what DR is and why it's important. A Statewide campaign may be needed. Perspective 3: Incentives work the best to motivate behavior change, marketing doesn't. Perspective 4: You must partner EE and DR. You cannot install a smart thermostat and expect demand reductions if their house/building isn't energy efficient.	§ 16 TAC §25.181(g)(5)(A)(B)(C)	
Goal Contribution	Demand Response programs play an important role in reducing both Winter and Summer peak demand.	Perspective 1: Cost Caps can be a hindrance in increasing or decreasing demand response programs through energy efficiency portfolios. Perspective 2: Any changes in goals need to carefully consider the role DR has historically played in meeting goals. Perspective 3: A separate DR goal would add complexity for administration. A single peak kW goal makes it easier. Perspective 4: Putting a Cap on how much of the total EE savings goal can come from DR may be preferable than a separate goal. Perspective 5: We need to establish goals that are right for the service territory. We need a series of goals that sets a high standard but doesn't put an unnecessary burden on some utilities given a certain service territory. This is supported by §16 TAC §25.181(e)(2)	§16 TAC §25.181(e)(1)(3)4)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Use of LM Programs	Load Management programs offer flexibility to a stressed grid. Demand Response provides non-wire alternatives to the grid. More integration with DERs is needed	Perspective 1: Using these programs to address congested feeders is an option, incorporating more Geo-targeting. Perspective 2: Electric vehicles may end up being extremely beneficial to DR programs. We need to keep this on the radar as the technology is developed and deployed as this can provide flexibility to the grid. Perspective 3: There is potential to incentivize back up services like battery storage etc. to help provide even more grid flexibility for longer durations. Perspective 4: Limit the years a commercial customer can participate in the EE demand response programs to encourage the experienced participants move to the ERS program.	§ 16 TAC §25.181(e)(5)	

6.6.2 Session 2 February 8th, 2023—Best Practices Discussion

The table below summarizes the best practices identified for demand response programs and the various perspectives expressed.

Best practice	Perspectives/ideas captured
Focus on the customer by providing tangible value and multiple paths to participation for a "Big tent" approach	Perspective 1: Stakeholders voiced it was important to note the original intent and purpose of these programs were to develop energy efficiency options for customers that were not yet readily available in the market or for which additional financial assistance (e.g., low-income programs) was needed. Perspective 2 Keep participation path simple: Example given of utility has an EE rebate for smart thermostats, a DR enrollment incentive along with a bring your own thermostat program. They market the program on their utility marketplace where a customer can get both incentives at the same time. Perspective 3: Build on smart thermostats while exploring other technologies. Simplistic program design examples are plentiful for smart thermostats, but other technologies like smart water heaters are a bit behind and it may be harder to market these technologies over a utility marketplace.

Best practice	Perspectives/ideas captured
	Perspective 4: Coordinating programs through REPs, customers who sign up get a free or reduced-price thermostat. The customer does not even need to know the money came from the IOU program. This may broaden the reach to customers that are not just early adopters. Perspective 5: Emerging Theme –consistency and flexibility in program designs to meet the needs of customers and evaluations. Perspective 6: Adding clarity around customer types would be helpful. For example, large commercial, industrial, mid commercial can benefit on their own, while aggregating residential and small business efforts there is untapped potential, but the economics are not as clear. Targeting these customers using rate payer funds seems appropriate.
Best practice	**Perspectives/ideas captured**
Integrates EE and DR when feasible	Perspective 1: For residential customers, understanding the readiness of the customer's home to install a smart device and participate in a DR program is important. Some homes will need an audit, weatherization, or other EE upgrades before DR is beneficial to them and the grid. Perspective 2: For Commercial Customers, using controls and software programs through Strategic Energy Management (SEM) programs should be explored. It was discussed that one can work with Vendors to integrate DR as they are automating responses to shave peaks daily in some cases. Bringing DR and EE program staff together to discuss how each program can contribute to help incentivize those controls/software measures is important. Perspective 3: Keeping programs simple is most important for adoption. This viewpoint cautions against requiring weatherization as it could crush the program participation unless budgets are drastically increased.
Best practice	**Perspectives/ideas captured**
Complements other DR offerings and the competitive market (i.e., ERCOT programs, REP coordination)	Perspective 1: Partner with REPs. REP can partner with a smart thermostat provider and TDUs can allocate a percentage of their EE program budgets to deployment of the thermostats to customers recruited by REPs who agree to install the thermostat and enroll in the DR program. Perspective 2: Prescreen and refer customers. The IOU could pre-screen the customer to ensure their home is smart thermostat ready through an audit or weatherization program or based on new construction. Perspective 3: Explore processes to support coordination even if Rule language does not need to change. Including a performance metric to promote coordination through tracking and reporting could be an option. Perspective 4: Coordination is of supreme importance between stakeholders. To be effective, the programs need the IOUs with the smart meters and site stability to measure and manage parity between smart devices (heat pumps, water heaters, electric resistance, smart thermostats, etc.). The REPs have direct customer interaction, but it may not be as permanent with customer choice. Keeping that customer engaged in DR activities.

Best practice	Perspectives/ideas captured
	Perspective 5: Coordination to bridge the gap to access data. Can make it simple to evaluate and be broad in solicitation of DR programs. Right now, this requires a contract with the customers.
Improves grid resiliency (i.e., geotargeting, DER integration, seasonal needs)	Perspective 1: Understanding the problem we are trying to solve is important. Historically it has been summertime afternoon system demands. But the problems are changing and different for each utility service territory, whether bulk system issues, market issues, or distribution level, having the flexibility of geotargeting is important. Perspective 2: Texas should glean best practices. We should be looking at other states who have implemented successful programs or are ranking high on the list for Energy Efficiency programs, for instance New York's Reforming the Energy Vision (REV) program. There is an excellent opportunity for each IOU to study their local distribution and transmission related needs and assign a value to them. Perspective 3: The T&D utilities need to proactively think about managing distributed resources. With solar systems, EV's, storage, and other emerging technologies, they need to determine how to build out this system, manage and interact with customers and/or their retailers in a way that turns these innovative technologies into a resource for them.
Best practice	**Perspectives/ideas captured**
Taps into potential across all eligible customer segments	Perspective 1: For commercial customers, it's important to have a range of participation options. Choices should consider their risk/reward tolerance, load shedding commitment, and flexibility needs and design the program with a range of options for customers. Perspective 2: For residential customers, look at simple demand response programs and technologies that will attract customers into the program. Having goals combined (DR and EE) simplifies this process. Example: you can install a smart thermostat and capture energy efficiency saving, but the utility also has a new smart device resource in the home that can be engaged on the DR side and enrolled even easier, even if down the road and vice versa. If you enroll the customer first in DR, it will be easier to engage them for other EE measures later. (Weatherization, etc.)
Employs consistency with flexibility to adapt to different markets and local system needs	Perspective 1: Rules to evaluate cost effectiveness of energy efficiency products. Historically funded demand response products through those plans and proceedings, but as portfolios evolve and get away from just peak shedding products into more flexible "DR 3.0" products, there's the need for tools and 16 TAC §25.181s to give us runway to implement these best practices because we know the value is there. Perspective 2: Consistency across utility territories can improve. There is an opportunity to have consistency in program offerings across utility territories that would increase efficiency of service providers coordination but recognize there are different needs across territories.

Best practice	Perspectives/ideas captured
Accurately reflects the value of the demand response to the grid	Perspective 1: Geotargeting can be used to value DR. Con Ed has a great program example where they have analyzed every subsystem peak and assigned a value in their distribution network, so they know what curtailment is worth during those peaks and can target efforts and budget where needed most. Perspective 2: Understanding what other states are doing with regards to intelligent rates is an opportunity. For instance, designing intelligent rate structures that reflect the cost of delivering energy to the customer, at the time it is being delivered to a particular location, while also making those price signals available to customers. Service providers will be encouraged to serve those customers, customers will better understand the value and a "clunky" separate market may not be needed for it. Perspective 3: Budgets will matter. Do not assume the commission is not willing to increase budgets. It is up to stakeholders to present options that will increase reliability in the market, safety, and other issues while also providing a significant benefit to Texans. Perspective 4: Revise avoided costs. It is important to remember the value these programs can provide to the T&D providers. We should be calculating the avoided cost of T&D for these programs not just the avoided costs of DR and EE savings. Going through the effort to track the benefits will be educational.

6.6.3 Session 3 February 22, 2023-- Considerations for Demand Response Best Practices

Session 3 discussion on Considerations to implement Demand Response Best Practices. The table below summarizes the key issues identified and places a priority/level of effort for addressing this issue in a rulemaking.

Issue	Summary	Working Group priority and why
Issue 1: Peak Definitions	Winter and Summer Peak demand periods are defined in 16 TAC §25.181(a)(45): 1-7 PM June – September 6-10 PM December -February, excluding weekends and Federal holidays, can be called for grid emergency or system reliability.	**High Priority:** Stakeholders voiced the need to look at future problems and align flexibility in definitions that will support Texas future grid needs.
Issue	**Summary**	**Working Group priority and why**
Issue 2: Cost-effectiveness of programs	Load management programs must pass the utility cost test, which does not include T&D from DR	**High Priority:** Stakeholders agree the value of demand response to the grid is not adequately recognized

Issue	Summary	Working Group priority and why
Issue 2: Cost of programs	25.182 (d)(7) Cost Caps for 2019 and after increases by CPI. 2018 base is $0.001263 per kWh; for commercial $0.000790 per kWh. 16 TAC §25.181(i) cost of administration not to exceed 15% of a utility's total program costs. The cost of R&D not to exceed 10% of a utility's total program costs. The total of both cannot exceed 20%. 16 TAC §25.181(f) Energy Efficiency Cost Recovery Factor (EECRF) (f)(2) Costs directly assigned to each rate class that receives services, can combine smaller and similar rate classes through good cause exception.	**High Priority:** Stakeholders agree that cost caps pose barriers to bringing new innovative programs to market. In addition, they voiced the need to include additional benefits in cost effectiveness calculations and considerations. Xcel cannot run a residential demand response program in their EE portfolio due to the cost cap.
Issue	**Summary**	**Working Group priority and why**
Issue 3: Process to coordinate and innovate	PURA and 16 TAC §25.181require ERCOT utilities to use their best efforts to encourage and facilitate involvement of retail electric providers (REPs) in delivery of EE and DR programs.	**Low Priority:** Stakeholders voiced the need for consistency in programs while also ensuring that customers bearing the costs of the program have access to the benefits as well. While it is important, it is noted as low as it was agreed 16 TAC §25.181 itself does not change, but this can be addressed through another process.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Peak Definitions	Narrowly defining peak inhibits innovation and problems not yet identified in a dynamic environment. Stakeholders documented that there is PUC effort to determine the	<u>Perspective 1:</u> The current definition allows for peak shedding programs but limits the ability for load shifting programs and innovation for solving future grid problems with innovative technologies. (EVs, DERs, etc.). <u>Perspective 2:</u> With innovative technologies, peak hours are shifting, and the current definitions may be out of date. This can be associated with the defined period but also excluding weekends and	16 TAC §25.181(a)(45): 1-7 PM June – September 6-10 PM December - February, excluding weekends and Federal holidays, can be called for grid emergency or system reliability.	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
	most high-risk days utility DR programs could be designed to align with the market redesign.	certain holidays. (i.e., expanded work shifts to weekends and working from home culture shifts). Perspective 3: The current definition is more aligned with "bulk system level", not specific distribution level challenges. Perspective 4: The TDU DR programs should align with their distribution systems and solve their feeder/capacity challenges with a caveat incorporated such as when ERCOT calls an emergency "all hands are on deck". In other words, a definition that complements ERCOT programs, not competing with it.		
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 2: Cost-effectiveness of programs	Stakeholders agree we need to look at the true benefits DR programs offer and include them in the cost effectiveness calculations.	Perspective 1: The name Demand Response deters from its value. DR is more than just turning things down for a second. Maybe we change the name to Demand Management vs. Load Management Perspective 2: Including a T&D cost avoidance figure along with the avoided cost of capacity. Perspective 3: The cost of carbon should be included in the cost effectiveness calculations.	16 TAC §25.181(d) Cost-effectiveness standard defines benefits as energy savings and demand reductions as calculated with the avoided costs.	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 2: Cost of programs	Stakeholders agree customer cost caps are limiting program innovations and offerings.	Perspective 1: At least one utility is running DR programs outside of their EE programs due to Customer Cost Caps. Perspective 2: With the Admin Cost Caps it causes a barrier to program innovation as there are significant startup costs associated with new programs.	16 TAC §25.182 (d)(7) Cost Caps for 2019 and after increases by CPI. 2018 base is $0.001263 per kWh; for commercial $0.000790 per kWh. 16 TAC §25.181(i) cost of administration not to exceed 15% of a utility's total program costs. The cost of R&D not to exceed 10% of a utility's total program costs. The total of both cannot exceed 20%.	
Issue 3: Process to coordinate and innovate	Stakeholders agree more can be done to educate/market demand response programs to customers.	Perspective 1: All customers are bearing the costs of these programs but not benefiting from them. Perspective 2: DR programs are complex – we are asking customers to change their behavior not just install a new piece of equipment and forget about it. Perspective 3: These programs require a strong relationship to educate the customer on what they are signing up for. Perspective 4: Consider a metric that captures the value of DR and EE measure integration and coordination with other parties. (i.e., a programmable thermostat provides both DR and EE benefits,		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		thermostats delivered through REPs).		

6.6.4 Session 4 March 8, 2023

The Demand Response working group focused on discussing a recap of Best Practices with word smithing and sharing Overarching Themes that emerged during all the workshops. In addition, the facilitator discussed the session summary tables and review process for the EEIP progress update.

6.7 PROGRAM PLANNING

Session 1 January 26, 2023: Planning Cycle

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Planning Cycle	PURA and 16 TAC §25.181 require an annual energy efficiency plan and report (EEPR) to be filed on or before April 1 of each year.	**High Priority:** Stakeholders identified the need to review the planning cycle voicing the following reasons: • reduce administrative burden, • encourage forward-thinking and align timeline with published avoided cost calculations.
Issue	**Summary**	**Working Group priority and why**
Issue 2: EM&V Cycle	16 TAC §25.181(o) defines the EM&V framework, which ensures that the programs are evaluated, measured, and verified using a consistent process that accurately estimates energy savings.	**Low Priority:** Stakeholders identified the need to review the frequency of the EM&V cycle to lower administrative burden.
Issue	**Summary**	**Working Group priority and why**
Issue 3: TRM Update Cycle	16 TAC §25.181 requires the EM&V contractor to review the TRM annually for updates. PUCT staff has approval responsibility for the TRM (16 TAC § 25.181(q) (6)(c). To facilitate proper vetting and collaborative input into the TRM, PUCT staff distributes the TRM to the Energy Efficiency Implementation Project (EEIP) and hosts an annual EEIP meeting to review the TRM.	**Low Priority:** Stakeholders identified a desire to review the TRM update cycle, voicing it may help reduce risk in their program delivery
Issue	**Summary**	**Working Group priority and why**
Issue 4: Stakeholder	PURA and 16 TAC §25.181 require ERCOT utilities to use their best efforts to encourage	**High Priority:** Stakeholders voiced a gap in knowledge surrounding the

Issue	Summary	Working Group priority and why
Engagement in Planning Cycle	and facilitate the involvement of retail electric providers (REPs) in the delivery of EE and DR programs. 16 TAC §25.181 also includes collaboration with the Energy Efficiency Implementation Project (EEIP).	planning cycle, manner of participation, and process, which may result in missed EE program opportunities.
Issue 5: Program Options: Standard Offer, Market Transformation, and Self-delivered Programs	Standard Offer Program (SOP): A program under which a utility administers standard offer contracts between the utility and energy efficiency service providers. Market Transformation Programs (MTPs): Strategic programs intended to induce lasting structural or behavioral changes in the market that result in increased adoption of energy efficiency technologies, services, and practices. Pilot programs typically fall under this definition. Self-Delivered Programs: a program developed by a utility in an area where customer choice is not offered that provides incentives directly to customers. The utility may design and administer the program using internal or external resources.	**Low Priority:** Overall, stakeholders agreed that the definitions of the program offerings provided enough flexibility. However, providing longer durations for pilots to run was overall the most commonly voiced theme from stakeholders.
Issue 6: Method of Avoided Costs Calculation Energy	Energy avoided costs are calculated from the load-weighted average of wholesale prices for the peak periods from the two previous winter and summer peaks.	**High Priority:** Stakeholders voiced a desire to review the calculation method to help level the volatility in energy prices.
Issue 7: Method of Avoided Costs Calculation Capacity	As reported by EIA, Capacity avoided costs are calculated from the base overnight cost using the lower of a new conventional or new advanced combustion turbine.	**High Priority:** Stakeholders identified that the avoided capacity cost had been the same at $80 per kW for over a decade. The calculation may not accurately capture the full value of EE programs.
Issue 8: Timeline of Avoided Cost Calculation Energy & Capacity	Each November avoided costs are calculated and published; Capacity by Commission and energy by ERCOT.	**High Priority:** The timing of November published avoided costs does not align with the April 1 EPPR filings. In other words, programs are filed before updated avoided costs; this can cause conflict with program filings and cost-effectiveness calculations.

For the first five identified key issues above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed. The remaining three issues were not discussed until session two. Please see Session two summaries for discussion of issues six through eight.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Planning Cycle	Streamlining the planning cycle in a way that optimizes EE Program value is the goal. Understanding that the comprehensive planning cycle (EPPR, TRM, EM&V, avoided costs, etc.) is interdependent and will require a holistic view when making any adjustments.	Perspective 1: Moving to a 2- or 3-year EE program planning cycle will encourage forward thinking and flexibility regarding measures, program design, and budgets. Perspective 2: Moving to a 2– or 3-year EE program planning cycle may limit flexibility because the plans are locked in and should be a consideration should any adjustments be made. Perspective 3: A one-year filing is simple and provides the ability to update goals and create them in a timely manner each year. Perspective 4: Transitioning EEPR and EECRF from two filings to one filing will reduce the administrative burden.	16 TAC §25.181 (d)	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 2: TRM Update Cycle	Some form of review must occur annually due to federal code standards and new measures. Understanding that the comprehensive planning cycle (EPPR, TRM, EM&V, avoided costs, etc.) is all interdependent and will	Perspective 1: Move to a 2-year cycle with a light review in Year 1 to add new technologies and updated standards and a full update in year two to manage the risk of measures being eliminated. Perspective 2: The Texas TRM is mature, so the annual reviews are not as heavy of a	16 TAC § 25.181(o)(6)(B)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
	require a holistic view when making any adjustments.	lift and typically focus on federal standards and new measures.		
Issue 3: EM&V Cycle	Understanding that the comprehensive planning cycle (EPPR, TRM, EM&V, avoided costs, etc.) is all interdependent and will require a holistic view when making any adjustments.	Perspective 1: Adjust the EM&V cycle to reduce the burden or expand the timeline to 2 years to allow more opportunity for programs to achieve savings and bring the most value	16 TAC §25.181(o) § 25.182 (e)	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 4: Stakeholder Engagement in Planning Cycle	Collaboration opportunities exist between IOUs, REPs, Implementors, and Advocacy groups.	Perspective 1: Stakeholders voiced the need to involve and educate REPS on the program planning process. When is the right time to introduce new ideas, and what is the most effective channel for coordination and inclusion? Perspective 2: Including REPs in the design phase of a program versus just the implementation would also be beneficial to overall program delivery. Perspective 3: Traditionally, the EEIP process has been the forum for that engagement		Representation and inclusion in all EEIP meetings

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 5: Program Options: Standard Offer Programs (SOP), Market Transformation Programs (MTP), and Self-delivered.	SOP and MTP seem to be offering the right flexibility in program offerings for utilities. Having only 1 Year to run a pilot is not enough time. Pilot programs need more time to stand up, learn, and adjust the program to realize the full benefits.	Perspective 1: Adding a Pilot Program classification to accommodate a longer program duration. Perspective 2: Through self-delivered programs, utilities should be able to provide incentives directly to customers more easily without approval from the PUC. Perspective 3: Given the Texas market's competitive nature, some approval from the PUC is needed for that self-delivered classification.	§16 TAC §25.181(h)(i)(j)(k) §16 TAC §25.181 (l)(2)(V) Defining a pilot may need to be added to 16 TAC §25.181, clearly allowing longer than a year if the planning cycle remains annual.	

Session 2 February 9th, 2023: Avoided Costs and Cost-effectiveness standard:

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Method of Avoided Costs Calculation Capacity	Since 2010, the cost-effectiveness standard has evolved around avoided cost of capacity and avoided cost of energy. Capacity is calculated by the commission from the base overnight cost using the lower of a new conventional or a new advanced combustion turbine as reported by EIA. Non-ERCOT utilities have the option to use their own avoided costs	High Priority: Stakeholders identified that the avoided cost of capacity had been the same at $80 per kW for over a decade. The calculation may not accurately capture the full value of EE programs.
Issue	**Summary**	**Working Group priority and why**
Issue 2: Method of Avoided Costs Calculation Energy	Since 2010, the cost-effectiveness standard has evolved around avoided cost of capacity and avoided cost of energy. ERCOT calculates avoided cost of energy from the load-weighted average of wholesale prices for the peak periods from the two previous winter and summer peaks. Non-ERCOT utilities have the option to use their own avoided costs.	High Priority: Stakeholders voiced requests to review the calculation method to help level the volatility in energy prices used in Workshop 1.

Issue	Summary	Working Group priority and why
Issue 3: Methodology of calculation Avoided Retail Energy (kWh) value used in SIR	The SIR is used for Targeted Low-Income Programs. Savings-to-Investment Ration (SIR) is the ratio of the present value of a customer's estimated lifetime electricity cost savings from EE measures to the present value of the installation costs, inclusive of any incidental repairs, of those EE measures. This is forecasted during the planning stage and finalized at the end of the program year.	Low Priority: – may not require a rule change - Stakeholders voiced a consistent method should be agreed to calculate Avoided Retail energy Value used in the SIR calculation to avoid confusion and timing issues with a fluctuating market
Issue	**Summary**	**Working Group priority and why**
Issue 4: Timeline of Avoided Cost Calculation Energy & Capacity	Each November avoided costs are calculated.	High Priority: The timing of November published avoided costs does not align with the April 1st EPPR filings. In other words, programs are filed before updated avoided costs. This can cause conflict with program filings and cost-effectiveness calculations. This was discussed in workshop 1.
Issue	**Summary**	**Working Group priority and why**
Issue 5: Cost-effectiveness Standards	The cost-effectiveness standard is the Utility Cost Test (UCT).	Medium Priority: An EE program is deemed cost-effective if the program's cost to the utility is less than or equal to the program's benefits. UCT is not called out specifically.
Issue	**Summary**	**Working Group priority and why**
Issue 6: Cost-effectiveness calculated at the program level	The cost-effectiveness standard is the Utility Cost Test (UCT), conducted at the program level.	High Priority: An EE program is deemed cost-effective if the program's cost to the utility is less than or equal to the program's benefits.
Issue	**Summary**	**Working Group priority and why**
Issue 7: Calculation of program benefits	The program's benefits consist of the value of the demand reductions and energy savings, measured in accordance with the prescribed avoided costs prescribed….	High Priority: The present value of the program benefits shall be calculated over the projected life of the measure installed or implemented under the program.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed.

Key Issue	Areas of Agreement	Areas of Debate	Would this require Legislation or Rulemaking? If so, what?	Could another process address?
Issue 1: Method of Avoided Costs Calculation Capacity	Stakeholders voiced agreement that more discussion around the 2% escalation rate is needed.	Perspective 1: Providing enough incentive for measures like HVAC and Heat Pumps in residential programs is tough, especially with HTR and/or Low-Income customers with the "incentives for customer classes can't be over 100% of the avoided costs." Perspective 2: For rural areas, some utilities face issues raising incentive levels to attract contractors to work in those areas, especially with changes in the TRM and inflation. Perspective 3: The current calculation has an escalator of 2%. For measures with long EULs, we're applying a discount rate of 8%, but we're escalating the value over time by only 2%.	16 TAC §25.181(d)(2) Cost Effectiveness Standard	
Key Issue	**Areas of Agreement**	**Areas of Debate**	**Would this require Legislation or Rulemaking? If so, what?**	**Could another process address?**
Issue 2: Method of Avoided Costs Calculation Energy	Stakeholders agree that the swing in avoided costs of energy can cause vastly different estimates of the value of 1 measure in a program year to year.	Perspective 1: The swing in avoided costs in energy is disruptive to consistent programs year over year. Whatever the avoided cost of energy is at the time the measure is installed persists through the estimated useful life of the measure. Perspective 2: Ensuring contractors obtain consistency from year to year will encourage them to stay in the programs. We need to focus on their business needs too. Perspective 3: Avoided cost calculations should be forward-looking to reflect our best estimate of the avoided value of saved energy and capacity over the lifetime of the measure.	16 TAC §25.181(d)(3) Cost Effectiveness Standard	

Key Issue	Areas of Agreement	Areas of Debate	Would this require Legislation or Rulemaking? If so, what?	Could another process address?
Issue 3: Methodology of calculation Avoided Retail Energy (kWh) value used in SIR	Stakeholders agree that the SIR method is intended to represent the customer's perspective and quantifies cost-effectiveness /eligibility at the measure level.	Perspective 1: Having a shared avoided retail energy value would provide value to eliminate confusion Perspective 2: For Low Income, specific measures may not need to be cost-effective, or the calculation includes additional benefits not incorporated into other programs.	16 TAC §25.181(c)(50) Definition of SIR & (p)(2) Used in Low Income Programs.	
Key Issue	**Areas of Agreement**	**Areas of Debate**	**Would this require Legislation or Rulemaking? If so, what?**	**Could another process address?**
Issue 4: Timeline of Avoided Cost Calculation Energy & Capacity	Not discussed in Workshop 2.	Perspective 1: Workshop 1 -The timing of November published avoided costs does not align with the April 1st EPPR filings. In other words, programs are filed before updated avoided costs. This can cause conflict with program filings and cost-effectiveness calculations.	16 TAC §25.181(d) Cost Effectiveness Standard (2) & (3) Timing of Avoided Cost Capacity and Energy. 16 TAC §25.181(l) EE plans and reports (EEPR)	
Key Issue	**Areas of Agreement**	**Areas of Debate**	**Would this require Legislation or Rulemaking? If so, what?**	**Could another process address?**
Issue 5: Cost-effectiveness Standards	Stakeholders agree the programs are undervalued using the current cost-effectiveness standard UCT. Stakeholders agree a Texas cost-effectiveness test could be beneficial.	Perspective 1: UCT is clean and simple and works at both the portfolio and program levels. Perspective 2: Texas is a different market with unique goals; why not create a Texas-centric cost-effectiveness test? Perspective 3: Incorporating language in 16 TAC §25.181 that allows for PUC approval if you present a good case for a new program type with a different	16 TAC §25.181(d) Cost Effectiveness Standard (UCT is not called out specifically)	

Key Issue	Areas of Agreement	Areas of Debate	Would this require Legislation or Rulemaking? If so, what?	Could another process address?
		cost-effectiveness standard could work.		
Issue 6: Cost-effectiveness calculated at the program level	Stakeholders agree that cost-effectiveness at the portfolio level will provide more benefits and flexibility to programs.	Perspective 1: Cost-effectiveness at the portfolio level will help include measures for low-income programs that may not be as cost-effective. But overall, ratepayers realize a benefit. Perspective 2: Cost-effectiveness at a portfolio level will allow for higher incentives so we can reach HTR customers. Perspective 3: Cost-effectiveness at the portfolio level will allow more innovations in program design and new measures. Perspective 4: Calculating cost effectiveness at the portfolio level may run the risk of subsidizing programs between rate classes. However, having different cost caps for residential and commercial programs may solve this.	16 TAC §25.181(d)(1) Cost Effectiveness Standard	
Issue 7: Calculation of program benefits	Stakeholders agree that the programs are not capturing all the benefits they provide to ratepayers and Texans.	Perspective 1: We should consider incorporating the avoided transmission and distribution costs associated with EE programs. They are not currently incorporated into the calculation. Perspective 2: Utilities should be able to claim both winter and summer peak savings if the measure achieves savings during both peaks and should be included in the cost-effectiveness calculation. Perspective 3: We should consider capturing the benefits of water, natural gas, and carbon savings.	16 TAC §25.181(d)(1) Cost Effectiveness Standard & Benefits	

Session 3 February 23, 2023: Performance bonus and REP participation in the delivery of programs

The table below summarizes the key issues identified and places a priority/level of effort for addressing the issue in a rulemaking and/or legislative change.

Issue	Summary	Working Group priority and why
Issue 1: Performance Bonus Need	PURA section 39.905 (b)(2) requires Commission to establish performance bonuses for utilities that exceed the minimum goals. 16 TAC §25.182 (e) Utility that exceed 100% of its demand and energy reduction goals receive a bonus equal to 1% of net benefits for every 2% that the demand reduction goal has been exceeded – capped at 10% of the utility's total net benefits. Performance bonuses are included in program costs when calculating Net Benefits.	**Medium Priority:** Stakeholders voiced agreement that the performance bonus or revenue recovery is needed to support programs. 16 TAC §25.182 change requirement may be more around the calculation of the performance bonus.
Issue	**Summary**	**Working Group priority and why**
Issue 2: Modifications to Existing Calculation	16 TAC §25.182 (e)(5), when calculating net benefits to determine performance bonus, a discount rate equal to the utility's weighted average cost of capital of the utility and an escalation rate of 2% shall be used.	**High Priority:** Utility performance bonuses are included as program costs in future years, impacting the cost-effectiveness calculations of programs.
Issue	**Summary**	**Working Group priority and why**
Issue 3: Performance Bonus Best Practices	Performance bonuses were first implemented in 2008 and paid out in 2010 (*fact check needed).* The Texas IOUs performance bonus structure pays less than other utilities in Texas (CPS Energy Municipality)	**Medium Priority:** Stakeholders voiced the need to research other states/regions' performance bonus best practices to understand options better.
Issue	**Summary**	**Working Group priority and why**
Issue 4: Delivery Model	16 TAC §25.181(r) facilitates the involvement of retail electric providers as an energy efficiency service companies in the delivery of efficiency and demand response programs.	**Low Priority:** Stakeholders voiced an opportunity for better communication and coordination surrounding REP/TDU involvement and program design and delivery models.
Issue	**Summary**	**Working Group priority and why**
Issue 5: Collaboration and Communication Best Practices and Strategies	Section 16 TAC §25.181(r) facilitates the involvement of retail electric providers as an energy efficiency service companies in the delivery of efficiency and demand response programs.	**Low Priority:** Stakeholders agree the opportunity exists for better communication and collaboration between IOUs, REPs, and Service Providers.

For each identified key issue above, the following table summarizes areas of agreement, multiple perspectives expressed, and changes that could be needed.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 1: Performance Bonus Need	Stakeholders voiced there is a need for performance bonuses.	Perspective 1: Reviewing the min/max of the performance bonus to ensure it is appropriate and that it promotes energy efficiency in Texas. Perspective 2: The Performance Bonus is a "thank you" that does not entirely make the IOUs whole. Utility as a whole does lose money on EE programs; it's a balance because they answer to investors. Performance bonuses are very much needed. Perspective 3: Performance bonuses must be reviewed with the same rigor as good ratemaking. Making sure they are just and reasonable and lead to the desired outcome. Reviewing to ensure the bonus does not cannibalize good programs in future years is important. Perspective 4: Performance bonuses are a way to encourage utilities to exceed their goals and maximize net benefits while remaining under the cost caps.	PURA 39.905 (b)(2) 16 TAC §25.182 (e)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 2: Modifications to Existing Calculation	Stakeholders voice the need to understand the correlation in changing avoided costs or cost-effectiveness structure will impact the performance bonuses. The bonus collected during the program year is applied to cost-effectiveness, and the bonus calculation is allocated to each program based on a percentage of total program spending. In other words, programs that have a larger budget receive a larger portion of the bonus applied to that program.	Perspective 1: Keeping the calculation related to Net Benefits rather than tying it to a percentage of spend keeps the bonus based on performance. Perspective 2: Incorporating the performance bonus as a program cost ultimately hurts the IOUs in the long term and the benefit these programs can offer to customers.	16 TAC §25.182 (e)(5)	

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
Issue 3: Performance Bonus Best Practices	Stakeholders agreed that the performance bonus model is pretty good; however, it should be reviewed to determine if it should be incorporated into future program costs. Stakeholders also agreed more research is needed to look at cost recovery best practices in other regions.	Perspective 1: The optics of performance bonuses in the media can be challenging and detrimental to the programs. (i.e., x amount of the program budget was a performance bonus). Perspective 2: Other regions in the US use a lost revenue adjustment mechanism to recover lost sales. Perspective 3: Cost Caps for IOUs in Texas are low based on other utilities (i.e., CPS Energy in San Antonio has a cost recovery		

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		mechanism nearly double what the IOUs receive).		
Issue 4: Delivery Model		Perspective 1: A program that works well in Houston may not work well in Dallas. Programs do tend to be regional to meet the needs of the customer. Perspective 2: On the REP side, programs also vary with incentives paid to participate or pricing incentives. REP programs are a powerful retention tool and differentiator among competition.	16 TAC §25.181(r)	
Key issue	**Areas of agreement**	**Areas of debate**	**Would this require legislation or rulemaking? If so, what?**	**Could another process address?**
Issue 5: Collaboration and Communication Best Practices and Strategies	REPs play a significant role in demand response, especially when the grid is stressed in Texas. Utilities currently have a level of engagement with the REPs (i.e., HVAC Tune-Up programs).	Perspective 1: Including REPs in the program design phase will help improve collaboration between REPs and TDUs. Perspective 2: Adding Key Performance Indicators to track TDU/REP collaboration will promote engagement. Perspective 3: Better understanding of the problem and the goals (load shifting, energy efficiency, grid resiliency…) will help design programs and improve collaboration. It may require sculpting consumer behavior to solve Texas's issues, which REPs can provide intrinsic value. Perspective 4: Many REPs with different business models make it challenging to find a program design that works for a large group of REPs. Perspective 5: The EEIP process has been a good way to share	16 TAC §25.181(r)	Engagement with a REP association group may be the best way to enhance collaboration between all parties. Rather than individually reaching out to all REP companies may not be feasible for TDUs with limited resources.

Key issue	Areas of agreement	Areas of debate	Would this require legislation or rulemaking? If so, what?	Could another process address?
		communication and best practices. The mechanism is in place; it just needs to be leveraged by all stakeholders.		

Session 4 March 9th, 2023, EE Program Planning Working Group

The Program Planning working group discussed the Best Practices and Overarching Themes that emerged during all the workshops, including any wordsmithing and/or comments gathered for each presented. In addition, the facilitator discussed the session summary tables and review process for the EEIP progress update.