

# Public Utility Commission of Texas

Third-party Evaluation, Monitoring & Verification  
(EM&V) Contractor for the Texas Utilities' Energy  
Efficiency Portfolios

Energy Efficiency Implementation Project  
October 3, 2017

# Meeting Agenda

## Morning Agenda

- Introductions
- PY2016 EM&V Findings and Recommendations
- PY2017 EM&V Overview

## Afternoon Agenda

- Technical Reference Manual (TRM)

# Introduction of EM&V

- Texas enacted SB 1125 in 2011
  - established the requirement for an EM&V framework
- Rule-making followed
  - Commission Energy Efficiency Rule 25.181
- PUCT selects EM&V contractor through competitive Request for Proposals (RFP) process
  - awarded first contract in 2013, which covered Program Years (PY) 2012-2015
  - awarded second contract in 2017, which covered PYs 2016-2019

# EM&V Scope

PUCT, utilities and the EM&V contractor built infrastructure to meet the following goals:

- Verify gross energy and demand savings for all energy efficiency and load management programs across 10 utilities
  - Estimate net savings
  - Determine program and portfolio cost-effectiveness
  - Provide feedback to the PUCT, utilities, and other stakeholders
  - Prepare and maintain a statewide Technical Reference Manual (TRM)
  - Provide ongoing support for M&V plans, savings calculation tools, deemed savings petitions and TRM
- Target level of precision: +/- 90% at the *utility portfolio level*.

# EM&V Approach

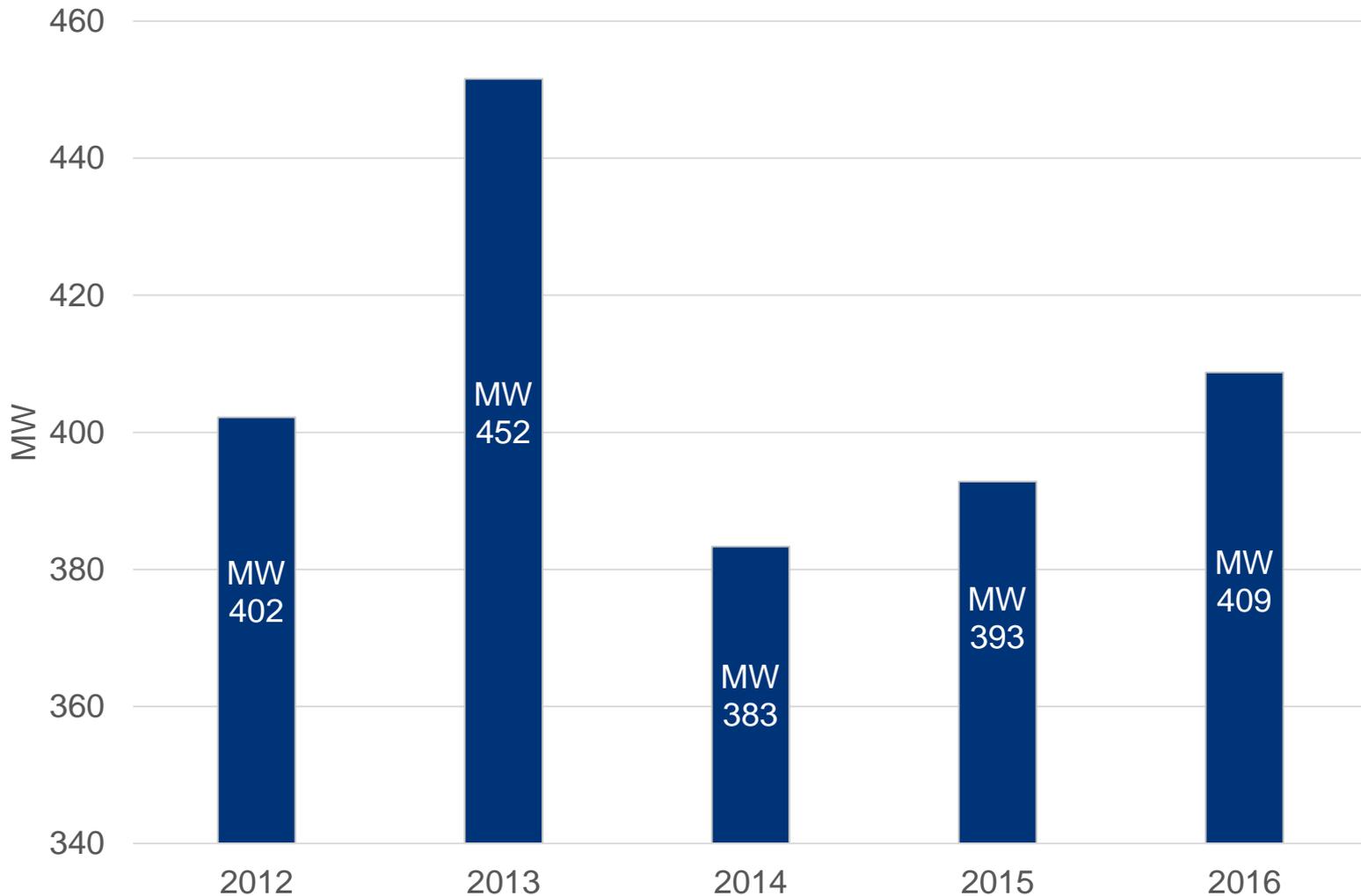
- Approach to EM&V is to:
  - Establish statewide best practices in data collection, evaluation techniques and reporting
  - Anchor the EM&V process in collaboration and clear communication with key stakeholders
  - Increase accuracy of impacts while fostering confidence in the results
  - Provide information that will serve as a valuable tool to improve program performance
  - Appropriately balance costs with the value of the information provided

# PY2016 Statewide Evaluated Savings

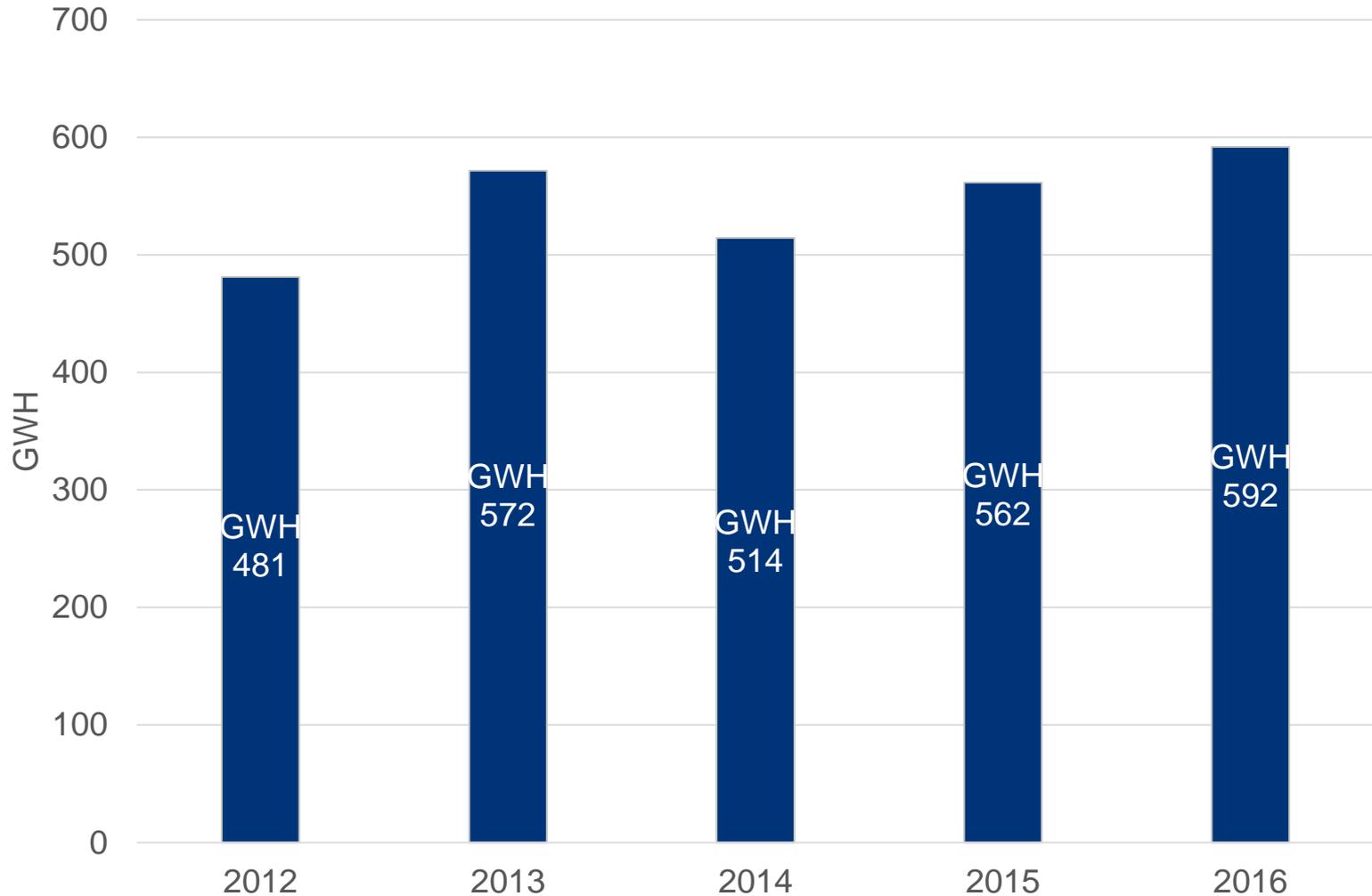
Texas electric utilities delivered statewide savings of 591,732,612 kWh and 408,743 kW at a lifetime cost of \$0.011 per kWh and \$17.26 per kW

- Nine of the ten utilities exceeded savings & demand goals
- Over last five years, 2016 saw the highest level of energy savings and second highest in demand reductions
- Statewide savings are approximately half from Commercial programs and half from Residential programs
- Load management is largest contributor to demand savings (61%)

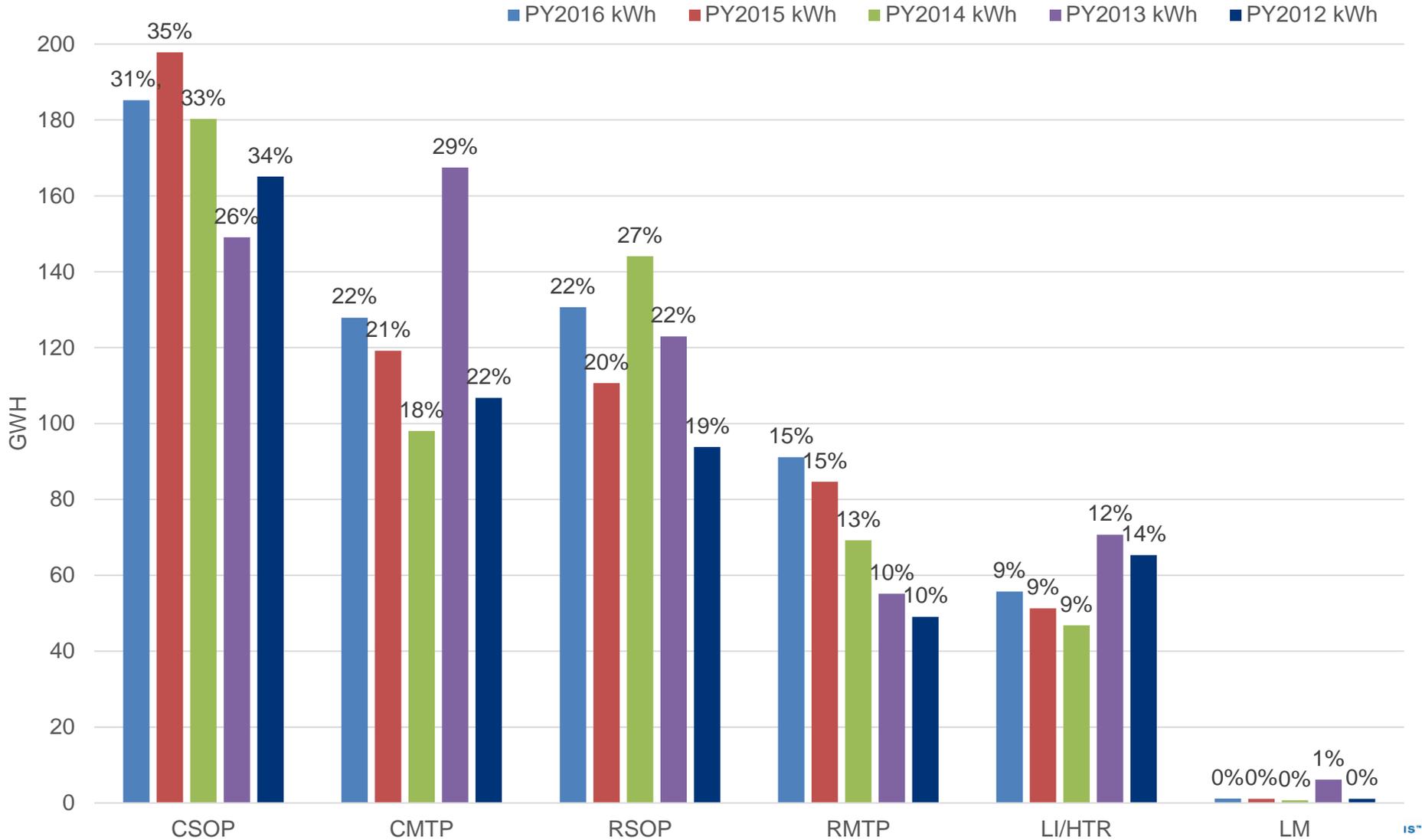
# Evaluated Demand Reductions 2012 - 2016



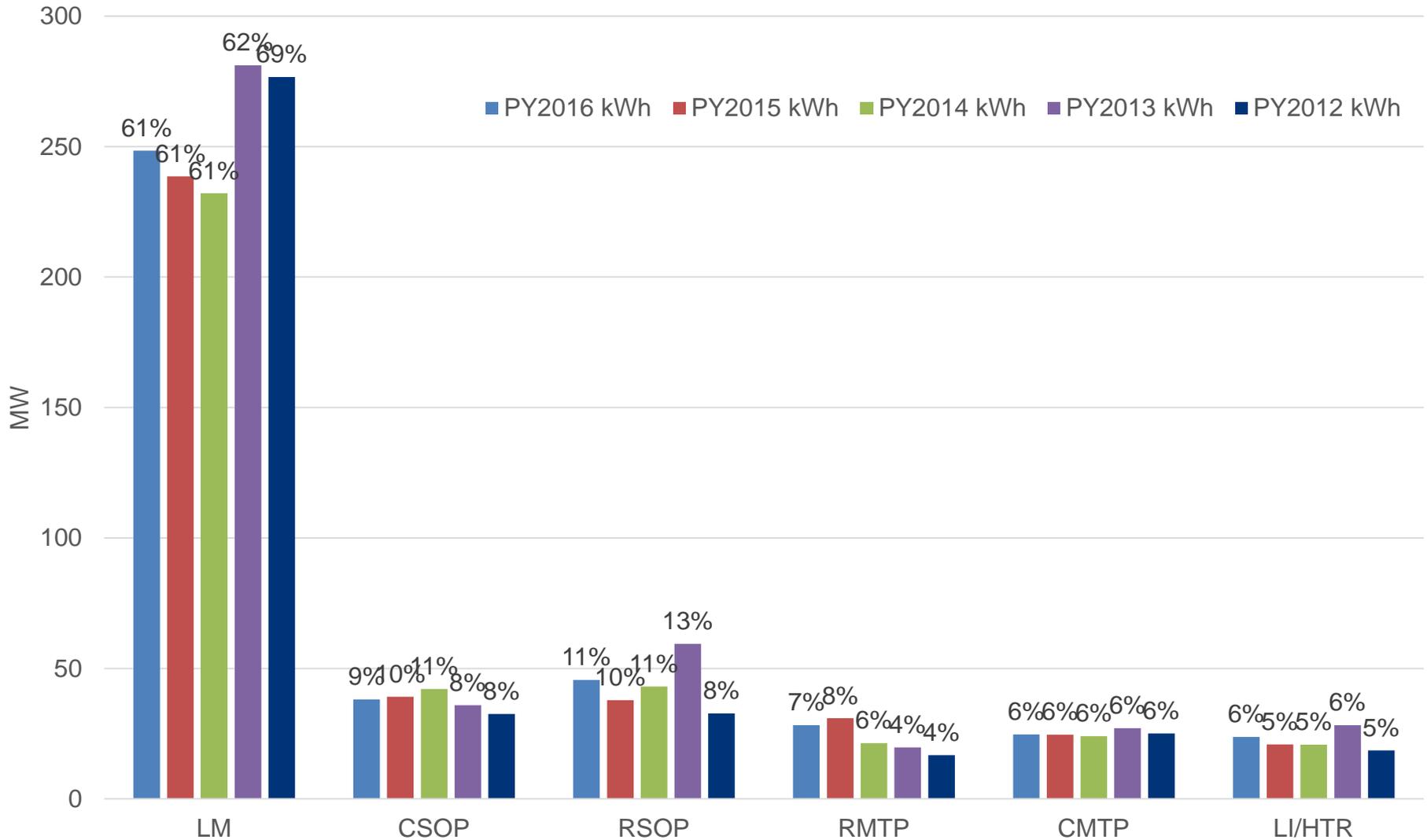
# Evaluated Energy Savings 2012 - 2016



# Evaluated Energy Savings by Program Type



# Evaluated Demand Savings by Program Type



# Where did the savings come from?

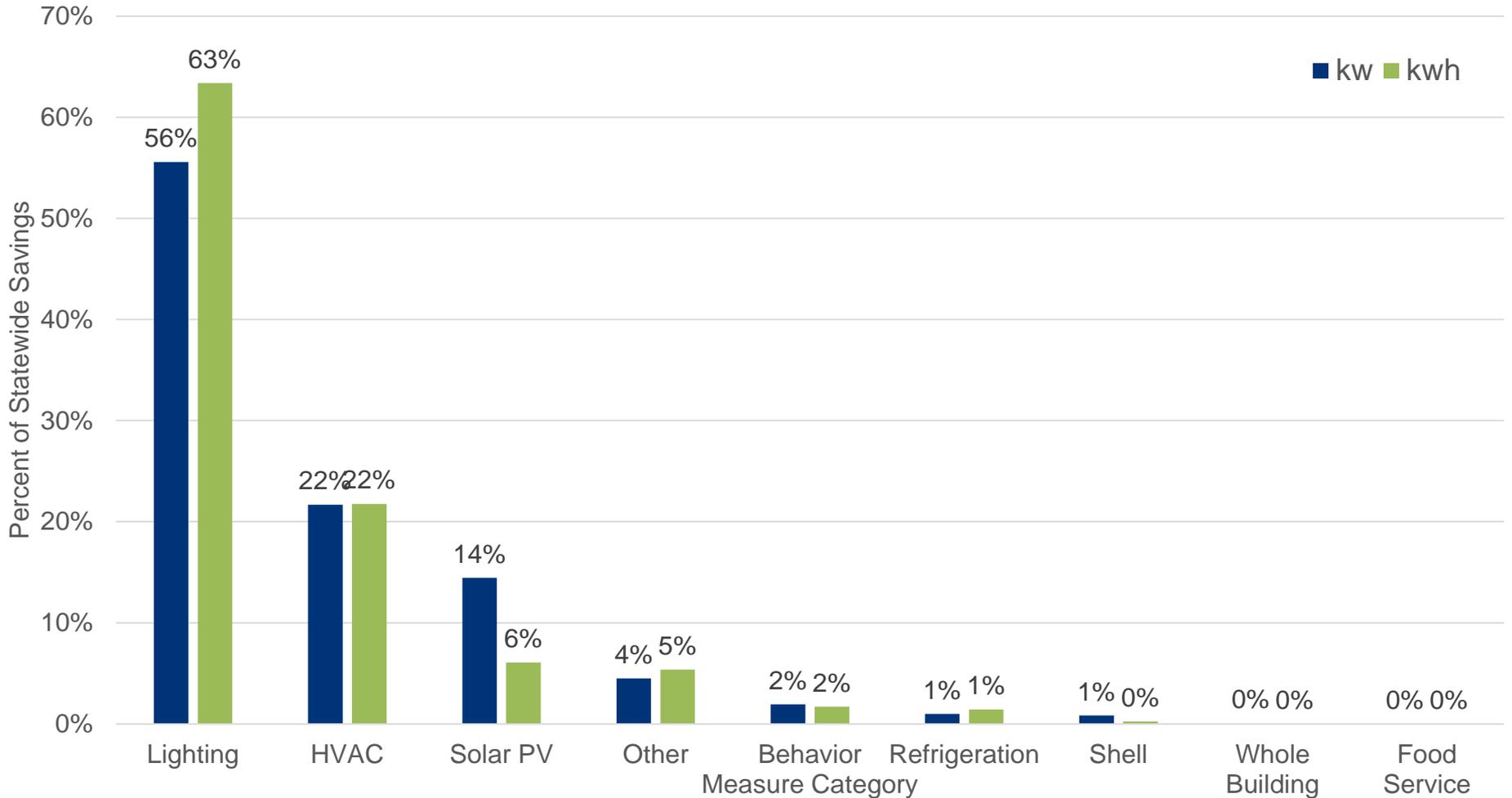


Lighting is largest contributor to Commercial savings

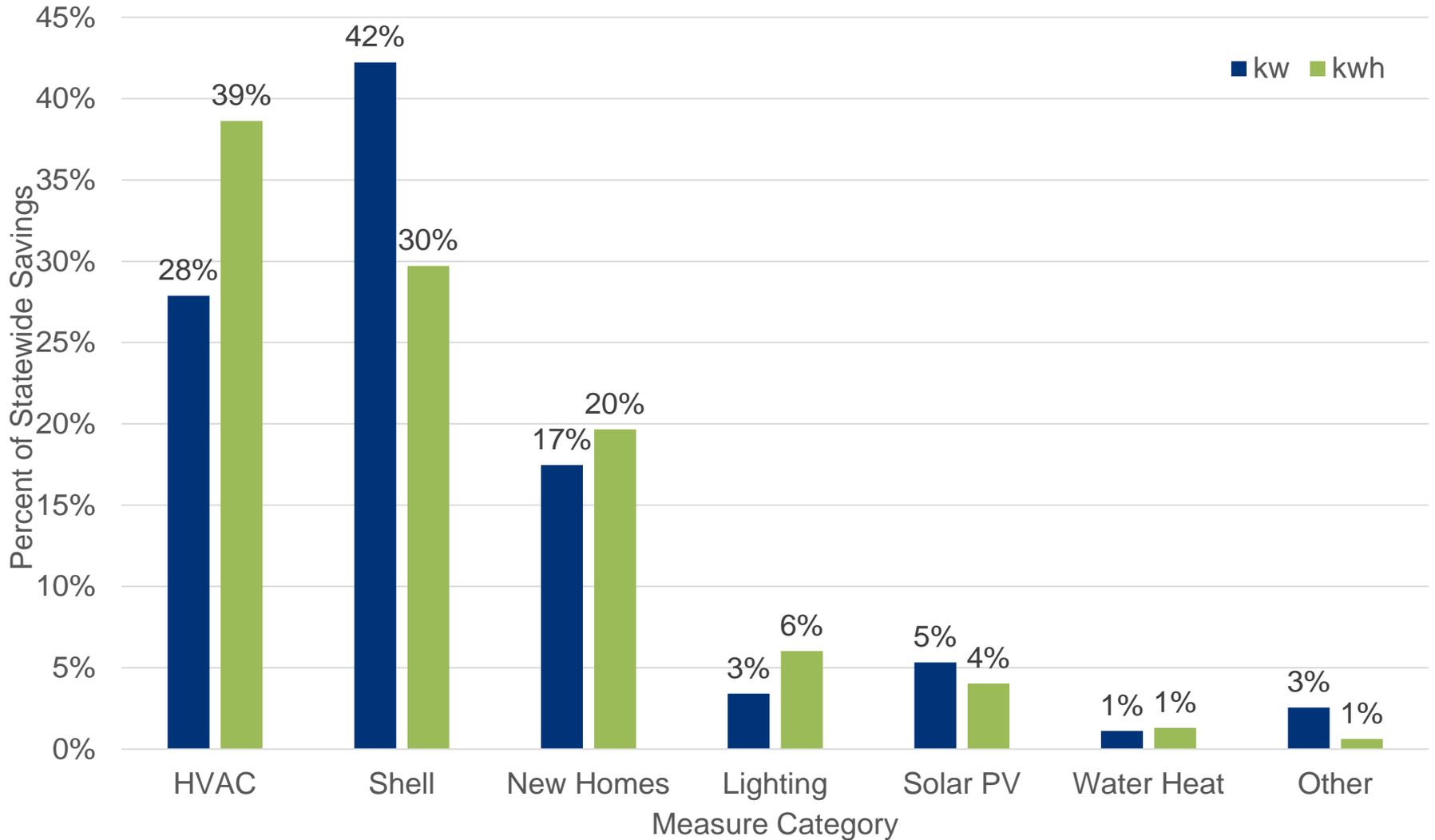
The measure mix has become more diverse across both sectors

HVAC measures have increased the most across both sectors

# Commercial Savings by Measure



# Residential Savings by Measure



# PY2016 EM&V Key Findings



# PY2016 Impact Evaluation Objectives

Confirmed that the measures installed are consistent with those listed in the tracking system

Verified that savings in the tracking system are consistent with the savings calculated in the deemed calculation tools or M&V methods

Reviewed savings assumptions and utility M&V reports, when available, for sampled projects and on-site M&V

Recommended updates in project-level claimed savings if EM&V results indicate variation in savings of at least  $\pm 5$  percent

Informed updates for the PY2018 TRM

# PY2016 Approach

The following EM&V activities were completed statewide:

- Tracking data verification of program savings across all programs
- Census review of residential deemed savings' calculations
- Census review of HVAC tune-up and pool pump measure savings
- 98 commercial program desk reviews
- 51 commercial on-site M&V
- Calculation of load management impacts using interval meter data across all participants.

# Accurate Claimed Savings

Healthy realization rates (evaluated savings compared to claimed savings)

- Statewide demand and energy savings realization rates are close to 100%

Results strengthened by EM&V team and utility collaboration

- Utilities engage EM&V team in upfront M&V reviews and technical guidance
- Utilities agreed to revise claimed savings based on EM&V recommendations

# Utility Portfolio Claimed and Evaluated Demand Savings

Utility	Percent Statewide Savings (kW)	Claimed Demand Savings (kW)	Evaluated Demand Savings	Realization Rate	Precision at 90% Confidence
AEP TCC	9.6%	39,321	39,116	99.5%	0.8%
AEP TNC	1.6%	6,381	6,417	100.6%	0.3%
CenterPoint	41.3%	167,671	168,750	100.6%	0.4%
El Paso Electric	3.1%	12,790	12,786	100.0%	0.4%
Entergy	4.8%	19,739	19,578	99.2%	<0.05%
Oncor	31.6%	128,831	129,118	100.2%	0.3%
Sharyland	0.1%	600	600	100.0%	0.1%
SWEPCO	2.9%	11,939	11,939	100.0%	0.3%
TNMP	3.0%	12,253	12,252	100.0%	<0.05%
Xcel SPS	2.0%	8,188	8,187	100.0%	0.9%
<b>Total</b>	<b>100.0%</b>	<b>407,714</b>	<b>408,743</b>	<b>100.3%</b>	<b>0.4%</b>

# Utility Portfolio Claimed and Evaluated Energy Savings

Utility	Percent Statewide Savings (kWh)	Claimed Demand Savings (kWh)	Evaluated Demand Savings (kWh)	Realization Rate	Precision at 90% Confidence
AEP TCC	11.2%	67,789,605	66,304,850	97.8%	0.7%
AEP TNC	1.8%	10,818,500	10,814,035	100.0%	0.3%
CenterPoint	31.8%	190,856,858	188,387,963	98.7%	0.2%
El Paso Electric	3.9%	22,912,025	22,905,591	100.0%	3.4%
Entergy	7.5%	45,044,145	44,616,971	99.1%	3.2%
Oncor	33.7%	198,777,156	199,673,742	100.5%	0.8%
Sharyland	0.4%	2,212,723	2,212,449	100.0%	0.1%
SWEPCO	3.5%	20,648,105	20,647,945	100.0%	3.8%
TNMP	3.7%	21,716,040	21,718,653	100.0%	<0.05%
Xcel SPS	2.4%	14,451,094	14,450,414	100.0%	1.6%
<b>Total</b>	<b>100.0%</b>	<b>595,226,252</b>	<b>591,732,612</b>	<b>99.4%</b>	<b>1.0%</b>

# Utilities' portfolios are cost effective

## Statewide evaluated savings results

- 2.46 including low-income programs
- 2.65 excluding low-income programs

## Statewide net evaluated savings results

- 2.08 including low-income programs
- 2.23 excluding low-income programs.

## Utilities' cost-effectiveness varied

- 2.2 to 3.4 without low-income programs
- 1.9 to 3.0 based on evaluated net savings

# Lifetime evaluated savings costs

## Statewide

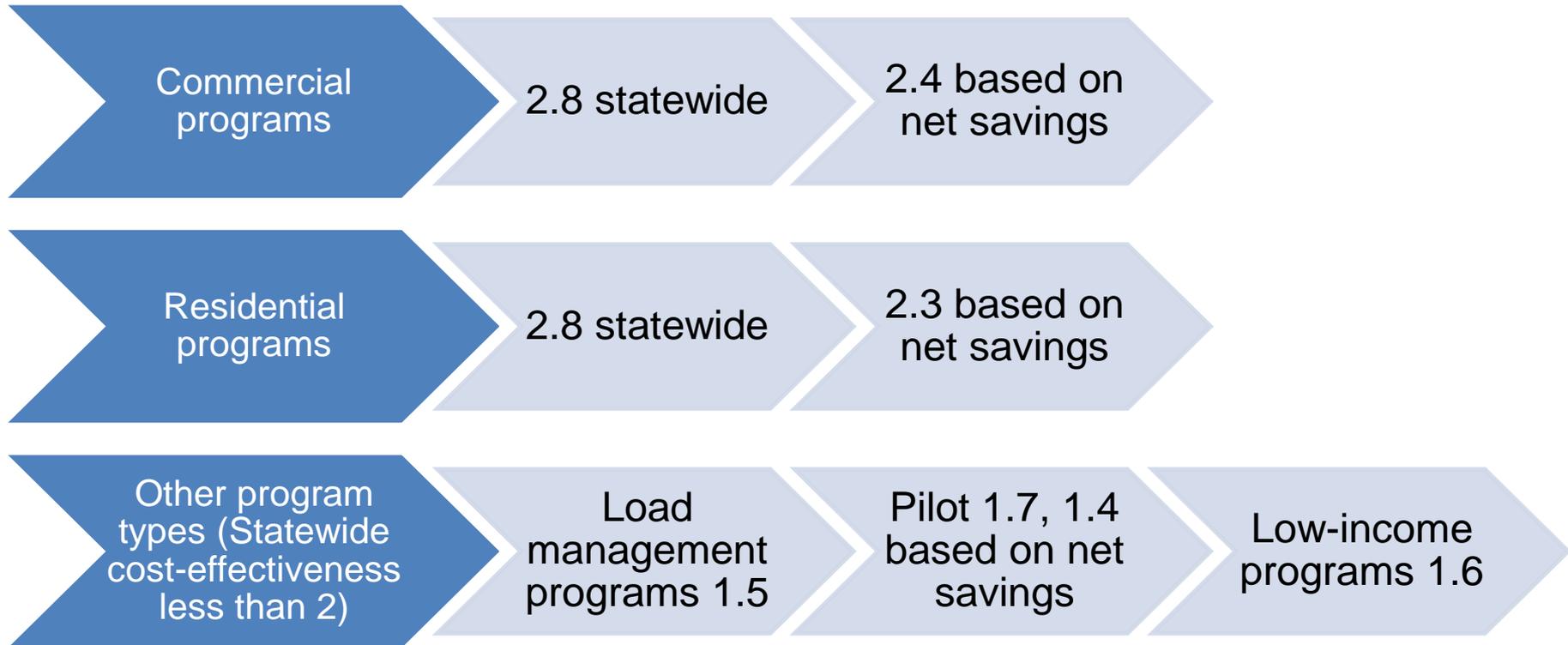
- \$0.011 per kWh
- \$17.26 per kW

## Across utilities

- cost per kWh ranges from \$0.009 to \$0.013
- cost per kW ranges from \$13.54 to \$21.00

Utility	kWh	kW
AEP TCC	\$0.012	\$19.36
AEP TNC	\$0.013	\$21.00
CenterPoint	\$0.010	\$17.49
El Paso Electric	\$0.009	\$14.56
Entergy	\$0.009	\$14.78
Oncor	\$0.011	\$17.55
Sharyland	\$0.009	\$13.54
SWEPCO	\$0.010	\$15.69
TNMP	\$0.010	\$15.87
Xcel Energy	\$0.011	\$18.62
Statewide	\$0.011	\$17.26

# All program types cost effective



# PY2016 Key Findings

## Positive PY2016 EM&V results

- Well-established program design and delivery processes
- Robust tracking systems, documentation, and savings tools

## Utilities' responsiveness to the EM&V effort

- More accurate savings estimates
- Increased consistency in savings calculations
- More diversified measure mix
- Increased compliance with TRM requirements
- Sharing of best practices across the ten utilities to improve program implementation across the state

# Opportunities for Improvement

## Statewide Recommendations



- Facilitate more accurate, transparent, and consistent savings calculations and program reporting
- Provide feedback that can lead to improved program design and delivery
- Defined in § 25.181 (q) (9)
- EM&V recommendations for implementation in subsequent program year
  - PY2016 recommendations for PY2018 implementation

# Program Tracking and Reporting

Utilities have significantly improved tracking and reporting in response to previous EM&V recommendations

***Tracking data should maintain sufficient detail so that records can be aligned with TRM entries.***

***Ensure that program plans, tracking data, and reporting maintain the same program definitions.***

Additional detail and consistency needed in utility annual reporting

***Report claimed savings in EEPs in kWh and kW.***

# Load Management Programs

Commercial Load Management Programs successfully employed new TRM baseline methodology

**Maintain ongoing communications to resolve minor calculation differences to ensure continued performance and streamlining data provision and analysis efforts.**

Residential demand response programs are a fairly new and increasing offering

**Clarify the approach for developing aggregate results across the population.**

**Follow the TRM Calculation methodologies.**

# Measure Level Recommendations

## Cool Saver HVAC tune-ups

Use a rolling three-year average of the efficiency losses to address that the efficiency losses appear to be reducing over time and to reduce the volatility from year-to-year.

Calculate efficiency losses by Refrigerant Charge Adjustment and Sector.

Determine the deemed peak demand coincidence factor (CF) for commercial projects by Building Type and Climate Zone as Specified in the TRM.

Continue to collect a robust M&V sample for tune-up measures.

Examine trends over time to determine if changes in the marketplace are evident from year-to-year.

Assess the average efficiency loss for Residential tune-ups that did not receive a refrigerant charge adjustment to Inform TRM Updates for deemed tune-ups.

# Pool Pumps

Informed new pool pump proposed deemed savings values.

Deemed savings values can be used for savings for delivering pool pumps through either a downstream or midstream delivery and for indoor and outdoor pools.

## ***Recommendations for M&V program from PY2016 EM&V:***

*Follow the TRM peak demand savings approach.*

*Use appropriate key savings parameters for pumps used for non-primary pool operations (e.g., spas, water features).*

*Capture commercial pool usage hours within project documentation.*

*Review the make and model number of the old and new pumps for accuracy within project documentation and the tracking data.*

# Commercial HVAC

*Address common errors and omissions found within the HVAC calculators*

*Conduct QA/QC of equipment efficiencies found within project savings calculations.*

*Examine calculators for further improvements in automation and quality control checks to increase overall usability and potentially limit common user mistakes.*

# Commercial Lighting

***Add building type field in program tracking data to track trends of building stock***

- *better informs whether updates to the TRM building category mix is needed*

***Update TRM Stipulated hours of operation for manufactures that operate different production shifts.***

- *the PY2018 TRM version 5.0 to provide separate stipulations for annual operating hours and coincidence factors for 1, 2 and 3 shift operations and guidance on seasonal changes in manufacturing shift schedules.*

# Commercial Lighting Qualification

*Establish a standard 12 month grace period for qualification changes to allow the market to respond to changes.*

*Continue TRM commercial lighting eligibility criteria for prescriptive lighting projects with the option of custom non-qualified lighting projects.*

*Investigate program strategies to shift beyond one-for-one lighting retrofits to more holistic lighting improvements.*

# PY2016 Key Findings

Utilities' achieved evaluated savings for PY2016 were close to or higher than their projected savings.

- Continue Commercial Load Management offerings to meet sector demand reduction targets
- Continue and/or consider Commercial MTP offerings to help achieve expected commercial sector savings.
- Continue RSOP type programs and efforts to expand HVAC offerings
- Explore other ways to bolster RMTP offerings.

# PY2017 EM&V



# EM&V Overview

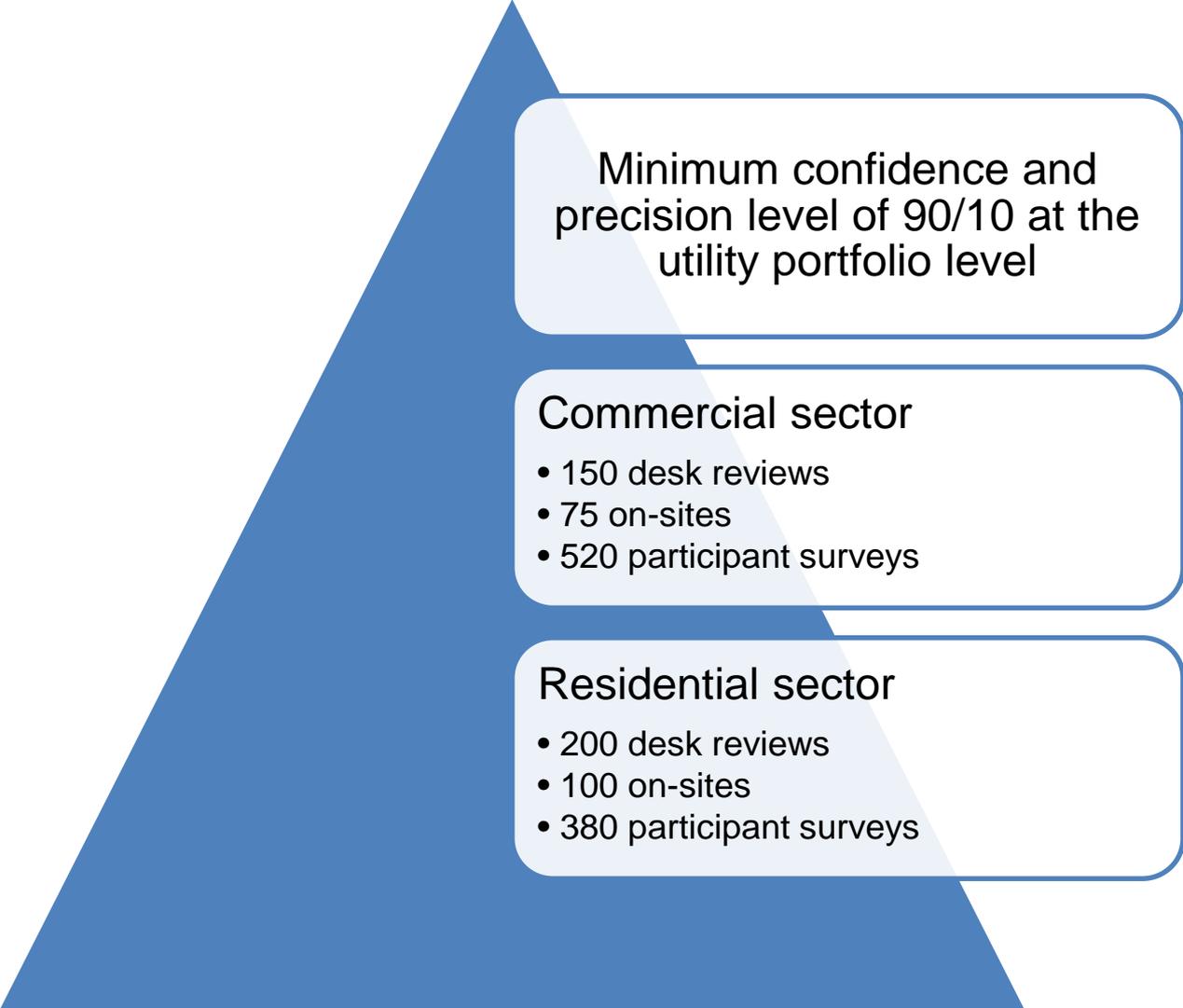
## Due Diligence across all programs

- Program tracking data verification of claimed savings across all programs
- Census review of residential deemed savings calculations and other high priority programs/measures

## Increased rigor for medium and high priority programs

- Desk reviews, on-site M&V and participating customer surveys

# PY2017 EM&V Data Collection Completes



Minimum confidence and precision level of 90/10 at the utility portfolio level

## Commercial sector

- 150 desk reviews
- 75 on-sites
- 520 participant surveys

## Residential sector

- 200 desk reviews
- 100 on-sites
- 380 participant surveys

# High Priority

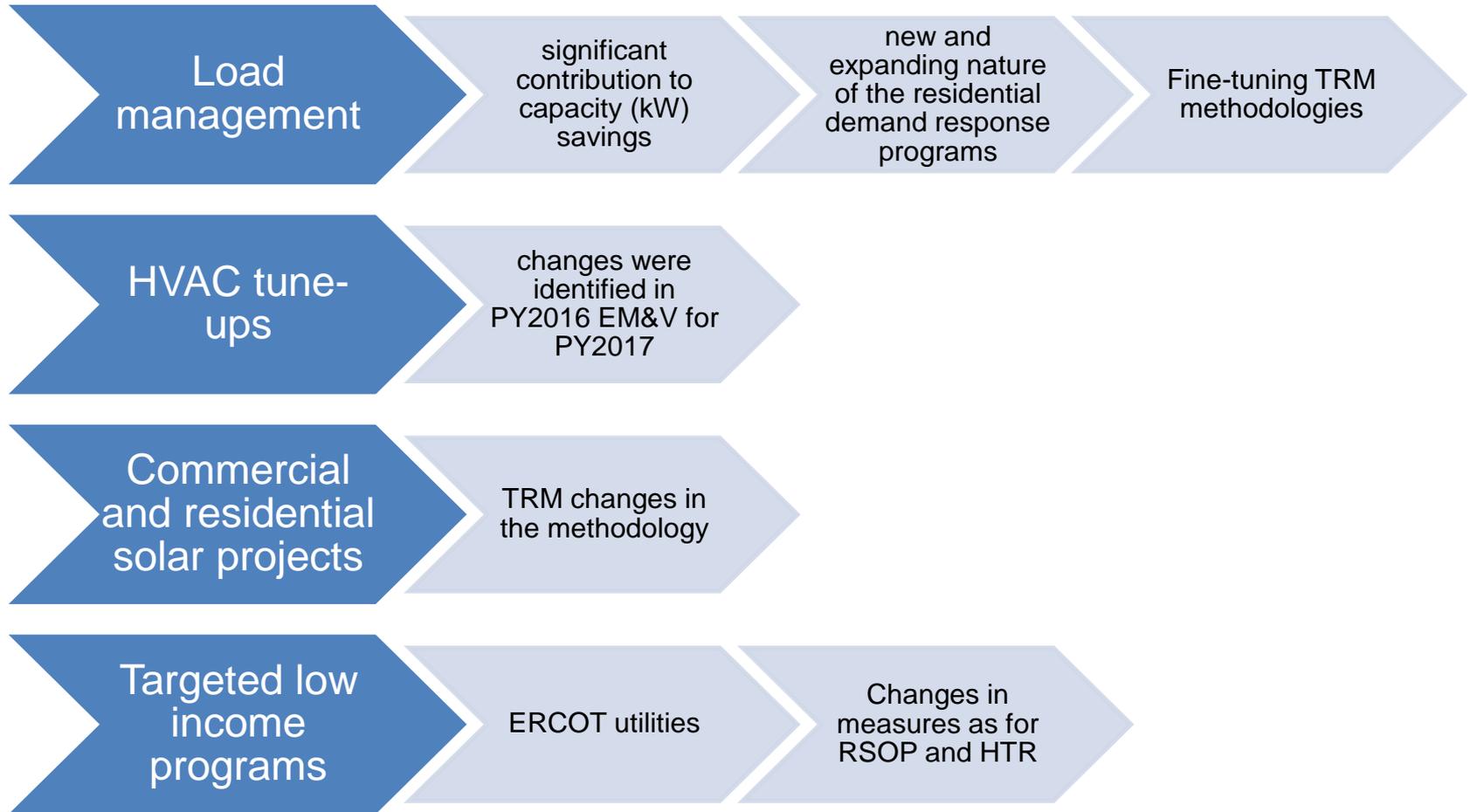
## Commercial SOP and the largest savers of the commercial MTPs

- largest percentage of statewide savings
- explore new customer segments and technologies.
- adjusted savings recommendations
- Needs updated net-to-gross research (last researched in PY2013)

## Residential SOPs and HTR programs

- responding to changes in the TRM for common measures.
- comprised a substantial percentage of overall statewide portfolio savings in PY2017
- expanding measure mix
- RSOP needs updated net-to-gross research (last researched in PY2013)

# Medium Priority



# Program Prioritization Summary

Program Type	Percentage of PY2017 Evaluated Savings Statewide (kW/kWh)	PY2017 Evaluation Priority and Activity
Commercial SOP	6%/28%	High/desk reviews and on-site M&V/ participant and market actor surveys
Largest commercial MTP savers (Solutions, SCORE/CitySmart)	6%/23%	High/desk reviews and on-site M&V/ participant and market actor surveys
Residential SOP	11%/23%	High/desk reviews and on-site M&V/ participant and market actor surveys
Hard-to-reach SOP	4%/7%	High/ desk reviews and on-site M&V/ participant and market actor surveys
Low-Income weatherization programs	2%/2%	Medium/ desk reviews and on-site M&V
Load management programs (residential and nonresidential)	62%/0%	Medium/ census interval meter data analysis
A/C tune-ups (residential and nonresidential)	2%/4%	Medium/census desk reviews
Solar (residential and nonresidential)	3%/5%	Medium/ desk reviews and on-site M&V

# M&V reviews



PY2017 scope includes technical guidance/M&V discussions and review upon utility request

Steady flow of reviews for unique situations, new technologies and new customer types

- Custom projects
- HVAC mini-splits
- Variable Refrigerant Flow (VRF)
- Geothermal heat pumps
- Noncertified LEDs
- Various project situations where the project eligibility/baseline is unclear or M&V method is unclear, typically large/complex type projects

Thank you for your time today.

Do you have any additional questions for us?

Lark Lee ([lark.lee@tetratech.com](mailto:lark.lee@tetratech.com))

Katie Rich ([katie.rich@puc.texas.gov](mailto:katie.rich@puc.texas.gov))

