

Industrial Energy Management Impact Evaluation



February 23, 2017



Why Evaluation?



What do we all want?



Energy efficiency programs that save customers money and energy

To be trustworthy stewards of ratepayer money

Evaluation

What did we achieve?

How do we improve?

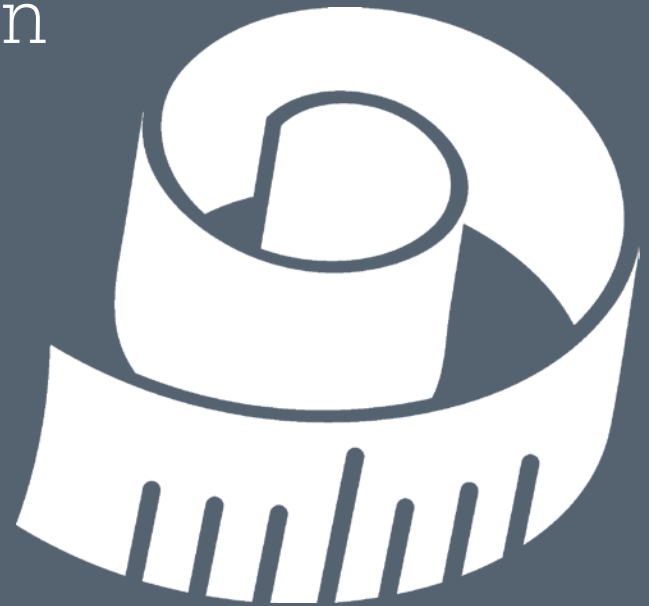


Impact Evaluation

Savings reliability with
independent verification



Program improvement
opportunities





SEM Evaluation Background

BPA's Industrial Energy Management (EM) Program

Began in 2010

One of nation's first large scale deployments

High Performance Energy Mgmt (HPEM)

Training and technical support

Engages facility staff to implement EM in business practices

Track and Tune (T&T)

Low/no cost O&M efficiencies

Establish systems to track energy performance

Energy Performance Tracking Team



Works closely with facilities



Gathers and tracks detailed data on facility and activities

Estimates energy savings using statistical models based on MT&R guidelines*

**Monitoring, Targeting and Reporting*

Electric Savings Types



Evaluation Objectives

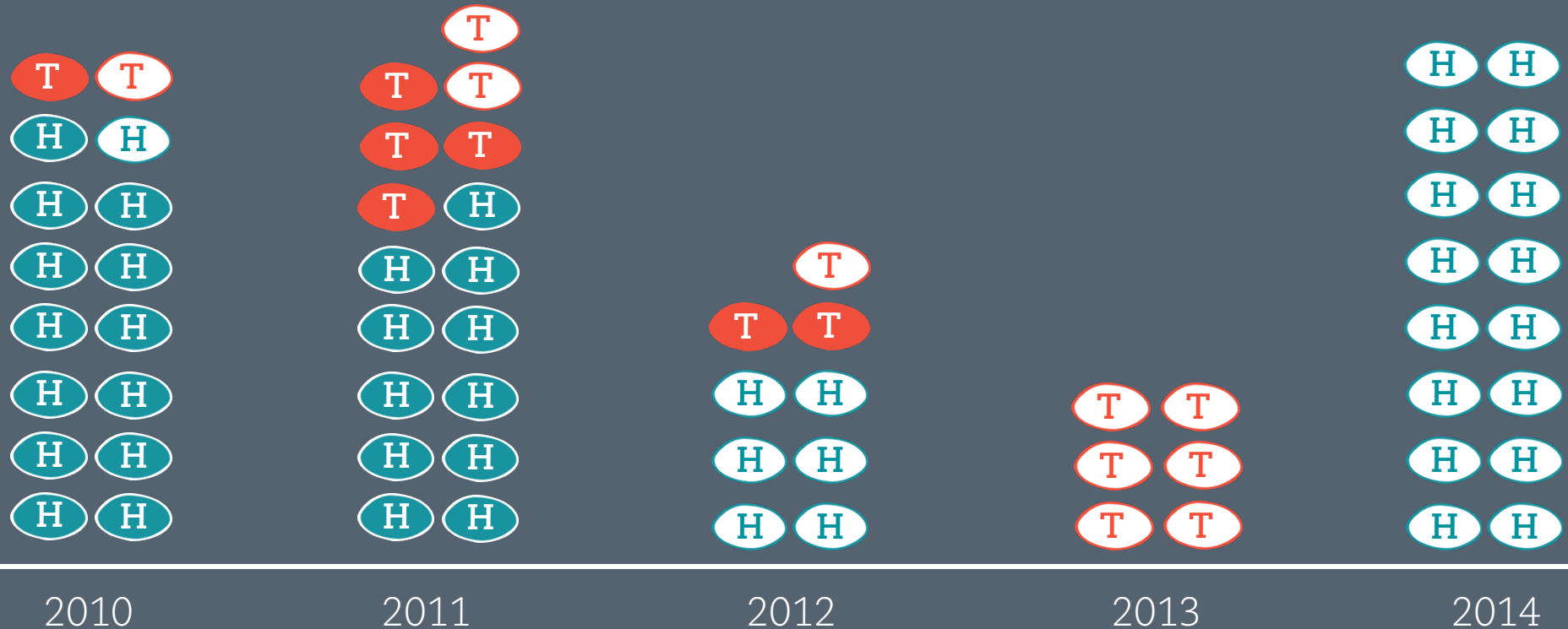
Independently estimate facility and SEM savings

- Year-to-year SEM savings trends
- Verify MT&R SEM and reported SEM savings
- Conduct deeper dive analyses as needed

Survey participants on adoption of SEM practices

If needed, develop recommendations on documentation, data collection and MT&R guidelines

Evaluation Sample



EM Program Start Date

 HPEM sites in Evaluation

 T&T sites in Evaluation

 HPEM sites **not** in Evaluation

 T&T sites **not** in Evaluation

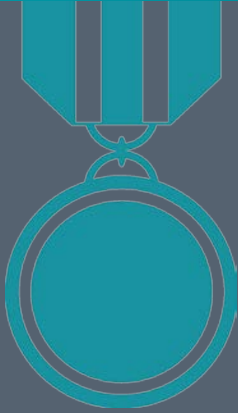
* Evaluation did not extrapolate to the population. Evaluated results are for sampled facilities only.

The image features a decorative background with a teal horizontal band across the middle. Above and below this band is a white background with a repeating pattern of grey spirals. The word "Findings" is centered in the teal band in a white serif font.

Findings

#1

EPT team carefully collected data and documented the program



Ongoing communication with facilities



High quality, thorough facility and activity data



Can serve as industry standard for SEM programs

Enabled evaluation team to estimate savings

#2

SEM saved 2.3% of consumption



EM facilities saved 4.1% of consumption, 3.8 aMW

Capital projects saved 1.8%

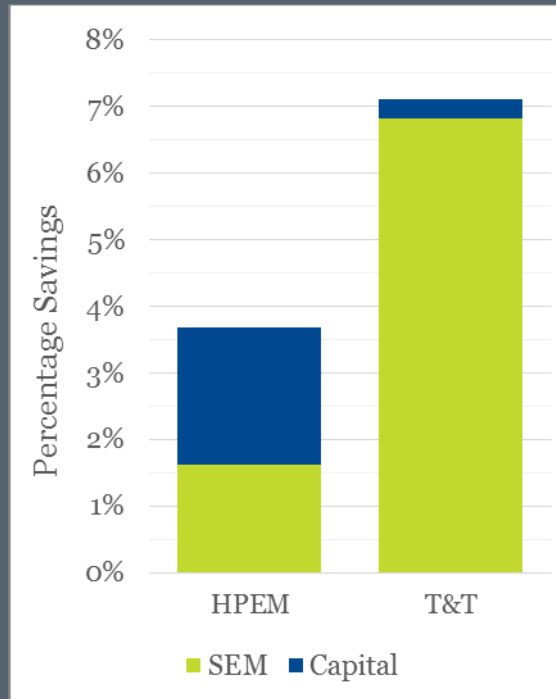
SEM saved 2.3%

Percentage savings equals sum of savings (all facilities, all years) divided by sum of adjusted baseline consumption (all facilities, all years). aMW are average annual MWh divided by 8760.

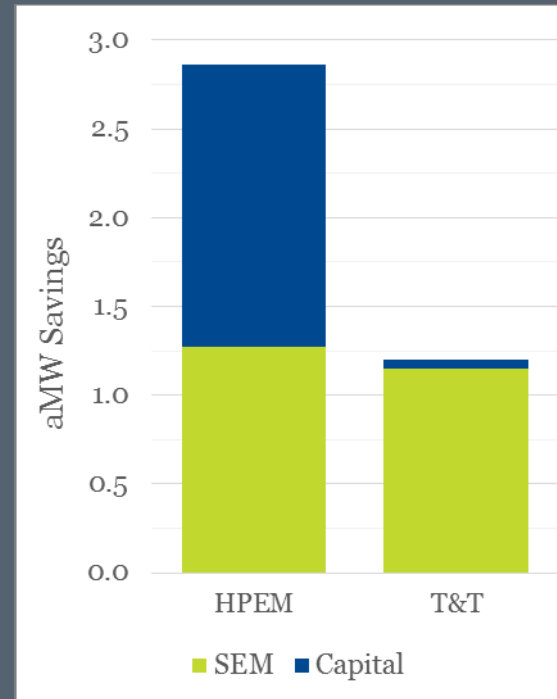
#3

SEM savings varied by component

T&T saved more on a percentage basis



HPEM saved more on aMW basis

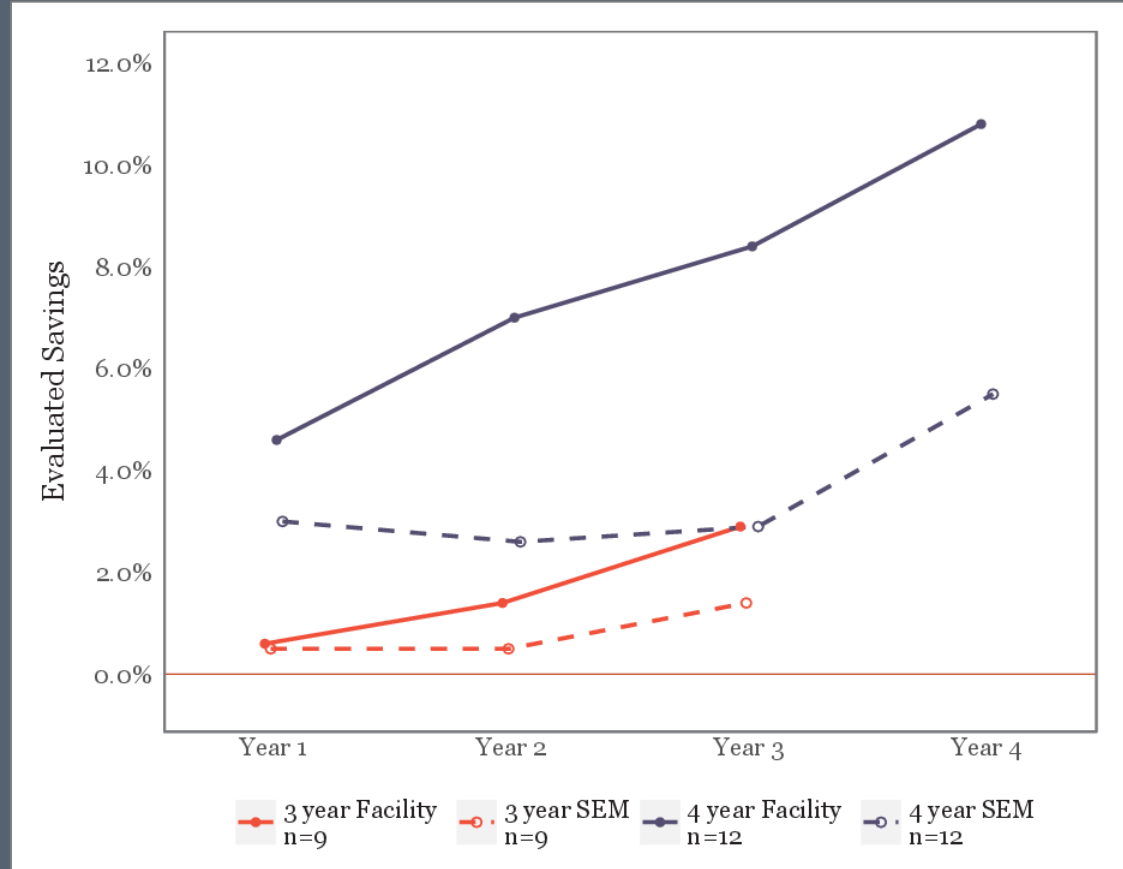


#4

SEM savings persisted

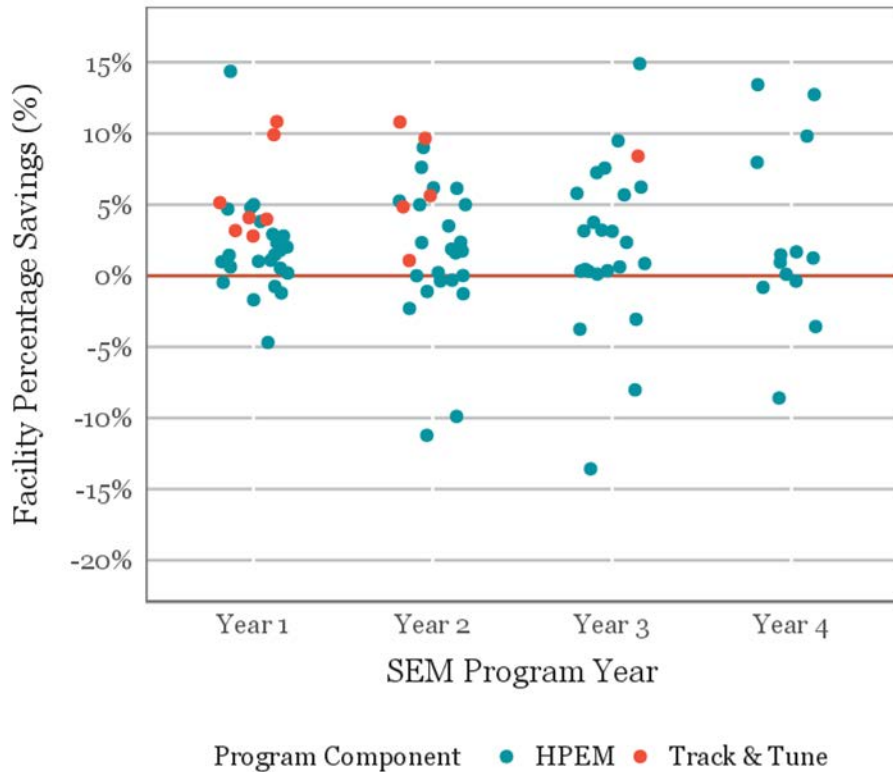
Facility savings increased each year

SEM persistence suggests facilities continued to practice EM throughout engagement



#5

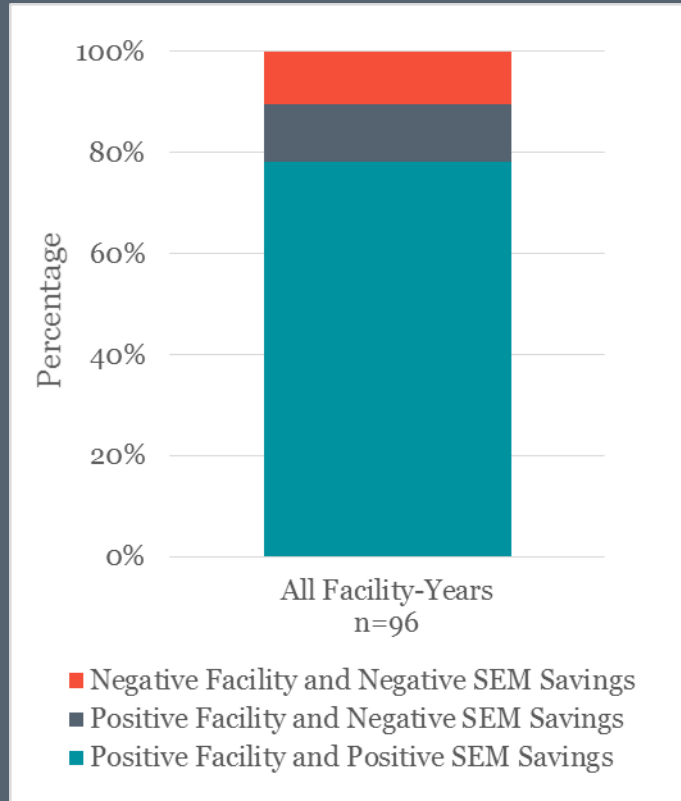
Individual facility savings were variable



Significant variation between facilities and from year-to-year for individual facilities

#6

Some facilities had estimated consumption increases (i.e., negative savings)



Estimated facility savings were positive 90% of the time

Estimated SEM savings were positive 78% of time

- Facility positive but SEM negative after capital project subtraction: 12%
- Facility and SEM negative: 10%

Facility-years represent a savings estimate for a single year and facility

SEM Elements Adoption Survey



- Customer Commitment



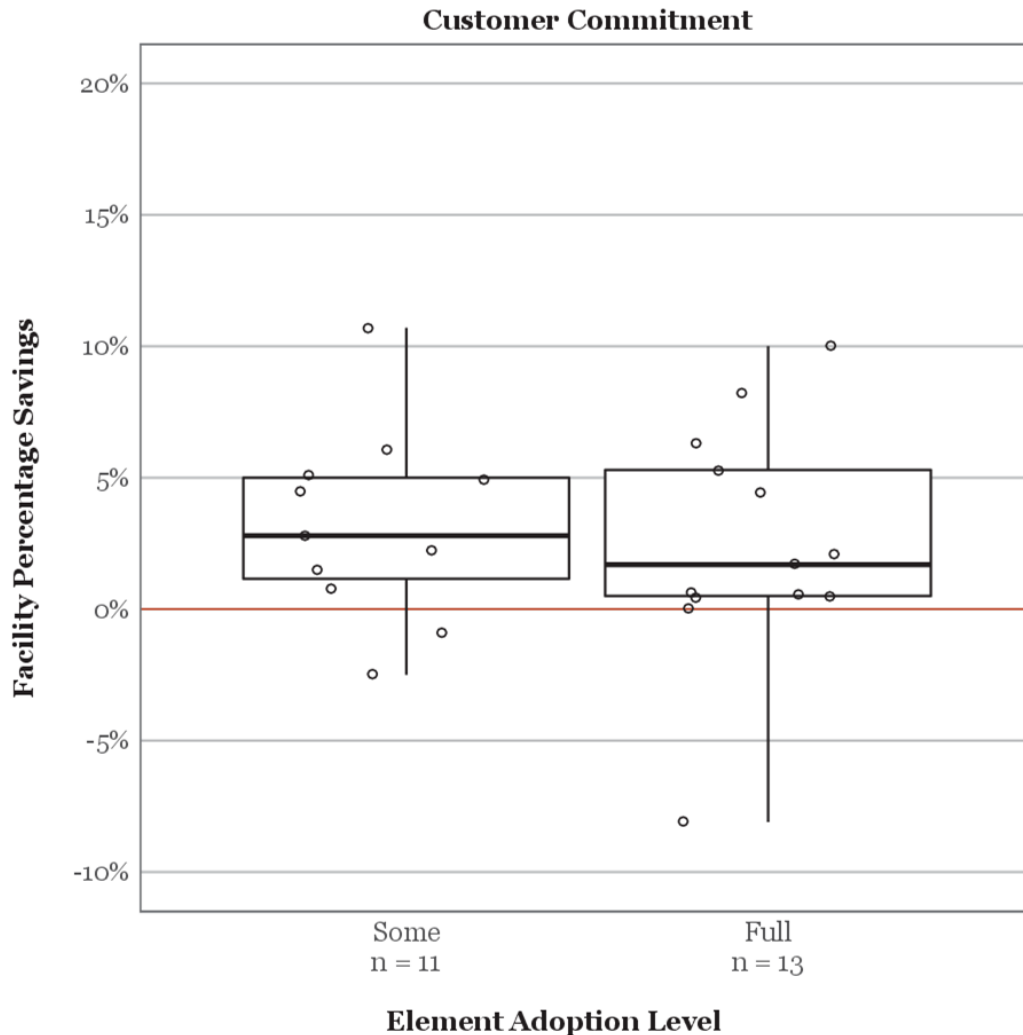
- Planning and Implementation



- Measuring and Reporting

#7

Adoption of SEM elements not correlated with SEM savings



No clear relationship between SEM adoption responses and energy savings

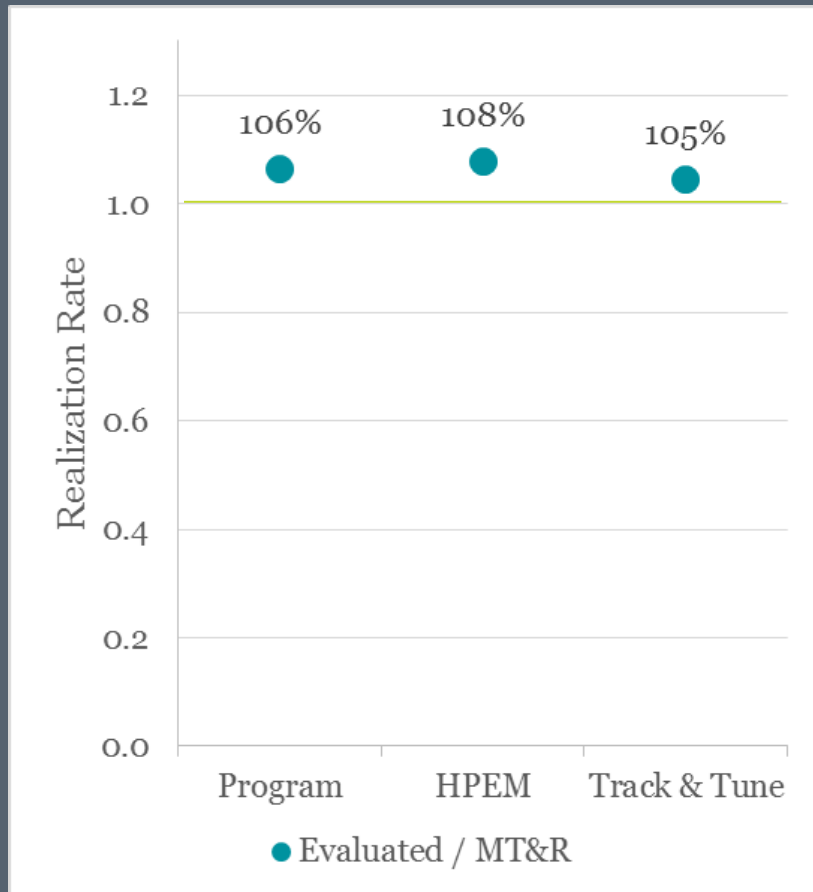
Definition: Realization Rate

$$\frac{\text{Evaluated Savings}}{\text{Program Savings}} = \text{Realization Rate}$$



#8

The evaluation team verified the MT&R SEM savings



Overall, evaluation found slightly more SEM savings than MT&R estimates (2.3% vs 2.2%)

Both HPEM and T&T had M&TR realization rates above 1.0

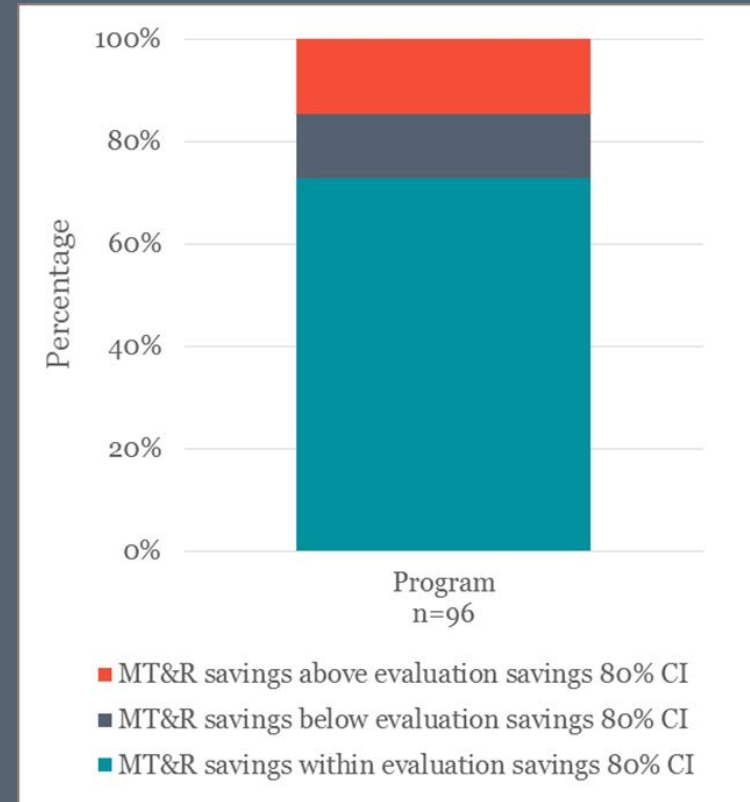
#8b

MT&R and Evaluation individual results also very similar

73% of evaluation and MT&R savings were statistically equivalent

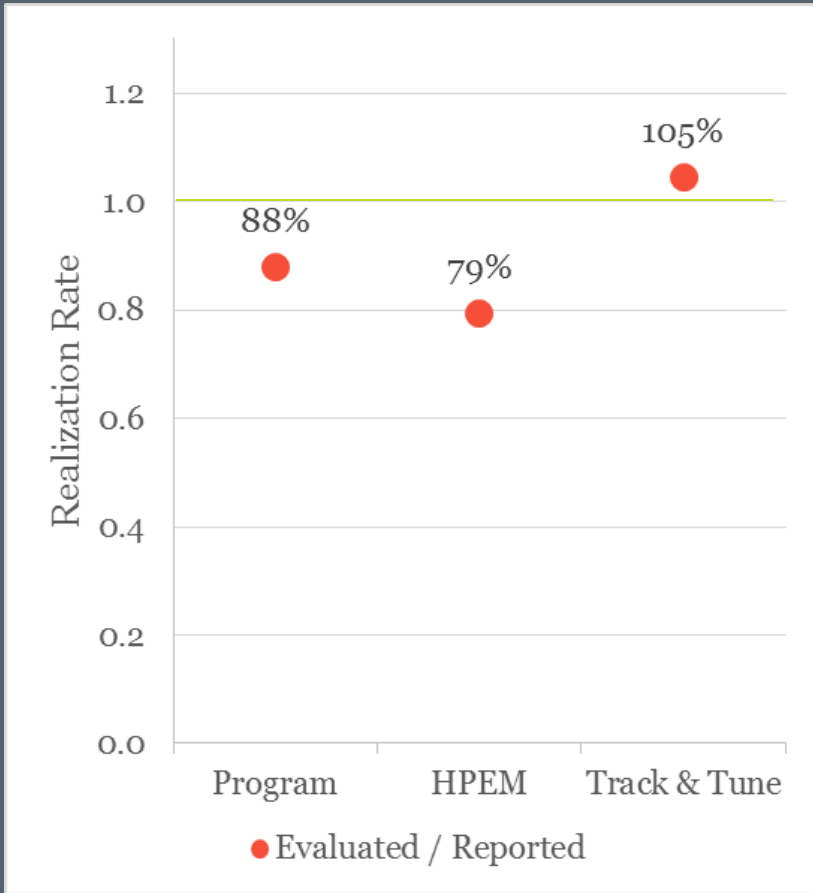
15% of MT&R estimates were higher than evaluation

12% of MT&R estimates were lower than evaluation



#9

Evaluation found lower SEM savings than BPA reported due to reporting practices



Overall, evaluation found less SEM savings than BPA reported (2.3% vs 2.7%) due to BPA's practice of reporting zero savings for facilities with estimated consumption increases.

T&T realization rate: 1.05
HPEM realization rate: 0.79

#9b

Reporting negative savings estimates as zero increased BPA's reported savings

BPA reported negative SEM savings estimates as zero

- o BPA reasoned increases in consumption were not likely caused by SEM implementation

Evaluation agrees that estimated consumption increases were likely due to difficulties in measurement of savings. However, not possible to rule out that program caused consumption to increase.

BPA reporting treats negative and positive savings estimates inconsistently

- o Positive savings estimates also likely to exhibit error, but not adjusted
- o Sign of the savings estimate should not be reason for accepting or rejecting MT&R result

#10

Evaluation led to new insights... still much to learn



Different SEM savings
estimation methods

Estimation uncertainty

Causes of negative savings


Controlling for non-routine
adjustments

Still much to learn in these areas



Recommendations

EPT team should continue to:



Use forecast approach and statistical analysis of individual facility consumption to estimate savings

Document non-routine adjustments

Collect high-frequency consumption data

Report consumption increases in the MT&R model workbooks

Key Recommendations for EM Program

EPT team should have discretion about whether to calculate and report uncertainty

EPT team should test for significance of weather variables and include in the model if appropriate

BPA should attempt to improve the accuracy of the reported SEM savings by recording negative SEM savings estimates or making program-level adjustments to savings

Research Opportunities

Track SEM elements annually

Post-participation persistence

Capital project savings persistence

Whether participation in SEM program increases capital projects

Cost-effectiveness, other fuel savings

Recent BPA participants

BPA's new policy of two year re-baselining

Relationship between savings and SEM activities

Evaluation sampling





BPA Evaluation “Perspective”



This evaluation confirms the great work of the program



Program implementation and MT&R modeling are solid and well executed



This evaluation and national evaluation learned from the process



Nearly all recommendations are minor



Need to consider reporting policies



BPA Response to Recommendations

BPA Response

Continue to: use forecast model, document non-routine adj, collect high-freq data, report consumption increases

- *The EPT team agrees and intends to continue these practices.*

Use discretion about calculating uncertainty

- *The EPT team agrees and intends to report uncertainty where appropriate or useful for the program team.*

Test for significance of weather variables

- *Program has already updated its practices and will update the MT&R guidelines with this practice.*

Improve accuracy of the reported SEM savings

- *BPA will examine this recommendation and review our policies on reporting*

Consider research in multiple areas

- *BPA will consider feasibility and value of conducting any of these additional research topics during program development and evaluation activities.*

Questions?



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