

REGULATORY REQUIREMENTS AND EVALUATION POLICIES ACROSS 25 STATES

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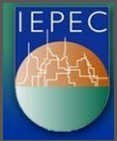
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ABSTRACT

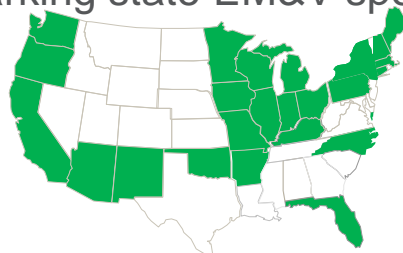
This paper reviews evaluation requirements across 25 states and assesses the impact of EM&V spending on savings.

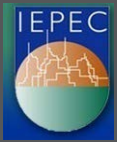
- The authors outline significant detail regarding evaluation policy, requirements and regulation across 25 states.
- 25 states were chosen based on their regulatory and EE program diversity to provide a broad array of program approaches.
- Detailed qualitative analysis of state's evaluation requirements is documented along with a parallel quantitative, statistical analysis of how states evaluation requirements compare against state costs and savings.
- States included are: Arkansas, Arizona, California, Connecticut, Florida, Iowa, Illinois, Indiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, North Carolina, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Vermont, Washington and Wisconsin.

SUMMARY FINDINGS

Analysis of evaluation requirements shows:

- CA spends more on EM&V than other states, gaining reasonable savings, while Vermont spends relatively less on EM&V and gains strong savings on a per capita basis.
- States that spend less on EM&V or do not use a TRM appear to have lower overall gross savings – but this can be due to the overall program size or longevity of the programs.
- CA, IL, MA, NM, OR and VT appear to be strong performers in evaluation requirements – EM&V spending is strong in those states.
- But no overall correlation between EE savings and EM&V spending can be identified. Our analysis reveals that it is difficult to arrive at specific conclusions about the success of EE programs based on benchmarking state EM&V spending.





EM&V REGULATORY STRUCTURES ACROSS TWENTY-FIVE STATES

This regulatory state analysis assesses EE evaluation differences on electric EE program development across 25 states.

- The comparison of EE programs is across seventy-seven utilities and various statewide EE programs (e.g., California, Connecticut, Massachusetts and Wisconsin) based on publicly available data, interviews and researched detail.
- The **qualitative analysis** examines state legislative and regulatory EE EM&V policies and assesses and attempts to rank those policies. The **quantitative analysis** is a statistical benchmarking of EM&V spending compared to state-level normalized overall program costs.
- Based on varied state EM&V frameworks, we assess whether specific EE program differences can be assessed from examination of the 25 states.

Overall, our analysis reveals:

- **EM&V policies and spending are established by state legislatures, state commissions or electric utilities and differences exist across states that implement rigorous EM&V.**
- **Success of EE programs and portfolios seems to reveal that states require EM&V to ensure savings are credible.**

EM&V REGULATORY STRUCTURES ACROSS TWENTY-FIVE STATES

We ranked the states based upon overall EM&V regulation, cost evaluation requirements and overall state EE focus in years based upon our review of the states EM&V practices and policies.

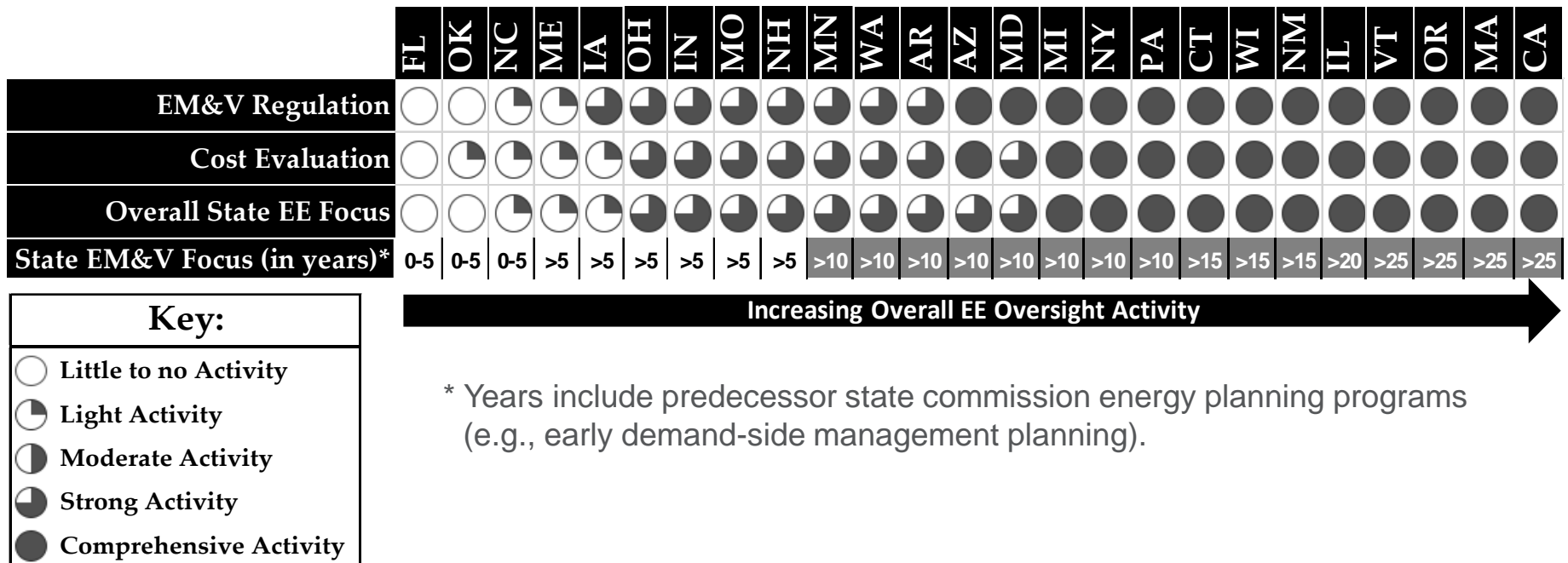


Figure 1. Measurement of EE EM&V Policy Activity by State - original analysis which is derived from the regulatory analysis in Table 1 in the Appendix.

LEGISLATIVE AND REGULATORY DETAIL - SUMMARY

There are varying degrees of EM&V requirements with FL, OK, NC, ME and IA having the least, while CA, MA, OR, VT and IL are at the opposite end of the spectrum.

Most Oversight

- CA, MA, OR, VT and IL continue to grow EE programs and their EM&V approaches are well established and have been implemented over numerous years.
- These states offer strong EM&V approaches and models for other states and provide state utility and commission examples. All five states have strong EM&V policies and cost evaluation processes.

Least Oversight

- States with the least amount of policy oversight are FL, OK, NC, ME and IA.
- These states have limited evaluation requirements and have limited to no legislated requirements, have retreated on legislation or have limited state commission oversight over multiple years.
- These states generally review EE programs on a case-by-case basis.

RIM Cost Test

- IA in 2018 allowed use of the RIM cost-effectiveness test to show negative cost-benefit results and disallow programs which tends to make it challenging for EE programs to be judged successful.



LEGISLATIVE AND REGULATORY DETAIL - SUMMARY

The remaining states have varying degrees of EM&V policy and years of evaluation.

IL

IL continues to implement EM&V policy through various state and Stakeholder Advisory Group policies. Illinois has strong EE statewide focus, stakeholder group focus and commission action.

**NM, WI, CT,
PA & NY**

NM, WI, CT, PA and NY are strong runners-up to IL and the strong EM&V states.

**MI, MD, AZ,
AR and WA**

MI, MD, AZ, AR and WA are stable EM&V states given established EM&V policies and track record of implementing consistent evaluations over a period of years.

MO & IN

MO and IN have established EE structures through legislation - Missouri and Indiana perform evaluations most program years.

AR

AR has established EM&V procedures and policies and a TRM that is the model for the southeast. **OK** utilities leverage the **AR** TRM and have limited evaluation history.

LEGISLATIVE AND REGULATORY DETAIL - SUMMARY

The remaining states have varying degrees of EM&V policy and years of evaluation.

IA

- **IA** has EE and EM&V policies without specific goals and does evaluation once per five-year cycle.

MN

- **MN** has few EM&V requirements and utilities conduct few evaluations.

IA, IN & OH

- **IA, IN and OH** have historically achieved EE savings based on performance against statewide goals.
- As of 2014, **IN** and **OH** state legislatures reduced or eliminated EE resource standards, and as of July 23rd, **OH** essentially eliminated EE programs by reducing overall EE goals in favor of supporting coal and nuclear generation assets after 2020.
- **IA's** legislature started a greater roll back of EE in 2018 which continues as of drafting this paper.

LEGISLATIVE AND REGULATORY DETAIL - SUMMARY

This legislative and policy analysis is mirrored, to a great extent, by our analysis of EE program performance in each state.

- We benchmarked utility performance for each of the 25 states against various factors
- We developed a picture of relative EE performance as a factor of:
 - **Verified gross electric energy savings at the meter, and**
 - **EM&V program spending for 2017**
- Our quantitative approach and methodology standardizes utility spending and evaluation data to track, accounting and adjusting for discrepancies in the data when possible.
- This allowed us to map state EE performance against EM&V policies
- Our benchmarking methodology standardized the data and we have tracked, accounted, and adjusted for these discrepancies wherever possible (e.g., program maturity, gross vs. net, meter vs. generator, etc.).





DATA ANALYSIS – DATA SOURCES

We gathered state utility EE savings, cost and baseline sales data from three key sources:

- 1) Utility and EE program data from utility EE reports submitted to state commissions.
 - 2) Data obtained from utilities through annual reports.
 - 3) Energy Information Administration (EIA) 861 data on baseline sales, revenues, and peak demands.
- To compare the performance of each state, we combined utility savings and cost data in their respective states to establish an estimate of the states' energy efficiency performance.
 - Where possible, we selected the largest utilities in each state to jointly account for at least 50% of the state's sales as reported in EIA 861.

DATA ANALYSIS – DATA SOURCES

We benchmarked seventy-seven utilities and other statewide programs across the twenty-five policy-diverse states using normalizing criteria.

Normalizing Criteria

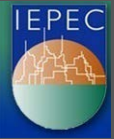
- Verified gross electric energy savings at the meter as a percentage of baseline electric sales, and
- Program costs per first year kWh saved for the 2017 program year. *All \$/kWh are first year.*

Key Points

- Gross savings were noted when not available or verified
- Savings reported at the generator are adjusted for a line-loss factor to approximate “at the meter” savings
- Program costs analyzed include the sum of the total direct and indirect utility costs for the year.

Our “Target”

- We standardized the 25 states by setting the data target values for EM&V and spending as the average spend value and rounded up to the nearest hundredth. For gross energy savings (MWh), the average MWh across all states was used and rounded to the nearest thousandth to create the target (“Target”).



DATA ANALYSIS – 77 UTILITIES

Sources of data for states, utilities:

State	Total EMV Spend \$1,000	Total EE Spend \$1,000	Total Gross Energy Savings MWh	TRM	Source
AR	\$2,063	\$74,033	341,235	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
AZ	\$3,500	\$117,100	1,210,793	Utility Specific	Consortium for EE Annl Industry Report, EIA 861
CA	\$56,859	\$1,033,809	2,569,859	Statewide	CA Energy Data Rptg. , Consortium EE Annl Indsty Rpt, EIA 861
CT	\$4,061	\$162,441	466,317	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
FL	\$923	\$92,300	304,480	None	Consortium for Energy Efficiency Annual Industry Report, EIA 861
IA	\$1,572	\$103,500	537,552	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
IL	\$11,299	\$376,623	3,252,205	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
IN	\$1,001	\$95,384	804,088	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
MA	\$15,618	\$523,456	1,610,739	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
MD	\$6,824	\$298,000	608,044	Regional	Consortium for Energy Efficiency Annual Industry Report, EIA 861
ME	\$1,230	\$41,000	113,687	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
MI	\$5,261	\$175,370	1,415,547	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
MN	\$2,567	\$113,235	999,787	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
MO	\$1,665	\$55,500	657,244	Utility Specific	Consortium for Energy Efficiency Annual Industry Report, EIA 861
NC	\$3,981	\$132,700	1,219,878	None	Consortium for Energy Efficiency Annual Industry Report, EIA 861
NH	\$411	\$17,900	89,975	None	E Source, Consortium for EE Annl Industry Report, EIA 861
NM	\$543	\$58,400	128,292	Utility Specific	Consortium for Energy Efficiency Annual Industry Report, EIA 861
NY	\$10,113	\$404,500	1,778,141	Statewide	Consortium for Energy Efficiency Annual Industry Report, EIA 861
OH	\$7,281	\$242,700	1,756,818	Statewide	Consortium for Energy Efficiency Annual Industry Report, EIA 861
OK	\$2,079	\$69,140	288,279	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
OR	\$3,773	\$150,900	655,742	Regional	Consortium for Energy Efficiency Annual Industry Report, EIA 861
PA	\$3,594	\$155,423	1,593,877	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861
VT	\$871	\$49,549	321,800	Statewide	Vermont 2017 Update to the Triennial Plan 2015 - 2017
WA	\$5,889	\$196,300	941,449	Regional	Consortium for Energy Efficiency Annual Industry Report, EIA 861
WI	\$2,847	\$94,900	716,255	Statewide	E Source, Consortium for EE Annl Industry Report, EIA 861

EM&V SPENDING COMPARED TO TOTAL SAVINGS AND SPENDING

We plotted EE spending as a percent of total EM&V spending compared to EE savings as a percent of baseline sales as shown in Figure 2.

- Figure 2 reveals that California is spending more than the other states and gaining reasonable savings.
- While Vermont is spending relatively less than most of the 25 states on EM&V and gaining significant savings on a per capita basis.

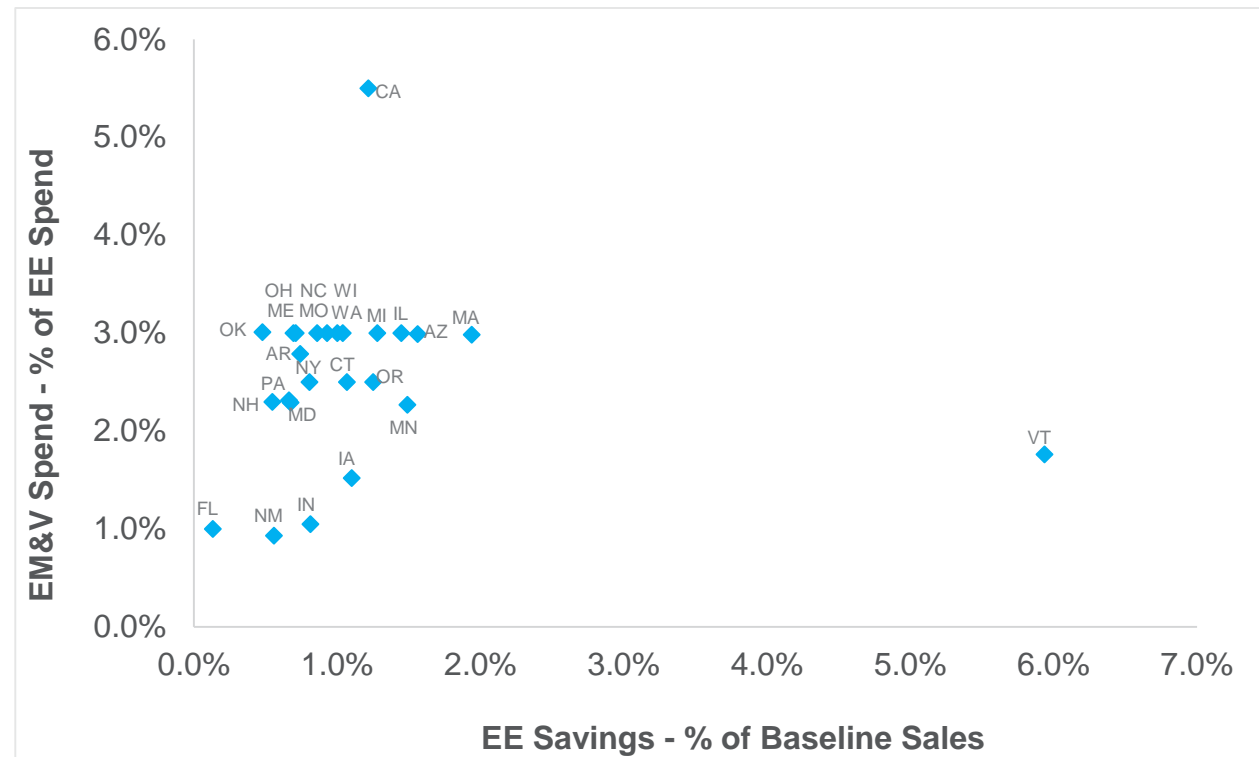


Figure 2 - EM&V spending compared to total EE savings across all 25 states; Source: Navigant Consulting Analysis.

EM&V SPENDING COMPARED TO TOTAL SAVINGS AND SPENDING

Figure 3, below, shows the results of our benchmarking across the 25 states. California is the outlier with spending and savings that far outstrips the other states.

- Figure 3 shows the results of our benchmarking across the 25 states.
- CA is the outlier with spending and savings that far outstrips the other states.
- MA, IL, NY, MD and OH trail behind CA, but their EM&V spending and overall savings are strong.

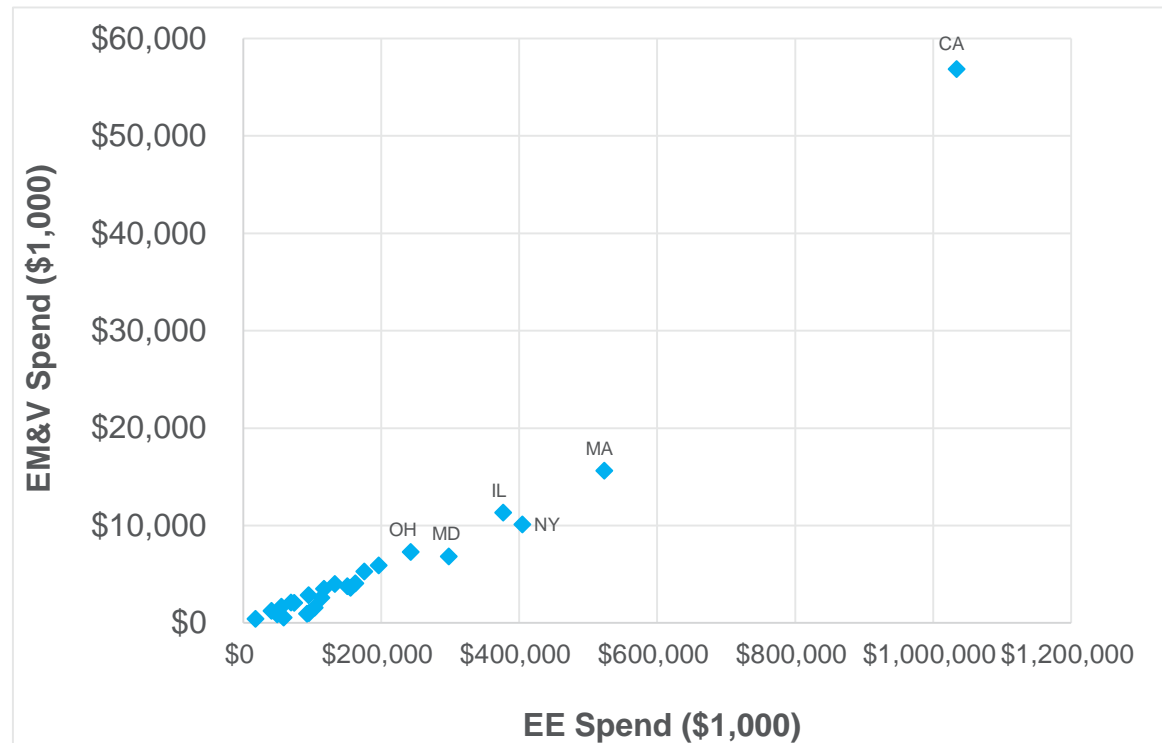


Figure 3. EM&V spending compared to total EE spending across all 25 states; Source: Navigant Consulting Analysis.

EM&V SPENDING COMPARED TO TOTAL SAVINGS AND SPENDING

To spread out all the states, Figure 4 was created to remove CA which is the strong outlier and skewed the results.

- Removing CA reveals that MA, IL, NY, MD and OH are spending fair amounts on EM&V, but also experience relatively strong gross spending on EE compared to the remaining states.
- The opposite is occurring in states in the bottom left quadrant (lower EM&V spending and lower overall EE spending).
- But total spending does not appear to be a meaningful indicator since EM&V spend is linear to EE sales and huge variations in state populations.



Figure 4. EM&V spending compared to total EE spending removing CA; Source: Navigant Consulting Analysis.

EM&V SPENDING COMPARED TO GROSS SAVINGS

Here state's success with EE savings are revealed by comparing EM&V spending to gross savings which shows a deviation from the linear relationship between EM&V and gross EE spending.

- IL shows that it has strong EE savings with average EM&V spending - IL is seen as spending an average amount on EM&V, but is witnessing strong savings in comparison to the other states.
- MA spends a good deal more on EM&V, but experiences lower overall EE savings compared to IL.

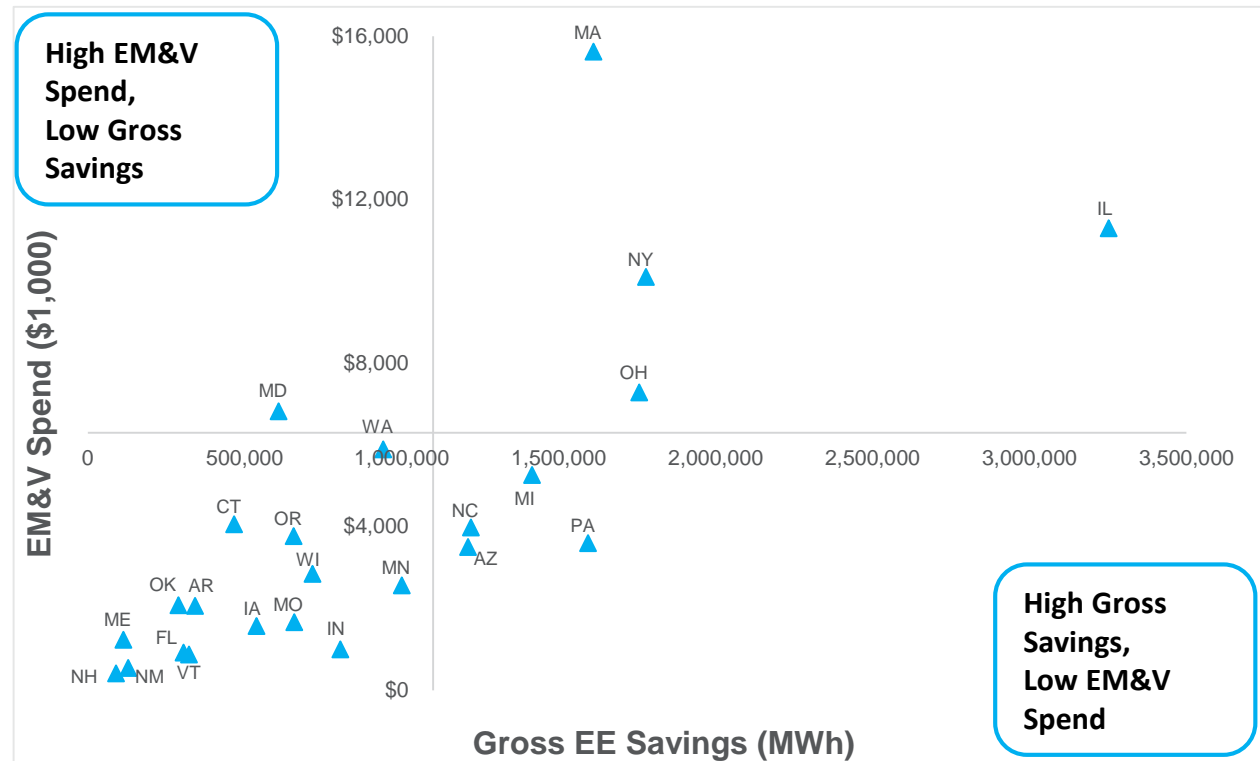


Figure 5. EM&V spending (\$1,000) compared to total gross EE savings (MWh); Source: Navigant Consulting Analysis.

DATA ANALYSIS – DATA SOURCES

These are interesting results, but it's not clear what conclusions can be directly deduced from them since there are multiple causal arrows potentially involved.

Possible Causal Arrow

- One causal arrow is that states with a lot of savings at stake are likely to recognize the need for rigorous EM&V to ensure savings credibility.
- Another possible causal arrow is rigorous EM&V may tend to decrease savings claims since it may capture a tendency for optimism in ex-ante savings estimation. This could possibly result in a positive correlation – also, increased EM&V can result in a negative correlation.

Increased Spending

- It's possible we are witnessing a dynamic where increased program spending leads to both increased savings and increased EM&V spending, then increased EM&V spending may reduce savings results as optimism is eliminated from the ex-ante savings estimates.
- Following this approach we see that there are quite a few states that are near the average of EM&V spending compared to EE savings: Arizona, Connecticut, Maryland, Michigan, Minnesota, North Carolina, New York, Pennsylvania, Ohio, Wisconsin, Oregon and Washington.

Further Research

- Applying this hypothesis, there may not be a direct causal link between EM&V spending and EE savings. Further analysis is needed to further assess a correlation.

EM&V SPENDING COMPARED GROSS SAVINGS - IDENTIFYING USE OF TRM

Finally, we tracked those states that use a TRM compared to those states that do not use a TRM for deemed savings analysis. Of our 25 states, only Florida, New Hampshire and North Carolina do not use a publicly available TRM.

- Figure 6 shows state use of TRMs labeled as follows: Statewide TRM, Utility Specific TRM, Regional TRM or No Publicly Available TRM.
- FL, NH and NC all have low EM&V spending as well as low gross savings.
- We would like to attribute low savings to TRM absence, but that cannot be done.

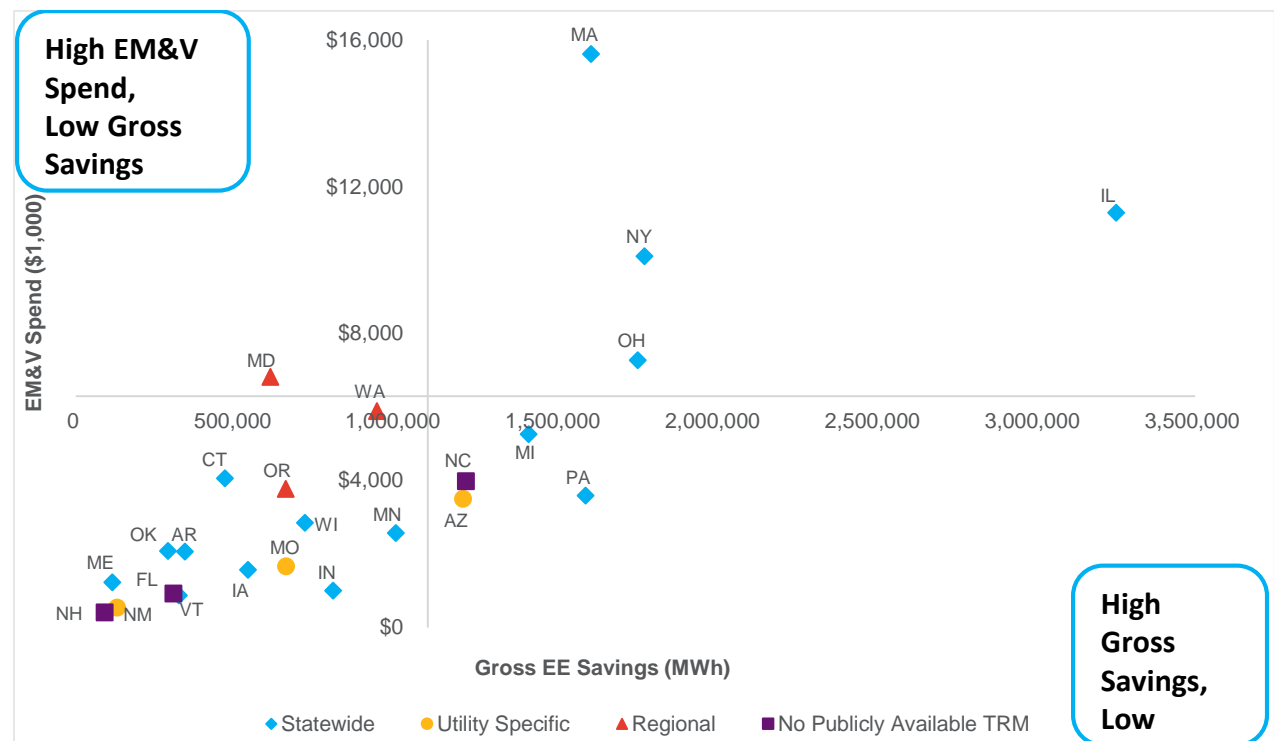


Figure 6. EM&V spend (\$1,000) compared to gross EE savings (MWh) also showing TRM use by state; Source: Navigant Consulting Analysis.

CONCLUSION

Our study shows that legislative and regulatory policy initiatives that require EM&V and attempt to codify and systematize savings analysis through TRM deemed savings, tend to have higher gross savings. But this finding cannot be fully attributed to the presence of EM&V or the use of a TRM.

Linearity of Spending

- This analysis reveals that there is a strong linearity of EM&V spending by program and our data analysis suggests that there is a strong convention of setting EM&V spending as a percentage of program spending.
- It is not clear if EM&V spending linearity shows a corresponding success of EE programs or if EM&V spending produces annual energy savings.

Spending Set to Achieve EE Savings

- A clear point from this analysis is that states that set spending levels and implement EM&V achieve some level of EE savings.
- Also, state EE efforts over numerous years appear to be more likely to have EM&V requirements.

EM&V & TRMs Lead to Savings

- It appears that those states that spend less on EM&V, or do not use a TRM, tend to have lower overall gross savings. But it is possible that states that are experiencing greater savings implement more stringent EM&V standards to ensure EE savings are determined valid at the state commission.

CONCLUSION

There is no single EE state structure that appears to be the best approach to gaining EE savings, even though all states appear to be gaining varying degrees of savings.

Spending & Savings

- CA spends more on EM&V, gaining reasonable savings, while VT spends relatively less than most of the states and gains significant savings per capita.
 - CA achieves strong gross savings based upon much larger gross EE spending and comparatively large EM&V spending.
 - Many of the other states achieve strong savings based on comparatively lower gross and EM&V spending, including IL, NY, MD and OH.

Spending & Gross Savings

- There is also a linear quality to the amount spent on EE programs and the resulting gross savings. There is variability in EM&V spending, EE spending and gross savings even though there is no direct correlation between gross EE spending and resulting savings.

Many Years & Spending

- States that implemented EM&V requirements over numerous years tend to spend more on EE programs and show greater savings, but more research would be needed to draw any conclusions regarding any causal relationship between EM&V spending and overall savings.

Multiple Causal Arrows

- These are interesting results, but highly certain conclusions cannot be drawn from the analysis since there are multiple causal arrows involved. States with greater savings possibly identify a need for rigorous EM&V to ensure credibility of savings.

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