



NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

Delaware EEAC Meeting

Overview of EM&V and State EM&V Plans

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OVERVIEW



1. EM&V Basics
2. State EM&V guidance, plans and frameworks - what are other states doing?
3. EM&V protocols and standardized reporting of methods used

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EVALUATION AND MEASUREMENT & VERIFICATION (M&V) - THE BASICS



- **M&V** - determines and documents energy or demand savings for a **measure, project, end-use or facility** using site surveys, metering of energy consumption, monitoring of independent variables, and analysis
- **Evaluation** - includes M&V and other activities. Typically refers to **measuring the performance of programs (collections of projects)**. M&V frequently used to assess gross savings from a sample individual projects, which forms the basis for the calculation or estimate of total program savings
 - **Impact evaluations** are based on:
 - M&V results for a sample of sites/projects in program portfolio and/or
 - Statistical/regression analysis of utility consumption data, for example comparison of treated population with a control population

KEY M&V QUESTIONS



- Is the energy efficiency measure installed and in use?
- What is the reduction in connected kW?
- What is the coincidence of kW reduction with system peak (performance hours)?
- Over the commitment period, is the EE measure still installed and providing the demand reduction value?

WHY IS EM&V SO IMPORTANT?

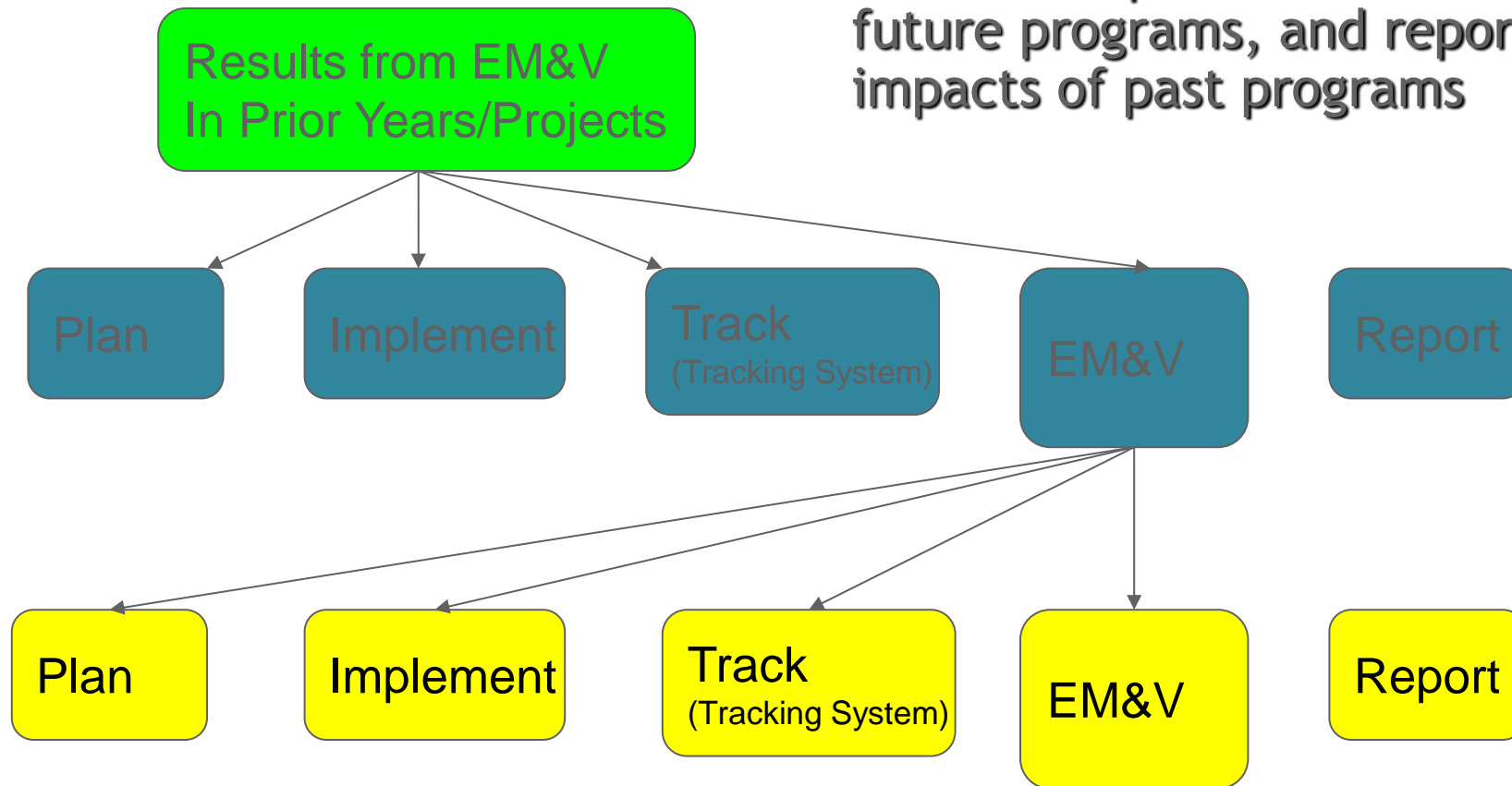


- Credibility of savings to support tracking towards state goals and state policies (energy, economic, environmental)
- Demonstrate compliance with PJM M&V standards for EE resources bid into market
- Informs continuous improvement process for program design and delivery, improves program cost-effectiveness

FEEDBACK LOOP AND CONTINUOUS IMPROVEMENT CYCLE



M&V results used to plan and forecast impacts of current and future programs, and report impacts of past programs



Mature process based on decades of development and refinement

M&V APPROACHES



- Metering or metering of samples
 - Custom projects (large customer single site end use metering)
 - Standard measures
 - Short term or spot metering
- Engineering calculations with input values
 - Standard EE measures targeted to small C&I and residential
 - Informed by evaluations that involve collecting data on key assumptions and/or analysis of billing data or metered data (pre- and post-installation) from statistical samples of participants

EMERGING EM&V 2.0



- New software tools and data analytics can enhance and streamline EM&V
- Helps to move savings measurement into the earlier parts of program execution for more timely feedback ('real time') to inform program improvement/corrections
- Use of 'big data' via smart meters can further provide more granular data and insight to program performance
- Not as applicable or useful for:
 - Custom C&I and retail lighting programs not best candidates
 - Programs with well established engineering estimates of savings or high certainty in the baseline conditions.
- Rigor of tools not on par with on-site M&V (at least not yet)

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- EM&V protocols and standardized reporting of EM&V methods

EM&V in Other States in the Region



Summary of various state evaluation frameworks, EM&V research and studies presented to the Regional EM&V Forum members:

[State Evaluation Activities Webinar May 2015](#)

STATE EM&V - CONNECTICUT



- CT Energy Efficiency Board (EEB) Evaluation Committee is guided by the [2012 Program Evaluation and Market Assessment Roadmap](#), which provides detailed information about the EEB's evaluation procedures and rules.
- EEB approved a comprehensive [2014-16 Evaluation Plan](#). The Plan guides the work of the Committee and its consulting team for the next triennium.
- PA 11-80, Sec. 33 (d)(4) requires the EEB to provide to the Energy and Technology Committee of the General Assembly an annual report of the results and recommendations of program evaluations undertaken in the course of the preceding year.
- See more at:
<http://www.energizect.com/about/eeboard/evaluationcommittee#sthash.bZmPe7cD.dpuf>

STATE EM&V - MARYLAND



- Evaluation Planning
- Utility Reported >> Evaluated >> Verified
 - Utility semiannual reports to PSC
 - Evaluated by Navigant/Cadmus reporting to utilities
 - Verified by Itron reporting to PSC staff
 - Stakeholder engagement: MEA, OPC, trades
- Emphasis on first year savings
 - But used for cost effectiveness for cumulative goals
- Alignment with PJM year
 - EY5 = June 1, 2013 thru May 31, 2014
- 2015-17 Evaluation Planning underway

STATE EM&V - VERMONT



- Savings Verification
 - *Engineering review of the Energy Efficiency Utilities (EEUs) current energy savings claim.*
 - *Statistical sampling of entire portfolio.*
 - *Development of a realization rate which is applied to entire portfolio.*
- ISO-NE FCM Evaluation
 - *Impact evaluation of the EEUs current capacity bid.*
 - *Statistical sampling of projects, followed by the deployment of on-site meters and use of AMI data.*

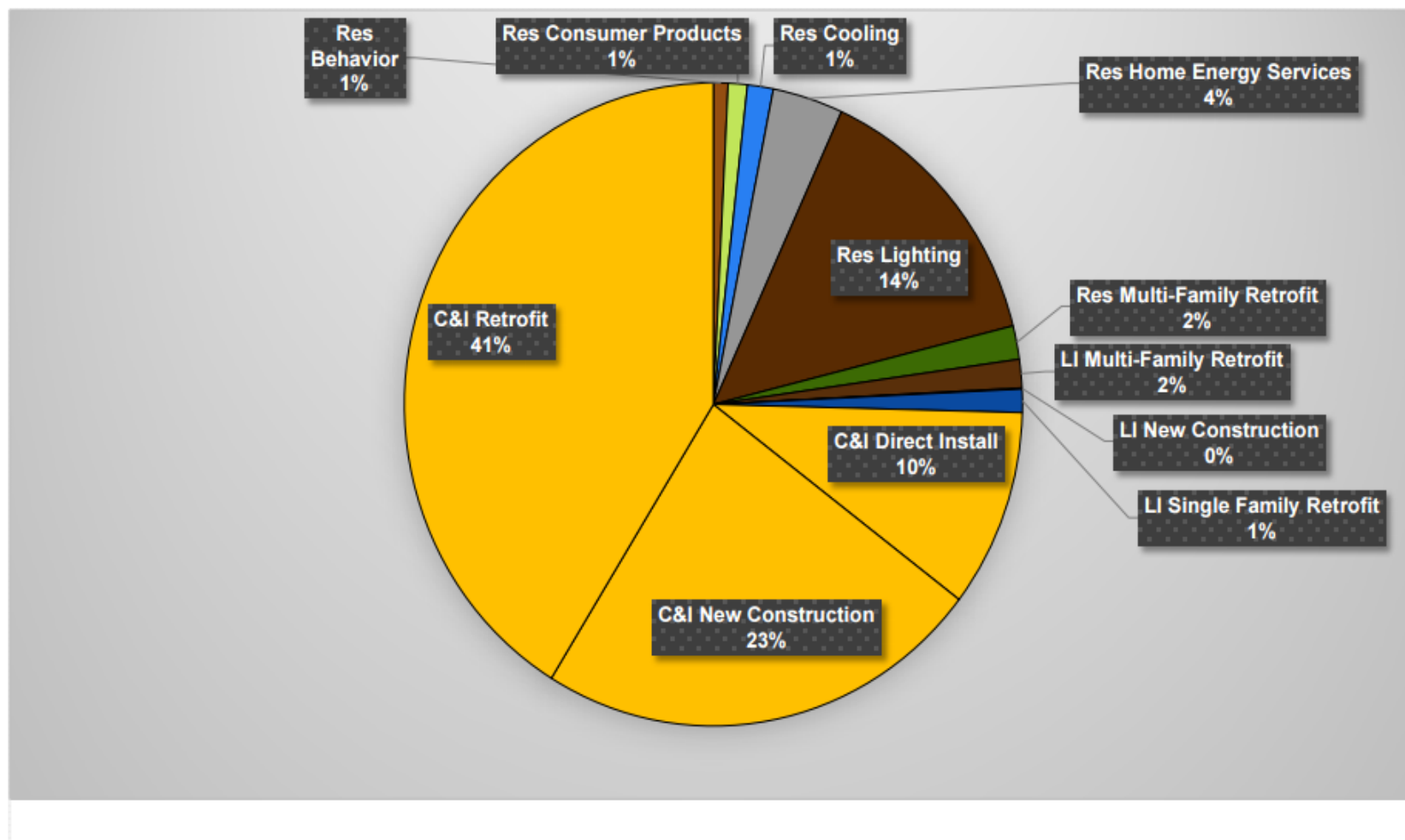
STATE EM&V - MASSACHUSETTS



- MA EM&V program is both extensive and complex
 - 2013-2015 Plan calls for three-year EM&V budget cap of nearly \$70m
- Under the current EM&V framework, all studies are:
 - Statewide
 - Administered by individual PAs, with responsibility systematically distributed across PAs by research area
 - Planned and performed collaboratively with EEAC and its consultants
 - Performed by standing contractor teams under long-term contracts
- EM&V Management Committee (EMC)
 - Provides a forum for statewide evaluation issues, and provides guidance, planning and direction to each evaluation research area
- Under the framework, if consensus cannot be reached, authority for decision-making to reside with EEAC or its designee.
 - Since 2009 framework developed, 100% of issues resolved collaboratively
- See [2013-14 Evaluation Plan](#)
- PAs and the EEAC consultants have initiated a process to develop a Strategic Evaluation Plan (SEP) for the 2016-2018 - to be part of final three-year plans filed in October 2015

MASSACHUSETTS SAVINGS BY SECTOR

2013 Statewide Actuals (MWHs)



MASSACHUSETTS EVALUATIONS (C&I)



Overview of Studies (2010-2015)



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KEY EM&V PROTOCOL RESOURCES



- Basics on EM&V Planning, Frameworks, and Methods: [SEE Action Impact Evaluation Guide](#)
- US DOE EE Savings Protocols - [Uniform Methods Project](#) (focus on impact evaluation)
- [Regional EM&V Methods and Savings Assumptions Guidelines](#) (EM&V Forum)
- Regional EM&V Forum: [Standardized EM&V Methods Reporting Forms](#)
- Regional EM&V Forum [Metering Data Collection Protocols](#)
- New York State [Process Evaluation Protocols](#)

OTHER USEFUL RESOURCES

Regional EM&V Forum



- Regional EM&V Forum Cost-Effectiveness Screening Guidelines: [http://www.neep.org/initiatives/emv-forum/forum-products#Cost Effectiveness Screening](http://www.neep.org/initiatives/emv-forum/forum-products#Cost%20Effectiveness%20Screening)
- EE as a T&D Resource Using Geotargeting: <http://www.neep.org/initiatives/emv-forum/forum-products#Geotargeting>
- Regional EE Database: <http://www.neep.org/initiatives/emv-forum/regional-energy-efficiency-database>

Current Research and Info Sharing:

Net Savings Project, Changing EM&V Paradigm

STANDARDIZED EM&V METHODS REPORTING

Regional EM&V Forum New Tool for States



Objectives

1. Provide for **standardized comparability of EM&V practices** through the use of a simple, model reporting format with consistent definitions;
2. Help to **reduce administrative costs associated with presenting and reviewing EE program impacts** by having a consistent format for reviewing results;
3. Support ability for interested parties **to compile data and analyze common practices** and associated impacts
4. **Build on or replace existing reporting requirements** where they exist, to avoid new reporting burden for PAs

STANDARDIZED EM&V METHODS FORMS



Audiences and Uses:

EPA, DEP, PUC, SEO, system planners, PAs, Forum members want to know:

- What EM&V methods were used to estimate savings?
- How reliable are the reported EE savings?
- How do EM&V methods compare across states?
- How do EM&V methods used align with existing state, regional or national EM&V protocols?
- Where do I need to dig deeper in reviewing evaluation of programs?
- How can we better understand differences in results reported in REED across states?
- How can we streamline evaluation review process and reduce costs?

Nutrition Facts	
Serving Size 1 Banana (130g)	
Servings per Container 1	
Amount Per Serving	
Calories 300	Calories from Fat 130
% Daily Value*	
Total Fat 16g	24%
Saturated Fat 8g	39%
Trans Fat 0g	
Cholesterol 0g	0%
Sodium 15mg	1%
Potassium 320mg	9%
Total Carbohydrate 44g	15%
Dietary Fiber 4g	16%
Sugars 32g	
Protein 2g	
Vitamin A	2%
Vitamin C	15%
Calcium	2%
Iron	6%
Riboflavin (Vitamin B2)	4%
Vitamin B6	15%
Folate	4%
Magnesium	6%
Copper	4%
Manganese	10%

* Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower, depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

FORM CATEGORIES



Study Form

1 – General Information

2 – Study Summary and Results

3 – **EM&V Methods** for Gross Savings

4 – **EM&V Methods** for Net Savings

5 – Study **EM&V Rigor** Summary

6 – **Evaluation Protocols**

7 – Recommendations

Program Form

1 – Program Year
Summary

2 – Program **EM&V
Methods** Summary

3 – Program **EM&V Rigor**
Summary

4 – Relevant **EM&V
Documents**

ADDITIONAL RESOURCES



- International Energy Program Evaluation Conference (www.iepec.org). Sharing knowledge of program results, evaluation methods and policy-related issues through conferences and webinars.
- Association of Energy Service Professionals (www.aesp.org). A membership organization serving the energy efficiency industry, connecting and informing implementers, evaluators, marketing professionals, and technology experts.

QUESTIONS?



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