



Northeast Energy Efficiency Partnerships

## **What's Under the Hood?:**

**Building Consistency & Transparency in Energy Efficiency Savings  
and Underlying EM&V Methods through a Standardized,  
Integrated Reporting Platform**

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Northeast Energy Efficiency Partnerships

Presented at the 2015 ACEEE National Conference on Energy Efficiency as a  
Resource

# About NEEP

## Mission

Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

## Approach

Overcome market barriers and transform markets via:

***Collaboration, Education and Enterprise***

## Vision

Region embraces **next generation energy efficiency** as a core strategy to meet energy needs in a carbon-constrained world



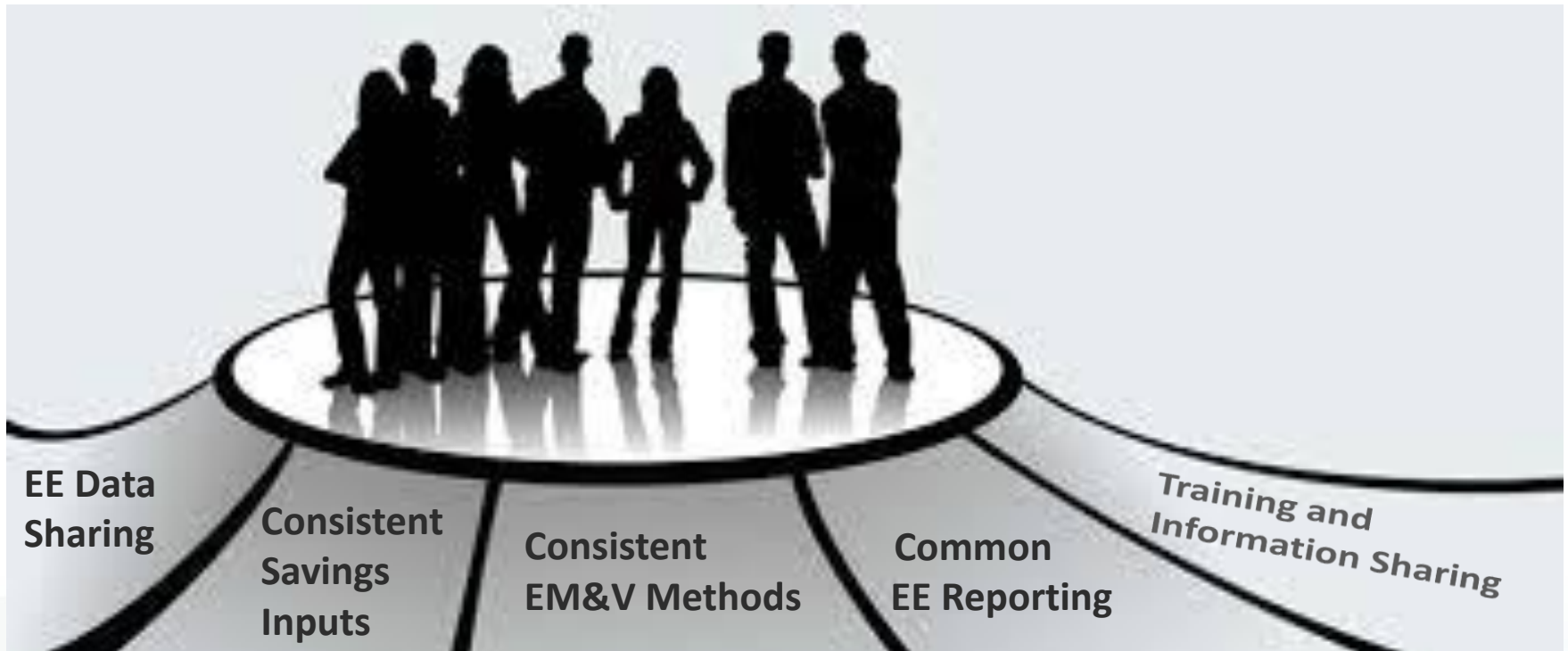
*One of six regional energy efficiency organizations (REEOs) funded by the US Department of Energy (US DOE) to link regions to US DOE guidance, products and programs*

# Regional EM&V Forum



**Goal: Build a Transparent and Common EM&V Platform (per NECPUC/MACRUC Resolutions)**

**PAAs PUCs DEPs SEOs ISO/RTOs RGGI**



# Regional Energy Efficiency Platform



## Reported EE Data

- Expenditures
- Savings
- Peak to Energy Ratio
- Avoided Emissions

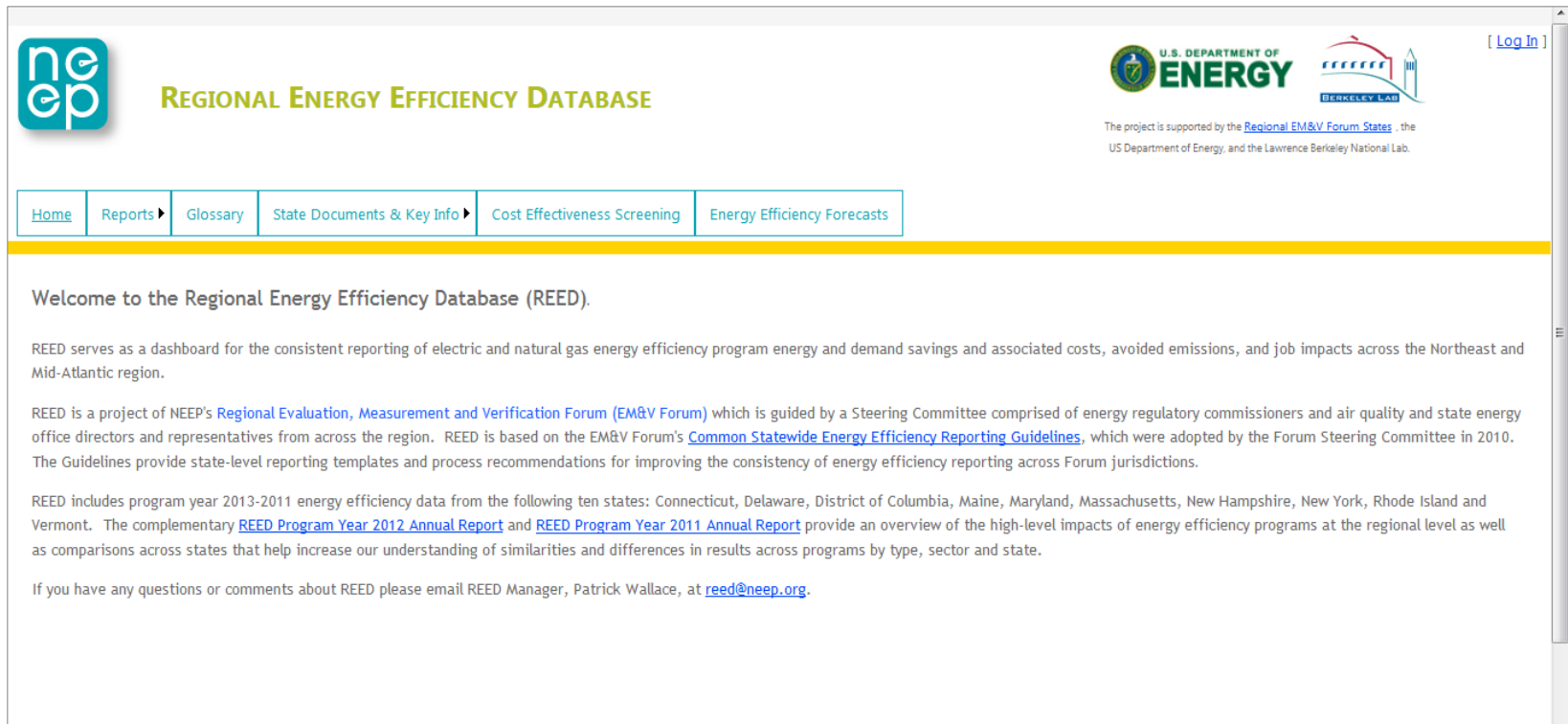
## Supporting Documents

- Program Plans
- Annual Reports
- TRMs
- EE Forecast Info

## EM&V Methods

- Program & Study Form
- SEE Action Guidelines
- Assessment of Rigor
- User Guide

# REED Overview



The screenshot shows the homepage of the Regional Energy Efficiency Database (REED). At the top left is the neep logo. To its right is the title "REGIONAL ENERGY EFFICIENCY DATABASE" in green. On the right side, there are logos for the U.S. Department of Energy and Berkeley Lab, along with a "[ Log In ]" link. Below the title is a navigation menu with buttons for "Home", "Reports", "Glossary", "State Documents & Key Info", "Cost Effectiveness Screening", and "Energy Efficiency Forecasts". The main content area begins with a "Welcome to the Regional Energy Efficiency Database (REED)." section, followed by three paragraphs of introductory text and a contact email address: reed@neep.org.

Visit REED at [www.reed.neep.org](http://www.reed.neep.org)

# REED Overview

- **What is it?:** REED serves as a dashboard for the consistent and transparent reporting of electric and natural gas energy efficiency program information including energy and demand savings and associated costs, avoided emissions, and job impacts across the Northeast and Mid-Atlantic region.
- **REED's Purpose:** Develop transparency and consistency in reporting of EE impacts across the region in order to increase the credibility and understanding of the EE resource to support state and regional energy, economic and environmental policies.

# REED Overview



Home | Reports | Glossary | State Documents & Key Info | Cost Effectiveness Screening | Energy Efficiency Forecasts

Share

Energy Savings
Demand Savings
Peak to Energy
Avoided Emissions
Savings as Percent of Sales
Total Annual Expenditures
Expenditures as Percent of Total Cost
Job Imp

### Energy Savings

#### Gross Annual Energy Savings Electric Meter Level (MWh) for 2013

States: Connecticut, Delaware, District of Columbia, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont

Program Sectors: All

Program Types: All

Region	State	Gross Annual Energy Savings Electric Meter Level (MWh)
ISO-NE	Connecticut	~250K
	Massachusetts	~1250K
	New Hampshire	~100K
	Rhode Island	~200K
	Vermont	~150K
NY-ISO	New York	~1350K
PJM	Delaware	~150K
	District of Columb..	~100K
	Maryland	~950K

**Energy Savings Values**

Gross Annual Energy Savings Electric Meter Leve... ▾

**Calendar Year**

(All)

2011

2012

2013

**State**

(All) ▾

**Program Sector**

(All) ▾

**Program Type**

(All) ▾

In accessing the REED and printing reports, the user agrees to NEEP's current full disclaimer per its website.

See the [Glossary](http://reed.neep.org/Glossary.aspx) page for definitions of all REED program type categories and the [Report Footnotes](http://reed.neep.org/Footnotes.aspx#energy_savings) page for more information

# REED Overview

Types of Data included in Common Reporting Guidelines and REED:

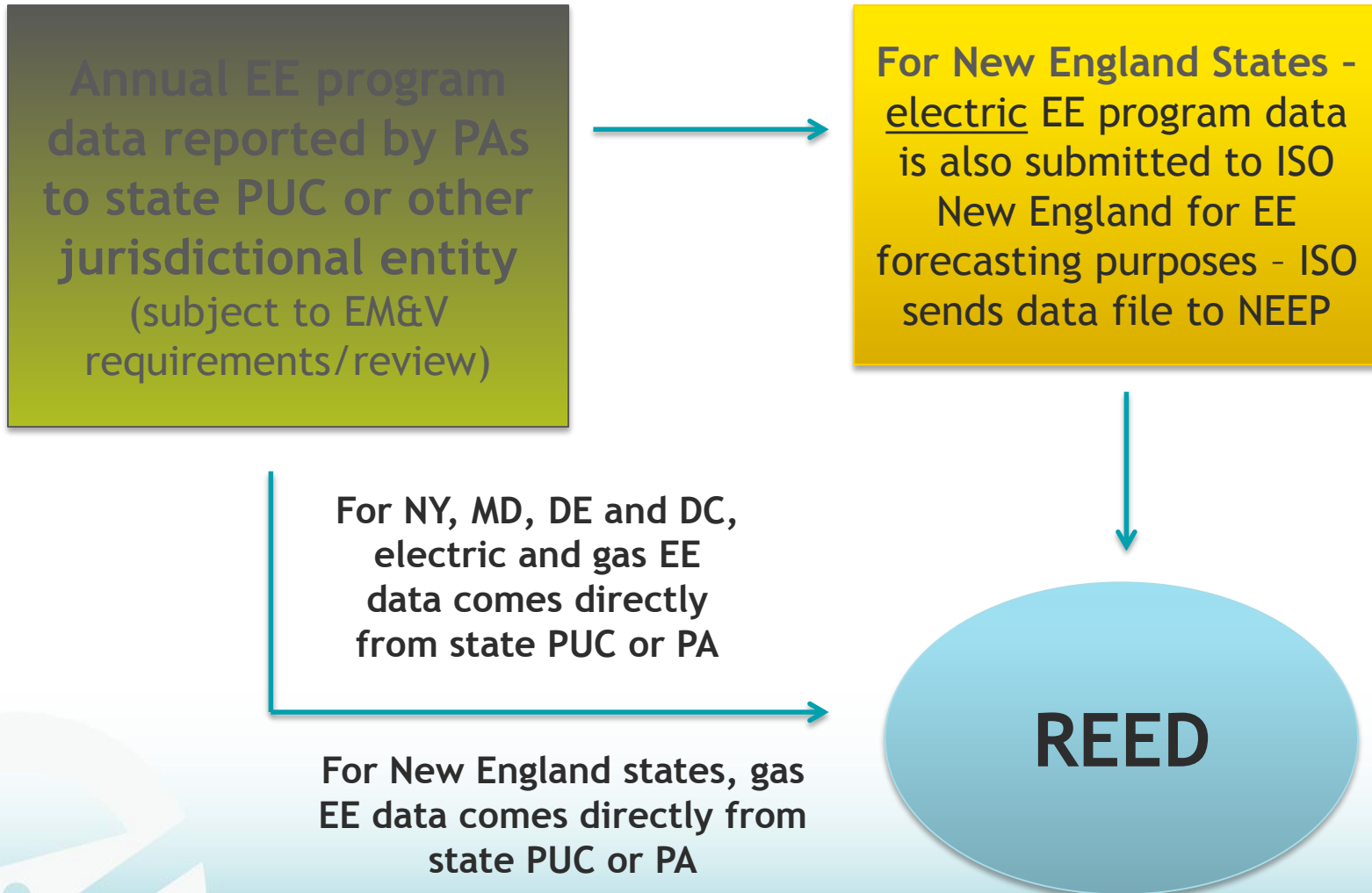
- Annual and Lifetime Energy Savings
- Summer and Winter Peak Demand Savings
- Peak to Energy Ratios
- Avoided Air Emissions\*
- Savings as a Percent of Sales
- Program Expenditures
- Job Creation Impacts
- Cost of Saved Energy\*
- Program Funding Sources

\* REED internal calculations, using methodology supported by Forum participants



# REED Overview

## Sources of Data in REED



# REED Overview



## How Energy Efficiency Stakeholders Can Use REED Data

Compare program impacts to help identify best practices



Aggregate results to inform regional and national impacts / policies



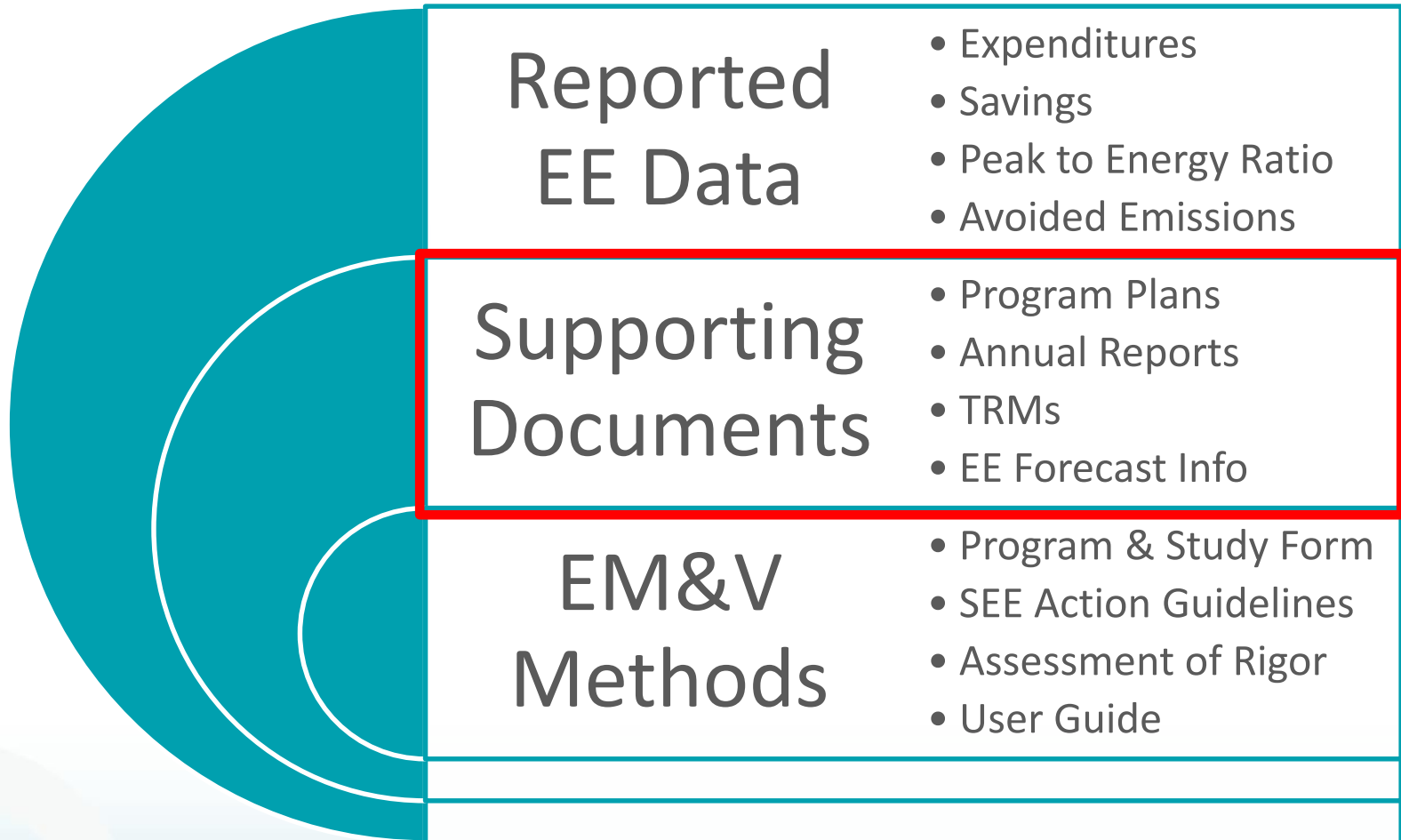
Support system & transmission planning, forecasting



Incorporate EE data into air quality plans



# Regional Energy Efficiency Platform



# Supporting Documents



**neep** REGIONAL ENERGY EFFICIENCY DATABASE

U.S. DEPARTMENT OF ENERGY ENERGY BERKELEY LAB

The project is supported by the [Regional EM&V Forum States](#), the US Department of Energy, and the Lawrence Berkeley National Lab.

[ [Log In](#) ]

Home Reports State Documents & Key Info Cost Effectiveness Screening Energy Efficiency Forecasts

### STATE DOCUMENTS & KEY INFO

The State Documents and Key Information pages provide a comprehensive overview of the energy efficiency programs and measures implemented in each state. These pages aim to provide you with the following information:

1. Energy efficiency documents, reports, and technical reference manuals to name a few, and
2. Key supporting information such as savings estimates for energy efficiency programs in each state.

g deeper into the data found in REED to help you answer your energy efficiency questions. For questions about specific reports in REED, please visit the [Report Footnotes](#) page.

The information on these pages is presented in a multiple choice format for those that are not highlighted with a blue background.

You may also view a [comparison](#) of the data from the Northeast and Mid-Atlantic answered these questions. Please take a look around and email [reed@neep.org](mailto:reed@neep.org) if you have any questions or comments on these pages.

- [Connecticut](#)
- [Delaware](#)
- [District of Columbia](#)
- [Maine](#)

[reed.neep.org/StateDocs.aspx](http://reed.neep.org/StateDocs.aspx)

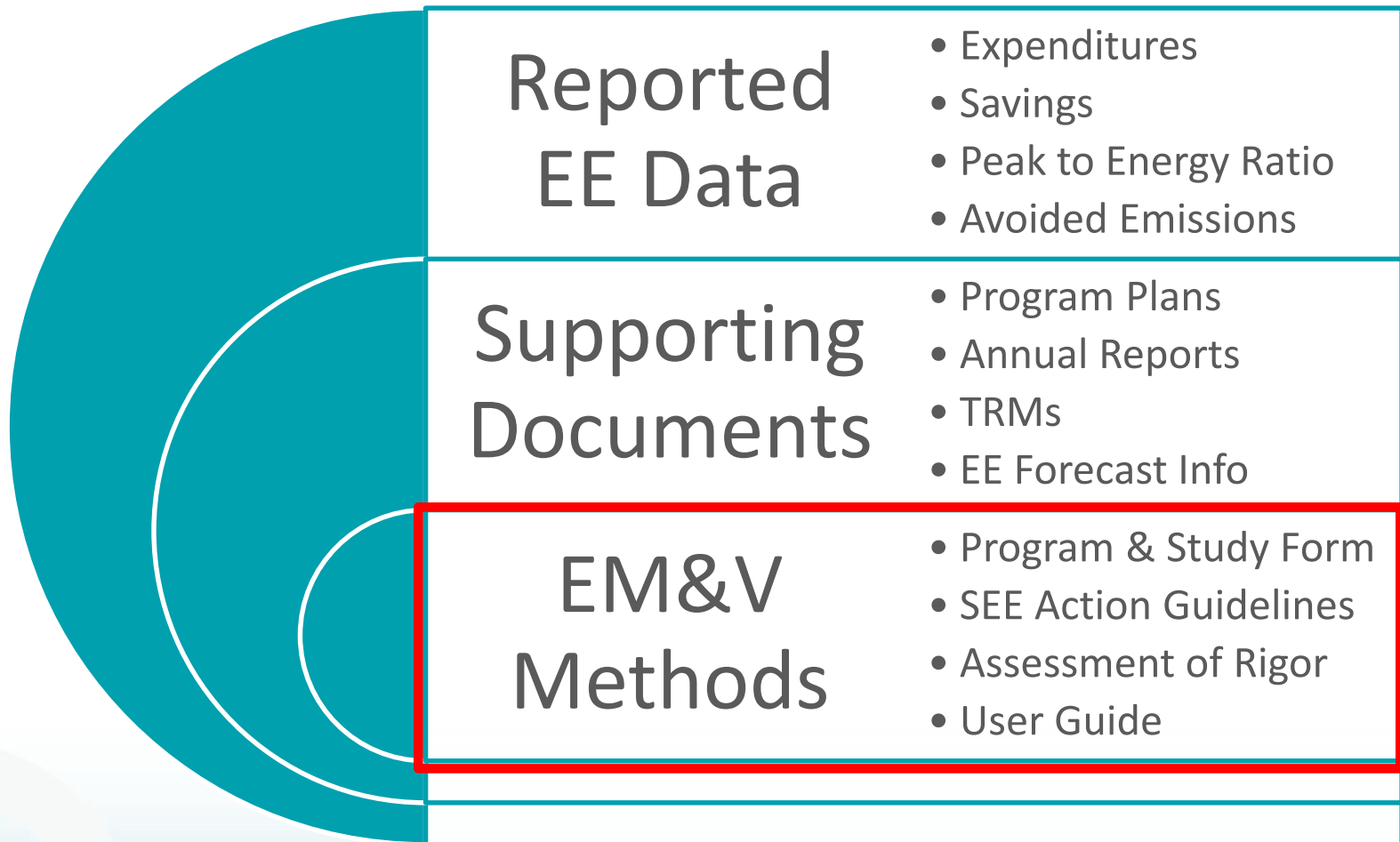
<http://reed.neep.org/StateDocs.aspx>

# Supporting Documents and Assumptions



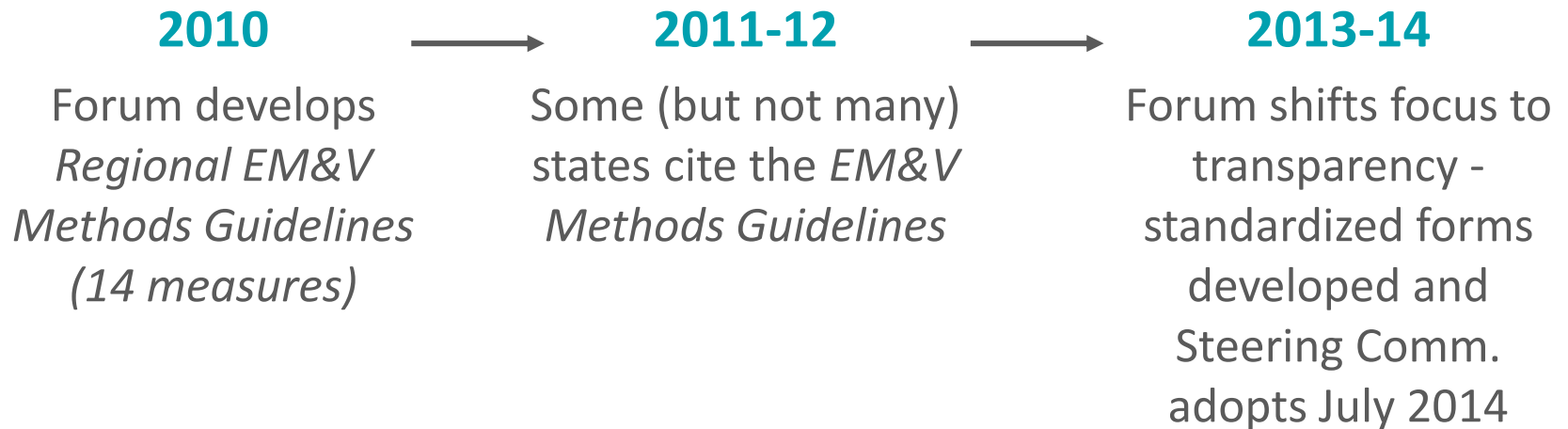
- Enabling legislation
- Annual Reports
- Program Plans
- Technical Reference Manuals
- Potential Studies
- Net and Gross Savings Assumptions
- Description of Review and Approval Process
- Sources of Funding
- Relevant NEEP Documents and Resources

# Regional Energy Efficiency Platform



# Standardized EM&V Methods Reporting

## A Project of the Regional EM&V Forum



*Overarching Goal: Build transparency and understanding of EM&V practices to support inclusion of EE resources in state, regional and national energy & environmental policies and markets*

# Standardized EM&V Methods Reporting



## The 'Food Label' for Various Audiences

PUCs, DEPs, EPA, SEOs, system planners, PAs, evaluation consultants want to know:

- What EM&V methods were used to estimate reported savings?
- How rigorous 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 should I focus my attention in review of specific studies and program EM&V?
- How can I streamline my evaluation review process and reduce administrative costs?

<b>Nutrition Facts</b>			
Serving Size 1 Banana (130g)			
Servings per Container 1			
Amount Per Serving			
Calories 300	Calories from Fat 130		
% Daily Value*			
<b>Total Fat</b> 16g	<b>24%</b>		
Saturated Fat 8g	<b>39%</b>		
Trans Fat 0g			
<b>Cholesterol</b> 0g	<b>0%</b>		
<b>Sodium</b> 15mg	<b>1%</b>		
<b>Potassium</b> 320mg	<b>9%</b>		
<b>Total Carbohydrate</b> 44g	<b>15%</b>		
Dietary Fiber 4g	<b>16%</b>		
Sugars 32g			
<b>Protein</b> 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	80g



# Standardized EM&V Methods Reporting



## The Forms – Digital Platform – Version 1.0

The screenshot shows a web browser window with the URL [191.237.21.11/fmi/webd#NEEP\\_EMV\\_REPORTS](http://191.237.21.11/fmi/webd#NEEP_EMV_REPORTS). The page features the NEEP logo (Regional Evaluation, Measurement & Verification Forum) and a navigation bar with a search function. The main content area is titled "Welcome to the EM&V Methods Standardized Reporting Forms" and identifies it as a project of the Regional EM&V Forum, facilitated and managed by Northeast Energy Efficiency Partnerships, Inc. Two primary buttons are present: "PROGRAM EM&V METHODS SUMMARY FORM" and "IMPACT EVALUATION STUDY EM&V METHODS SUMMARY FORM". Below these are links for the "full User Guide" and "E-mail questions or comments about the forms...". The page also includes logos for the U.S. Department of Energy and Berkeley Lab, and a note about funding from the Regional EM&V Forum States, the US Department of Energy, and the Lawrence Berkeley National Lab. The CADMUS logo is also visible in the top right corner.

<http://www.neep.org/initiatives/emv-forum/model-emv-methods-standardized-reporting-forms>

# Standardized EM&V Methods Reporting



**Study Form**



**Program Form**

# Standardized EM&V Methods Reporting



## Form Categories

### Program Form

1 – Program Year Summary

2 – Program **EM&V Methods** Summary

3 – Program **EM&V Rigor** Summary

4 – Relevant EM&V Documents/Protocols

### Study Form

1 – General Information

2 – Study Summary and Results

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

4 – **EM&V Methods** for Net Savings

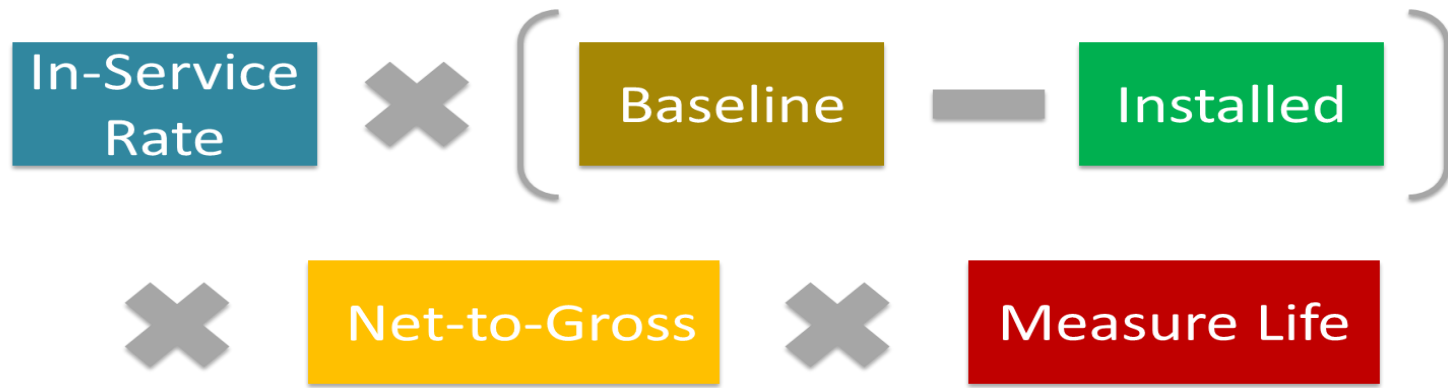
5 – Study **EM&V Rigor** Summary

6 – Relevant EM&V Docs/Protocols

7 – Recommendations

# Standardized EM&V Methods Reporting

## Key Building Blocks of EE Savings Calculation



# Standardized EM&V Methods Reporting



## Program Form - Methods

3. Indicate EM&V methods used to evaluate program savings. ?

Method	Method	Methods Savings
<b>Baseline</b> <input type="checkbox"/> Stipulated baseline <input type="checkbox"/> Building code or federal/state Standard <input type="checkbox"/> Standard practice <input type="checkbox"/> Existing conditions <input type="checkbox"/> Dual or dynamic baseline <input type="checkbox"/> Other (describe below) <input type="checkbox"/> Not applicable	<b>Verification</b> <input type="checkbox"/> None <input type="checkbox"/> Document review <input type="checkbox"/> Participant survey <input type="checkbox"/> Visual (on-site) inspection <input type="checkbox"/> Other (describe below) <input type="checkbox"/> Not applicable	<b>Gross savings</b> <input type="checkbox"/> Deemed savings <input type="checkbox"/> Engineering desk review <input type="checkbox"/> Measurement & verification <input type="checkbox"/> Large scale consumption data analysis <input type="checkbox"/> Top-down analysis (macro consumption) <input type="checkbox"/> Other (describe below) <input type="checkbox"/> Not applicable
<b>Net-to-gross</b> <input type="checkbox"/> Stipulated NTG ratio <input type="checkbox"/> Self-Reporting Surveys <input type="checkbox"/> Trade Ally Panel <input type="checkbox"/> Large-scale consumption data analysis <input type="checkbox"/> Cross-sectional studies <input type="checkbox"/> Top-down evaluations <input type="checkbox"/> Market sales data analysis <input type="checkbox"/> Structured expert judgement approach <input type="checkbox"/> Historical tracing (case study) <input type="checkbox"/> Other (describe below) <input type="checkbox"/> Not Applicable	<b>Measure life</b> <input type="checkbox"/> Stipulated value, program-level <input type="checkbox"/> Stipulated value, measure-level <input type="checkbox"/> Project-specific values	<b>Persistence</b> <input type="checkbox"/> None <input type="checkbox"/> Degradation <input type="checkbox"/> Rebound <input type="checkbox"/> Other (Describe Below) <input type="checkbox"/> Not Applicable

# Standardized EM&V Methods Reporting Program Form - EM&V Rigor



neep Program Administrator [input] PROGRAM NAME [input] Home  
State [input] Program Sector [input] Program Year [input]

User Guide Program Year Summary Program EM&V Methods Summary Program EM&V Rigor Summary Relevant EM&V Documents

1. Describe the overall EM&V strategy for the program. **EM&V Strategy** [input] certainty.

**2. Characterization of EM&V Rigor**  
The following four questions aim to provide information on the overall rigor of the evaluation. In the context of this form, we define "rigor" in terms of the validity of the results, based on (1) the quality of the data, (2) appropriateness of the way the data was collected, (3) statistical confidence and precision of the results, and (4) appropriateness of the measurement methods. See the user guide for general information about interpretation of this information: [\[link to user guide on NEEP website\]](#)

**1. Data Quality** [more info...]  
 All study components are recent and based on primary research.  
 Most study components are based on recent and secondary research.  
 Study EM&V components savings are not based on recent research. **Data Quality** [input]

**2. Sampling Method** [more info...]  
 All study components use census or random (incl. stratified) sampling methods.  
 Most study components use census or random (incl. stratified) sampling methods.  
 Study components use non-random sampling methods. **Sampling Methods** [input]

**3. Confidence and Precision** [more info...]  
 All study components achieve the planned level of confidence and precision.  
 Some study components achieve the planned level of confidence and precision.  
 Study components did not achieve the planned confidence and precision levels.  
 The study does not quantify confidence and precision levels. **Confidence/Precision** [input]

**4. Measurement Methods** [more info...]  
 Measurement methods address all major sources of bias.  
 Measurement methods address some major sources of bias.  
 Measurement methods do not address potential sources of bias. **Measurement Methods** [input]

# Standardized EM&V Methods Reporting

## References Standard Industry Protocols



167 Total 167

Quick Find

Completed by:  Approved by:   
Program Administrator:  Program Name:   
State:  Program Sector:  Program Year:

Home

User Guide | I. Program Year Summary | II. Program EM&V Methods Summary | III. Program EM&V Rigor Summary | IV. Relevant EM&V Documents

The EM&V studies supporting the reported savings for the program reference the selected national and regional protocols.

**National Protocols** ? **US DOE UMP Protocols**

- U.S. DOE Uniform Method Project (UMP)
- International Performance Measurement and Verification Protocol (IPMVP)
- Federal Energy Management Program (FEMP) M&V Guidelines
- ASHRAE Guideline 14, Measurement of Energy and Demand Savings
- NAESB Wholesale/Retail Electric Quadrant Energy Efficiency EM&V Standards
- SEE Action, Energy Efficiency Program Impact Evaluation Guide
- U.S. DOE Superior Energy Performance Measurement and Verification Protocol for Industry
- Other (describe below)  Don't know

Provide additional information for selected protocols:

**Regional/State-Specific Protocols** ?

- NEEP Regional EM&V Methods and Savings Assumption Guidelines
- ISO New England (ISO-NE) Manual for M&V of Demand Resources
- PJM Manual 18B: Energy Efficiency Measurement and Verification Manual
- State-specific EM&V protocols or guidance documents
- Other (describe below)  Don't know

Provide additional information for selected protocols::

The supporting EM&V studies for this program are below.

Relevant EM&V Studies (provide name and links to studies)

# Standardized EM&V Methods Reporting

## Mix of Standardized and 'Open-Ended' Questions



**Methods for Estimating Gross Impacts**  
Describe and characterize the methods for estimating gross and adjusted gross impacts.

**1. Select method(s) for gross impact analysis:**  Deemed savings  
 Engineering desk review  
 Measurement & verification  
 Large scale consumption data analysis  
 Top-down analysis (macro consumption)  
 Other (describe below)  Not applicable

Provide additional description:

**2. Select sampling method(s) for gross impact analysis:**  Census  
 Sample  
 Other  
 Not Applicable

Sampling Unit   
Participant Sample Size   
Non-Participant Sample Size



structured response



flexible response



# Standardized EM&V Methods Reporting User Guide and 'Info' Functions



Developed by The Cadmus Group

CADMUS

REGIONAL EVALUATION, MEASUREMENT & VERIFICATION FORUM

ne ep

Welcome to the EM&V Methods Standardized Reporting Forms  
A Project of the Regional EM&V Forum  
Facilitated and managed by Northeast Energy Efficiency Partnerships, Inc.

Click the button below to create a new Program EM&V Summary Form.

Click the button below to create a new Study EM&V Methods Summary Form.

IMPACT EVALUATION EM&V METHODS SUMMARY FORM

Click here to access the full User Guide...

This Project is supported by funding from the Regional EM&V Forum States, the US Dept of Energy, and Berkeley Lab.

U.S. DEPARTMENT OF ENERGY

BERKELEY LAB

### Characterization of EM&V Rigor

The following four questions aim to provide information on the overall rigor of the evaluation. In the context of this form, we based on (1) the quality of the data, (2) appropriateness of the way the data was collected, (3) statistical confidence, and (4) measurement methods.

#### 1. Data Quality

- All study components are recent and based on primary research.
- Most study components are based on recent and secondary research.
- Study EM&V components savings are not based on recent research.

more info...

#### 2. Sampling Method

- All study components use census or random (incl. stratified) sampling methods.
- Most study components use census or random (incl. stratified) sampling methods.
- Study components use non-random sampling methods.

more info...

#### 3. Confidence and Precision

- All study components achieve the planned level of confidence and precision.
- Some study components achieve the planned confidence and precision.
- Study components did not achieve the planned confidence and precision levels.
- The study does not quantify confidence and precision levels.

more info...

#### 4. Measurement Methods

- Measurement methods address all major sources of bias.
- Measurement methods address some major sources of bias.
- Measurement methods do not address potential sources of bias.

more info...

Describe your selection:

# Standardized EM&V Methods Reporting

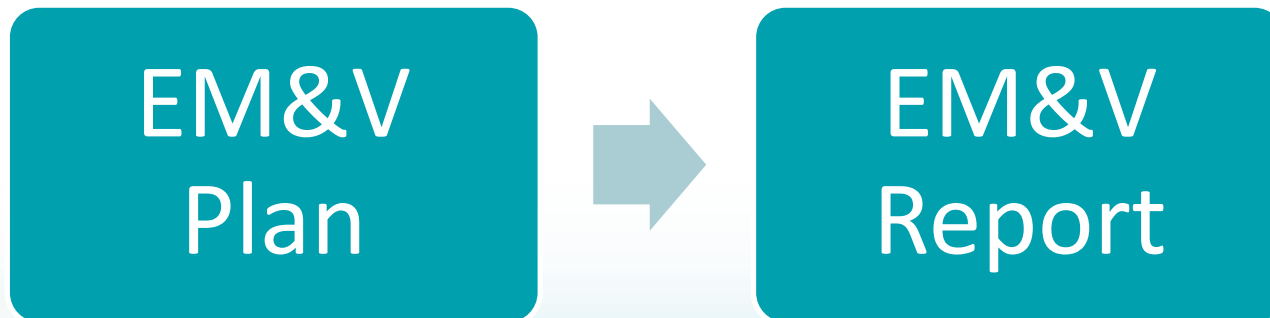
## State Pilots & Next Steps

- Tested several programs and underlying studies
- Worked with PAs and their contractors
- Regulatory staff feedback and suggestions on changes to forms
- Generally very helpful input and experience
- Final report on the pilot and webinar with recommendations due out end of September
- Develop plan for a searchable database to store completed forms

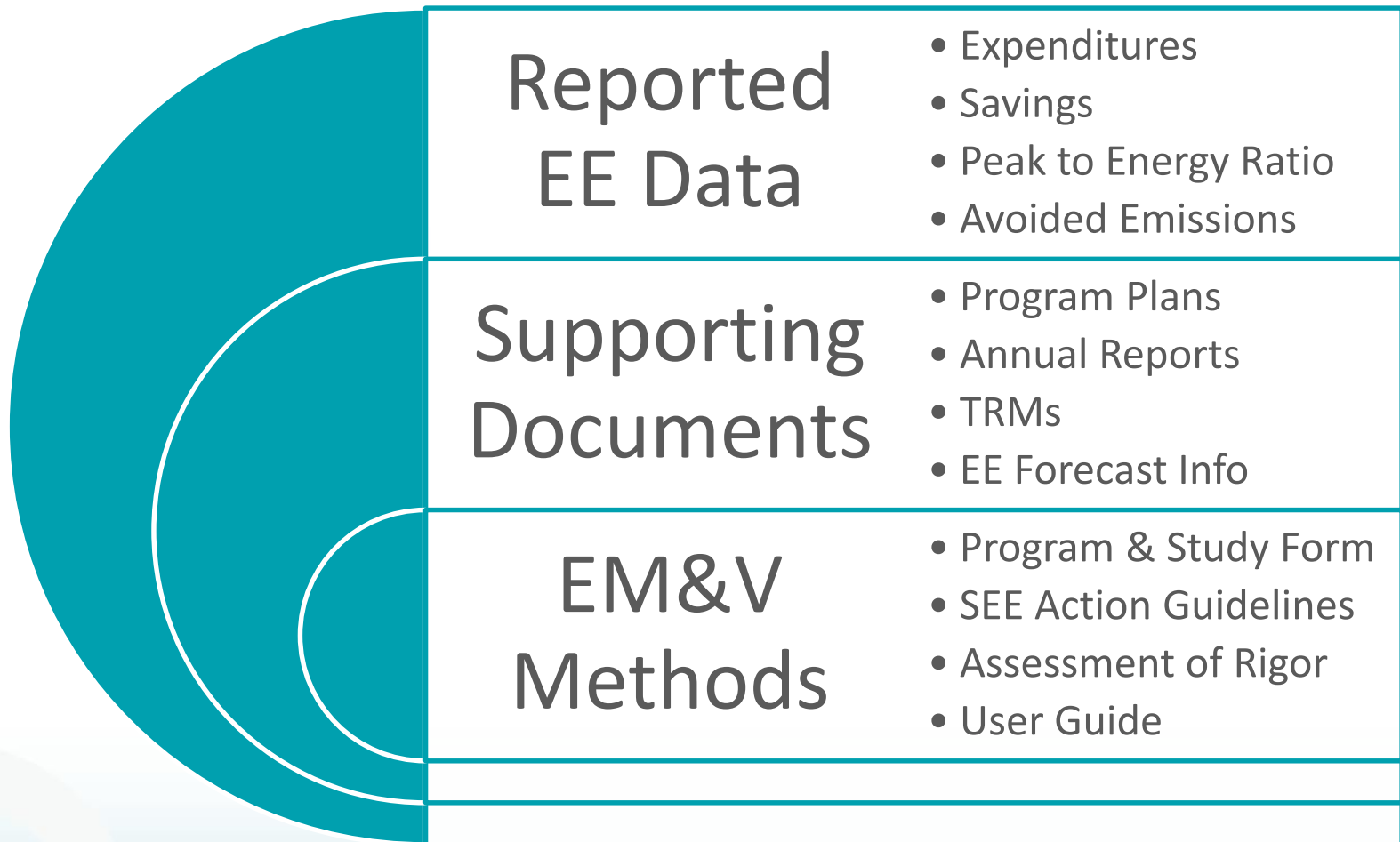
# Standardized EM&V Methods Reporting

## Alignment with CCP EM&V Requirements

- EM&V Method Reporting Forms closely align with EPA's proposed EM&V reporting requirements (some modifications needed)
- Potential for incorporation of forms into a national EE registry (e.g. The Climate Registry)
- Version 2.0 of Forms to be released early 2016



# Regional Energy Efficiency Platform



# QUESTIONS?



Northeast Energy Efficiency Partnerships

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