EM&V Status and Opportunities: A Federal Perspective

2016 EIA Energy Conference

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Topics for Today

- **Background**
  - Status of Energy Efficiency in the U.S.
  - EM&V Basics
- **Challenges for Standardizing EM&V**
  - Key EM&V Issues
  - Varied EM&V Experience
  - Differing Policy Goal Implications
  - Barriers to Consistent, High-Quality EM&V
- **DOE and LBNL Efforts**
- **EPA Efforts**

Background

Status of Energy Efficiency in the United States

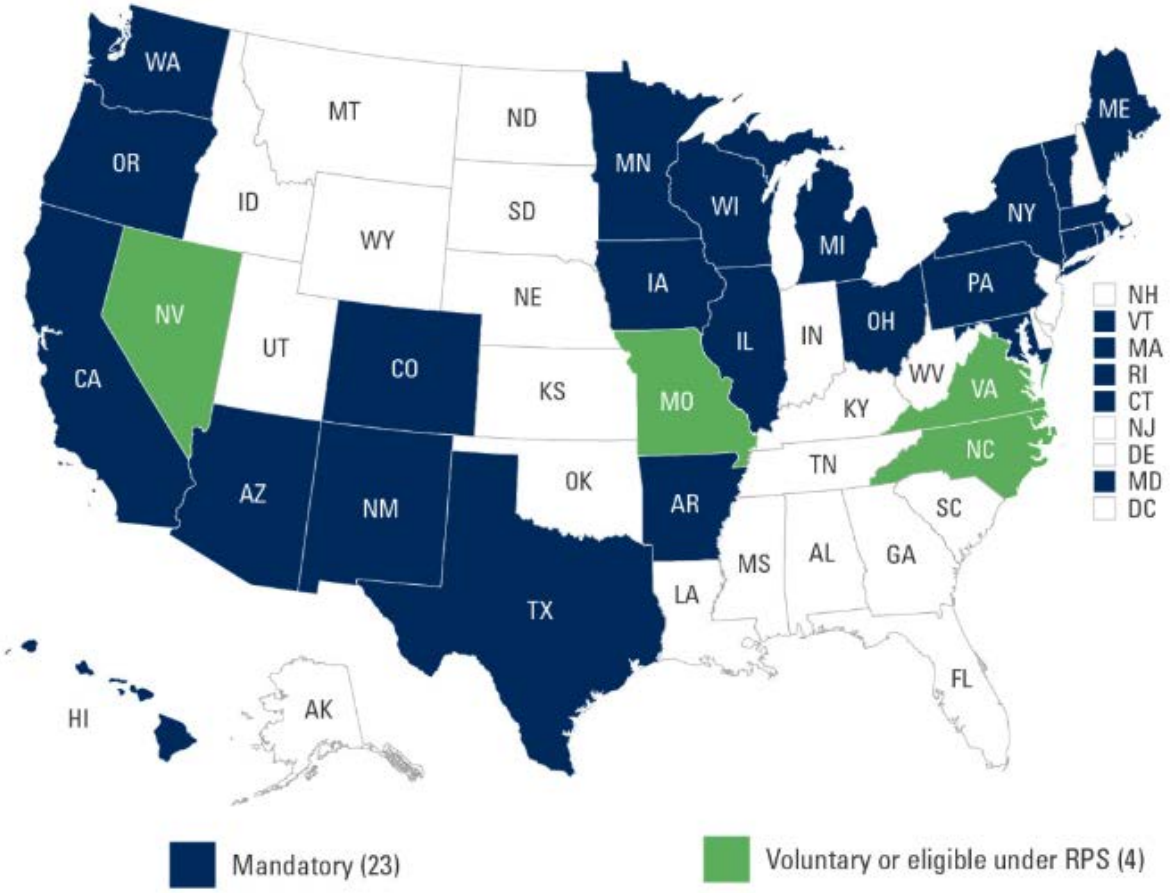
EM&V Basics

Demand-side EE Strategies and Trends

- States have employed a variety of strategies to increase investment in demand-side energy efficiency technologies and practices, including:
  - Energy efficiency resource standards (EERS)
  - Building energy codes
  - Appliance standards
  - Tax credits
- In 2014, utilities and administrators in all 50 states and the District of Columbia implemented electricity demand-side EE programs
- Savings from these programs are increasing
  - Reduced electricity demand by an estimated 25.7 million MWh in 2014 (0.7% of national retail electricity sales)
  - 2014 savings: 5.8% more savings than the previous year
- ESCO industry revenues: $5.3bn in 2011, expected to reach $6.4bn by 2013 with remaining market potential of $77 to $133bn

Current Status of EERS Programs

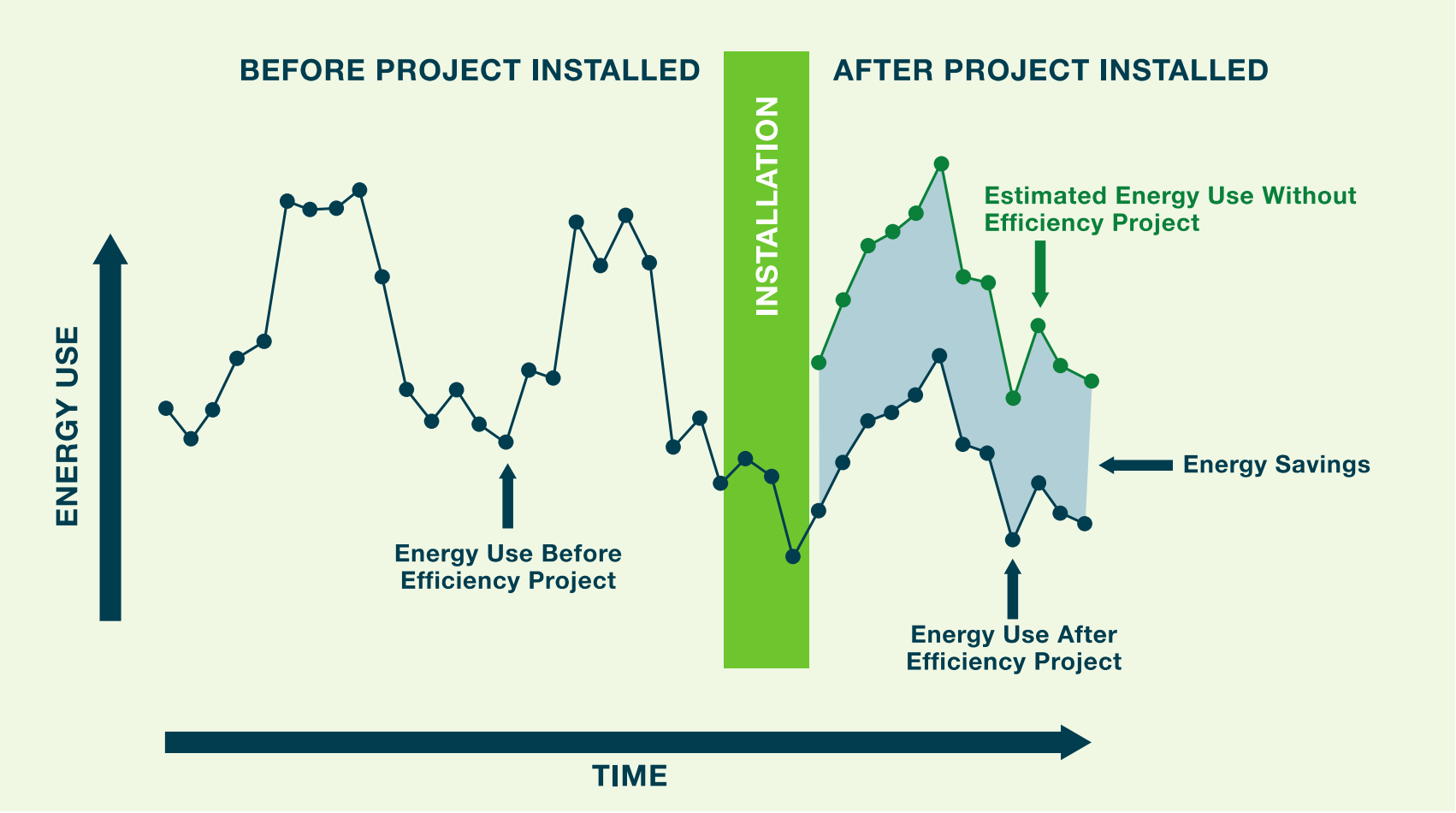
- Energy Efficiency Resource Standards (EERS) in 27 states
  - Establish multi-year targets for energy savings that apply to utilities or third-party administrators
  - Targets typically achieved via implementation of customer-funded EE programs



EM&V Basics

- Evaluation, measurement, and verification (EM&V) is key to successful EE policies, programs, and projects:
  - ***Measurement and verification*** refers to assessments of individual projects and measures
  - ***Evaluation*** refers to policies and programs
- Types of evaluation: process, market effects, cost-effectiveness, and impact
- ***Impact evaluation*** refers to the set of procedures, methods, and analytic approaches used to quantify MWh savings; key impact evaluation metrics include:
  - Gross savings
  - Net savings
  - Non-energy impacts
- Methods for quantifying gross savings
  - Established: Deemed savings, M&V, comparison groups
  - Emerging : Top-down evaluation, M&V2.0

EM&V Basics


BEFORE PROJECT INSTALLED
INSTALLATION
AFTER PROJECT INSTALLED
Estimated Energy Use Without Efficiency Project
ENERGY USE
Energy Savings
Energy Use Before Efficiency Project
Energy Use After Efficiency Project
TIME

Challenges for Standardizing EM&V

Key EM&V Issues

Varied EM&V Experience

Differing Policy Goal Implications

Barriers to Good, Consistent EM&V

Key EM&V Issues

- EM&V helps planners, implementers, and oversight entities understand why the effects occurred (or didn't)
  - *Things that are measured tend to improve*
- Two fundamental topics:
  - Balancing accuracy with cost/burden (How good is good enough?)
  - Setting baselines
- Other key topics:
  - Attribution: net vs. gross savings
  - Independent factors (e.g., weather, occupancy, production levels)
  - Potential for double counting
  - Interactive effects
  - Avoided T&D losses

EM&V Experience Varies by EE Strategy

- For ratepayer-funded utility programs:
  - EM&V is relatively well-established; many years of experience
  - Industry standard protocols and guidelines are widely used
  - Rich library of published reports, data and tech resources
    - EPA/DOE State and Local Energy Efficiency Action Network (SEE Action): https://www4.eere.energy.gov/seeaction
  - Quantification of utility program savings includes key protections (e.g., PUC oversight, third-party[ies])

- For ESCO projects:
  - Well-established standards and protocols
  - Ongoing M&V is the basis for contract between ESCO and customer
  - Existing conditions baseline is typical

- Growing EM&V experience with behavior and O&M programs

- For building energy codes and standards, there is less EM&V experience
  - Savings typically quantified using ex-ante approaches

Policy Goals Matter for EM&V

- EE is used in various contexts to achieve a range of objectives and deliver distinct benefits
- EM&V and quantification priorities and approaches may vary depending on the context-specific goals and objectives
- Potential contexts for implementing and evaluating EE may include:
  - Electric system resource planning
  - Regional capacity markets
  - Utility EE programs
  - Organizational and facility-level energy savings
  - Criteria pollution reductions in SIPs
  - Carbon reductions under the CPP

Barriers to Consistent, High-Quality EM&V

- Some jurisdictions and stakeholders lack:
  - Resources (EM&V funding, expertise, technical studies)
  - Clear guidance for quantifying MWh
  - Rigorous policy goals, PUC oversight, utility experience

- Inconsistencies in EM&V definitions and practices:
  - Across states
  - Between ratepayer funded *programs* and ESCO *projects*
  - Various regional/national efforts to support consistent and transparent reporting are underway

EM&V Related Efforts at DOE and LBNL

Uniform Methods Project

Evaluator Certification

M&V 2.0

LBNL EE Reporting Project

Uniform Methods Project and M&V 2.0

UMP

- M&V protocols for the most commonly implemented efficiency measures and programs
- Phase 1 and 2 covered 15 measures, representing ~¾ of energy saved through ratepayer funded programs
- Phase 3 will cover common industrial measures/programs:
    - Strategic Energy Management/Superior Energy Performance
    - CHP
- Phase 3 will be completed sometime in 2016

M&V 2.0

- Working with industry experts to define M&V 2.0 – automated and continuous M&V
- Working group experts from PG&E, LBNL, US DOE, Rocky Mountain Institute, EnergySavvy and DNVGL
- Will present a draft proposal for feedback at the ACEEE Summer Study – Aug 2016

Evaluator Certification

- Developing a professional certification for energy efficiency program evaluators.

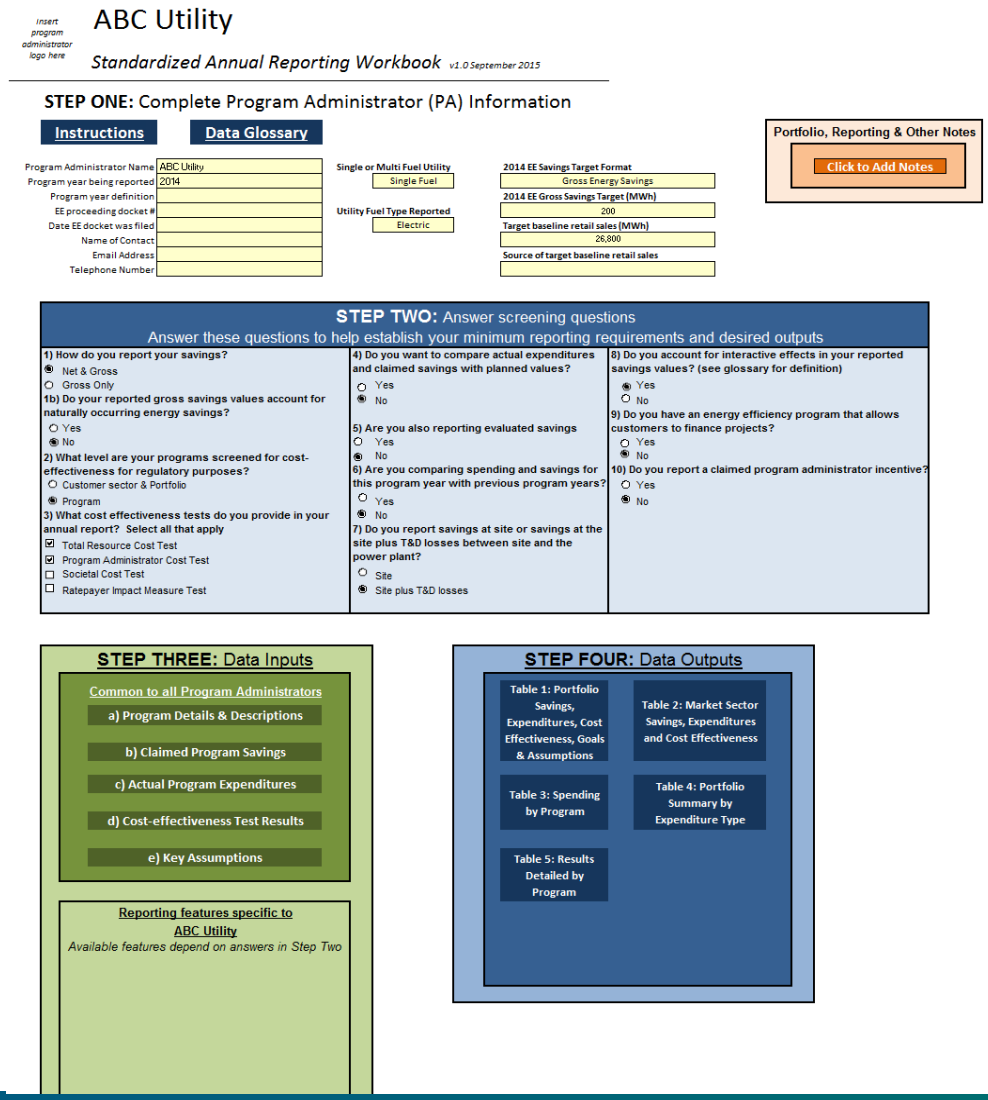
- Certification will provide several benefits:
  - Employers will know that potential employees have the basic skills and knowledge as they consider hiring people.
  - Regulators and policymakers will have increased confidence in evaluation reports.
  - Entities hiring evaluators will have insight into the qualifications of consultants.

- Will provide an update at the ACEEE Summer Study – Aug 2016

LBNL Energy Efficiency Reporting Tools

FOR MID-SIZED/EARLY STAGE PROGRAM ADMINISTRATORS

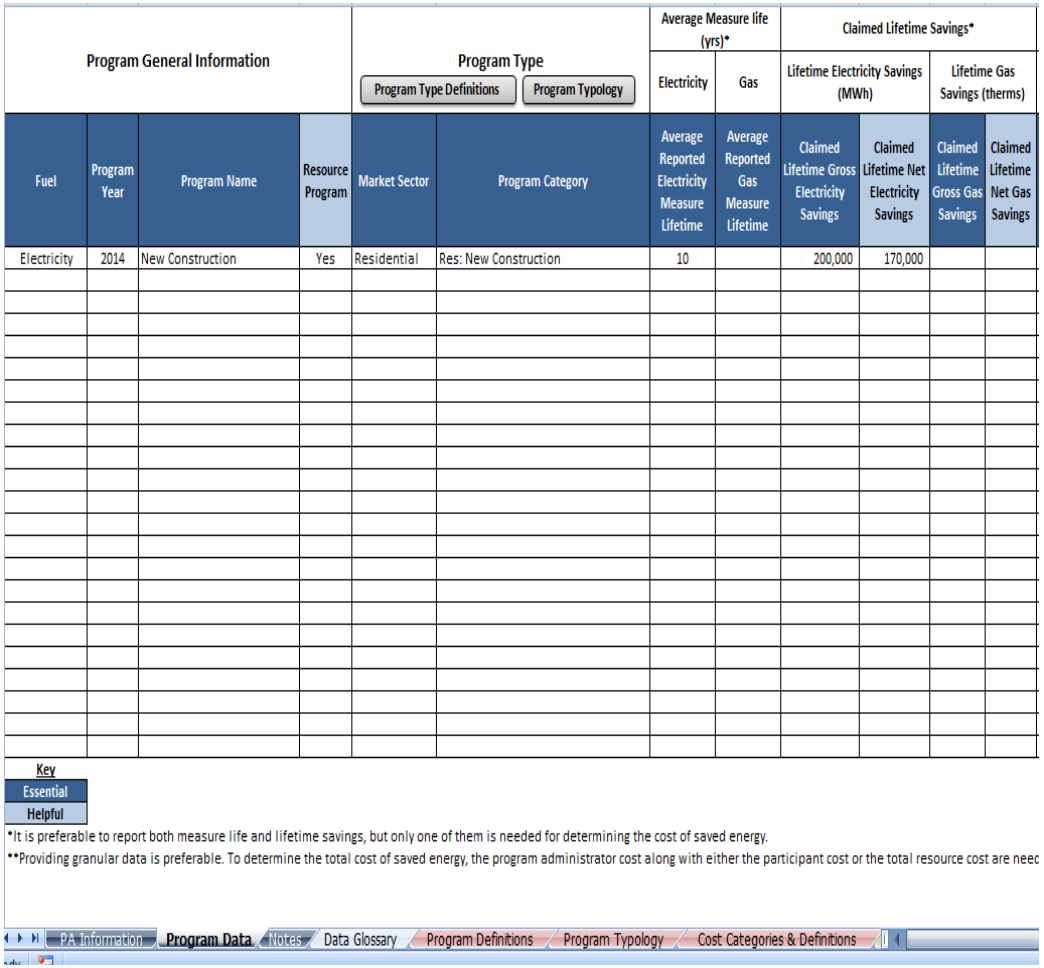
- Full-featured DSM reporting tool for program administrators (PA) funded by utility customers
  - Flexible to accommodate the diverse data requirements in states while maintaining consistency
  - Program-level data on spending, savings, participation, cost effectiveness and program design
  - Screening questions allow PA or PUC to customize information that is to be reported
  - Includes data glossary and program typology



LBNL Energy Efficiency Reporting Tools

FOR SMALL/EARLY STAGE PUBLIC POWER PROGRAM ADMINISTRATORS

- Working with APPA
- Simpler DSM reporting template developed for public power utilities
  - Objective: Consistency with low reporting burden for small staffs
  - Program-level data on spending, savings, participation, cost effectiveness and program design
  - Essential and supplemental (optional) data fields
  - Includes data glossary and program typology



Program General Information				Program Type (Program Type Definitions / Program Typology)		Average Measure life (yrs)*		Claimed Lifetime Savings*			
						Electricity	Gas	Lifetime Electricity Savings (MWh)		Lifetime Gas Savings (therms)	
Fuel	Program Year	Program Name	Resource Program	Market Sector	Program Category	Average Reported Electricity Measure Lifetime	Average Reported Gas Measure Lifetime	Claimed Lifetime Gross Electricity Savings	Claimed Lifetime Net Electricity Savings	Claimed Lifetime Gross Gas Savings	Claimed Lifetime Net Gas Savings
Electricity	2014	New Construction	Yes	Residential	Res: New Construction	10		200,000	170,000		

Key
Essential
Helpful

*It is preferable to report both measure life and lifetime savings, but only one of them is needed for determining the cost of saved energy.
**Providing granular data is preferable. To determine the total cost of saved energy, the program administrator cost along with either the participant cost or the total resource cost are neec

PA Information | Program Data | Notes | Data Glossary | Program Definitions | Program Typology | Cost Categories & Definitions

EM&V Related Efforts at EPA

Approach for Advancing S&L Climate and Energy Policies

Assessing the Multiple Benefits of Clean Energy

Quantifying the Energy Impacts of EE/RE

Clean Power Plan EM&V

GHG Equivalencies Calculator

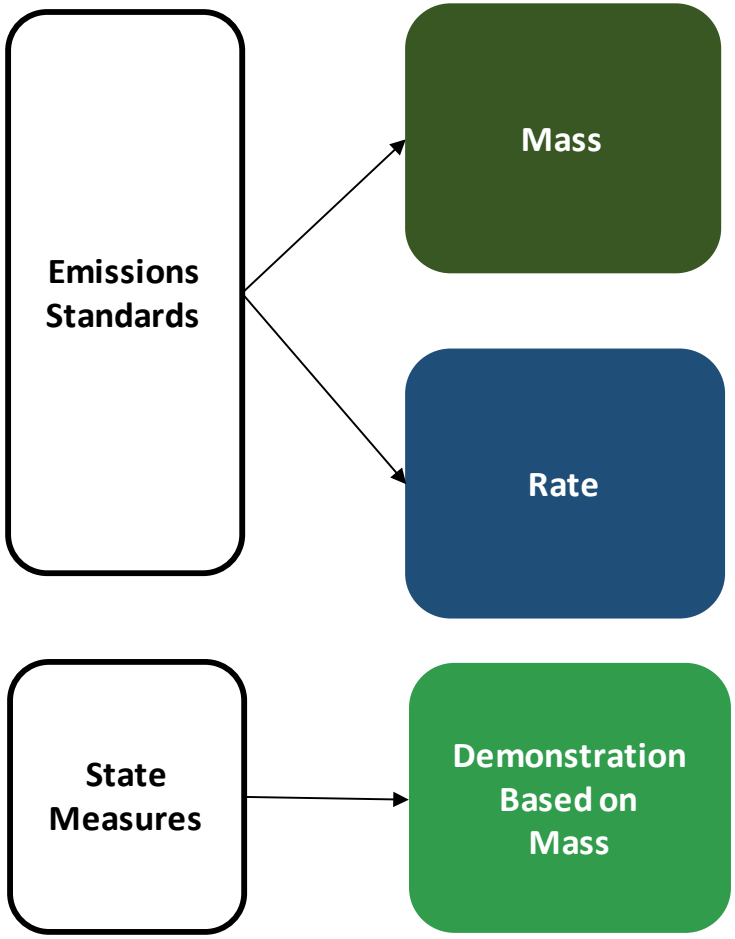
EM&V in the Clean Power Plan

- **Final emission guidelines** include basic requirements to conduct EM&V in certain state-plan circumstances (next slide) - *Section VIII.K.3*
  - Applies to all state plans
  - Expresses EPA's deference to "existing EM&V infrastructure"
  - Acknowledges "limited experience applying EM&V protocols and procedures to emission trading programs" and therefore establishes "safeguards and quality-control features"

- **Proposed federal plan & model trading rules** include EM&V provisions that support the issuance of emission rate credits (ERCs) - *Section IV.D.8*
  - Includes EM&V provisions for EE, RE, and CHP
  - Applicable to early action ERCs & allowances under CEIP

- **Draft EM&V guidance for EE** supports implementation of the final guidelines and proposed model rule
  - Purpose is to provide supplemental information to help states and EE providers successfully quantify and verify savings
  - Not a regulatory document
  - Applies only to EE, not RE or CHP

EM&V Requirements by Plan Approach

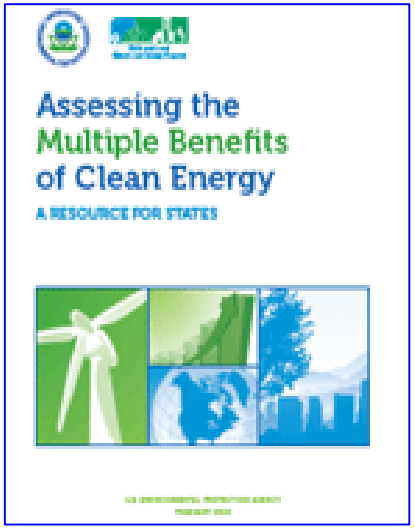


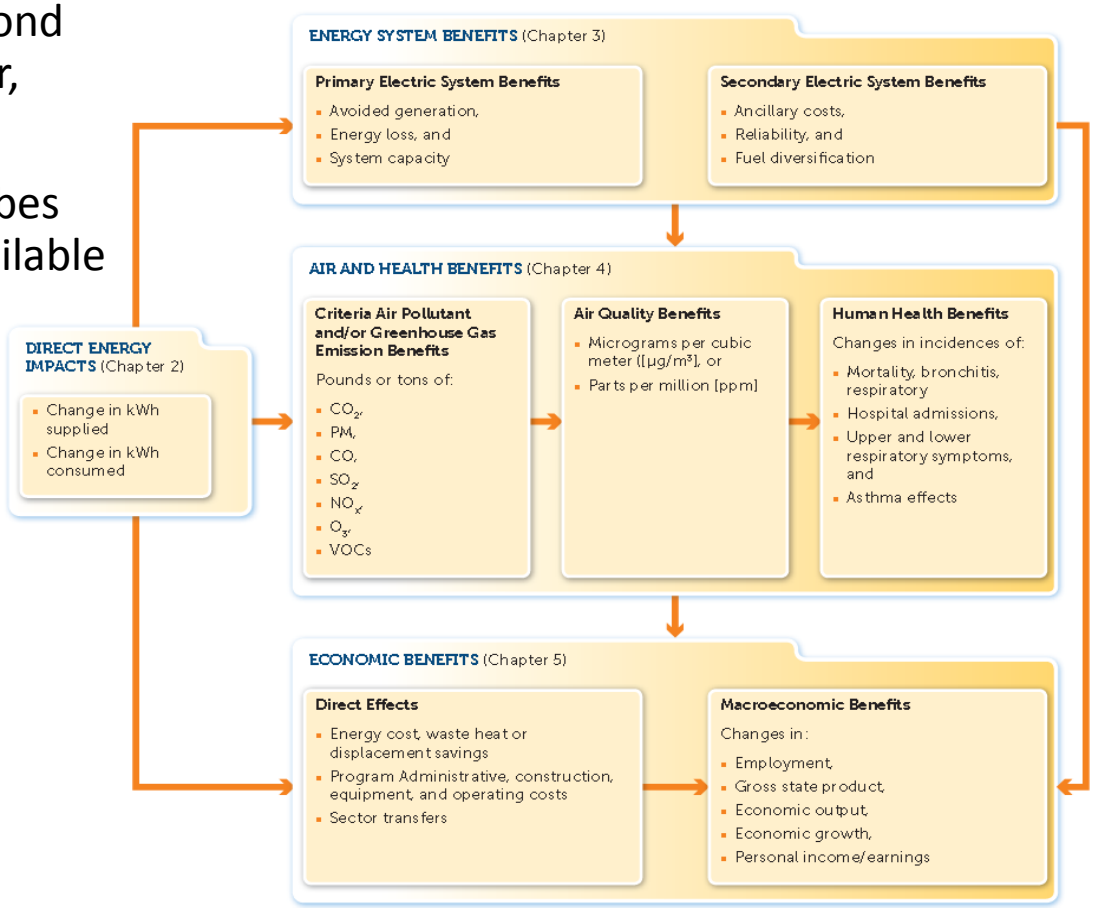
EM&V Requirements

- CEIP stipulaltes EM&V that is consistent with ERC issuance provisions
- EM&V plans and reports are needed to support EE/RE ERC tracking, trading, and issuance provisions
- EM&V is needed to secure ERCs in the CEIP for solar, wind and low-income EE
- EM&V is applicable for EE/RE "state measures" (e.g., EERS, building codes); must be documented in supporting material of state plan
- EM&V is needed to secure matching allowances in the CEIP for solar, wind and low- income EE

Assessing the Multiple Benefits of Clean Energy: A Resource for States

- Often state and local analysts do not focus on the benefits of EE/RE beyond their own areas of expertise (i.e. air, energy, economics)
- The Multiple Benefits Guide describes why they should be quantified, available tools, and how to get started





Get Started | Step 1: Establish Baseline | Step 2: Quantify Impacts | Step 3: Estimate Benefits | Step 4: Promote Benefits

Quantifying the Energy Impacts of EE/RE

- Direct energy impacts are the foundation from which S&Ls estimate air, health, energy system and economic benefits of policies
- EPA provides how-to information on quantifying energy impacts:
  - Retrospectively
    - EPA Web page: *Calculating Energy Savings* https://www3.epa.gov/statelocalclimate/state/activities/measuring-savings.html
    - CPP EM&V Guidance (***see next slide***)

      https://www.epa.gov/cleanpowerplantoolbox/evaluation-measurement-and-verification-emv-guidance-demand-side-energy
    - SEE Action EM&V Portal

      https://www4.eere.energy.gov/seeaction/evaluation-measurement-and-verification-resource-portal
  - Prospectively
    - *National Impacts of State EE/RE Policies*: Draft Methodology for identifying and assessing existing state EE/RE Policies relative to EIA's Annual Energy Outlook (AEO) https://www3.epa.gov/statelocalclimate/state/statepolicies.html
    - *Assessing the Multiple Benefits of Clean Energy:* Chapter 2 http://www.epa.gov/statelocalclimate/documents/pdf/epa_assessing_benefits_ch2.pdf

Approach for Advancing S&L Climate and Energy Policies

- EPA resources to estimate multiple benefits from direct energy/fuel impacts (Step 3)
  - For Emissions & Air Quality:
    - EE/RE SIP Roadmap *https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips*
    - AVERT *https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert*
  - For Health:
    - COBenefits Risk Assessment (COBRA) screening model *https://www.epa.gov/statelocalclimate/co-benefits-risk-assessment-cobra-screening-model*
  - For Energy System & Economics:
    - *Assessing the Multiple Benefits of Clean Energy* *https://www.epa.gov/statelocalclimate/assessing-multiple-benefits-clean-energy-resource-states*
- EPA resources to promote benefits to induce action (Step 4)
  - GHG Equivalencies Calculator *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*
  - Webinars, listservs, website, presentations, training, etc. *See https://www.epa.gov/statelocalclimate*

Questions?

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