



NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

New Hampshire PUC Technical Session

EERS Regulatory Process

Evaluation, Measurement & Verification (EM&V)

Julie Michals, Director
Regional EM&V Forum - NEEP
September 28, 2015

PRESENTATION OVERVIEW



1. EM&V Basics
2. NH EM&V regulatory process
3. EM&V processes, guidance, plans and frameworks in other states
4. Regional EM&V Forum

KEY EM&V QUESTIONS



M&V (Measurement & Verification):

- Is the energy efficiency measure installed and in use?
- What is the reduction in connected kW (i.e., delta watts)?
- What hours do the savings occur (actual and annual hours)?
Verify Annual kWh Savings = (delta watts x annual hours)
- What is the coincidence of kW reduction with system peak?
- Over the commitment period, is the EE measure still installed and providing the demand reduction value?

Evaluation:

- Is the project sample statistically significant?
- How did I address bias in the sample?
- What portion of savings is attributable to the program (e.g., free-ridership, spillover)?

EM&V – THE BASICS



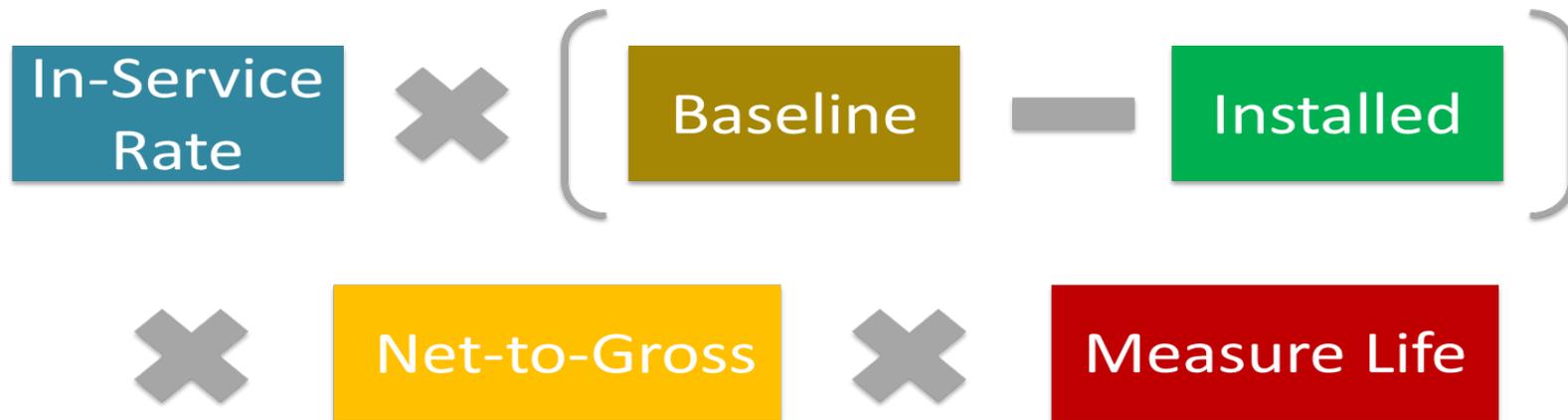
- **M&V** - determines and documents energy or demand savings for a **measure, project, end-use or facility** using site surveys, metering of energy consumption, monitoring of independent variables, and analysis. M&V used to assess gross savings from **a sample individual projects**, which forms the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

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

EM&V - KEY BUILDING BLOCKS FOR EE SAVINGS CALCULATION



*Realization rate applied based on post verification of savings

WHY IS EM&V SO IMPORTANT?

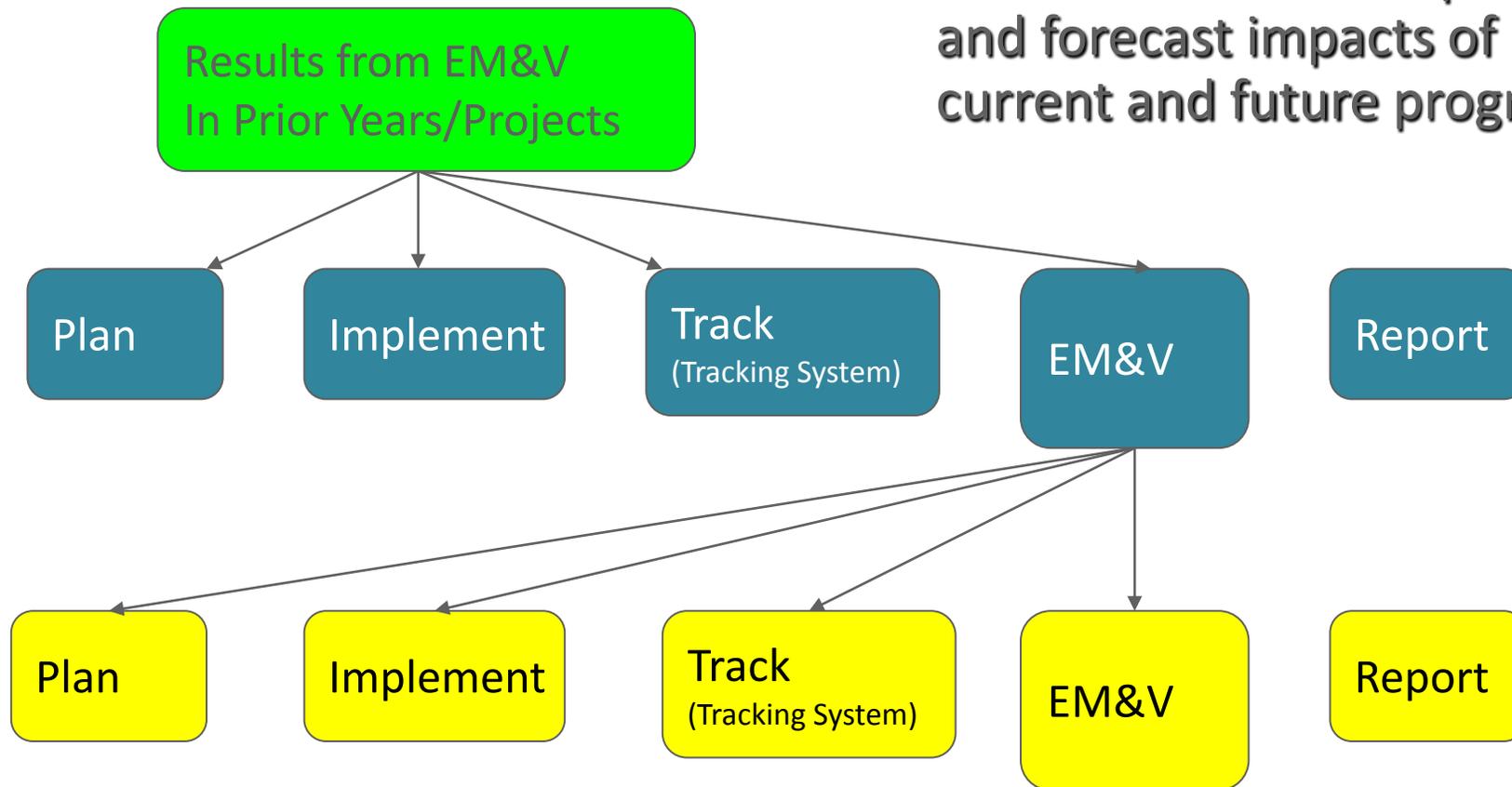


- **Credibility** of savings to support tracking towards state goals and state policies (energy, economic, environmental)
- Demonstrate **compliance** with ISO NE M&V standards for EE resources bid into FCM market
- Informs **continuous improvement process** for program design and delivery, improves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

FEEDBACK LOOP AND CONTINUOUS IMPROVEMENT CYCLE



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



Mature process based on decades of development and refinement

WHAT'S COMING: 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 (interval meter 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)

PRESENTATION OVERVIEW



1. EM&V Basics
2. NH EM&V regulatory process
3. EM&V processes, guidance, plans and frameworks in other states
4. Regional EM&V Forum

NH EM&V REGULATORY PROCESS



- NH PUC Staff oversees EM&V working closely with utilities:
 - Identify evaluations needed
 - Develop proposals and scope for conducting evaluations (RFPs), issue RFPs, review and select independent 3rd party evaluation contractors
- Transparent process - interested parties are invited to:
 - Kickoff meeting on any evaluation
 - Review reports, attend presentation of results, and provide comments on evaluation study prior to finalizing the report.
- Multi- year [Evaluation Plan for Core EE Programs](#) (2014):
 - Evaluation framework
 - Recommended 6 year evaluation plan and budget
 - Supporting information

NH EM&V PRACTICES



- Key goal: Vintage of evaluation studies no > than 5 years (unless utilities can justify using an older one), to be in compliance with ISO-NE FCM M&V requirements.
- Peak demand reductions bid into FCM must meet overall 80% confidence with +/- 10% precision for statistical sampling
- Currently do not evaluate free-ridership (FR) or spillover (SO) or long-term market effects:
 - Programs are designed to reduce FR
 - Can claim spillover but have not (at this time)
 - Small evaluation budget focuses on gross impact and process evaluations.

NH EM&V PRACTICES



- Prospective application of evaluated savings (see slide 7)
- TRM embedded in utility tracking systems – no “public” TRM at this time.
- Utilities have a ‘Common Assumptions Document’ (i.e., working spreadsheets with algorithms and assumptions used to calculate energy and kW savings). Document is used to support peak demand savings bid into ISO-NE FCM
- When needed, utilities also have access to the MA, CT and VT TRMs

NH PARTICIPATION IN REGIONAL EM&V FORUM



- Leverages state EM&V funds on evaluations that are less expensive and more effective to do regionally
- Focuses on EE technologies where joint research across more utilities gets better/larger sample size (e.g., refrigeration motors, VSDs on specific applications)
- Researches emerging technologies (home energy management systems, cold climate ductless mini split heat pumps, etc.).
- Supports NH stakeholder input to M&V in ISO-NE FCM
- Builds transparency and understanding of EM&V
- Supports sharing EM&V data/info with other states
- NH Participation and Leadership on EM&V Forum –
 - Commissioner Bob Scott - co-chair on Steering Committee
 - Les Stachow and utilities participate in ongoing evaluations (Mary Downes, Eric Stanley, Carol Woods, Tom Belair)

PRESENTATION OVERVIEW



1. EM&V Basics
2. NH EM&V regulatory process
3. EM&V processes, guidance, plans and frameworks in other states
4. Regional EM&V Forum

EM&V PROCESSES IN OTHER STATES IN REGION

(A Sample)



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 includes three-year EM&V budget cap of nearly \$70m
 - 2016-18 Plan (draft): S/T and L/T strategic evaluation issues, key questions, cross cutting issues: [2016-18 Evaluation Plan](#)
- Under the EM&V framework, all studies are:
 - Statewide, but 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
- EM&V framework - if consensus can't be reached, authority for decision-making resides with EEAC or its designee - 100% issues resolved to date
- See [2013-14 Evaluation Plan](#)

SUMMARY – STATE PRACTICES



EE savings are used for many different purposes

- state reporting – progress towards goals
- FCM reporting,
- federal reporting via EIA
- Clean Power Plan (for some states)

EM&V frameworks, EM&V plans, savings assumptions (TRMs), 3rd party review of evaluations, transparency and protocols - collectively help to guide evaluation process and ensure credibility of reported EE savings

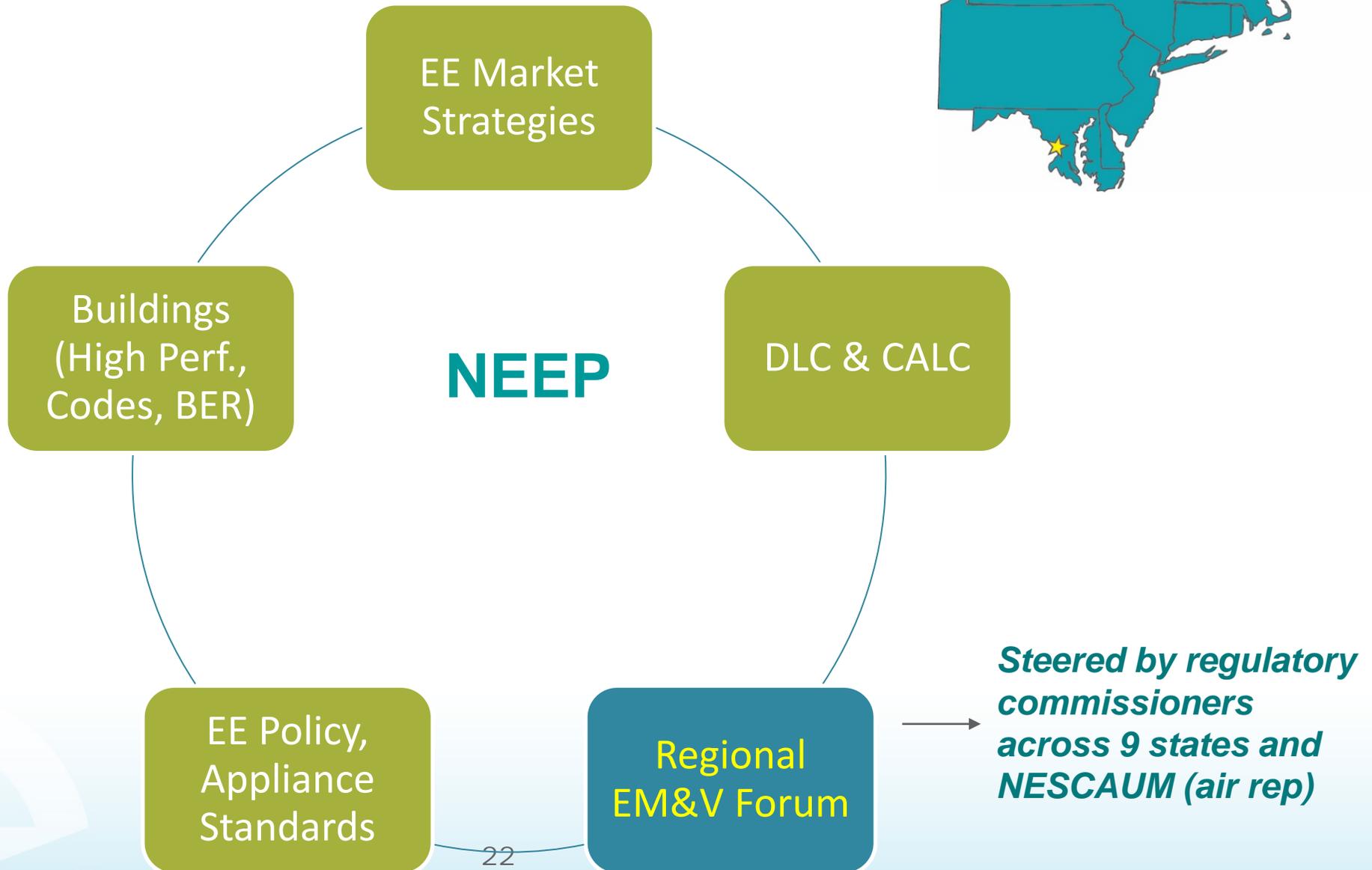
PRESENTATION OVERVIEW



1. EM&V Basics
2. NH EM&V regulatory process
3. EM&V processes, guidance, plans and frameworks in other states
4. Regional EM&V Forum

ABOUT NEEP

Regional EM&V Forum



REGIONAL EM&V FORUM

Key Resources



- 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 EM&V Forum: [Standardized EM&V Methods Reporting Forms](#) *
- Regional EE Database: <http://www.neep.org/initiatives/emv-forum/regional-energy-efficiency-database>

Current Research and Guidance – forthcoming...

Net Savings Guidelines; Changing EM&V Paradigm

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

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 [Metering Data Collection Protocols](#)
- New York State [Process Evaluation Protocols](#)

SUMMARY – REGIONAL EM&V FORUM



Regional EM&V Forum helps states by:

- Bringing New England (and other Northeast state) utilities perspective to the federal level (on EM&V protocols)
- Facilitating EM&V initiatives with utilities at ISO-NE (FCM)
- Facilitating learning and dialog on overarching issues across states (Cost-Effectiveness Screening Guidelines)
- Identifying, prioritizing and implementing regional evaluations that leverages EM&V funding across states
- Looking forward to new opportunities (“big data” evaluations)



THANK YOU!

QUESTIONS?

Julie Michals: jmichals@neep.org
Director, Regional EM&V Forum

Northeast Energy Efficiency Partnerships, Inc.
Lexington MA