



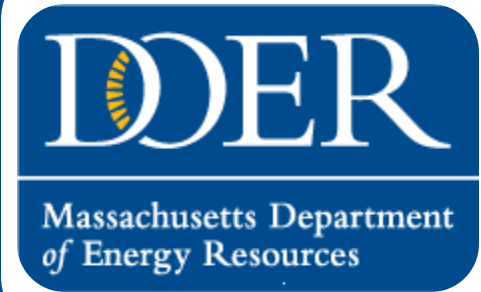
# Evaluation, Measurement, and Verification of Energy Efficiency Programs

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Tennessee

May 10, 2016



# Massachusetts – Energy Efficiency and EM&V

**Arah Schuur**

**Massachusetts Department of Energy Resources**

**DOE Better Buildings Summit**

**May 10, 2016**

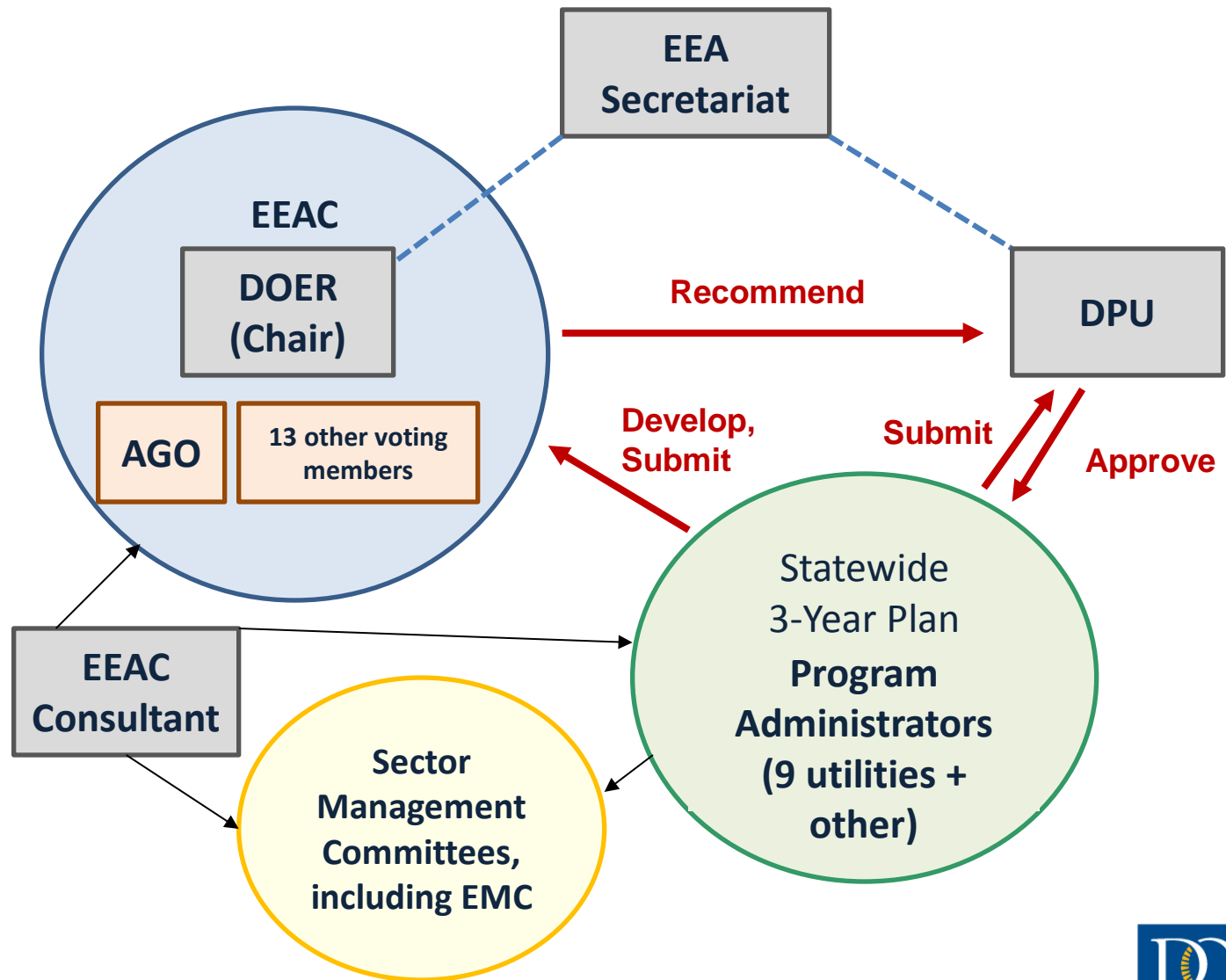


# Policy Framework for EE in Massachusetts



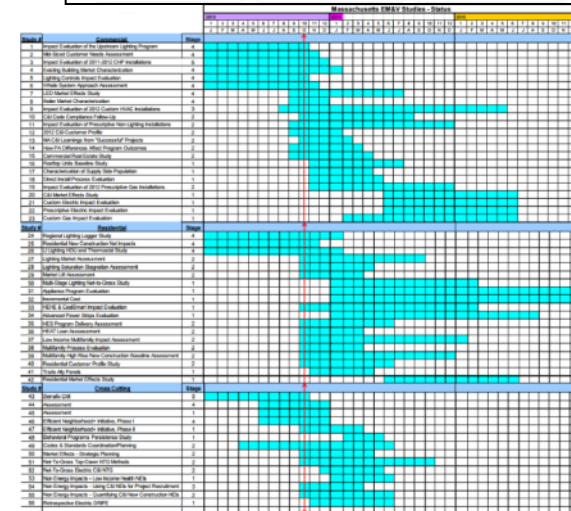
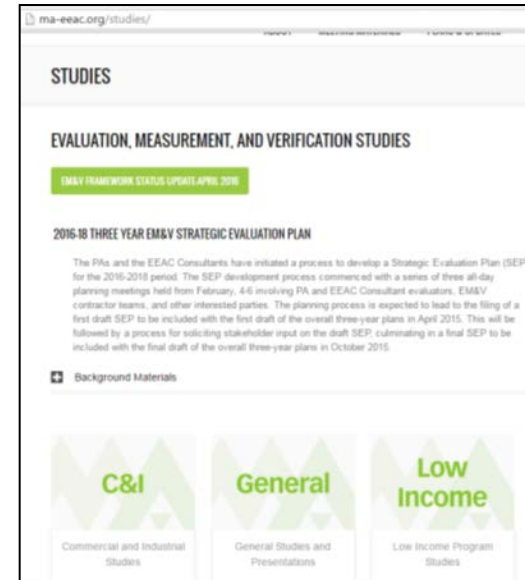
- State law requires pursuing “all cost-effective energy efficiency”
- Utilities / Program Administrators coordinate on statewide EE plans under single brand: Mass Save®
- Utilities develop 3-year plans that are approved by Department of Public Utilities
- Input into planning and execution of 3-year plans overseen by Energy Efficiency Advisory Council (EEAC), a broad stakeholder body chaired by DOER

# EE Structure in Massachusetts



# EM&V Structure in MA

- 2016-2018 Strategic Evaluation Plan included in Three-Year Plan
- 2016 Budget: \$816m - \$24m for EM&V
- Evaluation Management Committee
  - Reps from each PA, EEAC consultant
  - Collaborative approach
- EM&V Consultants are selected by PAs in periodic statewide sector-specific competitive bid process
- Evaluations are done on a statewide, not PA-by-PA basis (although results may provide PA-specific impact factors)
- Results are reviewed by DOER, EEAC Consultants, EEAC and PAs



# EM&V in MA: What's Working

- Stable, mature framework, structure and budgets
- Evaluation Management Committee: collaborative process but decision-making authority held by the EEAC consultants (on behalf of the EEAC)
- Three year cycle allows for look-ahead planning
- Rigorous
  - Multiple types of studies, using various methodologies providing information used in many ways (not just gross impact evaluation)
  - Evaluation results applied both prospectively and looking back
- Continuous improvement
  - EM&V more integrated with the implementation of energy efficiency
  - EM&V proactively responding to changing policy environment

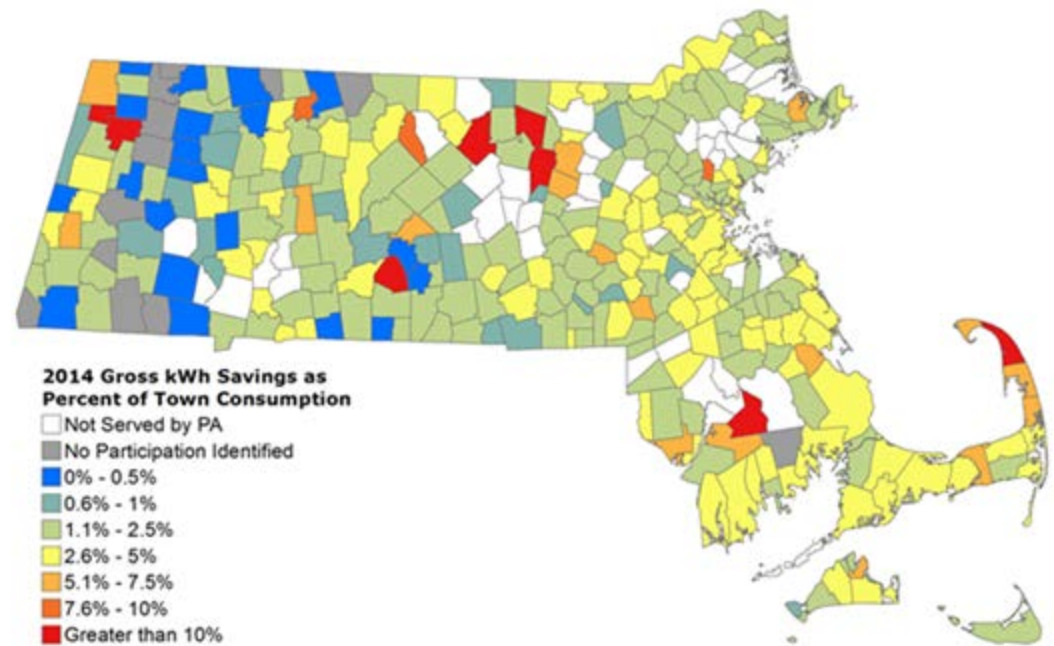
MA EM&V program regularly leads the country in conference papers and other refereed publications

# EM&V in MA: Innovation

- Study areas: residential, C&I, cross-cutting
  - Cross-cutting: innovative or overarching studies that cut across sectors (example – lighting)
  - Non-energy benefits, market effects
  - Adapting to new measures/goals – demand response
- Methods
  - Top-down modeling – using econometric methods to determine program impacts
  - Customer profile studies
  - New technologies (NILM)

# Example: Customer Profile Studies

- Sector status reports that identify underserved segments or measures, assess impact of different program delivery methods
- Example: mid-size C&I
- Important big picture perspective on programs
- Creates sample groups for other studies





# Regional Activities

- Technical Resource Manual (TRM) & (soon) Technical Reference Library
- Avoided Energy Supply Costs
  - Multi-state avoided cost study
  - Model simulates New England wholesale & capacity markets to determine “base case”
  - Base case used to quantify value of efficiency
- Contributor to regional and national efforts
  - NEEP Regional Energy Efficiency Database (REED)
  - National Efforts



# Challenges

Ours are common EM&V challenges:

- Significant lag time
  - Evaluated results come years after activities
  - Outdated or draft results used in decision-making
- Critique of methods (for example, using self-reported data)
- No AMI infrastructure


Also -

- Cautious exploration of new ideas
- Level playing field for regional / national efforts




# Questions?

# Thank You!



**In Partnership With**  
Georgia Environmental Finance Authority (GEFA)  
Kentucky Department for Energy Development and  
Independence (DEDI)  
National Association of State Energy Officials (NASEO)  
Clean Energy Solutions, Inc. (CESI)  
Southeast Energy Efficiency Alliance (SEEA)  
National Association of Clean Air Agencies (NACAA)  
National Association of Energy Services Companies (NAESCO)



Virginia Department of Mines, Minerals, and Energy

# “MEASURES”



Developing Consistency in EM&V Approaches and Emissions Reduction Calculations for  
Energy Savings Performance Contracting Programs



# Goals of the **MEASURES** Project



**EXPECTED OUTCOME:** Increased value, visibility, and utility of ESPC investments. 



# Why ESPCs?

Facility Improvements  
Cost Savings  
Emissions Reductions

# EM&V Credibility

**Must be established to the satisfaction of:**

- Customers
- State Energy Offices or other oversight agencies
- Legislatures (authorizing & funding)
- Environmental Agencies, if used for air quality management
- Public Utility Commissions, if utilities are involved
- Financiers



# **Develop Consensus Approach on EM&V**

**Survey Designed & Administered, State-Specific and Cross-State Reports Generated**



# Survey Administered to ESCOs, State Agencies & Local Governments in VA, KY, and GA & Supplemented by Interviews

## Findings on EM&V in Practice

(MEASURES focuses on ESPCs)

- International Performance Measurement and Verification Protocol (IPMVP) used almost exclusively
  - Often Option A; sometimes others
- FEMP M&V Guidelines sometimes but still prefer IPMVP
- Some states require IPMVP, none require FEMP for state agency and locality ESPCs
- Uniform Methods Project not well known to ESCOs
- Varied state oversight and tracking of locality ESPCs
- Varied level of tracking of state ESPCs
- Varied tech support to agencies, localities

How many of your EM&V plans have been primarily based on (None/Some/Most/All):

- IPMVP
- FEMP
- ASHRAE
- Other

What savings to emissions reductions conversion methodologies have you used, if any? eGrid, AVERT, State-Developed Model, Other: \_\_\_\_\_)

## Sample Questions for ESCOs

# Cross-State Report

## *Summary*

- Summarizes results of three states' interviews, surveys, and review of ESPC practices
- Recommends consistent protocols and gap-filling steps (relies on IPMVP consensus)
- Clean Power Plan context: EPA Draft EM&V Guidance offers “presumptively approvable” “project-based” M&V guidance for ESPCs
- Completed before SCOTUS stay of the Clean Power Plan

## *Recommendations*

- State oversight of ESPCs to ensure consistent application of EM&V protocols.
- M&V criteria in ESCO prequalification (IPMVP, FEMP M&V, ASHRAE guides)
- Phase in annual reporting in eProjectBuilder (ePB)
- Prohibit early termination of annual M&V reporting—unless ESCO and agency/locality agree to forego the receipt of emission rate credits (ERCs) or other air quality credits/allowances
- State review of annual M&V reports to ensure consistency
- State provision of technical assistance and ongoing M&V training to agencies and localities
- Get input from air quality offices and utility regulators



## **Research** Shared Tracking System

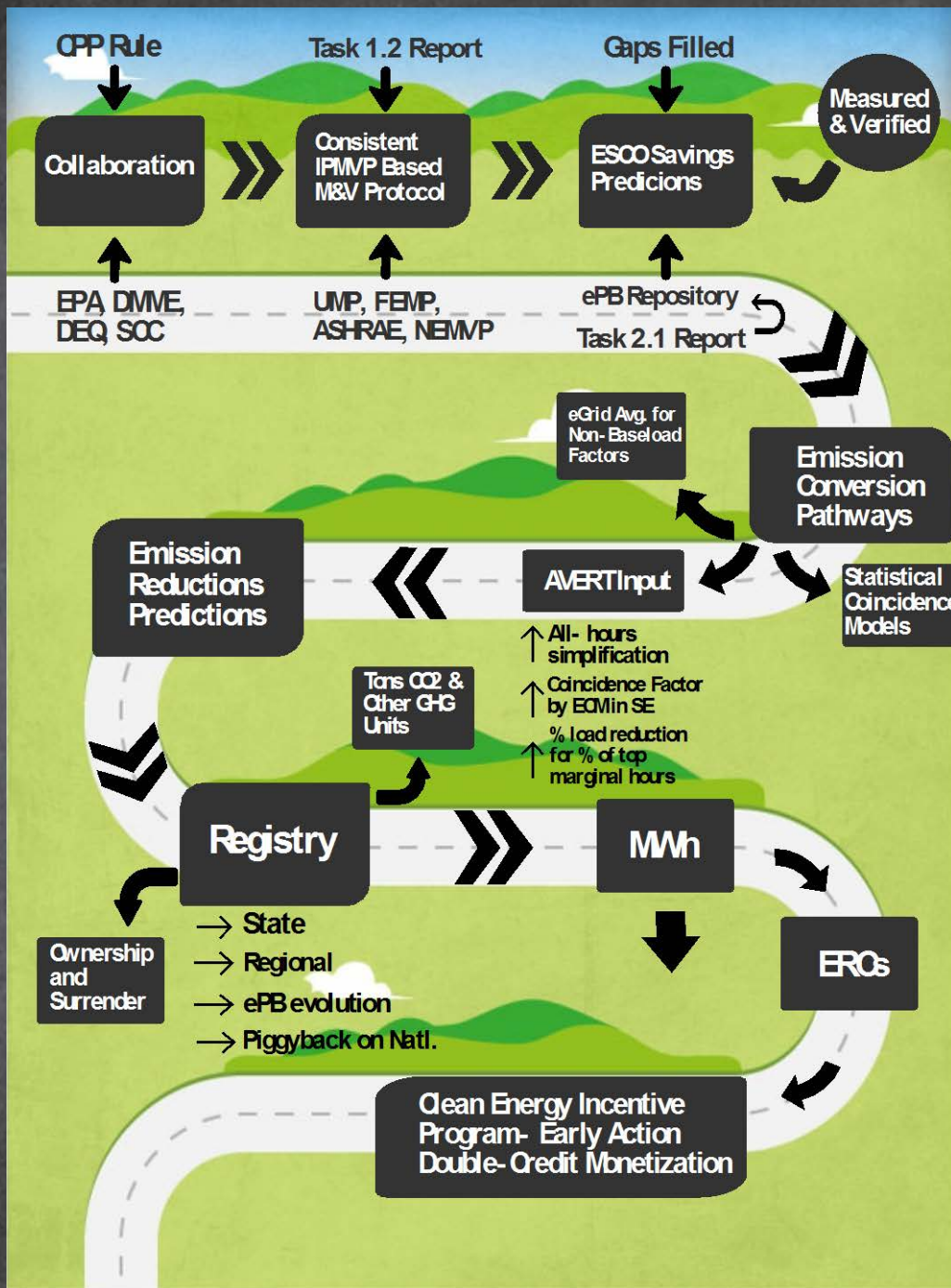
Comparison of existing systems (AVERT, eGrid), pilot of eProjectBuilder, developed white paper on registry design (“Emissions Calculation Roadmap”) 

## Avoided Emissions and generation Tool (AVERT)

- Proposed Clean Power Plan called for translating saved power into avoided CO<sub>2</sub>
- EPA eGRID provides average and average non-baseload avoidance, less accurate than incremental or marginal emissions rate
- Revised CPP does not require actual calculation of avoidance -- 1 MWh saved = 1 ERC (under rate-based compliance)
- But useful beyond CPP /CO<sub>2</sub> for criteria air pollutants
- EPA AVERT estimates incremental emissions avoidance based on historic dispatch
- Dispatch models more accurate but costly and require expertise

## eProject Builder

- Developed by Lawrence Berkeley National Laboratory (LBNL)
- ePB as an evolving platform
  - Project data repository
  - Can support ERCs, C offsets, other future values
  - MEASURES team provided significant input to development of ePB—M&V module development
  - ePB will be required in FEMP programs & state ESPC Accelerator commitments
  - Three states piloting ePB with real project data
  - Other states/localities starting to use or are interested (AR, CT, Ft. Worth...)
  - ePB can support a National Energy Efficiency Registry
  - But could be enhanced to support and improve ability to query and provide reports



# Emission Calculations Roadmap (White Paper)

States can meet several objectives by following the roadmap:

- To meet and document state and regional clean air goals or standards,
- To track ESPC investment and savings data, and benchmark performance against a national database,
- To understand when and where EGUs' generation may be displaced by ESPC impacts, which may be important to EE impact evaluations, utility and regulatory planning, and grid congestion analysis,
- To establish a basis for future trading of avoided-emission units in voluntary or potential compliance markets,
- To share with other states and DOE a consensus methodology and experience, and
- To potentially support each state's response to the Clean Power Plan (CPP), if implemented

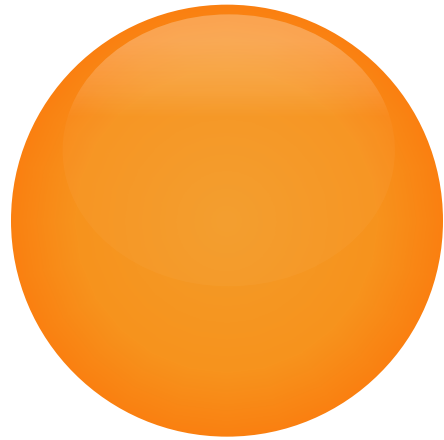


## **Set** the Stage for Improved EM&V & Tracking

Coordination with other tracking efforts, outreach to other states

# Other tools and developments

- KY has sophisticated database of energy usage in government facilities
- VA has developed in-house baseline and post-use tracking sheets
- TN is leading a six-state effort to develop a national energy efficiency registry (NEER)
- Tracking other regional EM&V efforts:
  - KY EM&V project
  - VA State Corporation Commission seeking EM&V input
  - AR tech reference manual (TRM) adopted by MS, LA; MO developing own



## **Next Steps**





# eProject Builder

- LBNL is offering training and assistance to states with initial entries
- ePB value could be improved by supporting queries and reporting
- Value proposition of ePB may be difficult for jurisdictions with few ESPCs
- M&V module is new & not yet populated - could be useful for registry, CPP

# Engage Environmental Regulators

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- CPP
  - Stay impact
- EE can help address other air pollutants (CSAPR, O<sub>3</sub> standard, regional haze)
  - Modest history, significant potential
- Other environmental impacts (energy-water nexus, wastes)
- Need to strengthen engagement of air quality regulators



# EM&V is **Changing**

Information and communications technologies can allow better monitoring, control and management.

- » Smart meters
- » Building EMSs and dashboards
- » Data analytics
- » Smart equipment and intelligent efficiency
- » Internet of Things



Active facility management, ongoing commissioning  
versus

Discrete M&V and commissioning functions



**Thank You!**





Department of  
**Environment &  
Conservation**

**U.S. DOE**

**2016 Better Buildings Summit**



# NEER

NATIONAL ENERGY  
EFFICIENCY REGISTRY



TN

# About the NEER

- A national web-based platform that will allow states to transparently track energy efficiency
- Policy neutral
- Built on best practice
  - Registry design
  - EE accounting and reporting protocols
- Will support both state energy and environmental programs *and* private sector efforts

# Benefits States & Private Sector

- **Ease administrative costs and reporting version associated with state energy efficiency programs**
  - **State administration**
  - **EE provider application**
- **Streamline energy efficiency project EM&V**
- **Avoids double counting of energy savings**
- **Create greater transparency of energy efficiency programs and impacts**
- **Provide consistent, robust framework for EE as an “eligible resource”**



# NEER Development Elements

States Initiative on  
Principles and  
Governance

Policy & Integration  
Working Groups

**NEER**  
NATIONAL ENERGY  
EFFICIENCY REGISTRY

Committee to Draft  
Functional Requirements

Development and  
Implementation

# State Initiative on Principles & Governance

**Two-year initiative to define:**

- **NEER principles and operating rules**
  - **Multi-stakeholder working group**
- **Roadmap for state adoption and implementation**
- **Key functional platform components**

# State Initiative on Principles & Governance

- Funded through U.S. DOE 2015 State Energy Program Award to Tennessee
- Project partners:



# State Initiative on Principles & Governance

Supporting project partners:



The Climate Registry



Additional project support provided by:



# NEER 2015 U.S. DOE SEP Competitive Project: Who's Who

## Steering / Advisory Committee

### Project Team

#### GEORGIA:

- David Gipson\*, Georgia Environmental Finance Authority
- Kristofor Anderson\*, Georgia Environmental Finance Authority

#### MICHIGAN:

- Robert Jackson\*, Michigan Agency for Energy, Michigan Energy Office
- Matthew Thomas\*, Michigan Agency for Energy, Michigan Energy Office
- Vince Hellwig, Michigan Agency for Energy, Air Quality Initiatives
- Rob Ozar, Michigan Public Service Commission

#### MINNESOTA:

- Jessica Burdette\*, Minnesota Department of Commerce
- Anne Jackson, Minnesota Pollution Control Agency

#### OREGON:

- Jessica Shipley\*, Oregon Department of Energy
- Philip Carver, Oregon Department of Energy
- JP Batmale, Oregon Public Utility Commission
- Colin McConaha, Oregon Department of Environmental Quality

#### PENNSYLVANIA:

- Dennis Maloskey\*, Governor's Green Government Council
- Kerry Campbell\*, Pennsylvania Department of Environmental Protection, Division of Energy Policy & Tech Deployment
- David Althoff, Pennsylvania Department of Environmental Protection, Pollution Prevention and Energy Assistance Office

#### TENNESSEE:

- Molly Cripps\*, Tennessee Department of Environment and Conservation (TDEC), Office of Energy Programs (OEP)
- Kendra Abkowitz, TDEC Office of Policy and Planning

#### NATIONAL ASSOCIATION OF STATE ENERGY OFFICIALS (NASEO):

- David Terry\*, Fred Hoover\*, Rodney Sobin\*, Stephen Goss\*

#### THE CLIMATE REGISTRY (TCR):

- David Rosenheim\*, Peggy Kellen\*, Jenna Brns\*

### Additional Members

- Mike Li, U.S. Department of Energy
- Frank Rapley, Tennessee Valley Authority (TVA)
- Emily Fisher, Edison Electric Institute (EEI)
- Ashley Duckman, American Gas Association (AGA)
- Robert "Bob" Jagusch, Minnesota Municipal Utilities Association, member of American Public Power Association (APPA)
- Keith Dennis, Nat'l Rural Electric Cooperative Association (NRECA)
- Ken Schuyler, PJM
- Tim Woolf, Synapse Energy Economics
- Malcolm Woolf & Matt Stanberry, Advanced Energy Economy (AEE)
- Ted Michaels, AJW
- Mike Myser, Energy Platforms
- Kate Zyla, Georgetown Climate Center
- Ari Peskoe & Kate Konschnik, Harvard Law School / Environmental Policy Initiative
- Jeff Genzer, NASEO General Counsel\* \*
- Lars Kvale, APX\* \*
- Pat Stanton & Audrey Starkebaum, E4theFuture\* \*

\* = Primary Project Team Members

\*\* = Key Contributors (Cost Share/Subcontractors for a Project Team Member)

### U.S. DOE Project Officer:

Amy Kidd, EERE

### Project Team Internal Support

- Alexa Voytek, TDEC OEP
- Shemika Spencer, NASEO
- Donna Brown, NASEO
- Kari Moeller, Minnesota Department of Commerce
- Anthony Fryer, Minnesota Department of Commerce

# State Initiative on Principles & Governance

## Timeline

- **March 9, 2016**
  - Webinar for potential stakeholders
- **April 14, 2016**
  - Kickoff webinar for stakeholder working group
- **June 2016 – Jan 2017**
  - Stakeholder working group to draft principles and operating rules
- **Apr - May 2017**
  - Public comment period for draft principles and rules
- **Sep 2017**
  - Final Roadmap for state adoption and implementation
- **Oct 2017**
  - Key functional platform requirements

# Sample Key Issues for Stakeholders

- **How can the NEER prevent double counting across different energy efficiency implementation approaches?**
- **What denomination and units should credits be issued in?**
- **How often should certificates be created?**
- **How can the NEER coordinate with other existing registries?**
- **How should banking and multi-year reporting periods be supported?**

# NEER

NATIONAL ENERGY  
EFFICIENCY REGISTRY

**NEER is a unique opportunity to provide input into new tools that will advance energy efficiency in the US!**



# Thank you!

For more information, please contact:

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