The Need for and Approaches to Developing Common Protocols to Measure, Track, and Report Energy Efficiency Savings in the Northeast

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ABSTRACT

Policymakers and utility and air regulators in the Northeast are increasingly turning to energy efficiency (EE) as a least-cost resource and strategy to address multiple policy objectives including: mitigating rising energy costs; meeting resource adequacy needs; increasing fuel diversity to ensure greater energy security and reliability; and reducing greenhouse gas emissions to achieve climate change goals. As such, there is an increased need to ensure that the measurement and verification (M&V) and reporting of savings from EE investments are:

- Reasonable and defensible, providing sufficient credibility and certainty;
- Transparent, based on documented sources; and
- Consistent, so that savings can be tracked and readily aggregated.

Currently, Northeast states measure, value and report electric EE program savings according to frameworks approved by their respective regulatory commissions. While these frameworks have met program needs to date, common protocols are necessary if EE is to be treated as a resource to meet regional policy goals.

This paper summarizes the policy needs for developing common protocols in the Northeast and the inconsistencies among the existing M&V protocols in the Northeast. Conclusions and recommendations are informed by experience with regional M&V protocols in other states/regions of the country.

The Need for Common M&V and Reporting Protocols in the Northeast

Energy efficiency is a high value resource that can play a significant role in helping meet the Northeast states' energy, economic and environmental goals. In New England alone, the remaining potential for cost-effective savings is estimated at 17,100 GWH in energy savings and 4,310 MW in demand savings by 2008, and a total of 34,375 GWH in energy savings and 8,380 MW in demand reduction through 2013 (Optimal Energy, Inc.). With an average cost of 3 to 4 cents per kWh, saving electricity is more than 65 percent cheaper than the cost to supply it. Energy efficiency is a key strategy to help the Northeast states offset energy and demand growth, lower historically high energy costs and projected supply shortages, and reduce carbon emissions.

Current EE strategies (system-benefits charge (SBC) funded programs, building energy code upgrades, and the adoption of high efficiency appliance standards) capture about 20 percent of the economically achievable EE potential in the region. To capture more of the EE potential, policies and strategies are needed that treat EE as a resource in the context of key energy system and environmental frameworks. *The success of such strategies may depend on creating a common currency for savings that is credible and transparent.* Developing common M&V and reporting protocols for EE savings would help to:

1. **Integrate EE into resource procurement and system planning processes.** Developing consistent protocols in the region would help assess EE as a resource on a comparable basis through such frameworks as: (a) regional wholesale capacity and energy markets; (b) clean energy or EE portfolio standards; and (c) portfolio management.[1] The most significant and immediate need for developing common M&V protocols is in New England, where the recently proposed negotiated settlement to establish a forward capacity market in the region includes a provision that allows demand resources to qualify for capacity payments, both during a transition period and forward auction market beginning in 2007.[2] During April-August 2006, a working group facilitated by the Independent System Operator (ISO) New England will be developing proposed rules and operational procedures to define qualifying energy efficiency resources and establish acceptable M&V rules.[3]

Energy efficiency portfolio standards (EEPS) have been adopted in Connecticut and Pennsylvania and are under consideration or proposed in New Jersey, Rhode Island and Maine. In other parts of the country, portfolio standards have been adopted in California, Illinois, Nevada, Texas and Hawaii.[4] An EEPS establishes efficiency savings goals as either a percent of forecasted load growth or total sales, or simply total kWh savings. Consistent M&V protocols for the region are needed if the impacts of EEPS are going to be effectively integrated into regional capacity/energy markets and into system planning processes. Not only do common protocols make sense within a single power pool (e.g., New England), but protocols across the three power pools in the Northeast will ensure consistency when modeling interchange and trade between independent system operators.

2. **Serve as the basis for consistently tracking and reporting emissions reductions associated with EE investments in the region.** As the participating Northeast states develop a carbon cap and trade system under the Regional Greenhouse Gas Initiative (RGGI), consistent and transparent M&V protocols for energy savings are a necessary element of being able to track and report emissions reductions associated with EE investments that are funded through the initial sale of carbon allowances.[5] Common protocols would also help measure the effectiveness of EE investments in meeting state and regional climate change and other pollutant reduction goals on a comparable basis.

3. **Assess the impact of EE on reducing natural gas demand for electric power generation.** Energy efficiency can play a significant role in reducing forecasted natural gas demand in the region.[6] Common protocols for EE savings will help policymakers, system planners and other modelers determine the current and potential impact that EE savings can have in reducing the demand for natural gas supplies in the region.

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[1] Portfolio management approaches have been adopted in California, Montana, Arizona and Arkansas.

[2] Demand resources include real-time demand response, energy efficiency and distributed generation, and load shifting.

[3] This Other Demand Resources (ODR) working group is focusing on EE and distributed generation resources. Other groups are addressing Real-time Demand Response and Intermittent Resources.

[4] For more information on EEPS, see EPA's Guide to Action at http://www.epa.gov/cleanenergy/pdf/gta/guide_action_chap4_s1.pdf, and ACEEE's paper on the topic at http://aceee.org/pubs/e063.pdf?CFID=2418471&CFTOKEN=39548081.

[5] Under the RGGI Memorandum of Understanding (MOU), each state agrees to allocate 25 percent of the proceeds from the initial sale of carbon allowances for a customer benefit or strategic energy purpose, which can include promoting energy efficiency. See http://www.rggi.org/docs/mou_12_20_05.pdf.

[6] NEEP estimates that energy efficiency investments in the New England region can reduce power plant natural gas demand by between 7 and 45 percent by 2013, depending on how much of the region's economically achievable EE potential is captured (Optimal Energy, Inc.).

4. **Improve regional EE modeling and forecasting.** Common protocols would benefit various regional modeling efforts, including regional climate change modeling and EE potential studies, which require the need to consistently characterize EE projects not only in terms of savings and costs but also in terms of how EE savings assumptions are likely to change in the future. Regional modeling efforts include the NE-MARKAL model developed by the Northeast States for Coordinated Air Use Management; and the IPM model used to model the carbon cap under the Regional Greenhouse Gas Initiative.

Review of Current M&V and Reporting Protocols in the Northeast

NEEP conducted informal interviews with program evaluators and researched existing M&V documents to assess whether M&V and reporting protocols in the Northeast meet criteria necessary to ensure that EE savings can be relied upon for specific policy needs. These criteria include ensuring that EE savings are: reasonable and defensible, provide sufficient credibility, accuracy, and certainty; transparent, based on documented sources that are readily available; and consistent, in terms of reporting requirements so that savings can be tracked and aggregated on a comparable basis.[7]

NEEP's analysis focused on: 1) the level of transparency in existing protocols; 2) the commonalities and differences in existing protocols; 3) reporting requirements across the states; and 4) the economic frameworks used to determine the value of EE programs. The key findings were as follows:

1. **The transparency of M&V protocols varies from state to state in the region.** Most Northeast states rely on a long history of accepted practice and approved savings by their respective regulatory commissions as the basis for how they measure and verify their energy efficiency program savings. A few states in the Northeast (Vermont, New Jersey and most recently, Connecticut)[8] have formally documented the formulas and standard input assumptions used to calculate energy and demand savings in a technical reference manual or equivalent, providing some level of transparency. These documents, however, do not include any verification protocols (i.e., specifying a required verification methodology or level of rigor).

In Massachusetts, Rhode Island, and New Hampshire no formal M&V protocols documents exist. Rather, savings calculations and verification methodologies are typically found in evaluation studies, and thereby are not as readily transparent.

The New York State Energy Research and Development Authority (NYSERDA) relies on the International Performance Measurement and Verification Protocol (IPMVP) for its commercial and industrial performance programs; it uses various field verification methods for its other programs. NYSERDA has a systematic evaluation and review process of its EE programs, where the frequency and level of rigor of evaluation depends on the size of the program budget, reported kWh and kW savings, and internal priorities.

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[7] These criteria are based on: "*Building From First Principles of Good Energy Modeling."* Ken Colburn, Executive Director of Northeast States for Coordinated Air Use Management (NESCAUM). Presented at: Northeast Energy Efficiency Partnerships, Inc. 2004 Conference on "Energy Efficiency: Policy and Applied Policy" on November 17-18 in Waltham, MA. http://bronze.nescaum.org/committees/modeling/Colburn.ppt. Draft paper in progress.

[8] Descriptions of verification or evaluation methods are described in the impact evaluations directly. See Vermont's Technical Reference Manual, New Jersey's Protocols to Measure Resource Savings, and Connecticut's 2006 Program Savings Documentation. Because these states have formal documents that are readily available, these states were largely used to more closely compare the consistency in algorithms and input assumptions.

In Maine, no program evaluations have yet been performed given Efficiency Maine's relatively new portfolio of programs. However, in a recent order, the Maine Public Utilities Commission requires that Efficiency Maine's portfolio of programs be evaluated over a four-year period (Docket 2005-446). The details of such evaluations have yet to be determined.

2. **Important differences exist in M&V protocols across the states.** Based on its review, NEEP found that a) baseline conditions are not always consistently defined when estimating savings; b) states use similar algorithms to calculate *gross* savings, but the calculation of *net* savings differs; c) stipulated/deemed savings estimates and standard input assumptions can vary significantly; and d) while evaluation methods used to verify initial savings estimates are similar, consistency in the level of rigor of the evaluations is unclear.

a) Inconsistencies in baseline assumptions: Important to estimating energy savings in the region is to have consistent – not necessarily uniform – baseline data. Currently, baselines in the Northeast are developed as part of evaluations and are updated on an as-needed basis, as evaluation budgets permit and/or as states update their building energy codes. The baseline definition or condition used as the basis for calculating EE savings can depend on the type of program or measure, and can vary by state. For some programs, like *new construction or major renovation*, the baseline is typically defined as standard practice (i.e., the state's current building energy code or common practice where common practice leads to a more energy efficient result than code). In this case, the baseline can vary from state to state depending on what energy code is in place and the maturity of EE program efforts and their effect on typical practice in the area.

For retrofit programs, the baseline is sometimes the measure that is being replaced, such as in the case of residential lighting where an incandescent bulb is the measure being replaced by a compact fluorescent bulb. In the case of *early replacement or retirement* measures and/or programs, some states define the baseline as either: a) the existing measure or technology (New York[9], Vermont); b) standard practice or what is required under the state's building energy code (New Jersey); or c) a blend of existing technology and current standard practice/code (Massachusetts, Connecticut), which accounts for "baseline shift."[10] For example, in the case of C&I prescriptive lighting, the baseline used in different states is a standard T-12 ballast (existing equipment), a T-8 ballast (the current standard), or a combination of both. In cases where baseline shift is not consistently accounted for, the savings reported could be overstated.

Given that the largest potential for additional EE savings in the region lies in the early-retirement retrofit market for C&I prescriptive and custom projects, it is important to ensure consistency in how baselines are defined, otherwise, this may result in systematically over- or under-counting savings.

b) States calculate net savings differently: M&V protocols typically make the distinction between *gross* and *net* energy and demand savings from EE programs.[11] NEEP compared gross savings algorithms used to calculate selected measures in a sample of states and found that they

[9] NYSERDA is beginning a research project in 2005 to determine how long to take credit for the first year's savings by determining how early was the early replacement.

[10] Baseline shift addresses the issue of whether a measure being replaced still has a significant amount of useful life remaining or it is near the end of its useful life and therefore would have been replaced by a standard efficiency measure anyway.

[11] Gross savings quantify the estimated change in energy consumption and/or demand that results directly from EE program-related actions taken by participants in the program, regardless of why they participated. Through evaluations and other studies or assumptions, gross savings are adjusted to determine net savings, which reflect only savings that can be attributed to the EE program. Net savings are used for the purposes of measuring program cost-effectiveness and awarding program administrators for performance.

are largely similar, although they can be difficult to compare due to differences in terminology. The most important distinction among states is that they have different rules on what adjustments are applied to gross savings to calculate net savings, where some states apply a number of adjustments or a combination of them, and to differing degrees. In particularly, NEEP looked at adjustments associated with market effects (e.g., non-participant and participant spillover effect, free-ridership) and persistence rates, as provided in Table 1. [12]

Table 1. Summary of Spillover, Free-Ridership and Persistence Adjustments

State	Spillover		Free-Ridership	Persistence and Retention
	Participant	Non-Participant		
CT	Yes	Yes	Yes	Yes
ME	No	No	No	No
MA	Yes	Yes	Yes	Yes
NH	Yes	Yes	No	Yes
NJ	No	No	No	Yes
NY	Yes	Yes	Yes	Yes*
RI	Yes	No	No	Yes
VT	No	Yes	Yes	Yes*

** Persistence is sometimes captured in the assumed measure life.*

Market Effects: NEEP found that states vary in what market effects adjustments are made to gross savings, as shown in Table 1. Six of the eight states include some form of spillover effect, while four states include free-ridership. Some states include net market effects (i.e., the difference between spillover and free-ridership) in their reported energy and demand savings, while others include them only in their cost-effectiveness analyses. Market effects are typically informed by market characterizations, market assessments, and attribution studies (e.g., spillover or free-ridership studies).[13] However, there are no consistent protocols in the Northeast for how market effects are determined. Common protocols would help to ensure that as states show increased adoption of ENERGY STAR® products, they can consistently report what part of the market change – and the associated impacts – was induced by their energy efficiency programs.

Persistence or Retention Rates: Some states apply an explicit persistence or retention factor[14] as part of a net savings algorithm; in other states, "persistence" is captured in the assumed measure life and therefore may not be readily transparent. Importantly, where states do account for most or all net-to-gross adjustments, the frequency of studies used to estimate

[12] Participant spillover refers to the additional EE actions that program participants take outside a program as a result of having participated in the program. non-participant spillover refers to EE actions by non-participants as a result of a program. Free-ridership refers to savings from EE actions of participants who adopted a particular efficiency measure or practice but would have done so anyway absent the EE program. Spillover is a positive adjustment to savings, while free-ridership is a negative adjustment.

[13] Market assessments track changes in markets with specific focus on market indicators that are likely to be impacted by an EE program. Market assessments use an initial market characterization as a baseline to track program/market indicators and changes in market characterization over. Attribution studies identify the impacts of the program interventions beyond what would have happened without the program.

[14] Persistence reflects whether or not an installed measure is still installed (measure retention) over the anticipated lifetime of the measure; it can take into account changes in how the measure is used and how savings may change over time due to technology degradation.

spillover, free-ridership and persistence can vary from state to state. Especially in the case of persistence, anecdotal information suggests that there is a wide range of variation in the extent to which program administrators account for this factor.

c) Stipulated or deemed savings estimates and standard input assumptions can vary significantly. While the purpose of this project was primarily to address the issue of consistency and differences in M&V methodologies, NEEP also looked at stipulated or deemed savings values for similar standard prescriptive measures. As with other M&V terms, the definition of stipulated or deemed savings, also known as standard or default savings, varied somewhat depending on the source.[15] NEEP found that deemed savings for similar measures vary across the Northeast considerably. For example, deemed savings values for residential lighting (compact fluorescents or CFLs) range from 38 kWh/yr to 95 kWh/yr. This wide range may be due to different assumptions about the average CFL wattage, or significant variations in standard input assumptions (e.g., measure life, hours of use). Variations in deemed savings values for other measures could also be due to different assumptions or different program strategies.

Variations in deemed savings value point to the need for greater transparency in assumptions, and potentially the need for a central, regional database that documents input assumptions used to calculate savings for common measures, similar to databases developed in California and the Northwest. [16]

d) Evaluation methods used to verify initial savings estimates are similar; however, the level of rigor of the evaluations varies across the states. Various M&V methods exist to collect and analyze gross savings data based on the type of program, cost, precision and uncertainty. In the Northeast, the type of M&V method used depends on the program and the available budget. In some states (CT, MA, NH, NY and RI), these decisions are largely informed by program administrators in conjunction with a state collaborative process. In other states, regulatory oversight or guidance dictates the level and frequency of evaluations (NJ, VT and ME).

M&V methods typically include agreed-upon stipulations, engineering calculations, metering and monitoring, utility meter billing analysis, and computer simulations. NEEP reviewed the methods used for a sample of measures in several states, and found differences in the approaches used to estimate and verify EE savings. For ease of comparison, NEEP compared the states' methods relative to the IPMVP. The IPMVP is a flexible M&V guideline that offers a range of M&V approaches. It is the accepted industry standard used by merchant energy service companies (ESCOs) for performance contracting projects, and is widely used throughout the U.S. and around the world. It is increasingly being used or recommended in a number of states as the M&V guideline for EE savings to support portfolio standards and carbon reduction programs.

The IPMVP is based on a scale of options A-D: Option A - stipulated baseline and savings using verified equipment performance (e.g., watts, kW/ton); Option B - measured and/or stipulated baseline, verified performance by estimating tool calibrated with end-use data; Option C - comparison of similar buildings with and without energy conservation measures using whole

[15] Deemed savings are typically agreed upon savings values by at least one but often more stakeholder organizations associated with the use of the values. For existing measures, deemed savings are based on engineering estimates and/or past studies, and are typically adjusted periodically as new evaluations are conducted. For new measures, deemed savings are often based on best engineering data or professional opinion.

[16] A central database for common savings assumptions is used in California as part of the Database for Energy Efficiency Resources (DEER), as well as in the Northwest, where the Regional Technical Forum (RTF) maintains a database on common default savings and input assumptions.

building data (hourly or monthly) using utility billing analysis; Option D: stipulated baseline, verified performance using simulation model calibrated with whole building data.

NEEP found that for standard prescriptive measures (e.g., residential lighting), all states use stipulated or deemed savings, which are partially informed by prior year evaluations or on-site measured data (the equivalent of IPMVP Option A). However, some states' (CT, MA) evaluation methods may be equivalent to IPMVP Options B or C in years when evaluations are performed. These same findings apply to prescriptive measures that have some variation in input values (e.g., commercial lighting). In the case of custom projects, evaluation methods range from Option A to Option C, although Option B is used by all the surveyed states in some capacity.

Table 2. M&V Methods Used in a Sample of Northeast States Relative to IPMVP

State	Evaluation/Verification Methods Used for Prescriptive and Custom Projects	IPMVP Option Equivalent (A-D)
Prescriptive measures with variations in one or more input values		
CT	On-site engineering assessments conducted on statistically selected sample of participants, including verification of measure quantity, technology, hours of operation, and subsequent engineering reanalysis.	Option B or C in measured years Option A in non-measured years
MA	On-site engineering assessments conducted on statistically selected sample of participants, verification of measure quantity, technology, hours of operation, and subsequent engineering reanalysis. Billing data analysis, lighting logger studies.	Options A, B and C
NJ	Measurement of key variables through end use metering data accumulated from a large sample of participating facilities from 1995 through 1999	Option A
NY	On-site engineering assessments conducted on statistically selected sample of participants, including verification of measure quantity, technology, hours of operation, and subsequent engineering reanalysis.	Option A
VT	On-site engineering assessments conducted on statistically selected sample of participants	Option A
Custom/site specific measures (e.g., comprehensive/complex projects)		
CT	Site specific analysis including on site visits and specific input values and/or engineering algorithms. Also supplemented with some spot or end-use metering.	Option B or C
MA	On -site specific metering, simulation and/or engineering analysis.	Option B, C or D
NJ	Site specific analysis either in number of site-specific input values or in use of special engineering algorithms	Option A or B
NY	On-site visits, database reviews, participant surveys, reviewing technical assistance studies for accuracy.	Option B
VT	Site specific analysis either in number of site-specific input values or in use of special engineering algorithms	Option A or B

Comparing evaluation methods based on IPMVP provides information regarding consistency in how savings are estimated, as well as an indication of the level of rigor of the savings estimate. Other indicators include how frequently evaluations are conducted (some states conduct evaluations on an as-needed basis as budget permits, while others are more systematic) and the range of end-uses that are analyzed (e.g., multiple types of commercial lighting measures versus one or two.

3. **A Comparison of Savings Reporting Requirements.** NEEP looked at a range of issues regarding reporting requirements in the Northeast, including the following:

a) Preliminary vs. Verified Savings Data: Program administrators typically report preliminary tracking data to their regulators, and use impact evaluations to prospectively adjust algorithms and input assumptions applied to following year estimated savings. In some states, evaluation results are used to retrospectively adjust preliminary savings data (MA, NY, RI and VT); other states do not (NH, ME, CT, NJ). Because the differences in preliminary and verified data can be significant, it is important to have consistency in how savings data is ultimately

reported for the purposes of resource adequacy and system planning, as well as tracking carbon emission reductions. This would ensure that verified, and not preliminary, savings serve as the basis of calculations or analyses.

b) Generator vs. Customer Level Savings: NEEP found inconsistencies in how savings are reported in terms of generator versus customer levels and annual versus lifetime savings. For the most part, program administrators in the region report energy and demand savings to their regulators at the net customer meter level; however New Jersey and Vermont report savings at the net generator level (accounting for transmission and distribution line losses). Inconsistencies exist in terms of whether annual, lifetime and/or cumulative savings are reported. For system planning, resource adequacy and carbon emission policy purposes, reporting savings at the net generator level is appropriate.

c) Program Impact Reporting Schedules: States have different schedules for reporting program savings, as well as different levels of regulatory review and approval. For some of the ultimate purposes of regional protocols similar reporting cycles may be important. Currently, all states report savings based on a calendar year, except Maine which reports savings for the fiscal year July-June. Some states report preliminary savings data as early as February of each year while others report preliminary or evaluated savings data as late as August/September. Most states require regulatory approval of savings, although Connecticut and New York's state commissions do not formally approve reported savings. The differences in reporting schedules may be important in the context of providing data in a timely manner to inform policy efforts.

d) Projections of Future EE Savings: NEEP found that program administrators make their own assumptions about projected EE savings beyond current year program installations to inform regional system planning. As such, separate from the need for M&V protocols for installed EE savings is the need for protocols to inform and guide forecasted or projected savings. In terms of system planning, this finding is largely unique to New England, where program administrators submit forecasted demand-side management savings (including savings from EE and load management programs) to ISO-NE that are based on utility or program administrator assumptions about future investments in EE; these assumptions are not necessarily informed by policymakers. For example, somewhat arbitrary assumptions are made that SBC program funding will decline in the future or completely sunset, or simply to do not exist beyond the current year. As a result, the ISO-NE's DSM forecast in its 2005 CELT Report[17] shows that DSM savings peak in 2009 and decline thereafter. Developing common protocols to inform or guide what policy assumptions are used as the basis for EE projections may be warranted to ensure projections are reasonable.

4. **Protocols Used to Measure Program Value and Cost-Effectiveness.** Northeast states currently value electric EE program savings according to economic frameworks and assumptions approved by their respective regulatory commissions. NEEP compared how states value EE programs in terms of their avoided costs and cost per kWh. These are especially important to inform and guide policymakers and system planners on the value of EE relative to other resource options.

a) Avoided Costs. The New England states have participated in joint avoided cost studies over the years to estimate a regional avoided wholesale electricity cost to use in their cost-effectiveness analyses. The latest study recommends: a common New England avoided wholesale electricity cost; a consistent method to calculate avoided transmission and distribution

[17] See 2005 Capacity, Energy, Loads and Transmission (CELT) Plan at http://www.iso-ne.com/trans/celt/report/2005/2005_celt_report.pdf.

(T&D) costs; consistent assumptions and methodologies to measure Demand Reduction Induced Price Effects (DRIPE); and the same peak demand-costing period. New England states are in the process of reviewing these recommendations and it is not yet clear to what extent they will be adopted (ICF Consulting).

Important to valuing EE peak savings is to ensure that program administrators assume the same peak demand costing period within a power pool. In New England, a common definition is being discussed as the market rules for the ISO-NE Forward Capacity Market are being developed. In other Northeast states, this is not an issue; New Jersey utilities use PJM's seasonal avoided energy and capacity cost patterns, where the coincident peak demand savings periods are broadly defined across multiple hours and months, as opposed to a single peak hour as recommended in New England. NYSERDA defines its coincident peak demand savings period similar to New Jersey's.

b) Program Cost-Effectiveness**.** In the context of developing common protocols to ensure that EE savings are sufficiently reliable for purposes of energy system planning, resource adequacy and environmental policies, the issue of cost-effectiveness[18] as a whole is not as relevant. EE program cost-effectiveness is a screening analysis largely undertaken to determine how best to allocate dollars to different programs. However, many of the issues addressed above are important components of determining cost-effectiveness, including what adjustments are made to gross savings to calculate net savings, and how programs are valued in terms of their avoided costs. Additionally, in regions where program administrators operate in multiple states, such as in New England, consistency in cost-effectiveness requirements may be warranted.

Leveraging Experience and Resources from Other States and Regions

NEEP reviewed experiences with M&V protocols in other parts of the country to determine how the Northeast can learn from and potentially leverage experiences in these regions. In particular, NEEP looked at the Northwest Regional Technical Forum (RTF), managed by the Northwest Power and Conservation Council (NWPCC), and the California Energy Efficiency Evaluation Protocols (CEEEP).

1. **Northwest RTF:** The RTF provides a web-based forum for four states (WA, OR, ID, MT) for reporting EE savings using default protocols.[19] The protocols include gross deemed energy savings estimates, standardized calculation procedures and M&V protocols that must be used by any utility participating in any of the all Bonneville EE programs, including guidelines for addressing custom projects for use by other jurisdictions (investor-owned utilities, commissions, public benefits charge administrators). The RTF's deemed savings estimates are developed and adopted by the RTF based on a combination of engineering estimates and ex ante estimates from prior utility evaluations. The RTF has established minimum criteria that must be met before a measure's savings can be "deemed." The RTF recommends that custom projects follow the IPMVP for evaluation. While some utilities and all public benefits charge administrators may select which IPMVP option they use, utilities participating in Bonneville program must submit their M&V plans for all custom projects for review and acceptance. The

[18] Cost-effectiveness analyses typically report the present worth of benefits and costs, as well as their difference (i.e., net benefits) and their ratio for each program being screened. Benefits not only include the electricity supply costs avoided by the EE investments (as discussed earlier), but also other energy as well as non-energy benefits. Costs include the program costs and may also include the cost to the program participants.

[19] For examples of the RTF on-line forum, see http://www.nwcouncil.org/energy/rtf/Default.htm.

NWPCC receives frequent requests to modify the RTF data based on updated input assumptions or values from utility impact evaluations, which it reviews and determines whether changes to the default assumptions and M&V protocols are warranted over a six-month period.

The RTF online planning, tracking and reporting software is a flexible tool that can be easily and regularly updated, allowing for frequent adjustments based on users' petitions to update input assumptions etc. It serves as a centralized function for updating deemed savings values and evaluation protocols in the region. According to NWPCC, the RTF supporting software could be modified to meet the needs of the Northeast states if common protocols are developed, and that a modification of the existing RTF system for use in the Northeast would be significantly lower than the cost of its initial development.

Importantly, the RTF is used as a tracking tool to gage the region's progress towards its energy conservation and renewable resource goals. The NWPCC conducts reviews of the region's progress toward its goals at least every five years, which account for changes in the market; any recommended changes for improving the effectiveness of conservation and renewable resource programs are communicated to the appropriate decision-makers.

Key to the challenge of meeting carbon emission reduction goals is that the RTF software has recently been enhanced to include a module that can calculate carbon offsets associated with the energy efficiency program savings in the region. This module can forecast the carbon offset from efficiency programs over the lifetime of the measures installed.

2. **California Energy Efficiency Evaluation Protocols:** NEEP also reviewed the Draft 2005 California Energy Efficiency Evaluation Protocols (CEEEP)[20], which sets forth a series of protocols to guide the state's evaluation process for all EE programs. Of particular relevance to NEEP's report are the Impact Evaluation, Market Effects, M&V, Sampling and Uncertainty Protocols.

The Impact Evaluation Protocol is designed to prescribe the minimum allowable methods to meet a specified level of rigor that measures and documents the ex-post energy and demand impacts achieved as a result of implementing energy efficiency programs and program portfolios. *The M&V protocol* supports the Impact Evaluation Protocol, and is designed to prescribe how field measurements and data collection will be conducted to support impact evaluations, updates to ex-ante measure savings estimates, and process evaluations. All of the M&V projects conducted under the CEEEP must adhere to the IPMVP. The Impact Evaluation and M&V protocols are designed to be used together: the M&V sets forth requirements for data collection, monitoring and analysis activities associated with the calculation of gross energy and peak demand saving from individual customer sites or projects, while the Impact Evaluation protocol guides the gross and net energy impacts at the program level.

The Markets Effects protocol estimates changes in behavior due to program activities. Such programs typically involve information, education, marketing, promotion, and outreach efforts that do not have specific energy saving goals but still can create energy impacts. The protocol includes three levels of rigor (I, II, III) where Level I is the lowest (for programs that cannot be linked to energy savings but where net behavior changes need to be estimated), while Level III is the highest level of rigor. The *Sampling* and *Uncertainty* protocols address the issue of precision for the gross and net impact savings estimates and M&V options.

The Northeast could leverage information and experience from the development of the CEEEP, both in terms of defining acceptable levels of rigor for energy savings, as well as for associated market effects.

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[20] See http://www.cpuc.ca.gov/static/energy/electric/energy+efficiency/rulemaking/eeevaluation.htm

Conclusions and Recommendations

While Northeast state EE savings data have been reliable for the purposes for which they were developed, several modifications are recommended to more fully support needs related to regional energy system planning and environmental policies. These include improvements to consistency, documentation and comparability.

As the region prepares to increase investments in EE along with other clean energy resources, it is in the states' interests to establish common protocols for measuring, verifying, and reporting energy and capacity savings in a consistent and transparent manner that meets minimum requirements for rigor. Lacking this, system planners and policy makers would find it difficult to reliably incorporate EE into power system planning or reliably assess the impacts of energy efficiency policies and programs to meet energy, economic or environmental goals.

Early in 2006, NEEP recommended to New England states, New York and New Jersey that they commit to developing common M&V protocols and reporting formats for EE program/project savings, and to establish a Regional Protocols Working Group represented by state air regulators, utility regulators, electric and gas efficiency program administrators, and electric power system planners. *With the recent development at ISO-NE to establish market rules for a Forward Capacity Market and transition period, including how EE can qualify to participate in this market (i.e., receive capacity payments for peak kW savings), this has provided an immediate impetus to develop common M&V and reporting protocols in the region.* At the time of this writing, it remains unclear what the scope of this effort will entail and what will ultimately be adopted given a very tight timeframe to develop the capacity market rules. The discussions will likely involve exploring IPMVP as a guideline for evaluating and verifying savings EE projects/programs and leveraging experience from the Northwest RTF and California protocols. An underlying goal of this process will be to ensure that the development of common regional protocols be designed to fill a full range of utility and state needs so as to not require program administrators to keep multiple sets of books to document their program costs or savings.

The ISO-NE capacity market developments will help to establish common M&V and reporting protocols in New England only. This process will hopefully assist in developing common protocols across other Northeast states as well, in particular for the purposes of tracking and reporting carbon emissions associated with EE savings that will be needed as part of the RGGI framework. Such efforts will be critical to ensuring that EE plays an effective role in helping the region reduce its greenhouse gas emissions.

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