Project A3: Common Reporting Guidelines for Energy-Efficiency Savings, Costs and Emissions Impacts

FINAL REPORT July 14, 2010

Submitted to:

Northeast Energy-Efficiency Partnerships, Inc.

On Behalf of

The Regional Evaluation, Measurement, and Verification Forum

REGIONAL EVALUATION, MEASUREMENT & VERIFICATION FORUM

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Executive Summary

NMR Group, Inc. (NMR) and its subcontractors The Cadmus Group, Inc. (Cadmus) and Dorothy Conant are pleased to present this report, which provides recommendations for the development of common guidelines for reporting energy-efficiency savings, costs, emissions, and job impacts, to the Regional Evaluation Measurement & Verification Forum (the Forum).

The Forum, established in 2008, is a regional project facilitated and managed by Northeast Energy Efficiency Partnerships (NEEP) representing states in New England,[1] New York, New Jersey, Maryland, Delaware, and the District of Columbia.

The overall purpose of this study is to address a growing need and interest in consistent reporting of electric and natural gas energy-efficiency program savings, costs and emission impacts across states in the region to help inform multiple energy and environmental policies, including:

- Climate change goals and air quality emission reductions, and associated planning
- State procurement policies, energy-efficiency savings and associated economic goals
- Regional energy planning and forecasting purposes

The objective of this Project is to develop common reporting guidelines, including underlying definitions where appropriate, for jurisdictional energy-efficiency programs in order to advance the consistency of energy-efficiency reporting so that the region can benefit from a common "currency" for reporting program impacts. Another key objective of the Project is to better understand, and make recommendations with regard to, energy-efficiency data and/or processes needed to support the effective integration of energy efficiency in state and regional air quality and climate change analyses and planning.

This study began in early October of 2009, proceeding with a review of current annual energy-efficiency reports and energy-efficiency plans filed by the eleven targeted jurisdictions,[2] along with in-depth interviews and Forum participant feedback. The NMR team tabulated and analyzed information and findings to identify gaps between current and best reporting practices, as informed by Forum participants and interviews with energy-efficiency regulators, air regulators and system planners, for the following general areas:

- Electric and gas efficiency energy and demand savings
- Program expenditures
- Emission impacts
- Job impacts

The deliverables for this Project are recommendations for reporting guidelines and a sample reporting template to consider for adoption as a Forum product for state use and implementation.

[1] Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont.

[2] When available, state-wide reports and plans were reviewed. If no state-wide report was available, but all program administrators in the state use the same template to report energy-efficiency savings, at least one program administrator annual energy-efficiency report was reviewed.

The recommendations presented in this report serve as the basis for the Regional EM&V Forum Common Statewide Energy Efficiency Reporting Guidelines, which, as a separate EM&V Forum document, will continue to evolve to address further stakeholder input and needs going forward.

Findings: Summary

Some jurisdictions are currently in the process of developing their own formats for reporting statewide annual energy-efficiency program results, while other jurisdictions have invested significant time developing and implementing consistent statewide reporting guidelines/definitions and templates. Utility regulatory personnel interviewed for this Project see benefits to having consistent reporting of key energy-efficiency program impacts across multiple jurisdictions and show a willingness at least to consider making changes in what they report. Regulators from several jurisdictions say any changes in what they report would need to provide value and/or comport with current reporting practices. Also, several interviewees indicated reluctance to change their own reporting requirements if the changes:

- Required altering tracking database calculations
- Required significant additional administration time and cost
- Involved changing definitions that could affect their ability to perform consistent multi-year analyses of results

A key message to Forum members is that the purpose of developing the guidelines is to facilitate consistent reporting of state-level energy-efficiency program impacts, building from data that are already largely reported and/or collected by program administrators, using a common reporting template. A common reporting template will provide basic information in a format that makes it easy to make comparisons and/or aggregate information across jurisdictions, and provide interested regional and national groups access to consistently reported data across multiple jurisdictions. It is not envisioned that the format or content of individual annual energy-efficiency program reports produced by individual jurisdictions would need to change significantly. In many cases the data fields in the common reporting template can be populated with data extracted from current annual reports, or data currently collected by program administrators but not currently reported (e.g. gross savings impacts).

Forum Subcommittee Priorities

The Forum subcommittee to this Project provided feedback to help identify priority reporting elements relative to a range of policy and market needs. The seven policy and market drivers considered are as follows:

- **Distribution Utility and ISO/RTO System Planning:** incorporating energy efficiency into short- and long-term system planning, including T&D planning
- **Air Quality State Implementation Planning (SIPs):** data needed to incorporate energy efficiency into air quality plans and forecasts for states/regions to meet National Ambient Air Quality Standards (ozone attainment)

- **Climate Change Impacts and Planning:** data needed to support impact of energy efficiency relative to state climate change plans and forecasts
- Tracking Economic Goals: data critical for states to track progress toward their energy efficiency or energy reduction goals and job impact goals
- **Informing National Reporting Guidelines:** key reporting elements that may inform national reporting activities/efforts, such as the National Action Plan for Energy Efficiency (NAPEE) project, and Energy Information Administration (EIA) form 861 data collection
- **State-by-State Comparison:** data considered important to allow for state-by-state comparison of key energy efficiency impacts and key parameters
- **ISO/RTO Market Integration:** data needed to support energy efficiency participation in wholesale capacity markets (e.g. ISO New England (ISO-NE) and PJM markets)

Feedback from nine participants representing six states suggests that the priority needs for common reporting of energy-efficiency data are for tracking economic goals, distribution utility and ISO/RTO system planning and ISO/RTO market integration, state-by-state comparisons, and informing national reporting guidelines (See Appendix A[3]).

Results of Electric and Gas Savings Reporting Review

The most commonly reported basic electric energy-efficiency impacts, reported by at least nine of the ten[4] jurisdictions with established reporting criteria are: annual kWh savings, lifetime kWh savings and annual kW savings. All ten jurisdictions report meter-level savings and three also report generation-level savings. Most jurisdictions (seven out of ten) report only net savings, two report both net and gross savings and one reports only gross savings. Six jurisdictions report natural gas savings from gas utility energy-efficiency programs and two report natural gas savings from electric utility energy-efficiency programs. Five of these jurisdictions report both annual and lifetime net therms, two report only annual net therms, and one reports only lifetime net therms. These differences in reported elements indicate the level of inconsistency in what is currently reported. In addition, there are inconsistencies in the underlying definitions (e.g., what factors are incorporated in calculating net savings, reporting of tracked versus evaluated savings).

The findings show that at least one-half of the Forum subcommittee members providing feedback identified the following as important to report:

- Net and gross, meter- and generation-level annual kWh and kW savings
- Net and gross meter-level lifetime kWh and kW savings
- Gross generation-level lifetime kWh and kW savings

[3] Subcommittee respondents did not include air regulator representation, however, a key objective of this Project is to better understand energy-efficiency data needs to support climate change and air quality planning. This topic is addressed in Section 7 of the report.
[4] Delaware is in the process of developing energy-efficiency program reporting criteria.

- Net and gross, meter- and generation-level peak summer and winter kW
- Net and gross, annual and lifetime natural gas savings

There are clear gaps between what Forum subcommittee members providing feedback view as important to report and what is currently reported. As discussed above, most jurisdictions (at least seven out of ten) currently report net, meter-level annual and lifetime kWh and kW and most of the jurisdictions reporting gas savings (at least six out of eight) report net annual and lifetime therms. However, no jurisdictions report gross annual or lifetime gas savings and only three or fewer jurisdictions currently report the following:

- Gross, meter-level annual or lifetime kWh or kW savings
- Net or gross, generation-level, annual kWh or kW savings
- Gross, generation-level lifetime kWh or annual kW savings
- Net or gross, meter- or generation-level Summer or winter peak kW

At least one-half of the Form subcommittee members providing feedback also indicated it would be important to report savings broken out by these categories:

- **Customer sector:** residential non-low income, residential low income, commercial and industrial (C&I), and other more detailed sectors
- **Program type:** retrofit, lost opportunity or new construction, and other program types
- **End use or measure:** examples are lighting, HVAC, appliances and motors/drives
- **Sector and measure:** examples are residential lighting and C&I lighting

There are some clear gaps between the breakouts that the Forum subcommittee members providing feedback indicate are important and what jurisdictions currently report. All jurisdictions currently report residential sector and commercial and industrial sector savings, and seven take the next step and split residential savings into residential non-low-income and residential low-income savings. All jurisdictions report savings for individual programs and seven report savings from retrofit programs and from lost opportunity or new construction programs. The major gaps or inconsistencies are as follows:

- Although some jurisdictions report savings by more detailed customer sectors, the sectors vary from jurisdiction to jurisdiction.
- Although most jurisdictions report savings for at least some general program types, not all savings may be allocated to a specific program type and the program types for which savings are reported, beyond retrofit programs and lost opportunity or new construction programs, vary widely.
- Only two jurisdictions that currently publish annual state-level energy-efficiency program reports show savings by end use: Connecticut and Vermont.

Inconsistencies in Reported Savings

Key issues related to reported savings are inconsistencies in net savings estimates and demand impacts. In general, all jurisdictions' saving estimates are consistent with the Forum Glossary of

Terms & Acronyms for net savings and demand impacts. However, at a more detailed level, there are differences across jurisdictions in how reported net savings are calculated.[5] In addition, individual jurisdictions currently report a mix of summer/winter/annual demand impacts in annual energy-efficiency reports.

Results of Expenditures Reporting Review

Jurisdictions report a variety of electric and gas energy-efficiency program expense categories. The following are the most frequently reported energy-efficiency program expense categories:

- Total expenses
- Research and evaluation expenses
- Administration expenses
- Incentives/rebates
- Marketing expenses

More than one-half of the Forum subcommittee participants who provided feedback consider all the above expenditure categories important. In addition, they would like to see performance incentive expenditures reported.

A key issue for expenditure reporting is that the definitions of what is included in specific expenditure categories vary widely across jurisdictions.

Results of Program Tracking Systems

Jurisdictions employ a variety of tracking systems and database management procedures. Several program sponsors were interviewed to address weaknesses in current tracking systems, how they could be improved, and the cost implications of such improvements.

Three program sponsors provided responses. An additional program sponsor provided comments on a similar system to one of the original interviewees. The overall level of tracking by those interviewed varies widely, from a most comprehensive and automated system to a less comprehensive system. The most comprehensive system is custom-designed and records, tracks and reports energy-efficiency program information from start to finish. The least comprehensive system, also custom-designed, is manual rather than automated. It has administrative staff enter data from forms filled out by contractors in the field, rather than electronically imputed on site.

Results of Emissions Reporting and Interviews

Energy-efficiency program administrators often include emissions impacts (tons of avoided greenhouse gas and pollutants) in their energy-efficiency program reports. These reports can serve as important resources for providing air quality regulators with the data required to support their planning activities, which focus primarily on pollution control and climate change. However, there is significant variation in the emissions impacts reported, from the calculation

[5] A separate, simultaneous Forum project is addressing the development of common evaluation, measurement and verification guidelines for energy-efficiency savings to promote consistency in estimated net savings.

methodology (e.g., type of emissions factor) to the gases included in the reports. Additionally, some of these reports do not provide enough information on topics of interest to air regulators, such as coincidence of energy savings with periods of high ozone.

We reviewed a set of documents and interviewed air quality regulators from six Forum states to better understand the current treatment of energy efficiency in air quality planning and reporting activities and barriers to incorporating energy-efficiency benefits. The general consensus from the interviews was that the US Environmental Protection Agency (EPA) needs to issue guidance on the preferred method of treating emissions impacts due to efficiency and also outline acceptable calculation methodologies to meet their strict standards. Air quality regulators also indicated that many of the requirements for integrating efficiency as a control measure in the state implementation plan (SIP)—a collection of enforceable regulations, policies, and procedures used to meet and maintain compliance with the Clean Air Act (CAA) requirements—were too burdensome and were preventing them from attempting to fully capture the benefits of energy-efficiency activities.

Results of Jobs Reporting Review

There is growing interest in the economic benefits of energy-efficiency programs, and energy-efficiency reports in four Forum states currently include employment impacts due to energy-efficiency programs. However, each report contains a different metric for assessing jobs impacts; thus, the values reported are not comparable. Given the reporting requirements of the recently implemented American Recovery and Reinvestment Act (ARRA) and development of job impact guidelines, we reviewed the ARRA reporting requirements and incorporated them into our recommendations.

Review of System Planner Energy-Efficiency Forecasting Practices and Data Needs

Interviews were conducted with three regional system planners representing PJM Interconnection (PJM), the New York Independent System Operator (NYISO) and ISO New England (ISO-NE). NYSIO uses only energy savings data from energy-efficiency programs, while PJM and ISO-NE use only demand impact data for energy-efficiency programs. None report state or regional level energy-efficiency program impacts.

It appears that having access to consistently reported state-level energy impacts would be minimally valuable to system planners at this time. However, studies that address load shapes that could be used to better translate energy-efficiency program energy impacts into demand impacts or vice versa, or studies that address the potential for energy-efficiency impacts in future years, could be valuable to system planners.

NYISO currently receives only energy data for energy-efficiency programs, though it is expected that what is reported will eventually include demand impacts. NYSIO develops energy forecasts for eleven specific parts of the state and would like to have energy-efficiency program savings

data by region. Having data by region would allow NYISO to better represent the energy-efficiency activity in these regions and develop better estimates of overall energy forecasts in these regions.

ISO-NE and PJM do all system planning based on demand. At ISO-NE, all energy-efficiency demand resources come in through the Forward Capacity Market (FCM), which is essentially an auction. PJM's information on energy-efficiency program impacts comes from participants who want to qualify energy-efficiency resources as capacity resources in the Reliability Pricing Model (RPM), PJM's capacity-market model. Neither ISO-NE nor PJM are looking for additional energy-efficiency program data at this time.

NYISO and PJM incorporate projected impacts of future year energy-efficiency programs in planning. ISO-NE does not currently include forecasted impacts of future year energy-efficiency programs in planning, but is addressing this through the Regional Energy Efficiency Initiative (REEI).

NYISO incorporates estimates of the impacts due to changes in state and national code standards and ISO-NE incorporates estimates of the impact of 2013 changes in federal appliance standards in planning. PJM does not make any explicit adjustments for changes in building codes or equipment standards–PJM considers them too uncertain in terms of implementation and impact.

Energy Information Administration (EIA) Data Reporting

The Form EIA-861 of the US DOE Energy Information Administration is required by electric industry participants including electric utilities, wholesale power marketers (registered with the Federal Energy Regulatory Commission), energy service providers (registered with the States), and electric power producers. These data help inform the following EIA reports: the Electric Power Monthly, Monthly Energy Review, Electric Power Annual, Annual Energy Outlook, and Annual Energy Review.

Schedule 6 of Form EIA-861, Demand-Side Management (DSM), reporting requirements are similar to what data program administrators already collect and report. As the US Department of Energy increases attention on the importance of energy efficiency, the need for common reporting elements such as data gathered from Schedule 6 of EIA-861 increases in relevance and significance.

Recommendations: Reporting Guidelines and Template

Recommendations for reporting guidelines and sample reporting templates to consider for adoption as a Forum product for state use and implementation are described in detail in the main body of the report. Following are summaries of the recommendations, which are based on findings from the review of current reporting practices, interviews, and feedback from Forum subcommittee participants. Recognizing possible concerns about changing or expanding

reporting requirements, the following two basic criteria for recommended reporting elements were established:

- Either currently reported or likely available
- Identified as important by Forum members

Definitions

To encourage increasing consistency in reported elements over time and to inform readers of exactly what each reporting element represents, each jurisdiction should include a clear definition for each reported element. Ideally, the definitions used by jurisdictions will be consistent with the definitions in the Regional EM&V Forum - Glossary of Terms and Acronyms Version 1, which is a living document that is updated annually. (See Appendix B)

Recommended Reporting of Energy and Demand Savings

All of the following recommended energy and demand savings elements were identified as important by at least one-half of Forum subcommittee members who provided feedback for meeting one or more of the following policy and market needs: tracking economic goals, making state-by-state comparisons, informing national reporting guidelines, and distribution utility and ISO/RTO system planning and ISO/RTO market integration.

In general, all jurisdictions' definitions of net saving and lifetime kW savings are consistent with the Forum Glossary of Terms.[6]

- **Gross Savings:** The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated. For the purpose of the guidelines, reported gross savings are adjusted gross savings, as presented in Section 11.
- **Net savings:** The total change in load that is attributable to an energy-efficiency program. This change in load may include, implicitly or explicitly, the effects of free drivers, free riders, energy-efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.
- **Lifetime kW:** The expected demand savings over the lifetime of an installed measure, calculated by multiplying the annual peak kW reduction associated with a measure by the expected lifetime of that measure. It is expressed in units of kW-years.

However, at a more detailed level, there are differences across jurisdictions in how reported net savings are calculated. Furthermore, unless all similar programs offered by individual utilities in a jurisdiction conduct joint evaluations, there may be differences among the individual utilities in a jurisdiction in what impact factors are incorporated in saving estimates, how they are incorporated and when they are updated. As previously described, a separate Forum project is

[6] Forum Glossary of Terms: Version 1 March 2009

addressing consistency in net savings. With respect to demand impacts, individual jurisdictions currently report a mix of summer/winter/annual demand impacts in annual energy-efficiency reports. Therefore, to be useful from a regional perspective, it will be important that all reported peak demand impacts be clearly defined.

It is anticipated that achieving consistency will be relatively easier for reporting elements addressing total program level electric and gas energy savings and electric demand savings, and relatively harder for reporting elements addressing savings by customer sector and program type. However, the recommended customer sectors and program types are reasonably broad and currently reported by several jurisdictions, which suggests that achieving consistency in definitions and reporting is a reasonable and achievable goal.

The recommendations for reporting energy and demand savings are as follows:

- **Electric Energy Savings:** Report net and gross, meter- and generation-level annual and lifetime kWh savings.
- **Electric Demand Savings:** Report net and gross, meter- and generation-level summer peak, winter peak, annual and lifetime kW savings.
- **Gas Energy Savings:** Report net and gross, annual and lifetime natural gas savings.
- **Savings by Customer Sector:** Report savings allocated to three customer sectors: commercial and industrial, residential non-low income, and residential low income.
- **Savings by Program Type:** Report savings attributable to retrofit programs and savings attributable to lost opportunity/new construction programs.
- **Savings by Customer Sector and Program Type:** Report retrofit program and lost opportunity/new construction program savings separately for the three customer sectors listed above (residential non-low income, residential low income and C&I).

Recommended Reporting of Electric and Gas Energy Efficiency Program Expenditures

All of the recommended expenditure categories were identified as important by at least one-half of Forum subcommittee members who provided feedback for meeting multiple policy and market needs. In particular, Forum subcommittee members identified expenditure reporting as important for tracking economic goals and making state-by-state comparisons.

The current inconsistency in expense category definitions needs to be addressed and it will likely take some time to develop consistent definitions. The following are two basic options for addressing the definitional inconsistencies:

- **Define broader expense categories** that can be reported by jurisdictions that report detailed expense categories by combining multiple currently reported categories. This is a lowest-common-denominator approach.
- **Have Forum members develop clear definitions** of what costs should be included in each expense category they would like to see in the final reporting template. Individual

program administrators likely have access to detailed expense information and could provide expense data meeting the agreed-upon category definitions. This is a much better approach for achieving consistency across jurisdictions, but it may take some time to reach agreement on expense category definitions and for individual program administrators to report expenses using these definitions. If this approach is used, to avoid inconsistencies in year-to-year reporting definitions, it may be appropriate to include only total program expenditures in the reporting template until Forum members agree on definitions for the more detailed expenditure categories.

The recommendation for the short term is to report only total program expenditures. In the longer term, assuming Forum members decide to develop consistent expenditure category definitions, the recommendations for reporting expenditures are as follows:

- **Report the six expense categories Forum members indicate are very important:** total, administrative, evaluation, incentive/rebate, marketing, and performance incentive expenses.
- **Report expenses for the three major customer sectors:** residential non-low income, residential low income and C&I.

Recommended Reporting of Emission Impacts and Suggested Process Improvements

To fully support air regulators' incorporation of efficiency benefits into their planning activities, two types of barriers must be overcome simultaneously: those that are process-related and those that are related to program reporting data. Process-related recommendations include:

- EPA should create a more structured approach for incorporating efficiency benefits.
- Coordination between State utility regulators and program administrators should identify best processes for sharing energy-efficiency impact data with air regulators.
- EPA and State Departments of Environmental Protection (DEP) together should establish a NOx allowance set-aside process.
- Air regulators should share best practices for handling benefits due to efficiency programs and data with each other and with EPA (e.g., through a facilitated process roundtable).

Air quality regulators would benefit from more consistent reporting of emissions impacts by program administrators because air regulators forecast emissions on a regional basis. To facilitate emissions reporting, we recommend that program administrators provide the following elements in their annual statewide reports:

- Annual, peak, and remaining lifetime potential emissions avoided for each program
- General description of calculation methodology used to estimate the avoided emissions, with example calculation(s)

- Emission factors and types, with references
- The type of energy savings used in the calculation of emissions impacts

Recommended Tracking Systems Development

Program administrators have differing needs and resources for establishing effective tracking systems. They should seek to attain and maintain a tracking system and database that best suits their specific situation and budget. Successful tracking systems and databases share several key features:

- A tracking system should align with the goals and objectives of the energy-efficiency program portfolio it represents.
- All necessary information must be able to be delivered to program administrators so they may evaluate the success of the program and portfolio of measures.
- A tracking system's functionality should include tracking of costs so it can be compared against program savings.
- Consider making it web-based with a simplified interface, which would allow many more user groups to provide input and retrieve data.

The Forum can assist in the transfer of information and examples of tracking systems across the region, facilitating consistency and transparency amongst the various member tracking systems.

Recommended Reporting of Jobs Impacts

Since many state agencies are recipients of ARRA funding and are already familiar with ARRA reporting requirements, we recommend that program administrators report the direct full-time equivalent number of jobs funded through energy-efficiency programs in accordance with ARRA guidelines.[7] To get a sense of the broader economic impact, we advise program administrators also to report the number of jobs predicted by the American Council for an Energy-Efficient Economy (ACEEE) Jobs calculator,[8] which is a publically available spreadsheet tool that calculates net direct and indirect job impacts. Additionally, we recommend program administrators report the median wage so that policy makers can better identify the quality of jobs being funded through the program.

Recommended Reporting Template

The proposed reporting templates for reporting state- or jurisdiction-level total energy-efficiency program electric and gas energy savings, electric demand savings, program expenditures, emissions and jobs can be found in Section 11 Common Reporting Template.

One process issue related to populating the templates that Forum members will need to address is timing. Currently, some jurisdictions issue annual energy-efficiency reports as early as the first quarter of the following year and others not until the fourth quarter. Jurisdictions that report

[7] http://www.recovery.gov/FAQ/recipient/Pages/Recipient_Reporting.aspx
[8] http://www.aceee.org/energy/national/recovery.htm

tracking data generally issue reports early in the following year. Jurisdictions that incorporate the results of evaluations and report ex-post savings generally issue reports in the third or fourth quarter of the following year. One jurisdiction reports tracked savings in the second quarter and ex-post savings in the fourth quarter of the following year. This variability in when jurisdictions issue annual energy-efficiency reports will continue as long as some jurisdictions report tracked savings and some report savings incorporating the results of evaluations conducted after the end of the program year. Having all jurisdictions fill in the templates in the first quarter of the following year would require jurisdictions that now report ex-post savings to report tracking data, which may not be considered a viable option by some jurisdictions because it could be administratively burdensome to both the state agency compiling state level results and the individual program administrators submitting data to the state agency. Also, at least some of the jurisdictions that currently report ex-post savings will likely want to continue to report ex-post savings in annual energy-efficiency reports and may not be comfortable providing public access to two different reports of the same program year's savings. If Forum members decide that it is acceptable to have some jurisdictions report ex-ante (tracking) savings data in the templates and some report ex-post (evaluated) savings, then it will be important to clearly define what each jurisdiction is reporting.

Another timing issue is that some annual energy-efficiency reports cover a fiscal year and some a calendar year.

We recommend that the completed templates be available on the Forum website to give those interested in seeing consistent state- and regional- level data easy access. Each state could include links to its website and to its individual program administrators' and/or state-wide full annual energy-efficiency reports.

Recommended Coordination with System Planners

Studies that address load shapes that could be used to better translate energy-efficiency program energy impacts into demand impacts or vice versa, or studies that address the potential for energy-efficiency impacts in future years, could be valuable to system planners.

Several factors suggest there are benefits to having the Forum continue its dialog with system planners about energy-efficiency data needs for planning purposes. As states implement aggressive multi-year plans to capture all cost-effective energy efficiency, there may be significant market-driven energy-efficiency savings coming from efforts outside the utility-sponsored energy-efficiency programs covered in this study. For PJM and ISO-New England, this may mean that it will be important to factor increased energy-efficiency impacts outside FCM submissions into system planning.

There are differences in how emission factors are developed and used. Also, there are inconsistencies in how, or to what extent, system planners currently include impacts from future energy-efficiency efforts and changes in energy-efficiency-related codes and standards in planning. Continued communication between and among Forum members and system planners

could facilitate consistency in addressing these issues and help ensure that system planners have access to consistently reported energy-efficiency data for planning purposes.

Recommended EIA Data Coordination

Form EIA-861 is a straightforward template where many inputs are already reported in state annual reports. It should be a continued annual practice by program administrators to submit the report to the EIA. It is also recommended that Forum members coordinate to share information from this Project with US DOE as it identifies issues with EIA data reporting requirements. Further it is recommended to develop an effort to align consistency in definitions and reporting elements between the EIA and Forum members.

1 Project Background

The Regional Evaluation, Measurement and Verification Forum (the Forum) is a project facilitated by the Northeast Energy-Efficiency Partnerships (NEEP) to develop consistent energy-efficiency reporting protocols for use by Northeast and Mid Atlantic Forum members. The Forum was initiated in 2008. This Project is funded by program administrators and/or state agencies from the eleven jurisdictions, and the US Environmental Protection Agency. Its primary purpose is to support the development and use of common and/or consistent protocols to estimate, track and report the savings, cost and emission reduction impacts of demand side resources implemented pursuant to state and regional energy and environmental policies.

1.1 Project Description

Regulators, program administrators and system planners in eleven jurisdictions in the Northeast (each New England state,[9] New York, New Jersey, Maryland, Delaware, and the District of Columbia) could potentially benefit from consistent and common state-level reporting practices for electric and natural gas energy-efficiency programs to help fulfill various state and regional goals related to energy savings, emissions reductions, energy system planning, and economic stimulus. In order to help develop common energy-efficiency reporting guidelines for savings, costs, jobs and emission impacts, NEEP employed the evaluation services of NMR Group, Inc. (NMR) and its subcontractors The Cadmus Group, Inc. (Cadmus) and Dorothy Conant.

The Project comprises five tasks culminating in this final report and its recommended Common Reporting Templates. The Project includes the following efforts undertaken by the evaluation team from September of 2009 to April of 2010:

- **Task 1:** Research existing state and regional energy-efficiency reporting requirements/ practices within the Forum jurisdiction.
- **Task 2:** Research energy-efficiency data needs to support state and regional environmental policies and energy system planning. This includes interviewing air regulators and system planners to identify energy-efficiency data needs to support emissions reporting and system planning.
- **Task 3:** Develop recommended energy-efficiency reporting guidelines and a set of Common Reporting Templates.
- **Task 4:** Participate in Forum meetings and subcommittee teleconference calls.
- **Task 5:** Develop and author final report.

1.2 Project Objectives

The objective of this Project is to develop common reporting guidelines, including underlying definitions where appropriate, for jurisdictional energy-efficiency programs in order to advance

[9] Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont

the consistency of energy-efficiency reporting so that the region can benefit from a common "currency" for reporting program impacts.

A separate, simultaneous Forum project is addressing the development of common evaluation, measurement and verification guidelines for energy-efficiency savings to promote consistency in estimated savings. The combined benefits of consistent evaluation protocols and reporting practices will, if adopted and implemented/used by Forum states, help to increase the reliability and consistency of reported energy-efficiency program impacts, thereby providing transparency when comparing impacts across jurisdictions and facilitating the reporting of consistent data to regional agencies needing energy-efficiency program impact data. Relevant to these objectives, this Project aims to address the following:

- Identifying commonalities and differences in current and evolving reporting practices by program administrators across Forum jurisdictions
- Identifying where important differences in definitions exist
- Identifying energy-efficiency data needs to support a range of policy/market needs
- Tracking against statewide energy and economic goals
- Informing System Planning (energy, capacity, transmission planning)
- Supporting Air Quality State Implementation Plan (SIP) reporting and planning
- Supporting Climate Change reporting and planning
- Informing potential national reporting guidelines (e.g., with national Energy-Efficiency Resource Standard (EERS)/carbon legislation)
- Aligning with data reporting submitted by utilities in their Federal Energy Regulatory Commission (FERC) Form 1s and to the Energy Information Administration (EIA)

1.2.1 Current Situation

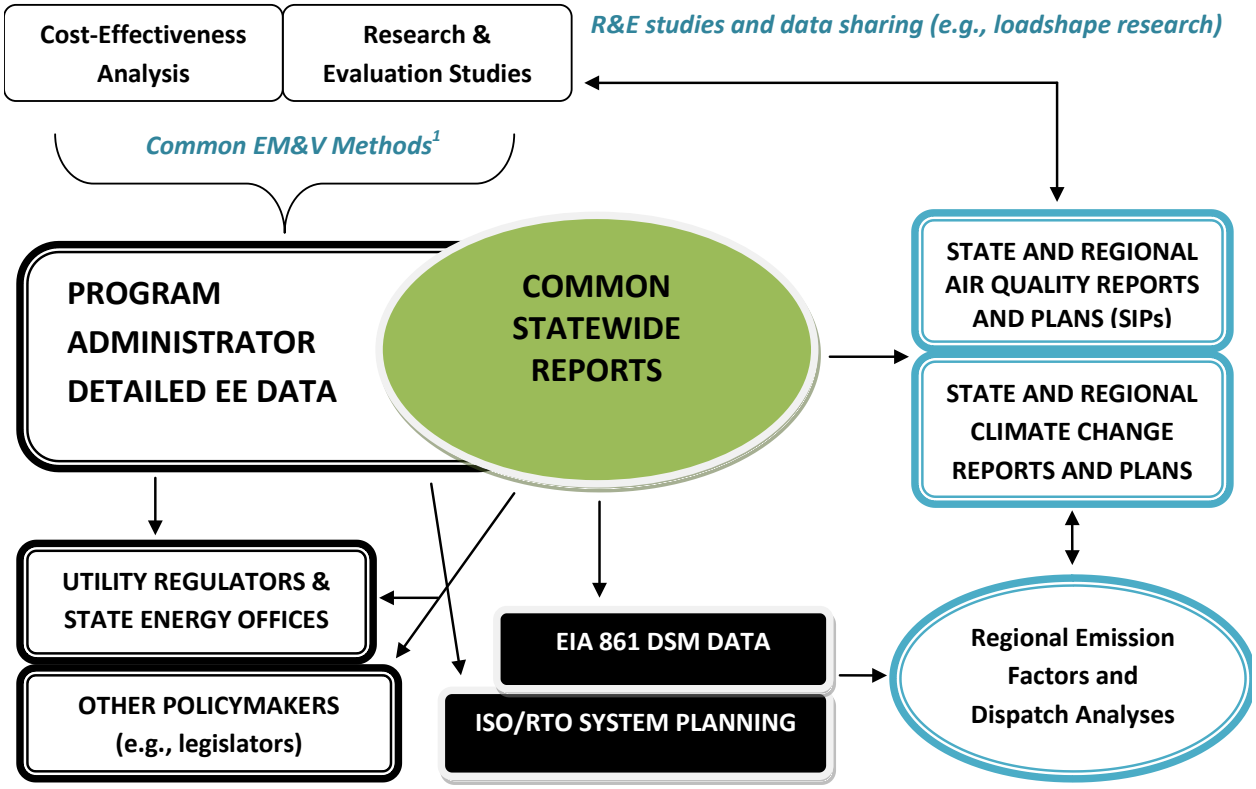
The NMR team performed a gap analysis, which involved identifying discrepancies in available data vs. information needs by cataloguing current and planned reporting practices from available energy-efficiency filings and comparing these to a desired reporting structure or set of practices. By highlighting the differences in current reporting practices among jurisdiction participants compared to ideal reporting practices, it is possible to identify gaps and develop recommended common reporting parameters and elements to meet the multiple policy and market objectives of Forum members.

Currently, reporting practices in the eleven jurisdictions in the study have similarities and differences. Several states have well established practices and protocols to estimate, track and report savings, costs and emissions reductions. Others are much less developed, while one is in the process of establishing protocols to begin reporting. Additionally, definitional differences arise when comparing across state reporting practices. It is these current differences in reporting and definitions this study aims to highlight and begin to address.

Conceptually, the Project aims to develop recommended guidelines that potentially could apply across states and regions as well as suitably fit into the larger scheme of reported energy-

efficiency data. Figure 1-1 illustrates the relative importance of common reporting guidelines among the many stakeholders involved in planning and creating reporting documents.

Figure 1-1: Energy-efficiency Data Reporting and Collection Conceptual Framework



[1] The Regional EM&V Forum has also developed, as a separate project, Common EM&V Methods & Savings Assumptions Guidelines to support consistency in the calculation of energy and demand savings impacts.

[2] The Common Statewide Reports may likely be a subset of what some program administrators currently report.

The final recommended guidelines and Common Reporting Template are informed by Forum subcommittee feedback on important reporting elements, existing commonalities in current reporting practices, and interviews with energy regulators, system planners and air regulators. Analysis of these combined data makes it possible to identify key differences in definitions and how these might be addressed.

2 Research Method Used

Given that the aim of the Project is to analyze and develop common reporting guidelines for energy-efficiency savings, an analysis tool useful in assisting a group to compare its combined actual performance with a potential performance is desirable. Gap analysis is a favored method in business and information technology to achieve such results. The NMR team performed a gap analysis by comparing currently available reporting practices with what stakeholders identify as the desired information needed to support state and regional energy, economic, and environmental policies. Any discrepancy between the two is considered a gap.

2.1 Gap Analysis

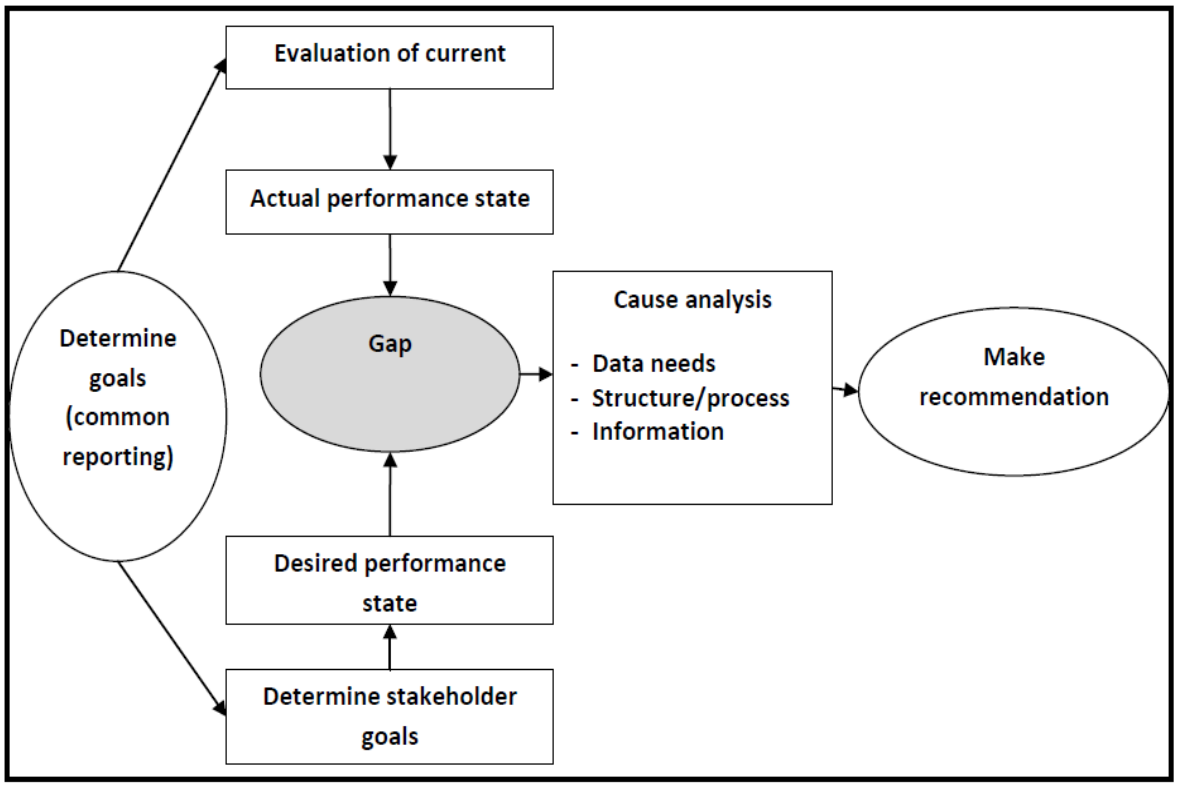
A gap analysis utilizes comparative analysis techniques to identify differences that may exist between a "where are we?" and "where do we want to go?" situation.[10] The difference between the two is considered the gap. In this process it is essential to identify the nature of the current scenario in order to make the comparison. A gap analysis is especially useful when planning changes to a current practice. The following steps are typical when performing the analysis:

- **Where we are now:** assess what is important to the current situation and what is relevant to make potential changes.
- **Define the desired changes to current practices or ideal state:** develop a complete template which provides the clearest indication of what standards are to be achieved.
- **Define the gap:** compare the first two steps and specify the major differences between the current picture and desired future position.

[10] For further information on the best practices of a gap analysis see Maren Franklin, *Performance Gap Analysis: Tips, Tools, and Intelligence for Trainers,* American Society for Training and Development, 2006 and the ISO 9001 2008 Gap Analysis Tool accessed from the International Organization for Standardization website: http://www.iso.org/iso/iso_catalogue.htm

The following flowchart (Figure 2-1) illustrates the analysis process for the Project:

Figure 2-1: Flowchart of gap analysis



Differences identified between the current and the desired state indicate the scope and detail of the changes that need to take place to reach the desired position. The 'gap' in the case of this Project might be the difference between a desired practice for reporting energy-efficiency savings among the Forum jurisdictions and what is currently being reported. Recommendations for improvement are then made from the analysis.

2.2 Review of Current Energy-Efficiency Program Reporting Practices and Data Needs

The gap analysis of current reporting practices examines the current state of common reporting practices or elements, identifies key reporting elements needed to support a range of state and regional needs and ultimately recommends an action item summarized in the Common Reporting Templates. Some jurisdictions that have invested significant time developing and implementing consistent statewide reporting guidelines/definitions and templates say any changes would need to provide value and/or comport with current reporting practices. This suggests that a key message to Forum members is that the purpose of developing guidelines is to facilitate consistent

reporting of state level energy-efficiency program impacts using a common reporting template. A common reporting template will provide key information (to meet range of policy needs) in a format that makes it easy to make comparisons across jurisdictions and to provide interested regional groups access to consistently reported data across multiple jurisdictions. Such key information includes data that are largely already reported by program administrators (but may require clarification or greater consistency in definitions), or data that are collected by program administrators but not currently reported. As such, it is not envisioned that the format or content of individual jurisdictions' or program administrators' annual energy-efficiency program reports would need significant changes. Rather, we expect states or program administrators to fall into one of the following categories:

- No change to current reporting practice, but provide clarification on certain definitions (e.g., peak savings)
- Add certain reporting elements for data that are collected but not currently reported (e.g., gross generation level savings)
- Other, including states currently in the process of developing state-level annual energy-efficiency reports

The NMR team, in collaboration with NEEP, conducted the following research and interviews to inform its recommended Energy Efficiency Reporting Guidelines:

- Review of current energy-efficiency program reporting practices, supplemented with interviews of regulatory personnel
- Interviews with air regulators
- Interviews with system planners
- Review of energy-efficiency data reported in FERC Form No 1s and to EIA

2.2.1 Review of Current Energy-Efficiency Program Administrator Reporting Practices

The evaluation team began by identifying primary source documents to review as well as the regulators, agencies and personnel for in-depth interviewing. The team researched existing energy-efficiency reporting practices within the Forum region by cataloguing current reporting practices from annual filings, annual plans, legislative actions and corroborating/supplementing these findings with information from interviews with associated personnel.

Table 2-1 on the following page lists the annual energy-efficiency reports reviewed and provides the links to reports that are publicly available. In cases where the annual reports were not available on websites, the NMR team requested, and received, copies of reports from program administrators. For New York, the NMR team was given access to June 30, 2009 versions of the data reporting template and NYDPS Data Reporting Manual for implementation of consistent state-wide reporting by all reporting program administrators. As mentioned above, plan filings and other relevant documents were also reviewed for some states.

Table 2-1: Annual Energy-Efficiency Reports Reviewed

State/ Jurisdiction	Annual State-level Energy-Efficiency Report or Program Administrator Report Representing State-wide Reporting Template	Link
Connecticut	Report of the ECMB Year 2008 Programs and Operations March 1, 2009 (Includes both electric and gas programs)	http://www.ct.gov/dss/lib/dss/pdfs/stimulus/weather/2008_annual_report.pdf
District of Columbia	District of Columbia Energy Efficiency Programs, Quarterly Performance Report, Potomac Electric Power Company: Q3 2009	No Website Link
Massachusetts*	2008 Energy Efficiency Annual Report Massachusetts Electric Company Nantucket Electric Company d/b/a National Grid Bay State Gas Company Energy Efficiency Program - Annual Status Report May 1, 2008 through April 30, 2009	http://www.nationalgridus.com/EnergyEfficiencyReports.asp No Website Link
Maryland*	BGE's Q3 2009 Quarterly EmPOWER Maryland Report (Case No. 9154)	http://webapp.psc.state.md.us/Intranet/Casenum/NewIndex3_VOpenFile.cfm?ServerFilePath=C:\Casenum\9100-9199\9154\\99.pdf
Maine	Efficiency Maine 2008 Annual Report	http://www.efficiencymaine.com/pdf/EMO14758_EMAnn.Rept_v11.pdf
New Hampshire	2008 CORE New Hampshire Energy Efficiency Programs NHPUC Docket No. DE 07-106 Northeast Utilities and KeySpan annual gas energy-efficiency reports	http://www.puc.state.nh.us/Electric/NH%20EnergyEfficiencyPrograms/2008%20CORE%20NH%20Energy%20Efficiency%20Program%20Filing%20%20Revised%2029Feb2008%20%20FINAL.pdf http://www.puc.nh.gov/Gas-Steam/EE%20Docs/08-106%202008-10-17%20N%20Grid-09%20Winter%20%20COG%20Schedules%201-24%20122.pdf http://www.puc.nh.gov/Gas-Steam/EE%20Docs/06-036%202008-08-29%20A-1%20Exh%20C%20of%20%20NUs%20Program%20Yr%202%20results.pdf
New Jersey	New Jersey's Clean Energy Program Report New Jersey Board (Includes both electric and gas programs)	http://www.njcleanenergy.com/files/file/Library/NJCEP4Q08RPT.pdf
New York*	June 30, 2009 versions of data reporting template and NYDPS Data Reporting Manual	No Website Link
Rhode Island	National Grid Electric and Gas Demand-Side Management Programs - 2008 Year-End Report	No Website Link
Vermont	Efficiency Vermont Annual Report 2008	http://www.efficiencyvermont.com/stella/filelib/2008_Efficiency_Vermont_Annual_Report.pdf

*State-level annual energy-efficiency reports are planned.

The NMR team catalogued each level and element of electric and natural gas energy-efficiency programs, emissions impacts and job impact reporting requirements/practices across each state and jurisdiction. This included the analysis of annual energy-efficiency reports and, in some cases, annual plans, legislative memos and other documents. Commonalities and differences were recorded by enumerating each reporting practice of a state or jurisdiction into a common matrix. The team then amalgamated this common matrix into a single comparative reporting table of common elements reported by each state and jurisdiction under study for ease of comparison. Each reporting level is divided into a separate table comprising the current state of reporting practices by each state and jurisdiction.

Because several states (Massachusetts, Maryland and New York) are in the process of developing state-level annual energy-efficiency reports, there is no way at this point to know exactly what information will be included in their final state-wide annual reports. For these states, in this report, the data elements described as currently being reported are those elements reported in the annual energy-efficiency reports of individual program administrators. In Massachusetts and Maryland all program administrators use the same reporting template. New York has recently introduced consistent state-wide reporting templates, but has not finalized a template for reporting state-level annual energy-efficiency program impacts. Prior to this, NYSERDA's annual energy-efficiency reports included several data elements not included in the June 2009 version of New York's planned reporting template for program administrators. Examples include gross electric and gas savings, peak summer kW, ex-post savings and "other economic benefits" of jobs created. At this point in time, it is not known whether or not New York will include some or all of these data elements in the state-level report.

2.2.2 Interviews of Regulatory and System Planner Personnel

The team conducted interviews with a range of stakeholders to better understand current energy-efficiency reporting program practices and data needs to support air quality and system planning. Energy-efficiency regulators were interviewed to discover if current reporting requirements had changed since the issuance of the latest annual report and to determine how likely or willing a regulator would be to change reporting requirements to facilitate consistency across jurisdictions. The team interviewed energy-efficiency regulatory personnel in each of the states and jurisdictions under study except Delaware,[11] resulting in ten total interviews. These energy-efficiency savings and expenditure interviews followed a standard script informed by the initial review of current reporting practice literature and materials.

Interviews covered the following topics:

- State-level reporting
- Utility reporting consistency
- Tracking versus evaluated results
- Time frames

[11] Delaware is developing reporting criteria at the time of this study.

- Definitions
- Detail reported
- Emissions impacts
- Job impacts and other economic impacts
- Access to reports
- Willingness to make changes

With respect to establishing the energy-efficiency data needs of air (emissions) regulatory personnel and system planners in order to support air quality, climate change planning and reporting, and system planning, appropriate personnel in the states and jurisdictions were identified and interviewed. Air regulators in Maryland, New Hampshire, Massachusetts, Connecticut, New York, and New Jersey were interviewed (six interviews). Interviews with system planners included representatives of ISO New England, PJM and New York ISO (three interviews).

Similar to the energy-efficiency regulator interview guide, the air regulator interview guide was composed of questions developed from the initial review of current emissions reporting practices from the states under study. These topics included:

- Elements of a state implementation plan (SIP)
- Accounting for energy-efficiency savings in the SIP
- Carbon emissions impacts from energy-efficiency savings
- Data needs and quality concerns

2.2.3 Forum Project Subcommittee Feedback

The Project was guided by a Forum project subcommittee, represented by a mix of utility and air regulatory staff and program administrators. In order to ascertain Forum members' perceived needs for common reporting practices, Forum subcommittee members were asked to identify common reporting elements that would be most useful to meet their policy, market and other driver needs and objectives. Each member was asked to record in each cell of a table if a reporting element is *very important* for a given policy need/driver. (See Appendix A) Nine Forum members representing six different states participated in the exercise. Tallies were recorded by each element and totaled for each policy, market need or other driver of consistent energy-efficiency reporting needs.

3 Electric Energy (kWh) and Demand (kW) Savings

All targeted jurisdictions either currently provide annual reports of statewide energy-efficiency program electric saving impacts or have plans to do so. The level of detail provided in the various state-level reports varies widely. The most commonly reported basic electric energy-efficiency impacts, reported by at least nine of the ten[12] jurisdictions with known reported elements are: annual kWh savings, lifetime kWh savings and annual kW savings. All ten jurisdictions report meter-level savings, but some report net, some report gross, and some report both net and gross savings. Three jurisdictions report generator-level savings: Maryland, Maine and Vermont. (See Table 3-1)

Table 3-1: Comparative Reporting Elements - Electric Savings

State / Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT	Overall Availability
State Level Report[5]	✓	✓	Plan	Plan	Plan	✓	✓	✓	Plan	✓	✓	
Consistent Template	✓			✓	✓	✓			✓		✓	
Energy and Demand Savings												
Annual kWh	✓	✓		✓	✓	✓		✓	✓	✓	✓	**High 9 of 10**
Net[2] Meter	✓			✓	✓	✓		✓	✓	✓	✓	**High 8 of 10**
Net[2] Generator					✓	✓					✓	**Low 3 of 10**
Gross Meter		✓			✓						✓	**Low 3 of 10**
Gross Generator					✓						✓	**Low 2 of 10**
Lifetime kWh	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	**High 10 of 10**
Net[2] Meter	✓			✓	✓	✓	✓	✓	✓	✓	✓	**High 9 of 10**
Net[2] Generator					✓	✓					✓	**Low 3 of 10**
Gross Meter					✓						✓	**Low 2 of 10**
Gross Generator					✓						✓	**Low 2 of 10**
Annual kW[4]	✓	✓		✓	✓	✓		✓	✓	✓	✓	**High 9 of 10**
Net[2] Meter	✓			✓	✓	✓		✓	✓	✓	✓	**High 8 of 10**
Net[2] Generator					✓	✓					✓	**Low 3 of 10**
Gross Meter		✓			✓						✓	**Low 3 of 10**
Gross Generator					✓						✓	**Low 2 of 10**

[12] Delaware is in the process of developing energy-efficiency program reporting criteria.

Table 3-1 (continued)

State / Jurisdiction	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT	Overall Availability
State Level Report[5]	✓	✓	Plan	Plan	Plan	✓	✓	✓	Plan	✓	✓	
Consistent Template			✓	✓	✓				✓			
Energy and Demand Savings												
Summer kW				✓						✓	✓	**Low 3 of 10**
Net[2] Meter				✓						✓	✓	**Low 3 of 10**
Net[2] Generator											✓	**Low 1 of 10**
Gross Meter											✓	**Low 1 of 10**
Gross Generator											✓	**Low 1 of 10**
Winter kW				✓						✓	✓	**Low 3 of 10**
Net[2]Meter				✓						✓	✓	**Low 3 of 10**
Net[2] Generator											✓	**Low 1 of 10**
Gross Meter											✓	**Low 1 of 10**
Gross Generator											✓	**Low 1 of 10**
Lifetime kW[4]	✓			✓		✓		✓	✓	✓	✓	**Moderate 7 of 10**
Net[2] Meter	✓			✓		✓		✓	✓	✓	✓	**Moderate 7 of 10**
Net[2] Generator						✓					✓	**Low 2 of 10**
Gross Meter											✓	**Low 1 of 10**
Gross Generator											✓	**Low 1 of 10**
Net/Gross	**Net**	**Gross**		**Net**	**Both**	**Net**	**Net**	**Net**	**Net**	**Net**	**Both**	**Net 9 of 10**
Ex Post Savings	✓			✓						✓	✓	**Low 4 of 10**
Meter / Generation Level	**Meter**	**Meter**		**Meter**	**Both**	**Both**	**Meter**	**Meter**	**Meter**	**Meter**	**Both**	**Meter 10 of 10**

[1]Some program administrators report some data elements not included in the broader state report.
[2]Net Savings—significant inconsistencies in reporting and definitions currently exist. Net Savings is being addressed in a separate Forum project.
[3] Currently there is considerable inconsistency in the level of detail reported for these parameters, or in how they are defined.
[4] Mix of seasonal, annual and peak demand.
[5]All reporting practices supplied by the following sources: CT ECMB, D.C. PSC, DE PUC, MA EEAC, MD PSC, ME PUC and Efficiency Maine, NH PUC, NJ NJBPU and Office of Clean Energy, NY DPS, RI National Grid, VT DPS and Efficiency Vermont.

Subcommittee feedback on desired energy-efficiency reporting elements suggests that the priority needs for energy-efficiency data are for tracking economic goals, distribution utility and ISO/RTO system planning and ISO/RTO market integration, making state-by-state comparisons, and informing national reporting guidelines (See Appendix A). To meet these combined needs,

at least half of the Forum subcommittee members contributing to the table (five out of nine Forum subcommittee members) indicated that it is important to have access to:

- Net and gross, meter- and generation-level annual kWh and kW savings
- Net and gross meter-level lifetime kWh and kW savings
- Gross generation-level lifetime kWh and kW savings
- Net and gross, meter- and generation-level peak summer and winter kW
- Net and gross, annual and lifetime natural gas savings

Although not all jurisdictions report net and gross meter- and generation-level energy and demand savings, it may be realistic for most jurisdictions to report this level of detail with a minimum of additional effort. In addition, program administrators are reporting energy-efficiency program impacts to the Energy Information Administration (EIA), regional system planning organizations, state and regional air regulators, etc. In the course of meeting the combined energy-efficiency program impact reporting needs of these other organizations and regulatory agencies, as well as for annual energy-efficiency reports, it is likely that they are reporting both meter and generation impacts, and both net and gross saving impacts. Therefore, providing meter- and generation-level net and gross savings for a common regional reporting template would not necessarily require having to calculate additional reporting elements, but rather would require combining reported elements from multiple other documents, and ideally using consistent definitions. It is also reasonable to think that most program administrators have access to multipliers to translate meter-level savings to generation-level savings, and vice versa. Also, program administrators who report net savings theoretically started with gross savings, to which they applied a net-to-gross (NTG) ratio or various individual impact parameters to estimate net savings.

Interviewed regulatory personnel see benefits to having consistent reporting of key energy-efficiency program impacts across multiple jurisdictions and a willingness to at least consider making changes in what they report. However, several interviewees indicated reluctance to change their own reporting requirements, especially if the changes:

- Required altering tracking database calculations
- Required significant additional administration time and cost
- Could affect their ability to perform consistent longitudinal analyses
- Are inconsistent with their current reporting policies

3.1 Reporting Inconsistencies

3.1.1 Net Savings

In general, all jurisdictions' net saving estimates are consistent with the Forum Glossary definition:

> **Net savings:** The total change in load that is attributable to an energy-efficiency program. This change in load may include, implicitly or explicitly, the effects of free drivers, free riders, energy-efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.[13]

However, at a more detailed level, there are differences across jurisdictions in how reported net savings are calculated, at least some of which are likely to persist for some time. (As described earlier, the Regional EM&V Forum is also developing, as a separate project, Common EM&V Methods and recommendations to improve consistency in savings input assumptions to support energy and demand savings estimates.) Furthermore, unless all similar programs offered by individual utilities in a jurisdiction conduct joint evaluations, there may be differences among the individual utilities in a jurisdiction in what impact factors are incorporated in saving estimates, how they are incorporated and when they are updated.

Examples of current differences include:

- Differences in treatment of free-ridership and spillover
  - Not all jurisdictions incorporate in all programs
  - Underlying estimation approaches vary.
- Differences in the timing/frequency of planning cycles and reporting
  - Planning cycles vary from one to three years.
  - Most jurisdictions report on a calendar year—a few report on a fiscal year basis.
- Updating of impact factors, realization rates and NTG ratios
  - Some jurisdictions report savings based on ex-ante saving estimates (that is, forecasted savings used for program and portfolio planning).
    - Evaluation results are not incorporated until the next planning cycle, which may be up to three years.
  - Some jurisdictions report ex-post saving estimates (that is, savings estimates reported by an evaluator after the energy impact evaluation has been completed).
    - Not all programs in a jurisdiction are evaluated every year. Ex-post savings incorporate the most recent evaluation results as they become available.

[13] NEEP Glossary of Terms: Version 1 March 2009

Given that there will be some differences in how net savings are calculated and reported, it will be particularly important for each jurisdiction to define net savings. One option for addressing these differences is for each jurisdiction to include a table of definitions. To be most useful, each jurisdiction would address the same list of definitions and use the same checklist of practices. Ideally, jurisdictions will use definitions consistent with EM&V Forum definitions. (See Appendix B)

Section 11 provides an example of what a checklist might look like.

3.1.2 Demand Impacts

In general, all jurisdictions' lifetime kW estimates are consistent with the Forum Glossary definitions:

- **Lifetime kW:** The expected demand savings over the lifetime of an installed measure, calculated by multiplying the annual peak kW reduction associated with a measure by the expected lifetime of that measure. It is expressed in units of kW-years.
- **Coincident Demand:** The demand of a device, circuit, or building that occurs at the same time as the peak demand of a utility's system load or at the same time as some other peak of interest, such as building or facility peak demand. The peak of interest should be specified (e.g. "demand coincident with the utility system peak").

However, individual jurisdictions currently report a mix of summer/winter/annual demand impacts in annual energy-efficiency reports. Examples of peak demand definitions provided in annual energy-efficiency reports include the following:

- **BG&E:** Energy Efficiency and Peak Rewards program demand reductions are coincident with BGE system peak load.
- **New Jersey:** On energy savings tracking worksheets and reports, kW = Summer Peak kW. In accordance with applicable electric protocols, Summer Peak kW = load reductions from programs coincident with PJM Summer Peak.
- **Vermont:** Winter coincident peak kW equals estimated impact of measures at time of winter system peak, at generation, net of adjustment factors. Summer coincident peak kW savings equals estimated impact of measures at time of summer system peak, at generation, net of adjustment factors.
- **Massachusetts:** Coincident demand savings definition is consistent with the one used by ISO-New England in its capacity market, and reported by Synapse Energy Economics in its "Avoided Energy Supply Costs in New England: 2007 Final Report." On-Peak demand reduction is defined as the average load reduction during non-holiday weekday hours of 1 PM to 5 PM in June, July and August (summer peak load reduction), and 5 PM to 7 PM in December and January (winter peak).
- **New York (NYDPS Data Reporting Manual–June 2009 version):** Estimated gross on-peak kW savings per unit (utility-specific): Each utility is required to report the

estimated gross on-peak kW savings per unit according to each utility's peak definition. NYSERDA is also required to report demand reductions for program participants in each given utility's service territory based on each utility's definition of peak. Estimated gross on-peak kW savings per unit (NYISO): Estimated gross on-peak kW savings per unit according to NYISO peak, the definition of which is forthcoming from the DPS.

To be useful from a regional perspective, it will be important that all reported peak demand impacts be clearly defined. Also, based on Forum Subcommittee feedback, Forum members would like to see each jurisdiction report and define net and gross, meter- and generation-level summer peak kW, winter peak kW, annual peak kW and lifetime kW.

3.2 Savings by Sector and Program Type

All jurisdictions currently report residential sector and commercial and industrial sector savings. Several jurisdictions take the next step and split residential savings into residential non-low income and residential low income savings. (See Table 3-2)

Table 3-2: Comparative Reporting Elements-Sector

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT	Overall Availability
State Level Report	✓	✓	Plan	Plan	Plan	✓	✓	✓	Plan	✓	✓	
Results Reported by Sector												
Residential	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	High 10 of 10
Res. Low Income	✓	✓		✓	✓	✓		✓	✓		✓	High 8 of 10
Commercial & Industrial	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	High 10 of 10

[1]Some program administrators report some data elements not included in the broader state report.

All jurisdictions report savings for individual programs in their annual reports. Most jurisdictions also report savings for at least some more general program types, though not necessarily all savings may be allocated to a specific program type. The most common practice is to report savings attributable to retrofit programs and savings attributable to lost opportunity or new construction programs. See Table 3-4 on the following page). Forum Glossary definitions of retrofit and lost opportunity programs are as follows:

- **Retrofit Program:** An energy efficiency program that provides incentives, information and technical support to customers in an effort to encourage the replacement of existing and operating equipment with more efficient equipment that provides the same function.
- **Lost Opportunity Program:** A program that captures energy efficiency opportunities at the time of a naturally-occurring market event, such as when a customer constructs, expands, renovates, or remodels a home or a building or makes an initial purchase of equipment, or replaces failed equipment.

Examples of other program types addressed in some annual energy-efficiency reports are: large commercial and industrial programs, small business programs, savings attributable to specific types of businesses, direct install programs, residential lighting programs, residential appliance programs, residential existing home retrofit programs, residential new construction programs, multi-family retrofit programs, etc.

Table 3-3: Comparative Reporting Elements – Program Type and End Use

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT	Overall Availability
State Level Report	✓	✓	Plan	Plan	Plan	✓	✓	✓	Plan	✓	✓	
State Level Results Reported												
Program Type[2]	✓	✓		✓	✓	✓	✓	✓	TBD		✓	Moderate 7 of 10
Retrofit, Lost Opportunity / New Construction	✓			✓	✓		✓	✓	TBD		✓	Moderate 7 of 10
Individual Programs	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	High 10 of 10

[1]Some program administrators report some data elements not included in the broader state report.
[2]Savings reported for at least some program types, not necessarily all savings allocated to specific program types.

Only two jurisdictions that currently publish annual energy-efficiency reports show savings by end use: Connecticut and Vermont. Delaware, Massachusetts,[14] Maryland and New York are in the process of developing state-level reporting formats and it is not yet known if these formats will include savings by end use.

3.3 Conclusions and Recommendations–Electric Savings

Forum Subcommittee members who provided input on reporting elements they consider very important for meeting specific policy needs indicated that some very detailed information on electric energy-efficiency program savings would be valuable (See Appendix A). Examples of detailed reporting elements that more than one-half of subcommittee respondents indicated would be important for at least some policy needs are:

- Savings reported by other customer sectors in addition to 1) commercial and industrial, 2) residential non-low income and 3) residential low income
- Savings reported by other program types in addition to 1) retrofit programs and 2) lost opportunity/new construction programs

[14] Currently, individual Massachusetts electric utilities' and the Cape Light Compact annual energy-efficiency reports use the same template, which includes savings by end use.

- Savings reported by end use/measure; examples are lighting, HVAC, appliances, motors/drives
- Savings reported by sector and measure—for example, residential lighting and commercial and industrial lighting

The purpose of this Project is to develop recommendations for the development of common reporting guidelines for jurisdictional energy-efficiency programs. The NMR team believes it is important that the recommended guidelines reflect what the majority of jurisdictions will find feasible to report without having to make significant changes in current practices. The recommended guidelines can be seen as a starting point; as jurisdictions adopt and become comfortable with the initial guideline recommendations, additional reporting elements can be added as they become more commonly reported or deemed valuable for regional or national reporting needs.

Based on the above conclusions, the recommended guidelines for reporting electric energy-efficiency program savings are as follows, and are presented more formally in Section 11:

- **Energy Savings**: Report net and gross, meter- and generation-level annual and lifetime kWh savings.
- **Demand Savings:** Report net and gross, meter- and generation-level summer peak, winter peak, and annual and lifetime kW savings.
- **Savings by Customer Sector:** Report savings allocated to three customer sectors–commercial and industrial, residential non-low income and residential low income.
- **Savings by Program Type:** Report savings attributable to retrofit programs and savings attributable to lost opportunity/new construction programs.
- **Savings by Customer Sector and Program Type:** Report retrofit program and lost opportunity/new construction program savings separately for the three customer sectors listed above (C&I, residential non-low income and residential low income).
- **Definitions:** To encourage increasing consistency in reported elements over time and to ensure readers of the reports know exactly what each reporting element represents, each jurisdiction should include a clear definition of each reported element. Ideally, the definitions used by jurisdictions will be consistent with the definitions in the Regional EM&V Forum - Glossary of Terms and Acronyms Version 1. (See Appendix B)

4 Natural Gas Energy-Efficiency Savings Reported

The majority of jurisdictions report energy-efficiency savings from reductions in natural gas usage. The majority of natural gas energy savings are reported at the annual (seven out of ten jurisdictions) and the lifetime (six out of ten jurisdictions) level. The annual reporting of natural gas savings comes from both gas utility programs and electric utility programs. Some of the states report savings directly from gas utility programs, some report natural gas savings from electric utility energy-efficiency programs and others a combination of the two.

Table 4-1: Comparative Reporting Elements - Gas Savings

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT	Overall Availability
Gas Savings												
Annual Therms Net	✓			✓	✓			✓	✓	✓	✓	Moderate 7 of 10
Annual Therms Gross												None
Lifetime Therms	✓			✓			✓	✓	✓	✓		Moderate 6 of 10
Lifetime Therms Gross												None

[1]Some program administrators report some data elements not included in the broader state report.

The inherent conflict for jurisdictions reporting a combination of gas savings from energy-efficiency programs sponsored by gas utilities and gas savings from electric programs that offset use of gas may promote the situation of double counting. It is important for each state to define the source of reported gas savings—an electric utility program or a gas utility program. We recommend continued reporting of these savings, as presented in Section 11, but with specific, separate definitions of each set of savings to avoid the issue of double counting of subsequent savings. Results will provide a better integration of the gas and electric savings components of the filing. Even though gross savings has not been reported, it has been identified as an important element to report by Forum subcommittee members (See Appendix A).

5 Expenditures Reporting

The targeted jurisdictions report a variety of expense categories. The definitions of what is included in specific categories vary widely.

5.1 Electric Energy-Efficiency Program Expenditures

The most frequently reported electric energy-efficiency program expense categories, reported by at least eight of ten jurisdictions are:

- Total expenses
- Research and evaluation expenses
- Administration expenses
- Incentives/rebates
- Marketing expenses

Forum subcommittee members were queried on which of the five above elements they considered to be very important. At least six of the nine Forum subcommittee members who responded indicated that all of the above cost categories are very important, and that the cost of performance incentives is also very important.

Differences in the definitions of what is included in specific cost categories are significant, which will make developing consistent reporting guidelines challenging. Also, New Jersey reports combined electric and gas program expenses. Using administrative costs as an example, several jurisdictions' definition of administrative costs are provided below. Consistent with widely varying definitions, reported administrative costs as a percentage of total program costs, also vary widely among the jurisdictions, ranging from less than 2% to over 30%.

- **Massachusetts**: Administrative costs, also commonly referred to as PP&A (Program Planning and Administration) costs, have traditionally been defined as all in-house and outsourced costs associated with planning activities and program administration. These include costs associated with developing program plans, as well as day-to-day program administration, including labor, overhead costs, and any regulatory costs associated with energy-efficiency activities.
- **New Hampshire**: Internal administration expenses are all utility costs associated with program design, development, regulatory support and quality assurance. Costs captured in this activity include: employee labor, benefits, expenses, materials, and supplies. External administration expenses are the cost of contractors and consultants used in support of program design, development, regulatory support, and quality insurance. Costs captured in this activity include all of the utility's external costs associated with program administration.
- **New Jersey:** Administration and program development costs include direct labor and employee overhead costs incurred in developing and managing the New Jersey's Clean

Energy Programs by the NJBPU's Office of Clean Energy, the utility program managers, the Department of Community Affairs, the Department of Environmental Protection and the Economic Development Authority, except those costs that are appropriately allocated to any of the other expense categories, plus the costs of facilities (including telephone, computers, supplies, etc.) and legal support services. For the market managers, Administration and Program Development Expenditures are those costs identified in the market manager contracts as "Program Administration" costs.

- **New York:** Costs to administer energy-efficiency programs that include but are not limited to: 1) staff salaries (e.g., management personnel, program managers, accounting personnel, regulatory staff, and administrative support staff), 2) company overhead (e.g., office space, supplies, computer and communication equipment, staff training, industry-related sponsorships and memberships), and 3) other costs that do not include program planning, marketing, trade ally training, direct program implementation, incentives and services, and program evaluation.
- **Vermont:** Administrative Costs include general management, budgeting and financial management and Efficiency Vermont contract management. These costs are not broken out by market.

Table 5-1 shows the electric energy-efficiency program expense categories reported by the targeted jurisdictions.

Table 5-1: Comparative Reporting Elements – Expenditures

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ[2]	NY	RI	VT	Overall Availability
Total Expenses	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	High 10 of 10
Program Evaluation	✓	✓		✓	✓	✓	✓	✓	✓	✓		High 9 of 10
Administration	✓	✓		✓	✓	✓	✓	✓	✓		✓	High 9 of 10
Performance Incentive				✓		✓		✓		✓		Low 4 of 10
Implementation Expenses				✓		✓	✓		✓	✓	✓	Moderate 6 of 10
Incentives / Rebates		✓		✓	✓	✓	✓	✓	✓		✓	High 8 of 10
Marketing		✓		✓	✓	✓	✓	✓	✓		✓	High 8 of 10
Customer Costs				✓		✓					✓	Low 3 of 10
Other	✓	✓			✓	✓		✓	✓		✓	Moderate 7 of 10

[1]Some program administrators report some data elements not included in the broader state report.
[2]New Jersey reports combined gas and electric program expenditures.

5.2 Gas Energy-Efficiency Program Expenditures

Five jurisdictions report natural gas energy-efficiency program expenditures, not including New Jersey where combined electric and gas energy-efficiency program expenditures are reported. Two additional jurisdictions (Maryland and Vermont) report gas savings that occur as a result of electric energy-efficiency programs and, therefore, do not separately budget or report expenses related to natural gas savings.

Table 5-2 shows that the only expense category reported by all six jurisdictions with natural gas energy-efficiency programs, including New Jersey, is total expenses. Three to five jurisdictions report gas expenditures in the remaining five expense categories considered very important by Forum Subcommittee members who provided input on reporting elements they consider very important for meeting specific policy needs:

- Program evaluation expenses reported by five jurisdictions
- Administration expenses reported by four jurisdictions
- Incentives/rebates reported by three jurisdictions
- Marketing expenses reported by three jurisdictions
- Performance incentives reported by four jurisdictions

Table 5-2: Comparative Reporting Elements – Gas Program Expenditures

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ[2]	NY	RI	VT	Overall Availability
Gas Program Expenditures												
Total Expenses	✓			✓			✓	✓	✓	✓		High 6 of 6
Program Evaluation	✓			✓				✓	✓	✓		High 5 of 6
Administration	✓			✓				✓	✓			Moderate 4 of 6
Performance Incentive				✓			✓	✓		✓		Moderate 4 of 6
Implementation Expenses				✓			✓		✓	✓		Moderate 4 of 6
Incentives / Rebates				✓				✓	✓			Moderate 3 of 6
Marketing				✓				✓	✓			Moderate 3 of 6
Customer Costs				✓								Low 1 of 6
Other	✓							✓	✓			Moderate 3 of 6

[1]Some program administrators report some data elements not included in the broader state report.
[2] New Jersey reports combined gas and electric program expenditures.

5.3 Conclusions and Recommendations—Program Expenditures

Forum Subcommittee members who provided input on reporting elements they consider very important for meeting specific policy needs indicated that the following six expenditure categories are very important:

- Total expenses
- Research and evaluation expenses
- Administration expenses
- Incentives/rebates
- Marketing expenses
- Performance incentives

The NMR team believes it is important that the recommended guidelines for consistent reporting of energy-efficiency program expenditures reflect what the majority of jurisdictions will find feasible to report without having to make significant changes in current practices. The recommended guidelines for expenditure reporting can be seen as a starting point. Initially, there are likely to be inconsistencies in what individual jurisdictions include in specific expense categories. Ideally, over time, as jurisdictions adopt and become comfortable with the initial guideline recommendations, consistency in category definitions will increase.

The current inconsistency in expense category definitions needs to be addressed. For example, as would be expected with widely varying definitions, reported administrative costs as a percentage of total program costs range from less than 2% to over 30%. There are two basic options for addressing these inconsistencies:

- **Define broader expense categories** that can be reported by jurisdictions that report detailed expense categories by combining multiple currently reported categories. This is a lowest-common-denominator approach.
- **Have Forum members develop clear definitions** of what costs should be included in each expense category they would like to see in the final reporting template. Individual program administrators likely have access to detailed expense information and could provide expense data meeting the agreed upon category definitions. This is a much better approach for achieving consistency across jurisdictions, but it may take some time to reach agreement on expense category definitions and for individual program administrators to report expenses using these definitions.

5.3.1 Expenditure Categories: Based on the above conclusions, the following are our recommended guidelines for reporting energy-efficiency program expenditures:

- **Report the six expense categories Forum members indicate are very important:** total, administrative, research and evaluation, incentive/rebate, marketing and performance incentive expenses.

- **Report expenses for the three major customer sectors:** commercial and industrial, residential non-low income and residential low income.

5.3.2 Cost of Saved Energy

Forum subcommittee members surveyed indicated that it is very important to report the cost of savings (i.e., cost per kWh and cost per therm). Cost per kWh can be presented as either a levelized cost and/or lifecycle cost. Current reporting practice across the Forum region includes a mix of both. In addition, one issue in defining total expenses when calculating the cost per kWh and cost per therm is whether or not to include participant cost in total expenses. In reviewing current energy-efficiency annual report documents, only a few jurisdictions report participant costs at all, and do not necessarily include participant costs in their cost per kWh calculation. Given that not all states track participant costs, it is recommended that the primary cost of savings value reported reflect only utility or program administrator costs, and not participant/customer costs.

The cost of saved energy can be reported using a lifecycle cost per kWh (or therm), and/or a levelized cost per kWh (or therm). The methods serve different purposes and are both considered to be of value, as explained below. The following formulas are typically used to calculate cost of savings:

Lifecycle cost per kWh and per Therm is a straightforward calculation used to determine the cost of saved energy that reflects the cost of saved energy over the lifespan of the measures implemented. This method is used in a number of states, and is the preferred method used in environmental analyses.

(1) *Lifecycle Cost of Electric Energy Savings* = $\frac{\text{Total Electric Program Expenses}}{\text{Lifetime Energy Savings in kWhs}}$

(2) *Lifecycle Cost of Gas Energy Savings* = $\frac{\text{Total Gas Program Expenses}}{\text{Lifetime Energy Savings in Therms}}$

Levelized Cost per kWh/Therm is a more complex, but economically accurate, calculation that captures the value of energy-efficiency investments over time. The levelized cost represents the level of payment needed each year to recover the total investment and interest payments (at a specified interest rate) over the life of the measure(s). This calculation is useful for comparing the value of energy efficiency to other resources. The calculation is as follows:

(1) *Levelized Cost of Conserved Electric Energy* = $\frac{\text{Program Costs x CRF}}{\text{Annual kWh saved}}$

(2) *Levelized Cost of Conserved Gas* = $\frac{\text{Program Costs x CRF}}{\text{Annual Therms saved}}$

$$\textit{Capital Recovery Factor (CRF)} = \frac{i\,(1+i)^n}{(1+i)^n - 1}$$

i = real discount rate
n = useful life period (i.e., average measure life for portfolio of programs)

In reporting the levelized cost per kWh/therm, the key underlying assumptions should be noted, specifically for the average useful measure life (for portfolio of programs) and the real discount rate used. There is a range of discount rates typically used to determine levelized cost of savings. It is recommended that the region move toward greater consistency in the definition of discount rate used.

A Note on Considering Peak Demand Savings in Cost of Saved Energy Calculations: An important consideration in calculating costs of saved energy is that they typically ignore the impact of peak demand savings, and therefore make portfolios of programs targeting peak savings measures look worse than those just promoting energy savings (e.g., CFLs). Thus, from a truly optimal economic perspective, the economic value of the peak savings should be deducted from the cost before dividing by the energy savings. For example, if an efficient central A/C had a cost of $500, annual energy savings of 300 kWh and a life of 15 years (with a real discount rate of 5%), the levelized cost using the above calculation would be 16.1 cents/kWh. However, if the peak demand savings from the measure were worth $400, then the cost would be reduced to $100 (net of peak benefits) and the net levelized cost per unit of energy savings would be 3.2 cents/kWh.

The above addresses the fact that energy efficiency provides numerous and diverse benefits and that it is often inappropriate to compare the total cost to just one type of benefit because that ratio is then often compared to a similar ratio for something that has only one benefit (e.g., comparing levelized cost of energy efficiency to market clearing prices for energy on the supply side). While it is not recommended here that a common cost of saved energy calculation consider the value of peak savings impacts, it is important to note this caveat and the context in which the cost is being compared so as not to potentially mislead policymakers.

6 Energy-Efficiency Program Tracking Systems

Tracking systems used by energy-efficiency program sponsors for compilation and reporting of required DSM data are a critical piece of understanding the impact of energy-efficiency efforts against state energy/demand savings and economic goals. The basic functions of a tracking system are similar among utilities; record customers receiving rebates, calculate savings and process payments. As illustrated in Figure 1-1, tracking system data is a foundation of the reported energy-efficiency data by program administrators and therefore of relative importance.

While this Project focused on data to include in common reporting guidelines, the team was tasked to conduct a high-level review of the tracking systems used by energy-efficiency program sponsors for compilation and reporting of required data. Interview questions addressed:

- The level of data tracked and how data are entered into the tracking system
- The name of the tracking system—if a commercially available program—and the software used
- A brief description of the system
- The cost of developing or purchasing the tracking system
- Key outputs, such as expenditure reports, savings reports and customer rebates

Several program sponsors were interviewed to address weaknesses in current tracking systems, how they could be improved, and the cost implications of such improvements (See Appendix E for interview guide).

Four program sponsors responded to the interview request, with one providing comments on a similar system used by another utility.[15] The overall level of comprehensiveness of tracking by the four systems reviewed varies widely.

Comprehensive Tracking System: The most comprehensive tracking system is a custom-designed system that tracks efficiency programs from start to finish (the start of the job to impact results). Impact formulas are embedded in the system. As new programs are developed, they are added to the system. The system tracks, processes and generates final reports for distribution. The cost of this comprehensive system, which serves programs in multiple states with different reporting requirements, was several million dollars and involved more than fifty people from a variety of consulting firms to develop over a period of two years. This particular system is constantly being improved and updated as necessary.

Modest Tracking System: Two systems reviewed are similar to the first yet have a lower level of automation and complexity. These systems were developed in house by program managers and their IT department. The tracking systems include basic customer information, rate class, building type, equipment and end-use, savings (energy, demand, MMBtu), coincidence factors, demand ratios, measure life, and other impact factors such as free-ridership, spillover, persistence, diversity, and realization rates. Not all these fields are currently in use. Key outputs

[15] Respondents included program sponsors from Baltimore Gas and Electric, LIPA, National Grid and Unitil.

include expenditure reports as well as lifetime and annual savings reported on a monthly basis. One of these systems however does not produce final reports for regulatory reporting. Data are extracted from the database and then entered into separate reports for regulatory reporting purposes. Weaknesses mentioned for these systems include difficulty navigating the database to draw out the necessary information for various needs, too many separate systems managing data and lack of a fully automated workload tracking process. The greatest barrier to expanding the system is the resources and data that IT can provide. These issues are currently being addressed.

Less Comprehensive Tracking System: The third tracking system reviewed has administrative staff enter data from forms filled out by contractors in the field. Outputs generated include reports on program impacts and measure data. This is also a custom system developed by a single consultant. The system is still under development, with improved accessibility as an outstanding goal.

6.1 Conclusions and Recommendations – Tracking Systems

Program administrators have differing needs and resources for establishing effective tracking systems. They should seek to attain and maintain a tracking system and database that best suits their specific situation and budget. Successful tracking systems and databases share several key features:

- A tracking system should align with the goals and objectives of the energy-efficiency program portfolio it represents.
- All necessary information must be able to be delivered to program administrators so they may evaluate the success of the program and portfolio of measures.
- A tracking system's functionality should include tracking of costs so it can be compared against program savings.
- Consider making it web-based with a simplified interface, which would allow many more user groups to provide input and retrieve data.

The Forum can help share information and examples of tracking systems across the region, facilitating consistency and transparency among the various member tracking systems. Recently many states have invested in developing a new or updated an older tracking system, while others are looking to develop one from scratch. Those looking to develop a system could fund a Forum study to define and advance the most effective options found in the Forum region. Finally the Forum can provide the most widely utilized elements and features found in effective tracking systems to those looking to update or customize an existing system.

7 Emissions Reporting

7.1 Current Program Administrator Emissions Reporting Practices

The gap analysis for this Project reviewed current reporting practices of energy-efficiency program-related emission reductions, and researched and reported on the extent to which energy-efficiency program savings impacts are being incorporated into air quality and climate change plans developed by air regulators in Forum states. Based on the gap analysis, recommendations are provided for specific data needs and steps needed to address barriers to incorporating energy-efficiency into air quality and climate change plans.

Overall, emissions reductions are a typical component of the annual reports from program administrators, reported in terms of tons per year. Table 7-1 indicates that typical emissions reported by the EM&V Forum program administrators in energy-efficiency annual reports or other publicly available literature are SO_2, NO_x, CO_2, and mercury (Hg). Out of the ten states plus D.C. in the EM&V Forum region, program administrators in Maryland, Delaware, and D.C. either did not provide emissions reductions information of some type in their annual energy-efficiency reports or did not have a report readily available. Carbon/greenhouse gases were the most commonly reported type of emission savings, but the methodology for calculating emissions reductions is usually not described and the units and gases reported are sometimes not consistent across program administrators from different states. For example, Connecticut's Clean Energy Program 2009 report includes annual and lifetime reductions for CO_2, NO_x, and SO_2 in metric tons. However, National Grid's 2008 Energy Efficiency Annual Report to the Massachusetts Department of Public Utilities only mentions CO_2 emission reduction benefits in dollars.

Table 7-1: Emissions Savings due to Energy Efficiency in Annual Report

State/Jurisdiction	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT
State Level Report	✓			✓	✓	✓	✓	✓	✓	✓	✓
State Level Results Reported											
SO_2	✓					✓		✓	✓		✓
NO_x	✓					✓		✓	✓		✓
CO_2/eCO_2	✓			✓		✓		✓	✓	✓	✓
Hg	✓							✓			
General							✓				

7.2 Introduction to Clean Air Act and State Implementation Plan to Meet Ambient Air Quality Standards

Air regulators are primarily interested in three major classes of emissions: criteria pollutants and their precursors, air toxics, and greenhouse gases. The majority of United States electrical generation comes from fossil fuels, which results in the release of multiple air pollutants. Therefore, reducing electricity demand through energy-efficiency programs can reduce criteria pollutants, air toxics, and greenhouse gas since less electricity needs to be produced and less fossil fuel is consumed.

Criteria Pollutants and Clean Air Act Requirements

To understand some of the data needs of air quality regulators, it is important to understand key regulatory mandates. For example the federal Clean Air Act requires EPA to establish and periodically update the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead). EPA sets NAAQS based on ambient levels that are protective of public health and welfare. EPA designates areas across the country as either attaining or not attaining the NAAQS (or unclassifiable if data are not available). A nonattainment designation triggers requirements for states to take actions to attain the NAAQS as expeditiously as possible. If a state has an area designated as nonattainment for a NAAQS, the Clean Air Act requires the state to develop and implement a state implementation plan (SIP). The SIP is a criteria-pollutant-specific air quality plan that includes an emissions inventory, photochemical modeling demonstrating attainment of the NAAQS, and emissions reduction strategies in the form of enforceable programs/regulations to meet and/or maintain that NAAQS. The SIP is subject to EPA approval, whereupon it becomes federally enforceable. Failure to attain a NAAQS or meet SIP obligations exposes the state to potential EPA sanctions, including, but not limited to, more stringent requirements to permit new emissions sources, and in more serious cases, loss of federal highway funds. SIPs are revised regularly and frequently. Within the SIP process, there may be opportunity to include emissions reductions from energy-efficiency programs.

EPA has issued guidance documents to support state incorporation of energy-efficiency measures and renewable energy measures into SIPs, including:

- Incorporating Emerging and Voluntary Measures in a State Implementation Plan (SIP), September 2004
- Guidance on State Implementation Plan (SIP) Credits for Emissions Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures, August 2004

7.3 Incorporation of Energy-Efficiency Impacts in SIP: Baseline, Weight of Evidence (WOE) or SIP Credit

The five steps in air quality planning are: 1) establish air quality goals, 2) determine emissions reductions needed, 3) develop control strategies, 4) implement control programs and 5) conduct

on-going evaluations of the efficacy of the control programs. This section is focused on step three; step five is emphasized through a separate EM&V Forum project to develop and implement consistent EM&V protocols that measure the energy and demand savings from energy efficiency. Air quality plans are referred to as state implementation plans or SIPs.

A SIP must include: 1) a recent emissions inventory of all emissions sources, state-wide and for each nonattainment area, 2) a baseline emissions growth projection over time, and 3) air quality photochemical modeling analysis that demonstrates attainment of the NAAQS by the attainment year. The modeling takes into account the various measures and regulations that are being implemented to reduce emissions in order to meet the NAAQS.

The emissions reductions from energy efficiency can be accounted for in SIPs in three different ways. Emissions can be:

- Included in EPA and state reference case (baseline) that assesses how emissions will change in the future based on various economic, energy and environmental variables
- Part of the weight of evidence (WOE) analysis included in the SIP emissions baseline projection that is submitted to EPA. In this context, WOE is a qualitative analysis used by an air quality agency to demonstrate attainment with the NAAQS.
- A specific control strategy where SIP credits are "guaranteed" emissions reductions achieved by a technology or program requirement, with accompanying enforcement of that strategy

EPA periodically releases a base case scenario for the electric power sector that states use in their SIP emissions growth baseline projections. EPA uses the baseline electricity demand forecast projected by the Energy Information Administration (EIA) found in their Annual Energy Outlook (AEO) Report. States could potentially input emission reductions as a result of existing, state-specific energy-efficiency measures into their emissions growth baseline projections. However, states must first assess and quantify what is already assumed in the base case predicted by EIA and EPA. SIP credits assure that emissions reductions occur through reliable technologies or other strategies and must satisfy a stringent list of requirements, which require that the reductions be:

- Real
- Quantifiable
- Surplus
- Enforceable
- Permanent

Regardless of which of the above paths a state chooses, the protocols and procedures used to verify the underlying energy savings from energy efficiency measures should be the same. Details regarding the methodologies and processes associated with the three paths are described in Appendix G.

7.4 Requirements for Obtaining SIP Credit for Energy Efficiency

Air regulators are required to quantify the emissions reductions resulting from the energy savings of energy-efficiency measures to qualify as SIP credits. EPA guidance documents described in section 7.2 above provide specific quantification steps necessary for translating efficiency savings data into air quality improvements. To illustrate, a state seeking EPA approval and credit for energy efficiency as part of an ozone SIP would be required to:

- Determine the amount, type, and location of electric generation that would be displaced by energy-efficiency and renewable energy measures being pursued in the jurisdiction
- Estimate the annual and summer ozone season NOx emission rates from power plants serving the state/region
- Quantify the impact on annual and ozone-season NOx emissions on ambient air quality during key time periods

For other criteria and toxic pollutants, and for greenhouse gases, the same process used in step one for NOx to calculate emissions reductions benefits per step one would also apply to other pollutants. The processes described by steps two and three would also apply to other pollutants, but, in addition to the calculation of annual emissions reductions, the calculations for these other pollutants would also include daily emissions rates and impacts for criteria pollutants such as particulate matter and SO_2.

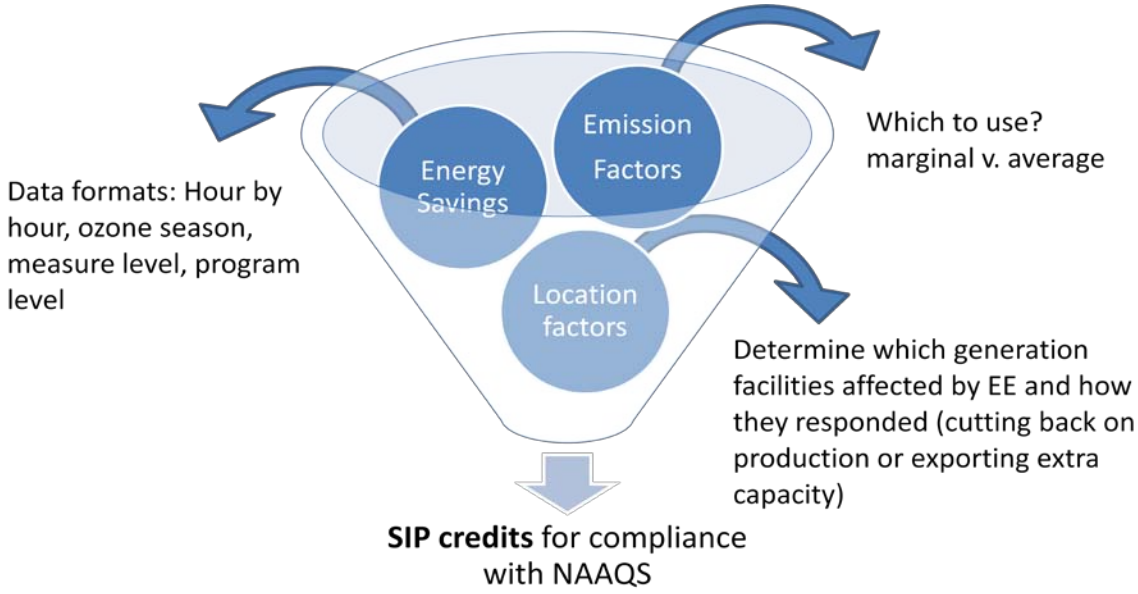
The illustration in Figure 7-1 demonstrates the various factors that must be synthesized to support air regulator activities when incorporating emissions reductions from energy efficiency in the SIP process. A challenge for air regulators in obtaining these energy-efficiency data is that program administrators are responsible for conducting energy-efficiency program savings impact evaluations and reporting energy and demand savings information. The factors described in Figure 7-1 however, are typically beyond the scope of program administrators' reporting requirements and emphasize the need for interagency coordination (with air quality regulators and independent system operators) to provide data that could be used with EPA guidelines on how to calculate emissions reductions (e.g., what level of detail is acceptable, which emissions factor to use, etc). Air regulators interviewed for this Project and EPA emphasized the importance of credible and replicable energy savings data. If the underlying energy savings data cannot be verified, or trusted, states and EPA are less likely to include the emissions reductions benefits from energy-efficiency programs in their SIPs and greenhouse gas reduction plans.

Once the energy savings from energy efficiency are determined, states must decide what emissions factor to use to convert the energy savings into emissions reductions. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an associated activity.[16] The emissions factor is derived from the pollutant content of the fuel used in the region and combustion conditions. Burning the fuel releases these compounds into the air, affecting local air quality. A first-order estimate of the emissions

[16] EPA definition.

avoided through reduced energy consumption can be found by multiplying the emissions factor by the energy savings.

Figure 7-1: Inputs for SIP credit



Emissions savings data are commonly provided by the independent systems' operator, and may be expressed as an average rate, marginal rate, or some other value related to the effect of energy saved on a specific portion of the generating units that operate within the particular load zone or regional power pool.

In regional power markets like those of the Northeast and Mid-Atlantic, it is common for electricity to be generated and imported and exported across several states. Consequently, energy-efficiency activities can influence the frequency of operation and the electricity output from generating units in the state where the measures are deployed and also in adjoining states, depending upon the characteristics of demand, transmission constraints or congestion, and the economics associated with the generating units. It may be possible to quantify the amount of energy saved by a program administrator's efficiency program, but if the resulting emissions reduction cannot be localized then it would be difficult to assign the air pollution reduction to a particular locale. These issues suggest that EPA and the states jointly discuss how to assign credit for energy-efficiency measures when these benefits occur in the affected state and adjoining ones because there will be a need for a method to link the energy savings with reduced fuel usage in a particular location. Localized emission factors are usually not available, and without knowing the reduction in generation in that locale from efficiency, there is no way to properly capture effects on air quality. Also, the more granular the data, the more likely data may

vary, which is counter to the need for consistency and repeatability desired by state air regulators and EPA.

7.5 Treatment of Greenhouse Gases (GHG)

Greenhouse gas emissions do not have the same local geographic barriers as criteria pollutants when quantifying the emission reductions from energy-efficiency programs, though if programs are done on a state basis then determining which state "gets' the credit still apply. To date, EPA has not designated NAAQS for greenhouse gas emissions; therefore, states do not develop SIPs for GHGs. However, state climate change action plans rely upon energy efficiency as one of the chief policy measures to reduce GHG over time. The same robust and consistent protocols that are used to measure and verify energy savings for criteria pollutants can also be applied to calculate the quantity of GHG reduced by energy efficiency.

Interviewees from some states, such as Maryland, expressed interest in conducting planning analyses for GHG and SIP related (criteria) pollutants simultaneously with the intent of identifying control strategies resulting in co-benefits (i.e., emissions reductions) that would address GHG and SIP/air quality program goals concurrently. Several interviewees remarked that this is currently a work in progress, with one example being New Hampshire, where there is a dedicated team from University of New Hampshire developing the best means to assess emissions impacts of energy-efficiency and renewable energy projects.

Furthermore, most air quality regulators mentioned the Regional Greenhouse Gas Initiative (RGGI), and their responses indicated that energy-efficiency reporting requirements vary from state to state. For example, in New Jersey three different agencies implement and report how RGGI proceeds are spent along with the resulting GHG reductions according to New Jersey rule 727d.[17] In contrast, for Connecticut the Energy Conservation Management Board reports GHG impacts to the Department of Public Utilities Control (DPUC). RGGI proceeds go into the system benefits pool for various conservation and load management programs in Connecticut and the resulting emissions avoided are then reported for those programs. Additionally, Connecticut's climate change action plan, headed by the governor's steering committee, also reports GHG emissions impacts from energy-efficiency programs.

Many states have also passed their own legislation dealing with climate change such as the Massachusetts Global Warming Solutions Act and the New Jersey Global Warming Response Act. In general, air quality regulators see energy efficiency as an important tool for mitigating greenhouse gases and this is frequently reflected in state climate change action plans. Data consistency and credibility are as important for measuring a state's progress to meet GHG reduction goals as they are for developing a SIP.

[17] Rule 727d states that each local agency that is awarded a grant shall submit to the Department of Environmental Protection progress reports describing project implementation progress, a final report describing implementation success and actual or expected greenhouse gas reductions resulting from project completion, and financial reports describing the justifying project expenditures.

7.6 Air Quality Regulator Interviews to Identify Energy-Efficiency Data Needs and Practices

To better understand mechanisms used, data needs, and barriers to incorporating energy efficiency in SIPs, air quality regulators from six Northeast states responsible for SIP planning were interviewed to identify current reporting and data needs. Although the number of regulators interviewed was not very large, these organizations represented over half those in EM&V Forum states. However, it is important to note that observations reported here are often based on feedback from as few as one or two entities and reflect only those entities' knowledge. The views and opinions expressed do not necessarily reflect those of all the directors of the state air quality agencies. Further, findings and recommendations were also informed by feedback from Forum project subcommittee members. Table 7-2 summarizes results from these interviews.

The key findings provide an overview of how the energy savings from energy efficiency are currently captured in air quality plans, and potential barriers to using these data in planning activities from a limited selection of states. Overall, the results indicate that the EM&V Forum states interviewed are at diverse stages of incorporating the benefits of energy-efficiency programs into air quality and climate change action plans. Additionally, there were differences in the views of the air regulatory staff about the best way to move forward incorporating efficiency benefits into planning activities. Current areas in which differences were identified include: communication between agencies dealing with air quality and energy-efficiency programs, awareness of available resources regarding efficiency program results, and understanding of how efficiency programs are evaluated. Generally, air regulators' awareness of energy-efficiency practices in other states is based on their review of the rankings of the state programs, such as the annual ACEEE Scorecard. With the exception of the air quality regulatory staff in Connecticut and Massachusetts, interviewees were not aware of or familiar with the requirements for energy efficiency as a resource in forward capacity markets in PJM and ISO-NE. This finding is important to note, as it is one issue that is highlighted in the recommendations section.

Table 7-2 divides states into two categories: those states where the air regulators incorporate energy-efficiency benefits into SIPs and those that do not, as identified by the interviewees. For states that incorporate energy efficiency in their SIPs, attributes are listed to describe what was in the SIP as well as a checklist of items desired. The staff from states that do not incorporate energy efficiency in the SIP provided many examples of the barriers preventing them from doing so. Their suggestions for how to overcome these barriers overlapped with some requests from those that incorporate energy efficiency in the SIP. These results are discussed in greater detail later in this section. When asked about additional data needs from program administrators, the responses varied from "nothing" to "everything available." Air regulatory staff also mentioned that they needed process and regulatory related support for their planning activities from EPA and amendments to state statutes to explicitly create opportunities to include the emissions reductions benefits of energy efficiency in air quality plans. These process related needs

constituted a greater concern for the interviewees than data requirements from program administrators and was an unexpected finding.

Table 7-2: Air Quality Staff Interview Results

State/Jurisdiction	CT	MA	MD	NH	NJ	NY
EE in SIP						
Pollutants						
NO_x	✓	✓	✓		✓	
Ozone	✓		✓			
SO_x		✓			✓	
$PM_{2.5}$			✓			
Mechanism for Including EE in SIP						
Weight of Evidence	✓				✓	
Voluntary Bundle – DC region SIP			✓			
SIP Credit – EE treated as an independent control measure						
Other -Incentive for EE in SIP based program		✓				
Data sufficient?						
for Weight of Evidence	yes				yes	
for SIP credit	no		no		no	
Other -Incentive for EE in SIP based program		yes				
EE not in SIP						
Interested in incorporating EE in SIP?				✓		✓
Aware of program administrator Reports				✓		
Barriers Identified						
SIP credit criteria				✓		✓
Budget Constraints						
Consistent calculation (emissions factor)				✓		
Cap and trade complications						✓
Treatment of Imports/Exports				✓		
Needs – All States Interviewed						
Regional modeling to account for EE benefits			✓		✓	✓
Interagency Collaboration			✓		✓	✓
EPA approved process for EE incorporation	✓	✓	✓	✓	✓	✓
Energy Savings Data from Program Administration reports		✓	✓			✓
Awareness – Wholesale FCMs						
Requirements for EE as a resource	✓					
GHG Reporting						
RGGI	✓	✓	✓		✓	
Climate Change Action Plan	✓	✓	✓	✓		

Two states, New Jersey and Connecticut, reported using energy efficiency as weight of evidence in their state implementation plan. A few state air quality agencies, like the Connecticut DEP, consider efficiency benefits in their emissions baseline. No states interviewed currently claim SIP credits for energy-efficiency activities, but some interviewees mentioned Washington D.C.'s

LED Traffic lighting project which was used in that jurisdiction's SIP for credit in the voluntary bundle.[18] Voluntary measures[19] are not directly enforceable against the source(s) implementing the measures. If measures do not achieve predicted emission reduction levels, then the responsibility of remedying the shortfall falls onto the state.

In Massachusetts, the NOx Budget program is part of the state SIP, and has a number of elements designed to promote efficiency. The program provides for a "public benefit set aside" where the set-aside provision allocates between 10 and 12 percent of the annual NOx Budget to a set-aside account. The Massachusetts DEP awards those allowances to projects that meet the requirements for energy efficiency and renewable energy projects calculated as per the terms prescribed in regulation (310 CMR 7.32(5)(c)2. pgs 393 of 601)[20]. In addition to the NOx Budget Program, Massachusetts has a number of state only requirements contained in air regulations that are not part of the SIP but that promote energy efficiency to reduce emissions, including new source permitting requirements (310 CMR 7.26 (42) pgs 287-601) and Emissions Standards for Existing Power Plants that contain output based emission standards (310 CMR 7.29(5) pg 351. All of the Massachusetts air regulations components, both SIP and non SIP, aggressively promote energy efficiency as a means to meet the Clean Air and energy goals of the Commonwealth.

7.6.1 Interview Results from States that Incorporate Efficiency Benefits in SIP

A review of the states that report efficiency WOE benefits in their SIP revealed that the impacts are calculated by the program administrator using either marginal or average emissions rates obtained from the regional systems operator. The program administrators typically take deemed savings and multiply the value by the regional emissions factor to get an estimate of avoided emissions. We found that ISO-NE provides a marginal rate while PJM provides an average rate. It is likely that the emission factor in use (marginal or average) is simply the one that is available and will persist until guidance or requirements are provided to use a specific rate and methodology.[21]

Findings from interviews included the following:

- Burden for obtaining SIP credit was felt to be too high.
- Lack of clarity on which agency bears the responsible for enforcement of savings (EPA, air regulators, program administrators or all)
- Imprecision of energy-efficiency savings captured as part of market-based emissions trading programs

[18] Jeff King - Metropolitan Washington Council of Governments (MWCOG)
[19] http://www.epa.gov/ttn/oarpg/t1/memoranda/coverpol.pdf
[20] See http://www.mass.gov/dep/service/regulations/310cmr07.pdf).
[21] Recently the ISO New England Environmental Advisory Group held a discussion in February 2010 on peak day NO_x analysis using the top 500 MW decrease in generation. The NO_x rates were averaged by fuel and generation type. The purpose was to examine the NO_x emissions on historic peak load days to provide a better basis for estimating future emission reductions from energy efficiency.

- WOE can be considered an ineffective and resource intensive vehicle to garner significant quantities of emissions reductions.

The states using WOE would like to be able to claim SIP credit as the next step, but are struggling with the SIP credit enforceability requirement. In particular, air quality regulators from New Jersey indicated that efficiency programs are voluntary and they cannot claim SIP credit because they are uncertain if they can rely on these savings in future years. One action that New Jersey air regulators would like to see taken to satisfy the enforceability requirement is for the Board of Public Utilities to retire NO_x allowances due to efficiency programs, which would then allow the air regulators to claim SIP credit.

If the savings were enforceable, then New Jersey air regulators stated that they would consider applying for SIP credit in the future because the forecasting tools are available for them to predict the avoided emissions. Since the forecast is done on a regional scale the New Jersey air regulators would have to figure out how to incorporate it at a state level, and that leads to further complications. According to New Jersey air regulators, EPA currently uses Integrated Planning Model (IPM) to forecast energy use and emissions. The New Jersey regulators have also used it before without focusing on energy efficiency, but they said they could run it again considering the energy-efficiency case and then propose to EPA that they accept the calculation in support of SIP credits due to energy efficiency.[22]

7.6.2 Interview Results from States that Do Not Currently Incorporate Efficiency Benefits in SIP

The group of regulators interviewed who do not include efficiency impacts in SIPs see energy efficiency as an increasingly important tool for reducing air emissions, and are interested in exploring opportunities to fully realize the benefits from energy efficiency. Many of these states would like to or are planning to include the effects of energy efficiency in their SIP. All air quality regulators in this group expressed interest in process related support from EPA to overcome several significant barriers preventing them from claiming SIP credit for efficiency programs:

- Difficulty satisfying all SIP credit requirements
- Separating out effects of electricity imports/exports (significant in Northeast states)
- Regional and state interagency coordination

Maryland and New York interviewees report not being aware of annual reports from program administrators. New Hampshire air regulators are aware of the reports and know they must be periodically submitted to the public utilities commission.

[22] A subcommittee member noted that IPM does not handle dispersed resources well and that there are more appropriate models/tools available to evaluate energy-efficiency benefits. Another subcommittee member opined that model runs alone will not be sufficient to generate SIP credits

One aspect of these interviews that should be emphasized here is that they provided a snapshot of the current understanding by interviewed air regulator personnel and likely did not capture the full spectrum of innovative activities related to energy efficiency occurring in Forum states. Some regulators do not readily categorize their activities in terms of energy efficiency, such as using output-based standards in NO_x cap and trade program, but they do have a number of elements designed to promote efficiency built in. One example is the use of output-based regulations for power plants, engines, and turbines in Massachusetts. This means that allowances in the NOx cap and trade program are awarded based upon annually updated electrical output rather than on historical emissions and the approach provides incentives for generating electricity in the most efficient manner. The Massachusetts DEP[23] pioneered standards for facilities written in lb/MWh instead of lb/MMBtu heat input, thus focusing on measures of efficient power plant operation.

Air regulators from four states that do not currently incorporate efficiency in the SIP indicated they would like the program administrators to calculate emissions impacts due to efficiency with input from the air quality agency. Additionally, they would like an audit trail to follow so they would feel comfortable using data from program administrators. It is the opinion of the authors, however, that passing along the responsibility of calculating emissions impacts to program administrators is not advisable because EPA and air quality regulators have not come to an agreement on how the calculation should be made. Responsibility should either be shared or fall to an organization like the Connecticut Energy Conservation Management Board (ECMB), which has representation from both air regulators and program administrators. Because of the dependence on location, season, time of day, and other variables, the uncertainty involved in calculating emissions impacts from energy savings is quite large and is complicated by the lack of consensus on which emissions factors to use, determining which generators are affected by the energy savings, and the efficiency and fuel mix of those generators as a function of time.

Common to all air regulators interviewed is a desire for an EPA-approved process for determining and approving SIP credits because the air quality regulators want their efforts documenting the impacts to be accepted. They would like to work with EPA on guidance on preferred ways to treat efficiency (as baseline, WOE, or SIP credit) and how to account for complications such as double counting with ISO forecasts, inter-state flow of electricity and issues arising from cap-and-trade programs (such as credit retirement and ownership of credits).

7.7 Communication among Regulatory Agencies and with EPA

The lack of a regulatory structure provided by EPA appears to be a key impediment to accounting for the emissions benefits of efficiency programs. State air regulators would like to see a concerted effort by key parties (EPA, air regulators, program administrators, RTOs) to come to some agreement on the best way to recognize the real benefits of energy efficiency on

[23] Nancy Seidman, Massachusetts Department of Environmental Protection

air quality, perhaps a roundtable headed up by EPA. The regulators expressed concerns about the lack of communication between program administrators and air regulators, and suggested there is a need for some structure to overcome this agency divide. The only state DEP interviewed that is not struggling with this communication barrier is Connecticut, which has air regulatory personnel on the Connecticut ECMB, and a good understanding and exchange of information exists between program administrators and air quality regulators.

7.8 Recommendations for Energy-Efficiency Data Reporting to Support Climate Change and Air Quality Goals

As suggested by the preceding discussion, large variations exist in the processes, data, and linkages needed to support the connection between program administrator energy-efficiency program reporting and accounting for the emissions impacts of such programs. None of the Forum states have a process in place that allows taking SIP credit for emissions reductions from energy-efficiency programs. All air quality regulators interviewed indicated a strong interest in solving the problem of accounting for emissions reductions from energy-efficiency programs, but there are fundamental issues that have to be addressed to permit that to happen. Recommendations below are in two areas. The first is process changes that need to be addressed. The second is data reporting that would be required.

7.8.1 Recommendations: Process Related

Air quality regulators indicated that there are overarching processes and policy issues that need to be addressed. A summary of these recommendations is listed in Table 7-3.

Based on these needs, the first recommendation would be for EPA to provide guidance that would help a state to choose which of the three paths (baseline, WOE or SIP credit) to take, and what steps are required in order for the state to receive EPA approval for the selected path. A transparent and consistent methodology for incorporation of efficiency benefits should be part of the guidance prepared by EPA. Finally, it is important for state public utility commissions, program administrators and air regulators to have the proper authority to collect data in support of their emissions planning activities.[24]

[24] Designing state energy-efficiency programs to facilitate assessment of air emission reductions, by Debra Jacobson of DJ Consulting LLC

Table 7-3: Recommendations to Provide Process Related Support to Air Regulators

Organization	Action
EPA	Determine best approach(es) for incorporating EE emissions benefits into air quality regulatory programs
EPA	Create a mechanism to ensure enforceability of EE programs
EPA	Develop transparent, consistent and simplified methodology for air regulators to account for benefits
PUCs, PAs, DEPs	Coordinate with air regulators (DEPs) to identify best processes for sharing EE data
EPA, DEPs	Establish NO_x allowance set-aside process
DEPs	Retire NO_x allowances on behalf of EE program accomplishments
Air Regulators	Coordinate with regulators from other states or hold best-practice roundtable

Given the issues discussed earlier, and in more detail in Appendix G, regarding the criteria to determine SIP credit and the process requirements, emissions reductions could be accounted for in the baseline, significantly simplifying the process and reducing the burden on air quality regulators. Regional air quality modeling, conducted to forecast the affects of energy and economic variables on future emissions, should integrate the efficiency programs in neighboring states as it would provide a more realistic estimate of the overall impact on air pollution. As mentioned above, EPA could help states to assess the effects of energy efficiency in the regional scale models that EPA conducts.

In addition to the above recommendations that reflect a longer-term perspective, other actions can be taken in the short term. EPA should revise its requirements for the actual energy-efficiency program and just apply those standards to the air agency allowance retirement. Air regulators are generally not aware that energy-efficiency resources participate in wholesale electric forward capacity markets in New England and the mid-Atlantic, and must meet stringent measurement and verification (M&V) standards. Air regulatory agencies could work with their colleagues to understand the M&V standards, and explore whether the standards, and the associated energy-efficiency resources that clear the market, can serve as the basis for the state to retire NO_x allowances. Program administrators currently bundle and bid a portfolio of energy-efficiency demand savings into the capacity market. Documentation of the resource clearing the market, along with supporting M&V reference documents, could potentially be used by the air agency to permanently retire the NO_x allowance (that year and in future years), thereby creating the ability to apply for SIP credit.[25,26]

[25] Recommendation from Jeff King, project subcommittee member.

[26] Limitation of using capacity market data is that PJM/ISO-NE peak performance hours may differ from NO_x HEDD hours, however much of the underlying evaluation impacts apply. For some states, the program administrator M&V plans and data provided to the ISO/RTO are not publically available. These issues would need to be addressed

Although air regulators' data needs were inconsistent across the states, from a high level perspective one driver of air regulator data needs stem from the amount of time efficiency programs have been running in the state and the comfort level that those regulators have with the data and EPA requirements. States with newer efficiency programs have not had time to become knowledgeable about the energy savings data and could benefit from training by regulators from states that are accustomed to using efficiency data for air quality purposes. Rather than having to reinvent the wheel in each state, there could be significant advantages for air regulators and even program administrators to discuss their respective experiences and lessons learned to adopt the best practices into air quality and energy-efficiency program plans.

7.8.2 Recommendations: Data Reporting Needs

This section contains a list of data that interviewed air quality regulators identified as important to report; however, it is likely that not all these data can be reported efficiently in the statewide annual reports from program administrators. The recommendations at the end of this section address three categories of data reporting: data to be reported in state reports; data that might be included in the reports, but needs further discussion; and data that are likely to be too burdensome to report, but should be shared or provided to air quality regulation agencies through some other venue (e.g., joint studies).

According to feedback from the EM&V project subcommittee, Figure 7-2 summarizes data needs that would assist the incorporation of energy-efficiency emissions impacts in SIPs and other planning activities. It is important to point out that consistency is needed not only among program administrators in how they report their energy savings, but also in how utilities and regional transmission organizations report peak hours. Peak hours of energy consumption do not always align with hours of peak pollutant concentration, which is of primary interest to air quality regulators. This is not addressed in Figure 7-2, but requires inter-organizational attention.

by interested stakeholders. For more information about M&V standards in the forward capacity markets see http://neep.org/emv-forum/emv-library/regional-policies-activities

Figure 7-2: Data needs from Program Administrators

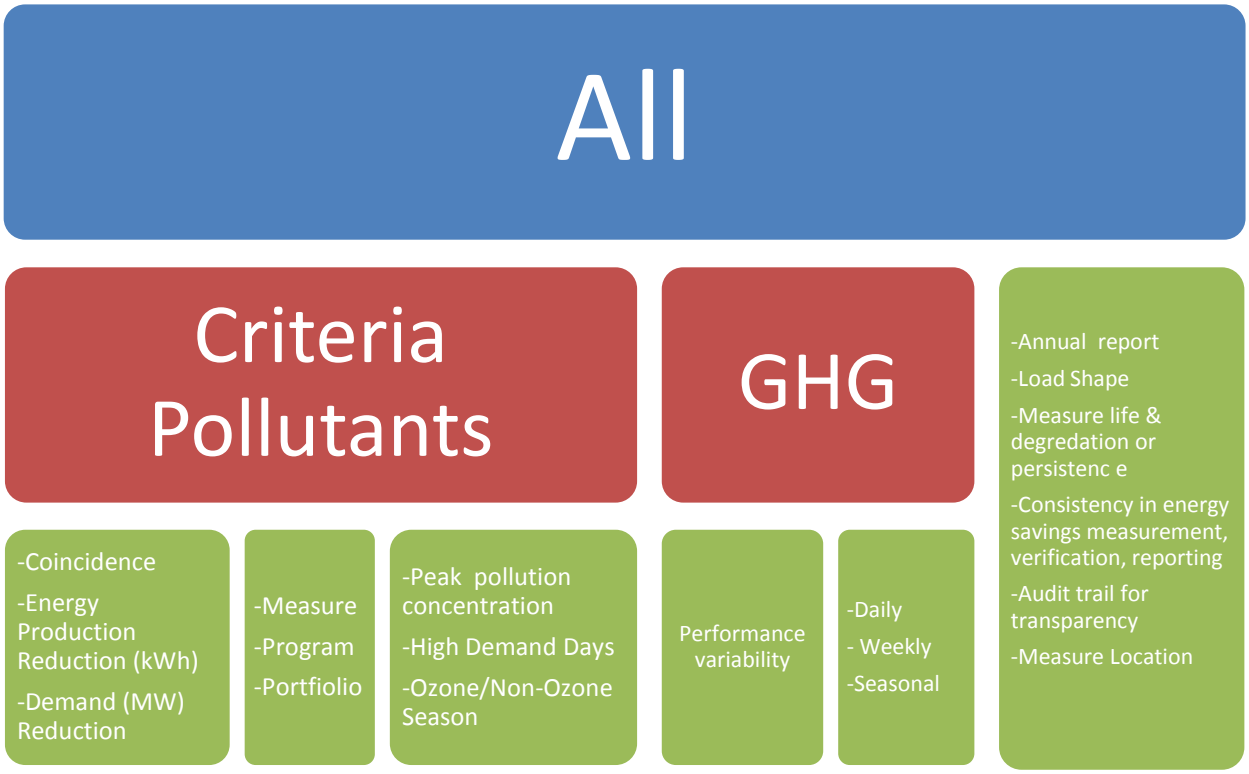


Figure 7-2 describes energy program data needs for all emissions, and is subdivided by those specific to criteria pollutants and greenhouse gases. In general, data should be available annually on at least a portfolio or program level. Measure-level reporting becomes very resource intensive and would provide minimal benefit due to larger variations within those data. However, data at the measure level are likely to be required as the basis for aggregating impacts. Consistency in energy savings measurement, verification, and reporting is highly desired, but likely to require interstate collaboration on best practices, such as how to consider measure interaction effects on savings. Measure persistence projections should be provided so that air regulators can incorporate them into their future emissions projections. Another key factor is the load zone (where efficiency measures are installed) if the penetration is not uniform across the entire state or region. For example, in the early 2000s the efficiency measures were concentrated in southwest Connecticut and it would be necessary to determine what generation sources supplied this region to assess emission impacts. The associated load shapes or effect on demand of these programs should also be made available to air quality regulators.

Most air regulators expressed a degree of trust in data provided by program administrators and would like access to these records in case they need to determine compliance at various emission sources. However, regulators expect transparency and/or an independent third-party audit that occurs with some predetermined frequency.

On a more specific level, the criteria air pollutant planning requires knowledge of overlap between energy savings with peak ozone and fine particulate concentrations as well as

coincidence during time periods of peak pollutant concentrations and energy savings. For GHG's, the measure performance variability (if any) should be documented over seasonal or annual periods.

Program administrators would likely have a difficult time coordinating and providing data at the level of detail described in Figure 7-2; these data are not appropriate for inclusion in an annual statewide report and this is reflected in the common reporting template (see section 12). We recommend air quality regulators and program administrators share and/or develop data that does not fit in the template through other channels, including joint studies (e.g., load shape research to develop coincidence factors with High Electricity Demand Day (HEDD)), development of a regional database of measure/technology savings data, persistence studies, etc.

Before common reporting guidelines can be enforced, data have to be made available in a common format for program administrators and air quality regulators. EPA should either update current databases or develop a new system to handle information exchange and sharing between agencies. One of the interviewees from Massachusetts mentioned using a system such as Generation Information System, which is used to track all the power generated and sold in New England. The database contains attributes of electricity generation such as fuel source, air emissions, vintage, and other information. It was originally used for compliance with renewable energy requirements, but could be used for emissions tracking purposes as well. Additionally, it would be beneficial to look at the strategy used by Texas to attain SIP credits from energy-efficiency and renewable energy measures.[27] Texas developed an accessible web-based emissions reductions and energy savings calculator tool (eCalc) for a variety of sectors and activities.[28] This tool has the ability to produce results specific to a particular locale and emissions reductions at various power plants using Emissions & Generation Resource Integrated Database (eGRID). However, this database is not current and needs to be updated according to one of the interviewees.

Additionally, given that much of the data needed by air regulators to meet SIP requirements is incorporated into ISO/RTO M&V Plans for energy-efficiency resources participating in wholesale capacity markets, Forum participants should explore how these documents and information can be shared and/or used by air regulators to support incorporation of energy efficiency in SIPs. We highly suggest the Forum participants work together to identify these specific venues for sharing information.

[27] "Texas Approach to State Implementation Plan (SIP) Credits from Energy Efficiency and Renewable Energy Measures", Malcolm Verdict, NASEO Energy Outlook Conference, February 18, 2005, Washington DC
[28] http://ecalc.tamu.edu/

Table 7-4 summarizes the data needs of air quality regulators and the recommended venue for sharing information.

Table 7-4: Recommendations for Air Quality Regulator Data Needs

Data Elements Proposed for Statewide Energy Efficiency Reports	Data Sharing Between PAs, Utility and Air Regulators
1. MW, MWH and MMBTU savings values (electric and gas) 2. Type of emissions factor used and Emissions calculation methodology 3. Natural gas or electric emissions reduction 4. Annual, peak and remaining lifetime reduction for: CO_2e, NO_x, SO_2	1. EE wholesale capacity market MW savings documentation 2. Load shape, coincidence data relevant to time period of savings and peak pollutant concentrations 3. EE measure persistence 4. EE performance variability 5. End-use measure level savings data

In Section 11 of this report, Table 11-6 describes a recommended common statewide reporting template for emission impacts from energy-efficiency programs. It is recommended that through collaboration among air regulators, utility regulators and program administrators, the information in Table 11-6 be based upon calculations provided by air regulators using energy and/or demand savings data collected and reported by the program administrator(s), with supporting references.

8 Impact of Efficiency Programs on Jobs

8.1 Jobs Impacts Reporting Practices

Given the recent increase in unemployment, more and more interest is being directed towards energy-efficiency activities as sources for job creation. Interviews with public utility officials in the Forum region indicate that they are looking into ways to include these benefits as part of the annual report from program administrators. Table 8-1 summarizes the status of job creation reporting in this region. In Massachusetts and also for Rhode Island, the 2008 Energy Efficiency Report from National Grid estimates 98 contractor field employees worked on approximately 3,500 low income weatherization assistance (WAP) projects resulting in 1 full time employee per 36 WAP installations. New York's System Benefits Charge Programs Evaluation and Status Report for the year ending December 31, 2009 listed net additional jobs created and retained per year. Connecticut's Neighbor to Neighbor Energy Challenge Project Impact Table calculates jobs created or retained using the metric of 1 Job-Year created or retained per $92,000 invested.[29] In five of the states, the annual reports provide mention of general economic benefits.

Table 8-1: Jobs and Economic Impacts Included in Energy Efficiency Report from Program Administrators

State/Jurisdiction[1]	CT	D.C.	DE	MA	MD	ME	NH	NJ	NY	RI	VT
State Level Report	✓			✓	✓	✓	✓	✓	✓	✓	✓
State Level Results Reported											
Jobs Created (quantitative)	✓			✓					✓	✓	
Other Economic Benefits	✓				✓	✓		✓			✓

[1]Some program administrators report some data elements not included in the broader state report.

During a project subcommittee call discussing interview results, some officials remarked that it was burdensome for program administrators to track jobs from efficiency programs and it may be more reasonable for them to report estimates from spending on certain sectors or weatherization jobs completed. However, another PUC representative countered that compliance with the American Recovery and Reinvestment Act (ARRA) jobs reporting requirements was not overly arduous. If the number of direct jobs funded through efficiency programs is to be included in the annual reports, then a very simple approach similar to the ARRA methodology would be the most practical since contractors and other agencies are likely to be reporting to ARRA already.[30] Other types of analyses, such as input-output models, used to determine job impacts require complicated calculations and can be costly to run (e.g. IMPLAN). The American Council for an Energy-Efficient Economy (ACEEE) provides a Jobs Impact Calculator for efficiency

[29] Executive Office of the President Council of Economic Advisors

[30] ARRA requires fund recipients to report jobs directly funded by ARRA funds on a full time equivalent basis, on a quarterly average, not including indirect or induced jobs. Part time jobs would count as a fraction of a job.

projects funded by the stimulus and, since it was calibrated to predict national job impacts, it can be used as a rough, first order estimate for state level analysis. The calculator could potentially be adapted to use state specific data available from IMPLAN for better local modeling.

8.2 Recommendations

There are different ways to report jobs impacts of energy-efficiency programs and as it is not the main area of expertise for program administrators, we recommend the minimum reporting suggestions of:

- Gross full time equivalent jobs directly funded through the efficiency program (using ARRA guidelines)
- Net Job Impacts–direct and indirect job impacts
- Median wage of jobs

Net job impacts reflect jobs created and sustained via a program administrator's spending of ratepayer dollars for its efficiency programs, less jobs that would have been created had the ratepayers kept the dollars and spent them on standard sets of goods and services typical for their sector.

It would be ideal if program administrators could run a model that differentiates between direct, indirect and induced jobs and compare those numbers to the results from their program, but it may not be realistic given the cost and time required.

Direct jobs are the actual, immediate jobs that result from an investment in an energy-efficiency program or initiative. For example, the employment and wages for field employees working on low income weatherization (WAP) projects. Indirect jobs result from "upstream" changes in business activity among firms supplying goods and services to the industries directly involved in the energy efficiency program or initiative. Induced jobs are those that result when the worker income generated from the direct and indirect jobs is re-spent in the local economy on consumer goods and services.

These recommendations are indicated in Table 11-7, in the job impacts common reporting template.

9 System Planning

Interviews were conducted with three regional system planners representing PJM Interconnection (PJM), the New York Independent System Operator (NYISO) and ISO New England (ISO-NE). These organizations administer and monitor wholesale electricity markets and do planning for meeting future needs.

Interview questions focused on the sources of energy-efficiency data system planners use, how energy-efficiency impacts are incorporated into planning and if there are energy-efficiency program data they need, or would like to have, for planning purposes that are not currently available. (See Appendix F for the Interview Guide)

NYSIO uses only energy savings data from energy-efficiency programs, while PJM and ISO-NE use only demand impact data for energy-efficiency programs. None report state or regional level energy-efficiency program impacts. PJM reports energy-efficiency impacts on a PJM transmission zone basis. NYISO and ISO-NE do not produce any official reports of energy-efficiency impacts.

9.1 NYISO

The system planner representing NYISO uses program administrator energy-efficiency program energy savings data. Program administrators submit information to the Public Service Commission (PSC) or the Department of Public Service (DPS) staff and NYSIO gets the reports through the DPS staff. NYISO uses energy-efficiency impacts for both energy and capacity planning; energy-efficiency impacts are not explicitly used for T&D planning.

NYISO currently receives only energy data, though it is expected that what is reported will eventually include demand impacts. In the meantime, NYISO derives demand impacts by looking at the system load factor in the area where program measures are being installed, and then looking at the energy-efficiency measures being installed in the area on a case by case basis. NYISO finds that a larger portion of programs in some areas target reducing the summer peak (programs targeting air conditioning load reductions, load management programs, HVAC equipment rebates), while in other areas of the state, a larger portion of energy-efficiency programs may be targeting local distribution peaks that may not be coincident with overall system peaks. Also, some programs may focus on promoting the use of compact fluorescent lights (CFLs), which have their maximum demand impact during evening hours. Once NYISO has this information on individual programs, the energy/demand relationship is adjusted accordingly. If a program is more directed to coincident peak reductions, then it will have a higher load factor than a program not targeting coincident peak reductions.

NYSIO develops energy forecasts for 11 specific parts of the state and would like to have energy-efficiency program savings data by region. Having data by region would allow NYISO to

better represent the energy-efficiency activity in these regions and develop better estimates of overall energy forecasts in these regions.

Energy and demand impacts from energy-efficiency programs are subtracted from the system forecast. NYISO currently has a ten-year forecast horizon and projects the impact of energy-efficiency program impacts from future programs that will be implemented during the planning horizon. For forecasting the impacts of future year programs, NYISO uses estimates of program savings or program budgets for future years together with estimates of realization rates, participation rates and decay based on measure life. NYISO also incorporates estimates of the impacts due to changes in state and national code standards.

9.2 ISO-New England

Currently the Forward Capacity Market (FCM) treats energy-efficiency program impacts equally with those of supply resources, including the quantity and duration of capacity payments. All energy-efficiency demand resources come in through the FCM, which is essentially an auction. Impacts submitted through the auction go through a qualification process including meeting the ISO New England (ISO-NE) measurement and verification (M&V) standards for demand resources.

In the annual Resources System Planning (RSP) process, ISO-NE plans for resource adequacy, i.e. installed capacity to serve load with minimum load disconnect. Demand resources, including energy efficiency, that clear the FCM are treated as supply resources in the RSP process. Currently ISO-NE assumes the impact of the auction MW will hold steady for the life of the forecast–a ten year horizon right now.

ISO-NE does not currently include forecasted impacts of future year energy-efficiency programs in planning. This issue is being addressed through ISO-NE's Regional Energy Efficiency Initiative (REEI). ISO-NE does currently incorporate estimates of the impact of 2013 changes in federal appliance standards using EIA data. EIA provided estimates of the impacts of the new standards in New England and ISO-NE portioned the impacts to the New England states based on energy use.

ISO-NE is currently examining NOx emissions on historic peak load days to provide a better basis for estimating future NOx emission reductions from energy efficiency during peak load periods.

Annually, since 1993, NE-ISO has produced a marginal emission analysis report known as the "MEA Report" which has been widely used by stakeholders. At the suggestion of several stakeholders, the 2008 annual ISO emissions report was expanded and is now called the New England Electric Generation Emissions Report. This report includes the marginal emissions analysis as was done previously, but focuses more on system emissions. It also includes a section on a peak-day NOx emissions analysis that the ISO performed. The results of this latter analysis, hopefully, can assist regulators to determine NOx emissions reductions for demonstrating ozone

attainment in state implementation plans (SIP) submitted to EPA from energy-efficiency measures during peak-load days.

9.3 PJM Interconnection

Like ISO-NE, PJM reports that all system planning is done based on demand. Reliability planning is done using a ten-year horizon and economic planning incorporates an additional five years. Information on energy-efficiency program impacts comes from participants who want to qualify energy-efficiency resources as capacity resources in the Reliability Pricing Model (RPM), PJM's capacity-market model. Energy-efficiency resources submitted through this process have to meet PJM's energy-efficiency EM&V manual specifications.

PJM is not looking for any additional energy-efficiency data. PJM captures the energy-efficiency data needed either through participants' cleared energy-efficiency bids in RPM auctions or via historical load analyses, which are a major input into PJM's load forecast, which in turn is a major component of RPM demand curves, reliability and planning studies, and transmission expansion plans. PJM does study public energy-efficiency databases and reference manuals etc. that states and state commissions publish as one of the tools in assessing the viability of the energy-efficiency plans received.

Energy forecasts are not used in PJM system planning. For demand planning and transmission and distribution planning, the amount of energy efficiency cleared in PJM's forward capacity market (RPM) is subtracted from PJM's unrestricted load forecasts for use in planning studies. Once the energy-efficiency program is installed and reflected in load data, no additional forecast adjustment is made. No explicit adjustments are made for other energy-efficiency impacts from such things as future expected changes in building codes or equipment standards–PJM considers them too uncertain in terms of implementation and impact. Additionally, to the extent that energy-efficiency improvements have impacted past load growth patterns they will serve to lower the load forecast. PJM's view is that attempting to quantify "other" energy-efficiency would likely lead to double-counting–the same energy-efficiency reducing the load and being paid as a resource.

Annual emission reports are available on the PJM Environmental Information Services (EIS) website (https://gats.pjm-eis.com/mymodule/mypage.asp). An average emission factor is calculated by PJM using an average emission rate for each generator (in lbs/MWh) multiplied by the production (MWh) to get total emission (in lbs) for each generator. The sum of the emissions is divided by total MWh's to get the system average (lbs/MWh).

9.4 Conclusions and Recommendations

It appears that having access to consistently reported state-level energy impacts would be minimally valuable to system planners at this time. However, studies that address load shapes that could be used to better translate energy-efficiency program energy impacts into demand

impacts or vice versa, or studies that address the potential for energy-efficiency impacts in future years, could be valuable to system planners.

Several factors suggest there are benefits to having the Forum continue its dialog with system planners about energy-efficiency data needs for planning purposes. As states implement aggressive multi-year plans to capture all cost-effective energy efficiency there may be significant market-driven energy-efficiency savings coming from efforts outside the utility sponsored energy-efficiency programs covered in this study. For PJM and ISO-New England, this may mean that it will be important to factor increased energy-efficiency impacts outside FCM submissions into system planning. There are differences in how emission factors are developed and used. Also, there are inconsistencies in how, or to what extent, system planners currently include impacts from future energy-efficiency efforts and changes in energy-efficiency-related codes and standards in planning. Continued communication between and among Forum members and system planners could facilitate consistency in addressing these issues and help ensure system planners have access to consistently reported energy-efficiency data for planning purposes.

10 Other Energy-Efficiency Reporting

10.1 EIA Data Reporting

The Energy Information Administration (EIA) requires annual financial and operational data to be collected from electric energy distributors. The EIA uses Form EIA-861, the Annual Electric Power Industry Report, to collect information on the status and condition of electric power generation, transmission and distribution of electric energy in the United States. The data from this form are used to provide input for the following EIA reports: Electric Power Monthly, Monthly Energy Review, Electric Power Annual, Annual Energy Outlook, and Annual Energy Review. The data collected are also used to monitor the current status and trends of the electric power industry and to evaluate the future of the industry.

Electric utilities, wholesale power marketers, energy service providers and electric power producers are required to file Form EIA-861 to the EIA. Form EIA-861 includes several schedules that electric industry distributors complete:

- Schedule 1. Identification
- Schedule 2. General Information, Energy Sources and Disposition, Customer Service Programs
- Schedule 3. Electric Operating Revenue
- Schedule 4. Sales to Ultimate Customers: Full Service – Energy and Delivery Service (Bundled), Energy – Only Service (Without Delivery Service), Delivery – Only Service (and all Other Charges), Bundled Services by Retail Energy Providers or any Power Marketer that Provides " Bundled Service"
- Schedule 5. Mergers and/or Acquisitions
- Schedule 6. Demand-Side Management Information, Actual Effects, Annual Costs, Supplemental Information, Advanced Metering
- Schedule 7. Distributed and Dispersed Generation, Number and Capacity, Types of Generators
- Schedule 8. Distribution System Information
- Schedule 9. Comments

Schedule 6, Demand-side management (DSM) programs are most relevant to this review for EM&V Forum participants. Reporting requirements to the EIA are similar to what data are collected and reported by the jurisdictions in this study. Schedule 6 is to be completed by every electric industry distributor with a company administered demand-side management program (Figure 10-1). Schedule 6 is divided into two relevant parts: Part A, Actual Effects and Part B, Annual Costs. Incremental Effects record the changes in energy use (measured in MWhs) and peak load (measured in MWs) caused in the current reporting year by new participants in the existing DSM programs and all participants in new DSM programs. Annual Effects record the

total changes in energy use (measured in MWhs) and peak load (measured in MW's) caused in the current reporting year by all participants in all DSM programs.

Figure 10-1: EIA-861 Schedule 6. Demand-Side Management Information

SCHEDULE 6. DEMAND-SIDE MANAGEMENT INFORMATION

If your company is a small utility (end-use sales for ultimate customers and sales for resale less than 150,000 MWh) complete Part A – Incremental Effects, Part B, line 13 – Total Cost, and Parts C and D.

LINE NO.		
1	Do you have company administered Demand-Side Management Programs? (check Yes or No)	[ ] Yes [ ] No
2	If your Demand-Side Management activities are reported on Schedule 6 of another company's form, identify the company.	
NOTE	If you answered "No," to Line 1 or another Company Reports your Demand-Side Management Activities on their Schedule 6, do not complete the rest of this Schedule.	

SCHEDULE 6. PART A. ACTUAL EFFECTS

		INCREMENTAL EFFECTS				ANNUAL EFFECTS			
ENERGY EFFICIENCY		RESIDENTIAL (a)	COMMERCIAL (b)	INDUSTRIAL (c)	TRANSPORTATION (d)	RESIDENTIAL (e)	COMMERCIAL (f)	INDUSTRIAL (g)	TRANSPORTATION (h)
3	Energy Effects (megawatthours)								
4	Actual Peak Reduction (megawatts)								
LOAD MANAGEMENT									
5	Energy Effects (megawatthours)								
6	Potential Peak Reduction (megawatts)								
7	Actual Peak Reduction (megawatts)								
7a	Were these savings verified through an independent evaluation?					[ ] Yes	[ ] No		

SCHEDULE 6. PART B. ANNUAL COSTS (THOUSAND DOLLARS AND PERCENTAGES OF TOTAL)

		(a) Costs (thousand dollars)	(b) Percentage of costs by State State 1:	(c) Percentage of costs by State State 2:	(d) Percentage of costs by State State 3:	(e) Percentage of costs by State State 4:
8	Direct Costs, excluding incentive payments - Energy Efficiency					
9	Direct Costs, excluding incentive payments - Load Management					
10	Incentive Payments – Energy Efficiency					
11	Incentive Payments – Load Management					
12	Indirect Costs					
13	Total Cost (sum of all above)					

SCHEDULE 6. PART C. SUPPLEMENTAL INFORMATION
(To be completed by all respondents)

14	Have there been any major changes to your Demand-Side Management programs (e.g., terminated programs, new information or financing programs, or a shift to programs with dual load building objectives and energy efficiency objectives), program tracking procedures, or reporting methods that affect the comparison of demand-side management data reported on this schedule to data from previous years? (check Yes or No)	[ ] Yes	[ ] No
15	Does your company currently operate any incentive-based demand response programs (e.g., direct load control, interruptible programs, demand bidding/buyback, emergency demand response, capacity market programs, and ancillary service market programs)? (check Yes or No)	[ ] Yes	[ ] No
16	If the answer to line 15 is "Yes", please disclose the number of participating customers by class. Residential	Commercial	Industrial	Transportation	
17	Does your company currently operate any time-based rate programs (e.g., real-time pricing, critical peak pricing, variable peak pricing and time-of-use rates)? (check Yes or No)	[ ] Yes	[ ] No
18	If the answer to line 17 is "Yes", please disclose the number of participating customers by class. Residential	Commercial	Industrial	Transportation	

SCHEDULE 6. PART D. ADVANCED METERING (To be completed by all respondents)

State 1	Number of Meters (a)	RESIDENTIAL (b)	COMMERCIAL (c)	INDUSTRIAL (d)	TRANSPORTATION (e)	TOTAL (f)
	Number of AMR Meters					
	Number of AMI Meters					
	Energy Served Through AMI Meters (MWh)					

The annual costs section collects information on actual DSM program costs in the current reporting year.

10.2 Conclusions and Recommendations

Form EIA-861 is a straightforward template that jurisdictions are required to complete each year for federal reporting purposes. As the US Department of Energy gives more attention to and assigns more importance to energy efficiency, the need for common reporting elements such as data gathered from Schedule 6 of EIA-861 increases in relevance.

Anecdotal information suggests that data currently reported to the EIA by utilities is inconsistently defined and therefore not comparable nor always accurate. The evaluation team recognizes that this reporting construct exists and that there are differences across state reporting practices. There is a national effort to revisit EIA reporting requirements. It is recommended that Forum members coordinate to share information from this Project with US DOE as it identifies issues with EIA data reporting requirements. Further, it is recommended to develop an effort to align consistency in definitions and reporting elements between the EIA and Forum members.

11 Common Reporting Templates

This section presents the suggested reporting templates for:

- Electric and gas energy-efficiency program energy and demand savings
- Electric and gas energy-efficiency program expenditures
- Emission impacts from energy efficiency programs, along with process recommendations for improved data sharing between program administrators and air quality regulators
- Jobs impacts from energy efficiency

We recommend that the templates be available on one website to give those interested in seeing consistent state- and regional-level data easy access. Each state could include a link to its website and to its individual full annual energy efficiency report.

Energy and Demand Savings

On the following four pages are sample reporting templates for electric and gas energy-efficiency program annual and lifetime energy savings.

Given that certain differences currently exist across jurisdictions/states in when and how energy and demand savings are calculated and reported, achieving greater consistency in some areas will take some time (or may not happen). As such, it is important for each jurisdiction to identify underlying definitions and practices for reporting gross and net program savings. The first template, Table 11-1, addresses this need in a simple checklist format. Tables 11-2 through 11-4 are sample reporting templates for electric energy and gas savings and electric demand savings. The rows in blue text identify data that are not currently recommended reporting elements, but are reporting elements that the Forum subcommittee members who provided feedback on what they consider important to have access to for meeting policy and market needs indicated would be important. These additional reporting elements and the level of detail that would be useful (total program level or by customer sector or by program type, etc.) should be discussed and considered for inclusion in future reporting templates.

Table 11-1: Description of Reported Energy-Efficiency Savings and Link to Jurisdiction/State Annual Energy-Efficiency Report

Jurisdiction/State: _____	**Program Year:** _____
1. Reported data are year-end tracking data (Ex Ante Savings from Tracking Database). Savings from the tracking database incorporate impact factors from previous evaluation studies. Impact factors are the same ones used to project savings in plan filings.	☐Yes ☐No
2. Reported data include ex-post (evaluated) data. Savings incorporate impact factors from the most current evaluation studies. (Note: not all individual programs are evaluated every year, but results from new evaluation studies completed after plan documents are filed are incorporated.)	☐Yes ☐No
Gross Savings	
3. Reported gross savings are adjusted for: (Please check all that apply)	☐ Realization Rate (Provide definition of Realization Rate) _____ ☐Persistence Factor ☐ In-service Rate ☐ Coincidence Factor ☐ Other _____ ☐ Other _____ ☐ Other _____
Net Savings	
4. Impact factors incorporated in reported net savings. (Please check all that apply.)	☐Free Ridership ☐Participant Spillover ☐Non Participant Spillover ☐Measure Energy Realization Rate ☐Measure Persistence ☐Summer Diversity Factor ☐Winter Diversity Factor ☐Demand Adjustment factor: Non-Coincident Connected Demand Factor ☐One Overall Program Net to Gross Ratio ☐Other _____ ☐Other _____
Jurisdiction/State Annual Energy-Efficiency Report	
5. Final annual energy-efficiency program savings data reported in what quarter of the following year.	☐1st Qtr. ☐2nd Qtr. ☐3rd Qtr. ☐4th Qtr.
6. Link to Jurisdiction/State annual EE report	

Table 11-2: Common Reporting Template Annual Energy Savings

Jurisdiction/State: (to be filled in)	Program Year: (to be filled in)	Gross Energy Savings			Net Energy Savings		
Electric and Gas Annual Energy Savings		Electric Gross Gen. Level (MWH)	Electric Gross Meter Level (MWH)	Gas Gross Meter Level (Therms)	Electric Net Gen. Level (MWH)	Electric Net Meter Level (MWH)	Gas Net Meter Level (Therms)
Total Program Energy Savings							
Total Program Energy Savings by Customer Sector							
Commercial & Industrial Sector							
Res. Non-low Income Sector							
Res. Low Income Sector							
Total Program Energy Savings by Type of Program							
Retrofit Programs[1]							
Lost Opportunity Programs[2]							
C&I Customer Sector Energy Savings by Type of Program							
C&I Retrofit Programs							
C&I Lost Opportunity Programs							
Residential Non-low Income Customer Sector Energy Savings by Type of Program							
Res. Non-low Income Retrofit Programs							
Res. Non-low Income Lost Opportunity Programs							
Residential Low Income Customer Sector Energy Savings by Type of Program							
Res. Low Income Retrofit Programs							
Res. Low Income Lost Opportunity Programs							
Reporting Elements Not Currently Recommended to Consider Going Forward							
Specific End Use Data, e.g. Lighting, Appliances, HVAC, Motors/Drives, Refrigeration, etc.							
Other Program Types, e.g. Multifamily Retrofit, Large C&I, Small C&I, etc.							

[1] **Retrofit Program** - An energy efficiency program that provides incentives, information and technical support to customers in an effort to encourage the replacement of existing and operating equipment with more efficient equipment that provides the same function.

[2] **Lost Opportunity Program** - A program that captures energy efficiency opportunities at the time of a naturally-occurring market event, such as when a customer constructs, expands, renovates, or remodels a home or a building or makes an initial purchase of equipment, or replaces failed equipment.

Table 11-3: Common Reporting Template Lifetime Energy Savings

Jurisdiction/State (to be filled in)	Program Year (to be filled in)	Gross Energy Savings			Net Energy Savings		
Electric and Gas Lifetime Energy Savings		Electric Gross Gen. Level (MWH)	Electric Gross Meter Level (MWH)	Gas Gross Meter Level (Therms)	Electric Net Gen. Level (MWH)	Electric Net Meter Level (MWH)	Gas Net Meter Level (Therms)
Total Program Energy Savings							
Total Program Energy Savings by Customer Sector							
Commercial & Industrial Sector							
Res. Non-low Income Sector							
Res. Low Income Sector							
Total Program Energy Savings by Type of Program							
Retrofit Programs[1]							
Lost Opportunity Programs[2]							
C&I Customer Sector Energy Savings by Type of Program							
C&I Retrofit Programs							
C&I Lost Opportunity Programs							
Residential Non-low Income Customer Sector Energy Savings by Type of Program							
Res. Non-low Income Retrofit Programs							
Res. Non-low Income Lost Opportunity Programs							
Residential Low Income Customer Sector Energy Savings by Type of Program							
Res. Low Income Retrofit Programs							
Res. Low Income Lost Opportunity Programs							
Reporting Elements Not Currently Recommended to Consider Going Forward							
Specific End Use Data, e.g. Lighting, Appliances, HVAC, Motors/Drives, Refrigeration, etc.							
Other Program Types, e.g. Multifamily Retrofit, Large C&I, Small C&I, etc.							

[1] **Retrofit Program** - An energy efficiency program that provides incentives, information and technical support to customers in an effort to encourage the replacement of existing and operating equipment with more efficient equipment that provides the same function.

[2] **Lost Opportunity Program** - A program that captures energy efficiency opportunities at the time of a naturally-occurring market event, such as when a customer constructs, expands, renovates, or remodels a home or a building or makes an initial purchase of equipment, or replaces failed equipment.

The table below is a sample reporting template for electric energy-efficiency program annual demand savings. Individual templates in the same format are proposed for summer peak demand, winter peak demand and lifetime demand savings. The rows in blue text are not currently recommended reporting elements, but are reporting elements that the Forum subcommittee members who provided feedback on what they consider important to have access to for meeting policy and market needs indicated would be important. These additional reporting elements should be considered for inclusion in future reporting templates.

Table 11-4: Common Reporting Template Electric Demand Savings

Jurisdiction/State (to be filled in)	Program Year (to be filled in)	Gross Demand Savings		Net Demand Savings	
Annual Electric Demand Savings		Gross Generation Level (MW)	Gross Meter Level (MW)	Net Generation Level (MW)	Net Meter Level (MW)
Total Program Annual Demand Savings					
Total Program Annual Demand Savings by Customer Sector					
Commercial & Industrial Sector					
Res. Non-low Income Sector					
Res. Low Income Sector					
Total Program Annual Demand Savings by Type of Program					
Retrofit Programs[1]					
Lost Opportunity Programs[2]					
C&I Customer Sector Annual Demand Savings by Type of Program					
Commercial & Industrial Retrofit Programs					
Commercial & Industrial Lost Opportunity Programs					
Residential Non-low Income Customer Sector Annual Demand Savings by Type of Program					
Res. Non-low Income Retrofit Programs					
Res. Non-low Income Lost Opportunity Programs					
Residential Low Income Customer Sector Energy Savings by Type of Program					
Res. Low Income Retrofit Programs					
Res. Low Income Lost Opportunity Programs					
Define Annual Demand Savings					
Reporting Elements Not Currently Recommended to Consider Going Forward					
Specific End Use Data, e.g. Lighting, Appliances, HVAC, Motors/Drives, Refrigeration, etc.					
Other Program Types, e.g. Multifamily Retrofit, Large C&I, Small C&I, etc.					

[1] **Retrofit Program** - An energy efficiency program that provides incentives, information and technical support to customers in an effort to encourage the replacement of existing and operating equipment with more efficient equipment that provides the same function.

[2] **Lost Opportunity Program** - A program that captures energy efficiency opportunities at the time of a naturally-occurring market event, such as when a customer constructs, expands, renovates, or remodels a home or a building or makes an initial purchase of equipment, or replaces failed equipment.

The table below is a sample reporting template for electric and gas energy-efficiency expenditures.

Table 11-5: Common Reporting Template for Electric and Gas Energy Efficiency Program Expenditures

Jurisdiction/State (to be filled in)	Program Year (to be filled in)	Energy Efficiency Program Expenditures	
Expenditure Category		**Electric Expenditures ($-Thousands)**	**Gas Expenditures ($-Thousands)**
Total Program Expenses			
Total Costs			
Administration Definition:			
Rebates/Incentives Definition:			
Marketing Definition:			
Performance Incentive Definition:			
Research and Evaluation Definition:			
Lifecycle Cost per kWh or Therm = (Total Expenses)/(Net Lifetime kWh or Therm savings)			
Lifecycle Cost per kWh (without participant costs)			
Lifecycle Cost per kWh (with participant costs)			
Lifecycle Cost per Therm (without participant costs)			
Lifecycle Cost per Therm (with participant costs)			
Levelized Cost per kWh or Therm: Use formulas provided on the following page.			
Levelized Cost per kWh (without participant costs)			
Levelized Cost per kWh (with participant costs)			
Real Discount Rate (i) & Useful Life Period (n)		**i =**	**n =**
Levelized Cost per Therm (without participant costs)			
Levelized Cost per Therm (with participant costs)			
Real Discount Rate (i) & Useful Life Period (n)		**i =**	**n =**

Levelized Cost Calculation

Levelized Cost per kWh/Therm is a more complex, but economically accurate, calculation that captures the value of energy-efficiency investments over time. The levelized cost represents the level of payment needed each year to recover the total investment and interest payments (at a specified interest rate) over the life of the measure(s). This calculation is useful for comparing the value of energy efficiency to other resources. The calculation is as follows:

$$(1)\ \textit{Levelized Cost of Conserved Electric Energy} = \frac{\text{Program Costs x CRF}}{\text{Annual kWh saved}}$$

$$(2)\ \textit{Levelized Cost of Conserved Gas} = \frac{\text{Program Costs x CRF}}{\text{Annual Therms saved}}$$

$$\textit{Capital Recovery Factor (CRF)} = \frac{i\,(1+i)^n}{(1+i)^n - 1}$$

i = real discount rate
n = useful life period (i.e., average measure life for portfolio of programs)

In reporting the levelized cost per kWh/therm, the key underlying assumptions should be noted, specifically for the average useful measure life (for portfolio of programs) and the real discount rate used. There is a range of discount rates typically used to determine levelized cost of savings. It is recommended that the region move toward greater consistency in the definition of discount rate used.

Emissions Reporting

The following tables are recommended templates for emissions reductions reporting and job impacts reporting. Our understanding is that the most important function that this template is to serve is as a starting point for transparency and consistency. It is expected that this table will evolve over time as consensus builds on the best way to document and capture secondary impacts of energy-efficiency. We recognize that many of these fields are currently not reported so it is advised that the program administrator and air quality regulators collaborate to fill this out to the best of their ability, fully documenting their assumptions or other sources used.

To fill out the emissions reporting template, the program administrator is encouraged to do so for each program rather than just producing one form for the whole portfolio for that state. For the jobs impacts, we recommend filling out the data for each sector and for the whole portfolio. If data are not available at the program level, then reporting the jobs due to the whole portfolio is still strongly encouraged. Auxiliary information should be included after the template to provide a full list of referenced values.

Table 11-6: Emissions Reporting Template

The information in this table is based upon calculations provided by [STATE AIR REGULATORY AGENCY] in collaboration with the state energy-efficiency program administrator(s), and are based on energy and/or demand savings reported by the program administrator(s) for [YEAR 20__] using evaluation, measurement and verification protocols/methods approved by the state utility regulatory commission.

Jurisdiction/State:

			Annual Emissions Reduction		Annual Peak Emissions Reduction	
Pollutant	**Emissions Calculation Methodology Used (general description)**	**Emissions Factor Used (Marginal/Average/Other) and Source (e.g., ISO/RTO)**	**From Electric Savings (metric tons)**	**From Natural Gas Savings (metric tons)**	**From Electric Savings (metric tons)**	**From Natural Gas Savings (metric tons)**
eCO_2						
NO_X						
SO_2						
Other						

Definition and Notes:

Provide Definition of Annual "Peak" _____

Include sources of data and/or references for values used

Table 11-7: Job Impacts Reporting Template

Program Year(s):				
	Residential Program*	**C&I Program**	**Total Program**	**Methodology**
Gross full time equivalent jobs directly funded through program				ARRA and/or description:
Net full time equivalent jobs				Describe method used:
Median wage of jobs funded through program (in 2010 $$)				
Other Metric: Describe (e.g. types of programs associated with Jobs created)				

*Includes low income

Given many state agencies are recipients of American Recovery and Reinvestment Act funding and are already familiar with ARRA reporting requirements, these Guidelines recommend that program administrators report the direct full-time equivalent (FTE) number of jobs funded through energy-efficiency programs in accordance with ARRA guidelines.[31] While the ARRA guidelines require quarterly reporting, these guidelines recommend annual reporting of number of jobs created or retained within a calendar year, using the following ARRA formula:

$$\frac{\text{Total Number of Hours Worked and Funded by Energy Efficiency Investments for Year}}{\text{Annual Hours in a Full-Time Schedule}^{32}}$$

Direct jobs are the actual, immediate jobs that result from an investment in an energy efficiency program or initiative. For example, the employment and wages for field employees working on low income weatherization (WAP) projects.

Some approaches to quantifying job impacts also consider indirect and induced jobs. Indirect jobs result from "upstream" changes in business activity among firms supplying goods and services to the industries directly involved in the energy efficiency program or initiative. Induced jobs are those that result when the worker income generated from the direct and indirect jobs is re-spent in the local economy on consumer goods and services.

To get a sense of the broader economic impact, it is advised that program administrators also report the number of net jobs predicted, including net direct and indirect jobs. Net jobs are defined generally as those created and sustained via energy efficiency program spending of

[31] http://www.energy.gov/recovery/ARRA_Reporting_Requirements.htm
[32] As defined by reporting entity.

ratepayer dollars less jobs that would have been created had the ratepayers kept the dollars and spent them on standard sets of goods and services typical for their sector. There are a variety of methods used to calculate net jobs, such as REMI and IMPLAN models which determined net job impacts by taking the difference of two separate runs, i.e., spending on energy efficiency vs. spending on standard sets of goods. ACEEE also has developed a Jobs Calculator to estimate net job impacts. [33,34]

[33] See summary of different models used in various states in the country at http://www.epa.gov/slclimat/state/activities/quantifying-econ.html

[34] The ACEEE Jobs calculator is a publically available spreadsheet tool that calculates net direct and indirect job impacts. See http://www.aceee.org/energy/national/recovery.htm

Appendix A Subcommittee Feedback Identifying Desired Reporting Elements

Appendix A Table 1: Subcommittee Feedback Identifying Desired Energy-Efficiency Reporting Elements

Common Reporting Elements	Policy, Market and other Drivers/Needs							
	System Planning (Utility ISO / RTO)	**Air Quality** (SIPs)	**Climate Change Impacts and Planning**	**Tracking Economic Goals**	**Inform National Guidelines**	**State-by-state Comparison**	**ISO/RTO Market Integration**	
	n = 9							**Total**
SAVINGS								
Annual kWh								
Net[1] Meter	3	1	2	7	4	6	3	26
Net[1] Generator	2	1	3	5	3	3	1	18
Gross Meter	5	2	2	8	5	5	3	30
Gross Generator	4	2	3	6	4	4	2	25
Lifetime kWh								
Net[1] Meter	2	1	2	7	4	6	3	25
Net[1] Generator	2	1	3	4	3	3	1	17
Gross Meter	4	2	1	7	5	4	3	26
Gross Generator	4	2	3	5	4	4	2	24
Annual, Summer and Winter kW								
Net[1] Meter	5	2	2	6	4	5	3	27
Net[1] Generator	3	3	2	5	3	3	2	21
Gross Meter	7	3	2	7	5	4	3	31
Gross Generator	5	5	3	6	4	4	3	30
Lifetime kW								
Net[1] Meter	3	2	1	5	4	4	3	22
Net[1] Generator	4	1	0	3	3	2	1	14
Gross Meter	5	3	1	6	5	4	3	27
Gross Generator	6	2	1	4	4	3	2	22
Annual Therms								
Net[1]	3	4	4	7	5	5	2	30
Gross	5	5	4	7	6	4	2	33
Lifetime Therms								
Net[1]	2	4	4	6	4	4	1	25
Gross	4	4	4	6	5	3	1	27

Common Reporting Elements	Policy, Market and other Drivers/Needs							
	System Planning (Utility ISO / RTO)	**Air Quality** (SIPs)	**Climate Change Impacts and Planning**	**Tracking Economic Goals**	**Inform National Guidelines**	**State-by-state Comparison**	**ISO/RTO Market Integration**	
	n = 9							**Total**
By Customer Sector								
Residential, C&I	3	3	2	7	5	6	2	28
Residential, Low Income, C&I	2	2	1	7	4	6	2	24
More Detailed Sectors?[2]	2	2	1	6	3	4	2	20
By Program Type2								
Retrofit, Lost Opport / New Const	3	2	2	8	4	7	2	28
Other Program Types?	3	2	2	8	3	5	2	25
By End Use / Measure[2] (e.g., Lighting, HVAC, Appliances, Motors/Drives)	3	2	2	8	4	7	2	28
By Sector and Measure[2] (e.g. Res Lighting, C&I Lighting, etc)	4	2	2	7	3	6	2	26
Total Resource Benefit	0	0	0	0	0	0	0	0
Total	98	65	59	168	110	121	58	679

[1] Net Savings - significant inconsistencies in reporting and definitions currently exist. Net Savings is being addressed in a separate Forum project.

[2] Currently there is considerable inconsistency in the level of detail reported for these parameters, or in how they are defined.

Appendix A Table 2: Subcommittee Feedback Identifying Desired Expense Reporting Elements

Common Reporting Elements	Policy, Market and other Drivers/Needs							
	System Planning (Utility ISO / RTO)	Air Quality (SIPs)	Climate Change Impacts and Planning	Tracking Economic Goals	Inform National Guidelines	State-by-state Comparison	ISO/RTO Market Integration	
	n = 9							Total
EXPENSES[2]								
Total PA Expense	4	2	2	7	5	8	4	**32**
Administration	3	2	2	6	4	7	3	**27**
Incentives / Rebates	3	2	2	6	4	7	3	**27**
Marketing	3	2	2	6	4	7	3	**27**
Performance Incentive	3	2	2	7	4	7	3	**28**
Research and Evaluation	3	1	2	5	3	6	3	**23**
Cost per kWh	4	1	2	7	5	8	4	**31**
Cost per Therm	4	1	2	6	4	7	3	**27**
# of Participants, Participant Costs, cost/participant	0	0	0	0	0	1	0	**1**
Total	**27**	**13**	**16**	**50**	**33**	**58**	**26**	**223**

[2] Currently there is considerable inconsistency in the level of detail reported for these parameters, or in how they are defined.

Appendix A Table 3: Subcommittee Feedback Identifying Desired Emissions Reporting Elements

Common Reporting Elements[1]	Policy, Market and other Drivers/Needs							
	System Planning (Utility ISO / RTO)	Air Quality (SIPs)	Climate Change Impacts and Planning	Tracking Economic Goals	Inform National Guidelines	State-by-state Comparison	ISO/RTO Market Integration	
	n = 9							Total
EMISSIONS IMPACTS (tons avoided/reduced) Reporting to indicate method e.g. based on marginal or average emission factors								
CO2e	2	4	5	5	3	3	2	**24**
NOx	1	6	2	4	3	3	1	**20**
SOx	1	6	3	4	3	3	1	**21**
Particulates	1	5	2	3	2	3	0	**16**
Mercury	0	4	0	2	2	2	0	**10**
Total	**5**	**25**	**12**	**18**	**13**	**14**	**4**	**91**

[1] Some program administrators report some data elements not included in the broader state report.

Appendix A Table 4: Subcommittee Feedback Identifying Desired Job Impacts Reporting Elements

Common Reporting Elements	Policy, Market and other Drivers/Needs							
	System Planning (Utility ISO / RTO)	**Air Quality** (SIPs)	**Climate Change Impacts and Planning**	**Tracking Economic Goals**	**Inform National Guidelines**	**State-by-state Comparison**	**ISO/RTO Market Integration**	
	n = 9							**Total**
JOB IMPACTS[1]								
Number of jobs created (FTE)	1	2	2	5	1	2	1	**14**
Other	0	0	0	2	1	1	0	**4**
Total	**1**	**2**	**2**	**7**	**2**	**3**	**1**	**18**

[1] Currently there is considerable inconsistency in the level of detail reported for these parameters, or in how they are defined.

Appendix A Table 5: Subcommittee Feedback Comments Savings

SAVINGS				
Annual kWh	In general, whether savings are net or gross needs to be made clear.	kWh Realization and persistence summer and winter rates for State, Federal, and ISO		
Net[1] Meter			ISO-NE and other ISO's are not at all focused on planned dramatic energy reductions over next decade/. One consequence could be worsening of load factor as same or larger infrastructure is being carried by lowered energy sales. Don't have a clear place for peak demand reductions other than the FCM -real gap in the systems.	
Net[1] Generator				
Gross Meter				
Gross Generator				
Lifetime kWh		kWh Realization and persistence summer and winter rates for State, Federal, and ISO		For any of these lifetime measures, it will be important to report the lifetime of the measures - weighted lifetime overall and by sector, market, program, end use
Net[1] Meter			Problems will persist with definitions of net savings in energy and demand. Using gross savings will perpetuate a lowest	

			common denominator.	
Net[1] Generator				
Gross Meter	Persistence of energy efficiency & conservation measures savings for State level reporting.			
Gross Generator				
Annual, Summer and Winter kW		kWh Realization and persistence summer and winter rates for State, Federal, and ISO	Air regulators need hourly data on demand reductions and better understanding of coincident peak reductions in multi-day heat spells in summer, since emissions vary greatly	It is also important tha the translation of kWh to kW is well documented, programs should define consistently - coincident kW (at the relevant system peak) is what is most crucial
Net[1] Meter			For any demand reduction need consistent and lasting definition of system peak. The ISO has been all over the map on this issue	
Net[1] Generator				
Gross Meter	In order to recover a portion of the costs of implementing the Energy Efficiency and Conservation ("EE&C") Program costs in New Jersey, an opportunity is presently e1ists to bid a percentage of the demand savings e1pected from the Programs as an EE Resources in the PJM capacity. Future reporting guidelines in the state should include a EM&V strategy to meet the PJM requirements to avail rate payers the opportunity of this revenue stream as cost effectively as possible.		For any demand reduction need consistent and lasting definition of system peak. The ISO has been all over the map on this issue. ISO-NE's currently looking only at FCM, which means the FCM- allowed definitions, not system peak.	
Gross Generator				
Lifetime kW			Same comment on common definitions - note this problem spills over into PJM too.	
Net[1] Meter				
Net[1] Generator				
Gross Meter	Persistence of energy efficiency & conservation measures savings for both State level reporting and PJM bid activity.			
Gross Generator				

Annual Therms				In my opinion mmBtu is a more easily understandable metric. This should be reported for both efficiency measures that directly save mmBtu (or therms) and separately for electric efficiency measures that have associated mmBtu savings (some elec efficiency measure cause increases in mmBtu and this should be clearly documented).
Net[1]				
Gross				
Lifetime Therms				
Net[1]			Cumulative savings are important as well to show how the savings impact sales - true for electric and gas savings.	
Gross				
By Customer Sector				This is a priority before end use and program type
Residential, C&I				
Residential, Low Income, C&I				
More Detailed Sectors?[2]			state-specific and optional to my view	It may be useful to separate industrial. In small states a couple of industrial users could skew the commercial numbers a bit, or in larger states a big manufacturing base could do the same, making it difficult to compare across jurisdictions.
By Program Type[2]				
Retrofit, Lost Opportunity/New Construction				
More Detailed or other Program Types?				Efficient Products - most programs have some sort of product rebate program. Very useful to compare, as many savings come from this program
By End Use/Measure[2] (e.g., Lighting, HVAC, Appliances, Motors/Drives)	KW savings reported at the meter level for individual measures is required for future energy efficiency bids into the PJM markets as a capacity resource. EM&V Strategy needs to be addressing this requirement and assist market transformation			And others where applicable. Snowmaking, break out HVAC etc)

	and PJM market integration over time.			
By Sector and Measure[2] (e.g. Res Lighting, C&I Lighting, etc)			Would like to see CHP called out As separate because of its nature	Reporting associated benefits of efficiency measures, such as mmBtu (as described above) and water savings, over the life of the measure. This gives a clear indication of the value of the investment. New England already all use consistent avoided costs to calculate this. Should be by market sector and program

Appendix A Table 6: Subcommittee Feedback Comments Expenses

EXPENSES[2]			
Total PA Expense	Need standard definition for each category if we intend to do compilation for national reporting or state-by-state comparison. Different programs might characterize some e1pense as admin. or as a specific program or marketing e1pense. Program Administrators would need guidance on what is intended to be captured for each line to have it for a valid comparison.	For column E, I think of these in relation to how well ratepayer dollars are spent (i.e., benefit cost)	
Administration			Necessary for clear definition. Consistent definitions will make a big difference in comparing across states. Same for all of these expenses
Incentives/Rebates			To participants and to trade allies, separate
Marketing	Would this category capture research and other studies (appliance saturation, baseline etc)?		
Performance Incentive	Should this be a broader "Performance Incentive" caption?		
Research & Evaluation			3rd party or internal process and development? Not clear here.
Cost per kWh	What about cost per therm?		LEVELIZED cost/kWh. This is an important distinction for electric efficiency perception. If only 1st year is shown, then the price looks awfully high to the lay person. Levelized cost shows the true cost over time. ($0.35 versus $0.035, for instance)
Cost per Therm			
# of Participants, Participant Costs, cost/participant			To understand how many people or entities are reached and an indication of how much private or 3rd party investment the efficiency portfolio is leveraging within the state or service territory. Provides more context when reviewing numbers on incentives

Appendix A Table 7: Subcommittee Feedback Comments Expenses

EMISSIONS IMPACTS (tons avoided/reduced) Reporting to indicate method e.g. based on marginal or average emission factors	
CO2e	Are emission reductions based upon average emissions rates (average of fuel mi1) or marginal emission rate based upon when the energy efficiency measure saves energy.
NOx	
SOx	
Particulates	
Mercury	

Appendix A Table 8: Subcommittee Feedback Comments Expenses

JOB IMPACTS[2]	
Number of jobs created (FTE)	Should this be created vs. created and/or sustained? Very difficult to capture for programs that are trying to support local HVAC contractors as the labor source.
Other	Whether any positions are considered temporary? Some state stimulus and ARRA programs might only have employment commitments for a limited duration. Not job impacts but have you considered market transformation (building and energy efficiency codes and baseline equipment improvement)?
	Again need standardization if intend to compare across states and to federal. NJ State definition is lower than what utilities generally use.
	Whether any positions are considered temporary? Some state stimulus and ARRA programs might only have employment commitments for a limited duration. Not a job impact but has you considered market transformation (building and energy efficiency codes and baseline equipment improvement)?

Appendix B Selected Regional EM&V Forum Definitions

Following are selected definitions from the Regional EM&V Forum - Glossary of Terms and Acronyms Version 1.

Annualized Energy Savings - The savings associated with an energy saving measure, project, or program calculated based on a full year's installation and operation.

Coincident Demand - The demand of a device, circuit, or building that occurs at the same time as the peak demand of a utility's system load or at the same time as some other peak of interest, such as building or facility peak demand. The peak of interest should be specified (e.g. "demand coincident with the utility system peak").

Deemed Savings - An estimate of energy or demand savings for a single unit of an installed energy efficiency measure that (a) has been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose and (b) is applicable to the situation being evaluated. Individual parameters or calculation methods can also be deemed.

Demand - The time rate of energy flow. Demand usually refers to the amount of electric energy used by a customer or piece of equipment at a specific time, expressed in kilowatts (kW – equals kWh/h) but can also refer to natural gas usage at a point in time, usually as Btu/hr, kBtu/hr, therms/day or ccf/day.

Demand Savings - The reduction in electric or gas demand from the baseline to the demand associated with the higher efficiency equipment or installation. This term is usually applied to billing demand to calculate cost savings or to peak demand for equipment sizing purposes.

Energy Adjustment Factor - Applied to gross gas and electric savings, a factor made up of one or more evaluation impact parameters applied to gross savings in the calculation of net savings.

Energy Savings - Reduction in electricity use (kWh) or in fossil fuel use in thermal unit(s).

Ex Ante Savings Estimate - Forecasted savings used for program and portfolio planning purposes.

Ex Post Savings Estimate - Savings estimate reported by an evaluator after the energy impact evaluation has been completed.

Free Driver - A program non-participant who has adopted a particular efficiency measure or practice as a result of the evaluated program. Also see Spillover.

Free Rider - A program participant who would have implemented the program measure or practice in the absence of the program. Free riders can be 1) total, in which the participant's activity would have completely replicated the program measure; 2) partial, in which the participant's activity would have partially replicated the program measure; or 3) deferred, in

which the participant's activity would have completely replicated the program measure, but at a future time than the program's timeframe.

Free Ridership Rate - The percent of savings attributable to free riders.

Gross savings - The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

Gross kW - Expected demand reduction based on a comparison of standard or replaced equipment, and equipment installed through an energy efficiency program.

Gross kWh - Expected kWh reduction based on a comparison of standard or replaced equipment, and equipment installed through an energy efficiency program.

Lifetime kW - The expected demand savings over the lifetime of an installed measure, calculated by multiplying the annual peak kW reduction associated with a measure by the expected lifetime of that measure. It is expressed in units of kW-years.

Lifetime MWh - The expected electrical energy savings over the lifetime of an installed measure, calculated by multiplying the annual MWh reduction associated with a measure by the expected lifetime of that measure.

Lifetime Therms - The expected gas energy savings over the lifetime of an installed measure, calculated by multiplying the annual reduction in therms associated with a measure by the expected lifetime of that measure.

Lost Opportunity Program - A program that captures energy efficiency opportunities at the time of a naturally-occurring market event, such as when a customer constructs, expands, renovates, or remodels a home or a building or makes an initial purchase of equipment, or replaces failed equipment.

Measure life - The life of an energy consuming measure, including its equipment life and measure persistence (not savings persistence).

Measure persistence - The duration of an energy consuming measure, taking into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.

Net savings - The total change in load that is attributable to an energy efficiency program. This change in load may include, implicitly or explicitly, the effects of free drivers, free riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.

Net-to-Gross Ratio (NTGR) - A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts. The factor itself may be made up of a variety of factors that create differences between gross and net savings, commonly including free riders and spillover. Other adjustments may

include a correction factor to account for errors within the project tracking data, breakage, and other factors that may be estimated which relate the gross savings to the net effect of the program. Can be applied separately to either energy or demand savings.

Peak Demand - The maximum level of metered demand during a specified period, such as a billing month or a peak demand period.

Peak Load - The highest electrical demand within a particular period of time. Daily electric peaks on weekdays typically occur in late afternoon and early evening. Annual peaks typically occur on hot summer days.

Realization Rate - The term is used in several contexts in the development of reported program savings. The primary applications include the ratio of project tracking system savings data (e.g. initial estimates of project savings) to savings 1) adjusted for data errors, 2) that incorporate evaluated or verified results of the tracked savings, and 3) that account for free ridership and/or spillover.

Retrofit Program - An energy efficiency program that provides incentives, information and technical support to customers in an effort to encourage the replacement of existing and operating equipment with more efficient equipment that provides the same function.

Spillover rate - Estimate of energy savings attributable to spillover effects expressed as a percent of savings installed by participants through an energy efficiency program.

Appendix C Energy-Efficiency Regulator Interview Guide

Interview Guide Addressing Energy-efficiency Savings and Expenditures

Note: Not all questions were asked of all regulators. In some cases we already had the answers to at least some of these questions based on our review of filed reports. We went through the guide before each interview to identify which questions needed to be asked.

State-level Reporting

1. Do you compile annual state-level reports of electric and/or gas energy-efficiency program impacts?
    a. Electric (yes/no)
    b. Gas (yes/no)
        i. *If yes to both electric and gas, ask*: Do you compile separate electric and gas annual energy-efficiency program reports or do you combine them into one report?

If they compile annual state level reports ask question 2, if not, skip to question 3.

2. Is your annual state-level report publically available?
    a. If so, where? *(Get website link if possible.)*
    b. If so, roughly how long after year end is it available?
    c. If not, do you plan on making a state-level report available to the public in the future?

Utility Report Consistency

3. Do you require that all utilities or energy-efficiency program administrators reporting to you use standard table templates for reporting energy-efficiency program results/impacts–one set of templates for gas utilities and one set for electric utilities? ***(Note:** This will tell us that we only need to look at one electric and one gas utility report per jurisdiction.)*

Tracking versus Evaluated Results

4. Based on the information and reports available on your website, it appears that you require utilities or energy-efficiency program administrators to file quarterly and/or year-end reports on energy-efficiency program impacts. We assume all quarterly and year-end reports are based on tracking data. Is this correct?

a. *If tracking data, ask:* Do the tracking data reported reflect gross impacts (they do not have evaluation impact factors such as free-ridership, spillover, persistence or other impact factors applied) or do they reflect net impacts (the most recently available impact factors or net-to-gross ratios have been applied)?

b. *If tracking data, ask:* Do you have utilities or energy-efficiency program administrators report adjusted or evaluated annual results later in the year that reflect the application of new/revised impact factors resulting from current evaluations of the programs?

    i. If yes, are these adjusted/evaluated results publically available?

        1. If yes, where are these results available? *(Get website link if possible.)*

Time Frames

5. Ask if reporting period is different for gas and electric reporting–if, for instance, electric reports cover calendar year program impacts and gas reports cover a different 12-month period: Do you have any plans for making the reporting periods the same for both gas and electric utilities or energy-efficiency program administrators to make it easier to provide state-level annual program impacts?

6. How long from the time a report is filed is it typically made available on the website, if at all?

Definitions

7. Do you have definitions of net savings, gross savings, and the spending components to be included in broader spending categories such as total cost, program implementation, program administration, etc. that you require utilities or program administrators to use in their reports?

    a. If so, would you be willing to share these definitions with us to enable us to assess consistency in these definitions across different jurisdictions?

        i. If yes, ask for a copy of relevant reporting definitions.

Detail Reported

8. Are the electric savings you report at the generation or meter level or do you report both?

9. *Ask the following of jurisdictions that issue and post high-level annual summary reports of energy-efficiency program impacts on their state websites:* We found an annual report posted on your website that provided a relatively high-level summary of annual energy-efficiency program impacts. Is more detail available

on, for example, savings by customer sector (residential, low income, commercial and industrial), or expenses by major category (program administration, program implementation, customer incentives, etc.), or annual versus lifetime savings, etc.?

   a. If so, is this information publically available or may we get access to the more detailed information available?

10. Are electric utilities or energy-efficiency program administrators required to report non-electric savings resulting from their energy-efficiency programs?

    a. If so, are they required to report non-electric resource savings (oil, gas, propane, water), or non-electric non-resource savings (non-energy benefits) or both?

        i. What are they required to report?

        ii. Where are non-electric savings reported?

        iii. Are reports covering non-electric savings publically available?

            1. If so, where are they available? *(Get website link if possible.)*

11. Are gas utilities or energy-efficiency program administrators required to report non-gas savings resulting from their energy-efficiency programs?

    a. If so, what non-gas savings are they required to report?

    b. Where are the non-gas savings reported?

        i. Are reports covering non-gas savings publically available?

            1. If so, where are they available? *(Get website link if possible.)*

Emissions Reductions

12. Are emissions savings due to energy-efficiency programs included in annual reports?

    a. If so, are they reported in individual reports or in the integrated annual energy-efficiency reports?

    b. Are uniform reporting requirements specified?

    c. Which air emissions are reported and how are the savings calculated?

    d. Are RGGI or state climate change action plans taken into account in these reports?

Job Impacts and Other Economic Impacts

13. There is a growing interest in evaluating the economic impacts of energy-efficiency programs. Are there any requirements for energy-efficiency program administrators to report job creation estimates (indirect or direct) or other economic impacts of energy-efficiency programs?
    a. If so, what is the reporting requirement?
    b. What organization requires these estimates?
    c. How this information is determined (input/output model, multiplier, or other)?
    d. If the reporting is under DOE Recovery Act, does your state intend to follow DOE Recovery Act guidelines on calculating job impacts?
14. If this information is not currently required, do you think it would be beneficial to compile and report job creation or other economic impacts of energy-efficiency programs as a way to report progress on attaining state economic goals?
    a. Do you plan on requiring estimates of job impacts or other economic impacts in the future?

Access to Reports

15. In order to be sure we are accessing the correct reports publically available on energy-efficiency program impacts, can we get a list of the docket or case numbers related to year-end and/or annual utility or program administrator energy-efficiency reports?

Future Changes

16. Do you have plans for changing what you will require utilities or energy-efficiency program administrators to report in their filings of annual energy-efficiency program impacts over the next two years?
    a. If so, what are those changes for electric utilities or energy-efficiency program administrators?
    b. If so, what are those changes for gas utilities or energy-efficiency program administrators?
17. What benefits do you see from having consistent reporting of key energy-efficiency program impacts across multiple jurisdictions?
18. How willing or likely would you be to change your reporting requirements to facilitate having consistent reporting of key energy-efficiency program impacts across multiple jurisdictions?

Program Contacts

19. Would you be willing to provide us with contact information for electric and gas utilities or energy-efficiency program administrators who could answer high-level questions about savings, emissions reductions, costs, and job impacts, and those who could talk about program and portfolio tracking systems?

Appendix D Air Regulator Interview Guide

INTERVIEW QUESTIONS ON ENERGY-EFFICIENCY DATA USED TO SUPPORT EMISSIONS REPORTING
Prepared by Cadmus
December 14, 2009

These questions are for environmental/air quality regulatory staff at state level.

We are assisting the Regional EM&V Forum – a multi-state effort facilitated and managed by Northeast Energy-efficiency Partnerships (NEEP) – in researching and developing common reporting guidelines for energy-efficiency activities in the Northeast and Mid-Atlantic. The project, to *Develop Common Energy-efficiency Reporting Guidelines,* specifically addresses the need for consistent reporting of electricity and natural gas energy-efficiency savings, costs, and emissions impacts to help inform multiple energy and environmental policies in the region.

Energy-efficiency is an important tool for reducing air emissions, and as such we want to explore opportunities to leverage and improve how energy-efficiency savings impacts are reported to support air pollutant and GHG emission reduction reporting, tracking and planning. Consequently, one aspect of our study focuses on the reporting of emissions impacts of energy-efficiency programs in the building sector implemented by program administrators (e.g., electric/gas utilities and funded through system-benefit charges paid by electric/gas ratepayers). We would like to ask you a few questions about reporting of energy-efficiency savings and/or associated emission impacts in your state, and whether the current reporting practices meet, or could meet, your needs to support air quality and climate change planning, tracking and reporting requirements.

1) We would like to start with some questions about the State Implementation Plan (SIP) prepared by your agency to meet National Ambient Air Quality Standards.

    a. In your state's SIP, are estimates of annual emissions savings due to program administrator energy-efficiency programs, either electric and/or gas, currently included? *[IF YES GO TO 1)c]*
    b. Why have annual emissions impacts of energy-efficiency programs not been included in your SIPs to date? *[GO TO 3)]What is the main barrier (cost, personnel, lack of data, etc)?*
    c. How are emissions reductions included in the SIP (e.g. voluntary bundle or weight of evidence or mandatory control measure)? What are the applicable pollutants? (e.g., NOx, SOx, fine particulates) [*IF CO_2 IS MENTIONED, SAY WE WILL COME BACK TO THAT LATER IN INTERVIEW.]*

d. For SIP purposes, does your agency calculate the emissions impacts (e.g., using program administrator reported MWH savings) or are they calculated and provided by another organization, such as the energy-efficiency program administrator?
e. *[IF AGENCY CALCULATES EMISSIONS IMPACTS]* What data are needed to calculate the emissions impacts?
    i. For each type of air emission, what are the sources of the data needed to calculate the emissions impacts of energy-efficiency programs?
    ii. For each type of air emission, what *general* methodologies are used to calculate the reductions? For example, are the energy savings multiplied by an emission factor (e.g., marginal emissions factor defined by regional ISO/RTO)?
    iii. In [RESPONDENT'S STATE], energy-efficiency program administrators are required to submit annual reports on performance of their programs that include information on emissions impacts. Are you aware of these reports?
    iv. What, if any, information do energy-efficiency program administrators or other entities provide to your agency to calculate emissions impacts?
    v. OR In [RESPONDENT'S STATE], energy-efficiency program administrators are not required to submit annual reports on performance of their programs that include information on emissions impacts. Would you like to see a requirement for such reports put in place, and if so, what types of energy-efficiency program emissions data would you like them to include?
    vi. If these reports were available, would your organization use the emissions data? *[IF YES]* How would your organization use the data? *[IF NO]* Why not?
f. *[IF EMISSIONS IMPACTS ARE PROVIDED BY ANOTHER ENTITY]* Are emissions impacts provided to you by energy-efficiency program administrators? [IF SO (GO TO f.i), *[IF NOT, ASK]* Who provides the emissions savings estimates?
    i. What information do program administrators provide, and how is it provided (i.e., informally or in a formal report)?
    ii. For each type of air emission, do you know what general methodologies and sources of information are used by the program administrator to calculate the emission reductions associated with their estimated savings data?
    iii. Are these methods and sources of data sufficient to meet your SIP needs?
    iv. What changes, if any, would you like to see made to current energy-efficiency/emissions reporting practices by program administrator(s) in your state? Why?

2) This question pertains to emissions projections and future year emission inventories for long term SIP planning. Does your agency currently account for projected energy-efficiency program emissions reductions in its forecast/baseline? *[IF NO GO TO 3)]*
    a. What emissions associated with energy-efficiency are included?
    b. What energy-efficiency data are needed to support emission projections and future year inventories?
        i. What, if any, information do energy-efficiency program administrators currently provide to inform these projections and future inventories?
        ii. What general methodologies are used to prepare these forecasts?

iii. Do you have any comments regarding any specific reporting timelines associated with SIP baseline inventories, attainment years, and how those could or would be served by the different reporting intervals associated with energy-efficiency programs?

iv. What changes, if any, would you like to see made to the type, availability, presentation and timing of energy-efficiency data to inform SIP forecasting needs? Why? *[GO TO 4]*

3) *[THESE QUESTIONS ARE ASKED IF THE INTERVIEWEE'S AGENCY DOES NOT CONSIDER ENERGY EFFICIENCY PROGRAM EMISSIONS IMPACTS IN EITHER CURRENT SIP ESTIMATES OR FORECASTS]* Does your agency plan to begin including energy-efficiency program emissions impacts in future SIPs? *[IF YES, GO TO 3)b]*
   a. Why is your agency not planning to include emissions impacts of energy-efficiency programs?
   b. Would availability of forecasted efficiency savings data make it more likely you would include emissions impacts of energy-efficiency programs in your SIP? *[GO TO 4]*
   c. If so, what specific forecasted energy-efficiency savings/emissions data would you need?
   d. In [RESPONDENT'S STATE], energy-efficiency program administrators are required to submit annual reports on performance of their programs that include information on emissions impacts. Are you aware of these reports?
   e. OR In [RESPONDENT'S STATE], energy-efficiency program administrators are not required to submit annual reports on performance of their programs that include information on emissions impacts.
      i. Would you like to see a requirement for such reports put in place?
      ii. If these reports were required, what types of energy-efficiency program emissions data would you like them to include?
      iii. If these reports were available, would your organization use the emissions data? *[IF YES]* How would your organization use the data? *[IF NO]* Why not?
4) Are you concerned about data quality from program administrators?
   a) Familiar with verification/audit of savings?
   b) program administrators must comply with standards for precision and accuracy in forward capacity markets, are you familiar with these regulations and are they sufficiently stringent to make the data trustworthy?
5) Are there requirements in your state for reporting carbon emissions impacts of energy-efficiency programs? *[IF NO, GO TO* 6*]*
   a. What are they? What information do they require?
   b. *[IF THEY DON'T MENTION RGGI]* Does your state currently or plan to track emission impacts from program administrator energy-efficiency activities that are funded by RGGI allowances? *[IF YES, ASK]* Please describe the carbon reporting requirements for your energy-efficiency programs. Who must report? What data and information must be reported?
   c. *[IF THEY DON'T MENTION STATE CLIMATE CHANGE ACTION PLAN]* Does your state have a climate change action plan that incorporates reporting of program administrator energy-efficiency program emissions impacts? *[IF YES]* Please describe what you know about the reporting requirements and process.

d. Currently RGGI does not give credit for electric energy-efficiency activities, but there may be a national cap and trade down the road given the current political environment. Have you thought about it and what type of data you would need to give credit for energy-efficiency programs?

6) Do you have any general comments regarding opportunities for improving information exchange between your agency and energy-efficiency program administrators, or their regulators, that would help your agency report, track, and forecast energy-efficiency program air and GHG emission impacts?

Thank you for your time in participating in this interview. We are happy to send you a copy of the final report once complete.

Appendix E Tracking System Interview Guide

Review of Energy-efficiency Program Tracking Systems

1. Can you briefly describe how you track energy-efficiency program activity and impacts?
   - All programs tracked within one system
   - Multiple tracking databases
   - Individual program tracking databases
   - Paper records
   - Other

2. Ask about the type of system(s) in use:
   - Commercially available system(s) **(get software name)**
   - Customized commercially available system(s) **(get software name)**
   - Custom system–worked with consultants to develop
   - Developed in house (by program managers or IT department)
   - Other

3. What was the cost of developing and implementing your tracking system(s)?

4. Can you briefly describe the inputs to and key outputs available from your tracking system(s)?

5. Does your tracking system produce reports used for filing monthly, quarterly and/or annual program impact reports to regulators?

6. What other types of reports are available from your tracking system? (probe for reports or commitment letters to customers etc.)

7. What other purposes Is your tracking system used for:
   - On-bill financing options and tracking
   - Customer rebate processing or payments
   - Assigning and/or tracking workflow responsibilities

- Other

8. What do you see as any weaknesses in your system?

9. What, if any, plans do you have for improving or expanding your tracking system?

    9a. What do you estimate to be the cost of making these improvements?

Appendix F System Planner Interview Guide

Regional EM&V Forum

Development of Common Reporting Guidelines for Energy Efficiency Savings, Costs and Emissions Impacts

Interview Guide – System Planners–ISO-NE, PJM, NYISO

From Work Plan: Interviews with regional energy system planners will address the energy-efficiency data needed to inform system planning for forecasting energy-efficiency impacts. In interviews, along with a high-level review of the data that are currently available, we will examine how and where these data are reported and how the data are incorporated into planning. We will also identify what data are needed to determine gaps between what planners need and what is available. Again, there may be cases where specific data are available in some states and not others. Describing how and where data not available in some states are provided in other states will help inform those states needing additional data about options for gaining access to needed data.

Introduction

I would like to talk with you about how energy-efficiency savings are incorporated into [ISO's/RTO's] system planning, including energy and capacity planning and T&D planning. I am interested in a range of issues regarding: what energy-efficiency data you currently collect, the sources of such data, in what format the data is provided (e.g., from program administrators, and whether it is in a standardized format), how energy-efficiency impacts are addressed in forecasting and planning; whether you forecast energy-efficiency impacts or look only at the future impacts from already installed measures; and whether there are any gaps between the energy-efficiency data available to you and what you need for planning purposes. I can ask you the series of questions below or, if you prefer, you can explain to me how you address energy-efficiency in system planning and then I may want to ask you a few questions to fill in blanks or clarify information. Which would you like to do?

Energy-Efficiency Data

1. What sources of energy-efficiency data do you use in your system planning?
    a. Program administrator energy-efficiency data?
        i. What energy-efficiency program data do you use in system planning?
            1. Energy impacts
            2. Demand impacts
            3. Over what time period?

ii. Who submits energy-efficiency program data to you?
iii. Does everyone submit data in the same format or in the same template?
iv. Do you report state or regional level energy-efficiency program impacts?
    1. If so, how and where do you report energy-efficiency program impacts?
v. Are there energy-efficiency program data you need, or would like, for planning purposes that are not currently available?
    1. If so, what data are not currently available?
        a. Do you have any plans to request and collect these data and, if so, when do you plan to begin collecting these data?
        b. How would you use these data in planning?

b. Do you have other energy-efficiency data sources?
    i. If yes, what are the data sources and what energy-efficiency data are collected?
c. How do data needs differ for energy, capacity and T&D planning purposes?

Planning

2. How are energy-efficiency impacts incorporated into planning? *(Probe to find out if they are subtracted from a system forecast, which is what I think ISO-NE does from what I read.)*
    a. Energy forecasts.
    b. Demand forecasts.
    c. T&D plans.
3. Do you incorporate forecasts of the energy-efficiency impacts of future year energy-efficiency programs in planning, or only the future year impacts from measures already installed through energy-efficiency programs?
    a. [In cases of ISO-NE and PJM], specifically, do you currently incorporate energy-efficiency resources that have cleared as a resource through the forward capacity market into your system plans?
        i. If so, what data sources do you use to support this forecasting (i.e., to translate peak demand savings to energy savings across 8,760 hours)?
        ii. If not, do you plan to incorporate energy-efficiency resources that have cleared the capacity market into your system plans?
            1. If so, when do you plan to start doing this?

   b. Given that many states now have aggressive multi-year energy-efficiency program plans, do you have any plans for including forecasted energy-efficiency impacts of future year energy-efficiency programs in planning?
      i. If yes, how would you go about forecasting the impacts of future year energy-efficiency programs? *(Probe for the source and/or method of forecasted data.)*
         1. How many future program years would you incorporate into your forecast?
      ii. If no, please explain why.
4. Do you reflect any other future year energy-efficiency impacts in your system plans (e.g. future expected changes in building energy codes or equipment standards)?
   a. If so how?
   b. If not, why not?

Emission Factor Calculations

5. Do you currently conduct an emission analysis for PJM?
   a. If not, why not?
   b. If so, do you calculate marginal or average emission factor?
      i. What methodology do you use, and why do you select this approach?

Closing

6. Is there anything you would like to add or anything you think I should know that I have not asked about?

Appendix G Details on Potential Paths to Include the Emissions Reductions Benefits from Energy Efficiency in Air Quality Plans

Section 7.3 describes the three possible ways for the emissions reductions benefits from energy efficiency to be used by air regulators. This section provides additional details regarding how such emissions reductions benefits can be determined and accounted for by states in their air quality plans. EPA and the states are still developing how to account for emissions reductions from energy efficiency in a SIP. While several states have adopted energy-efficiency programs, few, if any, have included them in their SIPs. Although EPA published two SIP guidance documents in 2004 for emission reductions from electric sector energy-efficiency and renewable energy measures, air regulators at the local, state and federal level are discussing options with EPA regarding the how to account for the emissions reductions associated with the energy savings from energy-efficiency programs and respective data requirements for each pathway.[35][36]

Air regulators may account for energy-efficiency measures in the emissions growth baseline projection. Emissions growth baseline projection accounts for many factors, including but not limited to, economic activity, population growth, as well as applicable federal and state regulations that are currently in effect. For example, EPA uses the Integrated Planning Model (IPM) to analyze the projected impacts of environmental policies on the electric power sector in the 48 contiguous states and the District of Columbia.[37] EPA uses the baseline electricity demand forecast projected by the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) Report as an input into the IPM base case runs. The Energy Information Administration uses the National Energy Modeling System (NEMS) to predict the regional electricity demand base case scenario characterized in the AEO. EPA periodically releases a base case scenario for the electric power sector that States use in their SIP emissions growth baseline projections. States could potentially input emission reductions as a result of existing, in force state-specific energy efficiency measures into their emissions growth baseline projections. However, States must first assess and quantify what is already assumed in the base case predicted by EIA and EPA. States may use a few tools currently available for this task, including dispatch models, Energy 2020[38], Integrated Planning Modeling (IPM), and DOE Annual Energy

[35] US EPA. *Guidance on SIP Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures.* 2004

[36] The Metropolitan Washington Council of Governments (MWCOG) has developed several tools to assist State and local governments with this goal. An emissions calculator and a regional protocol recommendation can be accesed from the following website:
http://www.mwcog.org/environment/air/EERE/default.asp

[37] http://www.epa.gov/airmarkt/progsregs/epa-ipm/index.html

[38] http://www.energy2020.com/ENERGY%202020%20Model%20Overview.htm

Outlook/Economic Growth Analysis System (EGAS).[39] NESCAUM has tailored the Market Allocation (MARKAL) model for the Northeast (NE-MARKAL), and states are starting to explore how to estimate emissions reductions from implementing energy program using that model. Other methods include using conservative assumptions regarding displaced emissions or a Monte Carlo probabilistic assessment.[40] These models generate scenarios which would be helpful in understanding emission inventory forecast options. While there are several possible models that could be used by states and EPA to account for the impact of energy efficiency, the model chosen should be capable of evaluating the dispersed and decentralized characteristics associated with energy-efficiency measures, and their cumulative energy and capacity values.

The business as usual (BAU) case represents normal economic growth behavior, based on forecasts of energy demand while the energy-efficiency case would account for effects of increased investment in measures reducing energy usage. However, including benefits from state energy efficiency programs could affect the rate of emissions growth as a result of energy savings that in turn may decrease total emissions.[41] As a result, emissions growth may be offset by energy-efficiency programs, and the emissions reductions provided by the energy-efficiency measures may help states in meeting their goals to attain and maintain the NAAQS.[42]

The WOE[43] process primarily provides a margin of safety and relies on quantitative and qualitative data that are not typically used in the SIP context. It does not reduce the burden on the state air regulators to demonstrate emissions reductions, as measures must be used to ensure that ambient concentrations do not exceed the NAAQS, but it could affect EPA's decision to accept or reject a SIP.

The main barriers associated with this approach are:

- The need to ensure regional and federal cooperation and consistency in the data reported for use in the modeling and in supplemental analyses

[39] For more information please refer to the work done by Synapse on displaced emissions: High Electric Demand Day CT, Utah. LEAP and MARKAL are two other models that have the ability to determine the emissions benefits from dispersed energy resources such as EE, RE and behind the meter CHP.

[40] This is not a complete list of all available tools or a review of how well they can handle EE benefits

[41] Chris James – Synapse Energy economics, Inc

[42] For example, see page 32 of: Reducing Emissions in Connecticut on High Electric Demand Days (HEDD), Synapse Energy Economics, July 2008. http://www.synapse-energy.com/Downloads/SynapseReport.2008-07.EPA.CT-HEDD.08-020.pdf

[43] A weight of evidence (WOE) determination examines results from a diverse set of analyses, including the outcome of the primary modeled, attainment test, and attempts to summarize the results into an aggregate conclusion with respect to whether a chosen set of control strategies will result in an area attaining the NAAQS by the appropriate year. Weight of evidence determinations can be used in some cases to demonstrate attainment conclusions that differ from the conclusions of the model attainment test. Weight of evidence analyses rely on quantitative and qualitative data.

- The need to develop SIP guidance that is flexible enough to allow for robust WOE approaches while not compromising the critical accountability mechanisms already in place for SIP approval
- Resources at the state and federal levels to develop methodologies and alternative modeling analyses

The third air quality application for energy-efficiency measures is to explicitly describe and project the future level of energy savings that is expected based upon implementation of energy regulatory or statutory requirements. The incremental energy savings associated with the forecasted quantity of energy efficiency can then be included as a control measure that the state is relying upon to help in to attain and maintain compliance with the NAAQS. The associated emissions reductions from these energy savings would become a SIP measure, with the quantity of SIP credit calculated and agreed upon by the state and EPA. SIP credits assure that emissions reductions occur through reliable technologies or other strategies and must satisfy a stringent list of requirements. The requirements are that the reductions be:

Quantifiable - The emission reductions generated by measures to reduce emissions must be quantifiable and include procedures to evaluate and verify over time the level of emission reductions actually achieved.

Surplus - Emission reductions are surplus as long as they are not otherwise relied on to meet air quality attainment requirements in air quality programs related to a SIP. With respect to surplus, qualifying allowances from energy-efficiency that are captured in state cap and trade programs must be retired in order to be certified as emissions reductions.

Enforceable - Measures that reduce emissions from electricity generation may be:

- Enforceable directly against a source
- Enforceable against another party responsible for the energy efficiency or renewable
- energy activity
- Included under EPA's voluntary measures policy[44]

Enforceability of the emissions reductions means that an organization at the state level is responsible for ensuring that the energy savings from the energy-efficiency activities occur, and that the methodology used to calculate the resulting emissions savings is credible and replicable. For energy efficiency, the air quality agency must be able to either independently determine such emissions savings or rely upon the program administrators responsible for ensuring those emissions reductions occur.

Permanent - The measure should be permanent throughout the term for which the credit is

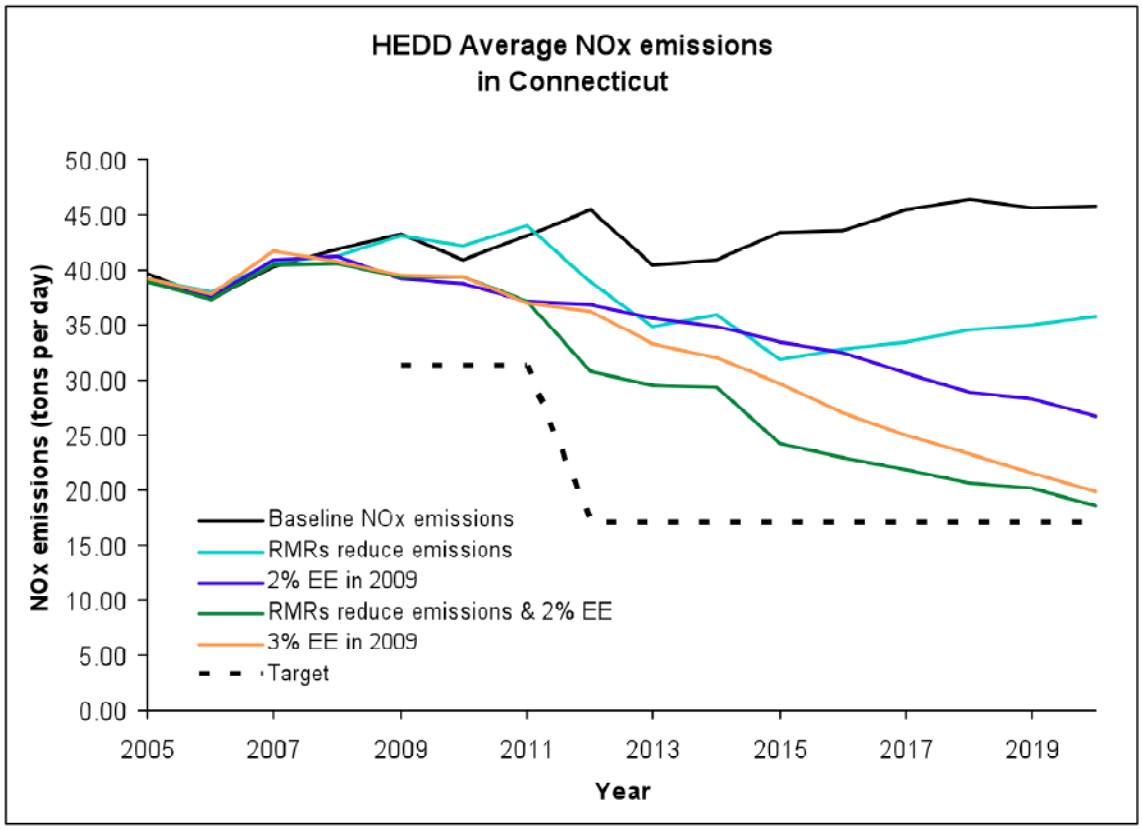
granted unless it is replaced by another measure or the State demonstrates in a SIP revision that the emission reductions from the measure are no longer needed to meet applicable requirements.

[44] The voluntary bundle of energy efficiency measures from the DC LED traffic light replacement program is one such example.

Permanence refers to the savings persisting throughout the energy-efficiency program or SIP credits assure that emissions reductions occur through reliable technologies or other strategies and must satisfy a stringent list of requirements.

Figure G-1 illustrates the flexibility in control options that energy efficiency measures can provide for air regulators.

Figure G-1: Examples of the Air Quality Benefits from Energy Efficiency



The analysis in Figure G-1 was completed to provide Connecticut with the emissions reductions and their timing from four different policies:

- The top black line reflects business as usual, the emissions trajectory from in-state generators if no additional control measures were implemented.
- The next line, shown in green, shows the results of applying best available controls to Connecticut's vintage power plants.
- The third line, shown in blue, reflects the emissions reductions that would be achieved if Connecticut doubled the quantity, compared to 2008 savings levels, of energy saved from energy-efficiency measures.
- The fourth line, shown in orange, reflects the emissions reductions that would be achieved if Connecticut tripled the quantity, compared to 2008 savings levels, of energy

saved from energy-efficiency measures (this quantity is consistent with that which could be captured by all cost-effective energy-efficiency measures as required by state statute).

- The bottom line, shown in dark green, reflects the combination of best available emissions controls installed on the vintage power plants plus energy savings at double the 2008 levels.

None of the options alone achieve the desired emissions reduction goal within the required timeframe. The combination of energy efficiency plus controls produces the largest quantity of emissions reductions, and is closest to meeting the long-term target for NOx emissions from Connecticut's power plants. How the emission reductions benefits are accounted for by Connecticut in this example would be up to the state, and discussed with EPA. The math behind how the energy savings are calculated will be identical regardless of whether Connecticut includes the differential energy consumption as part of its baseline, for WOE or specifically as a control measure.