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Coordinating Demand-Side Efficiency Evaluation, Measurement and Verification Among Western States: Options for Documenting Energy and Non-Energy Impacts for the Power Sector

Steven R. Schiller and Lisa Schwartz, Lawrence Berkeley National Laboratory

Demand-side energy efficiency (efficiency) represents a low-cost opportunity to reduce electricity consumption and demand and provide a wide range of non-energy benefits, including avoiding air pollution. Efficiency-related energy and non-energy impacts are determined and documented by implementing evaluation, measurement and verification (EM&V) systems. This technical brief describes efficiency EM&V coordination strategies that Western states can consider taking on together, outlines EM&V-related products that might be appropriate for multistate coordination, and identifies some implications of coordination. Coordinating efficiency EM&V activities can save both time and costs for state agencies and stakeholders engaged in efficiency activities and can be particularly beneficial for multiple states served by the same utility.

First, the brief summarizes basic information on efficiency, its myriad potential benefits and EM&V for assessing those benefits. Second, the brief introduces the concept of multistate EM&V coordination in the context of assessing such benefits, including achievement of state and federal goals to reduce air pollutants.[1] Next, the brief presents three coordination strategy options for efficiency EM&V: information clearinghouse/exchange, EM&V product development, and a regional energy efficiency tracking system platform. The brief then describes five regional EM&V products that could be developed on a multistate basis: EM&V reporting formats, database of consistent deemed electricity savings values, glossary of definitions and concepts, efficiency EM&V methodologies, and EM&V professional standards or accreditation processes. Finally, the brief discusses options for next steps that Western states can take to consider multistate coordination on efficiency EM&V. Appendices provide background information on efficiency and EM&V, as well as definitions and suggested resources on the covered topics.

This brief is intended to inform state public utility commissions, boards for public and consumer-owned utilities, state energy offices and air agencies, and other organizations involved in discussions about the use of efficiency EM&V.

[1] Among the air pollutants associated with electricity generation are nitrogen oxides, sulfur dioxide, particulates and carbon dioxide. States can include energy efficiency among the strategies in their State Implementation Plans showing how they will lower or maintain air pollutant emissions to meet federal standards. The U.S. Environmental Protection Agency's Clean Power Plan also allows states to use demand-side energy efficiency as a compliance option in their state plans to meet the carbon dioxide emission reduction targets for existing fossil fuel-fired electricity generating units.

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Disclaimer

The information presented in this document does not represent any U.S. Department of Energy (DOE) or Lawrence Berkeley National Laboratory (LBNL) positions with respect to the Clean Power Plan (CPP), CPP documents, or strategies/actions that states, electricity generating units (EGUs), or others should, can or may take with respect to CPP compliance.

With regard to the CPP, the information presented is based in part on the following proposed documents:

- Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations; and
- Evaluation Measurement and Verification (EM&V) Guidance for Demand-Side Energy Efficiency.

The above listed Environmental Protection Agency (EPA) documents are in draft form and are subject to change. Thus, the information presented is also subject to change. DOE and LBNL are not taking positions on the proposed documents. States, EGUs, or other parties should contact their local EPA regional office if they have questions concerning the CPP. Information on the CPP also can be found at the EPA CPP website: http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants.

Contents

1. Executive Summary

Demand-side energy efficiency avoids electricity commodity costs as well as generation, transmission and distribution capacity; helps stabilize electricity market prices; reduces disconnections due to arrearages on bill payments; improves system reliability and energy security; and provides a wide range of non-energy benefits to consumers and society as a whole, including reduced air pollution. Evaluation, measurement and verification (EM&V) involves assessments aimed at determining the effects of efficiency actions. EM&V is a valuable component of any efficiency activity as it documents impacts and provides a basis for assessing and improving program performance. EM&V is currently used for a wide range of efficiency activities throughout the United States.

Demand-Side Energy Efficiency

Energy efficiency is the use of less energy to perform the same function or provide the same or an improved level of service to the energy consumer. Specifically, demand-side (often called end-use) energy efficiency is reducing energy consumption at the point where the energy is used, typically at consumers' facilities — such as a factory, home or office building — as well as consumption for nonfacility-related uses such as street lighting or agricultural pumping. Efficiency measures that reduce losses in the electricity transmission and distribution system are sometimes included in the category of demand-side efficiency. Efficiency can be a low, and perhaps the lowest, cost option for reducing air emissions at power plants.

This document covers EM&V coordination associated with a wide range of efficiency activities, including those associated with programs funded by electric utility customers, energy efficiency standards for appliances and equipment, building energy codes, and energy savings performance contracting for state and local governments. These efficiency opportunities, strategies and products also may support initiatives such as state energy efficiency resource standards, energy resource planning efforts (by tracking energy savings levels), demand response initiatives, and using efficiency to support compliance with state, regional or federal air pollution regulations such as the U.S. Environmental Protection Agency's (EPA's) Clean Power Plan (CPP).[2]

Western states can coordinate efficiency EM&V efforts in order to:

- Facilitate and improve the quality of EM&V;
- Facilitate interstate (and intrastate) benchmarking, disclosure, and tracking of energy efficiency projects and their electricity savings using consistent EM&V procedures to support improvements in EM&V as well as trading of energy efficiency savings credits if used for pollution reduction programs or regulations; and
- Reduce EM&V development and implementation costs, thus reducing the cost of efficiency implementation and encourage more efficiency activity.

[2] EPA supports multistate cooperation on meeting the CPP's goal. To this end, EPA developed two approaches that allow states to coordinate implementation in order to meet CPP requirements: States can submit (1) multistate plans that address affected electricity generating units (EGUs) in a group of states or (2) individual state plans with individual state goals, but coordinate plan implementation through the interstate transfer of Emission Rate Credits (ERCs, used in rate-based plans) or emission allowances (for mass-based plans). 40 CFR Part 60, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, http://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf; and 80 Fed. Reg. 64661 (Oct. 23, 2015), pages 64833, 64838–40, 64844, 64848–51, 64859–61, 64892–94, 64910–12, and 64946.

This paper presents three strategies for coordination of efficiency EM&V. For each strategy, we list implications as potential advantages and disadvantages. However, these can be subjective and should be considered from the perspective of each state and stakeholder. The three strategies, in increasing order of effort and possible outcomes, are as follows:

1. **Information clearinghouse/exchange –** a relatively low level of coordination involving sharing of existing EM&V documents, procedural approaches and exchanging information and experience.

2. **EM&V product development –** mutual development of specific, new EM&V products (see list further below) that support consistent, cost-effective EM&V implementation by individual states on a voluntary basis.

3. **Regional demand-side efficiency tracking system platform –** development and implementation by interested states of an entity (e.g., a joint parties authority) that administers within states and across the region EM&V procedures, rules and reporting infrastructure, including but not necessarily limited to an expansion of the Western Renewable Energy Generation Information System (WREGIS) for efficiency tracking. The fundamental element of this infrastructure would be a tracking system (registry) for:

    - Supporting compliance with state, regional or federal pollution prevention programs,[3] and
    - Disclosure and benchmarking of regional, state and/or local efficiency efforts.

Additionally, this brief summarizes the following five EM&V products that can be developed:

- Standard reporting formats for projected, claimed and evaluated energy savings.
- Regional database of consistent values for deemed (stipulated) energy savings and effective useful life (persistence values).
- Regional glossary of EM&V definitions and concepts.
- Regional, standardized efficiency EM&V plans (methodologies) for determining energy savings and effective useful life values for specific efficiency actions.
- Regional EM&V professional standards or accreditation processes and entities for those individuals and companies conducting EM&V.

[3] The CPP includes a Clean Energy Incentive Program (CEIP) that states may use at their own option to provide incentives for early investments in wind and solar power generation, as well as efficiency measures in low income communities that reduce end-use energy demand during 2020 and/or 2021. For example, see 80 Fed. Reg. 64661 (Oct. 23, 2015), pages 64669, 64670, 64675–76, 64829–32, 64855, and 64943.

2. Background

2.1 *Introduction to Demand-Side Energy Efficiency*[4]

Demand-side (or end-use) energy efficiency (efficiency) — reducing electricity consumption at consumers' facilities and other electricity end-use sites — is an effective means of reducing power plant emissions because it can reduce the need to combust fossil fuels. Specifically for electricity efficiency, whenever electricity consumption is reduced, somewhere on the grid one or more generators reduce their electric output (all else being equal). Many utilities recognize efficiency as a resource in the integrated resource plans they develop to guide investment decisions and operational plans.[5]

Across the United States, efficiency programs funded by electric utility customers, energy efficiency standards for appliances and equipment, and more efficient building energy codes are likely to continue to offset the majority of the forecasted electric load growth. In 2013, Lawrence Berkeley National Laboratory (LBNL) projected incremental annual energy savings from utility customer-funded electric efficiency programs to reach about 0.8% per year in the United States by 2025, driven primarily by compliance with statewide savings or spending targets associated with these programs.[6]

Efficiency programs have been in place in the United States for several decades, and every state in the Western United States has programs in place.[7] Nevertheless, the potential of efficiency as an energy resource is vast and remains largely untapped.[8] Efficiency potential studies conducted for utility service territories or at the state level can provide an estimate of the technical, economic and achievable opportunity for energy and cost savings for a particular jurisdiction. These potential studies provide a benchmark for goal setting and subsequently provide a yardstick against which to measure actual performance.[9]

In addition to saving electricity, efficiency programs also save money. The full cost of saving electricity among U.S. utility efficiency programs was recently estimated at 4.6 cents per kilowatt-hour (kWh), based on a weighted average across programs in the residential, commercial, industrial, agricultural and low income sectors. That includes costs to the utility (or other program administrators), as well as costs to program participants. Utility and program participants, on average, split the cost almost right down the middle — paying roughly 2.3 cents per kWh each.[10] This compares favorably with an average national electricity price in early 2016 of about 11 cents per kWh.[11]

Efficiency is not only less expensive than the average retail price of electricity, it also is less expensive than building power plants. For example, the estimated U.S. average cost of energy for natural gas-fired combined-cycle power plants — the most common generator built in recent years and planned for the near

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[4] Portions of this section and Appendix A are from SEE Action Network (2016).
[5] Refer to SEE Action Network (2011).
[6] Barbose et al. (2013). These projections included savings not captured in the U.S. Energy Information Administration's (EIA's) Reference Case, offsetting the majority of projected growth in its projections of retail electric sales. These values also do not include savings from energy efficiency programs outside the utility sector.
[7] See The Cadmus Group (2015), hereinafter the *Modular Approaches Report*. Section 4.2 in that report provides an overview of efficiency policies and programs in the West.
[8] For example, see Winkel (2015).
[9] See National Action Plan for Energy Efficiency (2007).
[10] Hoffman et al. (2015). The study determined average, savings-weighted total cost of saving electricity from 2009 to 2013 in 20 states.
[11] The U.S. average electric rate is 10.44 cents/kWh. U.S. Energy Information Administration, Average Price by State by Provider (EIA-861), January 2016, https://www.eia.gov/electricity/data/state/.

future — ranges from 5.2 cents to 7.8 cents per kWh according to the financial advisory and asset management firm Lazard.[12] Even in regions where new generating capacity is not needed, efficiency avoids energy costs — saving on fuel and other variable costs. That's why efficiency — essentially not wasting energy — is considered the least-cost electricity resource and why efficiency is also often considered the low-cost approach to emissions mitigation.

Energy efficiency also supports a host of non-energy benefits for individual participants and society as a whole.[13] [14] For participants, these include such benefits as reduced energy bills and more disposable income, increased property values, improved comfort, lower maintenance costs, higher productivity, and positive health impacts. For society as a whole, non-energy benefits include reduced air emissions, water savings and other environmental benefits, reduced costs to operate public facilities, jobs created,[15] local economic development, and broad health benefits such as reduced asthma cases from cleaner air.

Particularly relevant for Western states as they consider coordination of EM&V across state borders is that in recent years the value of energy efficiency as a cost-effective strategy to reduce air pollutant emissions has grown in importance. Pollution often crosses state borders and is affected by power plants in one state supplying electricity to other states. Demand-side efficiency has the advantage of reducing *all* types of power plant-related emissions simultaneously by avoiding the need to generate electricity in the first place. Thus, efficiency can be thought of as an air quality control measure, at least in cases where the offset generation is fossil fuel-based and not hydro or other generation with zero emissions.

Appendix A provides further information about efficiency options and efficiency as a multipollutant reduction strategy.

2.2 *Introduction to Efficiency EM&V*

EM&V for demand-side energy efficiency includes a range of assessment studies and other activities aimed at determining the effects of energy efficiency policies, portfolios, programs, projects or individual measures. Fundamentally, EM&V is based on the importance of documenting results — i.e., *things that are measured tend to improve*. EM&V can document metrics such as efficiency activity performance (i.e., energy and demand savings, avoided air emissions), changes in energy efficiency markets, and cost-effectiveness. This section provides a brief introduction to the common practices associated with how electricity savings are determined.

EM&V best practices for determining savings from efficiency programs, projects and measures are relatively mature and robust. The EM&V industry includes professional firms, protocols and guidelines, training and certification programs, regulatory oversight, and established conferences with a rich library of published reports and publicly available data and analyses. EM&V approaches are becoming increasingly standardized and consistent, with an active number of state, regional and national efforts to define common EM&V procedures and terminology.

Throughout the three-part process of efficiency planning, implementation and evaluation, energy savings values are typically specified as follows:

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[12] Lazard (2015).
[13] Skumatz et al. (2010).
[14] Skumatz (2015).
[15] Some of these jobs displace others — for example, construction jobs for central-station power plants and transmission lines.

- **Projected savings –** Values reported by a program implementer or administrator before the efficiency activities are completed.
- **Claimed savings –** Values reported by a program implementer or administrator after the efficiency activities have been completed.
- **Evaluated savings –** Values reported by an independent third-party evaluator after the efficiency activities and impact evaluation have been completed.

Both claimed and evaluated savings are determined using impact evaluations. These evaluations involve assessments of the performance and implementation of an efficiency program in real-time, retrospectively, or both. Impact evaluations also support cost-effectiveness analyses aimed at identifying relative program costs and benefits of efficiency compared to other energy resources, including both demand- and supply-side options (e.g., power plant efficiency upgrades, fuel switching or renewable energy generation).

Appendix B summarizes the three categories of evaluation approaches used for efficiency EM&V. Appendix C contains definitions for select efficiency and EM&V terms used in this brief. Appendix D lists resources for more information on EM&V.

Regardless of how efficiency savings values are determined, they are estimates. Savings are determined by comparing energy consumption after an efficiency action is taken (the reporting period) with what is assumed to be the energy consumption in the absence of the action (the "counterfactual" scenario, or the baseline). Savings are thus based on baseline assumptions about energy consumption. Numerous methods for estimating these baselines are documented in guidelines and protocols.

Regional Technical Forum (RTF) of the Northwest Power and Conservation Council

Since 1980, the Northwest Power and Conservation Council has been charged with preparing regional integrated resource plans for the Pacific Northwest states of Idaho, Oregon, Washington and the western portion of Montana. The Regional Technical Forum (RTF) was established in 1999 by the Council and is charged with developing and providing reliable estimates of savings from efficiency activities.

A major function of the RTF is developing and updating transparent EM&V methods for specific energy efficiency measures. The RTF focuses on four savings estimation methods:

- Unit Energy Savings — deemed savings values
- Standard Protocols — deemed calculation methods for common, well defined efficiency measures
- Custom Measure Protocols — methods for specialized efficiency measures or applications
- Program Impact Evaluations — methods for determining program level savings

Each method is intended to produce savings estimates of "comparable reliability" at the lowest reasonable cost.

The RTF does not have regulatory authority, and while technically reporting to the Chair of the Council, in practice it works for the region, providing information to Bonneville Power Administration (BPA), administrators of efficiency programs (e.g., utilities) and regulators.

RTF members are appointed for their technical expertise (not constituency based) with technical analysis and staff supported by voluntary contributions from BPA, the region's largest utilities and the Energy Trust of Oregon. The RTF's 2013 budget was about $1.8 million.

Some of these guidelines and protocols have been developed by federal agencies, state public utility commissions (PUCs) and state energy offices that have oversight responsibility for these programs. National and international efficiency industry groups have developed other guidelines and protocols for the purpose of bringing consistency to EM&V practices. These documents are now in wide use and provide the benefits of establishing minimum requirements and best practices for the conduct of EM&V, as well as

protocols providing specific EM&V requirements that can be referenced in air quality program regulations. Some of these are identified and described later in this brief.

The majority of the efficiency industry guidance and protocols on documenting savings from efficiency programs in the United States have been driven by state PUC requirements for programs funded by utility customers. Typically, annual energy savings reports[16] are prepared based on requirements established by the state PUC. The reports are submitted for PUC review and approval. They also are used to assess energy efficiency program performance and in utility resource planning.

[16] Energy savings reports are typically prepared as part of impact evaluations, which are assessments that determine and document the direct and indirect benefits of an energy efficiency program.

3. Multistate Strategies for Coordination of Efficiency EM&V

This section presents three multistate EM&V coordination strategies:

1. Information clearinghouse/exchange.
2. EM&V product development.
3. Regional EM&V platform based on a demand-side energy efficiency tracking registry.

Each strategy includes conceptual descriptions, attributes in the form of potential advantages and disadvantages, and resources required, including those that might exist in the region that could be used or leveraged. Of course, advantages and disadvantages are "in the eye of the beholder," and each state must determine its position on such attributes.

Fundamentally, EM&V coordination consists of effective interactions among public agencies and other organizations. Public agencies that might be involved in such coordination are state PUCs, air regulators, energy offices, and community development offices (e.g., for the CPP's Clean Energy Incentive Program), local agencies such as city and regional governments with their own efficiency initiatives, and regional organizations such as the Bonneville Power Administration, Western Area Power Administration and the Northwest Power and Conservation Council.

Regional energy resource coordination is not new. Several organizations have a history of facilitating or at least encouraging coordination of energy topics in the West, including the Western Interstate Energy Board (WIEB), the Western Electricity Coordinating Council, utilities, and nongovernmental and private sector organizations such as industry associations (e.g., Northwest Energy Efficiency Council[17]) and non-utility administrators of efficiency programs (e.g., Energy Trust of Oregon[18] and Northwest Energy Efficiency Alliance[19]). Specifically with regard to efficiency EM&V, following are examples of existing regional organizations that have energy efficiency or evaluation-related functions and which could perhaps organize and facilitate Western regional EM&V coordination strategies:

- Regional Technical Forum of the Northwest Power and Conservation Council, a Northwest regional group specifically focused on efficiency EM&V: http://rtf.nwcouncil.org. See the text box on page 9 of this brief for a description of the EM&V aspects of the RTF.
- The Southwest Energy Efficiency Project (SWEEP), a public interest organization promoting greater energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming: http://www.swenergy.org.
- Northwest Energy Efficiency Alliance, an alliance of more than 140 Northwest utilities and energy efficiency organizations with a mission to accelerate energy efficiency, leveraging its regional partnerships to advance the adoption of energy-efficient products, services and practices: www.neea.org. The membership of its board of directors spans Northwest utilities, state representatives, public interest groups, energy service professionals and industry associations.
- Western Electricity Coordinating Council (WECC), a nonprofit corporation that exists to assure a reliable bulk electric system in the Western Interconnection: www.wecc.biz. WECC's program areas include education and training and WREGIS, an independent, renewable energy tracking system for the region.

[17] Northwest Energy Efficiency Council. http://www.neec.net.
[18] Energy Trust of Oregon. http://energytrust.org.
[19] NEEA. http://neea.org.

Other categories of entities that might house EM&V coordination functions are state and regional air agency organizations,[20] regional organizations that while not solely focused on energy have interest and experience with energy issues (e.g., Western Governors' Association), or state entities that already have a heavy involvement in efficiency (e.g., the California Energy Commission). However, these are not considered further in this brief as they would presumably need to develop new efficiency-related capabilities, rather than leverage existing capabilities or, in the case of state agencies, develop a regional perspective and overcome potential perceptions of one state driving regional outcomes.

An example of another region's approach to establishing an entity for coordinating efficiency EM&V activity is the Northeast and Mid-Atlantic EM&V Forum, which consists of representatives from eight jurisdictions from Vermont to the District of Columbia that work to develop and support the use of consistent savings assumptions and standardized, transparent guidelines, as well as tools to evaluate, measure, verify and report the energy and demand savings, costs and avoided emission impacts of efficiency.[21] The EM&V Forum is steered by a committee of state public utility commissioners, energy office and air agency representatives. The EM&V Forum was initiated in 2008 when the New England Conference of Public Utility Commissioners and the Mid-Atlantic Conference of Regulatory Utility Commissioners each passed resolutions supporting the creation and funding for a regional forum to build consistency in EM&V and reporting of energy efficiency. The EM&V Forum is coordinated by the Northeast Energy Efficiency Partnership, a nonprofit regional energy office.[22]

3.1 *Attributes of Efficiency EM&V Coordination*

In general, attributes of EM&V coordination among states depend on which coordination strategy is adopted, the level of success, and the level of commitment by each participating state. Another key variable is the decision making process — e.g., the relative weight of individual states, small versus large states — in driving outcomes. Irrespective of these variables, the following are what may be considered potential advantages and disadvantages for various EM&V coordination strategies.

Advantages. The general advantages of successful EM&V coordination efforts are potential for reduced transaction costs through economies of scale, high quality EM&V products and services, consistency in EM&V requirements, higher levels of efficiency activity, and consistent reporting to support efficiency initiatives such as utility customer-funded programs that operate in the Western states, as well as federal or regional initiatives.[23]

With respect to the first advantage, transaction costs are reduced to the extent there are both fixed costs associated with development and implementation of EM&V products and services and variable costs that depend on either the volume of activity or the need to tailor products to individual states. The degree of the potential savings is thus dependent on the ratio of fixed and variable costs. If multiple states participate in development of an EM&V product or service, the fixed costs can be shared. In other words, the fixed cost for a 10-state EM&V product is less, in total, than the cost for 10 individual state EM&V products.

Regarding the second advantage, bringing together the region's resources in terms of expertise, experience and funding can result in products and services of higher quality than one or two states could develop on

[20] Examples of regional air organizations include Western States Air Resources Council (http://www.westar.org/) and Western Regional Air Partnership (http://www.wrapair2.org/).
[21] Northeast Energy Efficiency Partnerships. EM&V Forum. http://www.neep.org/initiatives/emv-forum.
[22] Northeast Energy Efficiency Partnerships. www.neep.org.
[23] Appendix E provides information on how the Clean Power Plan addresses multistate coordination.

their own. The Northwest Regional Technical Forum's EM&V products are an example of how combining multiple states' resources has resulted in what is arguably the best resource of its kind in the country for creation and implementation, in a collaborative manner, of consistent guidelines for estimating savings. These guidelines are widely used by utilities and third-party program administrators, the Bonneville Power Administration (BPA), and regulatory agencies in the Pacific Northwest — reducing costs (including regulatory overhead for investor-owned utilities and PUCs) and disputes among stakeholders with regard to savings calculation methods and values.

In terms of more efficiency activity, the potential for lower EM&V costs and higher quality EM&V products and services should translate into lower efficiency program transaction costs and greater confidence in the performance of such programs as an effective and viable tool for state regulatory compliance and other purposes. The time, cost and difficulty associated with the EM&V process of determining savings, and achieving adequate confidence in the savings values, are all common barriers to efficiency implementation. Addressing these barriers by having broadly accepted, high quality products available to state agencies, program and project administrators, and implementers can result in more efficiency activity.

Consistency in EM&V across Western states may result in more efficiency activity, which can be important for multistate utilities or third-party administrators of efficiency programs, state utility and environmental regulators, regional energy efficiency efforts, and potential interstate trading of efficiency savings credits (such as for CPP compliance). A common set of EM&V requirements for how savings values are determined and documented also will make it easier, potentially substantially, to compare impacts across programs and jurisdictions, for the following reasons:

- Efficiency providers working in multiple states will only have to follow one set of EM&V requirements.
- Efficiency tracking systems and reporting formats will only need to be structured to implement one set of EM&V requirements.
- In the case of interstate trading of efficiency savings credits, consistent EM&V will mitigate the possibility of efficiency credits from a state with relatively easy EM&V overwhelming markets in trading-partner states with more rigorous EM&V requirements.

Disadvantages. The general disadvantages of EM&V coordination efforts across states include potential for some loss of state control, "lowest common denominator" products or services that do not meet the needs of some of the participating states, and increased costs and delays through coordination inefficiencies or failures. While these potential disadvantages can be mitigated, they do require attention to the issues, such as decision-making structure.

Loss of individual state control can be the result of any collaborative effort and, if not balanced by other benefits, can cause issues such as product or service development that is not beneficial to the needs of the state(s). This can be aggravated if a state believes that its financial contribution to collaborative efforts exceeds what it would have spent to develop its needed products/services on its own.

The potential for developing products or services that are at the lowest level of common agreement can take several forms. One form might be simply that there is little agreement on the level of rigor that should exist in EM&V, and so EM&V standards that are developed meet a very low minimum requirement. Another form might result from states being in different stages of EM&V infrastructure development. For example, a state that does not have much EM&V experience may want the coordinating group to develop simple,

fundamental products that the other, more advanced EM&V states do not feel they need or vice versa, with the result that some states may feel the developed products do not meet their needs.

Potential inefficiencies and failures are always a possibility. In some ways, this possible outcome is the opposite of what is intended with coordination, if it results in higher costs or ineffective products or services. If not avoided or mitigated early in the process, participating states may not be in a position to establish their own EM&V products and services in a timely manner.

3.2 *Strategy 1: Information clearinghouse/exchange*

The information clearinghouse/exchange strategy consists of a relatively low level of coordination that involves sharing of existing information, such as EM&V documents, procedural approaches and experience (such as case studies) that are developed outside of any new regional coordination effort. The clearinghouse could have a formal or informal structure. Formats for sharing information include a web portal, organized meetings and a listserv for people in the region doing similar work. Among the advantages of this strategy is that it does not require substantial resources and it provides a vehicle for states to leverage existing resources while not losing any state control.

While the focus here is efficiency EM&V, the clearinghouse could include information such as efficiency project and program options, best practices and program case studies. Importantly, this strategy could be a starting point for multistate EM&V coordination that, over time, could lead to more substantial joint efforts by Western states.

A national study of resource needs for efficiency EM&V found that experts in the industry, and those newer to the efficiency field, expressed an overwhelming need for EM&V resources.[24] Two major benefits of providing a central clearinghouse of documents are to save the time and effort necessary to locate useful materials, and to not "reinvent the wheel." Although many EM&V reports and studies are publicly available, searching and compiling relevant materials is time-consuming. Easy access to resources is particularly helpful to those new to the efficiency or EM&V fields. As also indicated in the national study of resource needs, an "EM&V documents database could fill the need for greater transparency and consistency than is currently possible from the existing resources and … could greatly facilitate comparisons … moving the evaluation community towards a more formal data sharing process."

The disadvantages of a regional information clearinghouse are the cost and time required to organize and, most important, to maintain it, whatever its format. Also, just listing information is usually not sufficient for its use. There must be ways to: (1) find the right document, requiring document summaries and preferably searchable formats, and (2) select quality documents through a screening process.

[24] Jayaweera et al. (2011).

Examples of efficiency EM&V information that could be shared in a clearinghouse include the following:

- EM&V methodologies and deemed savings values for specific energy efficiency measures used by states or efficiency providers to document electricity and demand savings (megawatt-hours and megawatts).
- State evaluation framework documents and protocols used to establish EM&V infrastructure — for example, as established by a PUC for efficiency programs funded by utility customers.
- Technical papers describing EM&V issues and techniques.
- Examples of requests for proposals used to solicit accredited independent verifiers.
- Links to regulatory filings and orders on energy efficiency EM&V.
- Contact information for people conducting EM&V activities, including state agency and utility staff and EM&V contractors.
- Glossary of industry EM&V terms.
- Case studies and lessons learned from EM&V activities.

Possible formats include:

- Web site with public and password-protected information.
- Regular webinars, workshops or conferences for formal presentation of information.
- Informal information-sharing and networking among those involved in EM&V implementation — for example, state agency officials responsible for efficiency oversight could meet regularly to discuss EM&V topics and have EM&V experts present information.
- A technical assistance network that makes experts available to support agencies and others for EM&V implementation, with funding pooled across the region or potentially from the U.S. Department of Energy,[25] or access to a pool of experts with a contracting mechanism through a central body with funding from the individual state requesting the assistance.
- Listservs and conference calls that connect state agency staff with each other to provide a venue for discussion of common issues and share experiences and solutions — either self-run (say, with different states taking turns organizing calls and agendas) or run by a central entity as discussed next.

While informal networks of experts in the region can and do share information on efficiency, most participants are utility, PUC and state office representatives. Information sharing across a broader stakeholder network is limited, and often does not include air officials that may have a growing interest in efficiency as an air pollution mitigation strategy. Any of the organizations listed at the beginning of this section could develop and maintain more formal networks and a clearinghouse, but they would need to expand to include air officials and other stakeholders, such as those that would be operating any efficiency tracking systems, and private-industry providers of efficiency projects and programs.

3.3 *Strategy 2: EM&V product development*

This strategy involves mutual development of specific EM&V products that support consistent, cost-effective EM&V implementation. States would use the products on a voluntary basis.[26] Which states

[25] State, Local and Tribal Technical Assistance Gateway: http://energy.gov/ta/state-local-and-tribal-technical-assistance-gateway.
[26] However, it would be reasonable to expect, and more helpful for multistate consistency, that states would commit to use products they participate in developing.

participate in development of products could be decided on a product-by-product basis. Section 4 describes possible products.

States need to develop a range of EM&V products that at a minimum document impacts for the range of efficiency programs offered — for example, programs for utility customers, building energy codes, appliance and equipment standards, and energy savings performance contracting for public and institutional facilities. It is reasonable to expect that many of these products could be the same, or very similar, across states. Furthermore, where efficiency is used to comply with federal air pollution regulations,[27] possible interstate trading of efficiency savings credits could be enhanced or facilitated through the use of common EM&V plans, methodologies and related implementation procedures (e.g., EM&V verifier certification requirements, EM&V analysis tools and EM&V reporting formats).

Thus, the major potential advantage of this mutual product development strategy is resource-sharing among states to develop common products. Resources can include funds as well as people — e.g., to manage project development and share experience and expertise. Another advantage, as discussed above with respect to all of the strategies, is the potential for higher quality products and services. Bringing the region's resources to bear in terms of funding, experience and expertise can result in products that are better than what one or two states could develop on their own. And that, in turn, can encourage and facilitate more efficiency activity.

The potential disadvantages of this EM&V coordination strategy are the same as the general ones discussed above: potential for some loss of state control and state-specific focus, the potential for lowest common denominator products or services that may not meet the needs of some of the participating states, and increased costs and delays through coordination inefficiencies or failures.

Vehicles for developing these products can include:

- Case by case agreements by entities in two or more states (e.g., energy offices, air agencies, PUCs) to define, fund, manage, distribute and (likely) use a specific product.
- A standing group of state entities that regularly develops EM&V products under an agreed-to plan, such as a five-year EM&V product development plan. (An example of such an entity is the previously mentioned Northeast and Mid-Atlantic EM&V Forum.)

Under both of these vehicles, funding and participation could include stakeholders beyond state agencies, such as utilities, efficiency providers, consumer representatives and other nonprofit organizations. Each project initiative would likely require mechanisms such as a memorandum of understanding defining who pays what amount and when, project management systems to address product scope development and approval, and processes for selection of contractors to develop products, review of draft documents and dispute resolution (in case there are disagreements among the sponsoring participants). Many consultants and contractors are familiar with working with multiclient collaborative teams, and established contracting mechanisms for such efforts can be adapted to support participating states and other stakeholders.

[27] For example, for either mass-based or rate-based efficiency EM&V approaches to CPP compliance.

3.4 *Strategy 3: Regional Demand-Side Energy Efficiency Tracking System Platform*

This strategy involves development and long-term implementation of an entity (e.g., a joint parties authority or a nonprofit organization) that administers for individual states and across the region EM&V procedures, rules and reporting infrastructure for energy efficiency programs and projects. The primary function of this entity would be an efficiency tracking system, but also could include roles in trading and compliance reporting, including for use with CPP compliance.[28] This specific strategy could involve, but not necessarily be limited to, an expansion of the Western Renewable Energy Generation Information System (WREGIS).

Efficiency Tracking Systems: Background and Definitions

There are no existing, substantive, efficiency credit trading programs or tracking systems (or registries) in the United States. (There are such registries outside the United States, and there are a few limited-function, regional efficiency credit tracking systems in the United States.) However, there are tracking systems in place for utility demand-side management programs and energy service company projects for administrative reporting and accounting purposes, including eProject Builder established by LBNL (https://eprojectbuilder.lbl.gov). See the Cadmus report for WIEB, sections 4.3, 4.4.2 and Appendix E, for an overview of existing U.S. tracking systems that have efficiency capabilities.

Efficiency tracking systems are in some ways more comparable to tracking in a greenhouse gas-offset context than in renewable energy credit markets. That's because efficiency projects can be very small, involve individual site project owners (versus utility or independent power developers), and there is a counterfactual against which savings are determined (versus utility-quality metered outputs). At the same time, existing renewable energy credit registries may be adapted for efficiency tracking.

Efficiency tracking systems typically include procedures for the following:

- Establishing tracking system accounts.
- Ensuring that each project has a unique identifier (e.g., serial number) with traceability back to the program or project for which they were issued.
- Transparent electronic (perhaps public) access to submitted EM&V reports and regulatory approvals related to such reports.
- Independent verification of data in the tracking system.
- Credit issuance, transfer and compliance functions if the tracking system is used for energy savings credit trading as part of an energy or environmental compliance program.

[28] "Tracking system" is the term used in the CPP. Another term used in the industry is "registry," based on the use of that term for tracking renewable energy credits and greenhouse gas emissions and offsets. For more information on efficiency registries, see The Climate Registry (2014) and Cadmus Group (2015).

These procedures would be defined in a tracking system's operating manual, similar in concept to the operating procedures now utilized by WREGIS and other renewable energy credit tracking systems, but probably significantly modified to address EM&V requirements associated with a wide range of efficiency activities. The role of the entity would be decided by the states establishing the entity — specifically, which state responsibilities would be delegated to the entity as an agent of the states.[29] One clear line of delineation could be that the entity is only involved in registering efficiency projects/programs and their savings and providing the systems and infrastructure for savings verification (such as certification of independent verifiers), but has no involvement in trading or compliance reporting. This is similar to the role of WREGIS today with respect to renewable energy credits. WREGIS only tracks renewable energy credits; it does not serve as a trading platform.

In the West, WREGIS is a logical starting point for an efficiency savings credit trading system, and/or a platform focused on the tracking system function, although its charter would need to be modified to accommodate these new functions. Also, its committee structure, as well as WECC's WREGIS Committee, would likely need to be modified to include state officials with an efficiency focus; state air officials that have responsibility for implementing state, regional or national environmental regulations; efficiency program administrators; and other efficiency stakeholders.

WREGIS

The Western Renewable Energy Generation Information System is an electronic data system/registry that tracks renewable energy generation in the Western Interconnection primarily for the eight Western states that have renewable portfolio standards: California, Colorado, Montana, New Mexico, Nevada, Oregon, Utah and Washington. The system can also track interstate certificate transfers and transfers from renewable energy registries in other regions. WREGIS is a department of the Western Electricity Coordinating Council (WECC). WECC administers the system and provides for its day to day operations — e.g., user registration, data control and payments. APX, a private developer of tracking system infrastructure, serves as the software provider and maintains the system.

(See Sept. 21, 2015, WIEB background paper on WREGIS - http://westernenergyboard.org/wpcontent/uploads/2015/09/09-21-15WREGIS_background_paper_brief.pdf)

The advantages of a Western U.S. regional tracking system are the facilitation of consistent recording of efficiency impacts and providing the infrastructure tracking needed if there is interstate trading of efficiency savings credits.

The potential disadvantages of this EM&V coordination strategy are the same as the disadvantages generally for multistate coordination discussed earlier in this brief: potential for some loss of state control (as regional tracking system operating procedures and oversight have a broader mission than serving a single state), the potential for tracking systems to be set at the lowest common denominator, and increased costs and delays if there are coordination inefficiencies or failures.

[29] For example, as defined in U.S. Environmental Protection Agency (2015), footnote 989, "an agent is a party acting on behalf of the state, based on authority vested in it by the state, pursuant to the legal authority of the state. A state could designate an agent to provide certain limited administrative services, or could choose to vest an agent with greater authority. Where an agent issues an ERC on behalf of the state, such issuance would have the same legal effect as issuance of an ERC by the state."

The entity that runs the tracking system also could perform other functions and provide infrastructure that supports efficiency and EM&V, such as implementing an information clearinghouse and product development strategies. Particularly, the efficiency EM&V methodology development process would make sense to operate through the entity overseeing the tracking system, as it will be the tracking system that ultimately needs to adopt and use the methodologies. See Section 4.4 for more information on methodologies.

A number of entities are considering development of efficiency tracking systems:

- The Climate Registry (http://www.theclimateregistry.org) has indicated interest in operating a national efficiency registry, and it is part of a team that includes the states of Georgia, Michigan, Minnesota, Oregon, Pennsylvania and Tennessee that was awarded funding from DOE to scope out a national efficiency registry. (See http://energy.gov/eere/wipo/state-energy-program-2015-competitive-award-selections.)
- The Midwest Renewable Energy Tracking System (M-RETS®, http://www.mrets.org) has expressed interest in efficiency tracking.[30]
- The Federal Energy Management Program through LBNL has established eProject Builder,[31] which could be a starting point for an efficiency trading platform as it currently enables energy service companies (ESCOs) and their contracting agencies to:
    - Upload and track project-level information;
    - Generate basic project reports required by local, state and federal agencies; and
    - Benchmark new energy savings performance contracting projects against historical data.
- For application to the CPP, EPA proposes that mass-based and rate-based trading programs use EPA's existing allowance tracking and compliance system. Also, EPA indicated in the final CPP Emission Guidelines that it "…is exploring options for providing such support [developing or administering a tracking system] and is conducting an initial scoping assessment of tracking system support needs and functionality."[32]

[30] See also Cadmus Group (2015), sections 4.3.1, 4.4.2 and Appendix E, which identify and describe U.S. registries that currently have some energy efficiency tracking or reporting capabilities.
[31] See https://eprojectbuilder.poundsl.gov/home/#/login.
[32] See 80 Fed. Reg. 64661 (Oct. 23, 2015), page 64832.

4. Regional EM&V Product Options

Section 3.3 introduced the approach of developing specific demand-side energy efficiency EM&V products for supporting implementation of efficiency activities. This section describes several suggested products:

- Standard EM&V reporting formats for projected, claimed and evaluated energy savings from efficiency actions and possibly avoided emissions.
- A regional database of consistent deemed (stipulated) electricity savings values and effective useful life (persistence) values for defined efficiency measures, called Technical Reference Manuals (TRMs). Examples include the Northwest Regional Technical Forum database and the California Database for Energy Efficient Resources.
- A regional glossary of definitions and concepts for use in defining and implementing EM&V — for example, definitions and approaches for defining baselines and savings persistence.
- Regional, standardized efficiency EM&V plans (methodologies) for determining energy savings (and perhaps effective useful life) values for specific efficiency measures, project types and program types, which could be designed as acceptable minimum requirements that states could expand on.
- Regional EM&V professional standards or accreditation processes/entities for those implementing EM&V.

4.1 *Standard EM&V Reporting Formats/Templates*

State agencies, utilities, ESCOs and others use a wide range of EM&V methods to develop energy savings metrics from efficiency activities. This reflects in part the wide range of efficiency activities and required reporting metrics in place throughout the region and the country. If electricity savings from this wide range of activities will be used in the context of meeting state efficiency goals or state, regional or federal environmental regulations, greater consistency at least in reporting of savings values will be helpful for any tracking and potential trading activities.

EM&V reporting formats would consist of standardized reporting templates for efficiency EM&V and savings. Such templates could simplify reporting for efficiency providers so that they do not have to provide data in different formats for different jurisdictions. In addition, templates could be cited in an efficiency registry's operating procedures for efficiency providers' reporting requirements (see Section 3.4).

In summary, reporting formats/templates could achieve the following objectives:

- Greater transparency and consistent documentation for reporting efficiency savings values, such as annual megawatt-hour savings or time-differentiated demand savings (in megawatts).
- Reduced administrative costs associated with presenting and reviewing efficiency program and project savings, and their incorporation into tracking systems.
- Support for interested parties to compile data and analyze EM&V practices and savings.

An electronic reporting template would include information on:

- Characteristics of the subject efficiency program or project.
- Savings values presented for a given year or years.

- Description of EM&V methods used with key assumptions and data sources, including baseline definition and savings persistence.
- Savings value accuracy.
- Who determined the savings and independently verified the savings.
- Other information that may be appropriate for compliance reporting for state efficiency goals or state, regional or federal environmental regulations.

In the Western United States, as across the country, standardized reporting templates are used for efficiency programs for utility customers and ESCO programs (although there are many of these templates used by different companies, utilities and agencies, and no standard form). The Northeast and Mid-Atlantic EM&V Forum has developed a reporting template for energy efficiency programs that focuses on documenting the EM&V methods used to determine energy savings.[33] In addition, LBNL recently developed a spreadsheet-based tool that helps electric (and natural gas) utilities and other efficiency program administrators report annual program savings, expenditures, and related information to state regulators and other utility oversight boards and stakeholders.[34] The tool is intended to help those states and utilities that are ramping up efficiency activities as well as states and utility organizations that want to improve and standardize program-level reporting with more transparent performance metrics.

4.2 *Regional Database of Consistent Deemed Electricity Savings Values*

Another typical resource document for large-scale efficiency portfolios (such as those funded by utility customers or regional programs funded by BPA) are databases of standardized, state- or region-specific deemed savings calculations and associated deemed savings values for well-documented efficiency measures. The industry standard term for such databases is Technical Reference Manuals (TRMs). Efficiency program administrators and implementation contractors use TRMs to reduce evaluation costs and uncertainty.[35] There are approximately 20 TRMs in use across the United States. In the Western United States these include the Northwest Regional Technical Forum (RTF, www.nwcouncil.org/energy/rtf) and California Database for Energy-Efficient Resources (DEER, www.deeresources.com).

TRMs are found in formats from spreadsheets to online searchable databases. These resource documents include efficiency measure information used in program planning and efficiency program reporting. TRMs can include savings values for individual measure or project types, measure life information, hourly load shapes of savings, engineering algorithms to calculate savings, source documentation, specified assumptions, and other relevant material to support the calculation of measure and program savings, as well as the application of such values and algorithms in appropriate applications. For example, a value for operating hours in an elementary classroom with no summer hours should not be applied to a high school classroom with summer sessions.

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[33] Northeast Energy Efficiency Partnerships. Model EM&V Methods Standardized Reporting Forms, http://www.neep.org/initiatives/emv-forum/model-emv-methods-standardized-reporting-forms.

[34] LBNL adapted the tool from a reporting template developed by Arkansas Public Service Commission staff. The LBNL tool is available at http://emp.lbl.gov/what-it-costs-save-energy.

[35] For example, the CPP indicates that well crafted and documented deemed savings values are an acceptable EM&V method that can provide consistency, quality Emission Rate Credit values and cost-effective EM&V. As indicated in the draft Clean Power Plan EM&V Guidance document, *"Ongoing and new state, regional, and federal efforts to improve the quality and documentation of TRMs are encouraged and can support higher-quality savings values for compliance with the EPA's emissions guidelines and reduced EM&V costs."*

A 2011 report found that TRMs are very valuable, but there is wide variation in methodologies for estimating savings and actual values.[36] Some TRMs include information based on prior year evaluations including, in some cases, rigorous metering and analysis. Thus, these TRMs contain robust (reliable) savings values. Many others have values based on what may be considered less rigorous analyses. With the exception of the RTF, which uses a public peer review process to determine consistency with clear guidelines, other TRMs also are created by skilled teams of expert consultants, but their methods and assumptions are not necessarily peer-reviewed prior to approval. A possible starting point for a Western regional TRM could be the RTF, through expansion of its mandate and committees to include states beyond Idaho, Oregon, Washington and Montana.

4.3 *Regional Glossary of Definitions and Concepts*

Efficiency EM&V terms are not consistently used and defined across the Western United States or the country as a whole. For example, "savings," or more accurately stated, "savings estimates," from efficiency measures, projects, programs and portfolios are reported with different definitions, at various times in the lifecycle of the efficiency activity and with differing degrees of certainty. In particular, different jurisdictions have different names and interpretations for net and gross savings, how baselines are defined, and whether and what adjustments or evaluation activities take place between pre-implementation and post-implementation. Consistent use of terms avoids confusion and a barrier to trading and other market interactions, and thus can be an excellent starting point for any multistate coordination.

Different types of entities (e.g., utilities, state agencies, ESCOs) use different glossaries, though there tends to be a lot of overlap and some consistency. For purposes of documenting progress toward meeting state efficiency objectives and state, regional or federal environmental regulations, and for coordination of EM&V, it is important to have an agreed-upon glossary of common terminology to ensure consistency in EM&V methods and Emission Rate Credits metric reporting. A possible starting point for a common glossary is the 2012 SEE Action *Energy Efficiency Program Impact Evaluation Guide.*[37]

4.4 *Regional Efficiency EM&V Methodologies*

The specifics of how the electricity savings from a given project or program will be determined is defined in specific EM&V methodologies. Some measure and project types might simply use deemed savings values, perhaps using a regional TRM, as described in Section 4.2. Other project/measure types and programs will use measurement and verification (M&V) or control group approaches.[38] If regional efficiency methodologies were developed, they would likely describe: (1) requirements for how deemed savings values are developed and applied and (2) procedures, assumptions calculations, etc. for M&V methods or control group methods (see Appendix B for more information on these approaches).

Example contents of an industry standard EM&V methodology are:

- Description of the subject efficiency measure, project or program type.
- Applicability conditions for the methodology.
- Baseline definitions.
- Data requirements and sampling approaches (as applicable).

[36] Jayaweera et al. (2011).
[37] SEE Action Network (2012).
[38] M&V and control group approaches are two of the three categories of approaches for EM&V. See Appendix B for description of these approaches.

- Assumptions.
- Savings calculation methods and algorithms for annual electricity savings (first year and throughout effective useful life).
- Verification methods.
- References.

As with definitions of EM&V terms, there are a large number of existing EM&V methodologies in the Western region, but they are not all equivalent for a given measure, project or program. Thus, a regional strategy to develop efficiency EM&V methodologies would be an effort to find common ground and consistency across multiple Western states for determining annual electricity savings (and perhaps effective useful life) so that the same methodologies could be used, or used as examples or starting points, for determinations across a broader region. Using a single methodology to calculate the energy savings from a particular measure or program will increase the credibility of the reported savings. This increased credibility will give energy resource planners, utility and environmental regulators, and other stakeholders a greater level of confidence about reported savings and reduce the risks of using efficiency as a compliance resource for meeting energy and environmental goals. The methodologies could represent *the* standards for the region's tracking (and trading) of energy savings, or they could serve as acceptable minimum requirements, with states having the option to expand on these methodologies.

Within the Western region, the RTF, Northwest Energy Efficiency Alliance, Energy Trust of Oregon and the California PUC all have established methodologies for efficiency EM&V, as do the many utilities (for customer-funded programs) and ESCOs that implement projects. In addition, DOE has an EM&V initiative called the Uniform Methods Project (UMP).[39] DOE published the first set of UMP protocols for determining energy savings from energy efficiency measures and programs in April 2013. The protocols provide standardized, common practice methods for determining gross energy savings for many of the most common residential and commercial measures and programs offered by energy efficiency programs in the United States funded by utility customers.

4.5 *Regional EM&V Professional Standards or Accreditation Processes*

The general concept of this product is a regional process by which EM&V professionals document their competence, including knowledge of codes, protocols and standards of the profession, and receive some form of acknowledgment (e.g., a certificate or license) of their expertise and experience in the field. Some, but not all, certifications and licenses are administered by governmental agencies, and some have International Organization for Standardization (ISO, www.iso.org) or American National Standards Institute (ANSI, www.ansi.org) accreditation. Other certifications are more informal, as is the case for most, if not all, of the few certifications in the efficiency industry. For example, the Efficiency Valuation Organization (EVO, www.evo-world.org)[40] implements the only efficiency EM&V-related certification, but that certification is currently neither ISO- nor ANSI-certified.

[39] Uniform Methods Project: Determining Energy Efficiency Savings for Specific Measures: http://energy.gov/eere/about-us/ump-protocols.

[40] EVO offers worldwide the Certified Measurement & Verification Professional (CMVP) designation. The right to use the CMVP title is granted to those who demonstrate proficiency in the M&V field by passing a four-hour written exam and meeting the required academic and practical qualifications. EVO's certification-level training is offered as preparation for the exam and as a review of basic principles for experts. There are on the order of 3,000 CMVPs worldwide. This training is focused on project M&V and not program evaluation. www.evo-world.org.

A recent ANSI cross-sector effort, the Energy Efficiency Standardization Coordination Collaborative,[41] developed roadmaps for a number of energy efficiency topics, including workforce credentialing. As one of the roadmaps notes, *"…unsubstantiated claims of competency and inconsistent assessment practices have given rise to a confusing and rather chaotic assortment of workforce credentials. The good news is that a core of quality standards and credentialing schemes are in place and provide a strong launching pad from which to build a competent workforce. The challenge is sorting through the various credentials offered…."* Certifying EM&V professionals could lead to more efficiency because funders, regulators (e.g., EPA and state air and PUC officials), policy makers and others will feel more comfortable with efficiency as an air emissions reduction strategy because they have more faith in the savings determination.

For example, in its CPP Emission Guidelines, the EPA calls out the need for a skilled workforce to implement demand-side efficiency and to evaluate, measure, quantify and verify the savings associated with efficiency. [42] EPA specifically "… recognizes that a skilled workforce performing the EM&V is important to substantiate the authenticity of emissions reductions." Thus, EPA recommends, but may not require, that states indicate how they will ensure through certification the skills of those who will perform EM&V for demand-side efficiency. Specifically, EPA recommends[43] a "*third party entity that*:

> *1) Develops a competency-based program aligned with a job task analysis and certification scheme;*
> *2) Engages with subject matter experts in the development of the job task analysis and certification schemes that represent appropriate qualifications, categories of the jobs, and levels of experience;*
> *3) Has clearly documented the process used to develop the job task analysis and certification schemes, covering such elements as the job description, knowledge, skills, and abilities;*
> *4) Has pursued third-party accreditation aligned with consensus-based standards, for example ISO/IEC 17024."*

As with the other products and coordination approaches, there are a number of regional organizations that could sponsor such a certification program, or Western states could participate in national programs that may be developed by DOE or others.[44]

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[41] ANSI. Energy Efficiency Standardization Coordination Collaborative (EESCC), http://www.ansi.org/standards_activities/standards_boards_panels/eescc/overview.aspx?menuid=3.

[42] From the Proposed Federal Plan Requirements (Model Trading Rule): "*The EPA will perform periodic reviews of accredited verifiers, to ensure that verifiers are maintaining necessary technical and professional qualifications and are meeting program requirements for provision of verification services. The EPA may recognize, in part, accreditation by an outside organization where such outside accreditation demonstrates that federal plan requirements are met."* See Section Federal Register §62.16470 for proposed details.

[43] See page 65008 of the proposed Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22848.pdf.

[44] DOE is evaluating potential certification processes for energy efficiency evaluators. The overall purpose of the project is to investigate the development of certification for evaluators of energy efficiency program impacts. The certification could ensure that the federal and state governments and stakeholders can rely on the claimed savings from energy efficiency program expenditures.

5. Next Steps

The probable next step for Western states is to review and discuss these potential efficiency EM&V coordination approaches and product and service options and decide which ones they may be interested in further exploring. For those approaches, products and services, more information-gathering would be needed on existing resources and potential parallel efforts being considered by other entities in the region and nationally. Following that, scopes of work would be further specified, and implementation and oversight plans, budgets and schedules would be developed.

References

40 CFR Part 60, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, http://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf

80 Fed. Reg. 64661 (Oct. 23, 2015)

Barbose et al. 2013. *The Future of Utility Customer-Funded Energy Efficiency Programs in the United States: Projected Spending and Savings to 2025*. Galen L. Barbose, Charles A. Goldman, Ian M. Hoffman and Megan Billingsley, Lawrence Berkeley National Laboratory, LBNL-5803E. https://emp.lbl.gov/publications/future-utility-customer-funded-energy

Hoffman et al. 2015. *The Total Cost of Saving Electricity Through Utility Customer-Funded Energy Efficiency Programs: Estimates at the National, State, Sector and Program Level.* Ian M. Hoffman, Gregory Rybka, Greg Leventis, Charles A. Goldman, Lisa Schwartz, Megan Billingsley and Steven Schiller. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/publications/total-cost-saving-electricity-through

Jayaweera, Tina, Hossein Haeri, Allen Lee, Scott Bergen, Cynthia Kan, Aquila Velonis, Christy Gurin, Michael Visser, Andrew Grant, and Ashley Buckman (2011). Scoping Study to Evaluate Feasibility of National Databases for EM&V Documents and Measure Savings. The Cadmus Group Inc. SEE Action Network. https://www4.eere.energy.gov/seeaction/system/files/documents/emvscoping_databasefeasibility.pdf

Lazard (2015). Levelized Cost of Energy Analysis: Version 9.0. https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf

National Action Plan for Energy Efficiency (2007). *Guide for Conducting Energy Efficiency Potential Studies*. Prepared by Philip Mosenthal and Jeffrey Loiter, Optimal Energy, Inc. https://www.epa.gov/energy/guide-conducting-energy-efficiency-potential-studies

Skumatz et al. 2010. *Non-Energy Benefits: Status, Findings, Next Steps, and Implications for Low Income Program Analyses in California. Revised Report*. Skumatz, L. A., M. S. Khawaja and R. Krop. (Sempra Utilities, May 2010). http://www.liob.org/docs/LIEE%20Non-Energy%20Benefits%20Revised%20report.pdf

Skumatz 2015. *NEBs: The Latest in Results, Applications, and Best Practices for State Cost-Effectiveness Tests.* International Energy Program Evaluation Conference, August 2015. http://www.iepec.org/wp-content/uploads/2015/papers/142.pdf

State and Local Energy Efficiency Action Network (2011). Using Integrated Resource Planning to Encourage Investment in Cost-Effective Energy Efficiency. https://www4.eere.energy.gov/seeaction/publication/using-integrated-resource-planning-encourage-investment-cost-effective-energy-efficiency

State and Local Energy Efficiency Action Network (2012). *Energy Efficiency Program Impact Evaluation Guide*. Prepared by Steven R. Schiller, Schiller Consulting, Inc., DOE/EE-0829. https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf

State and Local Energy Efficiency Action Network (2016). *SEE Action Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector.* Lisa Schwartz, Greg Leventis, Steven R. Schiller, and Emily Martin Fadrhonc (Lawrence Berkeley National Laboratory), John Shenot, Ken Colburn and Chris James (Regulatory Assistance Project), and Johanna Zetterberg and Molly Roy (U.S. Department of Energy). DOE/EERE 1335. https://www4.eere.energy.gov/seeaction/EEpathways

The Cadmus Group (2015). *Exploring and Evaluating Modular Approaches to Multi-State Compliance with EPA's Clean Power Plan in the West.* Prepared for WIEB. http://www.cadmusgroup.com/wp-content/uploads/2015/05/Cadmus_WIEB_Exploring-and-Evaluating-Modular-Approaches-Multi-state-Compliance-EPA-Clean-Power-Plan_April2015.pdf?utm_referrer=http%3A%2F%2Fwww.cadmusgroup.com%2Fpapers-reports%2Fclean-power-plan-west%2F&submissionGuid=548a9b5f-7b72-4f43-b2d7-89b7c2751a43

The Climate Registry (2014). *An Energy Efficiency Registry, A Flexible and Transparent Way to Track and Report Energy Efficiency Under the Clean Power Plan.* http://www.ourenergypolicy.org/an-energy-efficiency-registry-a-flexible-and-transparent-way-to-track-and-report-energy-efficiency-under-the-clean-power-plan/

U.S. Environmental Protection Agency (2015a). Energy Efficiency in the Clean Power Plan, Clean Power Plan Fact Sheet, http://www2.epa.gov/cleanpowerplan/fact-sheet-energy-efficiency-clean-power-plan

U.S. Environmental Protection Agency (2015b). U.S. EPA Clean Power Plan — Technical Summary for States, http://www3.epa.gov/airquality/cpptoolbox/technical-summary-for-states.pdf

Winkel, Carol. (2015). *Draft Seventh Northwest Conservation and Electric Power Plan.* Northwest Power and Conservation Council, document 2015-09. http://www.ourenergypolicy.org/draft-seventh-northwest-conservation-and-electric-power-plan/

Appendix A. Further Background on Demand-Side Energy Efficiency

Efficiency as a Multipollutant Reduction Strategy

Under the federal Clean Air Act, for example, criteria pollutants are regulated through the development of National Ambient Air Quality Standards (NAAQS), which set permissible ambient air concentrations on a pollutant by pollutant basis. States develop pollutant-specific state implementation plans showing how they will lower or maintain air pollutant emissions to meet these standards. States may choose whether they want to include energy efficiency among the strategies in their implementation plans — for example, to avoid designation as a nonattainment area for criteria air pollutants. EPA encourages state and local governments to use efficiency as a way to meet the NAAQS. In 2012, EPA released a *Roadmap for Incorporating Energy Efficiency and Renewable Energy (EE/RE) Policies and Programs in State Implementation Plans (SIPs) and Tribal Implementation Plans (TIPs).*[45] EPA also promotes voluntary efforts to reduce criteria air pollutants to help states keep their air clean and avoid nonattainment designations through their Ozone Advance and Particulate Matter Advance Programs.[46]

As an example, EPA has also recognized the potential role of efficiency in reducing power plant emissions in helping cost-effectively meet the CPP's carbon dioxide (CO_2) emission reduction goals:

- *"The Clean Power Plan puts efficiency front and center because it is an important, proven strategy widely used by states that can substantially and cost-effectively lower carbon dioxide emissions from the power sector…. The Clean Power Plan offers a wide array of flexible compliance approaches for states to fully deploy energy efficiency to meet their state goals."*[47]
- "*Demand-side [energy efficiency] EE is an important, proven strategy that states are already widely using and that can substantially and cost-effectively lower CO_2 emissions from the power sector. EPA anticipates that, due to its low costs and high potential in every state, demand-side EE will be a significant component of state compliance measures under the CPP."*[48]

Energy Efficiency Options

States have many options to cost-effectively achieve efficiency goals. Table A1 presents one way to look at the range of options.

[45] For more information see EPA, Incorporating Energy Efficiency/Renewable Energy in State and Tribal Implementation Plans, http://epa.gov/airquality/eere/index.html.
[46] For more information see EPA, Advance Program, http://www.epa.gov/ozoneadvance/.
[47] EPA (2015a).
[48] EPA (2015b). Also see 40 CFR Part 60, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, Federal Register Vol. 80, No. 205, Oct. 23, 2015, page 64699, http://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf.

Table A1. Demand-Side Efficiency Policies, Regulations, Programs, Projects and Measures[49]

Tool	Definition	Examples
Policies	Objectives, criteria or courses of action established by governors, mayors, legislatures, city councils, and agencies of state or local governments, as well as by businesses	• Energy Efficiency Resource Standard (similar in concept to a renewable portfolio standard)
Regulations	Rules established by local or state agencies to implement policies by prescribing or proscribing conduct by those subject to the regulation	• Building energy code specifying minimum efficiency requirements for construction or renovation of residential or commercial buildings • Standards setting minimum energy performance requirements for electricity consuming products not already regulated by the federal government
Programs	Activities, strategies or approaches undertaken by a state, utility, contractor, private company or other entity that directly result in efficiency-induced energy savings	Demand-Side Management (DSM) programs implemented by utilities or other administrators using utility customer funding (e.g., rebates for efficient products) Performance-based contracting programs implemented by private firms (includes energy service companies: ESCOs), contractors or site owners/developers) at public or privately owned facilities
Projects	Activities involving one or more energy efficiency measures installed at a single facility or site	• Home that complies with the state's energy code • Efficiency retrofit at a factory that receives a cash incentive for achieved savings • Combined heat and power projects (cogeneration) at industrial facilities
Measures	A piece of equipment, system or strategy intended to reduce the amount of energy that would otherwise have been used to deliver an equivalent or improved level of end-use service	• 10 watt LED lamp to replace a 75 watt incandescent lamp • High efficiency air conditioner replacing a low efficiency unit • High efficiency motor replacing a lower efficiency motor of the same size

[49] An efficiency program involves deployment of multiple efficiency measures or projects, such as utility- or state-administered incentive programs that accelerate the deployment of energy efficiency technologies and practices. "Project" refers to a discrete energy efficiency project (e.g., an energy efficiency upgrade to a commercial building or set of buildings).

Appendix B. Summary of Demand-Side Efficiency EM&V Approaches

The following are the three EM&V approaches primarily used for efficiency:[50]

- **Measurement and verification (M&V).** Measurement and verification is the process of using measurements to determine energy savings created within an individual facility. The International Performance Measurement and Verification Protocol (IPMVP),[51] an international M&V guidance document, defines four M&V options used in the efficiency industry: two end-use metering approaches, energy use data (billing data) regression analysis, and calibrated computer simulation.

  M&V 2.0 is catchall term for recent advances in metering, data availability, and analytical methods associated with documenting the energy savings from specific energy efficiency measures or projects. It primarily involves using more data and sophisticated analytics in the application of IPMVP M&V Option C. EM&V 2.0 involves applying these advances to program evaluations. In some cases, (E)M&V 2.0 may already be incorporated into current practices.

- **Deemed savings.** Deemed savings values, also called stipulated savings values, are estimates of energy or demand savings for a single unit of an installed energy efficiency measure that: (1) has been developed from data sources (such as prior metering studies) and analytical methods that are widely considered acceptable for the measure and purpose and (2) is applicable to the situation being evaluated. The use of deemed savings is only valid for projects with fixed operating conditions and well-known, documented stipulation values. Unlike the M&V approach, with the use of deemed savings for a specific measure or project, there are no (or very limited) measurement activities for that measure/project; instead, only the number of measures implemented is verified (e.g., number of motors installed correctly, number of point-of-sale compact fluorescent light bulbs that were sold). This approach involves multiplying the number of installed measures by the estimated (or deemed) savings per measure. A variant of deemed savings is the deemed savings calculation, which is one or more agreed-to (stipulated) engineering algorithm(s) used to calculate energy savings.[52]

- **Control Group Approaches**: A reliable approach for estimating energy savings from efficiency programs is to measure the difference between the energy use of facilities (e.g., houses) participating in a program (the "treatment group") and that of a similar comparison group of nonparticipating facilities (the "control group") during the same period of time. The two generic categories of control group approaches are randomized controlled trials and quasi-experimental methods. With these approaches, statistical analyses are conducted on the energy use data (typically collected from the meter data reported on monthly utility bills) and other important independent variable data (e.g., weather) for those in the control and treatment groups.

[50] A resource for more information on these approaches is State and Local Energy Efficiency Action Network (2012).
[51] Efficiency Valuation Organization. www.evo-world.org.
[52] Deemed savings values and deemed savings calculations are typically documented in databases known as "technical reference manuals" (TRMs). About 20 states' utility programs have their own formal TRMs or use regional TRMs that provide deemed savings values that are applicable to their jurisdictions. The SEE Action Network's EM&V portal includes a list of TRMs, most of which have been approved by a state agency, as well as a discussion of options for developing regional TRMs. See https://www4.eere.energy.gov/seeaction/evaluation-measurement-and-verification-resource-portal.

Appendix C. Definitions for Select Efficiency and EM&V Terms

Baseline is a set of conditions that would have occurred without implementation of the energy efficiency activity. Baseline conditions are sometimes referred to as "business-as-usual."

Deemed Savings Value (also called Stipulated Savings Value) is an estimate of energy or demand savings for a single unit of an installed energy efficiency measure that: (1) has been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose and (2) is applicable to the situation being evaluated. Individual parameters or calculation methods can also be deemed.

Energy efficiency measure is a single technology, energy-use practice or behavior that, once implemented or adopted, reduces electricity use of a particular end use, facility or premises. Energy efficiency measures may be implemented as part of an energy efficiency program or as an independent, privately funded action.

Energy efficiency program is an organized set of activities sponsored and funded by a particular entity to promote the adoption of one or more energy efficiency projects or measures with similar characteristics for the purpose of reducing electricity use.

Energy efficiency project is a combination of multiple technologies, energy-use practices or behaviors implemented at a single facility or premises for the purpose of reducing electricity use. Energy efficiency projects may be implemented as part of an energy efficiency program or as an independent, privately funded action.

Evaluation is the conduct of any of a wide range of assessment studies and other activities aimed at determining the effects of a program (or a portfolio of programs).

Evaluation, measurement and verification (EM&V) is a catchall term for determining both program and project impacts.

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

Impact evaluation is an evaluation of the program-specific, directly or indirectly induced, changes associated with an energy efficiency program (e.g., changes in energy use).

Measurement and verification (M&V*)* can be a stand-alone activity or a subset of program impact evaluation. In either case, it is associated with the documentation of energy savings at individual sites or projects.

Net savings is the change in energy consumption, demand, or both that is attributable to a particular energy efficiency policy or program.

Persistence is the duration of an energy-consuming measure, taking into account business turnover, early retirement of installed equipment, technical degradation factors, and other reasons measures might be removed or discontinued.

Technical reference manual (TRM) is a resource document that includes information used in program planning and reporting of energy efficiency programs. It can include savings values for measures, engineering algorithms to calculate savings, impact factors to be applied to calculated savings (e.g., net-to-gross ratio values), source documentation, specified assumptions, and other relevant material to support the calculation of measure and program savings — and the application of such values and algorithms in appropriate applications.

Verification is an assessment by an independent entity to ensure that the energy efficiency measures have been installed correctly and could generate the predicted savings. Verification may include assessing baseline conditions and confirming that the measures are operating according to their design intent. Site inspections, phone and mail surveys, and desk review of program documentation are typical verification activities.

Appendix D. Resources

Demand-Side Efficiency Resources

- U.S. DOE Office of Energy Efficiency and Renewable Energy: http://energy.gov/eere/efficiency
- DOE support site for state energy efficiency planning: http://energy.gov/eere/slsc/energy-efficiency-savings-opportunities-and-benefits
- ACEEE (American Council for Energy Efficiency Economy, a nonprofit efficiency organization): www.aceee.org
- Lawrence Berkeley National Laboratory: https://emp.lbl.gov/research-areas/energy-efficiency
- Utility and other program administrator websites (e.g. Northwest Energy Efficiency Alliance: www.neaa.org)
- EPA/DOE State and Local Energy Efficiency (SEE) Action Network
    - Focuses on providing assistance states need to advance policies and practices that bring energy efficiency to scale (www.epa.gov/cleanenergy/energy-programs/seeaction/)

Efficiency EM&V Resources

- EPA/DOE State and Local Energy Efficiency Action Network (SEE Action)
    - Focuses on providing assistance states need to advance policies and practices that bring energy efficiency to scale (www.epa.gov/cleanenergy/energy-programs/seeaction/index.html)
- Northwest Regional Technical Forum
- Advisory committee established to develop standards to verify and evaluate conservation savings (http://www.nwcouncil.org/rtf/about.htm)
- Regional EM&V Forum (Northeast and Mid-Atlantic)
    - Supports the development and use of common and/or consistent protocols to evaluate, measure, verify and report the savings, costs and emission impacts of energy efficiency. Covers 11 states. (http://www.neep.org/emv-forum)
- EVO
    - Capacity building for M&V best practices (www.evo-world.org)

Clean Power Plan

- EPA's Clean Power Plan website: http://www2.epa.gov/carbon-pollution-standards.
- Specific Documents:
    - CPP Emission Guidelines: http://www.epa.gov/airquality/cpp/cpp-final-rule.pdf.
    - Federal Model Plan: http://www.epa.gov/airquality/cpp/cpp-proposed-federal-plan.pdf.
    - EM&V Guideline: http://www2.epa.gov/cleanpowerplantoopoundsox/draft-evaluation-measurement-and-verification-guidance-demand-side-energy.
    - For additional resources to help states develop plans, visit the CPP Tool Box for States: http://www2.epa.gov/cleanpowerplantoopoundsox.

- EPA overview and energy efficiency presentations:
  - Webinar: http://www2.epa.gov/cleanpowerplan/clean-power-plan-overview-webinar
  - Fact Sheet: http://www2.epa.gov/cleanpowerplan/fact-sheet-energy-efficiency-clean-power-plan
  - https://emp.poundsl.gov/projects/evaluation-measurement-and-verification-energy-efficiency-programs

Appendix E. Energy Efficiency EM&V in the CPP and Related Multistate Coordination Strategies

Demand-Side Energy Efficiency in the Clean Power Plan (CPP)[53]

Under the CPP, states can select either a mass- or rate-based goal approach to compliance. States submit a CPP "State Plan" for affected electricity generation units (EGUs) to implement interim and final goals. The CPP final rule document that defines state requirements is informally referred to as the "Emission Guidelines" (EG), published in the Federal Register on Oct. 23, 2015.[54] In addition to the EG, EPA also released a document that contains a proposed rate-based federal plan and mass-based federal plan, one of which would be used if a state does not submit its own State Plan or if its plan is not approved by EPA. In the same document, EPA also released both a rate-based model trading rule and a mass-based model trading rule for potential use by any state. In the proposed federal plan, demand-side efficiency is not specifically addressed, and there are no efficiency Emission Rate Credits (ERCs). EPA took comments on whether to address efficiency in a final federal plan.[55]

For the CPP, efficiency EM&V is associated with successfully quantifying and verifying savings for purposes of generating ERCs and adjusting an emission rate when using rate-based approaches. EM&V for mass-based plans is not addressed in detail in the CPP EG.[56] The CPP documents highlight the importance of verification in the EM&V process and describe a number of requirements (Emissions Guidelines[57]), presumptively approvable provisions (proposed Model Trading Rules[58]), and applicable guidance (proposed EM&V Guidance document[59]) for conducting verification for efficiency actions that seek to claim ERCs. Verification consists of ensuring that efficiency measures have been properly installed and are operating as intended, and therefore have the potential to save electricity. Verification is done by what the CPP defines as "accredited independent verifiers."[60]

Several evaluation planning and reporting documents typically are prepared as part of any EM&V effort. The plans contain information regarding the EM&V to be undertaken, as well as why, when and how it should be undertaken. Specifically for the CPP, the "*EM&V Plan … must identify the eligible resource covered by the plan, and provide specific EM&V criteria that specify the manner in which the energy generated or*

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[53] Portions of this section are directly from the EPA (2015a).
[54] The formal title is "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule."
[55] The information presented herein does not represent any U.S. Department of Energy (DOE) or Lawrence Berkeley National Laboratory (LBNL) positions with respect to the Clean Power Plan (CPP), CPP documents, strategies or actions that states, electricity generating units (EGUs) or others should, can or may take with respect to CPP compliance.
[56] In the CPP, EPA indicates that mass-based state plans must include EM&V for the Clean Energy Incentive Program (assuming a state utilizes that program) and that EM&V provisions must be included in the supporting materials of state measures (mass-based) plans.
[57] For example, see Emissions Guidelines, 80 Fed. Reg. 64661 (Oct. 23, 2015), pages 64831, 64834, 64852, 64908–10, 64945, 64951, 64952, 64960.
[58] Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations. https://www.federalregister.gov/articles/2015/10/23/2015-22848/federal-plan-requirements-for-greenhouse-gas-emissions-from-electric-utility-generating-units.
[59] Evaluation Measurement and Verification (EM&V) Guidance for Demand-Side Energy Efficiency (EE), https://www.epa.gov/cleanpowerplantoolbox/draft-evaluation-measurement-and-verification-guidance-demand-side-energy
[60] Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations, page 180.

saved by the eligible resource will be quantified, monitored and verified."[61] In addition to these high-level EM&V plans, more detailed EM&V plans (methodologies) will likely need to be completed for each individual efficiency program, project or measure to be used to generate savings ERCs. These detailed EM&V plans describe the EM&V methods to be used and how issues such as baselines, persistence of savings (i.e., how many years the savings will continue), and savings estimation reliability will be addressed. Independent verifiers would use these methodologies to confirm savings before they could be recorded in a tracking system and possibly used for trading.

Requirements in EPA's Clean Power Plan EG, with respect to EM&V, are identified at a general level and include the following:

- State plans must include an EM&V plan for quantifying and verifying electricity savings on a retrospective (ex-post) basis using industry best-practice EM&V protocols and methods that yield accurate and reliable measurements of electricity savings.
- EM&V must include assessment of the independent factors that influence the electricity savings and the expected life of the savings.
- The baseline must be defined that represents what would have happened in the absence of the demand-side energy efficiency activity.
- Periodic (E)M&V reports are required.
- Skill certification of EM&V practitioners (and providers) is also discussed and strongly encouraged.

Regional coordination on EM&V among Western U.S. states can be considered in the context of both CPP EM&V requirements and guidance and CPP guidance regarding submittal of multistate plans. This was explored to some extent prior to release of the final CPP Emission Guidelines in a report prepared by the Cadmus Group for WIEB, *Exploring and Evaluating Modular Approaches to Multi-State Compliance with EPA's Clean Power Plan in the West*.[62] That report explores and analyzes state CPP collaboration potential for renewable energy and energy efficiency compliance activities, termed "modular approaches." The following sections present these modular approaches, as well as the two multistate approaches (and some options to these approaches) defined in the CPP. Important takeaways are: (1) multistate coordination is an option in the CPP and actually encouraged and (2) there are a number of advantages to such coordination.

Multistate Plans and Coordination in the CPP Emissions Guidelines

In the final EG document released on August 3, 2015, EPA discussed multistate coordination of state plans for CPP compliance and finalized two approaches that allow states to coordinate implementation to meet the requirements. EPA also indicated support in the EG for multistate plans and multistate coordination:[63]

> *"The EPA views the ability of a state to implement an individual plan or a multi-state plan as a significant flexibility that allows a state to tailor implementation of its plan to state policy objectives and circumstances. The EPA sees particular value in multi-state plans and multi-state coordination, which allow states to implement a plan in a coordinated fashion with other states. Such approaches can lead to more efficient implementation, lower compliance costs for affected EGUs and lower*

[61] Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations, pages 188–189.
[62] The Cadmus Group (2015).
[63] Quotes in this section are from 80 Fed. Reg. 64661 (Oct. 23, 2015), starting on page 64838.

impacts on electricity ratepayers. Coordinated approaches also will help states identify and address any potential electric reliability impacts when developing plans…"

"EPA also recognizes the value in allowing for collaboration where states retain individual goals. These approaches could provide some of the benefits of a joint goal while reducing the negotiations among states necessary to develop a multi-state plan with a joint goal."

One aspect of the EG is that states have the opportunity to design rate-based or mass-based plans that will make their affected EGUs "trading ready" ("ready-for-interstate-trading"). Trading ready allows individual power plants to use out-of-state reductions — in the form of credits or allowances, depending on the plan type — to achieve required carbon dioxide (CO_2) reductions without the need for upfront interstate agreements. The proposed federal plan also is a trading-ready plan, as are state plans based on the model trading rule. When states have coordinated implementation, there can be interstate trading between affected EGUs. However, mass-based trading programs can link to mass-based trading programs only, and rate-based trading programs can link to rate-based trading programs only.

Following are the two CPP approaches that allow states to coordinate implementation in order to meet the emission guidelines:[64]

1. States submit multistate plans that address the affected EGUs in a group of states. With this approach, the states included in this multistate plan aggregate their CO_2 rate- or mass-goals and commit to achieve a joint CO_2 emission goal for the fleet of affected EGUs located within those states.[65]
   - Plans can include a multistate rate-based or mass-based emission trading program.
   - The joint emission goal approach can be used for both types of state plans: the "emission standards" plan type and the "state measures" plan type. However, a joint goal may apply only to states implementing the same type of plan.
2. States with trading-ready approaches submit individual plans (not multistate plans) with individual state goals, but coordinate plan implementation with other states through the interstate transfer of ERCs (for rate-based plans) or CO_2 emission allowances (for mass-based plans).[66] This approach facilitates interstate emission trading without requiring states to submit joint plans.
   - This form of coordinated implementation may occur under both an "emission standards" type plan and a "state measures" type of plan, where states are implementing emission trading programs.
   - For rate-based plans, this type of coordinated approach is limited to state plans with rate-based emission standards that are equal to the CO_2 emission performance rates in the emission guidelines.

The EG also address some aspects of multistate coordination:

- *"EPA notes that in addition to these approved approaches, other types of multi-state approaches may be acceptable in an approvable plan, provided the obligations of each state under the multi-state plan are clear and the submitted plan(s) meets applicable emission guideline requirements…."*

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[64] See 80 Fed. Reg. 64661 (Oct. 23, 2015), page 64838.
[65] Or a joint mass-based CO_2 goal plus a joint new-source CO_2 emission complement.
[66] ERCs are in units of megawatt-hours/year and are used in rate-based plans to adjust EGU(s) emission rates in CPP compliance calculations. Allowances are in units of CO_2 tons/year and are used in mass-based plans where EGUs must have ownership of a number of allowances equal to their allowed emission tons per year.

- *"…a state may participate in more than one multi-state plan. Under this approach, the state would identify in its submittal the subset of affected EGUs in the state that are subject to the multi-state plan or plans. This could involve a subset of affected EGUs that are subject to a multi-state plan, with the remainder of affected EGUs subject to a state's individual plan. Alternatively, different affected EGUs in a state may be subject to different multi-state plans."*

Modular Approach to CPP Compliance

In the WIEB report, *Exploring and Evaluating Modular Approaches to Multi-State Compliance with EPA's Clean Power Plan in the West,* referenced throughout this brief, the concept of modular approaches to multistate coordination on CPP compliance is one in which "states develop their own [CPP] compliance plans for meeting their individual targets, but with portions of those state plans — or 'modules' — developed in voluntary collaboration with other states." WIEB (prior to release of the final EG) identified three strategic options to CPP compliance:

- A single-state approach, whereby each state develops an individual compliance plan and executes compliance activities independently, but may engage in informal collaboration with other states to develop modules that facilitate compliance (e.g., regional EM&V protocols).
- A partial multistate approach, where two or more states develop their own compliance plans but collaborate formally on certain components, such as renewable energy or energy efficiency, of their state plans.
- A full multistate approach, where two or more states develop compliance plans to meet joint goals.

The report analyzes the technical feasibility of tracking and trading efficiency credits and identifies important policy issues that require consideration for efficiency trading to become a viable compliance option. The report indicates that a "modular approach is a valid strategy for compliance with the requirements" of the CPP, and that the approach offers tangible and quantifiable benefits:

- *"It is conducive to multi-state solutions without requiring one or more states that would like to cooperate to engage in complex interstate negotiations and agreements on all plan elements. However, these negotiations would be necessary to develop a full joint emissions goal and a joint compliance plan. "*
- *"It offers the opportunity to lower overall compliance costs by allowing states to share certain costs for developing the plan and meeting tracking and reporting requirements."*
- *"Importantly, it allows greater compliance flexibility by enabling the trade of RE and EE in cases where collaborating states offer comparative advantages*