

Evaluation of Energy Efficiency Programs by the States: Common Purposes, Differing Approaches

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ABSTRACT

Program evaluation plays an essential role in assessing the impacts of energy efficiency programs and improving their performance. With no national standard for evaluation practices, a wide variety of state approaches to evaluation administration and implementation exist across the United States. This paper presents the results from a national survey of state regulatory staff and evaluation experts. Its purpose is to characterize and describe national trends and differences in approaches to energy program evaluation. Results include data from 43 states and the District of Columbia, including nearly all states that have meaningful utility ratepayer-funded energy efficiency programs. This data is compared with results from a similar survey conducted by ACEEE in 2012, to develop a more complete picture of emerging trends and issues relating to evaluation administration and implementation across nearly a decade.

Introduction

The science, art, and practice of energy efficiency program evaluation in the United States has evolved in parallel with the growth of these programs since their introduction in the 1970s. The methods by which demand-side programs are evaluated, the parties responsible and the types of metrics used, and the availability of data and degree of oversight into the evaluation process are all the results of decisions by state policymakers and regulators. This report documents some of the trends in program evaluation policy and practice across ratepayer-funded efficiency programs in the various states using data collected in a survey of regulators and evaluation professionals. These results are compared with a prior survey conducted by ACEEE in 2012 to identify emerging trends and shifts in the evaluation landscape (Kushler and Novak 2012).

In this second national survey of evaluation, measurement, and verification (EM&V), we find that evaluation policies and practices continue to vary widely from state to state, although many of the underlying methodological foundations of program evaluation are common among states. Energy efficiency program evaluation remains a critical tool for assessing program performance and cost effectiveness, and for guiding administrators and implementers in meeting program goals (which are broadening in many states to include carbon emissions reduction, improved health, energy equity, and other nonenergy benefits). While program evaluation is being called on to address various new, revised, or expanded objectives, evaluators have an increased set of tools, techniques, and resources available today to help them address these new challenges.

Methodology

Our core research method was a comprehensive census survey of all states with active utility sector energy efficiency programs (those funded through rates or fees paid by utility customers). It was specific to the evaluation of ratepayer-funded programs and thus excluded programs funded through taxes, grants, and other means. The survey method consisted of an excel document containing questions and answer fields where respondents were able to enter information specific to their state's evaluation practices. Certain fields were pre-filled with data from the Database of Screening Practices (DSP) compiled by the National Energy Screening Project, which respondents were asked to review and verify its accuracy (NESP 2021). The survey aimed to collect quantitative and qualitative information on a variety of topics,

such as: the parties responsible for overseeing and administering evaluations; the specific methods employed in evaluation; how evaluation results are used to inform cost recovery, policy objectives, and resource planning; key issues including the use of net vs. gross savings and deemed values; and the integration of new and emerging technologies such as advanced metering infrastructure.

ACEEE reached out to contacts in the 48 states (plus Washington, DC) with utilities that offer energy efficiency programs to customers funded through rates.¹ Most of the contacts in those states were staff members within state regulatory commissions or government agencies that are responsible for administering and/or overseeing energy efficiency program evaluations. For states where commission staff were unable to complete the survey, we reached out to evaluation professionals and experts with familiarity with protocols in that state. A total of 44 states completed the survey.

Results

Results are presented below in three basic categories: the administrative framework for evaluation; the methods and trends in evaluation practices, and the purposes and applications of evaluation results.

Administrative Framework and Oversight

Depending on the state or jurisdiction, the parties that carry out evaluations, and the purpose and use of evaluation data, can differ substantially. Figure 1 describes the variety of parties responsible for EM&V administration. This may include issuing requests for proposals, selecting contractors to conduct the evaluation, establishing contract terms, monitoring progress, and reviewing evaluation results.

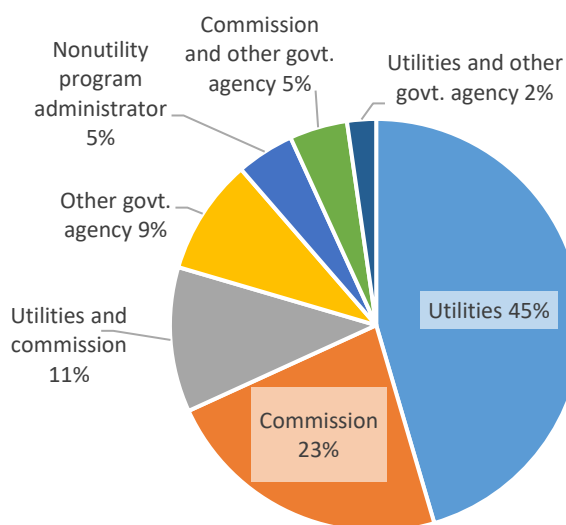


Figure 1. Entities responsible for administration of Evaluation, Measurement and Verification. (N=44)

Utilities continue to have a predominant role in administering the evaluation of utility energy efficiency programs. In 45% of states responding, utilities are the sole entity administering EM&V. In another 13% of states, utilities share that role with another organization (11% with the utility regulatory commission and 2% with some other government agency, e.g. a state-wide energy efficiency program administrator).

¹ Alaska and North Dakota were excluded because they lack ratepayer-funded energy efficiency programs. Additionally, we did not obtain data from the following states: Alabama, Delaware, Kentucky, Maryland, Ohio.

States employed various strategies to help assure independent, objective, and useful evaluations. These methods included requiring evaluation by an independent party; various degrees of Commission oversight into the evaluation process; and some type of public accountability process to allow for transparency and public engagement in program evaluation.

Figure 2 depicts the parties responsible for conducting evaluations. Most (78%) evaluations are conducted by independent contractors, rather than by the staff of a utility or other organization. The balance is performed by utility staff (13%) or government agency staff (9%). The use of independent consulting firms helps assure independent judgment and professionalism in evaluation methodology and implementation. This can help minimize potential bias and influence by a contracting entity.

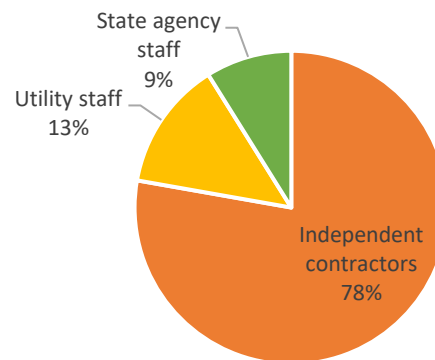


Figure 2. Parties responsible for conducting evaluation studies (N=44)

Another means to ensure independence is oversight by state commissions. Figure 3 shows the breakdown of Commission involvement in the evaluation process. 59% of state commissions play a significant role in evaluations, through either directly managing or approving evaluation plans and reports. 34% of state commissions provided general oversight into the evaluation process but had no formally defined role. Only 7% of state commissions played no role at all in evaluation.

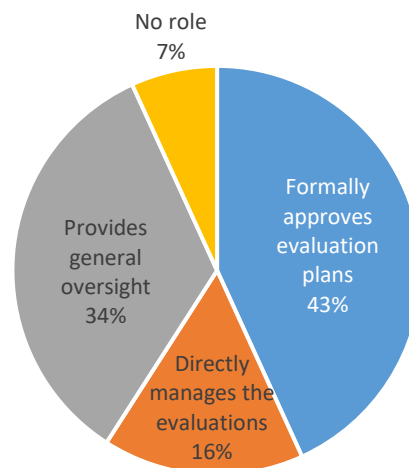


Figure 3. Role of the Public Utility Commission in Evaluation, Measurement & Verification (N=44)

Public involvement is another key means to ensure independence. Typical public involvement includes intervening or commenting in commission proceedings where evaluation results are reviewed. Figure 4 shows the distribution of public involvement and transparency among the states. 74% of states have some type of opportunity for public involvement, and almost all (95%) make evaluation reports available to the public.

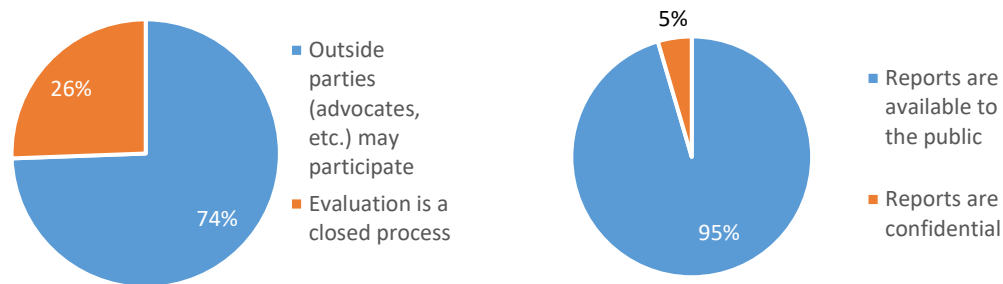


Figure 4. Involvement of the public and disclosure of evaluation results (N=43)

Methods of Evaluation

Estimating the amount of energy savings resulting from energy efficiency programs is arguably the single most important function of EM&V. The following results from the survey demonstrate the variety of evaluation approaches, including use of net versus gross savings, the source of evaluation protocols including whether a given state relies on technical reference manuals (TRM), and the use of advanced metering infrastructure (AMI) data to inform evaluations.

Energy savings can be measured as gross (all energy savings) or net (savings attributed solely to a given program). Figure 5 displays the breakdown of which approach states commonly use to evaluate energy savings in demand-side programs.

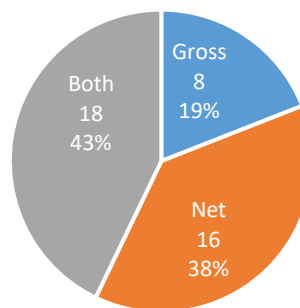


Figure 5. Net vs. Gross Savings Evaluation (N=42)

About half (43%) of all survey respondents report using both net and gross, employing different metrics for different purposes. This number of states is double what we saw in our 2012 research, where 9 states (21%) reported using both net and gross savings metrics. 16 states (38%) only use net savings and 8 states (19%) only use gross. Gross savings are especially important for tracking carbon emissions, since

policy objectives and monitoring in that area ultimately tend to be more concerned with total GHG emissions than with parsing out attribution. The integration of climate goals with utility energy efficiency efforts is a practice that has become more prevalent among utilities and states over the past decade.

Figure 6 describes where evaluation protocols are found. 79% of states publish evaluation protocols in a specific public location, such as a regulatory order or technical reference manual (TRM).² 11% of states had evaluation protocols located in a utility filing such as a planning document or IRP; these were largely states where the utilities conduct evaluations. Some states had different aspects of evaluation protocols in multiple locations, such as having protocols found in regulatory orders while deemed values were in a TRM.

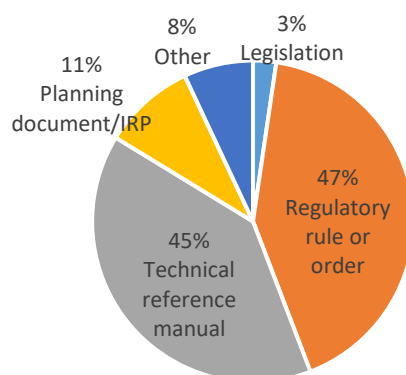


Figure 6. Sources of Evaluation Protocols. (N=38) Some respondents provided multiple answers.

The use of technical reference manuals has become more common; 17 total states reported using them, up from 13 states in 2012. TRMs typically include both deemed savings values and common methods and guidelines for estimating savings. States may adopt a state-specific TRM or refer to an external database, such as the Mid-Atlantic TRM, when state-specific values are unavailable (NEEP 2020).

Another emerging method for estimating energy savings is the use of metered data, particularly from advanced metering infrastructure (AMI). This was a new subject we explored in this edition of the survey given the relatively recent prevalence of AMI relative to in 2012. Figure 7 details the use of AMI data or evaluations and determining cost recovery from demand side programs.

² Lawrence Berkeley National Laboratory defines a technical reference manual as a “resource (document, database, website) that includes information used in program planning, reporting and evaluating of EE programs” (Schiller et al. 2016).



Figure 7. Use of AMI Data for Evaluations (N=43) and to determine program payments (N=31).

About half (42%) of respondent states reported using AMI for program evaluation—indicating that the technology has made substantial inroads into EM&V practices. But there is still a long way to go before use of AMI data is widespread, and its current potential as a resource to enable energy efficiency is largely under-utilized (Gold and York 2020). Evaluators using AMI for evaluation are taking advantage of more granular data to answer new questions, such as peak impacts, the time and location value of energy savings, impacts for specific customers, or for all customers rather than for a sample. This enables continuous program improvement and implementation of pay-for-performance programs. AMI data can also potentially be used for evaluation of other distributed energy resources, such as rooftop solar and battery storage.

Application of Evaluation Results

The energy savings and other results from program evaluations may be put to various uses once evaluations conclude, such as: providing general oversight and accountability for program administrators; deciding whether to scale up pilots into more widely available programs; for determining utility and program administrators' compliance with state policy targets (such as under an Energy Efficiency Resource Standard); for informing the integrated resource plan (IRP) process; for determining eligibility for and amount of lost revenue recovery for utilities; and for determining program cost recovery. The specific uses of EM&V results among the states are detailed in Figure 8, with some states using data for several purposes.

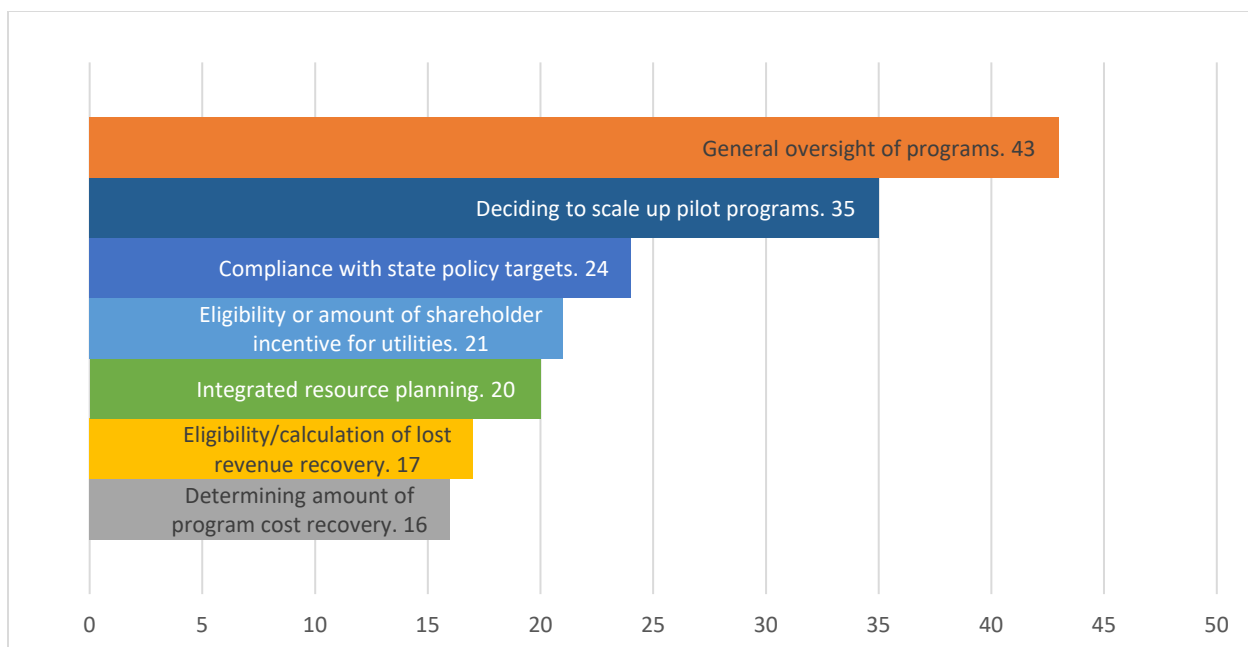


Figure 8. Regulatory Uses of Evaluation Results. (N=44) Some respondents selected multiple answers.

Virtually all states use evaluation for general oversight of program performance. An increasing number of states are using it to make decisions with financial implications for utilities. 21 states (48%) of the states indicate they use evaluation results to determine eligibility and/or the amount of shareholder incentives, up from 17 states (41%) in 2012. 17 states (39%) use evaluation results to determine eligibility and/or amount of recovery of lost revenues; this also increased from 10 states in 2012. 16 states used EM&V results to determine the amount of program cost recovery, a substantial increase from the 2012 survey where just 3 states reported using results for this purpose.

Evaluation results are also used in various ways to facilitate decision making. They may guide compliance with state policy targets (55%), such as an energy efficiency resource standard (EERS) or carbon reduction target for utilities. EM&V results may also serve as inputs for integrated resource planning (45%); or support decisions on scaling up pilot programs (79%). These uses of EM&V data were not included in the 2012 survey.

Conclusions and Recommendations

Energy efficiency program evaluation has continued to evolve and mature over the past decade. There have been notable advances in guidelines and resources for evaluation professionals and program administrators. Based on the results of the survey, as well as related conversations with respondents and experts in the field, we would offer the following recommendations to regulators and evaluation administrators.

In looking at the status of program evaluation today and the changes underway in the industry, program administrators and regulators should continue to:

- Emphasize the importance of independent and credible evaluation to facilitate good decision making, and structure evaluation processes and oversight to accomplish that objective
- Work to achieve an evaluation process that facilitates transparency and public and stakeholder input

- Build and use key evaluation resources to improve the quality, consistency, and value of evaluation results
- Support program evaluation as an essential component of customer-funded energy efficiency and related customer energy programs; such support includes adequate funding for program evaluation
- Develop, refine, and apply methods to include and value non-energy impacts
- Share key EM&V resources to support best practices
- Ensure timely evaluation to inform program design and implementation
- Stress the importance of efficiency program evaluation for resource planning via benefit-cost analyses and integrated distribution and grid planning
- Monitor and update deemed savings values and methods to assure their accuracy
- Develop a national database of evaluation reports that can provide information on efficiency performance for a wide range of program designs

A wide variety of technological advancements are creating new opportunities and challenges for program evaluation. These include the emergence of highly granular metered data, advanced communications systems, and other distributed energy resources such as customer-sited renewable energy and storage. Program evaluation is changing in response to these transformations. To build on existing foundations and strengthen evaluation practice, administrators and evaluation professionals should:

- Develop and apply new and emerging technologies and methods for program evaluation, such as advanced analytics and metering
- Extend methods developed for energy efficiency program evaluation to the wider range of distributed energy resources
- Advance approaches to value the time and location of savings from energy efficiency programs.

Energy efficiency program evaluation remains a vital element for assessing the performance of utility energy efficiency programs in meeting specific programmatic goals. At the same time, evaluators are increasingly being called upon to address broader policy goals such as carbon reduction, equity, corollary societal and non-energy benefits, etc. While program evaluation is being asked to address these various new, revised, or expanded objectives, the core factors examined in this survey (administrative structure, public and stakeholder involvement, uses of evaluation for decision-making, etc.) remain essential aspects for states to consider as they develop and establish their evaluation framework. Program evaluators have a growing set of tools, techniques, and resources available today to help them address these new challenges, and we look forward to gathering information on their use in future studies.

References

- Gold, R., and York, D. 2020. *Leveraging Advanced Metering Infrastructure to Save Energy*. Washington, DC: ACEEE. <https://www.aceee.org/research-report/u2001>
- Kushler, M. and Nowak, S. 2012. *A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs*. Washington, DC: ACEEE.
- NEEP (Northeast Energy Efficiency Partnerships). 2020. *Mid-Atlantic Technical Reference Manual (TRM) V10*. <https://neep.org/mid-atlantic-technical-reference-manual-trm-v10>

NESP (National Energy Screening Project). 2021. "Database of Screening Practices."
www.nationalenergyscreeningproject.org/state-database-dsesp/

Schiller, S., J. Easler, C. Rea, T. Jayaweera, and J. Light. 2016. Using Deemed Savings and Technical Reference Manuals for Efficiency Programs and Projects. Prepared by Berkeley Lab. Washington, DC: DOE. emp.lbl.gov/publications/using-deemed-savings-and-technical.