

Mixing and Matching: A Review of EM&V Frameworks in North America

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ABSTRACT

As the focus shifts to new climate strategies, there will be an increased need to ensure that energy efficiency (EE), also known as Demand Side Management (DSM) programs deliver on their savings goals. Evaluation, Measurement & Verification (EM&V) has always been essential for program measurement. Still, as new state, provincial, and federal policies evolve to address climate change issues, these energy efficiency programs may require a new regulatory model to verify program impacts.

But which EM&V model is best? This question was addressed in a recently completed jurisdictional scan of EM&V Regulatory Frameworks in the United States and Canada. This review identified ten different regulatory models, including a deep dive into the existing literature and in-depth interviews with evaluators in oversight functions.

These models reflect a continuum of regulatory oversight. Some states and provinces have instituted a high level of scrutiny, while others have developed hybrid models. Some more exciting permutations include the Commissioner-led Model in Maryland, the Verification-Focused model in Hawai'i and the EM&V Evaluator Model in Texas.

This review also identified essential elements of any successful regulatory model: transparency, stakeholder involvement, and clearly defined roles and responsibilities.

As states and provinces focus on measuring the effectiveness of climate initiatives, regulatory frameworks will need to be an essential consideration. This paper will summarize the pros and cons of each approach and identify the “best practices” to incorporate into EM&V regulatory frameworks.

Introduction

Evaluation, Measurement & Verification (EM&V) plays a critical role in energy efficiency policies and strategies. EM&V provides the metrics to determine if the energy efficiency (or DSM) programs meet the stated objectives (EPA 2017, p. 4).

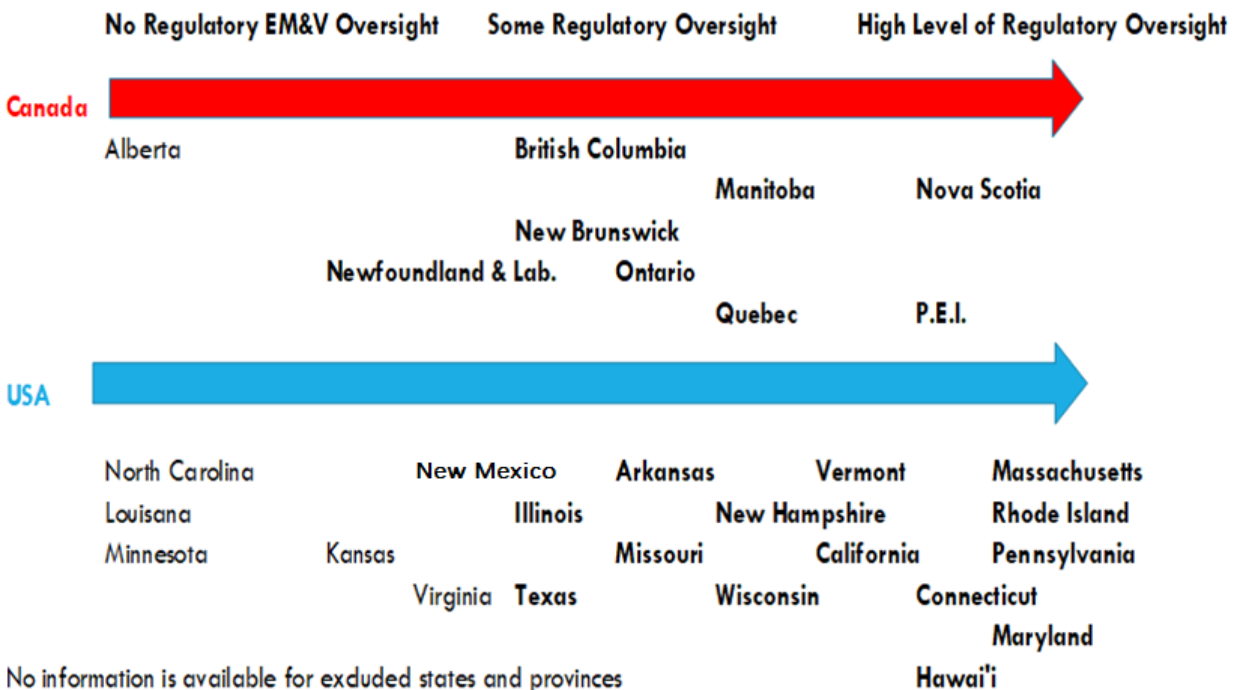
This paper summarizes the results of a literature review and in-depth interviews examining the different types of EM&V frameworks currently used in the United States and Canada. This review complements and extends the findings of an American Council for an Energy-Efficient Economy (ACEEE) completed by York et al. (2020). As this study noted:

“Program evaluation is becoming more important than ever as utilities, and other program administrators face higher savings targets in conjunction with state climate goals, rising baselines, increased emphasis on the time and locational value of energy efficiency, and changes to the structure of goals. Accurate and credible evaluation (more broadly referred to as “evaluation, measurement, and verification” or EM&V), including the full valuation of energy efficiency’s multiple impacts, is critical to developing and sustaining energy efficiency portfolios capable of meeting ambitious targets and to avoid over-investment in traditional resources (York et al., 2020, p. 2).

EM&V also plays a critical role in quantifying both the energy and non-energy impacts of DSM programs, such as quantifying environmental effects on measure carbon emission reductions and improved health due to air emissions reductions (York et al., pp. 32, 43).

This paper provides an overview of the current EM&V frameworks used in the United States and Canada. It also identifies how these models could be used to incorporate the broader societal questions associated with developing effective strategies to mitigate climate change. Figure 1 served as the starting point for our jurisdictional review of EM&V activities for DSM programs. This report summarizes results from the jurisdictional scan across 13¹ jurisdictions: four in Canada and nine in the United States. Research activities included:

- Complete a literature review of all available information for each selected jurisdiction.
- Conduct In-depth interviews with utility staff, EM&V experts serving in oversight roles, and subject-matter experts representing 13 Canadian and US jurisdictions.



Source: *Expanded EM&V Framework Jan 2018, p. 21*

Figure 1: Spectrum of EM&V Regulatory Oversight

¹ Although we interviewed two staff members from Michigan, the state does not currently have an oversight model and therefore was excluded from the subsequent analysis. *Appendix C: United States Jurisdictional Scan* provides additional details regarding Michigan’s current approach.

Findings from the Jurisdictional Scan

The literature review and in-depth interviews identified the four elements that are currently present, in varying degrees, in each EM&V framework. Our in-depth interviews expanded upon the information provided in regulatory filings and EM&V reports and provided insights regarding the interplay of these factors in each jurisdiction (Johnson et al., 2022 p. 2).

- **EM&V Oversight Models:** The ways in which the regulatory authorities currently monitor, supervise, and/or enforce independent EM&V activities. The regulatory authority either develops these oversight models directly or defers their development and deployment to selected EM&V experts, energy efficiency stakeholder groups, or a combination of these parties. Our review identified ten unique EM&V Oversight Models that are summarized in this review.
- **EM&V Frameworks:** Contain the EM&V “road map” or protocols used to conduct these evaluation tasks. These frameworks may rely on industry best practices, such as the International Performance Measurement and Verification Protocol (IPMVP), the Uniform Methods Project (UMP) and/or jurisdictional-specific protocols such as Arkansas’ EM&V Protocols in its Technical Reference Manual (TRM) or the algorithms used to determine energy savings in the individual TRMs such as those used in Illinois, Missouri, and Pennsylvania (IEM Report, 2021; Johnson et al. 2022, p. 2; Evergreen Economics & Michaels Energy 2021)
- **Stakeholder Engagement:** Interested parties and collaborative groups also play an important role in EM&V activities; however, their level of engagement differs by jurisdiction. In some jurisdictions, the stakeholders have a great deal of authority, even directing the actual EM&V tasks, such as Massachusetts and Connecticut or in determining EM&V protocols. In other jurisdictions, the stakeholders provide advice but have no statutory authority for enforcement. The level of stakeholder involvement varies significantly across these 13 jurisdictions (Johnson et al. 2022, p. 3).
- **Roles and Responsibilities:** This section describes the specific functions conducted or directed by the designated EM&V authority. These tasks are divided into EM&V Planning, EM&V Supervision, and EM&V Reporting. The scope of these duties differs across jurisdictions as they are determined by the EM&V model that has been established and the level of involvement of other interested parties. The research activities identified the following elements, which are incorporated, in various degrees, in each jurisdiction (MA EM&V Approach 2017, TX Public Utilities Commission, 2017).

These elements are defined next.

EM&V Oversight Models

The jurisdictional review identified ten unique EM&V Oversight Models currently used in at least one jurisdiction in either Canada or the United States. However, each jurisdiction has its own model, framework, and definitions for its EM&V oversight authority. For example, terms such as “EM&V Auditor” are used in several jurisdictions, but in practice, the roles and responsibilities differ significantly. For example, the level of EM&V involvement provided by the EM&V Auditor for E1 in Nova Scotia (NS) is higher than the EM&V Auditor in Missouri.

Still, other jurisdictions have even higher levels of involvement by EM&V experts (Johnson et al. 2022, p. 9). Table 1 summarizes these findings by country, jurisdiction, and the roles and level of engagement for each activity.

Table 1 Summary of EM&V Frameworks by Jurisdiction

Country	Jurisdictions	EM&V Oversight Models	EM&V Frameworks	Stakeholder Engagement	Roles and Responsibilities		
					EM&V Planning	EM&V Supervision	EM&V Reporting
Canada	NS: E1 (Utility)	Parallel Path Model	Evaluator-Developed Frameworks	●	●	●	●
	NS E1-Verification Consultant			◐	○	○	◐
	PEI and Manitoba, New Brunswick	Utility-Directed EM&V Model		○	○	○	○
US	Pennsylvania	EM&V Auditor Model	Jurisdictional Frameworks	●	●	●	●
	Massachusetts	EM&V Technical Advisor Model		●	●	●	●
	Hawai'i	Verification-Focused Model		◐	●	●	●
	Maryland	Commissioner-Led Model		◐	●	●	●
	Arkansas and Missouri	EM&V Monitor		●	●	●	●
	Texas	EM&V Evaluator Model		●	●	○	●
	Vermont	Regulatory Staff Review Model		○	○	○	◐
	Illinois	Stakeholder-Advisory Model		●	○	○	◐

Source: Johnson et al. 2022, p. 8.

Legend	Level of Involvement
○	None
◐	Medium
●	High

Canadian EM&V Oversight Models

In Canada, there are currently two EM&V oversight models. The four Canadian utilities covered in this review: Efficiency1 (E1), Prince Edward Island (PEI), Manitoba and New Brunswick (NB) rely on the industry-accepted EM&V Best Practices,² as codified in several U.S. publications from the Department of Energy. However, the energy efficiency offerings' size and scope are much smaller than the publicly owned (or Investor-Owned Utilities) programs in the United States. This smaller size and scale also limit the province's capacity to engage in high

² There are multiple sources of EM&V “Best Practices,” including the National Action Plan for Energy Efficiency 2007 <https://www.epa.gov/energy/national-action-plan-energy-efficiency> and the State and Local Energy Efficiency Action Network (SEE Action); <https://www.energy.gov/eere/state-and-local-energy-efficiency-action-network-see-action> and the Uniform Methods Project (UMP) for Determining Energy Efficiency Program Savings <https://www.energy.gov/eere/about-us/ump-home>.

levels of regulatory oversight (New Brunswick. 117.1; Econoler, 2020; Efficiency Manitoba, 2019, 2021; EfficiencyOne 2020; Efficiency PEI 2017).

Parallel-Path Model (NS)

As Table 1 shows, E1 relies on the parallel-path mode while the other three utilities use the Directed Model. The oversight in Nova Scotia differs from the other Canadian utilities in that the regulatory agency, the Nova Scotia Utility and Review Board (NSURB), and the utility (E1) hire third-party EM&V experts to conduct separate EM&V tasks. The NSUARB hires the “Verification Contractor,” who is expected to validate the reports completed by E1’s evaluator. However, the clear duties of the Verification Contractor are not well-defined, and instead of providing oversight, the Verification Contractor mainly provides separate evaluation reports directly to the NSUARB (Peach et al., 2019, 2020). This approach means two different evaluation activities are completed and do not provide a clear feedback loop for reviewing the EM&V results with the critical stakeholders.

Utility-Directed Model (PEI, NB, MB)

The other provinces implement DSM programs through a regulated utility and use the Utility-Directed Model for EM&V guidance. The utilities hire third-party implementers or conduct internal evaluations (British Columbia). Evaluations are conducted with little to no direct oversight from the regulatory agency. Even when a regulatory agency is involved, such as the Island Regulatory and Advisory Council (IRAC) in PEI, the interaction with this agency is minimal. However, recently in Manitoba there are changes currently underway to increase regulatory oversight soon (Johnson et al., 2022, pp. 9-10).

However, the Utility-Directed model does not provide meaningful guidance or transparency for EM&V since the evaluation activities are separated from the program planning and stakeholder engagement activities (Johnson et al., 2022, p. 11).

US EM&V Oversight Models

Currently, there are eight EM&V oversight models in the United States. Most oversight models are in jurisdictions that regulate Investor-Owned Utilities (IOUs).³ In these heavily regulated jurisdictions, the IOUs, both gas and electric, are often required to provide energy efficiency programs to achieve a specific energy savings goal or long-term objective. The regulators will often solicit feedback from different stakeholder groups and customer segments to ensure that the energy efficiency programs meet specific energy or demand savings goals. But the level of EM&V oversight and the role of the stakeholders, technical advisors and third-party evaluators varies by jurisdiction.

The literature review identified six of the eight EM&V oversight models currently used in the United States are more rigorous and transparent than the two Canadian models. Specifically, Pennsylvania, Massachusetts (and other New England states), Hawai’i and Maryland have the most thorough and prescribed EM&V Oversight Models. But each differs

³ Most rural electric cooperatives and a few municipally owned utilities are not subject to the exact regulatory requirements as the IOUs. Therefore, IOUs comprise the most significant number of utilities that offer energy efficiency or DSM programs.

based on the specific jurisdictional characteristics, including the level of interest and involvement of the regulating authority, key stakeholders, and the current EM&V practices and policies (Johnson et al., 2022, p. 11). The key features and unique characteristics of each EM&V model are summarized next.

1. EM&V Auditor Model (PA): The Pennsylvania Public Service Commission hires an independent EM&V Auditor to oversee the EM&V activities for each IOU across the state. Concurrently, each IOU hires its evaluation contractor to conduct third-party evaluations of its energy efficiency programs. Specifically, the EM&V Auditor supervises, approves, and conducts extensive Quality Assurance/Quality Control (QA/QC) activities to verify the accuracy of the third-party evaluations completed by the IOU's evaluators. Furthermore, the EM&V Auditor will conduct ad hoc studies and supplemental EM&V tasks as directed by the public service commission. This model is only used in Pennsylvania, as most states opt for a less rigorous approach. The EM&V Auditor plays an active and ongoing role in all aspects of program evaluations, which contrasts the Canadian models.

2. EM&V Technical Advisor Model (CT and the New England States): In this model, all critical decisions regarding the energy efficiency program portfolios and the EM&V activities are directed by a Stakeholder Group. This Stakeholder Group represents specific market sectors, and members are appointed by the Governor or another regulatory agency (in Connecticut and Rhode Island). Since these stakeholders may not have the technical expertise to supervise complex EM&V studies, they hire a group of specialized EM&V experts (Technical Advisors) who work directly for the stakeholder group.

The Technical Advisors (or Evaluation Managers in CT) manage the EM&V process completely. However, the level of QA/QC performed by the Technical Advisors varies by study and jurisdiction. This model minimizes the role of the utilities in this process; instead, stakeholders and evaluation experts decide the evaluation tasks, priorities, and overall objectives.

3. Verification-Focused EM&V Model (HI): This model emphasizes verifying the actual savings from the statewide programs. Other EM&V activities are also conducted, but the focus is on determining the basic savings levels from the efficiency programs rather than optimizing program performance. In an exciting twist, the third-party EM&V contractor also hires an independent *firm* as the Verification Contractor.

This model highly values the collaborative decision-making process from all critical stakeholder groups, including reviewing the EM&V guidance documents and establishing the three-year EM&V plans.

4. Commissioner-Led Model (MD): All EM&V activities are directed by the regulatory agency, which hires its technical advisor, while the IOUs hire one third-party evaluator to conduct all evaluations statewide. This model treats the selected EM&V consultant as a direct extension of the public service commission staff and therefore is an active participant and advisor in all regulatory proceedings related to energy efficiency program planning and implementation.

The Commissioner-Led EM&V advisor is authorized to review and approve all EM&V plans and conduct additional QA/QC activities to verify the savings estimates. The EM&V advisor also chairs all the stakeholder meetings and proactively establishes EM&V policies and direction. This model relies on a closer link with the regulatory authority than the other approaches reviewed in this study.

5. EM&V Monitor (AR and MO): This approach blends commission supervision with independent third-party evaluators. The Commission hires an independent EM&V consultant or

Independent Evaluation Monitor (IEM). Each IOU hires third-party evaluation consultants. The EM&V Monitor reports directly to the Commission; however, it supervises all the EM&V activities in the jurisdiction.

This model balances a full review of the proposed EM&V activities with supervision and guidance. Unlike Pennsylvania, there is less emphasis on duplicating results from site visits. Instead, the focus is to verify the inputs that determined the savings through desk reviews and audits of the program databases. The EM&V Monitor may also conduct additional verification activities if the results are questionable or concerning. However, this rarely occurs.

This well-balanced approach incorporates many of EM&V's "best practices," including using established evaluation protocols, engaging stakeholders in the EM&V process, and conducting QA/QC.

6. EM&V Evaluator Model (TX): The Public Utilities Commission in Texas (PUCT) hires an independent third-party evaluation firm to conduct all evaluation activities for all its regulated utilities. The EM&V Evaluator has the authority to determine the EM&V results from the regulated IOUs. Stakeholder engagement is also critical to the success of this model, as this approach requires a high level of coordination between utility staff and the EM&V Evaluator.

7. Regulatory Staff Review Model (ME and VT): This structure provides a minimum level of regulatory oversight. The regulated utilities hire a third-party evaluation contractor to complete the annual evaluation reports. Several regulatory staff members will review these results every three years to determine if they conform with the established EM&V protocols. The Commission staff rely on findings from third-party evaluations and technical experts on specific matters. But the scope and rigor of these studies vary considerably.

8. Stakeholder Advisory Model (IL): This model, which is only used in Illinois, relies on gathering technical input from interested intervenor groups. However, the stakeholders do not have any regulatory authority. Each regulated utility hires its independent EM&V consultant. The EM&V consultant develops the plans, and the stakeholders have an opportunity to provide input. The stakeholder group has a professional facilitator who posts all related evaluation documents on a dedicated website. Periodically, the stakeholders meet to discuss new or emerging topics.

This approach relies on stakeholder input and collaboration but does not provide any EM&V review or oversight.

Findings from the EM&V Oversight Models

The literature review identified various current EM&V frameworks used in jurisdictions in Canada and the United States. The level of EM&V Oversight guides the organization of each framework to its specific needs and priorities. Some models strongly emphasize verification activities which provide a high level of rigor and transparency but at a high cost. Other models use a more balanced approach in which EM&V oversight is viewed as an extension of the utility commission or as part of a broader stakeholder collaborative process. In contrast, a few jurisdictions focus only on an internal review of the EM&V by regulatory staff or input from interested stakeholders.

However, the most effective EM&V oversight models for developing an approach to address climate-related policies are those that balance stakeholder feedback with regulatory oversight. The EM&V Monitor design used in Arkansas and Missouri is one of the transparent and cost-effective frameworks. This paradigm allows for input from interested parties, including stakeholders, and guidance from the subject-matter experts. This design also clearly defines the

protocols and requirements that must be met to ensure that the evaluation activities will ultimately provide insights into program refinement and improvements. This feedback loop is essential to ensure that the current program activities meet overall, long-term policy goals.

EM&V Frameworks

The evaluation framework provides the road map of the evaluation activities for each program cycle. While these frameworks are based on industry standards for EM&V data collection and analysis, these protocols may also be tailored for each jurisdiction.

“The rationale behind the EM&V Framework Guide was to show how different states set up EM&V Frameworks, identify best practices, the purpose and value of the framework.” (Former Project Manager for the SEE Action Guide- EM&V Framework Guidebook.)

Evaluator-Developed Guidelines

Most Canadian provinces rely on the frameworks developed by third-party evaluators. The evaluation teams develop strategies based on national best practices, such as the UMP. However, these guidelines focus only on impact-related EM&V activities and therefore do not include specific guidance for conducting process evaluations or market effects studies. These frameworks may also not address more advanced evaluation topics such as quantifying Non-Energy Benefits or conducting evaluations on pilot programs.

Jurisdictional-Specific EM&V Frameworks

EM&V frameworks developed in a specific jurisdiction are most commonly part of a robust regulatory oversight model. These frameworks describe the specific EM&V protocols that the third-party evaluators must follow. These topics include guidance on establishing program databases, Net-to-Gross analysis, evaluating behavior programs, frequency and scope for process evaluations, and specific statistical rigor required for impact studies.

The literature review identified that EM&V Frameworks are currently used in most US jurisdictions. For example, the EM&V requirements have been codified in the state statutes in Missouri. Other jurisdictions have developed their comprehensive EM&V frameworks, including Arkansas,

Stakeholder Engagement

Stakeholders play a critical role throughout the EM&V process. But the part of engagement in specific EM&V activities varies considerably by jurisdiction. The most common formats are summarized next.

High level of Engagement with Authority

The Massachusetts Energy Efficiency Advisory Council (EEAC or Council) provides the clearest example of an empowered stakeholder group. The members are political appointees who represent specific market sectors or customer groups. The EEAC is also responsible for supervising and directing all the EM&V activities statewide. Although they are not necessarily

technical experts, they hire qualified EM&V consultants to plan and execute these studies. Ultimately, the EEAC makes the final recommendations regarding the evaluation reports and develops the long-term plan for energy efficiency program offerings.

The Parties Working Collaboratively (PWC) in Arkansas play a vital and decisive role in establishing EM&V Frameworks. The PWC members are “Parties to the Docket” and must represent a recognized utility or intervenor group. The PWC members can vote on specific EM&V matters and are encouraged to reach a consensus on all EM&V recommendations. The Commission considers the input and guidance from the PWC members in its decisions regarding energy efficiency program results and future planning and objectives.

Missouri established the process for stakeholder engagement in its statutes. The utilities are required to conduct at least one stakeholder workshop annually. In addition, even though the utilities are not required to incorporate the comments and feedback from the stakeholders, they are strongly encouraged to do so by the Commission Staff.

Texas and Hawai'i have active stakeholder collaborative environments that include input from diverse market segments. In Hawai'i, the stakeholder collaborative collectively wrote its TRM.

In Texas, the stakeholder collaborative focuses on program and planning design as well as evaluation planning and reviews. The EM&V Auditor works proactively with the regulated utilities to conduct the evaluations, review, vet the findings, and develop actionable and realistic recommendations for program improvement.

High Level of Engagement- Advisory Only

In Nova Scotia, E1 has a high level of stakeholder engagement for energy efficiency planning and EM&V tasks. Specifically, E1 works with the Demand Side Management Advisory Group (DSMAG) and works to incorporate the feedback in both program planning and evaluation activities. However, this is a consultative body only, without authority to bind the discretion of E1 in the operation of DSM franchise activities or its proposed DSM Plans. Therefore, its aim is to both:

- Facilitate discussion and the sharing of Member perspectives about demand-side resource management in Nova Scotia.
- Facilitate a collaborative and comprehensive consultative and engagement process to enhance the development of future DSM applications and plans (Term of Reference 2021, pp. 3-4).

Illinois has an active and engaged Stakeholder Advisory Group (SAG) with more than 300 members. However, the SAG is only advisory and has not been created explicitly by either the Public Service Commission or the State Legislature. So unlike Massachusetts and Arkansas, the Illinois approach is truly advisory only.

The stakeholders are encouraged to reach a consensus and have well-defined meeting protocols. But this entity does not have any legal standing.

Little to No Active Stakeholder Engagement

Most other jurisdictions have little to no active engagement with EM&V matters. Although stakeholders are included in EM&V discussions, they are not highly engaged. Limited stakeholder engagement occurs in several jurisdictions, including Vermont and PEI.

Roles and Responsibilities

The final element of any successful EM&V model is delineating each critical party's roles and responsibilities. The literature review identified the functions that EM&V Consultants provide in their oversight role. The parts are divided into the following categories:

- **EM&V Planning:** These activities focus on developing the plans, protocols, scope, and timing for conducting EM&V activities.
- **EM&V Supervision:** These functions correlate to the degree of scrutiny that the EM&V Consultant has in the actual conduct of evaluation tasks. This level of involvement ranges from a high degree of supervision, such as conducting follow-up site visits from selected customers, conducting basic mathematical calculations to estimate energy savings, and reviewing the techniques used to estimate Net-to-Gross, including free ridership and spillover.
- **EM&V Reporting:** The EM&V Consultants prepare various reports to the regulatory authorities, from quarterly progress reports to detailed annual reports that are filed in commission dockets. Some jurisdictions also request their EM&V Consultants to complete specialized studies on specific topics of interest, such as quantifying Non-Energy Benefits. A few jurisdictions also explicitly require that the third-party evaluators track and report on the progress of the recommendations made throughout the program cycle.

Conclusions and Key Takeaways

Key Takeaways

This paper illustrates the jurisdictions' creativity and flexibility in managing various EM&V oversight activities. As evaluation activities become more closely linked to specific climate-related goals, these jurisdictional frameworks should connect evaluation tasks to public policy concerns.

Many of these models evolved and were shaped by the specific requirements of the regulatory agencies. However, some models are top-heavy, laden with evaluation experts while minimizing the role of the utilities (i.e., models in the US Northeast). Other models do not have the “teeth” to enforce policy but only act as an advisory function (i.e., Illinois). The best models to balance the evaluation requirements with stakeholder involvement and transparency. The Texas model is the most powerful framework, as the evaluator is the ultimate decision-maker. A more balanced approach, such as the EM&V Monitor approach, used in Arkansas and Missouri, allows for input from diverse stakeholder groups, transparency, and accountability.

Some issues to consider when developing an EM&V Oversight Framework that also addresses climate policy issues should include the following elements:

- Develop clear evaluation protocols that define the level of expectations for each evaluation activity. This approach ensures that the studies will be tied to meaningful outcomes rather than just an academic exploration of an exciting idea.
- Establish ground rules for developing a truly collaborative approach that encourages input from all stakeholder groups and interested parties. Developing a clear communications protocol for collaboration ensures that each party remains on a “level playing field” during the planning and execution of the EM&V tasks.
- Fund and support a neutral and independent evaluation team, such as those in Arkansas, Missouri, and Texas. This approach ensures that no one party, either utilities or stakeholders, dictates evaluation priorities. This way, the utilities, regulators, stakeholders, and customers are assured that the evaluation results will lead to meaningful insights and well-designed climate initiatives.

References

The Environmental Protection Agency (EPA), 2017, “*EM&V for Energy Efficiency Policies and Initiatives*,” January 19. <<https://www.epa.gov/sites/default/files/2017-06/documents/emvframeworkpaper_2017-01-19.pdf>>

Johnson, K. Ambach, G, Cook, G. & Lansbury, L., 2022, “*Jurisdictional Scan of the DSM Evaluation and Verification Process*,” for *Efficiency1*,” Nova Scotia. March 24.

References cited from this review include the following:

An Act To Amend The Electric Power Act. Prince Edward Island.

An Act to Dissolve the Energy Efficiency and Conservation Agency of New Brunswick. New Brunswick. 117.1.

Christian, J., Shipley, L. and Lundell, L., 2020. Electricity regulation in Canada: overview | Practical Law. [online] Ca.practicallaw.thomsonreuters.com. Available at: [https://ca.practicallaw.thomsonreuters.com/5-632-4326?transitionType=Default&contextData=\(sc.Default\)&firstPage=true&fbclid=IwAR0UKgMryKSlyoLRYb2SkzYVkyI7GDGP-tCx_XDHDT3qvNjk-5NZoqw7h3k](https://ca.practicallaw.thomsonreuters.com/5-632-4326?transitionType=Default&contextData=(sc.Default)&firstPage=true&fbclid=IwAR0UKgMryKSlyoLRYb2SkzYVkyI7GDGP-tCx_XDHDT3qvNjk-5NZoqw7h3k) [Accessed 25 November 2021].

Efficiency Manitoba, 2019. 2020/23 Efficiency Plan Submission. Efficiency Manitoba. [online] Available at: <http://www.pubmanitoba.ca/v1/proceedings-decisions/appl-current/pubs/2020-em-3-yr-plan/em-3-yr-plan-application.pdf> [Accessed 17 October 2021].

EfficiencyPEI, 2017. 2018-2021 DSM Plan. EfficiencyPEI.

EfficiencyOne, 2020. *2020 Annual Report*. EfficiencyOne. [online] Available at: <https://ens-efficiency-one-prod-offload-647701102377-ca-central-1.s3.ca-central-1.amazonaws.com/wp-content/uploads/2021/05/26120658/5271-01-V2-Annual-Report-2020-PRF20-compressed.pdf> [Accessed 17 October 2021].

Electricity Efficiency and Conservation Restructuring Act. Nova Scotia.

The Efficiency Manitoba Act. Manitoba. 1, 9-11.

Independent Evaluation Monitor, 2021. “PY2020 Annual Summary Report on the Evaluation, Measurement & Verification Findings,” prepared by: Johnson Consulting Group, Michaels Energy, Eisenberg Energy, & Khan, A. prepared for The Arkansas Public Service Commission- Final Report, June 30.

Maryland 2016 (April 4). EmPOWER Energy Efficiency Programs Strategic Evaluation Guidance. Maryland 2017 (October 5). “*EmPOWER Energy Efficiency Programs Strategic Evaluation Guidance*.”

Massachusetts Department of Public Utilities 2015 (October). Exhibit 1 2016-2018 *Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan*. D.P.U. 15-160 to D.P.U. 15-169 *Three-Year Plan 2016–2018*. <https://www.columbiagasma.com/docs/default-source/default-document-library/three-year-plan.pdf>.

Massachusetts EM&V Approach, 2017. *Presentation to New Hampshire Energy Efficiency Resource Standard Stakeholder Workshop 4*, Evaluation, Measurement & Verification, March 2.

NMR Group, Demand Side Analytics, Brightline Group, 2021. “*Statewide Evaluator (SWE) Annual Report, Act 129, Program Year 11, Version 1.1.*,” Submitted to the Pennsylvania Public Utility Commission, May 25.

New Brunswick Power, 2018. DSM Plan 2018/19-2020/21 Energy Efficiency and Demand Response Initiatives. Fredericton, NB: NB Power.

Peach, G., Bonnyman, C, Webb, Y. & Mitchell, J. 2020. “*Verification Review of Program Year 2019 Evaluation Results, Report for the Nova Scotia Utility and Review Board.*” H. Gil Peach & Associates, May.

_____, 2021. *2020 Evaluation Results, Report for the Nova Scotia Utility and Review Board*. H. Gil Peach & Associates, June 2021.

Prince Edward Island Energy Corporation, 2020. *Annual Report 2019-20*.

Romine, T. 2009, *Consensus Report on the EmPOWER Maryland EM&V Process*, Ms. Terry J. Romine, Executive Secretary, Public Service Commission of Maryland, June 24, 2009

Texas, Public Utilities Commission of (2017). Section 25. Substantive Rules Applicable to Electric Service Providers. Subchapter H. Electrical Planning. Division 2. Energy Efficiency and Customer-Owned Resources. §25.181. Energy Efficiency Goal. (q) Evaluation, measurement, and verification (EM&V). Effective date 3/30/17. Available at: <https://www.puc.texas.gov/agency/ruleslaws/subrules/electric/25.181/25.181.pdf>.

Schiller, S. & Goldman, C. ND, “*Developing State and National Evaluation Infrastructures- Guidance for the Challenges and Opportunities of EM&V*,” Steven R. Schiller, Lawrence Berkeley National Laboratory, Berkeley, CA.
<https://www.osti.gov/servlets/purl/1050719>.

_____, & Eckman, T. 2017 *Evaluation Measurement and Verification (EM&V) Frameworks— Guidance for Energy Efficiency Portfolios Funded by Utility Customers and prepared by Lawrence Berkeley National Laboratory for the State and Local Energy Efficiency Action Network*.

York, D., C. Cohn, and M. Kushler. 2020. “*National Survey of State Policies and Practices for Energy Efficiency Program Evaluation*,” Washington, DC: American Council for an Energy-Efficient Economy. www.aceee.org/research-report/u2009.