

Energy Savings Performance Contracting for State and Local Governments: Strategies for Successful Measurement and Verification of Savings

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January 2019

Introduction

Energy savings performance contracts (ESPCs) enable public agencies to implement facility improvements with little or no upfront capital costs by leveraging a guaranteed multi-year stream of avoided utility and other costs. The process of measuring actual energy (and sometimes water and other non-energy) savings after project installation, known as measurement and verification (M&V), is an essential component of ESPCs. The goal of M&V is to accurately quantify and document savings achieved by an ESPC project to assure that the contract guarantees are being achieved or, if not, to assure that the shortfalls are addressed. The M&V process also enables building owners to work in partnership with the energy service companies (ESCOs) that implement ESPCs to identify additional savings opportunities and improve facility operations and maintenance (O&M). The M&V process also provides data needed to support planning; tracking of organizational energy, water, and emissions performance; and communication of ESPC project impacts to stakeholders.

Though ESPCs can leverage considerable funding for much needed facility improvements, they are still underutilized and are sometimes mistrusted or poorly understood by stakeholders. Building owners that implement ESPCs may under-budget M&V in their projects in an attempt to include more extensive improvements. However, inadequate M&V significantly increases the risk that a project will experience an undocumented or undetected shortfall that may result in the project savings not covering its costs. Such issues

can undermine decision makers’ confidence in ESPCs as a funding and contracting mechanism. Investing in meaningful M&V practices is in the ESPC customer’s best interests and represents a modest cost in relation to the overall project.¹

State ESPC program administrators can play a pivotal role in ensuring the long-term viability of ESPCs in their state by helping their constituent agencies develop robust M&V plans, manage M&V reporting appropriately, and collect M&V data. Disseminating information about ESPC performance across projects and over time can help to safeguard the public trust in the ESPC as a contracting and funding mechanism.

This document provides state ESPC program administrators—the individuals who oversee or provide ESPC technical support to their constituent state, local, healthcare, and/or educational facilities—with a selection of tested strategies to support successful M&V of ESPCs implemented in the state and local public sector. The resource includes program-level strategies to support strong M&V practices, as well as strategies administrators can share with individual facility owners and managers to conduct successful M&V at the project level. These strategies offer a menu of options that can fit different regulatory and administrative circumstances.

Table 1 provides a list of various strategies for effective M&V employed by state ESPC program administrators. This table is designed to help readers identify which strategies they may be able to implement according to their organization’s level of authority and available resources.

¹ For more information on the substantial, cost-effective benefits of incorporating well-documented M&V in ESPCs, see the companion document, *The Business Case for Conducting Measurement and Verification In State and Local Government Energy Savings Performance Contract Projects* (forthcoming).

Table 1. Summary of Key Strategies and Location in this Document

Strategy	Condition or Level of Authority Needed	Location in Document
For Program Administrators		
Provide tools and resources (e.g., guides, model contracts, and templates); require their use, if authorized to do so	Requires state-level funding (e.g., State Energy Program funds); may require legislation or other authority to require constituents use standard documents; however, no legislation is needed to encourage use of documents	<i>Page 4</i>
Establish administrative protocols to enable consistent, timely review of M&V reports	May require legislation to require M&V reporting by constituent facilities; however, where not required, state programs employ moderate- and low-effort ways to support timely reporting	<i>Page 5</i>

Communicate impacts broadly	Can generally be implemented by all organizations	<i>Page 5</i>
Provide contract oversight by qualified state staff	Requires state-level funding and may require legislation or administrative authority for state agencies to conduct contract oversight for different types of public agencies like K-12 schools, colleges, state universities, local governments, and state government facilities	<i>Page 5</i>
Provide or encourage use of technical expertise at critical points in project development	Requires some state-level funding or authority for the state agency to recover cost of technical expertise from ESPC project savings or other means (e.g., interagency memo)	<i>Page 7</i>
Employ a robust, accessible ESPC data tracking and document preservation system	Can require state-level funding to develop a system or can use the U.S. Department of Energy's (DOE) free, web-based energy project data tracking tool, eProject Builder	<i>Page 8</i>
For Individual Projects or Facility Owners		
Utilize state staff or third-party technical expertise, if available	Requires a state program that can provide staff or third-party technical expertise, or provide guidance to individual facilities on procuring third-party expertise	<i>Page 8</i>
Engage all key decision makers in M&V plan development	Can generally be implemented by all organizations with sufficient staff	<i>Page 9</i>
Ensure staff is assigned to review M&V reports and provide resources to support this activity	Requires some funding to support staff responsible for the M&V review; complex projects may require technical expertise; however, this can generally be implemented by all organizations	<i>Page 9</i>
Ensure M&V plan contains key components	Requires third-party technical expertise, provided by state program or procured by facility	<i>Page 10</i>
Ensure O&M plan supports persistent savings	Requires third-party technical expertise, provided by state program or procured by facility	<i>Page 11</i>
Resources		
M&V guidance documents	Includes M&V standard protocols and examples of state ESPC program M&V guidance documents	<i>Page 12</i>
State ESPC program resources	General ESPC resources and example guides and document templates from state ESPC programs	<i>Page 13</i>
U.S. DOE resources	Includes the Better Buildings ESPC Toolkit, eProject Builder, and Federal Energy Management Program resources	<i>Page 13</i>

The information in this guide is drawn from discussions with state-level ESPC program directors and M&V experts at ESCOs that implement ESPCs across the municipal, state, university, K-12 school, and healthcare (MUSH) public sectors. The research also includes a review of program documents and other literature. Agencies were identified through consultation with stakeholders and industry experts, including from the National Association of State Energy Officials (NASEO), National Association of Energy Service Companies (NAESCO), Energy Services Coalition (ESC), and Efficiency Valuation Organization (EVO), to identify state ESPC programs that had significant activity and experience, and that the experts considered to be strong examples of successful implementation of M&V.

For more information and guidance on implementing ESPC and M&V, please see links to additional resources at the end of this document.

WHAT IS SUCCESSFUL M&V?

Criteria for successful M&V are driven by the objectives of the state program and/or building owner. The most fundamental M&V objective is to ensure the fulfillment of the ESPC's contractual requirement that the installed measures achieve a minimum specified level of energy or water unit savings (and sometimes non-energy cost savings). M&V report data analysis identifies any deviation from the expected savings, attributes the cause of any savings shortfalls, and helps determine corrective actions. M&V thus supports many organizations' overarching need to ensure that the ESPC costs are covered by the project savings and add no financial burden to the state, locality, other public body, or facility owner.

When properly executed, M&V meets other important objectives as well, including ensuring that the savings risk is clearly defined and allocated appropriately, determining the total value of the project to the organization over time, ensuring that the organization is maximizing the potential savings from the project, and providing information (e.g., lessons learned, savings, and cost benchmarks) to inform future projects. M&V reports can be used to track progress against an organization's internal energy and/or water savings goals. They can also provide information on equipment performance and facility usage patterns to support effective operations planning and maintenance. Some program administrators suggest that it can be beneficial to use a portion of M&V funds for maintenance checkups by the ESCO or staff training. Understanding your organization's requirements and needs for a

project will be important since developing a good M&V plan starts very early in the project development process.

Successful M&V does not just involve technical staff at a facility. It provides the basis for enforcement of the savings guarantees in an ESPC. Consequently, it is important to involve everyone who has a stake in the success of the project. Both the technical and business sides of an organization should be engaged throughout the ESPC project development and performance life cycle. Key project phases where M&V comes into play include:

- The Requests for Proposal (RFP), which should include reviewing prospective ESCOs' previous M&V plans and reports
- The Investment Grade Audit (IGA) and project development phase, which should fully integrate with the development of the M&V plan and involve all key decision makers for the facility
- The post-installation verification and annual (or more frequent) M&V activity and reports
- The ESPC contract resolution, where the saving shortfalls may be identified
- Other activities specified in the M&V plan, such as proper O&M of the newly installed equipment and systems.

The strategies outlined below enable state and local agencies to ensure their ESPC contracts meet expectations and pave the way for future investments in energy, water, and other savings.

KEY STRATEGIES: STATE PROGRAM LEVEL

Provide updated tools and resources; require their use if authorized

ESPC programs have disseminated a relatively standard set of M&V practices to their constituent agencies by providing—and requiring if statutorily authorized—a suite of ESPC and M&V guidance and model documents. These tools not only alleviate administrative burdens on the individual agencies, they assure that high standards of practice for M&V are met. Commonly offered documents include: general ESPC guides, RFP templates, IGA agreements, ESPC contract documents (all of which typically have components that address M&V), and M&V plan templates. In some cases, documents differ by customer type: state agencies, public universities, local governments, and K-12 public school districts. It is important for a state

program that provides guidance and templates online to have the resources to keep those documents current as program rules change.

State or local agencies that do not already have such documents nor the resources to develop their own from scratch have many examples to use. For example, the North Carolina Department of Environmental Quality (DEQ) and Colorado Energy Office provide a suite of template and guidance documents, as well as detailed dedicated guidance documents specifically on M&V.² In addition, DOE's Solutions Center and ESC offer a suite of guides, decision-making tools, and model documents, including ESPC contracts.³ Such documents should be adapted to conform to relevant state and local statutes and program or agency objectives.

Establish administrative protocols to enable consistent, timely review of M&V reports

Some state program administrators report that, even with a good M&V plan in place, their constituent agencies struggle to review and approve the annual M&V reports in a consistent and timely manner. A number of factors can make it difficult for agencies to respond to M&V reports, including staff turnover, the difficulty of integrating responsibilities outside the normal routine, and lack of budget to assign an appropriate staff person. Delayed reviews of M&V reports can result in ESPC contracting disputes if issues identified in the M&V reports go unaddressed. Delays can also burden the state ESPC program administrator tasked with tracking and reporting ESPC results at a program level to the state legislature or other authority. State programs are advised to use a centralized system to collect and track M&V results. Agencies, regardless of resource availability, can use DOE's eProject Builder database,⁴ which is free to use and provides a secure web-based system for preserving, tracking, and reporting ESPC project information and annual M&V results. For example, the Colorado Energy Office manages technical assistance for its pipeline of client ESPC projects, including tracking M&V due dates, in a customized database and client management tool. This system helps prompt the administrator to nudge his or her client agencies to schedule an M&V review with

the state's technical expert. The Maryland Department of General Services (DGS) has historically used a spreadsheet to track review and approval status of their constituents' annual M&V reports and to compile reported annual savings.

Communicate verified impacts broadly to support ongoing M&V

State programs can use M&V results to tout detailed program accomplishments. Various state administrators file high-level annual reports to meet reporting requirements. However, some program administrators recommended that building owners also provide project-level results to their own stakeholders to build support for their projects and help their staff understand the importance of project features, such as heating and cooling setpoints. State program administrators have shared project and portfolio results through a variety of channels, including presentations at internal and industry events, press releases, and regular (i.e., annual, biennial, etc.) energy reports.

The North Carolina DEQ provides exceptional transparency by including the guaranteed and verified savings for every single contract year for state facilities projects in its publicly-posted report. The DEQ also leverages its reporting requirements to encourage the facility owners it works with to continue M&V reporting for the duration of the contract term. Additionally, agencies that use DOE's eProject Builder can generate reports on their portfolio of projects and use those results to meet their reporting requirements and communicate their outcomes to other stakeholders and the general public.

Provide state-level contract oversight and administrative support to constituent agencies

A 2018 study of state-level ESPC programs across the United States found that the most successful states, in terms of the volume of ESPCs implemented, provided qualified oversight and technical support to state and local agencies through a statewide ESPC program.⁵ The report noted that stable, adequate funding is vital

² The Colorado Energy Office provides two M&V guides: the program's original comprehensive 2008 Measurement and Verification Guidelines (<https://www.colorado.gov/pacific/energyoffice/atom/14756>) and a 2014 update, Interim Recommendations for Improved Measurement and Verification (<https://www.colorado.gov/pacific/energyoffice/atom/46761>), which updates recommended M&V procedures based on experience and lessons learned from implementing the program to date. The North Carolina DEQ provides a suite of ESPC guidance documents, including Success with M&V: Minimum Guidelines for North Carolina State and Local Government Agencies (<https://files.nc.gov/ncdeq/Environmental%20Assistance%20and%20Customer%20Service/Utility%20Savings%20Initiative/Minimum%20M%26V%20Guidelines%20-%20Post%20Training%20Final%20-%2009232016.pdf>).

³ ESC provides a suite of model procurement and contracting documents for state programs and individual facilities (<http://www.energyservicescoalition.org/resources/model-documents>). The DOE Better Buildings Solutions Center offers the ESPC Toolkit (<https://betterbuildingsolutioncenter.energy.gov/energy-savings-performance-contracting-esc-toolkit>). See the "Resources" section at the end of this document for more information about these and many other resources.

⁴ To request an account, free training, or information, visit <https://eprojectbuilder.lbl.gov>.

⁵ Energy Services Coalition, 2018. Analysis: The Relationship between Key Attributes for Programmatic Design and State GESPC Success. May. Available at: <http://www.energyservicescoalition.org/Data/Sites/1/documents/resources/needs-assessment-analysis-of-relationship-between-key-attributes-and-state-success-2018.pdf>.

for program success, especially to develop and maintain qualified administrative and technical staff over the long term.

This funding and oversight authority is often established by legislation, and some oversight activities may derive from a combination of administrative authority and established practices and expectations. For example, North Carolina DEQ oversees all ESPC projects done in state, local, county, K-12, higher education, and public sector healthcare facilities. While North Carolina DEQ does not have statutory authority to require use of its standardized contract and other documents, in practice all the agencies do so. By statute, all ESPC projects over \$500,000 must be reviewed and approved by the state treasurer's office; this requirement provides notification of pending projects to North Carolina DEQ and provides an intervention point where North Carolina DEQ can step in and oversee the process.

When state funds are not available to support the full complement of necessary technical and oversight services, some states have developed a self-funding approach that involves charging small fees to constituents' ESPC projects, which are paid for out of the project savings.⁶ For example, the Washington State Department of Enterprise Services provides a range of contract oversight and technical consulting to its constituent state, local, and educational agencies, while the Colorado Energy Office provides such services to county, local, and K-12 clients. In these cases, the public facility owners sign an interagency agreement to secure the technical services and reimburse the state office out of the ESPC project savings. The Georgia Environmental Finance Authority (GEFA) provides a different funding model; it is one of few state programs that uses DOE State Energy Program funds to cover the costs of state ESPC technical assistance.

The effort and resources required to maintain a state program is minimal compared to the level of capital investment and savings that ESPCs can support. For example, Maryland DGS provides a broad spectrum of ESPC contract development and management support to state agencies, including overseeing M&V plans and contracts, assisting with disputes, and tracking contract performance. To cover its staff costs for these services, Maryland DGS charges each project a flat fee; these fees represent about 2% of the aggregate investment.

The agency also reviews annual M&V reports and charges an annual fee for the service; the M&V review fees also represent about 2% of aggregate project investment value. Maryland currently has 27 active ESPCs, with a total project value over \$267 million. For states that do not yet have a well-established statewide program to provide ESPC oversight and support, ESC provides guidance on establishing appropriate enabling legislation, which includes information about establishing meaningful contract oversight authority.⁷

To support recruiting or developing qualified staff, state programs can avail themselves of nationally recognized training courses and designations, such as Certified Energy Manager (CEM),⁸ Certified Measurement and Verification Professional (CMVP),⁹ and engineering training. However, not all program staff need this level of technical certification to assist with successful ESPC oversight. For example, Maryland DGS successfully employs non-engineer staff to review annual M&V reports. The staffer effectively catches errors in ESCO M&V reports by checking whether they adhere to the contract and that the math and calculations are correct; the staffer calls in additional engineering support on an as-needed basis when additional technical review is required. The hiring process for this position includes a reading comprehension test for technical documents and key analytical skills. With that skillset as a basis, the recruit then gains ESPC-specific experience on the job.

In addition to having its own qualified program staff, ESPC program administrators need ready access to other staff and departments that may need to review and approve ESPC legal and financial documentation (e.g., business services, finance, procurement, and legal).

Provide or encourage technical review, particularly at critical stages in project development¹⁰

An ESPC is a specialized contracting vehicle whose specifics are outside the expertise of many smaller public agencies' management and maintenance staff. In addition, many individual organizations served by state programs implement very few ESPCs and, thus, likely cannot justify hiring and training qualified M&V staff. State ESPC programs can successfully support their constituent agencies—and their own program goals—by providing technical services at key stages

⁶ For examples of some states approaches, see <http://energyservicescoalition.org/attributes/program-funding>.

⁷ See Section 3 in ESC's Model Energy Performance Contracting Legislation document for guidance specific to establishing a Lead Agency (<http://www.energyservicescoalition.org/attributes/enabling-legislation>).

⁸ Certified Energy Manager Certification (<https://www.aeecenter.org/certifications/certifications/certified-energy-manager>).

⁹ Certified Measurement and Verification Professional Certification (<https://www.aeecenter.org/certifications/certifications/certified-measurement-verification-professional>).

¹⁰ Texas State Energy Conservation Office, 2018. Energy Savings Performance Contracting Guidelines for State Agencies: <https://comptroller.texas.gov/programs/seco/resources/docs/esp-c-guidelines.pdf>.

Independent Technical Review as Part of Standard Due Diligence

Texas law requires that state agencies executing ESPCs must obtain an independent, third-party review of the contract and its supporting documentation, including the audit report, the M&V plan, and the template for the annual savings report. The independent reviewer—who must be a licensed, professional engineer in the state of Texas—must certify that each document is complete and that the documents “present a cohesive package that fully describes the intended scope of services.” The reviewer is expected to assess the project in detail, including verifying that the technical details of the project scope and the savings calculation methodology are sound and support the economic justification for the project and that the project meets other state requirements, such as a full project payback within 20 years.¹⁰

in the project cycle. State ESPC programs can partner with technical engineering departments at local colleges or universities to offer technical support in reviewing the energy audit reports and/or periodic M&V reports. For example, the Texas State Energy Conservation Office (SECO) has established a long partnership with the Texas A&M University Energy Systems Laboratory (ESL) to conduct a variety of technical services for the Texas statewide LoanSTAR revolving loan program.¹¹ Texas A&M ESL has provided M&V for all energy-efficiency retrofit projects completed under the LoanSTAR program.

The two most critical touchpoints, which also involve the most intense effort, are: 1) the project development, IGA phase, and concurrent M&V plan development, and 2) final contract review and approval, when all parties on the agency side must fully understand and agree to the provisions of the contract and M&V plan. Two additional points where a technical expert should provide necessary oversight are: 1) witnessing the ESCO’s post-construction M&V and reviewing the resulting report,¹² and 2) reviewing the ESCO’s annual (or more frequent) M&V reports for the required number of years during the performance period.

State programs may provide their own staff or arrange for outside consultants, sometimes called “owner’s representatives,” to provide technical assistance for

their constituents’ ESPCs. As mentioned earlier, in many cases, ESPC customers receiving either type of state-provided expertise are able to pay for those services out of project savings.

Employ a robust ESPC data tracking and document preservation system

In order to have the requisite information to analyze and report program and project results to stakeholders, state programs must collect and retain key information about their projects. A growing number of state ESPC programs are using—and requiring—eProject Builder¹³, DOE’s secure, web-based project data tracking and reporting tool, which is available free of charge to ESCOs and ESPC customers. eProject Builder enables ESCOs and their customers to upload, preserve, track, and report information for their portfolio of energy projects. eProject Builder provides users a range of benefits, including long-term preservation of project financial, savings, and other vital information, as well as M&V data; analysis and reporting on project portfolios; and robust, data-driven analysis and decision making. eProject Builder contains nearly 700 projects, including state, local, educational, federal, and private sector projects.

KEY STRATEGIES: PROJECT LEVEL

Utilize state staff or third-party technical expertise

Program administrators and ESCOs strongly agree that one of the most important actions an ESPC customer can take is to engage an experienced technical consultant throughout the project development cycle and into the M&V performance review period. State program administrators note that most ESPC customers face staffing constraints and many lack staff with deep building, engineering, or ESPC expertise. Even facilities that have experienced building engineers and energy managers can benefit from specialized ESPC expertise, which spans building science, energy analysis, legal knowledge, experience with government procurement processes, and more. These third-party technical experts, sometimes called “owner’s representatives,” may be provided by a state program or procured by the individual ESPC customer.

¹¹ LoanSTAR Revolving Loan Program (<https://comptroller.texas.gov/programs/seco/funding/loanstar/>).

¹² The U.S. DOE Federal Energy Management Program (FEMP) provides a guide for M&V witnessing at <https://www.energy.gov/eere/femp/downloads/guide-government-witnessing-and-review-measurement-and-verification-activities>.

¹³ To find information about eProject Builder or request an account, visit <https://eprojectbuilder.lbl.gov>.

As mentioned earlier, some state programs offer independent technical support, either from their own staff or by arranging for outside consultants (owner’s representatives) on behalf of a client organization. In the latter case, they typically contract with known consultants or issue a request for proposals (RFP) from prospective consultants. Qualifications for the role of owner’s representative include an engineering background, one or more established energy management and M&V certifications, and—most importantly—extensive, demonstrated experience with ESPC M&V.¹⁴

Engage all key staff in review of the M&V plan and project contract

Program administrators and ESCOs note that a critical step in the M&V process is to gather all project stakeholders together at least once to review and discuss the contract and the M&V plan. The group should include staff from the facility owner’s organization—such as the business manager and finance, budget, procurement, legal, and facilities staff members—as well as the state program administrator, technical expert, and ESCO team. This meeting should aim to ensure that all parties discuss and fully understand the details of the M&V plan and contract.

Ensure clear assignment of responsibility for reviewing M&V reports and provide this staff adequate support and resources

Program administrators and ESCOs report that many public bodies, particularly smaller agencies and jurisdictions, are short-staffed and under-resourced, so they often delay or forgo reading M&V reports. In these situations, facility owners get little value from the M&V they are paying for. Any organization implementing an ESPC is advised to assign a staff person to track M&V activities and review the annual reports in a timely manner. To get the most value out of the ESPC, organizations should expect to allocate some time and budget for this person to, at minimum, check that the reports adhere to the contract terms and that its sums and high-level calculations are executed correctly. Reporting delays can be costly. For example, if a report finds that the facility operators have changed building temperature setpoints from the contractual agreement or that equipment is not working properly, a substantial delay in reviewing the report can let a potential savings shortfall continue undetected.

M&V Plan Review: Who Should Be in the Room?

The project contract and M&V review session helps generate buy-in for the contract terms and ensures all affected parties understand the project impacts and provisions, reporting schedule, and report formats. When applicable, the following types of staff should attend the review session:

- An engineering or technical expert who understands the project details
- The facilities manager who understands building operations and regular O&M
- A financing officer who will approve the financing terms and monitor payments to the lender
- A contracts or legal officer who will review the terms of the contract and can ensure that state statutes and other legal requirements are being met
- The operations director, who can approve the interruption to daily operations and any post-installation requirements (such as heating and cooling set points)
- The project manager or coordinator
- The ESCO project manager
- A representative from the state ESPC program, as applicable.

As noted earlier, a facility does not need a dedicated certified energy manager or engineer to effectively review M&V reports; however, having more advanced technical assistance (e.g., internal engineering staff) available on an as-needed basis is important for more complex M&V approaches. Staff with basic analytical skills and enough time to comprehend the general content of M&V reports can perform most of the work of the regular annual reviews. Even if a facility owner is able to enlist outside technical expertise, having an internal staff person that serves as the M&V point person is a vital component to successfully track and report on the M&V results. It can also be helpful to have the staff person(s) responsible for tracking and paying utility bills review the annual M&V report; he or she may be able to recognize any potential discrepancies between the reported savings and actual utility bills.¹⁵

¹⁴ For more information about third-party technical consultants, see the 2017 presentation, the Role of the Third Party Consultant (Owner’s Rep) in ESPC, presented at the ESC 6th Annual Market Transformation Conference (<http://conference2017.energyservicescoalition.org/Data/Sites/43/esc-presentations/3rd-party-administrator.pdf>).

¹⁵ For more information on different factors that can affect energy bills that may not affect the ESPC guarantee, see U.S. DOE, “Understanding Your ESPC Savings Guarantee,” (link forthcoming).

Use state program guidance documents and ensure the M&V plan contains key components

The M&V plan is a fundamental component of the ESPC contract. Well-designed M&V plans are vital for successful ESPC outcomes. Public-sector ESPCs should develop M&V plans based on contracting guidance and documents provided by the state program wherever possible. In particular, state agencies emphasize how important it is to make sure the M&V plan is thorough and tailored to the customer's objectives.

The plan establishes the baseline assumptions against which savings will be measured, specifies the M&V approach and activities for the duration of the contract term, and dictates what information is available to the building owner to assess whether the promised savings were achieved. The plan should also define the responsibilities of both the facility owner and the ESCO under the contract. It's also important that the M&V plan include:

- Compliance with any applicable state and local laws and regulatory requirements for M&V methods and tracking/reporting
- Math that is simple enough for most people to understand
- Clear, explicit details about the project's exact scope, schedule, and budget for the M&V activities
- The building operation and occupant factors that can affect the savings
- Exactly what will and will not be measured and which IPMVP¹⁶ M&V options will be used for which ECMs
- Provisions for dealing with disputes and shortfalls
- Risks and responsibilities for selection of equipment, proper installation, proper O&M, and repair and replacement of failed components
- The responsibilities of both the facility owner and the ESCO for maintaining the project and installed equipment during the performance period
- The training and manuals that will be provided to the customer operations staff—ideally including an initial educational “workshop” with facility staff

and management and multiple additional training sessions to institutionalize best practice O&M of installed systems and equipment

- Data collection activities and the schedule for site visits throughout year, both for the ESCO and for the owner, to witness M&V activities
- The reporting format and frequency and protocols for report review and acceptance
- The utility escalation rates that will be used to translate energy and water savings into cost savings. A key consideration for your contract and M&V plan is establishing appropriate escalation rates. If escalation rates are overestimated, actual cost savings could fall well short of the project payments. Equally important, underestimating escalation rates can significantly limit the scope of a project; it also raises the project's interest costs because actual dollar savings are under-applied toward the annual payments, which results in a longer contract term than necessary.¹⁷

When developing the M&V plan, the stakeholders should make sure they discuss and clearly understand the attributes, appropriate applications, performance risks, and costs of the M&V options requested by the customer or recommended by the ESCO.

Facilities in jurisdictions with few in-house ESPC resource documents can reference material from other states and from the Federal Energy Management Program (FEMP). (See the “Resources” list at the end of this document.) These facility owners can then work with their agency's business, procurement, and/or legal staff to adapt available documents to the applicable local or state laws and regulations.

Ensure O&M plan supports persistent savings—even if customer self-performs

Proper O&M procedures, including documentation of O&M changes during the ESPC performance period, is critical to maintaining the performance of the installed equipment and making sure the contractual savings are realized. Some state program administrators recommend that facility owners always include ESCO-performed O&M in the contract. However, many facility owners choose to have their own staff or contractors operate and maintain equipment rather than pay the ESCO to do so. Both ESCOs and state administrators report that poor O&M on the part

¹⁶ International Performance Measurement and Verification Protocol (IPMVP) provides methods, with different levels of cost and accuracy, for determining savings either for the whole facility or for individual energy conservation measures (ECM). IPMVP also specifies the contents of an M&V plan.

¹⁷ Coleman, P. 2015. Escalation Rates in Energy Savings Performance Contracts. Lawrence Berkeley National Lab, LBNL-1004319. June. <https://eta.lbl.gov/sites/all/files/publications/lbnl1004319.pdf>.

of the facility owner is a common cause of ESPC shortfalls. To help address this issue, North Carolina DEQ includes two key sections in its ESPC IGA: 1) Schedule L, which lists the requirements for maintaining the installed equipment for both the ESCO and the facility owner; and 2) Exhibit 4, which details the estimated cost for the project to be maintained. The facility owner must sign the exhibit attesting that they have allocated that amount of funding to operate and maintain the equipment according to provisions in the ESPC. Even in this case, it is still ideal to have the ESCO provide at least periodic O&M; if that is not possible for the customer, the ESPC should provide multiple training sessions to the facility staff on proper O&M of the project.

Another useful tool is the Risk, Responsibility, and Performance Matrix (RRPM), provided in the Federal Energy Management Program (FEMP) M&V Guidelines, Version 4.0. The RRPM serves a similar purpose to North Carolina's Exhibit 4. It provides a table that outlines various financial, operational, and performance factors and describes their influence on ESPCs. For each factor the ESCO indicates which

party—the ESCO or the customer, or perhaps neither—will take responsibility for the performance of that factor. The customer then has the opportunity to review and approve or counter the ESCO's proposal. A link to FEMP's M&V guidelines document is included in the "Resources" section at the end of this document.

Conclusion

Properly implemented M&V, with appropriate review and oversight, is critical for successful implementation of ESPCs. State administrators can choose from a number of tested strategies and resources to ensure that all ESPCs under their purview follow basic practices to develop and implement successful M&V. In addition, individual facility owners can leverage myriad tested tools and guidance to successfully engage in ESPC contracting and manage the M&V process.

Resources

M&V Guidance Documents

The International Performance Measurement and Verification Protocol (IPMVP) was developed and is maintained by the the Efficiency Valuation Organization and provides the basis for most ESPC M&V practices: <https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp>.

The Federal Energy Management Program (FEMP) offers M&V guidance primarily for federal government ESPC projects, but many state programs and ESCOs refer to this document to inform their own guidance documents and M&V practices: <https://www.energy.gov/eere/femp/downloads/mv-guidelines-measurement-and-verification-performance-based-contracts-version>.

FEMP also provides guidance on O&M best practices, including how to calculate and verify O&M savings in ESPCs: <https://www.energy.gov/eere/femp/downloads/operations-and-maintenance-best-practices-guide>.

The Colorado Energy Office provides two M&V guides: the program's original comprehensive 2008 Measurement and Verification Guidelines (<https://www.colorado.gov/pacific/energyoffice/atom/14756>) and a 2014 update, Interim Recommendations for Improved Measurement and Verification (<https://www.colorado.gov/pacific/energyoffice/atom/46761>), which updates recommended M&V procedures based on experience and lessons learned from implementing the program to date.

The North Carolina DEQ provides several resources on its Performance Contracting web page. The main page (<https://deq.nc.gov/conservation/energy-efficiency-resources/utility-savings-initiative/performance-contracting>) provides various templates and guides for ESPCs. The following documents provide detailed guidance on M&V:

- Success with M&V: Minimum Guidelines for North Carolina State and Local Government Agencies: <https://files.nc.gov/ncdeq/Environmental%20Assistance%20and%20Customer%20Service/Utility%20Savings%20Initiative/Minimum%20M%26V%20Guidelines%20-%20Post%20Training%20Final%20-%202009232016.pdf>.
- Better Practices for Performance Contracting: Focus on Review Process: <https://files.nc.gov/ncdeq/Environmental%20Assistance%20and%20Customer%20Service/Utility%20Savings%20Initiative/Better%20Practices%20for%20Performance%20Contracting%202009.22.2016.pdf>.

Examples of State ESPC Program Resources

The Georgia Environmental Finance Authority provides a suite of documents, including a state agency ESPC manual with a section on M&V, RFP templates, IGA agreements, and ESPC contracts: <https://gefa.georgia.gov/information-state-agencies>.

The Colorado Energy Office also provides a fleet of documents, including ESPC guidance, model contract and RFP templates, dedicated M&V guidance documents, and a pre-qualified ESCO list. Some documents are tailored to state agencies and higher education, while others are for municipalities, counties, and K-12 facilities: <https://www.colorado.gov/pacific/energyoffice/public-energy-performance-contracting>.

The Energy Services Coalition has developed model procurement and contracting documents, including documents for state programs (such as RFPs to qualify ESCOs, technical energy audits and proposals, and ESPC contracts) and a model RFP for individual facilities to use to qualify ESCOs: <http://www.energyservicescoalition.org/resources/model-documents>.

The Massachusetts Department of Energy's Resources Energy Management Services guide, which has a section on M&V: <https://www.mass.gov/files/2017-07/ems-guide.pdf>.

The North Carolina Department of Environmental Quality Performance contracting site provides a number of ESPC and M&V guidance documents: <https://deq.nc.gov/conservation/energy-efficiency-resources/utility-savings-initiative/performance-contracting>.

The Oregon Department of Energy's Energy Savings Performance Contracting guide: <https://www.oregon.gov/energy/energy-oregon/Documents/ESPC%20Guide%202016.pdf>.

The Texas State Energy Conservation Office's ESPC Guidelines, which includes M&V guidance: <https://comptroller.texas.gov/programs/seco/resources/docs/espc-guidelines.pdf>.

Examples of ESCO Pre-Qualified Lists Developed by State Agencies

The Georgia Environmental Finance Authority: <https://gefa.georgia.gov/prequalification-list>.

The Colorado Energy Office: <https://www.colorado.gov/pacific/energyoffice/atom/142866>.

The Oregon Department of Energy: <https://www.oregon.gov/energy/energy-oregon/Pages/Qualified-ESCOs.aspx>.

Washington State Department of Enterprise Services: <https://des.wa.gov/services/facilities-leasing/energy-program/energy-savings-performance-contracting/energy-service-companies>.

U.S. Department of Energy Resources

Understanding Your ESPC Savings Guarantee, U.S. DOE 2019, provides a summary of some important aspects of savings guarantees in ESPCs and includes links to reference documents for readers who want more detail (link forthcoming).

The Business Case for Conducting Measurement & Verification in State and Local Government Energy Savings Performance Contract Projects highlights the substantial, cost-effective benefits of incorporating well-documented M&V in ESPCs—M&V that includes ongoing data collection and regular reporting of M&V results (link forthcoming).

The U.S. DOE's Better Buildings Solution Center offers the online ESPC Toolkit, which includes decision tools, model documents and templates, data management tools, a guide on how to launch a state ESPC program, and more: <https://betterbuildingsinitiative.energy.gov/energy-savings-performance-contracting-espc-toolkit>.

DOE offers numerous additional resources on its State and Local Solution Center: <https://www.energy.gov/eere/slsc/state-and-local-solution-center>.

DOE's eProject Builder is a secure, web-based system that enables agencies and ESCOs to preserve, track and report information for their portfolio of energy services projects. For information or to request an account, visit <https://eprojectbuilder.lbl.gov>.

The Federal Energy Management Program offers its standard procedures and guidelines for M&V in federal ESPC projects in M&V Guidelines: Measurement and Verification for Performance-Based Contracts (Version 4.0). A number of ESCOs and state ESPC programs reference this document when developing their own M&V practices: <https://www.energy.gov/eere/femp/downloads/mv-guidelines-measurement-and-verification-performance-based-contracts-version>.

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January 2019