RECOMMENDED ESPC M&V PRINCIPLES DEVELOPMENT

Abstract

MEASURES is a U.S. Department of Energy supported project focused on enhancing the consistency and quality of measurement and verification (M&V) and tracking of financial and energy savings as well as other benefits from energy savings performance contract (ESPC) programs in the states. This project report offers draft principles for improving ESPC M&V and tracking and better recognizing ESPC benefits. This report also describes a survey of federal and selected states' ESPC program practices and how they relate to and could benefit from adherence to the draft M&V principles.

MEASURES Project

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Disclaimer

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Contents

Introduction

MEASURES is a U.S. Department of Energy (DOE) State Energy Program (SEP) supported project (formal title: "*Developing Consistency in EM&V Approaches and Emission Reduction Calculations for Energy Savings Performance Contracting Programs*") focused on enhancing the consistency and quality of evaluation, measurement and verification (EM&V) and tracking of energy savings from energy savings performance contract (ESPC) programs in the states. Improved quantification and tracking of ESPC performance can also provide visibility into other benefits of ESPCs, including of avoided energy-related pollution emissions from both reduced electricity and onsite fuel consumption that could be recognized by air quality regulators and, potentially, monetized by ESPC project performers or owners.

The MEASURES project team consists of three State Energy Offices (Virginia Department of Mines Minerals and Energy [DMME; project lead], Kentucky Department for Energy Development and Independence [DEDI], and Georgia Environmental Finance Authority [GEFA]), several non-state partners (Clean Energy Solutions, Inc. [CESI], National Association of State Energy Officials [NASEO], National Association of Energy Services Companies [NAESCO], National Association of Clean Air Agencies [NACAA], and Southeast Energy Efficiency Alliance [SEEA]), and the U.S. DOE.

Part of the MEASURES project focused on two sets of surveys of the three partner states' ESPC program practices, focusing on ESPC tracking and EM&V processes and practices. The first resulted in a "Cross-States EM&V Report" that provided an initial comparison of the three states' practices.[1] The second survey resulted in the "'MEASURES' SOPO Sub-Task 1.4" report that encapsulates points of consensus identified through the project, any resulting process changes in the MEASURES states, and recommendations for other states' agencies involved in the administration of performance contracting programs.[2]

While these surveys were informative and offered bases for general ESPC EM&V and tracking recommendations for the three partner states as well as for states generally, the project team agreed that a more detailed survey on tracking, reporting, EM&V, and related ESPC program practices to an expanded set of states and to the U.S. DOE Federal Energy Management Program (FEMP has oversight over most federal agency ESPCs) would be a useful enhancement to the project and could allow more robust insight into variances and commonalities among state ESPC programs and offer a stronger basis for recommendations and state considerations.

The enhanced survey (Appendix B) garnered responses from the Alabama Department of Economic and Community Affairs Energy-Energy Division, Colorado Energy Office, Hawaii State Energy Office, Massachusetts Department of Energy Resources, and FEMP as well as the three MEASURES partner states' State Energy Offices. (Summary responses are in Appendix C.)

[1] MEASURES Project, 2015, "Development of a Consensus Approach for Energy Measurement and Evaluation of Energy-Saving Performance Contracts," (October 19, 2015), MEASURES papers are available at http://seealliance.org/initiatives/state-local-utility-policy/emv-approaches-performance-contracting/

[2] MEASURES Project, 2016, "'MEASURES' SOPO Sub-Task 1.4," (September 26, 2016), MEASURES papers are available at http://seealliance.org/initiatives/state-local-utility-policy/emv-approaches-performance-contracting/

This enhanced survey was performed in parallel with development of draft M&V principles by the project team that could be offered both to states and to the energy service company (ESCO) community that provides ESPC services to state, federal, and local agencies and other customers. They were developed with sensitivity to varied state contexts, including varying degrees of State Energy Office or other agency authority over ESPC programs, the sometimes split responsibilities among multiple state agencies, resource limitations, the presence or absence of existing or legacy ESPC tracking systems, and state political environments. Hence, the MEASURES-developed principles are at a high level, neither highly detailed nor prescriptive.

Project partner NAESCO has engaged its Board of Directors and membership regarding ESPC tracking, M&V, and related processes. It presented the MEASURES draft principles to its Board for consideration (Appendix A). The NAESCO Board of Directors is establishing a committee to review and potentially update M&V practice guidelines in cooperation with NASEO and State Energy Offices, and with technical input from U.S. DOE (FEMP, Office of Weatherization and Intergovernmental Programs, and Buildings Technologies Office).

While the enhanced survey questionnaire (16 top level questions with various subsidiary questions) does not correspond directly to the eight draft M&V principles, the next section discusses the survey results as mapped to the draft M&V principles, suggesting opportunities as well as challenges for states and ESCOs adopting those principles.

In short, the enhancement survey results confirm earlier MEASURES project results indicating wide variation in state ESPC tracking and reporting requirements and practices, from essentially no centralized tracking and reporting to relatively stringent requirements for both state and local agency ESPCs. Even requirements for ESPC project M&V vary widely among the states sampled, ranging from no formal requirement to mandating specific protocol use. The authority of the State Energy Office or other state administrative body over state agency ESPCs and locality (including K-12 public school districts and other public bodies) ESPCs vary widely. In all the surveyed states there is some degree of technical assistance offered to at least state agency ESPC customers but that ranges from modest and informal to comprehensive. Resource and expertise availability as well as State Energy Office authority can be limiting factors in assisting public agencies to enhance ESPC utilization and effectiveness, and well as the ability to consistently track and quantify ESPC benefits.

The following section discusses MEASURES findings in the context of the draft M&V principles.

Annotated M&V Principles

The following eight draft M&V principles were developed by the MEASURES project team based on project research, survey results, partner experience, and other factors. They were developed with an eye toward applicability to both state (and broader public sector and institutional) ESPC programs and ESCO providers of ESPC services.

1. *A method for measuring and verifying avoided consumption and costs will be agreed upon between ESCO and Customer on a project-by-project (measure-by-measure) basis, along with the approval of designs, schedules, contractors, and cost, and the agreement documented for staff training and future reference. Protocols such as UMP, FEMP, ASHRAE, the CPP guidelines, and others will be considered along with the IPMVP Options,[3] and the measurement and verification choice made clear to the customer who should be required to document their understanding and acceptance of these choices. The methods chosen will include how commissioning and post-installation M&V, including third party review, will be conducted and paid for.*

Most ESPCs in the surveyed states use the International Performance Measurement and Verification Protocol (IPMVP) for M&V.[4] Among surveyed states, Kentucky and Virginia specify use of IPMVP while most others either specifically allow it among other recognized M&V protocols or tacitly do so by leaving discretion to the customer agency. Massachusetts and FEMP require use of FEMP M&V Guidelines 4.0.[5] The FEMP Guidelines are based on the IPMVP, utilizing the same four basic options. Both IPMVP and FEMP M&V Guidelines offer guidance on choosing among the four basic options depending on energy conservation measures (ECMs) employed, project complexity, expected level of energy savings, and other factors, including cost of M&V.[6] The states and FEMP vary on whether to require, encourage, or be silent on following the option choice guidance provided by those protocols. For all respondents IPMVP (or FEMP) Option A—Retrofit Isolation: Key Parameter Measurement--is most frequently used; it is also usually the simplest and least expensive option.

The MEASURES team found little use or even awareness of other applicable protocols, including the U.S. DOE-supported Uniform Methods Project (UMP).[7] The UMP offers IPMVP-based protocols covering

[3] As discussed, IPMVP and FEMP M&V Guidelines are most familiar to ESCOs and most frequently used in ESPCs. The other listed approaches include the U.S. DOE-supported Uniform Methods Project (UMP) which is based on the IPMVP but provides more detailed direction for performing M&V on specific ECM types; ASHRAE Guideline 14-2014 from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers; and guidelines in the Clean Power Plan.

[4] The IPMVP was developed and is published by the Efficiency Valuation Organization and is available via http://evo-world.org/en/.

[5] U.S. DOE, FEMP, 2015, "M&V Guidelines: Measurement and Verification for Performance Based Contracts, Version 4.0," http://energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf

[6] Lawrence Berkeley National Laboratory offers an online tool to assist in option choice decisions http://mnv.lbl.gov/interactive/ipmvp-1a-2

[7] http://energy.gov/eere/about-us/ump-home

ECMs and program types most commonly used in utility ratepayer-supported energy efficiency programs although various of the UMP protocols could be applied to ESPCs.

The states also varied in their provisions for early termination of M&V. Massachusetts and FEMP do not allow early termination over the course of the contract, nor does Georgia for state agency ESPCs. Colorado and Virginia require at least three years of M&V to demonstrate ECM efficacy in achieving savings. Other respondent states leave the decision to the customer agency's discretion.

Credible, ongoing M&V is important to demonstrate that ESPCs are delivering monetary savings (along with energy unit savings and other benefits) to meet ESCO performance guarantees and that such savings are sufficient to meet project costs, thus justifying the existence of ESPCs as a mechanism distinct and different from standard procurement processes. Choice and application of M&V as well as associated reporting, review, and tracking (some of which is discussed below) are critical to demonstrating ESPC efficacy and its meeting of statutory and policy requirements and objectives. In some cases, state policymakers have questioned ESPC programs when M&V, review, and tracking are perceived as inadequate in the face of audits or other inquiry.[8] However M&V rigor must be balanced with M&V costs and risks of lost savings (including from spending on additional M&V that could instead have financed addition ECMs). The FEMP M&V Guidance discusses such balance with respect to M&V option choice. But states (and localities) need to consider this balance—and perhaps avoiding being penny wise and pound foolish in the face of potential policymaker and public scrutiny--in deciding on early M&V termination options or in administering ESPC data collection, review, and reporting functions.

2. *M&V using near-real-time circuit-level monitoring, cloud-based computation and access to regional/national data bases will be considered, since the cost and practicality of these methods are increasingly within reach and their credibility increasingly acceptable.*

Advances in information and communication technologies (ICT) have enabled widespread implementation of building energy management systems for building and facility operation and maintenance (O&M) as well as for automation of individual systems (e.g., commercial lighting controls, improved boiler controls, manufacturing process controls). Real-time and near real-time monitoring and control, combined with diagnostics, can increase energy and resource efficiency as well as occupant comfort while improving O&M. These technologies also help enable participation in utility demand response programs and can support distributed generation and energy storage resource integration.

Further, by providing more precise information on energy savings including timing of saved energy, ICT can support greater recognition of ESPC and other energy efficiency approaches as emissions reduction strategies. This can sometimes include issuance of tradable (and monetizable) emission reduction credits or emission allowances.

[8] For example, State of Kansas, Legislative Division of Post Audit, 2016, "Limited-Scope Performance Audit Report: Kansas Corporation Commission: Evaluating Savings Achieved Through the Facility Conservation Improvement Program" (April 26, 2016), http://www.kslpa.org/assets/files/reports/l-16-003.pdf

These ICT advances also blur the line between O&M, commissioning, and M&V. Instead of discrete "one-off" specialized M&V (and retrocommissioning) activities, ongoing monitoring of systems and data allow ongoing building system optimization and energy use monitoring. Combined with appropriate software for data analytics, M&V activities can be performed on a continual basis.

These advances offer the opportunity to achieve greater energy savings, lower the cost of M&V and associated analysis and reporting, and can strengthen customer agencies' and state recognition of ESPC cost and energy savings and other benefits.

In the MEASURES survey, FEMP indicated widespread implementation of real-time energy data systems, including for improved M&V. FEMP notes that some projects utilize such systems dynamically for M&V, for instance using a combination of IPMVP options for establishing energy use baselines then reverting to other options for continuous monitoring during the ESPC performance period.

Even short of fully automated real-time or near real-time building energy management systems, ICT advances can support monthly (or other periodic) data collection, analysis, and reporting that can be used for monitoring a portfolio of buildings' performance and can support both M&V of an ESPC project portfolio and for prioritizing buildings or facilities for future upgrades whether via ESPC or other means.

While ICT advances offer very large benefits, ESPC customers, ESCOs, suppliers of building energy systems and components, and utilities need to consider cybersecurity and vulnerabilities of connected devices and components.

3. *ESCOs will encourage the involvement of a technical consultant (knowledgeable customer agency or cognizant state agency staff or third party consultant) to represent the interests of the customer in reviewing project M&V processes on a reasonable basis at the stages of design, commissioning, and project results reporting.*

This principle can be paraphrased by the slogan of a former clothier: "An educated consumer is our best customer."[9] This principle along with others in this document can also strengthen the recognition of ESPC benefits and address concerns some policymakers have lodged about ESPCs.

Often state agencies, localities, and other public sector ESPC customers (or potential customers) have limited building science and technical expertise. And many are inexperienced and relatively unfamiliar with ESPC processes and mechanisms, including M&V aspects. The MEASURES survey respondent agencies all indicate availability of some technical assistance to ESPC customer agencies. However, the resources and scope of such assistance vary considerably.

For example, Hawaii's State Energy Office provides agencies with assistance across the scope of the ESPC process (including with M&V) as funds are available but in addition, as a small state, agencies help

[9] Syms Corporation. Cited at https://en.wikipedia.org/wiki/Syms_Corporation

each other with advice and support on an informal basis. In Massachusetts, the Division of Capital Asset Management and Maintenance (for state ESPCs) and Department of Energy Resources (for local ESPCs) provide extensive support with requests-for-proposal (RFPs), bid review and contractor selection, and contracting processes. Also, they offer state contracted consultants to serve as "owner's agents" to provide technical support to customer agencies throughout the ESPC term. Alabama, Colorado, and Virginia's State Energy Offices prove "soup-to-nuts" technical assistance to both state and local ESPCs. In Kentucky, different agencies support state, local, and public school district ESPC programs. In Georgia, the State Energy Office (Georgia Environmental Finance Authority [GEFA]) can only render technical assistance for state agency ESPCs. The states also vary in their provision of training, education, and tools.

FEMP and the U.S. Army Corps of Engineers (which has purview over some federal ESPCs) provide the most comprehensive technical assistance, ranging from training (in-person and online) and tools to individual consultations (including with National Laboratory staff) and assignment of facilitators to support projects throughout their contract terms.

All survey respondents indicated that customer agencies could independently contract with consultants to provide technical support but that this occurred infrequently in states and localities due to cost to the agency. But, as noted, Massachusetts makes available "owner's agents" while FEMP has project facilitators and other specialist resources. GEFA also hires consultants periodically to support state agency ESPCs.

Despite all survey respondents providing technical assistance, the resources available to do so vary as does the experience and expertise resident in the State Energy Office or other ESPC oversight agency.

State Energy Offices and other ESPC oversight agencies and customer state and local agencies in many states could benefit from improved availability and scope of technical assistance services. This includes assistance in understanding and choosing M&V conditions, and reviewing and assessing M&V reports and other indicators of contract performance. A previously cited case of ESPC scrutiny raised questions about M&V, savings and cost calculations, and reliance on ESCO-performed evaluations, pointing to a need for customer agencies to carefully craft ESPC requirements and be able to independently evaluate savings claims.[10] This suggests greater roles for enhancing technical ability in or available to customer agencies as well as SEOs or other ESPC program oversight agencies.

4. *Although guarantees may be stated in financial terms, "savings" will refer to avoided consumption of units of energy (e.g., kWh, therms, gallons, etc.), unit measurements of water savings, and non-energy benefits (O&M savings, electric system capacity credits, emissions reductions credits, etc.) These will be rigorously identified in the project contract documents in a form that enables future customer business or financial managers, who have*

[10] State of Kansas, Legislative Division of Post Audit, 2016, "Limited-Scope Performance Audit Report: Kansas Corporation Commission: Evaluating Savings Achieved Through the Facility Conservation Improvement Program" (April 26, 2016), http://www.kslpa.org/assets/files/reports/l-16-003.pdf op cit.

not been involved in the development or implementation of the project, to re-create the savings calculations.

The MEASURES project found that often the term "savings" is construed to mean largely or exclusively monetary savings. Some states, when asked to provide "energy savings" information, replied initially with monetary values rather than energy unit savings (e.g., kilowatt-hours [kWh], British thermal units [Btu], or therms, or kilowatts [kW] for peak power demand savings) or other physical units (e.g., gallons of water). Also, some states have historically collected and published ESPC financial performance information but not performance in terms of energy or other physical units.[11]

Since the purpose of the ESPC mechanism is financial, the focus on financial performance data makes sense and is often the primary concern of policymakers as well as agency directors that must meet budget constraints. However, in almost all cases, ESCO savings guarantees are in energy unit term, not dollar savings. ESPCs achieve monetary benefits primarily by providing energy unit savings (and sometimes water is included as well) alongside O&M benefits. At base, M&V must start with calculating energy unit savings (which may also include peak demand reductions where demand charges are included in utility bills).

Identifying projected, guaranteed, and actual (measured and verified) savings in physical units in addition to monetary units improves visibility of ESPC expectations and performance to ESCOs, agencies, policymakers, and the public. It can guard against distorted expectations or perceptions at times of energy price volatility. Further, use of physical units can support recognition of wider objectives and benefits of ESPCs, including resource conservation and environmental benefits.

One of the MEASURES Project's focus areas has been to investigate approaches for quantifying air emission impacts of ESPCs.[12] To understand emissions impacts of ESPC energy savings, one must determine physical energy unit savings as well as distinguish savings by energy type and source (electricity, onsite fuel use [natural gas, fuel oil, propane, coal], purchased district energy steam or chilled water).[13] EPA's Emissions and Generation Resource Integrated Database (eGRID) and AVoided Emissions geneRation Tool (AVERT) as well as more detailed electric power dispatch models are available for quantifying electric power sector avoided emissions of some Clean Air Act criteria pollutants (e.g., nitrogen oxides [NOx], sulfur dioxide [SO_2]), hazardous air pollutants (mercury), and greenhouse gases (especially carbon dioxide [CO_2]). However, to use them one must start with electrical energy unit savings.[14] Likewise, emission impacts from onsite fuel use savings can be derived from data

[11] See, for example, Virginia DMME https://www.dmme.virginia.gov/DE/PerformanceContractingSupport.shtml and Hawaii State Energy Office http://energy.hawaii.gov/energy-efficiency-in-soh.

[12] MEASURES Project, 2015, "Emission Reduction Calculation Roadmap: 'MEASURES' SOPO Task 1.3."

[13] Information of timing of energy savings is also useful for improving the accuracy of avoided emission estimation due to (1) varying dispatch of electric generating units and (2) differing seasonal impacts of nitrogen oxides (NOx) on ground level ozone formation.

[14] See eGRID https://www.epa.gov/energy/egrid and AVERT https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert. Temporal data such as seasonal, daily and hourly electrical savings can be entered into AVERT to provide more accurate estimates of emission impacts.

on thermal energy savings (Btu, therms) and direct fuel volume savings (cubic feet, gallons, etc.) via equipment specifications or published emissions factors data.[15]

Use and reporting of energy, power, and (as appropriate) water physical units can support recognition and, perhaps in some cases, monetization of ESPC benefits in state and local energy planning, electric grid markets (demand response incentives, capacity markets, ancillary services markets), environmental quality planning and regulatory compliance, meeting state and local facility targets (e.g., Executive Order or legislative targets for state building energy or emission impacts), and voluntary goals and targets.

For example, in some states, ESPC-derived demand savings could participate in regional transmission organization capacity markets or earn utility incentives as demand response assets. Energy efficiency savings have been recognized in several states' National Ambient Air Quality Standards (NAAQS) plans, including ESPC-derived NOx emission avoidance in Louisiana.[16] Some states have established NOx "set-aside" allowances for energy efficiency and renewable energy projects.[17] The Clean Power Plan[18] offered a prospect for ESPC savings to be awarded monetizable Emission Rate Credits and, depending on state approaches, value under mass-based emission allowance approaches.

In these cases, and more, physical units of energy (and power and, as warranted, water) savings are required.

5. *The real benefits described above will be described and documented along with the savings in regular M&V reports specified in the project contract documents.*

This principle is mostly addressed under the preceding principle's discussion. Beyond financial status and performance, physical units of energy (and power and, if warranted, water) savings should be measures, verified, and documented. As desired, air emissions and other environmental benefits can be derived and assessed based on physical unit savings M&V.

Further, ESCOs, customer agencies, and the SEO or other ESPC-oversight agency should consider counting O&M and other operational benefits and impacts of ESPCs as are reasonable and feasible.

6. *Customer agencies should assure that such reports and any related materials are reviewed to assure that ESPC conditions, including guaranteed savings, are met. A technical consultant (knowledgeable customer agency or cognizant state agency staff or third party*

[15] For instance, U.S. EPA, AP-42: Compilation of Air Pollution Emission Factors. https://www3.epa.gov/otaq/ap42.htm

[16] National Renewable Energy Laboratory, 2005, "Comparison of Methods for Estimating the NOx Emission Impacts of Energy Efficiency and Renewable Energy Projects: Shreveport, Louisiana Case Study", Technical Report NREL/TP-710-37721.

[17] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs June 6, 2006 Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf

[18] The Clean Power Plan is under a U.S. Supreme Court stay pending completion of litigation at the time this is being written.

consultant) should review M&V reports and advise the customer. M&V reports and related materials should be filed and tracked by the customer and/or by the program administrator, and maintained by the ESCO, for easy access and to support reporting to cognizant state agencies (e.g., state energy office, landlord/general services/administrative agency) and responses to legitimate requests (e.g., legislative inquiries or audits, FOIA).

The MEASURES survey results point to varying levels of customer agency resource and expertise for reviewing and assessing M&V reports. Such reports or pertinent synopses may or may not be provided to the SEO or other ESPC-oversight agency.

Recognizing resource as well as authority limitations, customer agencies and the SEO or other ESPC-oversight bodies should, to the extent possible, assure that M&V reports are reviewed by knowledgeable staff or consultants to see that ESPC contractual conditions and savings guarantees are met. States should consider requiring the ESCO to provide a sample M&V report during project development and that the customer review the sample to ensure that he/she understands it. The customer agency should insist that the ESCO modify the sample and, of course, accordingly, ensuing actual M&V reports to assure that they will be understandable and useful to the customer agency throughout the life of the contract.

Ideally, as in Massachusetts or for ESPCs under FEMP's contracting vehicle, "owner's agents" or "project facilitators" can be provided to represent customer agency interests. In some states, SEO or other state staff or resident experts in the customer agency can fulfill this role. Training, education, and tools are a continuing need for customer agencies.

MEASURES also found that tracking of M&V reporting also differs considerably among the states; some requiring reporting to the SEO or other oversight agency while others do not. Sometimes it can be difficult for customer agencies or the SEO (or other oversight agency) to readily provide documented evidence that individual ESPCs or the overall ESPC program is achieving requisite monetary and energy savings.

These issues were strongly illustrated in the previously cited post-audit report (that arose in a state not participating in MEASURES) in which auditors found one customer agency did not require an M&V report, another failed to retain M&V reports delivered by the ESCO, and a third received M&V reports that claimed savings based on ECM installation but without any actual measurement of energy use or cost.[19] Beyond the case of not requiring an M&V report, the same post-audit study faulted agencies for allowing ESCOs to be absolved of M&V responsibilities after just one year's analysis and for technical shortcomings in M&V reporting such as not including O&M costs and improper consideration of time value of money.

While the post-audit report was from a state that is not a MEASURES partner nor a survey respondent, it offers a caution to some participating states that do not explicitly require M&V or that permit very early

[19] State of Kansas, Legislative Division of Post Audit, 2016, "Limited-Scope Performance Audit Report: Kansas Corporation Commission: Evaluating Savings Achieved Through the Facility Conservation Improvement Program" (April 26, 2016), http://www.kslpa.org/assets/files/reports/l-16-003.pdf op cit.

M&V termination. This point is made recognizing authority constraints in various state ESPC programs and the likely need for legislative remedy in some cases.

7. *ESCOs will cooperate pro-actively in ensuring access to transparent documentation and tracking of investments, measures taken, units and costs avoided, using DOE's eProjectBuilder platform and contributing to each state's ESPC Tracking system and "dashboard" of cumulative benefits.*

Following on the previous principle, this one emphasizes transparency of documentation of individual ESPCs and of the program. Again MEASURES survey respondent states differed on whether customer agency ESPCs are centrally tracked or not and, where they are tracked, the detail of data that are tracked (financial data is more commonly tracked than energy unit savings).

Among MEASURES project tasks was piloting of eProjectBuilder, a platform developed by the Lawrence Berkeley National Laboratory (LBNL) with FEMP support to facilitate consistent tracking and reporting of ESPCs. With eProjectBuilder, which features a new M&V module, ESCOs and customer agencies can report and track individual ESPCs in a consistent manner. FEMP is promoting use of eProjectBuilder for ESPCs under its purview and is migrating historic ESPC data previously collected on separate platforms into eProjectBuilder.

The three MEASURES project partner states have piloted it with the assistance of LBNL staff. The MEASURES project also provided feedback to LBNL to help make the tool more useful for states. Virginia is considering mandating eProjectBuilder use in the future. Georgia is still evaluating options and Kentucky indicates that it will likely retain its existing database tool. Among other survey respondents, Alabama is considering requiring eProjectBuilder use while others plan to rely on their existing tools, such as Salesforce or customized spreadsheets.

Increased ESCO awareness and use of eProjectBuilder in the federal ESPC market and growing parts of state markets may support more widely consistent reporting and tracking of ESPC status and performance to the benefit of customer agencies, oversight agencies, policymakers, and ESCOs. ESCOs could benefit from avoiding having greatly varying reporting tracking and reporting formats that differ by jurisdiction and customer. Agencies and policymakers can benefit from improved transparency and easier assessment of ESPC status and performance at both individual contract and program levels. Irrespective of whether a state chooses to use eProjectBuilder or its own tracking system, there are benefits to states tracking ESPCs consistently to include financial information (amounts contracted, saved, paid down, etc.) and physical units (e.g., kWh and therms energy saved, gallons water saved, emissions avoided). Further, as noted earlier, building energy management systems and other ICT tools allow for easier sharing and analysis of data for reporting and tracking building and ESPC contract performance.

8. *A means of soliciting and documenting customer satisfaction will be considered in each contract.*

Two MEASURES survey respondent states, Colorado and Virginia, are developing customer satisfaction survey tools. FEMP solicits feedback on the ESPC (and ESCO) as well as on FEMP's own service to customer agencies throughout the contract term. Most of the survey respondents do not have a customer feedback process in place.

A means to solicit, receive, and track ESPC customer experience and satisfaction would be useful for improving the quality of ESCO services, identifying needs of customer agencies, and improving the quality and effectiveness of ESPC programs.

Conclusions

The MEASURES project developed a set of eight draft M&V principles based on its experience with partner states and various research, discussions, and experiences of the wider set of project partners and broader stakeholders. The principles are at a high level and are only moderately prescriptive. This is in recognition of the highly-varied organization of different states' ESPC programs—differing state agency authority, purview, and resources; often multiple agency responsibilities; different relationship of states to their localities (including public school districts); and varied political cultures, among other factors.

The principles were drafted as being first directed to ESCOs via NAESCO, to help support wider ESCO industry acceptance of the principles even in light of varied state organization and practices of ESPC programs. However, the principles can be encouraged and adopted by states (and localities) as well, to the extent their authority allows. They can also be brought to the attention of executive branch and legislative policymakers as means to enhance the transparency of ESPC programs and to strengthen their efficacy in delivering public sector financial benefits as well as supporting capital improvement, energy policy, environmental, and other objectives.

The principles were developed in conjunction with a survey of M&V, tracking, reporting, technical assistance, and related ESPC practices in partner states, a selection of additional states, and FEMP. While the survey questions do not directly map to the eight draft M&V principles, the responses alongside of MEASURES project research and experience allow discussion of the breadth of state practices as they relate to the draft principles and suggest how adherence to the principles can benefit a broad variety of states despite their ESPC programmatic differences.

NAESCO is drawing from the MEASURES draft M&V principles and other project results to establish a committee that will engage with SEOs to develop M&V practices guidelines that will be mutually beneficial for the ESCO industry and public sector customers, enhancing achievement and recognition of financial, energy, environmental, and other benefits of ESPCs. This is a very favorable result of the MEASURES project.

Appendix A: MEASURES Project M&V Principles

The following document was developed by the MEASURES project team for consideration by the National Association of Energy Services Companies (NAESCO)

DRAFT MEASURES Project M&V PRINCIPLES

NAESCO has historically taken the lead in promoting the rigorous measurement and verification of energy savings. As new capabilities and new challenges develop, NAESCO has an opportunity to exercise and extend that leadership. This will be one of the ways that ESCOs can continue to distinguish their capabilities and provable results from increasing non-ESCO competition.

The most important "stakeholders" in the ESPC process will continue to be customers. But there are others, and their voices are being heard in ESPC markets. They include state energy and facilities offices, US DOE, HUD, GSA, EPA, the National Labs, utility regulators, consumer and environmental advocacy organizations, and the media. They are questioning, sometimes with validity, the reality of the "savings" that ESPCs promise. If they are not detectable by the customer, and if almost no ESCO ever pays out on a guarantee, are they a true distinguishing value of ESPCs?

The real benefits of ESPCs include net cash savings to the customer, of course, but for many customers that is rarely the most important result. Capital improvements to facilities, catching up on deferred maintenance, increasing reliability and reducing maintenance expense, providing local jobs, reducing GHG emissions, and enhancing comfort, health, security, and productivity, are all real and measurable values. ESCOs are uniquely skilled at finding such opportunities and designing them such that their costs can be entirely offset by other costs avoided. ESCOs are also uniquely skilled at devising means of measuring these benefits.

A sound ESPC is far superior, in deriving such benefits, to conventional design and contracting procurement. An ESPC can easily be amended to incorporate additional work as opportunities are mutually discovered. It establishes a partnership between ESCO and customer staff, in which either can find and recommend facility improvements and benefits can be shared. It incorporates the best principles of life-cycle costing and value engineering.

With these benefits and means in mind, NAESCO should consider adopting the following principles:

1. A method for measuring and verifying avoided consumption and costs will be agreed upon between ESCO and Customer on a project-by-project (measure-by-measure) basis, along with the approval of designs, schedules, contractors, and cost, and the agreement documented for staff training and future reference. Protocols such as UMP, FEMP, ASHRAE, the CPP guidelines, and others will be considered along with the IPMVP Options,[20] and the measurement and verification choice made clear to the customer who should be required to document their understanding and acceptance of

[20] IPMVP and FEMP M&V Guidelines are most familiar to ESCOs and most frequently used in ESPCs. The other listed approaches include the U.S. DOE-supported Uniform Methods Project (UMP) which is based on the IPMVP but provides more detailed direction for performing M&V on specific ECM types; ASHRAE Guideline 14-2014 from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers; and guidelines in the Clean Power Plan.

these choices. The methods chosen will include how commissioning and post-installation M&V, including third party review, will be conducted and paid for.

2. M&V using near-real-time circuit-level monitoring, cloud-based computation and access to regional/national data bases will be considered, since the cost and practicality of these methods are increasingly within reach and their credibility increasingly acceptable.

3. ESCOs will encourage the involvement of a technical consultant (knowledgeable customer agency or cognizant state agency staff or third party consultant) to represent the interests of the customer in reviewing project M&V processes on a reasonable basis at the stages of design, commissioning, and project results reporting.

4. Although guarantees may be stated in financial terms, "savings" will refer to avoided consumption of units of energy (e.g., kWh, therms, gallons, etc.), unit measurements of water savings, and non-energy benefits (O&M savings, electric system capacity credits, emissions reductions credits, etc.) These will be rigorously identified in the project contract documents in a form that enables future customer business or financial managers, who have not been involved in the development or implementation of the project, to re-create the savings calculations.[21]

5. The real benefits described above will be described and documented along with the savings in regular M&V reports specified in the project contract documents.

6. Customer agencies should assure that such reports and any related materials are reviewed to assure that ESPC conditions, including guaranteed savings, are met. A technical consultant (knowledgeable customer agency or cognizant state agency staff or third party consultant) should review M&V reports and advise the customer. M&V reports and related materials should be filed and tracked by the customer and/or by the program administrator, and maintained by the ESCO, for easy access and to support reporting to cognizant state agencies (e.g., state energy office, landlord/general services/administrative agency) and responses to legitimate requests (e.g., legislative inquiries or audits, FOIA).

7. ESCOs will cooperate pro-actively in ensuring access to transparent documentation and tracking of investments, measures taken, units and costs avoided, using DOE's eProjectBuilder platform and contributing to each state's ESPC Tracking system and "dashboard" of cumulative benefits.

8. A means of soliciting and documenting customer satisfaction will be considered in each contract.

[21] The phrase *"in a form that enables future customer business or financial managers, who have not been involved in the development or implementation of the project, to re-create the savings calculations."* was added after initial presentation to the NAESCO Board of Directors.

Appendix B: MEASURES Questionnaire

Questions on Key Aspects of ESPC Management

MEASURES is a state-led project focused on enhancing measurement and verification (M&V) and tracking of energy savings performance contracts (ESPC) to better document financial and energy savings as well as energy-related emission impacts.[22] The project is reaching out to select states to better understand ESPC management approaches and processes and how they compare with practices in the three MEASURES project partner states. The objective is to learn lessons and identify and recommend practices for improving the quantification and tracking of ESPC financial, energy and environmental benefits, including for potential recognition under air quality management programs (Clean Power Plan and others).

The MEASURES project team would be grateful for your (or your colleagues') responses to the questions below regarding ESPC management practices in your state. Coordinating this task for the project is Rodney Sobin (rsobin@naseo.org 703-299-8800 x112) of NASEO who will be happy to call you or exchange e-mails (which ever medium is most convenient for you) about this questionnaire and will be happy to answer your questions about MEASURES.

Thank you for your valuable assistance.

1. Is there a particular agency/office with oversight over state ESPC? Local, K-12, etc. ESPCs? If more than one, how are roles split and how do they cooperate/coordinate?
   [Please provide distinct answers for state agency ESPCs and locality/K-12 school district/other non-state public sector ESPCs.]

   a. Reviewing and approving ESPCs
   b. Approving, pre-approving/pre-qualifying eligible ESCOs
   c. Establishing standard contract language (audit and M&V as well as main contract)
   d. Tracking of ESPCs
   e. Reporting to executive/administration or legislature on ESPC status and performance

2. What funding mechanism is there for administration and oversight of the ESPC program?
   a. Any "self-funding" via a fee on project costs? If so, who pays and how?

3. Must ESCOs be pre-qualified to work on state agency ESPCs? On local, K-12, etc. ESPCs?
   [Please provide distinct answer for state agency ESPCs and local/K-12/etc. ESPCs on whether ESCOs must be pre-qualified.]

   a. If so, what criteria must an ESCO meet to be prequalified?
   b. Is NAESCO accreditation considered in the prequalification process?

[22] The project is led by Virginia in partnership with Georgia and Kentucky and non-state partners, including the National Association of State Energy Officials (NASEO), Clean Energy Solution, Inc., Southeast Energy Efficiency Alliance (SEEA), National Association of Energy Service Companies (NAESCO), National Association of Clean Air Agencies (NACAA), and the U.S. Department of Energy, which is also providing funding under a State Energy Program cooperative agreement (DE-EE0006891).

c. Which state agency handles pre-qualifications?
d. Other details—must ESCOs re-qualify periodically? When can new ESCOs apply for qualification (rolling-basis? particular periods)?

4. Is technical assistance provided to agencies and/or local governments during the project development and/or contract stages?
[Please provide distinct answers on whether or what type of technical assistance is provided for state agencies as distinct from local/K-12/etc. ESPCs.]

a. Does the state lead/oversight agency/office provide technical assistance?
b. Another agency?
c. Does or could the state or customer agency (or locality) hire a consultant advocate to provide technical support? (Are there or could there be funds, perhaps from fees on ESPCs to do this?)
d. If technical assistance is provided, how comprehensive is it? (e.g., assisting RFP preparation? Review of bids? Contract negotiation help? M&V advice?)

5. Is (E)M&V required? If so,
   a. Are particular protocols specified or required? Permitted? Precluded? (IPMVP, FEMP M&V Guidance, Uniform Methods Project…)
   b. If IPMVP or its derivatives is used (or required)? Which IPMVP (or derivative protocol) options are most used (Options A, B, C, D)? Is this based on IPMVP option choice guidance? Or just on ESCO's preference?
   c. Is IPMVP's option choice guidance encouraged? Required?
   d. Who performs M&V? Is there any third-party, independent M&V? Or third-party, independent review of ESCO's M&V report?
   e. Who pays for M&V?
   f. Are any real-time or near-real-time energy data gathered?
   g. What are purposes of M&V?—Demonstrate ESCO meeting guarantee? State tracking of benefits and costs? Support energy policies/directives/regulations (e.g., Executive Order or legislated state energy savings goals)? Support environmental goals?

6. To what extent are the decisions about M&V driven or affected by the cost of M&V? Are agencies provided guidance on reasonable M&V costs relative to the magnitude of ESPC projects and expected or guaranteed savings?

7. Is early termination of M&V of permitted?
   a. If so, under what circumstances?
   b. Is there a specified minimum number of contract years for which M&V is required?
   c. If so, are financial, energy, and other savings estimated after termination and, if so, on what basis?
   d. Does the SEO or other lead/oversight agency or landlord agency review and approve the decision by the customer agency and ESCO to terminate M&V?

8. Is there direct (lead or oversight) agency/office involvement in M&V assessment for the contract term?

9. Is adequate M&V education and training in place for agency and local government staff?
   [Please provide distinct answer for state agency ESPCs and local/K-12/etc. ESPCs.]

    a. Does the state lead/oversight agency/office provide M&V technical assistance? Another agency?
    b. Must the lead/oversight or other agency or third party review or approve a project's M&V plan prior to contract execution?
    c. Does or could the state or customer agency (or locality) hire a consultant advocate to provide M&V technical support? (are there or could there be funds, perhaps from fees on ESPCs to do this?)

10. Are state ESPCs centrally tracked? Local, K-12, etc. ESPCs tracked?
    [Please provide distinct answer for state agency ESPCs and local/K-12/etc. ESPCs.]

    a. What is tracked—financial data? Energy (MWh, therms, etc.)savings? Other savings? Emission impacts?
    b. Is there awareness of eProjectBuilder as a tracking tool? Is it used? Promoted?
        i. Any impressions or reactions to eProjectBuilder to share?
    c. Is there another platform used for tracking ESPCs and their performance?
    d. If tracked, how long has your state centrally tracked ESPCs (State? Localities/K-12/etc.?)?
    e. Are collected data tracked in one data base? If not, in how many data bases and who maintains and has access to them?
    f. Is there a "dashboard" or similar presentation online to summarize ESPC program status, costs, and benefits for non-experts?

11. Are project technical data collected at installation or commissioning?
    a. Financial data?
    b. Energy data? (Electricity, natural gas, other)
    c. Other (water, sewer, O&M, occupant complaints or comfort, etc.)?
    d. Projected and/or guaranteed savings and benefits?

12. Is annual ESPC *project* data collection and reporting required? Is the format for this reporting specified? Can we get a sample report?
    [Please provide distinct answers for state agency ESPCs and local/K-12/etc. ESPCs—i.e., if data collection and reporting is required is it only for state agencies or does it also apply to localities/K-12/etc. too?]

    a. Of financial savings? Amounts invested?
    b. Of energy savings (electricity, natural gas, other fuels)? Annual M&V reports?
    c. Of other savings or benefits (water, sewer, O&M, reduced occupant complaints, etc.)?
    d. Are these compared with projected and/or guaranteed savings and benefits? If so, by whom?
    e. Is there a process to gather and assess customer agency (or locality/K-12/etc.) satisfaction and feedback?
    f. Are there case studies publicly available on the web? If so, where are they posted?

13. If annual data collection and reporting is required, is an agency responsible for analyzing and reporting the data for the ESPC *program*? (State? Localities/K-12/etc.?)
[Please provide distinct answers for state agency ESPCs and local/K-12/etc. ESPCs—if the state does analyze and report, are only state ESPCs included or local/K-12/etc. too?]

    a. If yes, to whom does the agency report?
        i. State administration (e.g., Governor's office or budget office)?
        ii. Legislature?
        iii. Other?

14. If there is central data collection:
    a. Which energy efficiency/conservation measures (ECMs) are most prevalent?
    b. Which agencies (state, localities/K-12/etc.) have been most active?
    c. What types of facilities (offices, health care, education, recreation, etc.) have been most active?

15. Has the air quality agency been engaged on potential role of ESPC as an emissions avoidance/reduction strategy? If so, is there or could there be interest—under Clean Power Plan? Under other rules or requirements?

16. Has your Administration or Legislature raised questions or concerns about the ESPC program and its performance?
    a. If so, what are major concerns?
    b. Have ESCOs? State agencies? Localities/K-12/etc.? been sensitive to and responsive to these concerns?

Appendix C: MEASURES Questionnaire Responses

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
Q1.Is there a lead agency for ESPC oversight?		No specific agency authorized to oversee ESPCs; AL Dept of Economic and Community Affairs (ADECA) Energy Division supports.	Colorado Energy Office (CEO) oversight.	Georgia Environmental Finance Authority (GEFA) lead for state ESPCs; no designated oversight for localities' ESPC.	No specific agency oversees ESPCs; State Energy Office informally tracks.	Finance and Administration Cabinet (FAC) main oversight of state ESPC; Dept. for Energy Development and Independence (DEDI) support; Dept. of Education (KDE) some responsibilities for K-12 school divisions; Dept. of Local Government (DLG) support for localities.	Div. of Capital Asset Management and Maintenance (DCAMM) for most state agencies and Dept. of Energy Resources (DOER) for state and local ESPC.	Dept. of Mines, Minerals and Energy (DMME) technical; Dept. of General Services (DGS) contractual/procurement.	Federal Energy Management Program (FEMP).
	1a. Review and approve ESPCs?	No review required; ADECA will review and comment on request.	For state agency and higher education, CEO, Office if State Architect (OSA) and State Treasurer review and approve; CEO may review (but no approval needed) for localities/K-12/special districts based on MOU.	GEFA review and approval for state ESPC; no review for local/K-12.	No review or approval required.	FAC review and approval of state ESPC; KDE review and approval for K-12; DLG offers technical assistance but approval not required for localities.	DCAMM issues and approves all state ESPC soliciations; all solicitations are filed with DOER; DOER reviews and approves local ESPCs.	DMME technical review of state ESPCs.	FEMP reviews and approves ESPCs under DOE IDIQ contract; U.S. Army Corps of Engineers (USACE) reviews and approaves ESPCs under its contractual vehicle; stand alone projects reviewed by customer agency only.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	1b. Approve or prequalify ESCOs?	ADECA Energy Division is in process of establishing prequalified ESCO list but agency discretion on ESCO choice.	CEO and OSA prequalify ESCOs.	GEFA for state ESPC. Localities can but are not required to use GEFA's prequalified ESCO list.	Dept. of Accounting and General Services (DAGS) provides prequalified ESCO list but agency discretion on use of list and ESCO choice.	N/A	DCAMM certification required of ESCOs and contractors for state and local ESPCs.	DGS prequalified ESCO list for state agencies; optional for localities.	FEMP qualified ESCO program.
	1c. Standard contract, documents language	ADECA Energy Division provides standard ESPC documents; agency discretion on their use (typically agencies use ESCO-provided documents).	CEO, OSA and State AG establish contract language.	GEFA for state ESPC. Localities can but are not required to use GEFA's standard contracts.	SEO provides Guide with standard language but agency discretion on use; agencies often share contract language.	FAC provides standard template for state ESPC; DLG offers but does not require standard template for local ESPCs.	DCAMM model contracts with DOER input comply with statute for state ESPC; DOER offers localities model contracts that localities may use or edit.	DGS and Office of Attorney General provide contract language for state ESPC; optional use by localities.	DOE FEMP and USACE have standard contract language.
	1d. Tracking ESPCs?	State does not track public sector ESPCs.	CEO tracks projects and metrics.	GEFA for state ESPC; none for localities.	SEO informally tracks.	FAC tracks state ESPCs; DEDI tracks ESPCs overbroader public sector.	DCAMM tracks projects for (state) buildings under its purview; DOER tracks all local projects.	DMME tracks ESPCs.	FEMP and USACE track ESPCs under their respective contract vehicles; FEMP established eProjectBuilder as repository to track all federal ESPCs and available for states, localities, etc.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	1e. Reporting on ESPCs?	Each agency responsible for its own ESPCs; no state level reporting.	CEO responds to information requests.	GEFA for state ESPC; none for localities.	Each agency responsible for its own ESPCs; SEO tracks and summarizes informally.	N/A	DCAMM reports on state projects and provides information to DOER; DOER reports on local ESPCs.	DMME.	FEMP responsible for cumulative federal ESPC investment reporting; FEMP and USACE track and report on ESPCs under their respective contracts; eProjectBuilder will support tracking and reporting.
Q2. Funding mechanism for ESPC administration, oversight?		ADECA Energy Division ESPC program funded by U.S. DOE State Energy Program plus state match.	CEO ESPC program funded through combination of federal and state funding.	Currently, GEFA ESPC work supported by U.S. DOE State Energy Program.	Agency discretion. Dept. of Budget and Finance must approve funding approach.	N/A	Supported with a combination of state budget and DOE State Energy Program funds.	DGS receives 1% ESPC contract value as fee; DMME received General Funds and federal support.	FEMP receives appropriated funds from Congress, some devotes to ESPC administration and oversight.
	2a. Any "self-funding" fee?	No.	No.	No, but GEFA has authority to implement.	No.	No.	No.	1% ESPC contract value to DGS.	No.
Q3. Must ESCOs be prequalified? (includes Q3a.)		No, but ADECA developing prequalification list for optional use.	Yes.	Yes for state ESPCs; no for localities.	No.	N/A	Yes, all ESCOs, contractors, vendors must be DCAMM certified.	Yes for state ESPCs; yes for localities if they use state contract.	Yes, ESCOs must be on DOE qualified list to work on any federal ESPC regardless of contract vehicle.
	3b. Is NAESCO accredidation considered in prequalification process?		Considered but not required.	Yes .	No.		No.	No.	Considered but not an official evaluation criterion.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	3c. Which agency administers prequalification?		CEO and OSA.	GEFA.	DAGS.		DCAMM.	DGS.	DOE/FEMP process; Qualification Review Board comprised of federal energy officials approves ESCOs for listing.
	3d. Qualification period?		CEO ESCO prequalification RFP every five years; ESCOs must renew annually.	GEFA prequalification for three years; new ESCO can apply any time.	Determined by DAGS.		ESCOs must be certified by DCAMM every three years; new ESCO can apply at any time.	DGS prequalified ESCOs currently under contract period April 1, 2012 through March 31, 2014 with option for three 1-yr renewals.	DOE Qualified List of ESCOs application may be submitted any time; each January FEMP initiates annual certification process for each ESCO on list.
Q4. Is technical assistance provided to agencies?		Yes.	Yes.	Yes to state agencies; no to localities.	Yes, by SEO pending funding availability.	Yes, limited.	Yes.	Yes.	Yes.
	4a. and 4b. Which agency/ies?	ADECA Energy Division.	CEO.	GEFA for state ESPCs.	SEO; other agencies share advice on request.	FAC for state ESPCs; DEDI assists localities under DLG contract.	DOER.	DMME.	FEMP, can tap National Laboratories; USACE assistance available for projects under its contract vehicle.
	4c. Can agency hire technical consultant?	Yes, but not aware of that ever being done.	Yes, but agencies must use own budget or have ESCO cover cost through savings.	Yes, GEFA sometimes hires a technical consultant. A state agency can also hire their own at any time.	Yes, if agency has funds to do so.		MA has statewide contract for energy consultants ("owner's agents") available to state and local agencies.	Yes, if agency has funds to do so.	Yes, agencies at times hire project facilitators or other third parties to assist project development; paid by agency.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	4d. Scope of technical assistance?	Entire scope of ESPC process, including M&V.	Entire scope of ESPC process, including M&V. In-house engineers and program consultants provide support.	GEFA provides extensive assistance (RFP, proposal review, audits, contract closing, help obtain finance).	SEO will provide for entire scope of ESPC process, including M&V, as funding allows.	DEDI supports local government RFP preparation, review of bids; negotiation of contract, some M&V.	DCAMM helps create bids, reviews responses, and evaluates contractors for state ESPCs. DOER reviews RFPs, RFQs. Contracts for local ESPCs. State contracted energy consultants serve as owner's agents provide comprehensive technical support to state and local ESPCs.	Entire scope of ESPC process, including M&V.	FEMP provides project facilitators to all projects under FEMP contract vehicle; DOE Federal Project Executives can assist project development; National Laboratories can support and provide tools; USACE technical staff support projects under USACE contract vehicle. Entire scope of ESPC process, including M&V.
Q5. Is M&V required?		AL legislation does not specifically require M&V; customer agency responsibility to negotiate M&V provisions.	All ESPC requires at least three years M&V, additional years optional.	Yes, for state agencies.	No, agency discretion.	M&V requires for state and local but can be terminated after first few (1-3) years.	Yes.	Yes.	Yes.
	5a. Are particular protocols required, permitted or precluded?	No, agency discretion.	Program guidelines based on IPMVP and FEMP M&V Guidelines.	Any industry standard engineering method may be used (IPMVP, ASHRAE, FEMP, etc.).	No, agency discretion.	IPMVP.	FEMP M&V Guidelines.	IPMVP.	FEMP M&V Guidelines.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	5b. If IPMVP or derivitive used, which options are most common?		Options A and C most common.		Agency discretion.	Option A most common.	Option A often.	Options A and B most often; C less often.	Option A 50%; B 32%; C 7%; D 11% (note that percents are of cost savings not of number of projects or measures).
	5c. Is IPMVP option choice guidance encouraged or required? How is option choice determined?	Agency choice with ESCO.	ESCO required to explain option choice for each measure; CEO consultant participates in discussion with agency and ESCO.	GEFA encourages agency to understand options and make considered choice with ESCO.	Agency choice with ESCO; combination of options may be used depending on measures and project complexity.	Tend to choose lowest cost option.	FEMP M&V Guidelines suggestions followed as appropriate.	IPMVP option choice guidance is standard for state contract.	FEMP M&V Guidelines suggestions followed as appropriate, but option choice is left to agency in negotiation with ESCO.
	5d. Who performs M&V? Any third party (i.e., outside customer agency) review of M&V report?	ESCO typically performs M&V.	ESCO performs M&V, with CEO consultant review.	ESCO performs M&V, agency can hire independent reviewer if it wishes.	ESCO performs M&V; SEO available to review, agency can hire independent reviewer if it wishes.	ESCO performs M&V.	ESCO performs M&V.	ESCO performs M&V; DMME can support customer agency in review.	ESCO performs M&V; third party performance or review of M&V rare due to cost; FEMP provides high level review of M&V of projects under FEMP contract vehicle.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	5e. Who pays for M&V?		First three years in project pro forma and covered by savings; M&V services invoiced after delivery of services and paid by customer agency.	Agency.	Agency.	Agency.	Agency.	Agency, out of savings or operational budget.	Agency, intial costs prior to project acceptance rolled into project financing; annual M&V costs paid along with debt service.
	5f. Are real-time or near real-time energy data gathered?		Depends on M&V plan; not required.	Depends on project.	Some may.	Some ESCOs offer real-time or "dashboard" options.	Yes.	Code requires at least annual reconciliation. Some projects have capable energy management infrastructure and may use real or near real time data. DMME currently is developing a monthly energy information management system for state facilities that will target ESPC projects.	Continuous monitoring frequently utilized. Many Option B projects continuously monitor select data points. Many projects establish baselines using Options C or D then revert to A or B during performance period and use continuous monitoring data to verify savings persistence.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	5g. What are purposes of M&V?	Verify if savings guarantee met.	Verify if savings guarantee met; can support other objectives.	Verify if savings guarantee met.	Verify if savings guarantee met.	Verify savings guarantee met.	Verify if savings guarantee met, also tracking costs and benefits, supporting state goals, and environmental goals.	Verify if savings guarantee met, also track costs and benefits, supporting Executive Order and environmental goals.	Verify if annual savings guarantee met.
Q6. To what extent are M&V decisions guided by cost? Is guidance provided on M&V cost?		ADECA Energy Division is gathering more information on M&V costs.	CEO provides guidance on reasonable cost (cost, rigor, riak balance). Do see ESCO-to-ESCO variation.	Cost not big driver yet but may change, main thing is to assure cost savings guarantees met.	Agency discretion.	Cost and project type drive option decision.	Cost is significant driver; agencies increasingly change M&V oprtion after five years to a less expensive option.	DMME provides guidance; cost-risk balance figures into IPMVP option choice.	FEMP M&V Guidance discusses balance among M&V rigor and cost, measure/project complexity, and risk of lost savings.
Q7. Is early termination of M&V allowed? If so, under what circumstances? Is there a specified minimum number of contract years for which M&V is required? (includes 7a., 7b.)		Yes, up to agency and ESCO agreement.	M&V required at least three years, then agency discretion.	Not for state agencies. Localities at their discretion.	Yes, agency discretion.	Yes, often terminated after 1-3 years.	No, M&V required throughout project contract term.	M&V required at least three years, then agency discretion.	No. M&V required through entire contract term. Agency would have to terminate energy conservation measure (ECM) entirely (i.e., buy out ECM from contract).
	7c. If M&V is terminated, are financial, energy or other savings still estimated? If so, on what basis?		First three years are intended to prove savings guarantee met; if M&V terminated afterwards, savings assumed to persist.	N/A for state ESPC. Localities can do as they wish.	Agency discretion.	Implication is that guarantee is terminated when M&V terminated.	N/A	Estimated based on performance at meeting savings guarantee during first three years of M&V.	N/A

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	7d. Does lead/oversight agency review or approve customer agency's decision to terminate M&V?	No.	No. CEO informed but no approval required.	N/A for state ESPC. Localities can do as they wish.	No lead agency; agency discretion.	FAC oversees decisions by state agencies. Localities can do as they wish.	N/A	No.	N/A
Q8. Does lead/oversight agency have direct involvement in M&V assessment over contract term?		No. ADECA Energy Division offers tech assistance on request.	No. CEO consultant reviews M&V reports but, as noted, early M&V termination can be done.	GEFA receives state ESPC M&V reports but does not approve them.	No lead agency. M&V at agencies' discretion.	No.	Yes. Local agencies report annually.	No but DMME can review M&V on request.	FEMP monitors project performance through life of contract.
Q9. Is M&V training and education provided to customer agencies?	9a. Does lead/oversight agency or other agency provide M&V technical assistance?	ADECA Energy Division developing education and training with Energy Services Coalition.	CEO offers as part of technical assistance.	GEFA provides limited M&V technical assistance; limited GEFA expertise.	Agency discretion. SEO can provide on request; also Guide provides templates for agencies.	FAC provides state agencies M&V technical assistance; DEDI/DLG offer limited M&V tech assistance to localities.	State oversees state agency M&V; DOER provides webinars, guides, and assistance (owners' agents).	DMME.	Extensive FEMP direct and online training and support offered. 3-day ESPC training offered. FEMP, DOE Federal Project Executives, and National Lab staff can support projects.
	9b. Must lead/oversight agency review or approve M&V plans prior to contract execution?	No.	CEO can provide review and assistance.	Yes, GEFA reviews and approves state ESPCs.	No lead agency.	No.	No.	DMME can provide review but agencies not required to follow recommendations.	FEMP offers guidance/recommendations but DOE approval not required.
	9c. Can customer agency hire a consultant to provide M&V technical assistance?	Yes.	Yes.	Yes, agency or GEFA.	Yes.	Yes, but cannot put on ESPC fee.	Yes, but cannot put on ESPC fee; statewide contract for owners' agents provides resources to all agencies.	Yes.	Yes, but would need to be paid by agency.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
Q10. Are ESPCs centrally tracked?		No. Future intent is for ESCOs to use eProjectBuilder to enable project tracking.	CEO uses Salesforce portfolio manager.	Yes.	Informally by SEO.	Yes, FAC for state contracts.	Yes.	Yes.	Yes. FEMP for ESPCs under its contract vehicle. OMB has established tracking system for all President's Performance Contracting Challenge projects.
	10a. What data are tracked (financial, energy unit savings, emissions, others)?		Financial, energy unit savings, emissions impact, others.	Financial, energy unit savings, others, not emissions.	Contract amount, contract period, construction period, ECMs, kWh and cost savings, annual guaranteed kWh and cost savings, estimated savings over life of contract, guaranteed savings.	FAC database of state ESPC tracts contacts, locations, agencies, dollars, not energy unit savings.	Guaranteed savings throughout contract, ECM unit savings for first year. Date solicitation filed, investment grade audit (IGA) filed, contract filed; contact list; contract cost; KW generated; energy unit cost esclation rate; degradation rate for solar projects.	Project, contract date, contract costs, amount financed by savings, dollars paid down. DMME currently is developing a monthly energy information management system for state facilities that will target ESPC projects.	FEMP tracks development and installation costs, financing, ECM composition, performance period expenses, energy savings, and cost savings for each project under FEMP contracting vehicle.

Question	Sub-Question	Alabama	Colorado	Georgia	Hawaii	Kentucky	Massachusetts	Virginia	Federal
	10b. And 10b.i. Is there awareness, promotion, use of eProjectBuilder? Comments?	Intent is to require eProjectBuilder use in future.	Yes, awareness; promoted through ESCO, not CEO.	Low awareness.	Have used, challenge to get all data.	Awareness. Perceive useful only for those with multiple ESPCs (e.g., FAC) but FAC uses its own data base and has no interest in migrating to ePB.	Aware but do not use or promote. Perceive as geared toward federal ESPCs.	Yes, will consider making use of ePB mandatory when ESPC contract is renewed in Q2 - 2017.	FEMP funded ePB development and promotes it for FEMP contracting vehicle but it is not yet mandatory. Required for DOE's ESPC ENABLE program. ePB helps stndardize approach to ESPC project structure, will help for tracking M&V.
	10c. and 10e. Is another platform used to track ESPCs? Are data collected in one or multiple data bases? *(10d. Responses to "how long have tracked?" omitted here)*	N/A	Salesforce.	No specific platform. Spreadsheets.	Agency discretion on what and how data are collected.	FAC Access database; DEDI spreadsheet.	Own data base.	Quarterly report in Excel. Used in several databases/dashboards. Financial data collected when contract signed. DMME currently is developing a monthly energy information management system for state facilities that will target ESPC projects.	FEMP migrating historic ESPC data from multiple data bases into eProjectBuilder.
	10f. Is there a "dashboard" or similar high level presentation of ESPC program data for non-experts?	No.	CEO publishes annual portfolio statistics but does not have a rolling, public facing dashboard.	No.	Some summary information posted online.	No.	No.	Yes.	Some high level portfolio data published including project investment, ECMs, cost savings, energy savings.

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Q11. Are project technical data collected at installation or commissioning?	Includes 11a.-d. (Financial, energy, other [e.g., water, sewer, O&M, occupant complaints]; projected and/or guaranteed savings or benefits)	Customer agency discretion.	Yes.	GEFA collects investment grade audit (IGA) data but no other data until M&V reports submitted.	Agency discetion.	Yes, by agency but not centrally reported to FAC, DEDI, etc.	Yes, most at invest grade audit (IGA) level, some at commissioning level.	Yes, at ESCO level.	Financial data defined as contract requirement. Energy data gathered by ESCO during preliminary assessment and investment grade audit (IGA). DOE contract requires ESCO to provide commissioning report and post-installation report.
Q12. Is annual ESPC **project** data collection and reporting required? If so, is there a specified report format?		No.	Yes.	Yes, for state ESPCs from agency or ESCO. Not collected from localities.	No.	No	Yes, state, local, and K-12 public schools.	Quarterly Excel spreadsheet	Annual M&V report template requires reporting on these elements
	12a. Of financial savings? Amounts invested?	N/A	Yes	Yes	Agency discetion.	N/A	Yes, state, local, and K-12 public schools.	Yes.	Yes.
	12b. Energy unit savings? M&V reporting?	N/A	Yes.	Yes.	Agency discetion.	N/A	Yes, state, local, and K-12 public schools.	No. DMME currently is developing a monthly energy information management system for state facilities that will target ESPC projects.	Yes.

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	12c. Other savings and benefits (e.g., water, sewer, O&M, occupant comfort)?	N/A	Water, sewer, O&M. Occupant comfort not specifically tracked unless in M&V report.	Yes	Agency discetion.	N/A	Yes, state, local, and K-12 public schools.	No. DMME currently is developing a monthly energy information management system for state facilities that will target ESPC projects, and include water.	Yes.
	12d. Are reported savings compared with projected or guaranteed savings or benefits?		Yes, compared against baseline and guarantee.	Yes, by agency and GEFA.	Agency discetion.		Yes, must verify annually.	DMME receives annual report showing whether guarantee has been met.	Yes.
	12e. Is there a process to gather customer agency satisfaction and feedbacK?		CEO is developing client satisfaction survey toll to be implemented in 2017.	No.	Agency discetion.	No.	No. Developing survey.	No, but DMME is adapting its quarterly customer satisfaction survey tool to encompass ESPC customers.	FEMP solicits agency satisfaction/feedback through its life of contract services. It also solicits feedback on FEMP services to agencies.
	12f. Are ESPC case studies publicly available?	No.	No.	No.	Yes. http://energy.hawaii.gov/energy-efficiency-in-soh	Yes, on ESC web site.	Yes, on web page.	Yes, two DMME websites (agency and Virginia SAVES); ESCOs infrequently post cases.	Yes. http://energy.gov/eere/femp/federal-energy-management-case-studies

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Q13. If annual data collection and reporting is required, is there an agency responsible for analyzing and reporting data for the ESPC **program**?	13a. If so, to whom does the agency report? (e.g., Governor/Executive, Legislature)	N/A	CEO collects and reports all ESPC data for the program annually; reports are provided to the Administration, Legislature and others.	GEFA collects state agency M&V reports and compiles data for state ESPCs but not for local ESPCs. Reports are provided to the Georgia State Finance and Investment Commission and the Governor's Office of Planning and Budget.	Agencies are responsible to track outcomes, etc. There are internal reports to agency administrators .	No.	ESCOs provide M&V reports at least annually. State agencies are monitored by the division that manages most state buildings (DCAMM). Localities/K-12 analyze their own M&V reports and annually report to DOER.	DMME collects and analyzes data, which is published on a state performance website and shared with the Governor's Office.	FEMP analyzes and reports on savings achieved from active projects under its contract vehicle. FEMP also collects data from each federal agency on total annual investments across contracting vehicles and contract programs or types (ESPC and UESC). Various data reported to the U.S. Congress, Office of Management and Budget, Council on Environmental Quality.
Q14.If there is central data collection:	14a. Which energy efficiency measures are most common?	N/A	Lighting, HVAC, controls.	Too early to tell.	Lighting.	N/A	Lighting, HVAC.	ECM information not collected/reported.	Under FEMP vehicle, 70% of investment from boiler improvements, building automation systems/energy management control systems, lighting, HVAC, chiller improvements.

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	14b. Which agencies are most active?		Higher education, state agencies, school districts.	Dept of Corrections, Board of Regents.	Dept. of Transportation noted.				Defense, Energy, Justice, GSA, Veterans Affairs, NASA.
	14c. Which types of facilities are most active?		offices, schools, correctional facilities.	wide range.	Dept. of Transportation (airports, highways and harbors).		schools, colleges.		offices, correctional facilities, courthouses, barracks.
Q15. Has the state air quality agency been engaged on the potential role of ESPC for emissions reduction or avoidance?		No.	No, but should.	Yes but not in detail.	No.	Not in detail.	No.	Yes.	Could be of interest.
Q16. and 16a. Has the Administration or Legislature raised questions or concerns about the ESPC program?	16b. If so, have ESCOs and/or agencies been sensitive and responsive to such concerns?	No.	No.	No.	Legislative Auditor reviewed airports project; questions resolved positively. Governor and Legislatiure very supportive of ESPC program.	No.	No.	Yes, periodic concerns are raised about integration of ESPC with other funding sources, especially capital outlay and maintenance reserve funds. The Governor is very supportive. DMME has been responsive to concerns.	Federal ESPCs routinely audited by agency inspectors general and U.S. GAO. Findings typically concern improving management and documentation of ESPC contractual requirements. FEMP recently revised annual M&V report template to improve transparency of savinbgs impact reporting.