

## ESPC Success for State and Local Governments

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### ESPC Principles and Measurement and Verification Resources

August 11, 2021

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# ESPC Principles and M&V Resources: Speakers

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# Public-Sector Building Retrofit Opportunity

## ESPC Market Opportunity

### PROJECT INVESTMENT OPPORTUNITY<sup>12</sup>

MUSH MARKET  
**\$66–208 BILLION**

FEDERAL MARKET  
**\$3–15 BILLION**

### ENERGY SAVINGS POTENTIAL<sup>13</sup>

MUSH MARKET  
**200–262 TRILLION BTU**

FEDERAL MARKET  
**27–68 TRILLION BTU**

## Opportunity:

Within the Municipal and State Governments, Universities and Colleges, Schools, and Hospitals (MUSH) market, the energy savings performance contracting (ESPC) energy savings opportunity is between **200-262 trillion BTU**.<sup>1</sup>

## Tracking energy project results through measurement and verification (M&V):

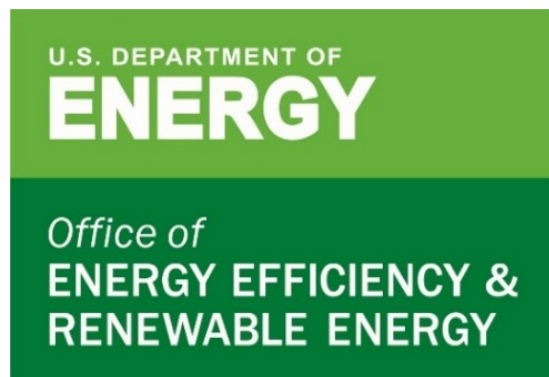
- Fulfills reporting and compliance requirements.
- Safeguards public interests and dollars.
- Demonstrates successes.

1. DOE, 2017. [Energy Savings Performance Contracting: Improving Infrastructure & Turning Waste into Wins](#).



# DOE M&V Resources for State & Local Governments

ESPC Toolkit – A collection of over 30 tools and resources to enable state and local communities to learn about and benefit from ESPC.



## Key M&V Resources:

- [Measurement & Verification Guidelines](#)
- [The Business Case for Applying M&V in State and Local Government ESPC Projects](#)
- [Understanding Your ESPC Savings Guarantee](#)
- [Energy Savings Performance Contracting for State and Local Governments: Strategies for Successful M&V](#)
- [Guide to Verifying Operating and Maintenance Savings in Energy Savings Performance Contracts](#)



# NASEO-ESC-NAESCO

## State ESPC Program and Project Principles

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ESPC Success for State and Local Govts: M&V Resources and Principles  
August 11, 2021



# NASEO-ESC-NAESCO

## State ESPC Program and Project Principles

- ESPC: very successful public-private partnership (P3) mechanism
  - ▣ >\$30B in cost-effective upgrades over last ~30 years
  - ▣ ~\$300B potential additional market
- But-
  - ▣ Still unfamiliar and complex to some
  - ▣ Some cases of poorly structured projects
  - ▣ Some cases of customers not understanding contracts, documents
  - ▣ Some cases of inadequate or misplaced documentation and tracking of savings, performance
  - ▣ Have led to questioning of projects and program



NASEO-ESC-NAESCO State ESPC Program and  
Project Principles  
2019

**NASEO, ESC, NAESCO developed Principles to enhance ESPC understanding, quality, and confidence**





## State ESPC Program and Project Principles



- Need for well-defined understanding of ESPCs
  - Customers, ESCOs, state/local ESPC program managers, 3<sup>rd</sup> party consultants (including owner agents) all have responsibilities
  - Need to enhance clarity and transparency of contract provisions, pricing, M&V reporting, long-term responsibilities, performance tracking
- State Energy Offices or sister agencies often have roles—
  - from information provision to oversight, facilitation, technical assistance, model documents, and tracking and reporting
- Ten Principles are aimed at state and local *programs* and *projects*



## State ESPC Program and Project Principles

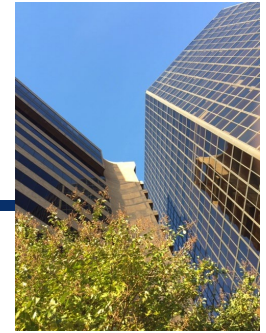


- Administrative support
  - ▣ *Program* level funding for administration, technical assistance, updating of documents and guides, program tracking and reporting.
- Guidance on attributes of service
  - ▣ Guidance on allowable measures, contract types, financing methods; links to statute and authority—what does/doesn't qualify as ESPC.
- Guidance and a process roadmap
  - ▣ ESPC guide or manual—what it is, contracting and financing processes, project management and monitoring, commissioning and M&V, links to documents, resources.
- Models and standards
  - ▣ Model ESPC contracts and related documents, policies, protocols, and guidance.
- Technical assistance
  - ▣ Technical, business, and administrative assistance to help owner/customer; review, advise on project development and implementation (including M&V); agency staff or qualified consultant acting as owner's agent.





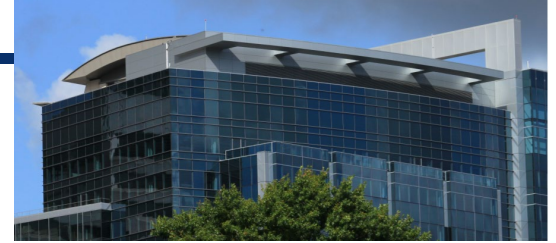
## State ESPC Program and Project Principles



- Standardized M&V Guidance
  - Standardized methods and terms for M&V; assure customer understands baselines, O&M requirements, adjustments, escalation rates, how commissioning and M&V is to be done and funded.
- Project and contract management
  - Assure M&V reports and other documents reviewed by technical consultant (like owner's agent) to assure ESPC conditions, savings guarantees met; document, file, and track to assure access for oversight agency, audits, legislative inquiries, etc.
- Program activity tracking
  - Track ESPC investment, savings, etc. at program level and provide “dashboard” or similar way to transparently share program activities and performance.
- Standard tracking mechanism
  - Gain ESCO assistance in maintaining transparent documentation, tracking of investment, measures undertaken, energy savings, cost savings, etc.; eProject Builder (ePB) and eProject eXpress (ePX) platforms recommended.
- Mechanisms for customer feedback
  - Solicit and document customer satisfaction and suggestions on projects and process.



## State ESPC Program and Project Principles



- Also helpful for pursuing the Principles:
  - ESC's [Key Attributes for Guaranteed Energy Savings Performance Contracting Program Readiness](#)
  - [eProject Builder \(ePB\)](#) with the new *eProject eXpress (ePX)* ESPC project tracking and reporting platform for state and local governments
  - U.S. DOE, [ESPC Toolkit](#)
  - U.S. DOE, [Performance Contracting National Resource Center \(PCNRC\)](#), which is in the process of developing a training certificate program for Owners' Representatives



# ELECTRICITY MARKETS & POLICY

U.S. DEPARTMENT OF  
**ENERGY**

Office of  
ENERGY EFFICIENCY &  
RENEWABLE ENERGY

## The Business Case for Conducting Measurement and Verification In State and Local Government Energy Savings Performance Contract Projects

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U.S. DEPARTMENT OF  
**ENERGY**

Office of  
ENERGY EFFICIENCY &  
RENEWABLE ENERGY

## Understanding Your ESPC Savings Guarantee

This guide summarizes some of the important aspects of savings guarantees in energy savings performance contracts (ESPCs) and includes links to reference documents for readers who want more detail. Many ESPC customers look at the savings guarantee, and the methods used to verify whether the project is meeting it, as a simple calculation. In fact, the measurement and verification (M&V) of an ESPC savings guarantee is similar to a good financial audit: it verifies whether the project is producing the guaranteed savings, identifies specific areas of concern that may require attention, and may highlight opportunities for additional savings.

### Definition of Savings

to be agreed upon by the customer and energy service company (ESCO)<sup>1</sup>.

The pre-project utility usage, O&M, and sometimes other relevant expenses (e.g., planned capital costs) are captured in a calculation called the baseline, which factors in historical utility usage and O&M expenses for the equipment that the project will replace or retrofit. A baseline may be established for the facility's entire usage of a given utility (such as electricity or natural gas) or it may be focused solely on the consumption of one system or piece of equipment the ESCO plans to upgrade (in which case there can be many individual baselines). Baseline calculations rely on a set of variables, such as weather and occupancy, which influence utility usage (these are described in detail on page 2). Customers and ESCOs should be sure that they have a clear, mutual understanding of the project's baselines and the factors that go into them.

in each measure's M&V approach. The following examples illustrate some of the considerations.

**Simpler Retrofits:** In a basic lighting project, the risk of not achieving savings and the potential for discovering additional savings opportunities are relatively low. Consequently, the ESCO and customer could agree to a pre- and post-retrofit measurement of key variables (e.g., the number and wattage of the fixtures) to be performed by the ESCO and witnessed by the customer. If the lighting retrofit involves the extensive use of sensors or a building automation system (BAS) that automatically turns fixtures on and off or adjusts brightness, the M&V might require continuous monitoring through meters, as well as more ongoing analysis of metered data and other factors.

**Comprehensive Projects or Substantial Renovations:** If the lighting retrofit is

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

National Laboratory

ESC)  
f Energy Service Companies (NAESCO)  
State Energy Officials (NASEO)

This work was funded by the U.S. Department of Energy Weatherization and Intergovernmental Programs Office under Contract No. DE-AC02-05CH11231.



## The Business Case for Conducting M&V

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How M&V provides cost-effective value for state and local government ESPC projects

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# Why is effective M&V necessary for ESPC?

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- ❑ M&V is the *only* activity that provides the basis for enforcement of the savings guarantee
- ❑ Enables customer to hold the ESCO accountable for factors attributable to the ESCO
- ❑ Without M&V, the facility owner cannot know if the project is achieving or will achieve the guaranteed level of cost, energy, water and other savings
- ❑ When done well, M&V enables ESPC success by correctly documenting results over time
- ❑ M&V is necessary to ensure that project costs are actually being paid from savings
  - Critical when statute/regulations *require* project be paid from savings
  - Identifies and correctly attributes any savings shortfalls
  - Identifies and quantifies necessary remedies



# What are the benefits of well-executed M&V?

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- ❑ **Assures project meets minimum legal requirements for demonstrating ESCO has met guarantee**
- ❑ **Identifies causes of, and possible remedies for, savings shortfalls**
- ❑ **Enables accurate reporting of project and program results to stakeholders**
- ❑ **Identifies opportunities to further optimize equipment and systems performance**
- ❑ **Quantifies non-energy savings for other goals, e.g., job creation, or emissions and waste reduction**





# How do I maximize the value of M&V?

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- ❑ **Incorporate M&V from the very start of project development through the performance period**
- ❑ **Enlist third-party technical support such as an Owner's Rep to ensure technical and contractual aspects of M&V are reasonable and clear**
- ❑ **Understand and use the appropriate M&V approaches for the complexity and risk level of the measures**
- ❑ **Conduct M&V for multiple performance years**
  - Building operations can change over time; equipment can fail; M&V can detect and mitigate shortfalls that crop up years into a project
  - It is important to ensure that building owner or Owner's Rep actually reviews annual M&V reports and follows up with ESCO on issues



# Business Case for M&V Example #1

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- **A university caught a significant shortfall undetectable through metering alone**
  - ▣ Capital project value: \$1.3 million
  - ▣ Guaranteed annual savings: \$81,000
  - ▣ M&V methods: IPMVP Options A and D<sup>1</sup>
- **Discovery and outcome**
  - ▣ Scheduled 3-month M&V “check-up” by the ESCO revealed the project was heading for a 40% annual savings shortfall - attributable both to the university and ESCO
  - ▣ University pleased – M&V caught what their metering could not
  - ▣ ESCO provided remuneration and additional work to remedy their portion of the issue

<sup>1</sup>The four International Performance Measurement and Verification (IPMVP) Options are Retrofit Isolation with Key Parameter (A), Retrofit Isolation with All Parameter (B), Whole Facility Measurement (C), and Calibrated Simulation (D).



# Business Case for M&V Example #2

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- ❑ **Maryland Office of Energy and Sustainability able to hold ESCO accountable for substantial shortfall**
  - ❑ Capital value: \$18 million
  - ❑ Annual savings guarantee: \$1.8 million
  - ❑ M&V method: IPMVP Option C
- ❑ **Discovery and outcome**
  - ❑ First performance year M&V report showed significant shortfall
  - ❑ Cause and attribution of shortfall was disputed
  - ❑ Documentation from required ongoing M&V enabled the state to definitively hold the *ESCO* accountable for a \$900,000 annual shortfall
  - ❑ Without rigorous ongoing M&V, the state would likely have settled for a far lower and inaccurate shortfall amount on the part of the ESCO



## Understanding Your Savings Guarantee

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What it does – and doesn't – protect you against

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# First, how do we define savings?

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$$\text{Energy/Water Use}_{\text{pre}} - \text{Energy/Water Use}_{\text{post}}$$

## □ Is it really that simple?

- ▣ Will ESCO assume risk of hours that lights are on? Facility size?  
How about the loads (including due to weather) on the chiller?
- ▣ Answer: Sure, if you pay them to ...
  - These are risk factors ESCOs can't control, hence their reluctance

## □ What about the bucks? Are energy rates considered?

- ▣ While savings are often expressed in dollars, those are subject to energy rates ... that are stipulated in the contracts.
- ▣ So the real guarantee is for energy *units* (kWh, MMBtu, etc.)



# Guarantees hinge on M&V “baselines”

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$$\text{Energy/Water Use}_{\text{pre}} - \text{Energy/Water Use}_{\text{post}}$$

- **Baselines are the “pre” condition**

- And can be for whole facility (e.g., all the electricity use for bldg.) or for individual ECMs (e.g., electricity for the overhead lighting)
  - In latter case, need to be separately measured/metered

- **Baselines come with usage and load assumptions**

- E.g., that lights will be on for 12 hours/weekday
- Assumptions should be based on IGA measurements
- Assumptions are used to compute usage in “post” condition – whether or not they still represent *actual* conditions





# Is all this assuming *fair*???

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**Energy/Water Use<sub>pre</sub> – Energy/Water Use<sub>post</sub>**

- **Yes, in general**

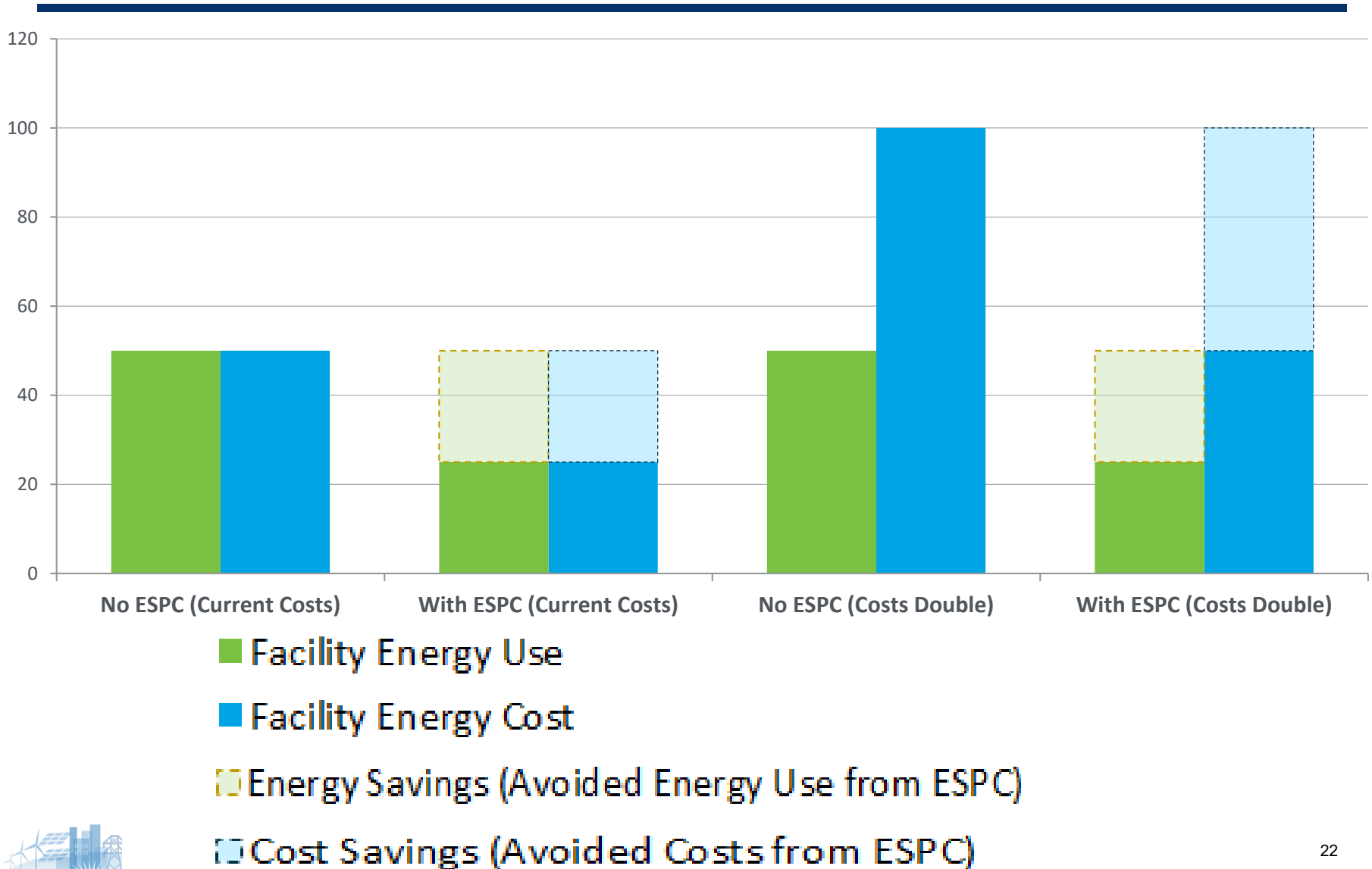
- Goal should be to hold ESCO responsible for eqpt. performance ... but not for things it doesn't control (hours, loads, etc.)

- **Key is to make sure assumptions are realistic**

- Is it reasonable to expect lights will be on 12 hours/weekday?
  - Depends – what do your facility people think?
- Is it reasonable to expect electricity rates will go up 5%/yr.?
  - Probably not – and do you want to take that risk?
  - Tip: DOE has a tool (EERC) to help estimate rate escalation



# ESPC is a great hedge against rising energy prices!



## Strategies for M&V Success

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Tested strategies for effective M&V employed by state  
ESPC program administrators

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# What is successful M&V?

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- ❑ Ensures project meets contractually specified level of energy, water and/or other savings
- ❑ Where required, ensures project costs are covered by savings and add no financial burden to government
- ❑ Involves everyone who has a stake in the project
  - ▣ I.e., the business and technical sides of the organization
- ❑ Is a key part of *all* phases of project development--from the ESCO RFP through the IGA, contract and annual performance reports
- ❑ M&V plans and execution that meet additional specific objectives of the program and/or building owner



# M&V Strategies Overview

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- **The strategies in this document were the result of extensive interviews with state ESPC administrators**
- **We highlight successful strategies that have been implemented at two key levels:**
  - ▣ **State ESPC program level**
  - ▣ **Individual project level**
- **Different strategies may be appropriate for different organizations depending on the jurisdiction's regulatory authority, resources and administrative structures**



# Key Strategies: State Program Level

Strategy	Condition or Level of Authority Needed
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
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
Communicate impacts broadly	Can generally be implemented by all organizations
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 institutions, e.g., K-12 schools, colleges and state universities, local governments, and state government facilities
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)
Employ a robust, accessible ESPC results tracking and document preservation system	Can require state-level funding to develop a system or can use the DOE's free, web-based energy project data tracking tool, eProject eXpress



# Key Strategies: Individual Project Level

Strategy	Situation or Level of Authority Needed
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
Engage all key decision makers in M&V plan development	Can generally be implemented by all organizations with sufficient staff
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
Ensure M&V plan is robust	Can require third-party technical expertise, provided by state program or procured by facility
Ensure O&M plan supports persistent savings	Can require third-party technical expertise, provided by state program or procured by facility



# eProjectExpress Tracking & Reporting Tool

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- New free, streamlined online tool for state/local ESPC project tracking and reporting
- Enables quick generation of custom reports
- Enables secure project file storage and quick retrieval in perpetuity
- Enables programs and project owners to evaluate and communicate project successes to stakeholders and the public



- Register for Aug. 19, 1pm EDT eProject eXpress training webinar: <https://register.gotowebinar.com/register/6713582131469446926>
- Register for an account: <https://eprojectbuilder.lbl.gov>



# Resources and Contact Information

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## Resources:

- ❑ [ESPC Project and Program Principles](#)
- ❑ [Evaluating ESPC Results](#) (includes the M&V resources presented today)
- ❑ [DOE ESPC Toolkit](#)
- ❑ [ESC Key Attributes for Guaranteed Energy Savings Performance Contracting Program Readiness](#)
- ❑ [DOE Performance Contracting National Resource Center \(PCNRC\)](#)



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