

Welcome to Today's Training for State and Local grantees on **Energy Savings Performance Contracting: Savings Measurement and Verification (M&V)**

Some tips before we get started...

- Session will be recorded
- All attendee phone lines are muted
- Please submit your questions via the **Questions** window
- As many questions as possible will be answered during and at the end of the session
- Presentation slides along with the summary of ALL questions and answers will be sent to attendees a few days after the training



The Parker Ranch installation in Hawaii

Energy Savings Performance Contracting: Savings Measurement and Verification for State and Local grantees

Date:

**ARRA EECBG Recipient
Webinar Series**

What is TAP?

DOE's Technical Assistance Program (TAP) supports the Energy Efficiency and Conservation Block Grant Program (EECBG) and the State Energy Program (SEP) by providing state, local, and tribal officials the tools and resources needed to implement successful and sustainable clean energy programs.



TAP offers –

- One-on-one assistance
- Extensive online library, including –
 - Webinars
 - Events Calendar
 - TAP Blog
 - Best practices and project resources
 - Facilitation of peer exchange

Topics include –

- Energy efficiency and renewable energy technologies
- Program design and implementation
- Financing
- Performance contracting
- State and local capacity building

Access the TAP Blog!
<http://www.eereblogs.energy.gov/tap/>

Provides a platform for state, local, and tribal government officials and DOE's network of technical and programmatic experts to connect and share best practices on a variety of topics.

Technical Assistance Program Blog

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Local Energy Rebate Programs

June 11, 2010 11:19 | [Comments \(1\)](#)

Maggie from Florida asks: Anyone implement an energy rebate program at a local level? Is it being managed by staff or was it contracted out competitively? Any advice on how to best implement/manage such a program?

The TAP Team responds: There are quite a few good examples of energy programs offered at a local level that offer rebates, technical assistance and other incentives. A few of these include the following:

- The City of Charlottesville and Albemarle County in Virginia jointly formed the Local Energy Alliance Program (LEAP) which is creating and administering energy efficiency (EE) programs for the residential sector. The Southeast EE Alliance (SEEA) seed funded the creation of LEAP in 2009 and the county and city have each allocated EECBG funds for LEAP to take programs to scale. They are currently working on rebates, incentives, and a local contractor network to deliver services to the residential sector. LEAP site: www.leap-va.org
- The town of Babylon, New York has rolled out the Long Island Green Homes Program in which residents can make energy efficient improvements to their homes at little or no cost and without assuming new debt through some innovative municipality-based financing initiatives. <http://www.townofbabylon.com/shadesnew.cfm?id=252>
- The Cambridge (Massachusetts) Energy Alliance is a not-for-profit organization created to save residents money, while reducing Cambridge's carbon footprint. The Alliance is working with homeowners, businesses and institutions across the city to achieve unprecedented levels of energy savings and to expand clean energy sources. They offer:
 - Comprehensive energy assessments/audits for Cambridge buildings, generally for free
 - Up to 30% reductions in energy bills
 - Energy efficiency upgrades with no up front cash required
 - A one-stop energy solution with guaranteed quality
 - See: <http://cambridgeenergyalliance.org/>
- The ClimateSmart programs are run by the City of Boulder, Colorado's Office of Environmental Affairs. For information on Boulder's programs, see: http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=1068&Itemid=336

The management of these programs varies. The municipalities listed above include both municipal staff tasked with running these programs and others that have an outside non-profit organization providing services on behalf of the municipality. There are other examples of municipalities that outsource these services to for-profit consulting firms (Charleston, SC is about to put out an RFP to hire one).

There is not one best way to go on implementing/managing municipal EE programs. There are good reasons and justifications for each of these three models. If the municipality is

BLOG HOME

PAGES

- [TAP Blog Policy](#)

ABOUT THE BLOG

The Technical Assistance Program Blog provides a platform for state, local, and tribal government officials that receive funding from the DOE State Energy Program and Energy Efficiency and Conservation Block Grants to connect with technical and programmatic experts and share best practices about their renewable energy and energy efficiency programs. Click find what you're looking for? Contact the TAP Blog Team via email to suggest a topic or submit materials you'd like to share.

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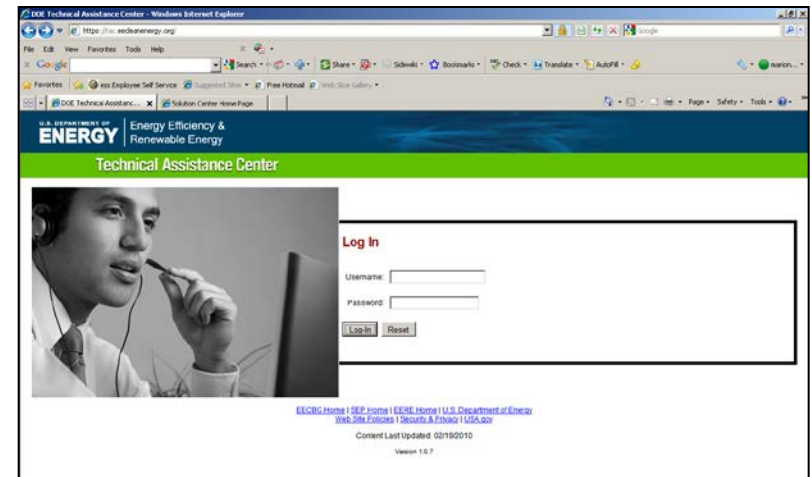
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via the [Solution Center](#)



2) Submit a request via the
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3) Ask questions via our call center at
1-877-337-3827 or email us at
<http://www1.eere.energy.gov/wip/solutioncenter/default.html>

Measurement & Verification (M&V)

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



The Parker Ranch installation in Hawaii

**Energy Savings Performance
Contracting: Savings
Measurement and Verification
for State and Local Grantees**

**ARRA EECBG Recipient
Webinar Series**

This webinar will cover:

- M&V Background
- Energy Savings M&V
- M&V Methods
- The M&V Plan
- M&V Report

M&V Background

- Measurement and Verification (M&V) is the process used to evaluate performance of an energy savings project to support a guarantee of performance from an Energy Services Company (ESCO)
- A performance guarantee allows a building owner to invest in an energy savings project by providing confidence that the investor will either achieve a desired level of savings OR recover a shortfall for underperformance

- An ESCO guarantees performance it can control
 - that rarely covers all risks in a project
- An effective M&V plan shares risks between the owner and the ESCO:
 - Risk of operating a facility is usually borne by the owner
 - Equipment performance is usually covered by the ESCO
 - Maintenance to ensure savings may be taken on by ESCO and/or owner
 - Market price for energy can rarely be underwritten by the ESCO

THE EARLY DAYS

- Shared Savings
- ESCO direct Financing



PRESENT DAY

- **E**fficiency **V**aluation **O**rganization (EVO)
- 14 years of **I**nternational **P**erformance **M**easurement and **V**erification **P**rotocol
- Universally accepted



Energy Savings M&V

- Establish energy usage baseline
- Establish baseline adjustment procedures
- Determine IPMVP M&V method for each energy conservation measure (ECM):
 - Method A: Retrofit isolation – key parameter
 - Method B: Retrofit isolation – all parameters
 - Method C: Whole facility – continuous measurement
 - Method D: Calibrated Simulation – engineering modeling
- Stipulated savings

- Identify baseline period
- Baseline energy consumption and demand data
- Independent variables coinciding with energy data
- Static data coinciding with energy data
- Witnessing by client is important

- Routine Adjustments
 - Weather
 - Occupancy
 - Operating hours
 - Temperature settings
- Non Routine Adjustments
 - New equipment
 - Changes in use of space e.g. office to lab space
 - Demolition
 - Add cooled/heated space previously not cooled/heated
- $\text{Energy savings} = \text{adjusted baseline} - \text{actual usage}$

- Method A: Retrofit Isolation – Key Parameter Measurement

Short term or continuous measurement of key operating parameters: parameters not measured are estimated

Example: lighting retrofit – shortterm measurement – operating hours are estimated (agreed to) or measured in the audit phase

- Method B: Retrofit Isolation – All parameter Measurement

Shortterm or continuous measurement of all parameters

Example: Lighting retrofit – continuous measurement of power, lightson time and room occupancy

- Method C: Whole Facility Measurement
Continuous Measurement of the whole facility's energy use

Example: Building with several ECMs and expected savings are above 10% of total baseline usage. Interaction of ECMs is difficult to determine

- Method D: Calibrated Simulation

Savings are determined through simulation of the energy use of the whole facility, calibrated against the utility bills.

Example: Facility with multiple ECMs where no utility meter was available during the baseline period

- Stipulated savings:
 - ⌘ Not measured
 - ⌘ Small compared to overall savings
 - ⌘ Too small to cost-effectively measure
 - ⌘ Moves risk from ESCO to owner

The M&V Plan

IF YOU DON'T UNDERSTAND IT :

DON'T SIGN IT

In accordance with IPMVP 2010, the M&V plan should cover 13 specific topics:

- ECM Intent
- Selected IPMVP Option and Measurement Boundary
- Baseline: Period, Energy and Conditions
- Reporting Period
- Basis for Adjustment
- Analysis Procedure
- Energy Prices

- Meter Specifications
- Monitoring Responsibilities
- Expected Accuracy
- Budget
- Report Format
- Quality Assurance

- Additional Topics
 - For Method A:
 - Justification of estimates
 - Periodic inspections
 - For Method D:
 - Software name
 - Input/Output data
 - Measured data
 - Calibration

The M&V Reconciliation Report should include:

- Energy data for the reporting period
- Values of independent variables – weather, occupancy and variables that affect energy usage
- Justification for corrections made to any data
- Handling of bad or missing data
- Agreed estimated values for Option A
- Energy rates used
- Details on non-routine adjustments
- Computed savings in both energy units and dollars
- Emissions reduction

- For a copy of the 2010 International Performance Measurement and Verification Protocol, Volume 1, go to: www.evo-world.org
- Download the correct language version
- IPMVP Volume III, Concepts and Practices for Determining Savings in Renewable Energy Technologies Applications (2003)
- FEMP M&V Guidelines
http://www1.eere.energy.gov/femp/pdfs/mv_guidelines.pdf

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