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

DOE Technical Assistance Program

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

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.

How Can TAP Help You?

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

The TAP Blog

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.

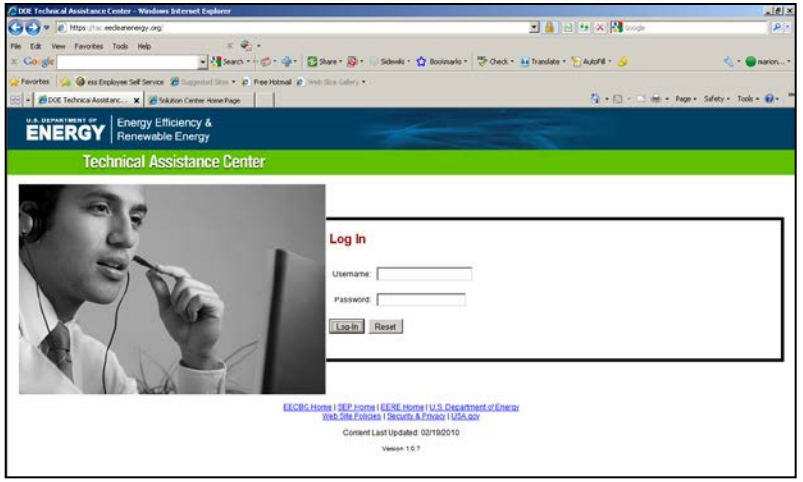
Accessing TAP Resources

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

We encourage you to –

1) Explore our online resources via the Solution Center

2) Submit a request via the Technical Assistance Center



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:

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

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

M&V Background

Purpose of (M&V)

- 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

Risk and M&V

- 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

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

Energy Use Baseline

- 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

Baseline Adjustments and Energy Savings

- 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

- Energy savings = adjusted baseline – actual usage

IPMVP Method A

- 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

IPMVP Method B

- 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

IPMVP Method C

- 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

IPMVP Method D

- 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

- 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

The M&V Plan

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

M&V Plan (cont'd.)

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

M&V Plan (cont'd.)

- 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

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

Additional Information

- 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

Questions?

DOE Team Lead

Chani Vines: chani.vines@ee.doe.gov

ESPC Technical Assistance Team Contacts

- Irina Bulkley-Hopkins: Irina_Bulkley-Hopkins@sra.com
- Karl Berntson: Karl_Berntson@sra.com

Upcoming Webinars

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

Please join us again for additional Webinars:

- Title:
  Host:
  Date:
  Time:

- Title:
  Host:
  Date:
  Time:

- Title:
  Host:
  Date:
  Time:

For the most up-to-date information and registration links, please visit the Solution Center webcast page at www.wip.energy.gov/solutioncenter/webcasts