International Performance Measurement and Verification Protocol

International Energy Efficiency Financing Protocol

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ABOUT EVO

Efficiency Valuation Organization (EVO)

www.evo-world.org

– A non-profit corporation
– Led by volunteers around the world
– Administrative office in Sofia, Bulgaria.
EVO

• **Vision**
  
  A global marketplace that correctly values the efficient use of natural resources and utilizes end-use efficiency options as a viable alternative to supply options

• **Mission**
  
  To develop and promote the use of standardized protocols, methods and tools to quantify and manage the performance risks and benefits associated with end-use energy efficiency, renewable energy, and water efficiency business transactions
EVO

- **Protocols**
  - IPMVP, IEEFP

- **Training, Certification**
  - Also joint with the Association of Energy Engineers

- **Building Community, Promoting Efficiency**
  - Subscriber services through www.evo-world.org: industry newsletter, discussion forums, library, discounts, pre-release access to public documents
  - World wide partnerships for communication, training and development
IPMVP - Overview

• Presents a **framework** and **defines terms** used in determining ‘savings’ after implementation of a project.

• Specifies the topics to be addressed in an **M&V Plan** for a specific project.

• **Allows flexibility** in creating M&V Plans, while adhering to the principles of: **accuracy**, **completeness**, **conservativeness**, **consistency**, **relevance** and **transparency**.
### IPMVP - Documents

- **IPMVP Vol. II** - Concepts and Practices for Improved Indoor Environmental Quality
- **IPMVP Vol. III** - Applications
  - Part II  Concepts and Practices for Determining Energy Savings in **Renewable** Energy Technologies Applications
What is M&V?

“Measurement & Verification (M&V) is the process of using measurements to reliably determine actual saving created within an individual facility by an energy management program.”

Ref: IPMVP Vol I, 2007, Section 9
Measure Savings?

- Savings are the absence of energy use.
- We can *not* measure what we do not have.
- We do *not* ‘measure’ savings!

- We *do* measure energy use.
- We *analyze* measured energy use to **determine** savings.
A Notional Baseline

Baseline + Adjustments

Savings

Metered Energy

Baseline Period

Reporting Period

Energy

250,000

500,000

750,000

1,000,000

Introduction 10
The M&V Spectrum

**No M&V**
- No extra cost (or more left to spend on retrofits)
- Most energy retrofits since 1975
- Low cost M&V without the M, just the V

**Full M&V**
- Maximize savings
- Savings persistence
- Energy users needing performance demonstration or guarantee (mostly utilities & public buildings) - since 1990
Two Basic Methods

Whole Facility Method:
Measures **all** effects in the facility:
- Retrofits AND other changes (intended and *un*intended)
- Often uses the utility meter
- Adjustments can be complex

Retrofit Isolation Method:
Measures the effect of the retrofit, **only**
- Savings are unaffected by changes beyond the measurement boundary
- Usually needs a new meter
- Adjustments can be simple
### A. Retrofit Isolation: Key Parameter Measurement

**Savings** are determined by field measurement of the key performance parameter(s) which define the energy use of the ECM’s affected system(s) and/or the success of the project.

Measurement frequency ranges from short-term to continuous, depending on the expected variations in the measured parameter, and the length of the **reporting period**.

Parameters not selected for field measurement are **estimated**. Estimates can be based on historical data, manufacturer’s specifications, or engineering judgment. Documentation of the source or justification of the estimated parameter is required. The plausible savings error arising from estimation rather than measurement is evaluated.

<table>
<thead>
<tr>
<th>IPMVP Option</th>
<th>How Savings Are Calculated</th>
<th>Typical Applications</th>
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</table>
| A. Retrofit Isolation: Key Parameter Measurement | Engineering calculation of baseline and reporting period energy from:  
- short-term or continuous measurements of key operating parameter(s); and  
- estimated values.  
_Routine and non-routine adjustments as required._ | A lighting retrofit where power draw is the key performance parameter that is measured periodically. Estimate operating hours of the lights based on building schedules and occupant behavior. |

### B. Retrofit Isolation: All Parameter Measurement

**Savings** are determined by field measurement of the energy use of the ECM-affected system.

Measurement frequency ranges from short-term to continuous, depending on the expected variations in the savings and the length of the **reporting period**.

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<th>IPMVP Option</th>
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| B. Retrofit Isolation: All Parameter Measurement | Short-term or continuous measurements of baseline and reporting-period energy, and/or engineering computations using measurements of proxies of energy use.  
_Routine and non-routine adjustments as required._ | Application of a variable-speed drive and controls to a motor to adjust pump flow. Measure electric power with a kW meter installed on the electrical supply to the motor, which reads the power every minute. In the baseline period this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to track variations in power use. |
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<th><strong>C. Whole Facility</strong></th>
<th><strong>D. Calibrated Simulation</strong></th>
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<tr>
<td><em>Savings</em> are determined by measuring energy use at the whole <em>facility</em> or sub-<em>facility</em> level. Continuous measurements of the entire <em>facility’s energy</em> use are taken throughout the <em>reporting period</em>.</td>
<td><em>Savings</em> are determined through simulation of the energy use of the whole <em>facility</em>, or of a sub-<em>facility</em>. Simulation routines are demonstrated to adequately model actual energy performance measured in the <em>facility</em>. This Option usually requires considerable skill in calibrated simulation.</td>
</tr>
<tr>
<td>Analysis of whole <em>facility baseline</em> and <em>reporting period</em> (utility) meter data. <em>Routine adjustments</em> as required, using techniques such as simple comparison or regression analysis. <em>Non-routine adjustments</em> as required.</td>
<td>Energy use simulation, calibrated with hourly or monthly utility billing data. (Energy end use metering may be used to help refine input data.) Multifaceted energy management program affecting many systems in a <em>facility</em>. Measure energy use with the gas and electric utility meters for a twelve month <em>baseline period</em> and throughout the <em>reporting period</em>.</td>
</tr>
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</table>
IPMVP
Resume and benefits

• IPMVP
  – Leading international standard in M&V protocols
  – Used in more than 40 countries
  – Available in 10 languages
  – Cited as basis for numerous US federal, state and utility M&V protocols
  – Recognized as best practice by many government and utility energy-efficiency programs and emission trading regimes around the world

• Benefits of Adherence:
  – Substantiation of payments for performance
  – Lower transaction costs in an energy performance contract
  – International credibility for energy-savings reports
  – Enhanced LEED™ building rating
  – Promotion and achievement of resource efficiency and environmental objectives
International Energy Efficiency Financing Protocol ("IEEFP")
The Barriers

One of the most significant barriers to widespread implementation of clean and proven energy efficient technologies around the world is the lack of reliable and commercially-viable financing to:

• End Users
• Developers (includes “ESCOs”)
• Contractors
• Manufacturers and Vendors
The Disconnect

Problem is NOT a lack of available funds!
Problem is getting access to available funds at Local Financial Institutions (“LFIs”)
Caused by a Disconnect with LFIs’ current “asset-based” lending practices
Most energy efficiency markets are not developed/organized enough to motivate LFIs to invest in a new EE product line.
EVO SOLUTION
IEEFP

• Focuses on the “Savings Value” of EEPs for loan repayment and credit capacity review

• Trains LFIs on the intricacies of financing EEPs

• Creates procedures/guidelines for evaluating and assessing benefits/risks of financing EEPs

• Creates sustainable lending infrastructure at a “grassroots” level within local Economies.
EVO SOLUTION
IEEFP

• Provides Minimum Criteria for EEP lending ratios/terms and use of “proven” technologies

• Develops generic terms and conditions to be included in various financing agreements

• (Savings M&V, Commissioning, Warranties)

• Develops and mandates use of standardized savings protocols based on “IPMVP”

• Creates training manuals, workshop materials and case studies for LFIs
“PERMANENT”
A 28 month EU Project

Funded under
Intelligent Energy for Europe
PERMANENT

The Acronym stands for

Performance Risk Management for Energy efficiency projects through Training
PERMANENT Stated Objective

To enhance the rate of investment in EE projects in

- Bulgaria
- Croatia
- Czech Republic
- Poland
- Romania

by addressing the fear of EE permanence.
PERMANENT Plan

To educate financiers, project developers and energy users about:

• How EE projects can be demonstrated to have PERMANENT results; and

• How that PERMANENCE breaks the distrust barrier.
Markets & People

Markets:
• Industrial
• commercial (e.g. office, retail)
• multiple residential
• institutional (e.g. education, health care)
• and government (e.g. office, military, etc).

People:
• Managers
• financiers and technical personnel
• energy service companies, consulting engineers, banks and insurance companies.
Method

- Adapt widely accepted guidelines (IPMVP and IEEFP) to local conditions. Add them to the library of Efficiency Valuation Organization (EVO), for life after PERMANENT.

- Train instructors and customize EVO’s training materials.

- Promote and run awareness and training sessions.
Target Results

- Recognition amongst energy users, financiers and emerging ESCOs of the need for, and how to evaluate and finance EE projects, how to measure their results, and where to find related resources;

- Improved quality of monitoring and verification of end user projects;

- Improved quality of EE project designs;

- Increased international trade in emission reduction commodities.
Target “Indicators”

- 2,000 persons directly exposed to M&V educational sessions and 1,200 copies of the adapted IPMVP distributed in 6 languages.
- 1,000 end users will be trained and more will be made aware of the techniques for managing performance risks in guaranteed savings projects.
- 100 European and international institutions and professional bodies and authorities informed about the project through 7 Newsletters.
- 2-3,000 institutions in total receive the 7 Newsletters.
- At least 5 events in each country, i.e. 25 events with audience of about 70 – 100 persons (2,000 informed).
- 20-30 qualified trainers created.
- International conference organised for at least 100 professionals and other EU energy performance projects.
Partner Roles

Maicon:
• Main Vehicle for imparting Know How
• introduce EVO & IPMVP & IEEFP to local experts
• negotiate customizations with EVO (WP2 Zagreb +);
• train local instructors.

EEE, EnEffect, EnergoECO, Enviros, FEWE and HEP-ESCO:
• identify local customizations
• provide potential instructors to be trained
• promote and deliver local awareness and training activities.

After PERMANENT potentially continue training as a business opportunity.
THANK YOU

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