MEASUREMENT AND VERIFICATION 2003

The Why ... some questions

How do you judge the accuracy of engineering predictions?

How do you know if you are getting promised results?

How do bankers know if the financed projects are delivering as promised?

What is the owner really paying the ESCO for?

The answer is:

MEASUREMENT…

MEASUREMENT AND VERIFICATION 2003

The Why ... some questions

How do we know where we were?
Where we are?
Where we are going?
And if we got there?

The answer is:

Measurement

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The Why

To create some certainty out of uncertainty

To determine effectiveness of measures taken

To track savings trends

If payment is to change hands based on savings, then some means of assuring the savings actually occurred is needed

To assure the savings can be attributed to the party that initiated the energy measures

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The When:

Full planning of the M&V strategy must wait until the potential energy measures are known.

There is no point in assessing the HVAC system if lighting is the only cost-effective measure to be taken.

Accurate baseyear data and existing conditions must be the first step.

Faulty hindsight leads to inaccurage measurement, disagreements and legal problems.

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The Where: Determinants

- Project size
- Consistency of usage, patterns
- Measures selected
- Type of savings documentation needed
- Payments related to savings achieved
- Instrumentation available
- Whether permanent installation is warranted
- Accuracy required; cost of that accuracy

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Guidance Available:

~~NEMVP~~ ~~BMVP~~ IPMVP$_{2001}$

To obtain the IPMVP:

- As a book call (800) DOE-EREC
- Fax request with name, address & phone number to EREC at (703) 893-0400
- Via E-mail EREC at doe.erec@nciinc.com
- Via world wide web www.ipmvp.org

ASHRAE 14; FEMP Guidelines

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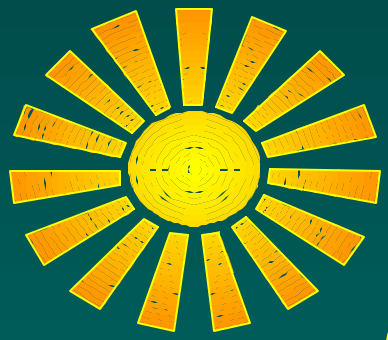

Building on a history of experience and success...

NEMVP

IPMVP 1997

- *27 countries*
- *translated 11 languages*
- *World Bank & IFC require it in EE projects*

- *Experts from 25 countries,*
- *100+ organizations,*
- *An international Executive Committee, and*
- *A great Technical Committee*

IPMVP 2001

Kiona International

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Sources of information in Brazil:

Alan Poole is on IPMVP Advisory Committee

INEE has taken lead in translating the documents into Portugese

Pericles Pinheiro has experience in commerical applications

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Now 3 Volumes:

Volume I: Concepts and Options for Determining Savings

Volume II; Indoor Environmental Quality

Volume III: New Construction and Renewables (2003)

Volumes I and II are available on the web

ipmvp.org

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Four Options in Volume I:

Option A. Partially Measured Retrofit Isolation

Option B. Retrofit Isolation

Option C. Whole Building

Option D. Calibrated Simulation

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OPTION A. Partially Measured Retrofit Isolation

Intended for measures where end use capacity, demand or power level (kW) can be measured using one-time, *in situ* measurements or accurately assessed manufacturer's measurements; AND energy consumption or hours of operation are known in advance (or stipulated) and agreed to by both parties.

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Option B: Measured Capacity; Measured Consumption

Intended for measures where end use capacity, demand or power level can be established by a measured baseline before the retrofit; *and* continuous consumption of the equipment or sub-system can be measured post-installation for a selected period of time.

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OPTIONS A & B CAUTIONS

- Measures are not additive
- Retrofit isolation does not treat interaction among measures

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Option C: Whole-facility; Main Meter Measurement

Appropriate where whole-facility baseline and post-installation data are available to measure savings. Option C usually relies on *continuous* measurement of whole-facility energy use and electric demand for a specific time before retrofit, *and continuous* measurement of whole-facility energy use and demand post-installation.

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Option D: Calibrated Simulation Model

To be used where calibrated simulations of baseline energy use and/or calibrated simulations of post-installation energy consumption can be used to measure savings. Applicable for whole building or equipment subsystem analysis. Can be used to confirm equipment performance or for one-time "snap shot" measurements.

THE BOTTOM LINE

Only get the amount of accuracy the project can justify/afford.

And only as much data as you will really use.

Don't let the tail wag the dog.