

BPA M&V Protocol Updates & Developments

Presented at Oregon APEM Winter Forum
December 2, 2011
Linfield College, McMinnville OR



BPA M&V Protocol

Presentation Purpose

- Provide background for updates and developments
- Focus on current and future project/program implementation
- Address current practices, an increased emphasis on M&V, and the benefits and challenges of integrating new M&V practices at the program/portfolio level



Originally, BPA M&V Protocol Update & Development Project Goals were to:

- Identify gaps compared to best practices and BPA efficiency activities
- Identify tools and software
- Payment periods of incentives
- Address uncertainty: data to be acquired, data collection periods, precision of calculations, etc
- Evaluation versus M&V: how and when savings claimed, true-ups, free-ridership
- M&V frameworks developing elsewhere



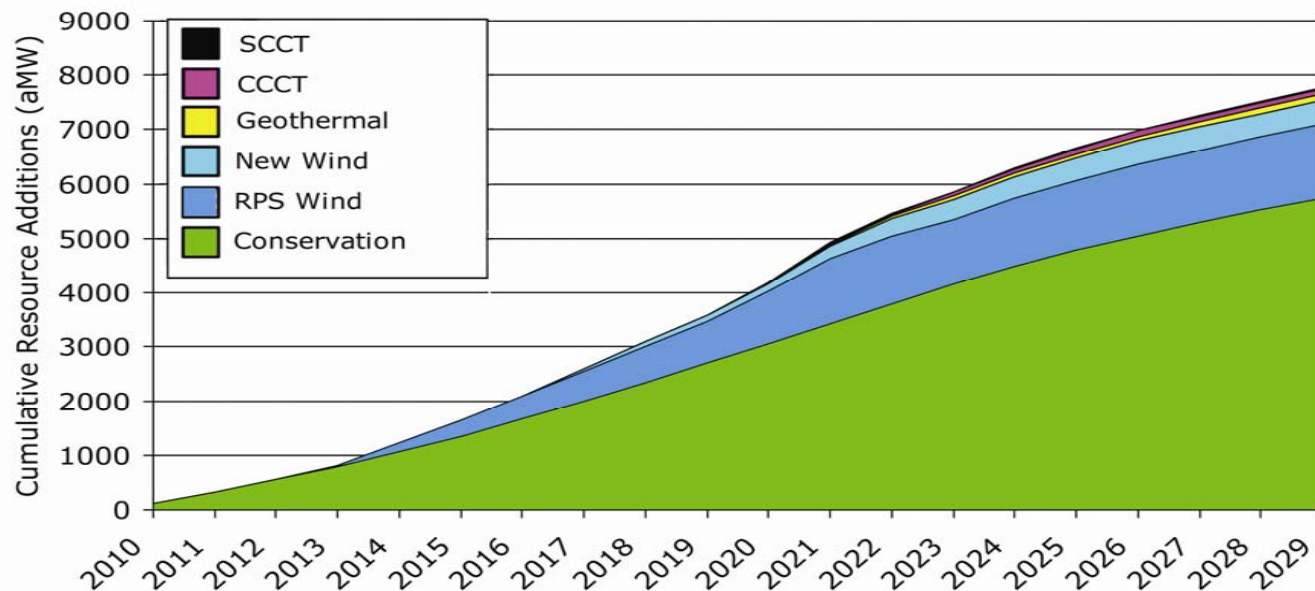
With a Recognition of the Following:

- Increases in aMW Savings Targets
- Different Program Sectors, including 3rd Party Programs
- Regional Consistency
- Advancing Capabilities in Monitoring and Reporting Equipment/Systems
- Recent Custom Project M&V Plans Implemented and Available in Planning, Tracking & Reporting System
- Cost-Effective Resource Acquisition

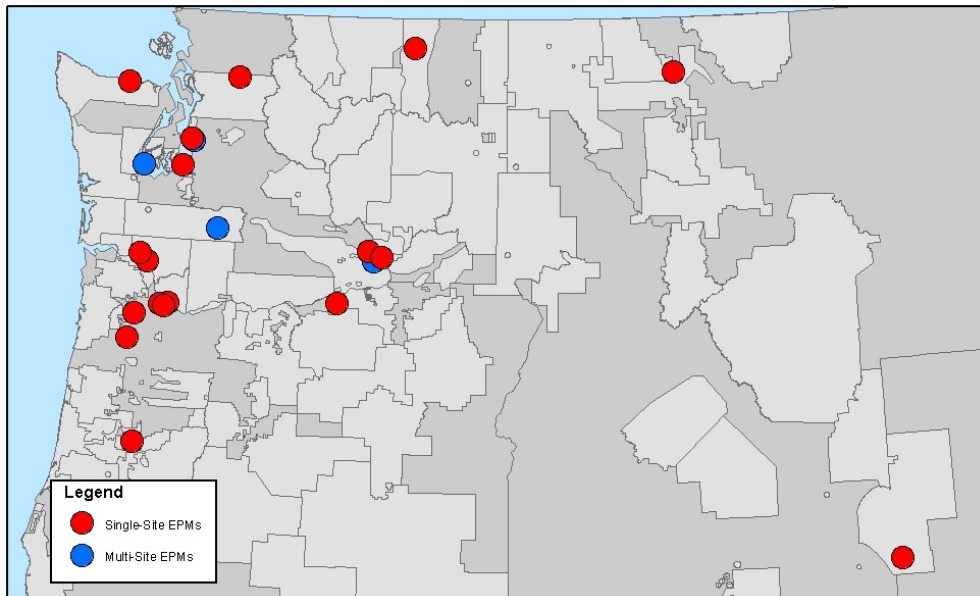


NWPCC 6th Plan – Increasing Energy Efficiency Savings Targets

6th Plan Representative Resource Development Schedule



A Large Territory with Many Miles Between Project Sites...



BPA's M&V Protocol Update and Development Activities Included:

- A review of BPA's site-specific M&V protocols, referencing:
 - National best practices
 - BPA's efficiency resource acquisition activities
- Making recommendations for revising and augmenting protocols (Phase 1)
- Drafting and revising the protocols and guides (Phase 2) - *Now Final... Finally!*



A Phase 1 Deliverable...

research/intro/action™

Final Report
Research Supporting an Update of BPA's Measurement and Verification Protocols

Funded By:
 BONNEVILLE
 POWER ADMINISTRATION

Prepared By:
 research/intro/action™

left fork energy, inc.

QUEST
 Energy Services & Technology, Inc.

Schiller Consulting, Inc.

WARREN ENERGY
 ENGINEERING, LLC

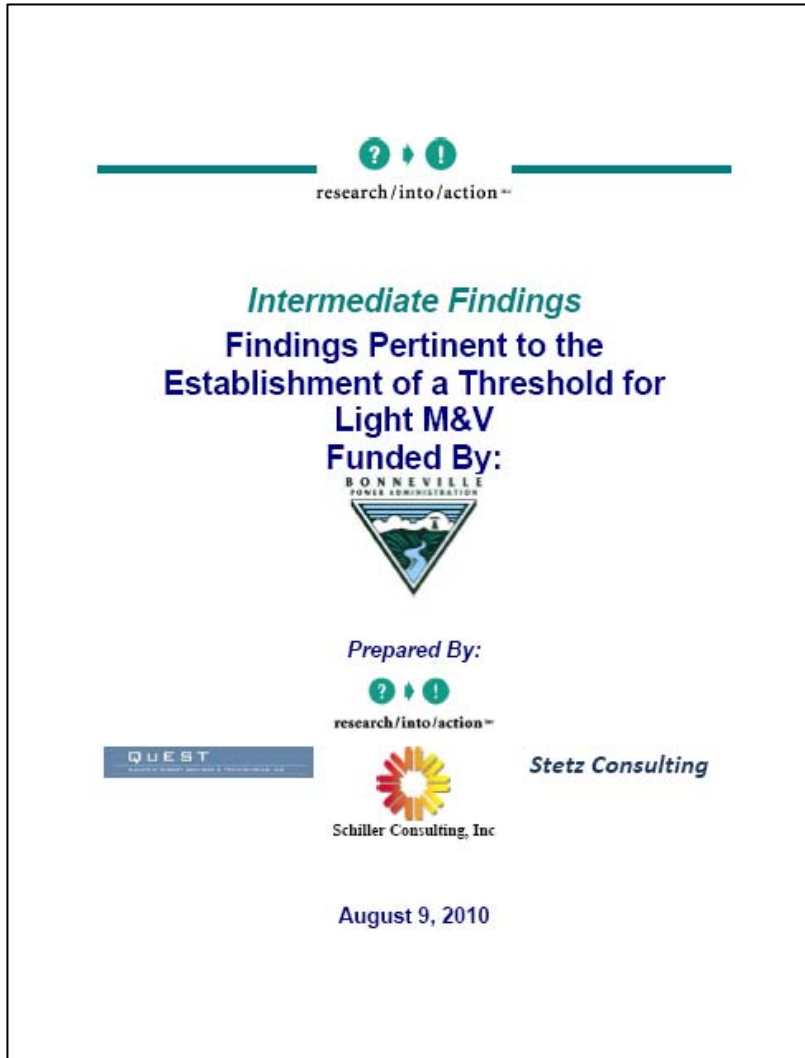
April 2, 2010

In Spring of 2010

- Report Delivery
- BPA EE Staff, RTF & Utility Stakeholders Review & Feedback
- Direction for Phase 2



Another Phase 1 Deliverable...



In Summer of 2010

- Report Delivery
- Review & Feedback from:
 - Utility Stakeholders
 - 3rd Party Program
 - BPA EE
- Direction for Phase 2



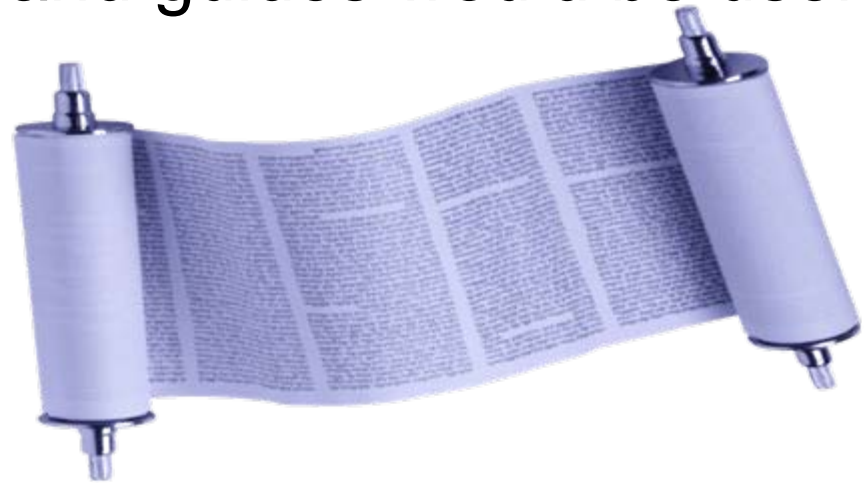
Findings - From Stakeholders

- BPA's site-specific protocols are generally working well from a process perspective
 - Yet contacts note that M&V expenditures per project are not tracked
- Contacts have confidence in the measured and verified savings
- BPA should move toward classifying as custom a smaller proportion of projects needing the Standard M&V Plan
 - Move projects into Light M&V, deemed savings calculators, and deemed savings



Findings – Protocol Review

- BPA protocols are reasonable, yet fall short of being IPMVP-adherent and should be revised
 - Not surprising, since the BPA protocols were developed prior to IPMVP!
- Additional protocols and guides would be useful



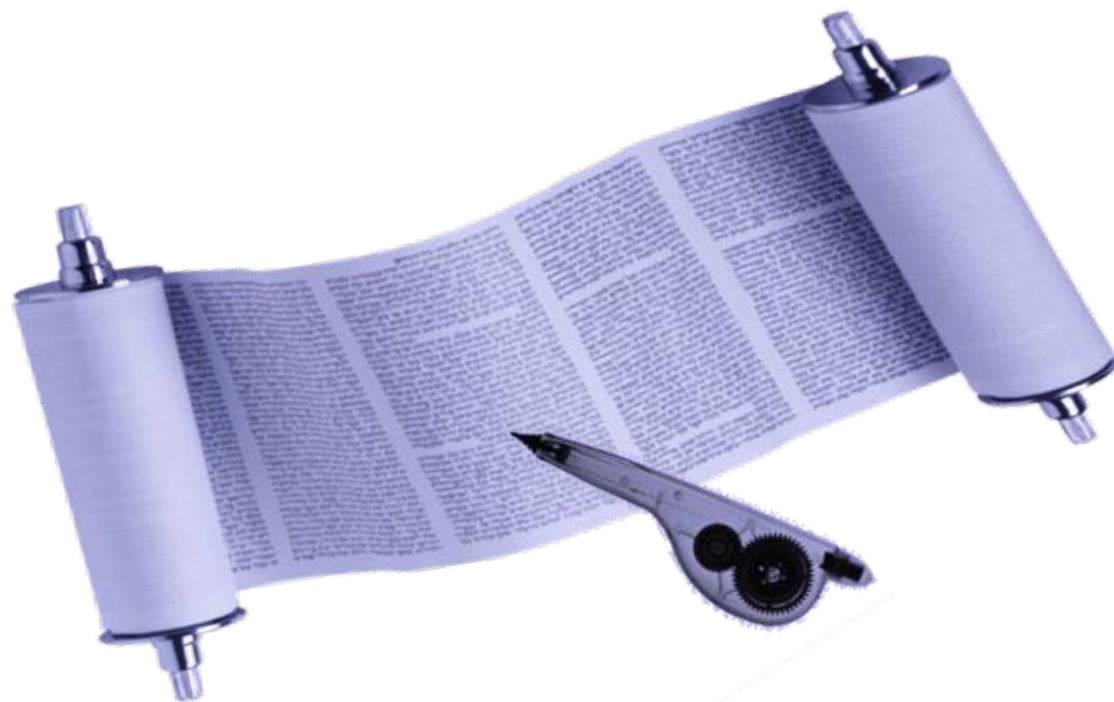
Phase 1 Recommendations

- BPA should revise its protocols to be IPMVP-adherent, including:
 - Identifying the IPMVP Option
 - Requiring documentation of baseline equipment and operating characteristics
 - Expanding the description of calculations to be used, data to be collected, and use of data in calculations
 - Providing additional detail – e.g., selecting monitoring points, sampling, and generally addressing questions that often arise



Phase 2: Revise Protocols

- Update Existing Protocols – Show Relationships
- Create New Protocols and Guides



Existing Protocols & Guidelines

Site Specific Verification Guidelines

May 1992

Prepared by
Steve Harding, P.E.
with
Fred Gordon
and
Mike Kennedy

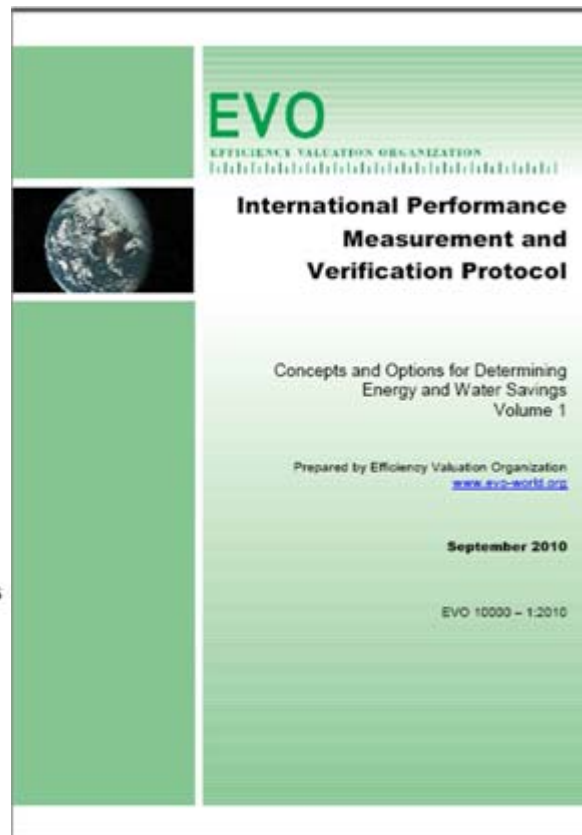
For
Bonneville Power Administration
Office of Energy Resources
Commercial Programs

APPENDIX P



Energy Savings Verification Protocols Conservation and Renewable Resources Discount

September 14, 2001



Existing Protocols

PROTOCOL	REFERENCE	DESCRIPTION
ENERGY INDEXING	Guidelines	Applies to industrial processes, consumption calculated on unit basis
CONNECTED LOAD	Guidelines	Site-specific , similar to IPMVP Option D
END-USE METERING	Guidelines	Site-specific , similar to IPMVP Option B
BILLING ANALYSIS	Guidelines	Site-specific, similar to IPMVP Option C
HYBRID METHODS	Guidelines	Addresses measure interaction, double counting, when verifying performance for more than 1 measure, each reported independently
RTF GROUP NO. 1	App P, RTF	Applies to groups of existing residential projects, requires control (non-participant) group, like impact evaluation billing analysis
RTF GROUP NO. 2	App P, RTF	Applies to residential new construction, savings are difference between simulated baseline and actual consumption, includes impact evaluation topics like attribution
RTF GROUP NO. 3	App P, RTF	Applies to impact evaluation, not project- or measure-specific
RTF GROUP NO. 4	App P, RTF	Applies to non-residential buildings and multifamily, uses simulation, like IPMVP New Construction and Option D
RTF SITE NO. 1	App P, RTF	Applies to industrial end use measures like motors and lighting that are not weather dependent, similar to IPMVP Option A
RTF SITE NO. 2	App P, RTF	Applies to industrial processes, similar to IPMVP Option B, requires baseline monitoring



Protocols Revised

EXISTING PROTOCOL	REVISED PROTOCOL
ENERGY INDEXING	<p>Verification by Energy Use Indexing (IPMVP NA)</p>
CONNECTED LOAD	
END-USE METERING	<p>Verification by Equipment or End-Use Metering (IPMVP Options A and B – Savings small relative to building annual use; Characterizes equipment load, schedule, and impact of ECM; Non-interactive, non-complex energy flow paths)</p>
RTF SITE NO. 1	
HYBRID METHODS	
RTF GROUP NO. 3	<p>Verification by Energy Modeling (IPMVP Options B, C, and D – ECMs that involve multiple pieces of equipment with interactions among multiple or complex energy flow paths)</p>
RTF GROUP NO. 4	
BILLING ANALYSIS	
RTF SITE NO. 2	



New Documents

NEW DOCUMENT	DESCRIPTION
EBCx	<p>Existing Building Commissioning: An M&V Protocol Application Guide (applies Energy Modeling Protocol)</p>
"BASELINE NOT AVAILABLE"	<p>End-Use Metering Absent Baseline Measurement (applies Equipment and End-Use Metering Protocol)</p>
LIGHT M&V PROTOCOL	<p>Engineering Calculations with Verification (available for projects < 200,000 kWh and projects meeting other criteria, such as safety issues precluding energy metering)</p>
REGRESSION GUIDE	<p>Regression for M&V: Reference Guide</p>
SAMPLING GUIDE	<p>Sampling for M&V: Reference Guide</p>
PROTOCOL SELECTION GUIDE	<p>Measurement and Verification (M&V) Protocol Selection Guide and Example M&V Plan</p>
GLOSSARY	<p>Glossary for M&V: Reference Guide</p>

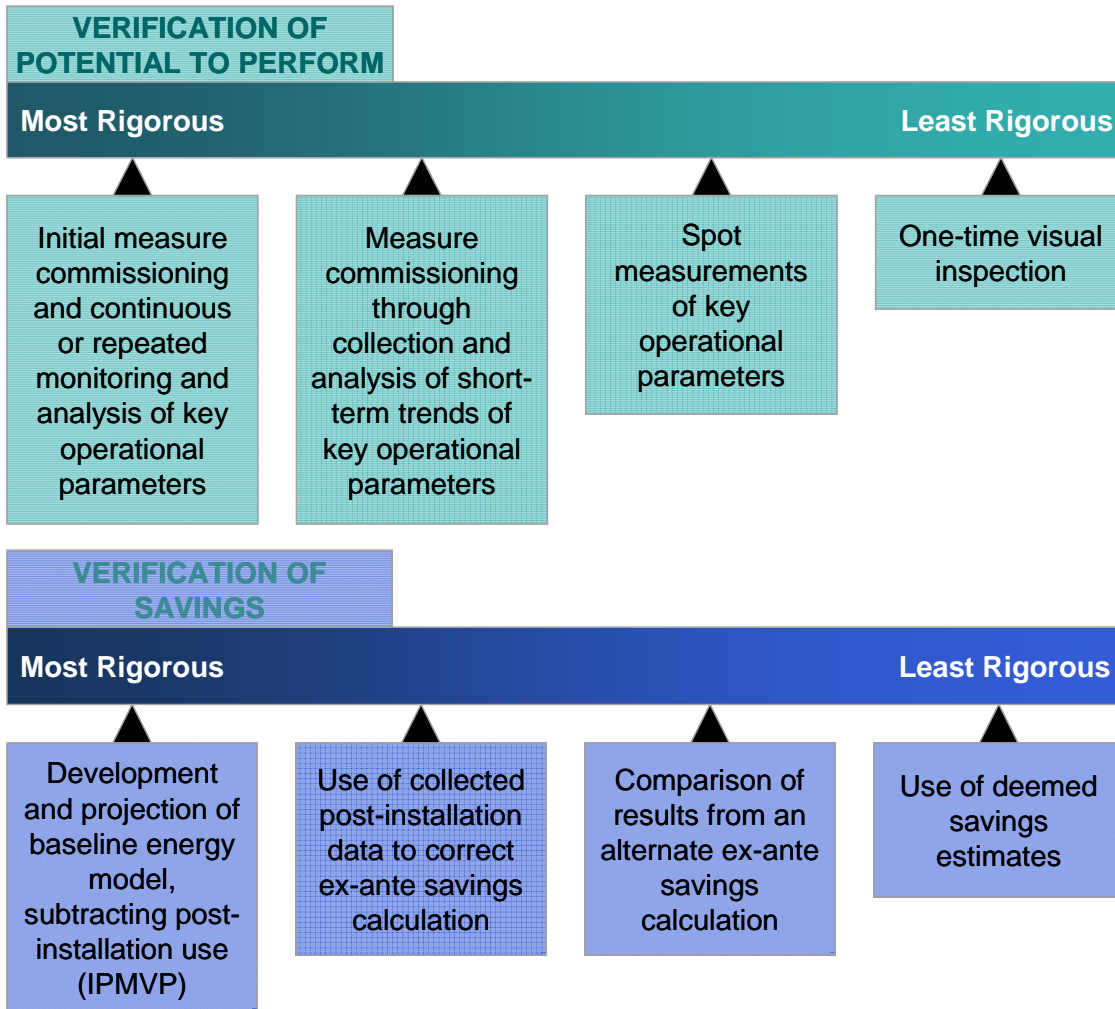


M&V Protocols for Custom, Site-Specific Projects

- All BPA's M&V documents can be used to provide guidance on development of a custom, site-specific project M&V Plan:
 - *Protocol Selection Guide*
 - *Light Custom Protocol: Engineering Calculations with Verification*
 - *Verification by Equipment or End-Use Metering Protocol*
 - *Equipment in New Construction: An M&V Protocol Application Guide*
 - *Energy Modeling Protocol*
 - *Existing Building Commissioning: An M&V Protocol Application Guide*
 - *Verification by Energy Use Indexing Protocol*
 - *Regression for M&V: Reference Guide*
 - *Sampling for Measurement & Verification (M&V): Reference Guide*



Site Savings Verification: Spectrum of Rigor Levels – Potential to Perform & Site Savings



BPA Protocol Relationship to RTF Standard Savings Estimation Protocols

- RTF Protocols are focused on specific measures

(see <http://www.nwcouncil.org/energy/rtf/subcommittees/deemed/>, for details, including Draft Standard Savings Estimation Protocols for VAV Conversion, Variable Speed Air Compressor, Fan VFD, Lighting Capacity Reduction with Code Baseline, Pump VFD, Refrigeration Compressor VFD, and Refrigeration Condenser Fan VFD).
- BPA Protocols are not measure-specific.
 - provide detail on the necessary processes
 - can be used to provide guidance on development of a specific standard savings estimation protocol



Relationship of BPA Protocols to Other Standards

■ IPMVP

- BPA protocols are more specific and prescriptive than IPMVP (although less prescriptive than the measure-specific RTF protocols)
- BPA protocols are designed for adherence to IPMVP, except for Option D

■ ASHRAE Guideline 14

- BPA protocols focus more on the processes and issues associated with M&V and less on data acquisition, cost and compliance issues
- BPA protocols are (we hope!) easier to read



Relationship of BPA Protocols to IPMVP

- IPMVP Option A
 - *Verification by Equipment or End-Use Metering Protocol*
- IPMVP Option B
 - *Verification by Equipment or End-Use Metering Protocol*
 - *Verification by Energy Modeling Protocol*
 - *Verification by Energy Use Indexing Protocol*



Relationship of BPA Protocols to IPMVP

- IPMVP Option C
 - *Verification by Energy Modeling Protocol*
 - *Verification by Energy Use Indexing Protocol*
- IPMVP Option D
 - *Engineering Calculations with Verification Protocol*
 - “A revision of the protocol formerly known as *Light*”
 - Note that Option D requires calibration, whereas the BPA protocol focuses on calculation and simulation methods, but not calibration

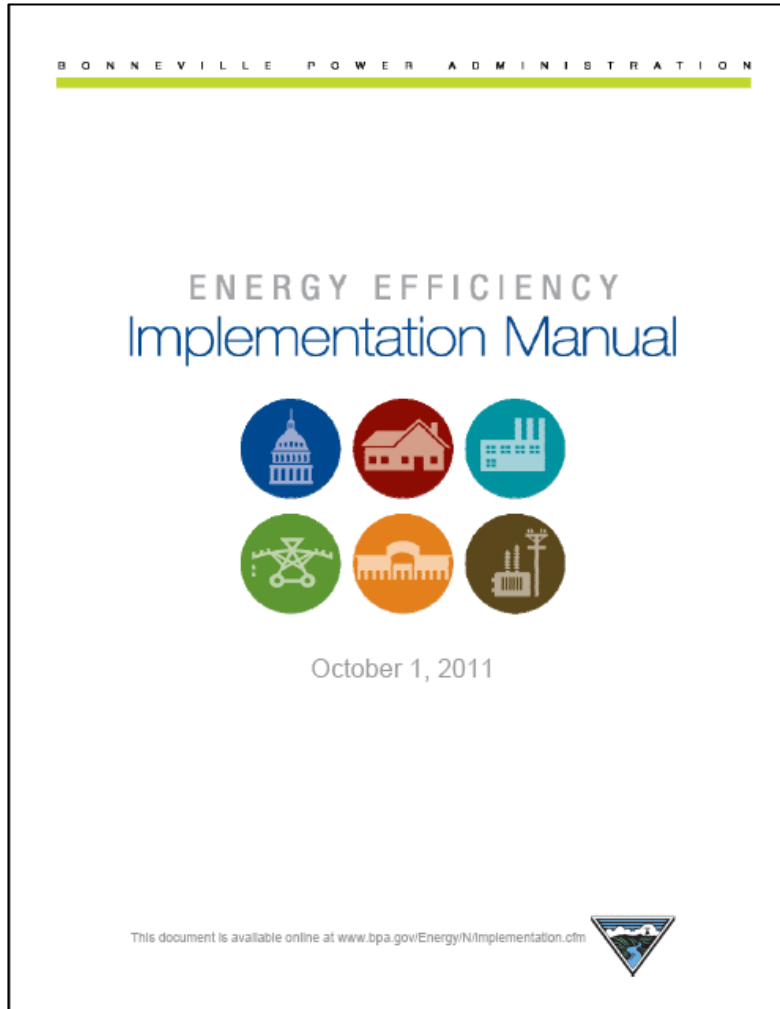


Relationship of BPA Protocols to ASHRAE Guideline 14

- Whole Building Approach
 - *Verification by Energy Modeling Protocol*
- Retrofit Isolation Approach
 - *Verification by Equipment or End-Use Metering Protocol*
- Whole Building Calibrated Simulation Approach
 - *Engineering Calculations with Verification Protocol*
 - Again, note that ASHRAE requires calibration, whereas the BPA protocol focuses on engineering calculation and whole-building simulation methods, but not calibration



Custom Program & Project Implementation



- BPA IM Chapter 4 – Custom Programs and Projects
- BPA M&V Protocol Selection Tool
 - Engineering Calculations with Verification Plan
 - Comprehensive M&V Plan



Custom Projects General M&V Requirements for Option 1 & 2 Utilities

a. Engineering Calculations with a Verification Plan

- Detailed guidance on preparing Engineering Calculations with a Verification Plan is included in the BPA Engineering Calculations with Verification Protocol. As directed in the BPA M&V Protocol Selection Tool, Engineering Calculations with Verification Plan may be used for the following custom projects:

Projects with an expected annual energy savings less than 200,000 kWh per year

Projects qualifying under the BPA Engineering Calculations with Verification Protocol

OR...



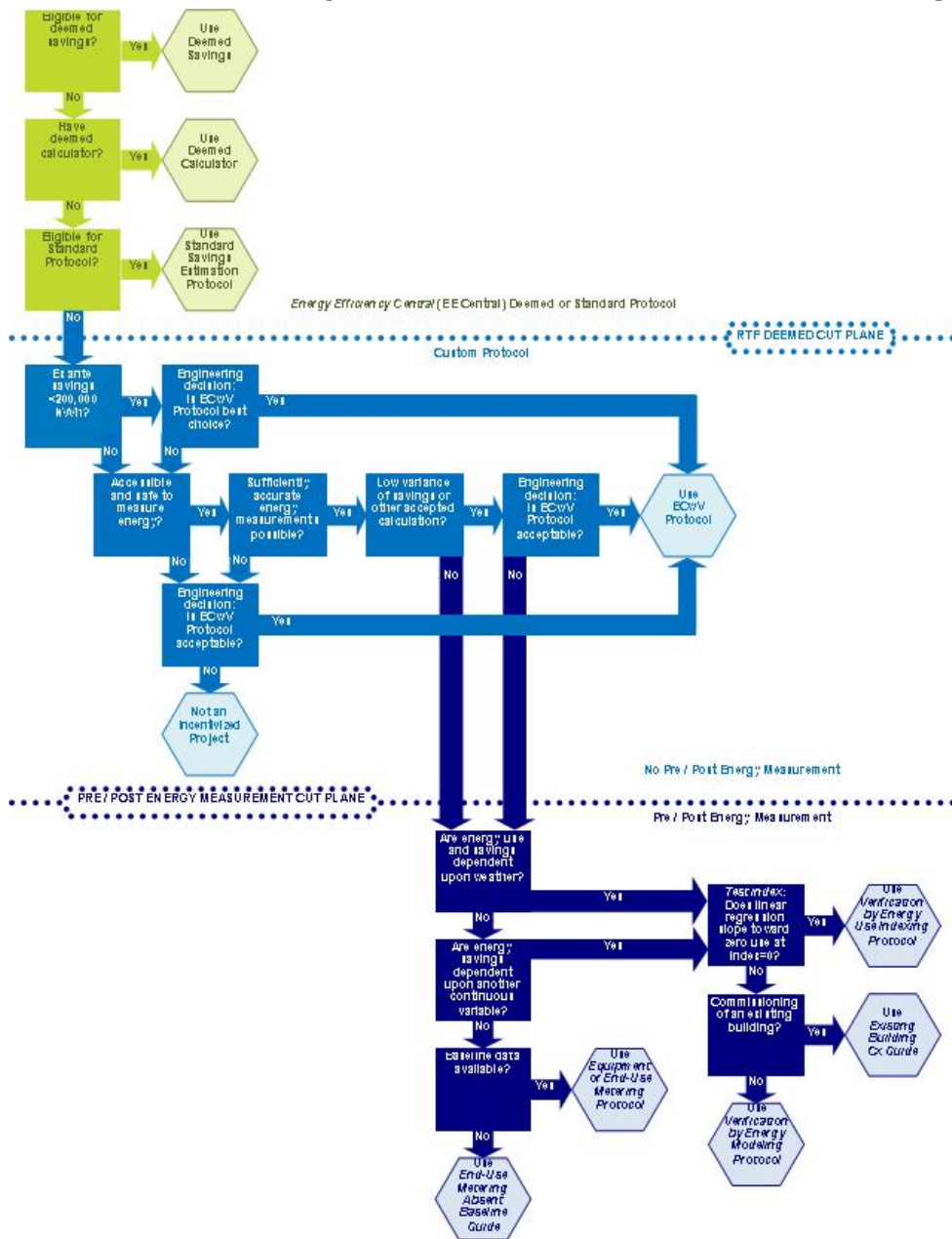
Custom Projects General M&V Requirements for Option 1 & 2 Utilities

b. Comprehensive M&V Plan

- Detailed guidance on preparing a Comprehensive M&V Plan is in the BPA M&V Protocols and Guidelines and RTF Standard Savings Estimation Protocols.



BPA Protocol Selection Guide



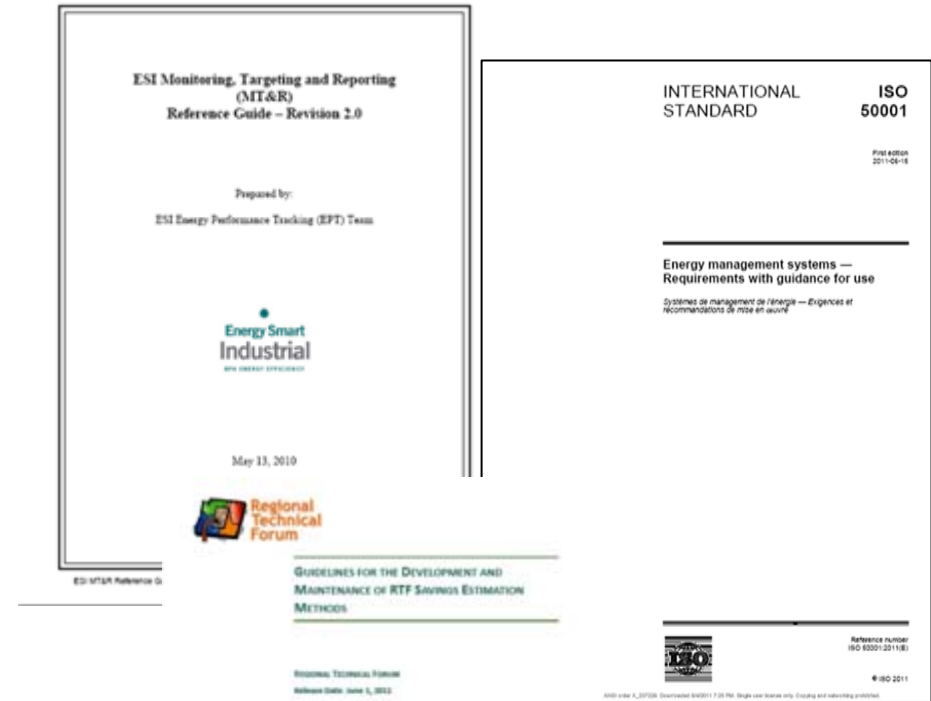
BPA M&V Documents Available at

- <https://conduitnw.org>
- Topics→
 - click More→
 - click M&V
- Documents have been posted since September 30th
- Soon to be on a BPA Website



Continued BPA M&V Activities

- BPA EE M&V Website
- Revise and update ESI MT&R Guidelines with ESI Energy Performance Tracking team
- Participation with ISO 50001 TAGs 242 and 257
- Participation with RTF on Custom /Comprehensive / Standard M&V
- BPA M&V Protocol and Guideline Training Opportunities



Questions &/or Comments are Welcome!

Please Contact:

- Todd Amundson, PE, CEM, CMVP
BPA EE Mechanical Engineer &
ESI Energy Management Engineer
Phone: (503) 230-5491
E-mail: tmamundson@bpa.gov

