

US EPA ARCHIVE DOCUMENT

APPENDIX I

EM&V Protocols and Guidance

This appendix provides information on evaluation, measurement, and verification (EM&V) protocols and procedures. Tables I.1 and I.2 present some of the most commonly utilized federal and state EM&V manuals. In addition, this appendix lists other reference materials and resources. Additional information on M&V protocols can be found in Section 6.4, *Conduct Evaluations*.

FEDERAL GUIDELINES FOR DETERMINING INDIVIDUAL PROJECT SAVINGS

Table I.1 summarizes federal guidelines that are designed for determining savings from individual projects: IPMVP, FEMP M&V Guidelines, and ASHRAE Guideline 14.

STATE AND UTILITY PROGRAM EM&V GUIDELINES

Several utility- and state-sponsored performance-contracting programs offer incentive payments for verified energy savings. Each of these incentive programs has guidelines specifying their individual requirements for the EM&V of energy savings. Table I.2 presents examples of programs that have readily accessible guidelines.

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TABLE I.1 GUIDELINES FOR DETERMINING SAVINGS FROM INDIVIDUAL PROJECTS

Title	Description	URL
International Performance Measurement and Verification Protocol	Provides a framework and definitions that can help practitioners develop M&V plans for their projects. It includes guidance on current best practice techniques available for determining energy savings and verifying the results of energy efficiency, renewable energy, and water efficiency projects in commercial and industrial facilities. The IPMVP includes separate volumes related to (1) determining energy savings, (2) improved indoor environmental quality, (3) determining energy savings in renewable energy technologies applications, and (4) determining energy savings in new construction. It is important to remember that the IPMVP is not a compliance document. Simply requiring parties to comply with the IPMVP is insufficient for defining how the actual M&V will be conducted or the level of rigor and uncertainty expected of the analyses. The IPMVP is often referenced in M&V planning, but additional requirements must also be specified in order for M&V requirements to be defined.	http://www.evo-world.org/ (Web site contains IPMVP protocol plus a wide range of other M&V resources.)
FEMP M&V Guidelines	Provides guidelines and methods for measuring and verifying the savings associated with federal agency performance contracts. It contains procedures and guidelines for quantifying the savings resulting from energy efficiency equipment, renewable energy, cogeneration, water conservation, and improved operation and maintenance projects. The current version of the FEMP M&V Guidelines is Version 2.2 (2000). The FEMP Guidelines provide similar background information as the IPMVP, but offer more detail on measure-specific M&V techniques. For example, the guidelines include summaries of techniques for determining the savings from lighting retrofits, motor retrofits, and chiller retrofits.	http://www1.eere.energy.gov/femp/financing/superespcs_measguide.html http://ateam.lbl.gov/mv/ http://ateam.lbl.gov/mv/docs/26265.pdf (This LBNL Web site contains the FEMP M&V Guidelines and a number of other M&V resource documents, including some on the use of stipulations for determining savings, M&V checklists, and M&V resource lists.)
EPA Model Energy Efficiency Program Impact Evaluation Guide	This EPA document provides guidance to utilities and state regulators on evaluating the impacts of energy saving activities implemented under the National Action Plan for Energy Efficiency.	http://www.epa.gov/cleanenergy/documents/evaluation_guide.pdf
Lawrence Berkeley National Laboratory Measurement and Verification Documents	LBNL has collected a number of resources that organizations can rely on for M&V guidance.	http://ateam.lbl.gov/mv/
ASHRAE Guideline 14-2002 Measurement of Energy and Demand Savings	This guideline was developed under the auspices of ASHRAE, a professional engineering society that has been involved in writing guidelines and standards associated with energy efficiency. Compared to the FEMP M&V Guidelines and the IPMVP, Guideline 14 is a fairly technical document that addresses the analyses, statistics, and physical measurement of energy use for determining energy savings. Guideline 14 provides guidance on how to use measured pre- and post-installation data for quantifying energy and demand savings. Unlike most guidelines and protocols it provides a specific compliance path for a few M&V approaches. It provides valuable information on project-specific uncertainty analyses, regression analyses, measurement systems and equipment, and case studies. There is a fee for this document.	http://www.ashrae.org

TABLE I.2. STATE AND UTILITY PROGRAMS WITH EM&V GUIDELINES

State and/or Utility	Description	URL
California Utility Standard Performance Contracts (SPC) Program (Utility Administrators: San Diego Gas & Electric, Pacific Gas and Electric Company, and Southern California Edison)	A statewide energy efficiency program under the direction of the CPUC, the Large Non-Residential Standard Performance Contract (LNSPC) Program is a performance-based program that offers incentive payments to project sponsors who develop projects delivering verified energy savings at host customer facilities. Energy savings are measured and verified annually by the project sponsor over a two-year period following the approval and installation of the energy-efficiency equipment.	http://www.sce.com/RebatesandSavings/LargeBusiness/SPC/ (This Pacific Gas and Electric Company Web site provides a link to additional information about the SPC programs, including M&V protocols)
NYSERDA Energy SmartSM Commercial/Industrial Performance Program	This program offers fixed-price incentives to ESCOs that install cost-effective energy efficiency measures. Project-specific incentives are paid based on measured data from the performance period.	http://www.nyserda.org/programs/Commercial_Industrial/cipp.asp
State of Hawaii Performance Contracting Guide	The State of Hawaii has published <i>A Guide to Performance Contracting</i> , which includes M&V guidelines. These guidelines are modified from DOE's Rebuild America Program.	http://hawaii.gov/dbedt/info/energy/efficiency/state/performance/
State of Texas Programs	Texas operates statewide programs sponsored by the Public Utilities Commission of Texas, including the TXU Electric programs. TXU's Energy Efficiency Markets currently has several energy efficiency programs, including a Small Air-Conditioner Program and a Commercial and Industrial Standard Offer Program.	http://www.oncorgroup.com/electricity/teem/default.aspx
Texas Loan Star Program	This program, which includes M&V of savings, is used as a funding mechanism for Texas state agency energy projects.	http://www.seco.cpa.state.tx.us/ls_guideline.htm
Wyoming Energy Conservation Improvement Program: Measurement and Verification Plan Guidelines	The Wyoming Business Council State Energy Office has developed these M&V plan guidelines for state agencies involved in energy performance contracts.	http://www.wyomingbusiness.org/pdf/energy/Appx_1K-WYECIP_Contract_Attach_FMandV_Plan_Guide.pdf