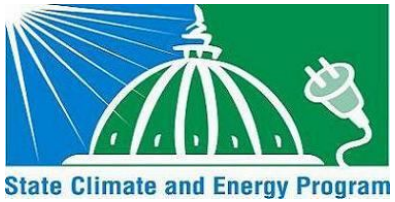
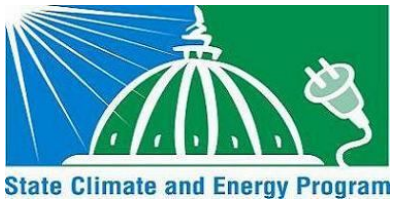
Energy Efficiency Evaluation Measurement and Verification Planning





US EPA Webinar - Introduction to EM&V and EM&V Planning – Context for our next three speakers

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Definitions – EM&V

- Evaluation - The performance of studies and activities aimed at determining the effects of a program

- Measurement and Verification – Data collection, monitoring, and analysis associated with the calculation of gross energy and demand savings from individual measures, sites or projects. M&V can be a subset of program evaluation. It can involve both verifying proper installation (potential to generate benefits) and actual determination of benefits (documenting benefits)

- EM&V - The term "evaluation, measurement, and verification" is frequently seen in efficiency evaluation literature. EM&V is a catchall acronym for determining both program and project impacts.

EM&V Objectives

- EM&V has two primary objectives:
  - Assess the savings resulting from an efficiency program or portfolio, and
  - Provide feedback for program/savings improvement.
- Things that are measured tend to improve!

Two Categories and Six Types of Evaluations

Evaluation Category	Phase at Which Implemented	Evaluation Type	Assessment Level
Formative	Pre-program Planning Phase	Market Assessment (includes characterization, baseline)	Market, Portfolio, Program
		Potential or feasibility	Portfolio, Program, Project
	Implementation Phase - ongoing	Process	Portfolio, Program
Outcomes	Implementation Phase – ongoing and/or ex-post	Impact	Program, Project, Measure
		Market Effects Evaluation	Market, Portfolio
		Cost Effectiveness	Portfolio, Program, Project

Impact, Process, and Market Evaluations

- *Impact evaluations* determine the impacts (usually energy and demand savings) and co-benefits (e.g., avoided emissions, water savings) that directly result from a program. Impact evaluations also support cost-effectiveness analyses that evaluate relative program costs and benefits.

- *Process evaluations* assess program delivery, from design to implementation, in order to identify bottlenecks, efficiencies, what worked, what did not work, constraints, and potential improvements.

- *Market effects evaluations* estimate a program's influence on encouraging future energy efficiency projects because of changes in the energy marketplace..

Selection of Evaluation Observations

Process Evaluations

- Most useful for new programs and initiatives
- Must be carefully scoped to produce recommendations that are of highest use for program implementation and avoid "general" but less useful results

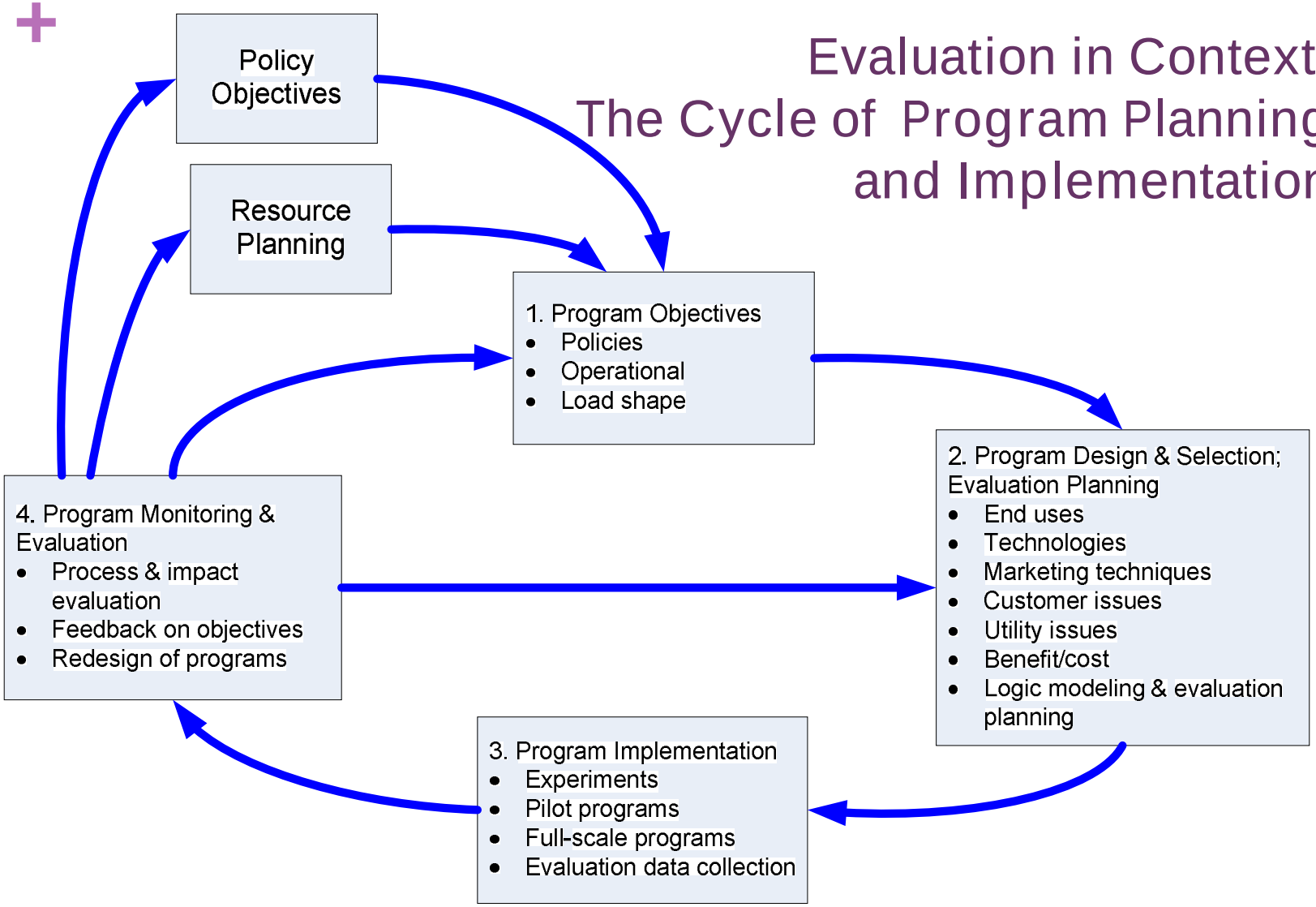
Market Evaluation

- Useful both for program targeting and tracking.
- Important to clarify the purpose of the research and establish tracking mechanisms in situations where long-term effects are expected to be and where the effects are expected to be identifiable

Impact Evaluations

- Benefits are determined by comparing what would have happened in the absence of the activity, with what did happen. It is an estimate.
  - First year
  - Over time - persistence
- Evaluation resources vary as a function of rigor - ex post evaluation and fieldwork is expensive. Important to prioritize resources.
- Less rigor may be required for established programs with well-documented ex ante savings estimates; and vice-versa.

Evaluation in Context: The Cycle of Program Planning and Implementation



Adapted by CEE from Pierre Landry, SCE, and *Demand-Side Management, Vol. 4: Commercial Markets and Programs,* EPRI, 1987.

Selection of Planning Issues

- Deciding which benefits to evaluate
- Setting time frame for evaluation and reporting expectations
- Establishing budget vis-à-vis expectations for quality of reported results
- Defining baseline
- Selecting who (or which type of organization) will conduct the evaluations
- Defining evaluation goals, scale and accuracy – how good is good enough (as compared to what)?
  - Large or small program?
  - New program with uncertain savings or an established program with understood savings?
  - Is the program likely to be expanded or contracted?
  - How certain an estimate of energy and demand savings are required?

Successful evaluations harmonize the costs of evaluation with the value of the information received—that is, they appropriately balance risk management, uncertainty, and cost considerations.

Emerging National Evaluation Planning Issues – from a recent survey of national policy makers and experts

- Consistency in Reported Program Savings
- Disagreement on What (types of effects) should be included in Net Program Saving Evaluation Designs
- Wide Range of Processes Used to Ensure Quality Control and Accuracy
- Evaluation Resource Allocation (priority of process, impact , or market effects, estimate measure and or program level savings, and integrated vs. independent process and impact evaluations)
- Methods to Ensure Evaluator Independence/Objectivity
- Integration of EE evaluation load impact results in utility planning and forecasting

Using Experience to Address EM&V Issues

Issue

Addressing the challenge of quantifying a counterfactual situation whose characteristics can never be *proven* ex-post, i.e. how much energy would have been consumed or emissions produced in the absence of the efficiency activity

Solution

Applying the experience and protocols and TRMs already in place - EM&V has and is being done for billions of dollars worth of programs

Conclusion

EM&V can be defined and implemented to a level of sufficient accuracy for any international, national, regional, state or local energy efficiency program

EM&V is not a barrier for efficiency, it is an opportunity

EM&V Resources - Technical Reference Manuals and Evaluation Protocols

Technical Reference Manuals

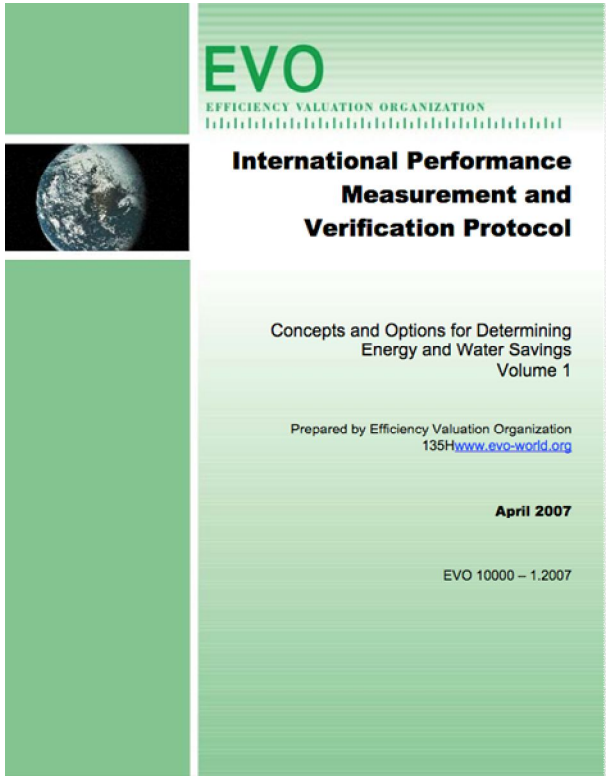
- In the simplest form 'TRMs' are databases of deemed savings values with applicability conditions
- Examples of database contents are:
  - kWh, kW, therm savings values
  - Measure effective lifetimes
  - Net to gross ratios
  - Measure cost information
  - Local/regional utility cost information for TRC calculations
  - Work papers that document basis for values

Evaluation Protocols

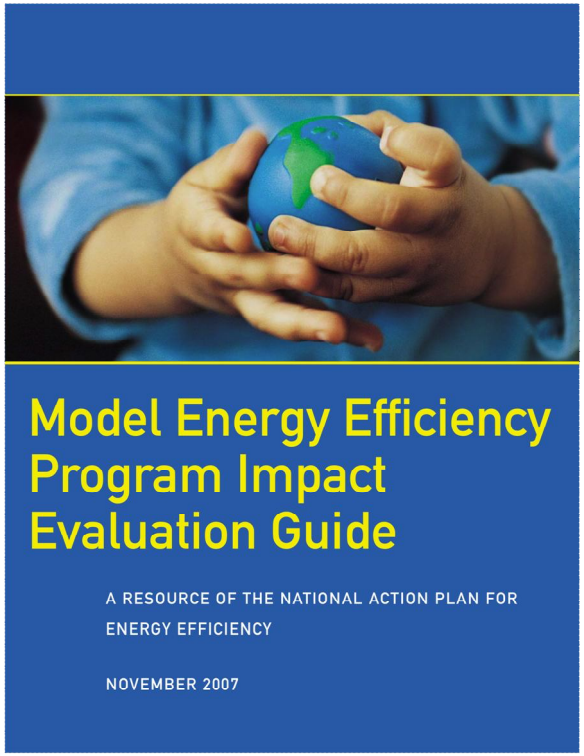
- Documents with varying level of detail that define how the evaluations (and M&V) are to be conducted with a particular jurisdiction. Contents might include:
  - Which approaches to use
  - Sample size requirements
  - Evaluation timing
  - Reporting requirements

EM&V Resources – Guidance Documents (examples)

IPMVP



Action Plan Evaluation Guide



- And now to present some of that experience, our next three speakers