Planning and Budgeting for the Evaluation of Energy Efficiency Programs

May 23, 2016

EM&V Webinars Facilitated By:
Lawrence Berkeley National Laboratory
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U.S. Environmental Protection Agency
National Association of Regulatory Utility Commissioners
National Association of State Energy Officials

Introduction

LBNL is supported by the U.S. Department of Energy to conduct non-classified research, operated by the University of California

- Provides technical assistance to states—primarily state energy offices and utility regulatory commissions
- Assistance is independent and unbiased
- More information see: https://emp.lbl.gov/projects/technical-assistance-states

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New Webinar Series

- Webinars designed to support EM&V activities for documenting energy savings and other impacts of energy efficiency programs
- Funded by U.S. DOE in coordination with EPA, NARUC and NASEO
- Audience:
  - Utility commissions, state energy offices, state environment departments, and non-profits involved in operating EE portfolios
  - Particular value for state officials starting or expanding their EM&V methods for a wide range of efficiency activities
  - Evaluation consultants, utilities, consumer organizations and other stakeholders also are welcome to participate
- For more information (upcoming and recorded webinars, EM&V resources) see:
  - https://emp.lbl.gov/emv-webinar-series
  - Contact: EMVwebinars@lbl.gov

Today's Webinar

How states are establishing infrastructures, plans and budgets for their evaluations of efficiency programs funded by utility customers (ratepayers)

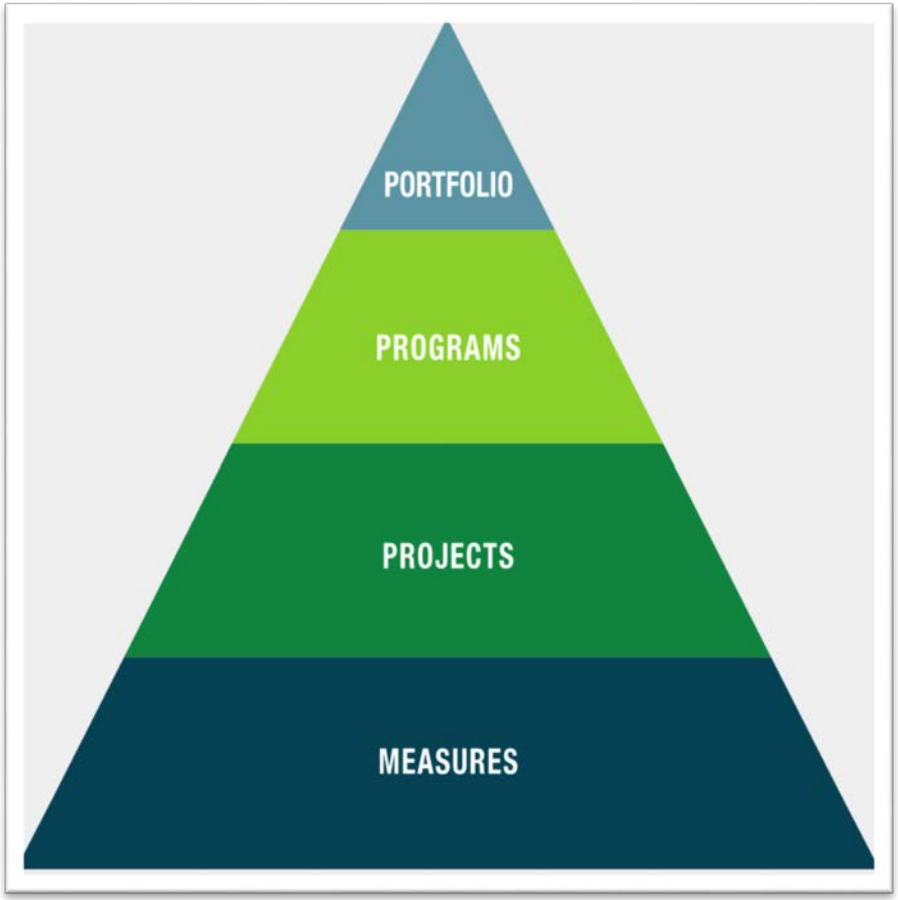
- Planning Basics and Frameworks ~15 minutes
  - Steven Schiller, Senior Advisor, LBNL
- State Examples: Planning Processes and Lessons Learned ~45 minutes
  - Jennifer Meissner, Program Manager for Evaluation, New York State Energy Research and Development Authority
  - Katie Rich, Director, Infrastructure Policy & Homeland Security Coordinator, Public Utility Commission of Texas
  - Fred Gordon, Director of Planning and Evaluation, Energy Trust of Oregon
- Q&A with panelists ~ 10-15 minutes

Energy Efficiency EM&V Planning Basics and Frameworks

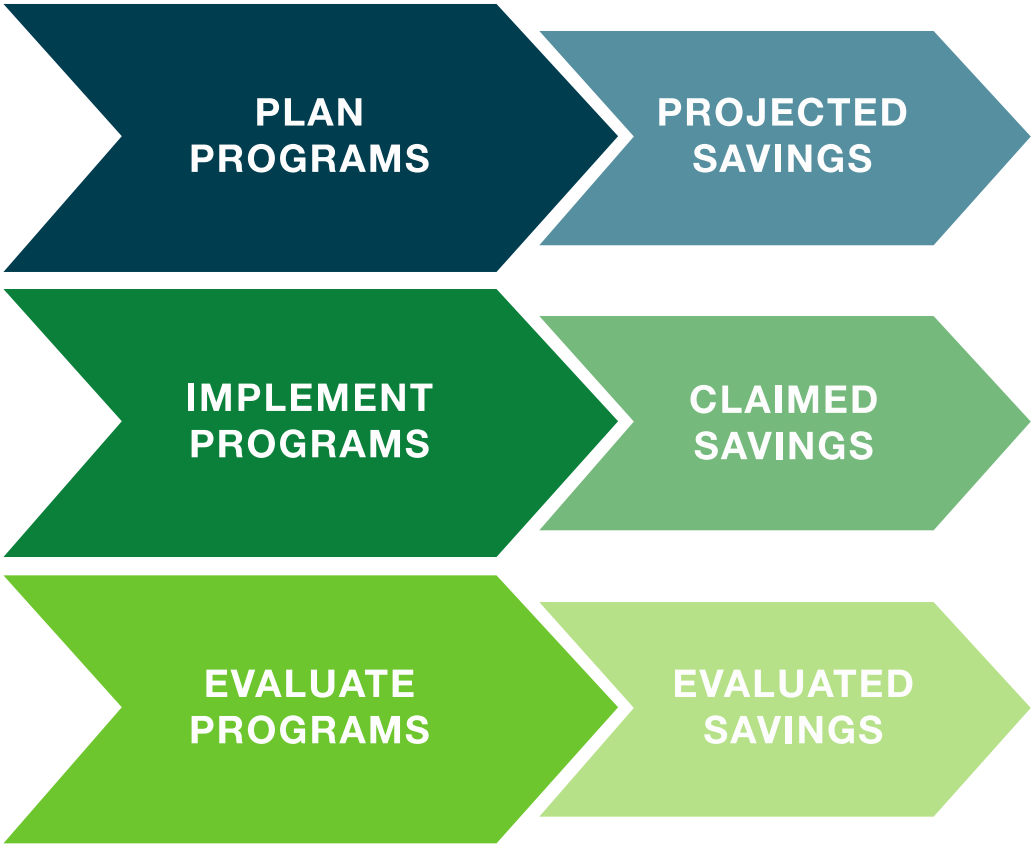
Steven Schiller, Senior Advisor, LBNL

EM&V Definitions

- Evaluation - Performance of studies and activities aimed at determining the effects of a program or portfolio.
- Measurement and Verification - Data collection, monitoring, and analysis associated with the calculation of gross energy savings from individual sites or projects. M&V can be a subset of program evaluation.
- 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.



Planning, Implementing, and Evaluating Efficiency Programs



Evaluation Types

Evaluation Type	Description	Example Uses
Impact Evaluation	Quantifies direct and indirect changes associated with the subject program(s).	Determines the amount of energy and demand saved.
Process Evaluation	Indicates how the procedures associated with program design and implementation are performing from both the administrator's and the participants' perspectives.	Identifies how program designs and processes can be improved.
Market Effects Evaluation	Analyzes how the overall supply chain and market for energy efficiency products have been affected by the program. Market baselines and Potential Studies.	Characterizes changes that have occurred in efficiency markets and whether they are attributable to and sustainable with or without the program.
Cost-Effectiveness Evaluation	Quantifies the costs of program implementation and compares them with program benefits.	Determines whether an energy efficiency program is a cost-effective investment compared with other programs and energy supply resources.

Why Evaluate?
Different Perspectives, Different Metrics

- **Document impacts**: Document the energy savings of projects and programs in order to determine how well they have met their goals; e.g., has there been a good use of the invested money and time? Provide PROOF of the effectiveness of energy management.
- **Resource Planning:** To support energy resource planning by understanding the historical and future resource contributions of energy efficiency as compared to other energy resources. Provide data to support efficiency as a reliable resource.
- **Understand why the effects occurred:** Identify ways to improve current and future projects and programs as well as select future projects. "You can't manage what you don't measure" and "Things that are measured tend to improve".

EVALUATION SUPPORTS SUCCESSFUL EFFICIENCY PROGRAMS

EM&V Planning

Evaluation is Integral to Planning—Implementation-Evaluation Process

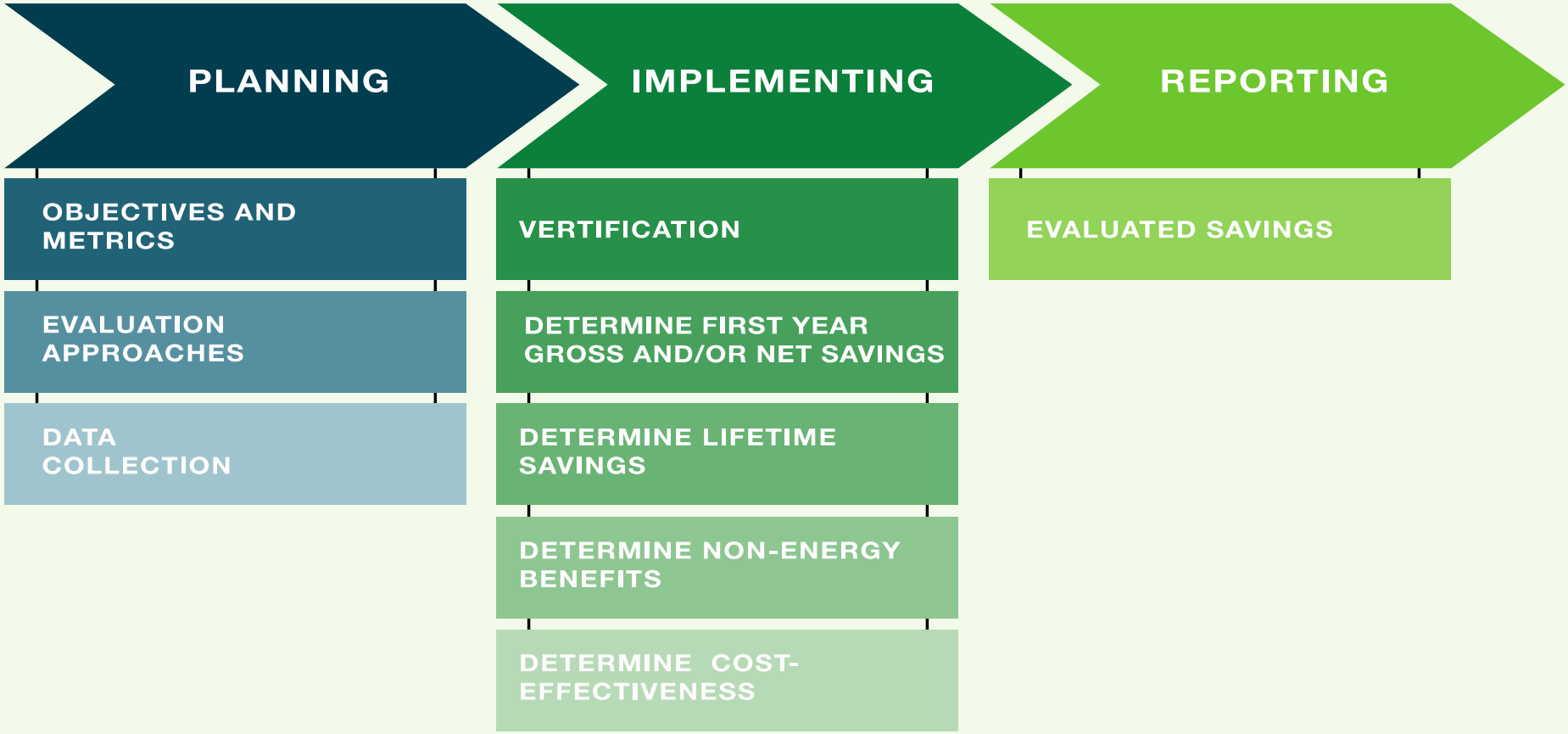
When to Evaluate:

- Evaluations should be produced within a portfolio cycle or very soon after the completion of a cycle

- In a timely manner and provide feedback for:
  - Ongoing program improvement
  - Supporting portfolio assessments
  - Support the planning of future portfolio cycles, load forecasts, and energy resource plans

- Can also be used to inform future evaluations, for example, through updating deemed savings values

EM&V Workflow



EM&V Issues and Frameworks

The Big Issues of EM&V

How good is good enough?

- Fundamental issue of EM&V
- How certain does one have to be of savings estimates and is that certainty balanced against the amount of effort utilized to obtain that level of certainty?
- EM&V investments should consider risk management principles—balance the costs and value of information derived from EM&V (i.e., EM&V should be cost-effective).

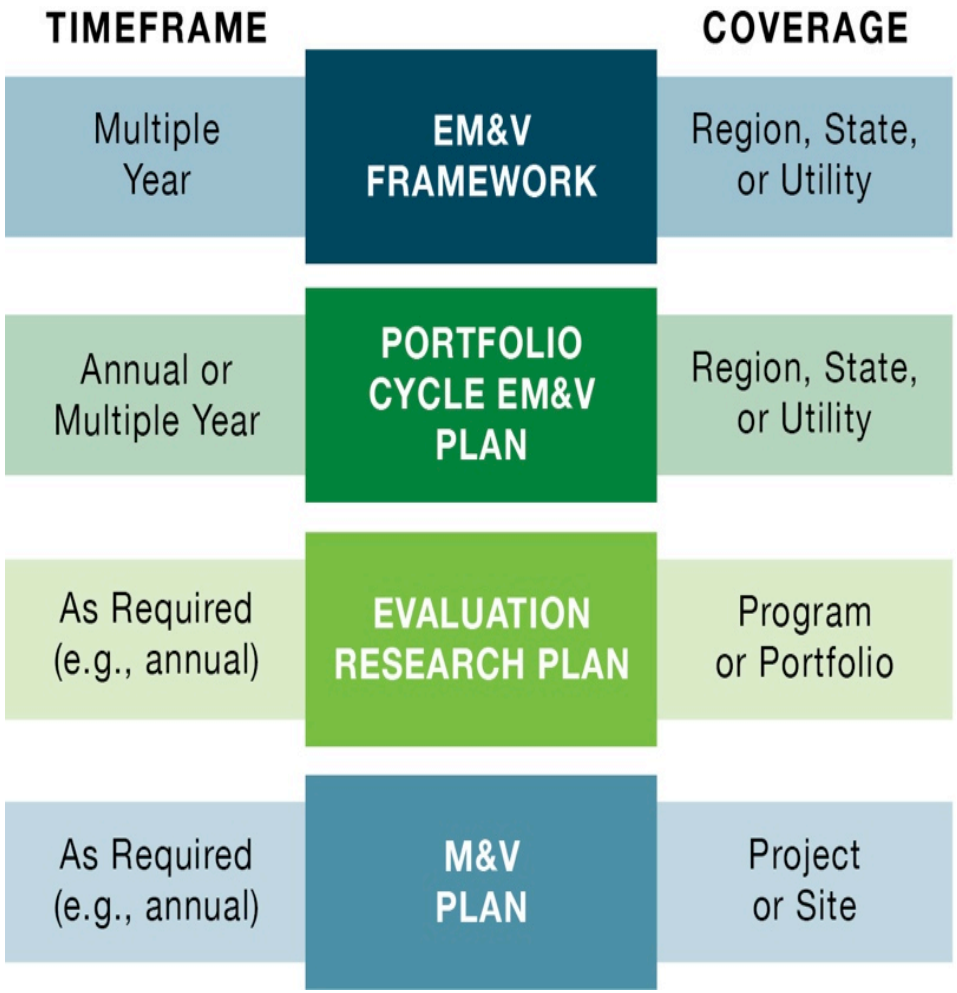
As compared to what?

- First – Define a baseline against which efficiency actions are compared for determining energy savings and whether attribution should be considered—the counterfactual
- Second – Establish level of performance confidence and risk for efficiency relative to other options for meeting goals

EM&V is About Risk Management

Structure for Defining Evaluation Activities

- EM&V Framework – Primary document that lays out top level structure. *This is perhaps the principal document that all stakeholders can focus on and provide high level input.*
- Annual Plans – Indicates major activities that will be conducted during the evaluation cycle
- Evaluation Research Plans – Created for the major EM&V activities
- Site Specific M&V Plans – For custom project sites that are analyzed and inspected



EM&V Framework

- Primary document that lays out key aspects of evaluation such as:
  - Definitions
  - Evaluation principles
  - Allowable approaches
  - Metrics for determination of gross and/or net savings
  - Reporting requirements
  - Schedules
  - Roles and responsibilities of various entities
- Tends to be “fixed” for several years, but can be updated periodically
- Sets expectations for the content and scope of subordinate evaluation documents, such as a portfolio cycle EM&V plan
  - Whereas the subordinate EM&V documents contain a higher level of detail and apply to narrower time frames, the EM&V framework is the principle document on which all stakeholders can focus and provide input

Example: Who Does What EM&V Activities

Common factors for deciding:

- Realities and perceptions of conflict of interest
- Resources and capability to manage and timely implement
- Resources to conduct (major issue in industry is lack of human EM&V capacity)

Examples: Who Does What in 'Utility' Programs

Impact

- Administrator (utility) conducts EM&V with internal staff
- Administrator (utility) conducts EM&V with third-party consultants
- Commission (or Commission surrogate) conducts EM&V with third-party consultants
- Administrator (utility) conducts EM&V and Commission (or Commission surrogate) conducts review/audit

Process

- Almost always done by administrator (utility)—with internal staff or more often third-party consultants

Market

- Almost always done by administrator (utility)—with internal staff or more often third-party consultants—but can be initiated by others particularly if looking at statewide or regional market analyses (good to combine resources)

Planning

- EE potential studies—can be done as part of utility or regional resource planning

How Much Does it Cost – Budgeting for EM&V

Typical Budgets

- EM&V costs for third-party evaluation of utility demand side management (DSM) efficiency programs typically on the order of 2% to 5% of program expenditures for these programs.
- The Consortium of Energy Efficiency annual survey put the national average percentage for EM&V at about 3%
- Caveats
  - Reported costs are subject to different definitions of EM&V and what costs are accounted for in such reports
  - Reported values may refer to costs incurred by project implementers, program administrators (e.g., utilities), and third-party evaluators hired by administrators

Budgeting Approaches

Conceptual approach

- Balance EM&V rigor/costs with the importance and risk of impact (savings) uncertainty
- ideally, there would be an iterative process of computing budgets (and schedules) with different levels of savings certainty
  - Balancing – time, budget and quality of the EM&V

Typical approach

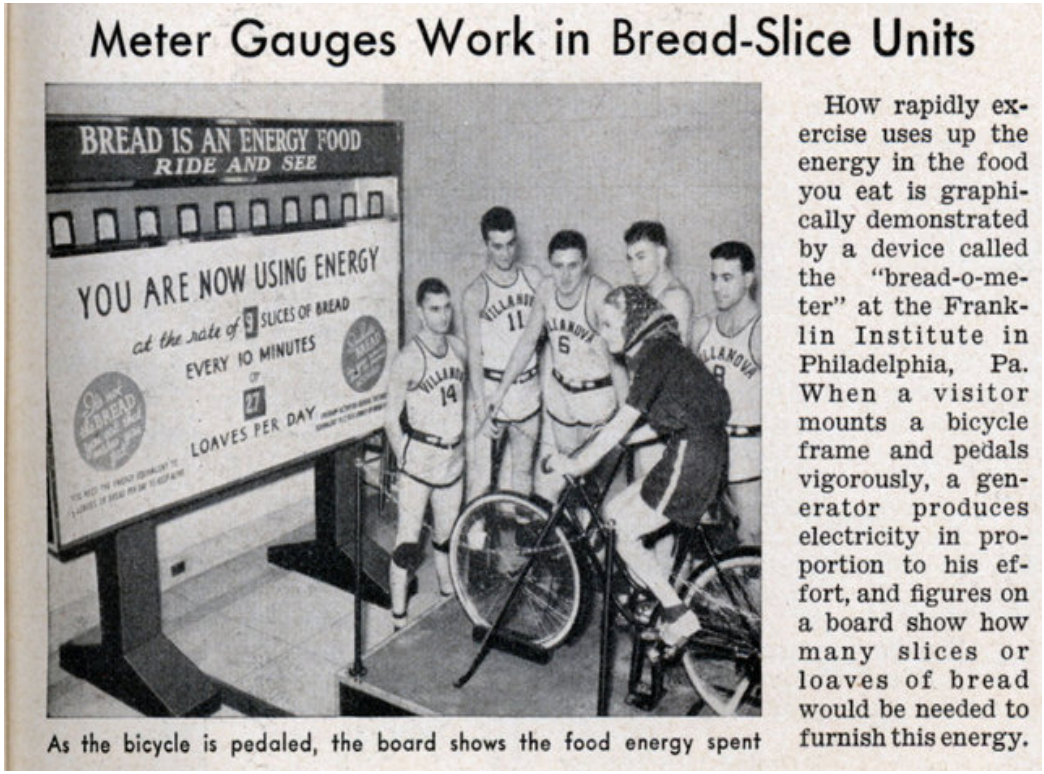
- Unfortunately, it is hard to quantify relative risk and certainty
- Therefore, what is usually done is that those involved set what they consider to be a reasonable budget first, and then rely on professional judgment of the EM&V professionals to find EM&V approaches that match that budget.

Now - Our State Speakers

From Albert Einstein:

"Everything should be as simple as it is, but not simpler"

"Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted"



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Planning & Budgeting for the Evaluation of Energy Efficiency Programs

US DOE/LBNL EM&V Webinar Series

Jennifer Meissner, NYSERDA

May 23, 2016

NYSERDA Background

- Public benefit corporation established in 1975
- Mission to advance innovative energy solutions in ways that improve New York's economy and environment
- Statewide energy efficiency programs primarily funded by ratepayers since 1998
- Operating in the same markets as utility incentive programs
- State Public Service Commission regulates NYSERDA and utility programs
  - Evaluation guidelines and review

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Clean Energy Fund (CEF)

- 10-year, $5 billion funding commitment
- Reshapes New York's energy efficiency, renewable energy and energy innovation programs
- Reduces cost of clean energy
- Accelerates adoption of energy efficiency to reduce load
- Increases renewable energy to meet demand
- Mobilizes private investment in clean energy

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Key Metrics

- Portfolio level
  - Energy savings (MWh, MMBtu)
  - Renewable energy capacity (MW)
  - Energy Bill Savings ($)
  - Private Investment Leveraged ($)
  - Carbon reduction (tons CO2)
- Program/Initiative Specific
  - Output/Activity indicators of progress
  - Outcomes related to market change, e.g., number of service providers, evolution of business models, increase in market share of energy efficient technologies

Evaluation Areas

- Top-Down Evaluation
  - Macro-consumption Analysis
  - Sector Building Stock/Potential Studies
- Bottom-Up Evaluation
  - Market Characterization/Market Progress Studies
  - Impact Evaluation/Field Verification
  - Process Evaluation

Evaluation Approach

- Evaluation function formally established in 1998
  - Evaluation staff/department organizationally separate from program implementation
- All major portfolios now receive evaluation
- Evaluation budgets
  - Varied over time
  - Majority of funds used for Market evaluation

Evaluation Approach, Cont'd

- NYSERDA Evaluation Staff
  - Develop long-term evaluation plans, program theory/logic models, evaluation project work scopes and conduct some data analysis
  - Support NYSERDA's Test-Measure-Adjust strategy
- Independent Consultants
  - Qualified pool of consultants in each evaluation area will be engaged on a Task Work Order basis
  - Increasing amount of "real time" data collection and analysis to support decision making

Evaluation Cycle

- Context
  - Key insights to support decision making and market responsiveness
  - Rapid feedback is highly valued
- Impact Evaluation
  - Large, retrospective evaluations on the decline
  - Statistical samples will be built over time, through annual cohorts, allowing report-outs along the way
  - Pre-retrofit review will reduce risk in baseline development and other aspects of energy savings estimates
- Market Evaluation
  - More effective longitudinal tracking of key market indicators
  - Larger number of smaller studies

Evaluation Planning

- Clearly define key performance metrics, regulatory requirements, stakeholder expectations
  - Prioritize based on available resources
- Document evaluation approach with clear, transparent, theory-driven evaluation plans
  - Collaborative process
  - Revise as needed
- Know what your evaluation output will be and how it will be used
  - Optimize work product for key use cases
  - Ensure the feedback loop is part of the design
  - Involve evaluators in program design discussions

Optimizing Limited Evaluation Resources

- Macro-level analyses
  - Examine the impact of multiple programs together
- Market Evaluation
  - Validate secondary/market data sets to save on more costly primary data collection
- Impact Evaluation
  - Assess risk and focus on largest risk areas (e.g., largest energy savers, greatest uncertainty in savings)
- Process Evaluation
  - Leverage your other evaluations to collect data
  - Can be done by in-house evaluation staff

Questions?

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NEW YORK STATE OF OPPORTUNITY. NYSERDA

EM&V IN TEXAS: THE EFFICIENT WAY

Katie Rich, Director,
Infrastructure Policy and
Homeland Security Coordinator

ABOUT THE TEXAS PUC'S ENERGY EFFICIENCY PROGRAM

1. The Commission regulates the state's electric, telecom, and water and wastewater utilities
2. Oversees the 10 electric utilities' energy efficiency programs
3. Programs were implemented following legislation in 1999
4. EM&V program has been in effect since 2013, following 2011 legislation requiring an EM&V framework
5. Major energy efficiency rule revisions adopted in 2013 outline the scope of EM&V in 16 TAC § 25.181(q) (Project No. 39674)

TEXAS EVALUATOR

1. Led by Tetra Tech with Texas-based project manager
   A. Subcontractors – Texas Energy Engineering Services, The Cadmus Group, Itron, and Johnson Consulting Group
   B. 12 "core" staff in project, planning, and program lead roles
2. Under three-year contract with a total of $10.7M budgeted (see slides 6 & 7 for more detail)
   A. Costs are allocated to the utilities based on the savings associated with their programs and the priority level assigned by the evaluator
3. The review period for one program year spans two years
   A. Primary data collection in year one and incorporation of findings and recommendations in year two reporting
4. The total program costs expended for 2015 was $126M*, so the evaluation costs represent about 1% of the budget ($1.8M)

*Subject to reconciliation

ROLE OF STAFF

1. Review utilities' annual energy efficiency plans and reports (EEPRS) and energy efficiency cost recovery factors (EECRFs)
   A. Reconciliation of prior program year and review of proposed budget for following program year
   B. Review of projected and actual savings achieved*
   C. Ensuring cost-effectiveness of all programs after first year*
   D. Setting a demand goal for following program year
   E. Determining eligibility for a performance bonus

*EM&V Contractor provides recommendations

ROLE OF EVALUATOR

1. Verify energy and demand savings for over 130 programs across 10 utilities
   A. Includes on-sites, desk reviews, surveys, and consumption analysis
   B. Includes standard offer, market transformation, pilot and load management programs
2. Estimate net savings
   A. However, utilities report gross savings
3. Determine program and portfolio cost-effectiveness
4. Prepare a statewide evaluation report
5. Prepare and maintain a statewide Technical Reference Manual (TRM)
   A. Moving to one annual update rather than mid-year updates

REDUCING THE SCOPE AND BUDGET

1. In 2013, the evaluators reviewed program years 2012 and 2013
   A. As allowed under the rule, the 2012 program year review ($2.3M) was mainly focused on building a program tracking system, comprehensive desk reviews, and recommendations for improving program documentation and processes
2. The 2013 program year review ($3.4M) involved a more detailed review across all of the programs
   A. This included on-site M&V, customer and market actor surveys, and desk reviews; used by the evaluator to calculate a realization rate
   B. Action plans were developed for each of the utilities with an implementation deadline in program year 2015

REDUCING THE SCOPE AND BUDGET

1. Beginning with the 2014 program year review ($3M), the evaluator began prioritizing the review of certain programs
   A. For example, the evaluator collected interval meter data to evaluate the impacts of the load management programs
   B. Errors in claimed savings for the program year were provided to the utilities; most chose to modify their 2015 EEPRs and EECRFs accordingly
   C. There are other larger programs such as commercial standard offer (SOP) that are reviewed every year due to level of savings
2. For the 2015 program year ($1.8M), the review became even more focused
   A. The evaluator focused on 25 different program types and prioritized them based on the contribution of savings and savings uncertainty identified during the 2014 program year review
   B. For example, the residential SOP and hard-to-reach (HTR) program received the highest priorities since they represent a large percentage of the overall savings

KEY SUCCESSES: REALIZED SAVINGS AND IMPROVEMENTS

1. Cost-effective portfolios
   A. Texas uses the program administrator cost test (PACT)
2. Overall high realization rates
   A. Claimed savings are close to measured savings
3. Generally high program attribution
   A. Net savings, taking into account free ridership and spillover

KEY SUCCESSES: REALIZED SAVINGS AND IMPROVEMENTS

4. Responsiveness to EM&V recommendations has resulted in improved:
   A. Program design and delivery
   B. Documentation and tracking system quality
   C. Savings estimates and consistency across utilities
      - Energy efficiency measures
      - Load management baseline methodologies
   D. Transparency of savings calculations and approaches
      - First centralized source of all deemed savings values
      - Incorporation of M&V protocols into TRM

LESSONS LEARNED

1. Having one statewide evaluator has been very cost-effective; there's also an additional level of neutrality by having the evaluator report to staff
   A. Synergies realized with one evaluator reviewing all the programs and finding issues that impact multiple or all utilities
2. The scope of the review has narrowed over the years, which has reduced the costs
   A. Focus has shifted to programs with large savings uncertainty and new programs
   B. Recognize there are still some programs like commercial SOP that will need to be reviewed annually due to the level of savings and the diversity of projects included

LESSONS LEARNED

3. Utilities have been much more responsive to requests to incorporate savings adjustments
   A. Evaluators worked to build trust with utilities, contractors, and administrators in prior year reviews before advancing to this step
   B. If utilities were pushed to make these changes from the beginning, it would have been much harder to achieve compliance
   C. For example, we've been taking small steps over the last few years to develop transparency and consistency in load management programs
4. Recognizing Texas has an established energy efficiency market
   A. The programs were implemented over 10 years before an EM&V program was initiated
   B. Bringing existing program administrators and stakeholders together took some forethought

- Organizing Evaluation
- Skipping and Hopping Your Way to Success
- 5/21/16
- Fred Gordon- Director of Planning and Evaluation

EnergyTrust of Oregon

• About Energy Trust

• Since 2002, an independent nonprofit serving customers of five investor-Owned utilities in Oregon, one also in Washington.

Gas and electric efficiency, small renewable generation

• Key component of utility resource plans

• Potential future source of carbon credits

• 1.5 Million customers

• $189 Million/year in 2016 for

  • 483 GWH of electric savings
  • 6 million annual therms of gas savings,
  • 36 GWH of small renewable generation

Objectives for Evaluation

- Looking backward: Verify/correct savings estimates
- Looking forward: Data for investment-grade savings- used to reduce purchases of power and gas- *in the aggregate*
- Continuous improvement- program design and marketing
- Document program history, processes, changes, outcomes
- Inform future strategies

Evaluation at Energy Trust

- Part of “Planning and Evaluation”
- Planning= two groups: Economic/reporting and engineering .
- Roles overlap, especially for market research, technology testing, pilot programs.
- Lots of cross-group help- virtuous learning cycle: Evaluation drives reporting, program refinement, future efforts.
- To separate is to lose most of the value of evaluation

- Budget and Staffing

- 2016: $4.96 M- includes planning and some market research, impact and process evaluations.
- 2.6% of budget
- 1 manager, four staff, one intern
- About 100 projects at some stage at any time.

STAFFING AND CONTRACTING

- Most evaluations outsourced- to assure independence, utilize range of consultant skills, and minimize staffing needs, BUT
  - Statistical analysis of utility billing data performed by staff, with independent contractor review of analysis plans and final product.
  - Energy Trust always does the data cleaning and sorting and selection- with five client utilities this can be complex, and is not efficient to outsource.

Staffing and Contracting

- Impact evaluations using site visits and/or monitoring and re-modeling of buildings are more efficiently contracted out.
- Most market research and process evaluation is contracted out, but some efforts to synthesize and analyze market data bases are performed in-house, sometimes using interns.

Assuring Independence of Evaluation Without Completely Separate Evaluation Organization

- Evaluation Department is under separate Director from programs.
- All studies are performed by contractors OR work plan and final product reviewed by contractors.
- Contractor has final edit.
- Major evaluations are further reviewed by the evaluation committee of our volunteer Board of Directors.
- Volunteer experts who help board committee assess our work.
- For measures, Regional Technical Forum provides an independent review function to consider all evidence.

Market Effects Evaluation

- Complexity is overrated!
- For most programs, rolling sample, quick phone survey, standard questions.
- Allows trend tracking
- Stops the arguing over methods- mostly
- Other methods where there are complex network decisions (new building construction) or where a few huge projects dominate results

Evaluation Timing and Reporting

- 4-6 month after year end seriously limits reliability.
- We have no profit incentive or decoupling.
- So, Energy Trust has unlinked evaluation schedule from annual reporting cycle.
- “Realization rates” for measures and classes of custom projected are set the August before a program year based on prior evaluation and research.
- These values are used for the next year’s annual report.
- A “true up” report published each fall updates annual and cumulative savings for evaluation results.

Keeping Costs Down

- Staff can run many studies at once- if they know how to manage effectively
- Internal data cleaning and statistical analysis of billing data.
- Protocols for billing analysis, market effects analysis, etc. are transparent and simple. Estimation happens.
- Rely on aggregation to help with reliability.

- More Keeping Costs Down

- Don’t over-reach- e.g., spillover estimates may be loose, so use it conservatively.
- Work closely with program staff to identify important questions.
  - E.G., persistence may be a bigger question than annual savings at some point.
- Sharing with overseers on ongoing basis leads to reasonable oversight.
- One study for multiple years? Painful to execute, may not be worth it.

Takeaways

- Evaluation is integrative, and as varied and unique as programs.
- It pays to invest in expertise to lead.
- Know which questions are endless, and build consensus around simple approaches.
- Customize where there are different circumstances. Standardization is not good management when it erases meaning.
- Standardization in certain processes- data cleaning, market effects analysis, reduces swirl, saves money, and improves quality.

- Thank You

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EnergyTrust of Oregon

Discussion/Questions

For more EM&V information (upcoming and recorded webinars, EM&V resources) see:

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Contact: EMVwebinars@lbl.gov

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