

# Important Principles of Energy Efficiency Program Evaluation

The principles offered here were developed through the CEE Evaluation Committee in 2011. This Committee is comprised of evaluation staff of administrators of ratepayer-funded energy efficiency programs, including both utility and non-utility administrators across the United States and Canada. It is the Committee's collective opinion that these principles are important to increase the likelihood that evaluation of energy efficiency programs will be undertaken in a responsible and effective way. The principles are specific to the evaluation of ratepayer-funded energy efficiency programs. They are not meant to be comprehensive, and they may need to evolve over time to meet the changing realities of this increasingly dynamic industry.

The principles are meant to be relevant to all types of energy efficiency program evaluation, including formative evaluation, such as market and baseline studies or process evaluation, and outcomes evaluation, such as impact evaluation and associated measurement and verification (M&V) activities, market effects and cost-effectiveness studies. (For definitions of these terms and a more complete description of the different types of energy efficiency program evaluation, see the document "[Categories and Types of Evaluation](#)" at [www.cee1.org](http://www.cee1.org).)

The principles are organized by the aspects of program evaluation that they address. This includes general aspects of evaluation as well as evaluation planning, budgeting, precision, quality assurance, and the context in which program evaluation is undertaken.

## GENERAL PRINCIPLES

1. **As much as possible, ensure that program administrator goals are measurable.** This includes goals at the individual program and portfolio levels. During the process of setting goals, input from professional energy efficiency program evaluators can help in identifying the viability of measuring progress toward the goals under consideration.
2. **Effective progress indicators align with goals. Remember that "what you measure is what you get": the variables that are measured tend to drive outcomes.** Consider the possible unintended consequences of required goals and related progress indicators or metrics.

## EVALUATION PLANNING

3. **As much as possible, plan for evaluation in conjunction with program planning and implementation, and look to evaluation to serve both program and broader organizational goals.** Planning in advance for evaluation-related activities to occur at appropriate points in the cycle of program planning and implementation, rather than planning for evaluation after program launch, results in more efficient and effective evaluation

expenditures. More useful evaluations reference organizational and program goals and inform with respect to them.

4. **Agree on baseline considerations for measuring savings, including measurement methodology, at the beginning of program and evaluation planning.** “Baseline” refers to initial measurements of energy use and other key variables that are expected to change in response to an energy efficiency program. Energy efficiency program evaluation poses a special challenge in that it is not possible to measure both the energy use that would have taken place in the absence of the program and the energy use in the presence of the program. Agreement on baseline considerations at the beginning of a planning period can mitigate this challenge.
5. **Consider the rate of change of programs, the markets they serve, or regulations, and take this into account in planning for evaluation.** Evaluation studies are only as useful as the data on which they rest are relevant. Where conditions are changing rapidly, more frequent or timely evaluation is likely to be needed. Conversely, when there is little change, evaluation may not need to be as frequent.
6. **Programs do not operate in a vacuum. In planning for evaluation, consider and disclose causal factors other than the program activities that could contribute to observed outcomes, and the possible impacts of these factors on the outcomes.** In assessing evaluation results later on, look for these factors to be identified, and the extent to which they were accounted for disclosed. The impact, if any, of such causal factors on the level of free-ridership and spillover should be considered on a case-by-case basis.

## CONTEXT

7. **Measurement of energy savings and cost-effectiveness is context-sensitive.**
  - For many measures, energy savings and cost-effectiveness depend on where the measures are installed (e.g., different buildings have different schedules of use).
  - Cost-effectiveness and energy savings of some equipment depend on the installation of other equipment (e.g., if windows are improved, sometimes a smaller chiller can be installed in a commercial building). It is important to think carefully about where a component versus combined approach makes sense.
  - Consider the choice of cost-effectiveness test, and inputs to the test, carefully in light of program goals. Measurement of cost-effectiveness is sensitive both to the type of cost-effectiveness test selected and to the associated input assumptions, such as discount rate, avoided costs, etc. Consequently, the selection of a cost-effectiveness test and the assumptions used should be consistent with the goals of the program. For example, if the primary goal of a program is to reduce greenhouse gas emissions, it would be inappropriate to use only a cost-effectiveness test that excludes the value of the avoided emissions
8. **Take into account how equipment and people interact when planning for and conducting evaluation.** The conscious and unconscious decision-making and behavior of individuals, households, and businesses can have a major impact on both energy use and the energy savings achieved by a program.
9. **Programs aimed at altering behavior, manufacturing and stocking practices, and other lasting structural change tend to require a different evaluation approach from traditional rebate programs.** Lasting structural change takes time, so longer measurement time horizons are needed. Where savings are small per customer across many customers, obtaining very

precise estimates may not make economic sense, but it is still possible to get sufficient precision to make good resource decisions.

## PRECISION

10. **In determining precision requirements, consider how the results are to be used and what is practical and affordable relative to the undertaking or goal.** There is no single rule or confidence interval for evaluation estimates that is attainable or useful for all evaluations. None of the key elements of utility resource planning, such as outage rates or fossil price forecasts, are precise, yet the process is designed to manage with reasonable imprecision. In the same spirit, a good evaluation plan allocates an appropriate level of resources toward enough precision for the things we need to know most.
11. **Disclose the level of precision associated with reported measurements.** To avoid a misleading impression of an estimate's precision, provide evaluation estimates of a program's impacts with a range, usually including a central estimate, rather than just a single figure.
12. **Recognize potential sources of bias in evaluation data that could produce inaccurate results, no matter what the level of precision.** Make efforts to identify, control, and correct for sources of bias.

## QUALITY ASSURANCE

13. **Consider evaluation as a routine part of a continuous program improvement process.** Many evaluation activities are fundamental to effective program management. Programs do not work as static strategies, because markets, participant segments, technologies, and contractor delivery infrastructures change over time. Ongoing feedback from process evaluations, market assessments and impact evaluations allows for program assumptions to be routinely tested and helps programs stay on course and focus on milestones.
14. **Where program administrators have excellent data tracking systems and reporting capability, have internal capability for data cleaning, and have collected necessary evaluation data along the way, evaluation is more affordable, rapid and accurate.**
15. **The timing of data collection is important to good evaluation.** Better evaluation plans include data collection schedules that seek to provide results in a timely fashion given the nature of the program and intervention. Depending on the design and objectives of particular projects in a program, data may need to be collected at one or more of the following times: pre-program intervention to establish baselines, soon after an intervention to verify measure installation or other program activity while memories are fresh, and one or more later intervals to assess impacts over time. Generally, evaluations should adhere to planned data collection schedules to assure accuracy, comparability, and consistency of analyses and to provide feedback for program improvement.
16. **Allow adequate time to pass before calculating cost-effectiveness.** Achieving program cost-effectiveness often takes time, because costs can fall and benefits increase over time. Cost-effectiveness is sometimes achieved only after the market for a measure matures. After gathering baseline data, two years or more may be needed before calculating cost-effectiveness to give time for market effects to work through the supply and distribution systems.
17. **After taking into account the other principles identified here, consider allowing alternative methods when establishing requirements for evaluation.** There are sometimes

tradeoffs between statistical precision and meaningful results. At times, multiple methods with lower precision may provide more useful and meaningful answers at less cost.

18. **As programs and markets evolve, the evaluation methods may need to change.** Ensure that the evaluation method(s) being used continue to be appropriate. Findings from process evaluations and market assessments can help identify when to reassess impact evaluation methods.
19. **Evaluation reports should include an executive summary that presents the results in a manner that will enable those with limited background in the subject matter to understand the key findings and conclusions.**

## EVALUATION BUDGETING

20. **Allocate evaluation resources in relation to the expected program savings, level of uncertainty of savings estimates, cost or difficulty of measurement, and the importance of the undertaking or goal.**

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