ENERGY EFFICIENCY Guidebook℠

for public power communities

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The *Energy Efficiency Guidebook for Public Power Communities* is a comprehensive resource to assist public power utilities in developing and implementing energy efficiency programs for their customers.

The Guidebook provides an overview of the key components of energy efficiency program planning, design and delivery with links to additional sources of information on each topic.

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TABLE OF CONTENTS

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CHAPTER 1: The business case for energy efficiency

Introduction

Why does promoting energy efficiency make business sense for public power utilities? Given that community-owned utilities are in the business of serving customers, keeping rates low and making contributions to the city's general fund, it may seem counterintuitive that a local utility would want to encourage customers to use less of the product they are selling.

Utilities are accustomed to assessing the cost of meeting future energy demand by building a new power plant or purchasing power in the market. Similarly, energy efficiency can be viewed as a resource for meeting future energy needs by reducing customer demand. The cost-effectiveness of energy efficiency resources can be evaluated using the same tests that are used to evaluate new supply-side resources. The reality is that new power plants are expensive. The costs of building and operating plants only increase with the likelihood of new federal regulations limiting carbon emissions. The least expensive way to control costs over the long term is to reduce waste by building energy efficiency resources.

By acquiring energy efficiency resources, utilities can reduce fuel costs, defer capacity investments, increase system reliability, demonstrate environmental stewardship and reduce regulatory risk. In addition, by reducing customer energy bills and creating business opportunities around energy efficient products and services, energy efficiency programs keep dollars in the community, supporting job creation and other local economic development benefits. Research has also shown customer satisfaction increasing as the utility becomes a trusted source of information on how to save energy.

What about benefits for utility customers? The National Action Plan for Energy Efficiency analyzed eight business case scenarios for utility investment in energy efficiency, and demonstrated customer bill reductions of between two and nine percent over the ten- to 15-year timeline of the analysis. As noted in the study, "Even though the efficiency investment and decreased sales drives rates slightly higher, this increase is more than offset in average customer bills due to a reduction in energy usage."

Customers will also benefit from improved system reliability and spillover effects such as increased retail stocking of energy efficient products, and contractors and home builders who incorporate energy efficiency services into their business models. Many customers derive personal satisfaction from taking action to reduce energy use and protect the environment.

Meeting revenue requirements

In order for energy efficiency to represent a successful business proposition, it is important to ensure that the utility is not financially harmed by the reduced energy sales that result from energy efficiency initiatives. Utility revenue requirements are comprised of variable costs and fixed costs. Variable costs, such as fuel, decrease when sales decline. However, fixed costs such as infrastructure, administrative expenses, and payments in lieu of taxes do not decline with reductions in sales. To the extent that fixed costs are recovered through per-kWh and per-therm charges, declining sales will cause a greater reduction in revenues than costs. In light of this issue, steps can be taken to ensure that energy efficiency initiatives do not have a negative impact on the utility's financial health.

An article in the July/August 2009 edition of the American Public Power Association's (APPA) *Public Power* magazine summarizes actions that utilities with successful energy efficiency initiatives have taken to ensure that energy efficiency programs do not cause a negative impact on their bottom line. The most critical factor is to make timely rate adjustments to ensure cost recovery and address potential revenue shortfalls. Public power

utilities that are regulated by local governing bodies generally have an advantage over investor-owned utilities in terms of having greater flexibility to adjust rates as needed. To accomplish this objective, the APPA article sets forth the following recommendations:

- Educate governing boards on long-term financial benefits of energy efficiency to the utility and the customer. Key selling points include the fact that in the long run, energy efficiency costs less than supply-side investments, and reduces the risks associated with future climate-related regulations. It is also important to emphasize the local economic development benefits associated with energy efficiency.
- Educate customers about the benefits of utility investments in energy efficiency, such as lower long-term costs, environmental benefits, and economic development benefits. Emphasize the distinction between rates and bills, and point out that energy efficiency programs represent a small portion of rates in comparison with supply-side costs.
- Track the impact of energy efficiency programs. It is particularly important to distinguish between the energy efficiency-related impacts on revenue and the impacts of other factors affecting sales such as weather and economic conditions. Other sections of this Guidebook address best practices for energy efficiency program evaluation and tracking program results.
- Ensure that load forecasts and revenue projections take energy efficiency-related impacts into account. Some public power utilities adjust financial forecasts annually (or even more frequently) to incorporate the effects of energy efficiency programs.
- Provide regular updates to the governing board on the status of energy efficiency program activities, and associated impacts on revenue requirements. Request rate adjustments on a timely basis to address revenue shortfalls.

Business case analysis tools

Demonstrating a compelling business case for energy efficiency investments is valuable from a customer relations perspective, and also useful in requesting budgetary approval from city officials and utility governing boards. In addition to presenting compelling arguments for local economic development, civic pride, environmental responsibility, and energy independence, the rationale for investing in energy efficiency often comes down to numbers-in effect, demonstrating that over the long term, energy efficiency investments cost less than supply-side alternatives.

An early leader in the energy efficiency arena was Waverly Light and Power (WLP)-a municipally owned utility in Waverly, Iowa, serving around 5000 meters. WLP's 17-year track record in delivering energy efficiency programs demonstrates the business case for energy efficiency. In his presentation Energy Efficiency and Ethics, former WLP general manager, Glenn Cannon, describes the value of energy efficiency in today's utility business climate and summarizes results from WLP programs. WLP's Conservation Analysis spreadsheet is a straightforward tool that tracks the utility's energy efficiency program results and cost-effectiveness over the 17 years that programs have been offered. A blank Conservation Analysis template is also provided. Utilities can conduct their own business case analysis by adapting this tool to reflect their own energy efficiency program offerings, costs, and results.

Resources

- Energy Efficiency and Ethics presentation
- Waverly Light & Power's Conservation Analysis spreadsheet
- Conservation Analysis template
- American Public Power Association: A New View on Energy Efficiency for Public Power Utilities
- American Public Power Association: The Effect of Energy Efficiency Programs on Electric Utility Revenue

Requirements

- American Public Power Association: Reconciling Energy Efficiency Programs and Revenue Adequacy
- American Public Power Association: When More is Less
- National Action Plan for Energy Efficiency Report (Chapter 4)
- National Action Plan for Energy Efficiency: Energy Efficiency Benefits Calculator
- National Action Plan for Energy Efficiency: Business Case for Energy Efficiency Presentation

CHAPTER 2: Starting the energy efficiency plan

There is no one-size-fits-all approach to developing a successful portfolio of energy efficiency programs, and the approach should be tailored to meet the utility's goals, available resources, and the needs of their customer base. However, there are several key steps that can be undertaken early in the planning stages that should facilitate greater success in the long run.

Step 1: Designate a manager for energy efficiency initiatives

Public power utility employees often wear multiple hats and it can be challenging to develop new initiatives while keeping up with existing responsibilities. In addition, a diverse skill set is required to administer energy efficiency programs, from marketing and public relations, to engineering and technical assistance, to general administrative functions. Even if resources do not permit dedicating a full-time staff position to overseeing energy efficiency program design and delivery, designating primary responsibility to a single individual will streamline administrative/management functions and help to ensure that planning and implementation proceed in a coordinated, timely manner. (See Operational Challenges chapter for information on hiring an energy efficiency coordinator, including a sample job description).

Step 2: Assess current efforts

In developing a new energy efficiency initiative, it is important to undertake a comprehensive review of efforts that are already available for utility customers. This could include federal or state-funded energy efficiency programs or existing utility programs that could complement energy efficiency offerings, such as pricing structures, power quality services and demand response initiatives. It is important to identify any existing utility resources that can be leveraged. For example, what avenues are available to communicate energy efficiency information to customers, such as the utility web site, newsletters, advertising and community events? How could energy efficiency information, incentives, and resources complement existing customer offerings?

Step 3: Leverage peer knowledge

Utility-administered energy efficiency programs have been around for more than thirty years, so there are well-established models that can be followed and a wealth of information on successful (and unsuccessful) strategies that can be gained from peers. Reach out to utilities that already have programs in place. Find out what strategies have worked best for them and what lessons they have learned. There is also a wide array of published information and online resources that address energy efficiency best practices. Some key resources include:

- American Public Power Association (APPA): offers policy and advocacy resources, training, and technical information to help public power utilities promote energy efficiency. The Energy Efficiency Resource Central website is a clearinghouse for many informational resources, including a searchable Database of Energy Efficiency Programs at Public Power Utilities.
- Clean and Efficient Energy Program (CEEP): This nationwide initiative promotes public power investment in energy efficiency and clean energy. CEEP is building on the existing base of successful strategies and case studies of energy efficiency programs, refining them into topical "tool kits" for use by public power managers. These resources will be available on the web and deployed through regional workshops. CEEP is a partnership of APPA, the Large Public Power Council (LPPC), and the Alliance to Save Energy.
- National Action Plan for Energy Efficiency: The National Action Plan is a public-private initiative aimed at creating a sustainable, aggressive national commitment to energy efficiency through the collaborative efforts of gas and electric utilities, regulators and other partner organizations. National Action Plan activities are coordinated by the U.S. Department Energy (DOE) and the U.S. Environmental Protection Agency (EPA).

- National Energy Efficiency Best Practices Project: Funded by California investor-owned utilities, this online resource provides energy efficiency best practices and also includes a benchmarking tool to help utilities identify strengths and weaknesses in existing programs.
- Rapid Deployment Energy Efficiency (RDEE) Toolkit: Developed with input from the National Action Plan for Energy Efficiency and coordinated by DOE and EPA, the toolkit provides detailed program design and implementation guides for ten broadly applicable energy efficiency programs. The toolkit is designed to help state and local governments choose successful programs as they respond to funding opportunities through the American Recovery and Reinvestment Act of 2009.

Step 4: Conduct community outreach

With strong ties to the community and a proven role as a trusted source of energy-related information, public power utilities are uniquely positioned as leaders in energy efficiency. Once an energy efficiency plan is developed, obtaining community feedback on the plan lays a strong foundation for future outreach efforts and helps to ensure that program offerings are informed by community needs. Potential strategies for community engagement include reaching out to local elected officials, holding town meetings during the planning process, and assessing opportunities to partner with local businesses, community groups, churches, schools, and other organizations in bringing energy efficiency information and services to the community. Forming a formal community steering committee can be a useful mechanism for obtaining ongoing input and support.

Resources

- American Public Power Association: Starting an Energy Efficiency Program for Your Utility and Community
- National Action Plan for Energy Efficiency: Guide to Resource Planning with Energy Efficiency

CHAPTER 3: Customer energy baseline assessment

Baseline research helps utilities make informed decisions about the energy end uses and equipment that will be most readily and cost-effectively targeted with energy efficiency programs. For example, it is useful to know what share of the utility's load serves residential versus non-residential customers, and if possible, to further break down load into more specific market segments (single family/multifamily/mobile home; office/retail/school, etc.). Baseline research can also be used to characterize the types of equipment that are installed in customer homes and businesses. These data validate program planning assumptions and are also useful in evaluating energy savings impacts once programs are established. According to the National Energy Efficiency Best Practices Study's Portfolio Best Practices Report, "Objective baseline research reinforces the credibility of the portfolio and its underlying programs with diverse stakeholders and improves the accuracy of savings estimates, cost effectiveness calculations, and goals."

The first step in establishing an energy efficiency baseline is to gather relevant information that the utility already has but which may not be gathered in a single place. Valuable information about customer energy use can be gleaned from the utility's billing system and from employee knowledge of the customer base. At a minimum, the utility should collect and organize all information available on customer energy use and facility characteristics.

The next step is to identify a few key areas where there are significant information gaps. Targeted baseline research in these areas would help to reduce uncertainty and improve the chances of program success. For example, the majority of program savings typically come from lighting measures. A utility with a largely residential customer base could undertake baseline research to determine key characteristics of the residential lighting market in their service territory: average number of light sockets per home; average number of CFL bulbs and incandescent bulbs installed per home, etc.

There are two basic categories of research: primary and secondary. Primary research involves the collection of data that do not already exist. Primary research approaches include surveys, site inspections, and measurement of end use energy consumption. Secondary research involves the collection and synthesis of data contained in existing sources such as studies done for other utilities or the compilation of data from the utility's own information systems. In general, primary research is more expensive and labor-intensive than secondary research.

The following table describes the types of data that are most useful for baseline assessments and suggests possible data sources for secondary research.

DATA SOURCES FOR BASELINE ASSESSMENTS

DATA NEED	DATA GATHERING APPROACH
Total energy sales by sector (residential, commercial, industrial, and agriculture)	Obtaining these data should be straightforward for customer classes that are on different rate schedules. (If there is a single rate class for nonresidential customers, the following row provides information on using national data sources to disaggregate sales by market segment).
Energy sales by market segment	If the billing system contains NAICS or SIC data for commercial and industrial customers, disaggregating nonresidential sales by market segment is straightforward. If not, the local Chamber of Commerce or business school may be able to prove useful demographic information on the types of businesses in the community. National data sources can also be used to estimate sales by market segment. The U.S. Census Bureau's CenStats database provides county/zip code-level data on the total number of business establishments, employment, and payroll by NAICS code. For the residential sector, the Census Bureau's American FactFinder provides zip code-level data on total housing units and breakdowns between owner-occupied/ rental, single family/multifamily.
Top energy users by rate class	This information should be available from the utility's billing system and can be used to direct in-depth facility assessments as well as targeted outreach strategies.
Nonresidential facility characteristics	Useful data include facility type (office/hospital, etc.), occupancy, hours of operation, square footage, heating fuel, and types/counts of installed equipment. For utilities that have offered energy audit services, compiled data on participating facilities are a valuable source of information. Customer service representatives and field operations staff are also useful resources for this type of information.
Residential facility characteristics	Useful data include age of housing stock, number of occupants, square footage, heating fuel, and type of heating system/air conditioning system/water heater. For utilities that have offered energy audit services, compiled data on participating households are a valuable source of information. Municipal utilities may also have access to more detailed demographic data from property tax records and other community records. The Census Bureau's American FactFinder also provides zip code-level data on age of housing structure and heating fuel. As residential energy usage characteristics are relatively homogenous within climate regions, secondary sources—such as baseline studies conducted in similar markets—can generally provide a good approximation of local housing characteristics.

If the utility requires additional customer data to help set goals and if resources allow for a primary data collection effort, conducting surveys of high energy users is an effective strategy for targeting available research dollars. Utilities typically conduct surveys via telephone or mail. For business customers, telephone surveys are usually the most effective way of reaching the decision-maker and obtaining a response. Response rates for mail surveys are generally better in the residential sector than in the business sector, though telephone surveys are also widely used in surveys of residential customers.

Surveys can be used to gather information listed in the table above directly from customers. They also provide a good opportunity to gather information that will be useful in program planning and marketing efforts. For business customers, surveys can request contact information for individuals involved in energy-related decisions such as the decision-maker for capital expenditures, the facility manager or other individual in charge of energy management decisions, and the person responsible for payment of energy bills. In addition, the utility can solicit general information about the customer's business and about any energy-related concerns. For residential customers, surveys can request information about the customer's general level of energy awareness and solicit input regarding potential resources that would help the customer make more informed decisions about energy use.

Following are a few general best practice tips for conducting surveys:

- Provide advance notice to survey participants, ideally through a letter that clearly explains the purpose of the survey and why the customer's participation is important.
- Pre-test the survey instrument for clarity with a few people who were not involved in drafting the survey. Make sure the survey questions are easy to understand and that it takes no more than 20 minutes to complete.
- Track non-respondents and follow up to encourage them to return the completed survey. Consider offering multiple ways of responding to the survey. For example, if individuals do not respond to a mail survey, follow up with a telephone call to see if they will answer the questions over the phone.
- Consider providing a small incentive such as a $5 gift card for returning a completed survey or entering respondents in a prize drawing to show appreciation for their time and input.

Secondary sources can also provide useful information for a baseline assessment. Market characterization and baseline studies from other jurisdictions are useful secondary sources—particularly if they were conducted within the state or in a neighboring state with similar climate, economic, and demographic conditions. Other utilities, state agencies, and regional energy efficiency organizations (such as the Midwest Energy Efficiency Alliance or Northwest Energy Efficiency Alliance) are good resources to check for recent studies. The California Measurement Advisory Council (CALMAC) maintains a searchable database of energy efficiency studies conducted in California, including market studies. However, caution must be used in applying California data to other states given California's historical levels of energy efficiency program investment and aggressive energy codes and standards. The Consortium for Energy Efficiency (CEE) maintains a similar resource for studies conducted in other states. The Energy Center of Wisconsin's online library contains all of the market research studies published by the Energy Center, as well as studies published by other organizations.

In relying on secondary data sources, it is important to keep in mind some key areas where adjustments may be necessary to ensure secondary data provide a reasonable approximation of reflect local conditions:

- Differences in climate that affect the baseline for heating and cooling equipment
- Differences in historical levels of energy efficiency program effort
- Differences in appliance efficiency standards and building codes
- Market/demographic differences (e.g., breakdown between residential, commercial, industrial, and agricultural customer base)

- Economic differences (e.g., economic growth)

Resources

- CALMAC: Database of Market Assessment and Evaluation Research Reports
- Consortium for Energy Efficiency (CEE): Market Assessment & Program Evaluation Clearinghouse
- Energy Center of Wisconsin: Energy Research Library
- National Action Plan for Energy Efficiency: Guide for Conducting Energy Efficiency Potential Studies
- National Institute of Building Sciences article on energy modeling approaches: Energy Analysis Tools
- Regional energy efficiency organizations:
  - Midwest Energy Efficiency Alliance
  - Northeast Energy Efficiency Partnerships
  - Southeast Energy Efficiency Alliance
  - Southwest Energy Efficiency Project
  - Northwest Energy Efficiency Alliance
- U.S. Department of Energy: Links to energy code baseline studies
- Dr. Don A. Dillman, Washington State University: Papers and other resources on conducting survey research

CHAPTER 4: Energy efficiency opportunity assessment

Introduction

Energy efficiency potential studies are used to assess the level of cost-effective energy savings that can be achieved through energy efficiency programs. This information helps utilities set realistic savings goals, determine appropriate funding levels for energy efficiency programs, and allocate program resources across market sectors. Potential studies also provide useful information in making the business case for energy efficiency program investments.

A potential study can be a high-level analysis or a rigorous and data-intensive undertaking. A high-level assessment is typically sufficient for goal-setting purposes and to guide allocation of program resources across market sectors. A more rigorous analysis would be necessary to assess the potential for energy efficiency resources to supplant future supply-side investments. According to the National Action Plan for Energy Efficiency, potential studies are typically outsourced and—depending on the scope—take three to eight months to complete and cost between $100,000 and $300,000. Given technology developments and market changes that result from programmatic efforts, as well as revisions to building codes and equipment efficiency standards, it may make sense to update the potential study every three to six years.

As shown in the figure to the right, energy efficiency potential can be assessed at several levels:

- **Technical potential**: The theoretical maximum level of potential energy savings, assuming immediate implementation of all feasible energy efficiency measures regardless of cost-effectiveness.
- **Economic potential**: A subset of technical potential which assumes immediate implementation all cost-effective energy efficiency measures (where multiple measures compete for a given application, the most cost-effective option is selected).
- **Achievable potential**: The level of savings that could realistically be achieved by energy efficiency programs within a specified time horizon, given limiting factors such as cost-effectiveness, capital constraints, the useful lifetime of existing installed equipment, program ramp-up time, and other barriers that affect adoption of energy efficiency measures.

The most useful estimate for goal-setting and program planning purposes is achievable potential, since it takes cost-effectiveness as well as key time-related and program-related constraints into account.

Key decisions in planning a potential study

Consider the following key factors in determining the appropriate scope and approach for conducting an energy efficiency potential study.

Establish study objectives

The goal of the study will determine the scope and desirable level of rigor. Secondary data sources are generally sufficient for the purposes of a high-level study that is primarily intended to inform goal-setting

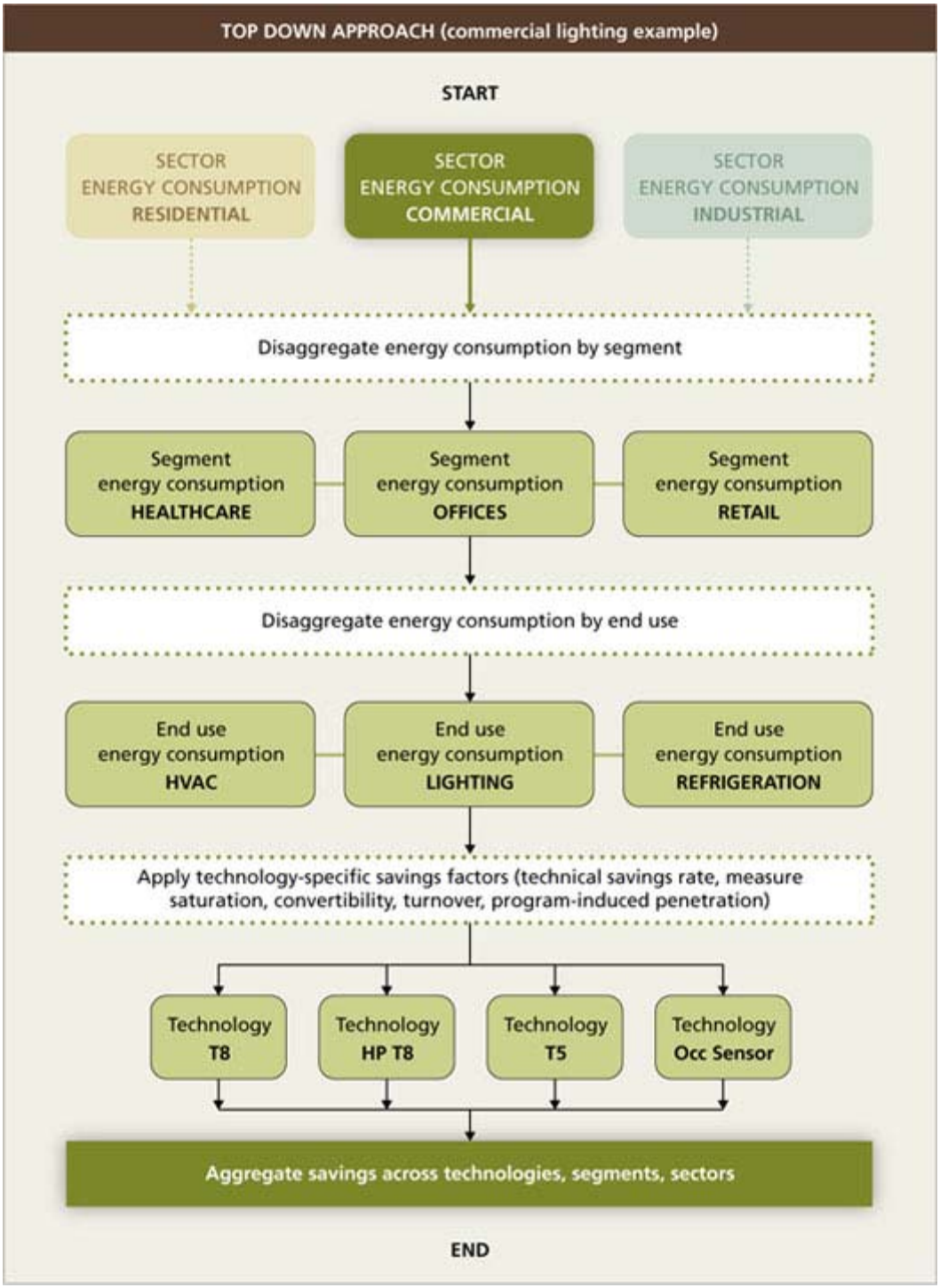
processes and allocation of resources. A more rigorous study, requiring primary research, would be necessary to determine whether energy efficiency could supplant a planned supply-side investment.

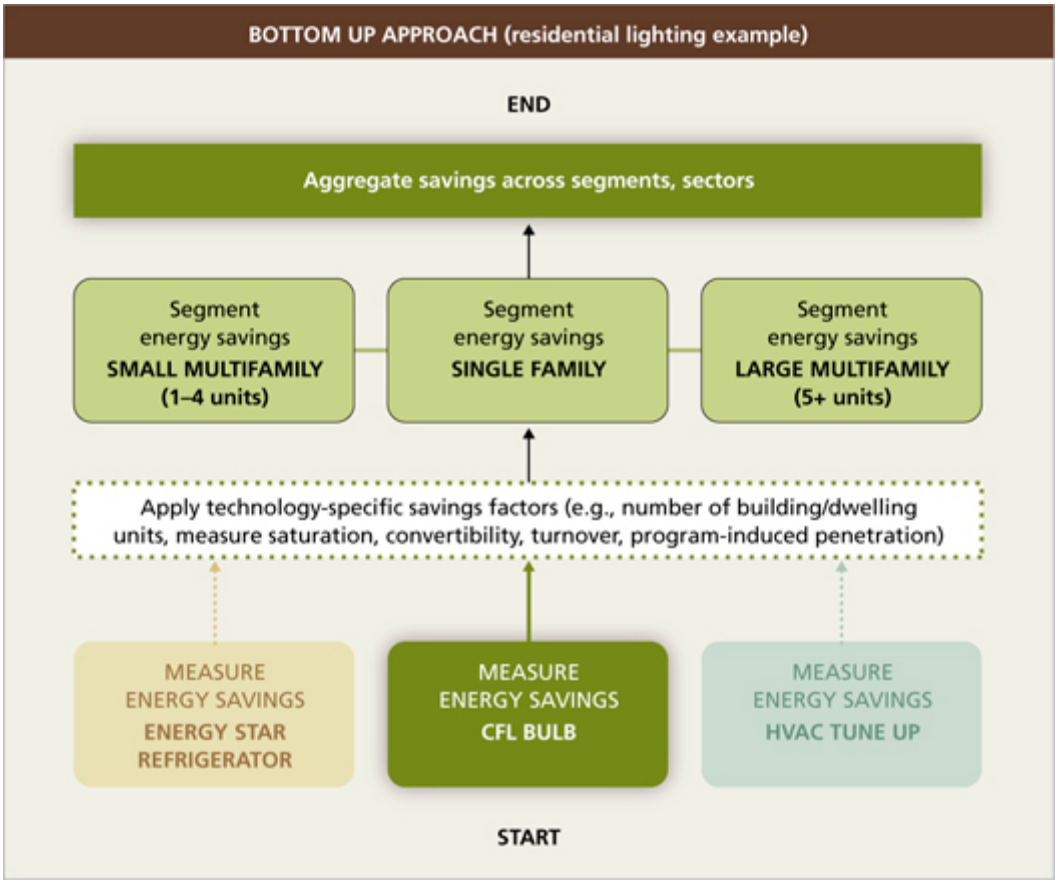
Determine the study timeframe

Estimates of achievable potential are time-dependent, and thus require a specified time horizon in which program results will be achieved. Most studies develop energy savings estimates for five to ten years in the future. Longer-range studies may be conducted, but longer-range estimates are inherently more uncertain given the myriad factors affecting adoption of energy efficiency measures (changing energy policy, technological development, etc.).

Select an analytical approach

Energy efficiency potential can be assessed using a top-down or bottom-up approach, or combination of the two approaches. A top-down approach starts with forecasted energy consumption disaggregated by end-use and estimates the percentage savings that energy efficiency measures could achieve during the specified timeframe. A bottom up approach begins at the measure level, estimates how many individual measures a program could deploy over the specified timeframe, and aggregates the savings across all measures addressed in the study. The graphics below show a simplified process flow for each approach. The appropriate analytical approach is determined by the objectives of the study as well as by data availability. A top-down approach is generally less data-intensive and usually sufficient for a high-level study. In addition, a top-down approach is typically used to assess energy efficiency potential in the commercial and industrial sectors, given the variability in energy end use and technology installations across nonresidential market segments and facility types. A bottom-up approach is more commonly used for assessing energy savings potential in the residential sector, where technologies and end-use energy consumption patterns are more homogeneous.


TOP DOWN APPROACH (commercial lighting example)
START
SECTOR ENERGY CONSUMPTION RESIDENTIAL
SECTOR ENERGY CONSUMPTION COMMERCIAL
SECTOR ENERGY CONSUMPTION INDUSTRIAL
Disaggregate energy consumption by segment
Segment energy consumption HEALTHCARE
Segment energy consumption OFFICES
Segment energy consumption RETAIL
Disaggregate energy consumption by end use
End use energy consumption HVAC
End use energy consumption LIGHTING
End use energy consumption REFRIGERATION
Apply technology-specific savings factors (technical savings rate, measure saturation, convertibility, turnover, program-induced penetration)
Technology T8
Technology HP T8
Technology T5
Technology Occ Sensor
Aggregate savings across technologies, segments, sectors
END



Determine avoided costs

Avoided supply-side costs (electric generation, transmission, distribution, and fuel cost savings) are the primary mechanism for valuing the dollar benefits of energy savings achieved through program efforts. Avoided costs are based on the cost of avoided supply-side infrastructure development, or on the forecasted cost of avoided wholesale power/fuel purchases. If a utility's primary objective is reducing carbon emissions, the cost of a clean energy source such as wind power could be the appropriate supply-side benchmark. Other important considerations include accounting for time-differentiation—the fact that avoided costs will be higher during periods of peak system demand. Time-differentiated avoided costs are matched up with the individual load shapes of energy-saving measures.

Consider including avoided carbon costs

Though there is not yet a national policy framework to regulate and monetize the costs associated with carbon emissions, it is likely that such regulations will be in effect in the near future. Recent studies by Synapse Energy Economics and EcoSecurities Consulting Ltd. have forecasted prices of between $10 and $50 per metric ton of carbon equivalent. If utility-specific emissions factors are not known, EPA's Emissions & Generation Resource Integrated Database (eGRID) provides regional emissions factors based on a comprehensive inventory of the environmental attributes of electric power systems.

Consider including avoided externality costs

Utilities may also elect to include a monetary value for other avoided pollutant emissions such as sulfur dioxide, oxides of nitrogen, and mercury.

Select measures to include

In addition to including energy efficiency measures across all applicable market sectors (residential, commercial, industrial, agricultural), some studies also elect to include fuel switching measures, demand response (DR) measures, customer-sited renewable energy systems, energy efficient distributed generation resources such as combined-heat-and-power (CHP) applications, and efficiency improvements that utilities can

make to their own distribution infrastructure.

Determine how results will be reported
Study results can be presented in different ways, and it is important to understand definitional distinctions. Annual savings represent the first-year savings that occur as a result of all measures installed in a given year of energy efficiency program activity. *Lifetime savings* represent the total savings that will occur as a result of all measures installed in a given year, aggregated over the respective measure lifetimes. *Cumulative savings* represent the sum of annual savings over multiple program years. Reported results should be aligned with energy savings goals. For example, if a utility has to meet annual energy savings goals, study results should be expressed in terms of annual savings potential.

Steps to assessing energy efficiency potential

An energy efficiency potential study is largely a data collection effort. Once the necessary data are compiled, the analytics are relatively straightforward. Key steps in conducting a top-down assessment of energy efficiency potential are summarized below.

Step 1: Compile the data that will be used in conducting the analysis
As discussed above, a high-level assessment can rely primarily on secondary data from other studies. The best sources of information are other potential studies from the same state or region. There are also some national data sources that may provide useful information, but which also have limitations. The National Action Plan for Energy Efficiency advises: "national public data sources should be considered sources of last resort: they provide data averaged over large regions, sometimes are not very current, and it is often difficult to ascertain sufficient background information to fully understand the underlying methods used to determine what biases may exist." The matrix, National Data Sources for Energy Efficiency Potential Studies, summarizes national resources that provide useful information for potential studies. Whether using national or state/regional data, it will be necessary to adapt the data to ensure that assumptions are reasonable given local conditions. Potential study data requirements include:

Baseline energy sales forecasts
Baseline sales forecasts include the effects of "naturally occurring" efficiency improvements. Naturally occurring efficiency includes the effects of future changes in codes and standards that are known at the time of the study, as well as other non-program-related factors affecting market penetration of energy efficiency measures. For utilities that have not offered energy efficiency programs in the past, historical growth rates should provide a reasonable approach for projecting future energy sales trends.

Market segmentation data
Market characterization data are used to disaggregate energy sales forecasts by market segment and end use. At a minimum, sales forecasts should be disaggregated by sector (residential/commercial/industrial). Ideally, available data will also permit disaggregation by market segment—for example, subdividing the residential market between single family and multifamily homes, and subdividing the commercial market into offices, schools, hospitals, retail establishments, etc. In addition, sector or market segment data should also be disaggregated by end use: lighting, space heating, space cooling, refrigeration, water heating, etc.

Data on energy efficiency measures
For each energy efficiency measure addressed in the study—whether technology-based or operations/maintenance-related—the following data are used to quantify the costs and benefits of energy efficiency: energy savings, peak-coincident demand reduction, savings from avoided maintenance, median service lifetime, measure cost, and installation cost. Other useful data include the percentage of the equipment market that has already adopted the energy efficiency measure (referred to as the "saturation factor"), and the percentage of equipment market that

can be converted to an energy efficiency measure from a technical/engineering feasibility perspective (referred to as a "convertible factor"). In accounting for energy savings and measure costs, the following issues should be taken into account:

- *Energy savings*: Different approaches for calculating lifetime energy savings are used depending on the type of energy efficiency investment. There are two main investment categories: (1) "lost opportunity" investments, such as new equipment purchased to replace failed equipment (sometimes referred to as "replace-on-burnout" measures), and equipment purchased for new construction; and (2) retrofit measures, consisting of efficiency upgrades to functioning equipment as well as operational/maintenance improvements. The matrix, Approaches for Estimating Measure Savings, summarizes energy savings estimation approaches that are used under different circumstances.
- *Measure Costs*: For lost opportunity measures, the cost is typically measured as the incremental cost of the energy efficiency measure over the standard efficiency alternative. For retrofit measures, the cost is typically measured as the full capital cost of the measure plus installation cost.

Program data

Results from energy efficiency programs in other jurisdictions can be used to develop reasonable assumptions for the increased market penetration of energy efficiency measures that programs are expected to achieve. Useful program data include the set of measures that are typically included in a given type of program, participation rates, and program costs (incentive versus non-incentive).

Step 2: Conduct cost-effectiveness screening

Cost-effectiveness screening compares the net present value of benefits produced over the lifetime of the energy efficiency measure with the cost of the measure. Measures that do not pass the cost-effective screen with a benefit/cost ratio of 1.0 or above are excluded from savings potential estimates. The Program Screening chapter includes detailed information on conducting cost-effectiveness analysis, including a description of common cost-effectiveness tests, and a simple Excel tool that can be adapted to conduct cost-effectiveness analysis using assumptions that are specific to your utility. Note that with the exception of the Participant Cost Test, most cost-effectiveness tests require that program administrative costs be accounted for in the analysis. Administrative costs consist of all program-related expenditures *except* incentives—e.g., planning, administration, implementation, marketing, and evaluation. There are different ways of accounting for program administrative costs. Energy-saving measures can be bundled into example programs, and administrative costs can be estimated using historical program expenditure data or data from similar programs implemented in other jurisdictions. Administrative cost factors (also derived from existing program data) can also be applied on a *pro rata* basis (e.g., per-kWh/per-therm) at the measure level.

Step 3: Estimate energy savings potential

For each energy efficiency measure, this step involves projecting the increased penetration (sales/installation) that will result from program activity over the specified time horizon, and aggregating the results. A common approach is to bundle cost-effective measures into sample programs, and use results from other programs to approximate the effect that energy efficiency programs are likely to have on the market. Under the bundling approach, sample program budgets can be developed and program-level cost-effectiveness analysis can also be conducted. The spreadsheet, A Top-Down Approach to Estimating Savings Potential illustrates the basics of a top-town approach, where energy consumption is disaggregated by sector, market segment, and end use, and a variety of factors are applied to estimate the effect that energy efficiency program activity will have in reducing end-use energy consumption.

Step 4: Assess uncertainty

Potential studies always involve data availability challenges, and there is always a degree of uncertainty around

potential study results. It is useful to assess the sensitivity of overall results to changes in key assumptions made in the analysis. The basic approach for conducting sensitivity analysis is to vary major parameters (e.g., avoided costs, measure-level energy savings, market penetration of energy efficiency measures, value of avoided carbon emissions, etc.) within the reasonable bounds of uncertainty, and assess the degree to which such changes affect estimated energy savings potential.

Step 5: Present results
Analysts typically produce a final report to present potential study results. For goal-setting and program planning purposes, the most important information to be communicated in the report is the projected energy savings and peak demand reduction, the expected cost of achieving these energy savings results, and the estimated net economic benefits produced. Estimating other benefits associated with energy efficiency program investments, such as job creation and emissions reductions, may also be useful for reporting purposes.

Potential study pitfalls

There are several pitfalls to be aware of in conducting potential studies, not least among them the inherent challenges associated with limited/imperfect data availability. A few additional concerns include:

Impact of known changes in codes and standards
Since potential studies focus on estimating the savings that will result from energy efficiency program activity (not other factors in the marketplace), estimates should exclude the efficiency improvements that will result from impending changes in state or federal equipment efficiency standards and local building codes that are known at the time the study is conducted. In particular, the new federal efficiency standards for residential general purpose light bulbs and motors, as established in the Energy Independence and Security Act of 2007, should be taken into account.

Free riders and free drivers
Estimating **net** energy savings impacts involves excluding energy efficiency actions undertaken by "free riders"—individuals who take advantage of a program incentive even though they would have made the efficiency improvement anyway. Free riders increase program costs without producing additional energy savings benefits beyond what would have occurred without program intervention. Conversely, net savings estimates should also take "free drivers" or "spillover effects" into account—individuals who do not directly participate in a program, but who undertake energy efficiency actions in response to program activity (e.g., marketing/advertising). Accurate estimation of free ridership and spillover effects is complex, to say the least. Some researchers make the simplifying assumption that the actions of free riders and free drivers cancel each other out. Evaluation studies from other jurisdictions may provide appropriate net-to-gross ratios that can be applied to estimate net savings, though it is important to understand the methodology used to develop these ratios and ensure that assumptions are reasonable for the local market.

Interactive effects
Measure interaction occurs where installation of an energy efficiency measure that has a primary effect on one end use (such as lighting) produces a corresponding secondary effect on another end use (such as heating or cooling). Interactive effects can cause an increase or decrease in the energy consumption associated with the secondary end use. The issue becomes even more complex when considering interactive effects across electricity and natural gas consumption. Examples of significant measure interactions include fuel switching (e.g., switching from an electric water heater to a natural gas water heater), heating penalties and cooling benefits associated with installation of energy efficient lighting and equipment, and insulation/air sealing measures that save electricity used for cooling and natural gas used for heating. Studies that account for measure interaction achieve a higher level of accuracy.

Mutually-exclusive measures
In some cases, there are multiple energy efficiency measures that apply to a given end use. Once the savings associated with installation of a given measure are counted, the energy consumption associated with that end use should be taken "off the table" to avoid double-counting the savings. Mutually-exclusive measures are

usually dealt with through iteration. For example, analysis tools can include a stacking algorithm that ranks measures by cost-effectiveness, so that the savings associated with installing the most cost-effective alternative are then unavailable to other potential efficiency measures.

Resources

- National Data Sources for Energy Efficiency Potential Studies
- Approaches for Estimating Measure Savings
- A Top-Down Approach to Estimating Savings Potential
- American Public Power Association: Presentations from conference call on conducting energy efficiency potential studies (August 5, 2008)
- California Municipal Utilities Association: Establishing Energy Efficiency Targets: A Public Power Response to AB2021
- Energy Center of Wisconsin: Energy Efficiency and Demand Response Potential for Iowa Municipal Utilities for the Years 2012 and 2018
- National Action Plan for Energy Efficiency: Guide for Conducting Energy Efficiency Potential Studies
- National Action Plan for Energy Efficiency: Guide to Resource Planning with Energy Efficiency

CHAPTER 5: Setting goals and budgets

Introduction

Establishing clear goals for energy efficiency initiatives serves an important accountability function, making it possible to conduct an unbiased assessment of the utility's performance. At a minimum, goals should be set for the energy efficiency portfolio as a whole. Program-level or sector-level targets may also be developed.

There are multiple approaches to goal-setting, including differences in the types of goals that are adopted. In some states, public power utilities may be subject to regulatory requirements that specify how goal-setting is to be done and what types of goals should be established.

In its Portfolio Best Practices Report, the National Energy Efficiency Best Practices Study delineates goal-setting best practices:

- Ensure that goals are internally consistent, actionable and measurable.
- Ensure that goals are informed by sound research, aligned with available resources, and updated periodically.
- Develop tools to track performance against goals and institute reporting mechanisms that monitor performance on a regular basis.

Establishing long-term goals (three- to five-year targets rather than annual goals) helps to ensure consistency in funding commitments and program resources over time. Such consistency avoids disruptions in funding cycles and program offerings, and allows sufficient time for new programs to become established in the marketplace. In addition, some energy efficiency opportunities such as commercial new construction design services involve projects that span a year or more. Using multi-year program cycles to accommodate longer project timelines helps to reduce lost opportunities.

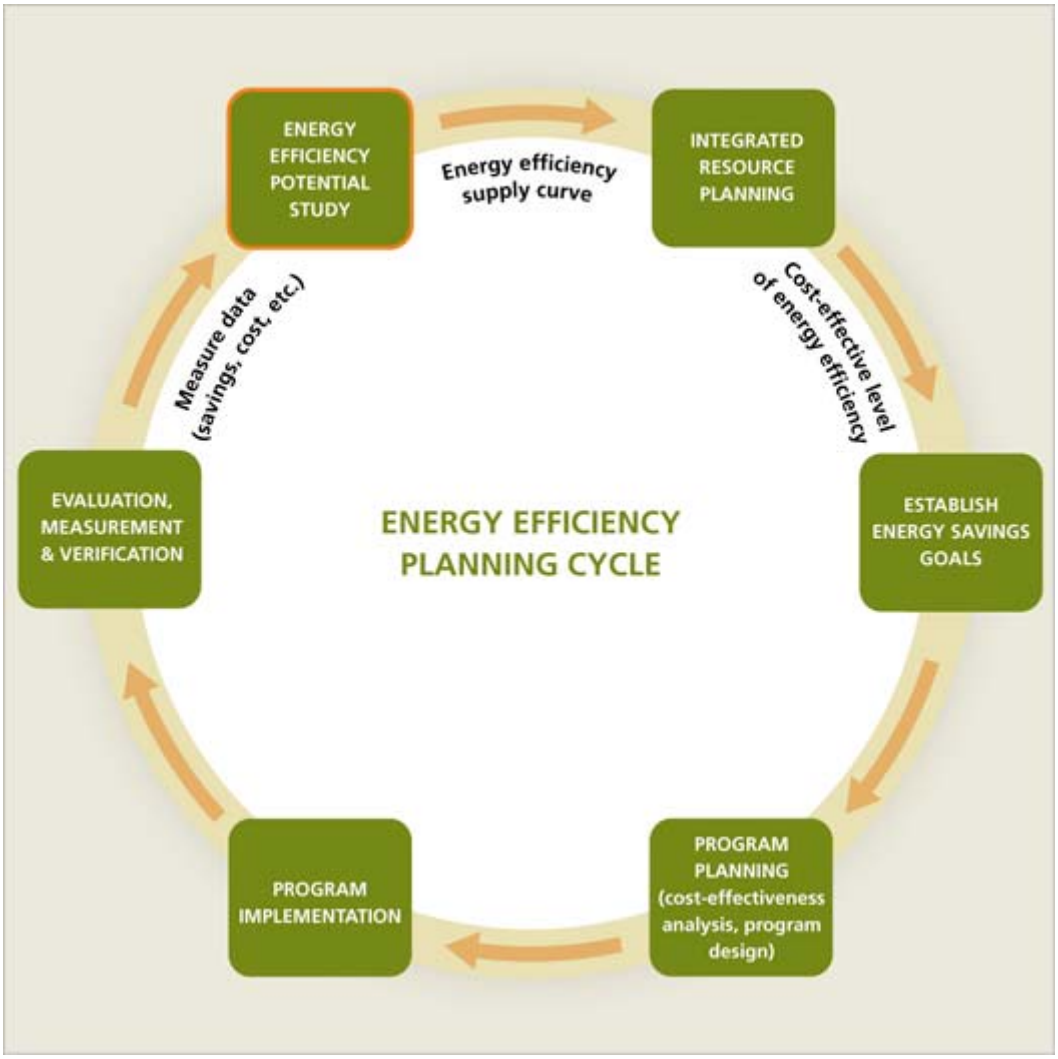
Setting targets for energy savings and peak demand reduction is the most common goal-setting approach. Savings goals are generally more effective than spending targets, in terms of ensuring that results are delivered. Ideally, savings targets should be based on an empirical assessment of cost-effective energy efficiency potential. Determining a savings goal based on a percentage of annual energy sales is a relatively straightforward approach. The National Action Plan for Energy Efficiency reports that for a given program year, consistently-funded, well-designed programs provide annual savings of 0.15 to 1 percent of energy sales. Programs that have been running successfully for a number of years should ratchet up goals as higher levels of savings are achieved. In addition to setting quantitative savings goals, a utility may choose to adopt qualitative objectives, such as customer satisfaction targets.

Aligning goal-setting with integrated resource planning processes

Many utilities use integrated resource planning (IRP) to determine the long-term mix of supply-side and demand-side resources that will be necessary to meet future energy demand, and IRP can also be used to inform goal-setting. For utilities with an existing IRP process in place, it is important to ensure that energy efficiency resources are evaluated on a level playing field against supply-side alternatives. This approach is critical to mitigating carbon risk and ensuring a least-cost strategy for meeting future energy needs. According to the National Action Plan for Energy Efficiency, "Including energy efficiency in the resource planning process is essential to realizing its full value and setting resource savings and funding targets accordingly."

The figure below shows how integrated resource planning should ideally align with other key elements of

energy efficiency program planning and implementation discussed in this Guidebook: potential studies, goal-setting, program planning, program implementation, and evaluation.



An empirical assessment of energy savings potential represents the first stage in the process. In effect, potential studies generate an "energy efficiency supply curve"—the estimated cost of achieving varying levels of energy savings. In IRP modeling, energy efficiency should not be treated as a pre-determined input that reduces projected load. Rather, the desirable level of energy efficiency resource acquisition should be an output from the modeling process. It is also important to consider the risks associated with energy efficiency resources *vis-a-vis* the risks associated with large-scale supply-side resources. Such considerations are particularly important given the uncertain, but likely significant, cost impacts that future carbon regulation would have on fossil fuel generation resources.

IRP outputs can then be used in establishing energy efficiency goals. In-depth planning and program design follow the goal-setting process, and the cost-effectiveness of energy efficiency resources is assessed at the measure, program, and portfolio levels. Program implementation is the next stage in the process, followed by measurement and verification of individual energy-saving projects, as well as comprehensive evaluation at the program level. Data on the costs and load impacts of demand-side measures obtained through evaluation, measurement and verification (EM&V) are then fed into the next round of integrated resource planning to improve modeling accuracy.

Developing a portfolio budget

According to the National Action Plan for Energy Efficiency, typical funding levels for energy efficiency initiatives

are in the range of 1 to 3 percent of electric revenue, and 0.5 to 1 percent of gas revenue. Each utility must conduct its own analysis to determine the optimal funding level. Whatever the investment, the important thing is to ensure consistent levels of funding over time to avoid market disruptions and allow time for longer-term program strategies to gain traction.

Typical budget items at the portfolio and program levels are summarized below.

PORTFOLIO LEVEL BUDGET	PROGRAM LEVEL BUDGET
Salary/benefits	Administration
Staff training	Marketing to target audiences
Planning	Implementation
Portfolio management (tracking/reporting, etc.)	Incentives
Marketing and communications to mass audiences	Education & training Evaluation

Budget allocations vary widely based on utility-specific characteristics such as the customer base, the maturity of the energy efficiency portfolio, and the types of programs that comprise the portfolio. To illustrate this point, the table below shows two allocations for public power utilities with a well-established track record of administering cost-effective energy efficiency programs.

	UTILITY 1	UTILITY 2
Number of customers	5,000	70,000
Budget Allocation (% of total energy efficiency expenditures)		
Portfolio administration	18%	7%
Program implementation (delivery, admin., evaluation)	56%	23%
Customer incentives	26%	70%

In reviewing data from other utilities, it is often challenging to make apples-to-apples comparisons as different utilities often use different approaches for classifying program expenditures. For example, one utility may classify energy efficiency audits as an implementation expenditure, and another may classify audits as an incentive since they are provided free-of-charge to the customer.

It is important to consider the equitable distribution of program costs across the utility's customer base. One approach is to allocate energy efficiency funding according to the magnitude of energy savings potential by customer class (residential, commercial, etc.). If no energy efficiency potential study has been conducted, another approach is to allocate energy efficiency funding by energy sales. It is important to note, however, that the utility may have specific objectives—for example, offering energy efficiency resources for low income customers—that also should be taken into account in determining allocation of resources.

Resources

- National Action Plan for Energy Efficiency: Guide to Resource Planning with Energy Efficiency
- National Energy Efficiency Best Practices Study: Portfolio Best Practices Report

- Snohomish County Public Utility District: 2008 Integrated Resource Plan
- Synapse Energy Economics: Portfolio Management: How to Procure Electricity Resources to Provide Reliable, Low-Cost, and Efficient Electricity Services to All Retail Customers
- UNEP Collaborating Centre on Energy and Environment: Tools and Methods for Integrated Resource Planning.
- Western Area Power Administration: Integrated resource plan and alternative plan checklists

CHAPTER 6: Portfolio strategies to meet goals

Similar to a portfolio of financial investments, a utility's energy efficiency programs can be viewed as a portfolio that is designed to offer a balanced strategy for meeting overall goals while minimizing risk.

According to the National Energy Efficiency Best Practices Study's Portfolio Best Practices Report, the most important consideration in developing an energy efficiency program portfolio is ensuring diversity in program offerings. Like diversification in an investment portfolio, a diverse portfolio of energy efficiency programs reduces risk. For example, the utility may wish to reduce the risk that energy savings targets will not be met. A diverse portfolio of programs reduces that risk by ensuring that all the utility's eggs are not in one program basket.

To ensure diversity and minimize risk, consider the following strategies:

- Develop energy efficiency program offerings for all segments of the utility's customer base (e.g., residential, commercial, industrial, etc.). Depending on the composition of the customer base and the utility's overall objectives, it may also be important to develop offerings for hard-to-reach market segments such as low income customers, multifamily property owners, and small businesses.
- Employ a combination of strategies to motivate efficiency improvements, such as:
  - Educational/awareness-building efforts
  - Direct installation offerings that reduce barriers to participation and secure immediate savings
  - Prescriptive incentives that motivate purchases of common energy efficiency measures
  - Custom incentives that reduce barriers for complex or comprehensive energy-saving projects
  - Incentives and technical assistance for building design and construction professionals to motivate construction of energy efficient homes and nonresidential buildings
- Offer quick-start programs that deliver significant returns in a short period of time as well as programs that deliver savings over the longer-term once established in the market. (See Program Models chapter for discussion of quick-start versus longer-term programs).
- Offer tried-and-true program models while also piloting innovative approaches that lay the groundwork for future evolution in program design. (See Program Models chapter for discussion of innovative program offerings).

Another key consideration highlighted by the National Energy Efficiency Best Practices Study is to allow for flexibility to adjust allocation of resources, program design, and implementation strategies as needed. To ensure the best use of available funding, portfolio managers should have leeway to adapt strategies in response to changing market conditions. For example, a utility that has devoted significant resources to a residential new construction program in a booming housing market would be well-advised to shift resources to other programs if the housing market goes into a slump. In addition, program implementation experience and evaluation results will indicate areas where mid-stream adjustments to program strategy may be necessary.

Additional elements to consider in developing a balanced portfolio of energy efficiency programs include:

- Complement programs that offer incentives with education/information efforts to increase customer knowledge about energy efficiency and their own energy use habits.
- Incorporate education/training elements that build the capacity for trade allies to deliver energy efficient

products and services in the local market.

- Develop combined strategies for promoting energy efficiency as well as demand response and/or customer-sited renewable energy installations.

Resources

- American Council for an Energy-Efficient Economy: Exploring the Relationship Between Demand Response and Energy Efficiency: A Review of Experience and Discussion of Key Issues
- National Energy Efficiency Best Practices Study: Portfolio Best Practices Report

CHAPTER 7: Program models

Criteria for selecting programs

Public power utilities have achieved success with a wide variety of energy efficiency programs, targeting an array of energy-savings opportunities across all market segments. Developing a portfolio of energy efficiency programs requires careful consideration of the program models that are best-suited to achieve overall goals and objectives. For example, programs are typically designed to target specific market segments—from broad residential and commercial program offerings to more targeted strategies for low income housing, multifamily housing, or small businesses. Some programs target peak electric demand reduction opportunities while others focus on reducing overall energy consumption.

Program ramp-up time is another important consideration. Some programs can be launched quickly and deliver savings results within a relatively short time frame. Others take longer to gain traction in the marketplace. Some programs address energy savings opportunities that can be quickly deployed at the customer's home or business (e.g., changing a light bulb, or replacing a motor). Other programs target projects with a longer time horizon, such as new construction or process improvements at industrial facilities. Programs that target longer-cycle projects generally benefit from multi-year program investments.

The program matrix summarizes nine well-established energy efficiency program models, and describes how each program model addresses the following criteria:

download

Download the program matrix.

- **Target market**: Is the program designed for residential, commercial, or industrial customers or a more specialized market segment?
- **Incentive strategy**: What types of incentives are typically offered?
- **Demand reduction opportunity**: Is the program well-suited for peak demand reduction (kW) or more broadly focused on energy savings (kWh/therm) opportunities?
- **Ramp up time**: Is the program "quick-start" or does it require longer-term investments of program resources?
- **Project cycle**: Does the program target immediate energy-savings improvements at the customer's home or business or does it target projects with longer completion cycles?
- **Program strategy**: Does the program promote longer-term shifts in the market for energy efficient products and services (market transformation) or is the emphasis on shorter-term energy/demand savings (resource acquisition)?
- **Incentive share of budget**: What is the typical budget allocation between incentives and all other types of program expenditures (administrative, marketing, outreach, training, evaluation, etc.)?
- **Cost-effectiveness**: What is the typical cost per kWh/therm for this type of program?
- **Evaluation approach**: What is the typical approach for measuring program savings?

Recommended approach

In developing a portfolio of energy efficiency programs, it is important to establish clear criteria that serve the utility's overall goals for the portfolio. Such criteria could include peak demand reduction objectives, market transformation objectives or ensuring that program services are available for given

market segments, such as small businesses or low income customers. The portfolio should be comprised of programs that best address these criteria, within available levels of funding and staffing resources.

Innovative program strategies

A recent report from the National Energy Efficiency Best Practices Project states that best-practice programs are targeting the following areas for program innovation:

- "Whole building" approaches for energy efficiency improvement such as deep shell retrofits in the residential market, and energy performance benchmarking and continuous improvement strategies for commercial buildings.
    - Public power example: Austin Energy's Home Performance with ENERGY STAR program
- Opportunities for energy savings through improvements to operations and maintenance for commercial and industrial facilities. Program models include support for local Building Operator Certification™ training courses and funding onsite energy manager positions at industrial facilities.
    - Public power example: Austin Utilities Technical Seminars and BOC Training
- Networks of trade allies that are qualified to deliver energy efficiency services to market. Examples include programs that work with HVAC contractors to promote right-sizing and quality installation practices as well as tune-ups of existing equipment; programs that work with lighting design professionals to promote energy efficient system design and controls for commercial buildings; and programs that work with retrocommissioning providers to expand the market for their services.
    - Public power example: Snohomish County PUD Trade Ally Network
- Initiatives that employ behavior-based strategies for promoting energy efficiency improvement. Such efforts may include installation of in-home displays that provide real-time information on energy consumption and associated costs, as well as direct mail strategies that educate consumers about how their household energy use compares with similar households in their area.
    - Public power example: Owatonna Public Utilities Home Energy Reports Pilot

Given that energy efficiency portfolios necessarily evolve over time, even utilities that are in the early stages of energy efficiency program development may wish to keep apprised of innovative program strategies that could represent good opportunities for future development.

Resources

- Program matrix
- American Council for an Energy-Efficient Economy: Behavior, Energy, and Climate Change: Policy Directions, Program Innovations, and Research Paths
- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.
- California Institute for Energy and the Environment: Working Papers on Energy Efficiency Programs and Behavior
- Clean and Efficient Energy Program web site: Above & Beyond
- National Action Plan for Energy Efficiency Report
- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit

- National Energy Efficiency Best Practices Study: Energy Efficiency Best Practices: What's New?
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 8: Energy efficiency financing models

Even though energy efficiency programs promote energy-saving improvements that are cost-effective from an economic perspective, programs still face significant barriers that inhibit customer investments in energy efficiency. A white paper by the Center on Wisconsin Strategy (COWS) describes these barriers, and presents an innovative financing program model that is designed to address them: City Energy Efficiency (CEE).

The CEE program targets the residential and small business markets and offers customers a variety of benefits that are designed to increase adoption of energy efficiency improvements by eliminating typical barriers to investment. A short synopsis of the program offering is provided below.

The CEE Offer

- A CEE auditor or contractor visits the customer's house or business to assess opportunities for energy-saving improvements that would be cost-effective at current energy rates. The customer receives a list of suggested improvements, which might include additional insulation, sealing air leaks, replacing old appliances, or upgrading the furnace or air conditioner. The customer can decline to have any work done, choose to have all the improvements made, or-subject to some limitations-choose to implement some of the options from the list.
- A CEE contractor installs the efficiency improvements. CEE and/or a designated auditor will check to make sure the work has been done correctly.
- Over time, the customer pays for the cost of the energy efficiency improvements through a monthly charge that is either part of the energy bill (a tariffed charge) or part of the property tax bill (a government charge). The monthly charge will not exceed the projected monthly energy savings that the improvements will produce, so the customer is assured of savings without an increase in costs. If gas and electric rates rise, so will the customer's savings.
- The monthly CEE charge will not continue beyond the expected useful life of the improvements. CEE will warranty mechanical systems during the payment period. If repairs are required, they will be made without any increase in the customer's monthly payment amount.
- If the customer sells the home or business before the charge expires, the customer's obligation ceases and transfers to the next owner (unless the charge applies to portable goods, such as appliances, that the customer takes with him/her).

The specific approach summarized above—targeting comprehensive efficiency improvements in existing homes—is just one example of a program area where the CEE financing model could work. Program offerings can be adapted to target other capital-intensive energy savings opportunities, such as efficiency upgrades for small businesses, installations of new HVAC equipment, and even customer-sited renewable energy applications.

The following table summarizes key barriers that confront energy efficiency programs and describes how CEE offers solutions to address each barrier.

CEE SOLUTIONS TO KEY ENERGY EFFICIENCY PROGRAM BARRIERS

BARRIER	DESCRIPTION OF BARRIER	CEE SOLUTION
Free ridership	Free riders are individuals or businesses who take advantage of a program even though they would have made the efficiency improvement anyway. Free riders increase program costs without producing additional energy savings beyond what would have occurred without program intervention.	Participants repay the program for energy efficiency improvements over time, eliminating their ability to "ride for free."
Opportunity cost	Even if the energy savings from an efficiency project are greater than the up-front cost, efficiency projects compete with other potential investments. For example, rather than investing $1 million in an efficiency project that will save $400,000 per year, a business would likely prefer to invest the same amount in advertising that will generate $500,000 in long-term annual revenues.	The program provides up-front funding for the energy efficiency improvements with repayments made over time through the energy bill. Monthly payments are always less than expected energy bill savings, so the efficiency project does not compete with other opportunities for investment.
Risk	From the customer perspective, an efficiency project may entail a variety of risks. Savings may be lower than projected or performance may be compromised. If property ownership changes hands, the customer may not recoup the full value of their investment.	The program only covers efficiency improvements that will cover costs through energy savings, as predicted through audits or deemed savings calculations. Warranties cover mechanical measures during the repayment period, and payments cannot extend beyond the life of the measures. Most crucially, payment obligations run with the meter or property, so that future occupants who benefit from the energy savings will continue to make payments on the installation costs.
Transaction costs	Customers who want to improve energy efficiency must find and supervise contractors to perform the work. Obtaining financing involves additional time and fees.	The program connects customers directly with pre-qualified contractors, and it covers the upfront costs without requiring loan applications, fees, or liens.
Split incentives	Landlords have little incentive to improve their properties' energy performance if tenants pay the energy bills.	Utility-based programs can place repayment charges on energy bills that go to tenants. With the energy savings, the tenants' net cost decreases and the landlord benefits from an improved property at no cost other than to inform subsequent tenants of the arrangement.

Program examples

The table below summarizes some of the relevant programs now in operation or under development.

EXAMPLES OF ENERGY EFFICIENCY FINANCING PROGRAMS

PROGRAM	TYPE	GENERAL INFORMATION	ADDITIONAL INFORMATION
Berkeley FIRST	Local government charge	One of the best-known government-charge programs, BerkeleyFIRST launched in 2008. It finances solar energy installations, but plans to expand to energy efficiency and has spawned energy efficiency programs in other cities. The program, capitalized with a $1.5 million municipal bond issue, recovers costs for installations over 20 years through a property tax assessment.	
How$mart	Tariffed charge	In 2007, Midwest Energy, a cooperative, launched its How$mart program, based on the Pay As You Save (PAYS)® model. Installment payments for efficiency measures are made through the energy bill, allowing the program to target tenants of rental properties. As of April 2009, the program had 415 residential and small-business projects completed or lined up. Participants' monthly savings were averaging $49, while monthly charges averaged $40.	Interview with Midwest Energy's Michael Volker Enabling order from the Kansas Corporation Commission
Long Island Green Homes	Local government charge	The Town of Babylon, NY, had hoped to begin a PAYS program with the local energy utility, but was unable to make such arrangements. Instead, the town implemented a government-charge based program called Long Island Green Homes, capitalized with its solid waste fund, which launched in 2008. Repayment is through a "benefit assessment," similar to a charge the town might levy when it cleans up delinquent property. If the benefit assessment goes unpaid, it is billed along with the property tax.	Babylon-based resources for other communities
Michigan Saves	Tariffed charge	In 2008, the Michigan PSC declared that "that a program similar to PAYS® could provide significant benefits to all classes of utility customers, provided that the program is properly designed and implemented." Commission staff has convened stakeholder workgroups to institute the program through regulated utilities in the state, and in June the commission awarded a contract to Public Sector Consultants of Lansing to organize and implement the program.	Enabling order from the Michigan Public Service Commission
Milwaukee Energy Efficiency (Me2)	Local government charge	Milwaukee has attempted to partner with the local IOU for a tariffed-charge program, but that effort ran into regulatory difficulty that may require legislative action. In the meantime, the city has set aside $1.1 million of its federal Stimulus block grant for a city-charge based program, which was facilitated by a recent change in state law allowing local governments to bill for energy efficiency services along with trash pickup and other fees; defaults are charged to the property tax bill. Neighboring Racine will also use Stimulus funding for its program. It plans to run repayment directly on the property tax bill, but will allow participants to make monthly payments, with a coupon book, so that only those who miss a payment will see any change in the tax bill.	

Resources

- Boulder County ClimateSmart Loan Program
- California Institute for Energy and Environment: Enabling Investments in Energy Efficiency: A Study of Energy Efficiency Programs that Reduce First Cost Barriers in the Residential Sector
- Center on Wisconsin Strategy (COWS): Making the Energy Efficiency Case to Customers: Overcoming the Five Key Barriers to Participation
- National Association of Regulatory Utility Commissioners: Pay-as-You-Save Energy Efficiency Products: Restructuring Energy Efficiency
- Environmental Defense Fund: A New Business Model for Energy Efficiency: Midwest Energy Invests in Energy Efficiency While Reducing Customers' Net Costs
- Renewable and Appropriate Energy Laboratory (RAEL), UC Berkeley: Guide to Energy Efficiency & Renewable Energy Financing Districts for Local Governments

CHAPTER 9: Program screening

Overview of cost-effectiveness tests

Cost-effectiveness screening is a critical part of the energy efficiency program planning process and there are well-established methodologies for conducting cost-effectiveness analysis. The California Standard Practice Manual is used by California utilities and regulators, and is frequently cited by regulatory bodies in other states. This publicly-available reference describes in detail the primary approaches used for evaluating the cost-effectiveness of demand-side management activities.

Though there are several different tests that evaluate cost-effectiveness from a variety of perspectives, all of them compare the net present value of the benefits of the energy efficiency resource (lifetime savings) with the net present value of the cost of the energy efficiency resource. Results are typically expressed as a benefit-cost ratio or as the net present value of benefits (NPV benefits - NPV costs).

- **Total Resource Cost Test (TRC)**: This test compares benefits to society as a whole (avoided supply-side cost benefits, additional resource savings benefits) with the participant's cost of installing the measure plus the cost of energy efficiency program administration (non-incentive costs). Incentives are considered a transfer payment from program to participant and thus are not explicitly accounted for in the calculation. Since the TRC test takes a societal perspective into account, it is the appropriate test for regulatory agencies and other policymakers to use in establishing energy conservation goals.
- **Societal Cost Test (SCT)**: The SCT is similar to the TRC, except the SCT explicitly quantifies externality benefits such as avoided pollutant emissions not represented in market prices and other non-energy benefits (e.g., improved health/productivity).
- **Program Administrator Cost Test (PAC)**: Sometimes referred to as the utility cost test, this test compares the utility's avoided cost benefits with energy efficiency program expenditures (incentives plus administrative costs). Along with the TRC test, the PAC test is one of the most commonly-used tests for energy efficiency program planning purposes. It is also frequently used in a resource planning context to evaluate energy efficiency investments against supply-side alternatives.
- **Participant Cost Test (PCT)**: This test compares participant benefits (incentives plus bill savings) with participant costs (incremental or capital cost, installation, O&M, etc.).
- **Rate Impact Measure Test (RIM)**: This test compares the utility's avoided cost benefits with the cost of administering energy efficiency programs plus lost revenue from reductions in customer energy consumption. The RIM test is a distributional test that is best-suited for assessing the equity (fairness) impacts of energy efficiency programs.

The following table, published in the National Action Plan for Energy Efficiency guide Understanding the Cost-Effectiveness of Energy Efficiency Programs, shows the costs and benefits that are included in each test.

COMPONENT	PCT	PAC	RIM	TRC	SCT
Energy- and capacity-related avoided costs	Benefit	Benefit	Benefit	Benefit	Benefit
Additional resource savings (e.g., water, secondary fuel)				Benefit	Benefit
Non-energy benefits (externality)					Benefit
Equipment (incremental or capital) and installation costs	Cost			Cost	Cost
Program overhead (administrative) costs		Cost	Cost	Cost	Cost
Incentive payments	Benefit	Cost	Cost		
Bill savings	Benefit		Cost		

SOURCE: National Action Plan For Energy Efficiency

Cost-effectiveness model

download

Cost-effectiveness model spreadsheet.

The Energy Center of Wisconsin has developed a simple spreadsheet model for evaluating program cost-effectiveness. This model has been set up to run the Participant Cost Test, the Program Administrator Test, and the Total Resource Cost test for three sample programs: residential lighting and appliance incentives; residential audit and direct installation; and prescriptive rebates for C&I customers. Utilities may download this simple tool and modify it as needed to meet program planning objectives. Cells containing input assumptions are highlighted in yellow and should be modified to reflect utility-specific conditions. Calculation cells are highlighted in blue. Additional measures and programs can be added using this format.

Application of cost-effectiveness analysis

Cost-effectiveness can be assessed at the measure level, at the project level, at the program level, or at the portfolio level. While the program planner is primarily interested in evaluating cost-effectiveness at the program and portfolio levels, there are several important considerations to keep in mind.

When screening cost-effectiveness at the measure level, the benefit-cost ratio represents the **average** cost-effectiveness of that measure across all potential applications. A measure that has an average benefit-cost ratio of 0.75 could potentially achieve a benefit-cost ratio of 1.50 in some applications, and a benefit-cost ratio of 0.25 in other applications. Consider, for example, a high-efficiency HVAC system that would be cost-effective if installed in a large, leaky home, but would not be cost-effective if installed in a small, air-tight home. Understanding this issue is particularly important when it comes to evaluating energy efficiency projects for large commercial and industrial facilities, where cost-effectiveness can vary widely depending on site-specific characteristics.

Another important consideration is that some measures may not be cost-effective if assessed on an individual basis, but would be cost-effective if bundled with other measures. For example, weatherstripping may have a benefit-cost ratio below 1.0 if evaluated by itself, but a bundle of weatherization measures that includes weatherstripping could pass the cost-effectiveness screen if implemented as a package. Bundling multiple measures into a single program delivery mechanism is one strategy for reducing lost opportunities.

Finally, while cost-effectiveness analysis indicates which energy efficiency resources represent a prudent use of energy efficiency program dollars, it does not indicate the magnitude of the savings opportunity. A measure with a high benefit-cost ratio could represent a small amount of potential savings, while another measure that is marginally cost-effective could represent an area of significant savings potential. In that case, the marginally cost-effective measure could represent a better target for energy efficiency program resources. Ranking all cost-effective measures by amount of potential savings rather than by benefit-cost ratio would be a preferable approach for determining which measures to target with energy efficiency programs.

Additional considerations

There are several key areas where input assumptions have a significant effect on cost-effectiveness analysis results: avoided costs; valuation of avoided externality costs (such as sulfur dioxide, oxides of nitrogen, and mercury); and discount rates.

Avoided costs are the primary basis for valuing energy efficiency resource benefits, and there are important policy implications inherent in determining the appropriate avoided cost values to use. Some utilities use forecasted prices for wholesale power purchases, others use estimated costs of new supply-side generation resources. It is also important to account for avoided transmission and distribution costs. If a utility's primary objective is reducing carbon emissions, the appropriate supply-side benchmark could be the cost of a clean energy source such as wind power.

Valuation of avoided externality costs is a component of the TRC and SCT tests. As utilities seek strategies for mitigating climate risk, a growing number are incorporating the value of avoided carbon emissions into cost-effectiveness analysis. Given that there is not yet a national policy framework for regulating carbon emissions, there are inherent uncertainties involved in forecasting carbon prices into the future. However, recent studies by Synapse Energy Economics and EcoSecurities Consulting Ltd. have forecasted prices between $10 and $50 per metric ton of carbon equivalent. The EcoSecurities study commissioned by the Northwest Power Coordinating Council is publicly available and presents ranges for carbon prices under alternative policy scenarios. Information about an individual utility's generating mix is necessary to convert prices per metric ton to a $/ kWh basis. If utility-specific emissions factors are not known, EPA's Emissions & Generation Resource Integrated Database (eGRID) provides regional emissions factors based on a comprehensive inventory of the environmental attributes of electric power systems.

Discount rates are used to determine the present value of future energy savings. The appropriate discount rate to use depends on the perspective from which cost-effectiveness is evaluated. From the participant perspective, the appropriate discount rate would be the consumer lending rate-the interest rate a customer would have to pay if they financed the energy efficiency investment. From a utility perspective, the appropriate discount rate would be the utility's weighted average cost of capital, or the interest rate paid in financing supply-side investments. Public policy decisions are made from a societal perspective, and thus typically employ a lower discount rate to appropriately value long-term societal benefits that result from energy efficiency investments made today.

Finally, it is important to be aware of state-specific requirements that utilities must follow in conducting cost-effectiveness analysis. For example, the Iowa Utilities Board defines the cost-effectiveness tests that utilities should use, and specifies an "externality adder" that must be included in the calculation of benefits. It is important to determine whether any such requirements apply to your calculations.

Resources

- Cost-effectiveness model
- California Public Utilities Commission: California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects
- EcoSecurities Consulting Ltd.: GHG Market Forecasting Services: Assigning Carbon Price Estimates to Alternative Policy Scenarios. A Report for NWPCC.
- National Action Plan for Energy Efficiency: Understanding the Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers
- National Action Plan for Energy Efficiency: Guide to Resource Planning with Energy Efficiency

CHAPTER 10: Market research

Once the utility has made initial determinations on the types of programs that will be offered, market research is used to determine what program approaches will be most effective. Market research helps the utility find out more detailed information about how customers use the equipment (or actions) the programs will target, how they go about making energy-related decisions, and what resources (incentives, information, etc.) would be most effective in motivating them to make energy efficiency improvements. The research should focus on a few key market segments where the majority of energy savings are likely to be found. Market research can target customers as well as retailers, equipment suppliers, and contractors (often referred to as "trade allies").

For customers, research objectives include developing a better understanding of customer attitudes toward energy efficiency and barriers to energy efficiency investment. This information is used in crafting effective program strategies for influencing customer decision-making. Market research also provides an opportunity to test program concepts before programs are formally launched.

For trade allies, the primary goal is to develop partnerships that lead to increased promotion of energy efficient products and services in the local market. A number of program models depend on strong trade ally relationships for success. Examples include programs that work with local retailers to increase sales of ENERGY STAR® qualified lighting and appliances, programs that work with local contractors promote quality installations and tune-ups of central air conditioners, and programs that work with builders to promote energy efficient home construction. Involving trade allies early in the program design process helps to ensure buy-in and greater participation once the program is launched.

Research methods range from informal and qualitative, to formal and quantitative. Informal, qualitative approaches can be a rich source of information, and are generally low-cost and straightforward to administer. Examples include:

- One-on-one meetings with large energy users to assess needs and opportunities
- Trade ally workshops to introduce program plans and solicit input
- Outreach through local economic development entities such as the Chamber of Commerce
- Community meetings

Recommended approach

Offering refreshments is a proven strategy for getting customers and trade allies to attend meetings, workshops, and focus groups. Consider sponsoring a "trade ally breakfast" to introduce local suppliers to new energy efficiency program offerings.

Surveys are a formal, quantitative method for conducting market research. Surveys allow the utility to reach a broader cross-section of the market, but the data collection effort is less open-ended than direct dialog. Telephone or mail surveys are the most common approach. For business customers, telephone surveys are usually the most effective way of reaching the decision-maker and obtaining a response. Response rates for mail surveys are generally better in the residential sector than in the business sector, though telephone surveys are also widely used in surveys of residential customers.

As discussed in the Baseline Assessment chapter, general best practice tips for conducting surveys include the following:

- Provide advance notice to survey participants, ideally through a letter that clearly explains the purpose of the survey and why the customer's participation is important.
- Pre-test the survey instrument for clarity with a few people who were not involved in drafting the survey. Make sure the survey questions are easy to understand and that it takes no more than 20 minutes to complete.
- Track non-respondents and follow up to encourage them to return the completed survey. Consider offering multiple ways of responding to the survey. For example, if individuals do not respond to a mail survey, follow up with a telephone call to see if they will answer the questions over the phone.
- Consider providing a small incentive such as a $5 gift card for returning a completed survey or entering respondents in a prize drawing to show appreciation for their time and input.

Whether an informal approach or survey is used, examples of typical market research questions for customers and trade allies are summarized in the table below. In general, a mix of specific and open-ended questions is a good approach for eliciting relevant information.

RESIDENTIAL CUSTOMER MARKET RESEARCH

TYPE OF INFORMATION	EXAMPLE RESEARCH QUESTIONS
Household information	• Number of occupants • Age of occupants • Education attained • Household income • Age of home • Size of home • Heating fuel
Energy efficiency awareness	• Recent actions taken to improve efficiency—turning off lights, setting back thermostat, installing CFL, installing insulation, etc. • Trusted sources for energy efficiency information—utility, consumer groups, environmental groups, retailers, contractors, friends/relatives/coworkers, etc. • Preferred communications vehicles for energy efficiency information—online, direct mail, bill insert, newspaper, radio, TV, community events
Barriers to energy efficiency improvement	• Cost • Lack of information • Products/service providers hard to find
Types of utility support that would be valuable	• Written information • Detailed information about household energy use • Home energy audits • Direct installation of energy efficiency measures • Rebates/discounts • Financing for efficiency improvements

BUSINESS CUSTOMER MARKET RESEARCH

TYPE OF INFORMATION	EXAMPLE RESEARCH QUESTIONS
Business information	• Type of business • Facility square footage • Hours of operation • Number of employees • Heating fuel
Energy efficiency awareness	• Recent actions taken to improve efficiency—purchased equipment, made O&M improvement • Trusted sources for energy efficiency information—utility, equipment suppliers, contractors, business associations, peers • Preferred communications vehicles for energy efficiency information—online, direct mail, newsletters, industry publications, one-on-one meetings, trainings
Motivating factors for energy efficiency improvement	• Reduce energy costs • Demonstrate corporate environmental responsibility • Improved workplace comfort • Improved product quality (manufacturing)
Barriers to energy efficiency improvement	• Cost • Payback too long • Competing needs for capital • Business downturn • Lack of information • Products/service providers hard to find
Types of utility support that would be valuable	• Facility audits to identify energy-savings opportunities • Detailed information about facility energy use • Rebates/discounts • Financing for efficiency improvements • Training on efficient operations and maintenance practices • Technical assistance—feasibility studies; engineering review of potential projects, etc.
Contact information for decision-makers	• Approver of capital expenditures • Facility manager • Person who pays energy bills

TRADE ALLY MARKET RESEARCH

TYPE OF INFORMATION	EXAMPLE RESEARCH QUESTIONS
Business information	• Types of customers served • Type and volume of equipment sold/installed
Energy efficiency awareness	• Efficiency levels of equipment sold, by sales volume • Trusted sources for energy efficiency information—utility, business associations, peers • Preferred communications vehicles for energy efficiency information—online, direct mail, newsletters, industry publications, one-on-one meetings, trainings
Motivating factors for selling energy efficient products/services	• Distinguish business from competitors • Demonstrate corporate responsibility • Expand business into new areas
Types of utility support that would be valuable	• Marketing resources—collateral templates, co-branding opportunities, "approved contractor" list • Cooperative advertising funds • Incentives (equipment supplier and/or customer) • Training • Technical assistance/tools to help sell energy efficient products/services to customers—informational materials, payback calculators, etc.
Contact information for decision-makers	• Business owner/manager • Sales manager • Marketing manager

Resources

- Association of Energy Services Professionals: Market Research & Evaluation Topic Committee
- CALMAC: Database of Market Assessment and Evaluation Research Reports
- Consortium for Energy Efficiency (CEE): Market Assessment & Program Evaluation Clearinghouse
- Energy Center of Wisconsin: Energy Research Library
- Dr. Don A. Dillman, Washington State University: Papers and other resources on conducting survey research

CHAPTER 11: Program planning and design

Program plan

After preliminary program strategies have been refined through market research and outreach to stakeholders, the program design process culminates in the development of a written plan addressing each program in the utility's energy efficiency portfolio. The plan will serve as a roadmap to guide program development and implementation processes. Though a written program plan is a useful reference for utility staff and any contractors involved in program implementation and evaluation, it does not mean the program design is "set in stone." It is important to retain flexibility so that program strategies can be adapted in response to implementation experience and changing market conditions.

Program plans typically include the following elements:

- **Program description:**
  What types of energy efficiency opportunities will the program target, and what strategies will be employed to accomplish program objectives?
- **Target market:**
  What types of customers will the program seek to reach? The target market can be defined broadly (e.g., residential/commercial/industrial) or narrowly (e.g., single family homes at least 20 years old) depending on the scope of the program.
- **Eligible measures:**
  What types of measures will qualify for program incentives? Include a summary of efficiency specifications (e.g., ENERGY STAR qualified products).
- **Marketing strategy:**
  How will the program be marketed to customers? Will there be a trade ally outreach component targeting retailers/contractors/home builders, etc.?
- **Implementation strategy:**
  What activities will be involved in program delivery? Will the program primarily work downstream at the customer level, or will it involve upstream partnerships with trade allies? Will there be education/training elements?
- **Incentive strategy:**
  Will the program offer financing, customer incentives, or trade ally incentives to motivate purchases of energy efficient equipment?
- **Evaluation, measurement & verification (EM&V):**
  What approaches will be used to verify installations (e.g., purchase documentation, site inspection, etc.)? What approaches will be used to measure energy savings impacts (e.g., deemed savings, engineering calculations, energy use measurement)?
- **Cost-effectiveness results:**
  What cost-effectiveness tests were conducted and what were the benefit/cost ratios?
- **Program budget:**
  What is the annual budget and what are the allocations for major budget categories (e.g., incentives, administration, marketing, delivery, evaluation)?
- **Program goals:**

What are the energy savings targets? Are there other program objectives (e.g. customer satisfaction, raising awareness, customer education)?

- **Timeline:**
  What are the major implementation milestones and when will they occur?

The Rapid Deployment Energy Efficiency Planning Guide, developed under the auspices of the National Action Plan for Energy Efficiency, includes "program snapshots" for ten well-tested energy efficiency program models. Each snapshot provides a summary of the program, target market, EM&V approaches, infrastructure and staffing needs, implementation timeline, and metrics for calculating savings estimates and budgets. Public power utilities can use these snapshots as a template for program plan development.

The remainder of this chapter addresses specific components of the program design process in more detail.

Resources

- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.
- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 11: Program planning and design

Intervention strategy

The "intervention strategy" refers to the approaches the program will use to address specific market barriers in order to increase adoption of targeted energy efficiency improvements. The table below provides examples of common barriers to energy efficiency improvement and strategies that programs use to overcome those barriers.

INTERVENTION STRATEGY

BARRIER	STRATEGY
Energy efficient products cost more than standard efficiency alternatives	Offer an incentive covering part or all of the incremental cost difference
Energy efficiency projects compete with other investment opportunities	Provide up-front funding for the energy efficiency improvements which the customer repays over time through payments on his/her energy bill or property tax assessment (see the Energy Efficiency Financing Models chapter for more details)
Energy efficiency is not an important consideration at the time of equipment purchase	Partner with trade allies (equipment suppliers, contractors, retailers, etc.), providing training, marketing resources, and/or incentives to help them market energy efficient products to their customers
Customers have limited understanding of their energy usage habits	Provide in-home displays that deliver real-time information on energy use and costs, or provide detailed energy reports that allow the customer to compare their energy usage with that of similar homes in their community
Customers lack information on ways to save energy	Provide free or discounted energy audits to identify energy savings opportunities

One way of conceptualizing the program's intervention strategy is to develop a logic model. A logic model is a simple process flow diagram that program managers can use to organize relevant information about how the program will work to increase energy efficiency. The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) has developed a web reference that explains how logic models can be used to develop program strategy and tell a compelling story to internal and external stakeholders.

The key elements of a logic model are:

- **Resources:** Funding, staffing, and other inputs

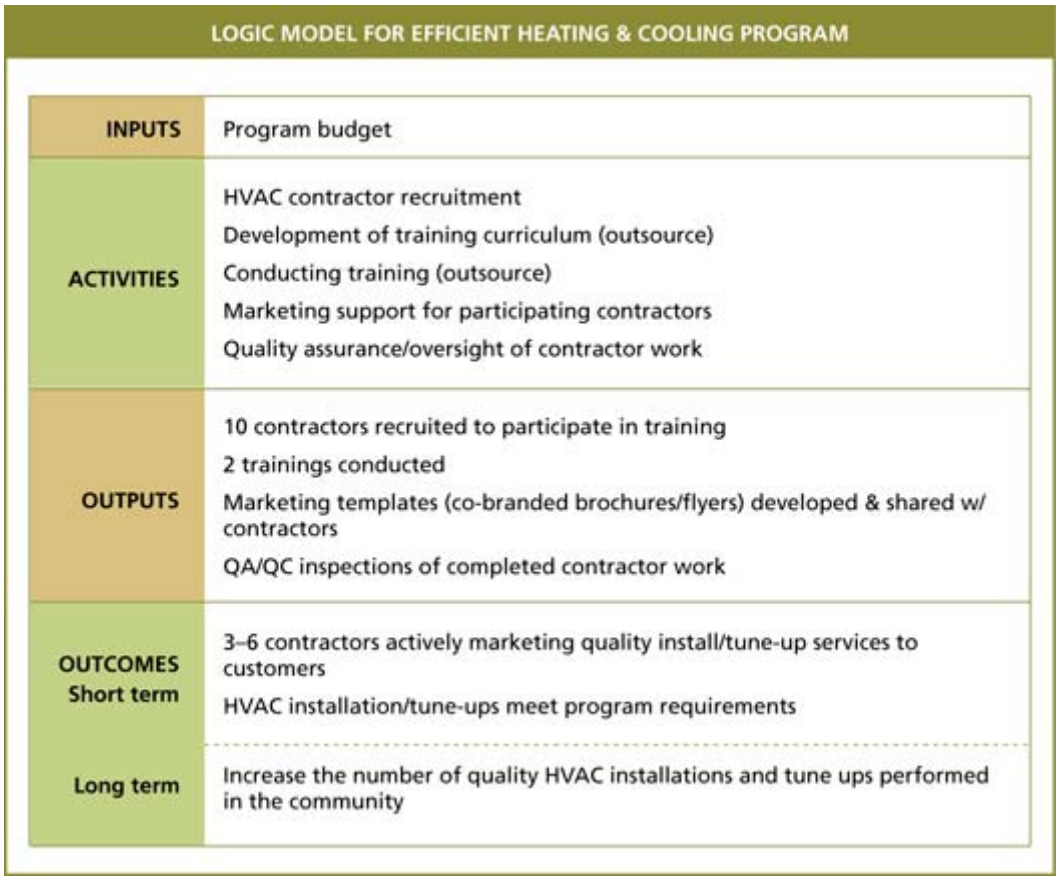
- **Activities:** Key elements of program delivery (distributing incentives, conducting trainings, etc.)
- **Outputs:** Benchmarks against which program performance can be measured (number of participants, number of trainings conducted, etc.)
- **Outcomes:** Short-term and long-term goals

The elements of the logic model are filled in by answering key questions about how the program will work in the market.

- What are the program goals?
- Who are the key actors (customers, trade allies, other stakeholders) who will be engaged during the program process?
- What are the barriers to broader deployment of targeted energy efficiency measures?
- How will the program address each barrier?

Information gathered during market research and other planning stages discussed in previous chapters will inform answers to these questions.

An example logic model is shown in the diagram below.



LOGIC MODEL FOR EFFICIENT HEATING & COOLING PROGRAM

INPUTS	Program budget
ACTIVITIES	HVAC contractor recruitment Development of training curriculum (outsource) Conducting training (outsource) Marketing support for participating contractors Quality assurance/oversight of contractor work
OUTPUTS	10 contractors recruited to participate in training 2 trainings conducted Marketing templates (co-branded brochures/flyers) developed & shared w/ contractors QA/QC inspections of completed contractor work
OUTCOMES Short term	3–6 contractors actively marketing quality install/tune-up services to customers HVAC installation/tune-ups meet program requirements
Long term	Increase the number of quality HVAC installations and tune ups performed in the community

Resources

- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy: Logic model web guide

CHAPTER 11: Program planning and design

Marketing plan

The marketing plan describes the communications and outreach strategies that the utility will use to increase awareness of energy efficiency opportunities in the community. Key tasks in developing a marketing plan include:

- Define the target audiences for marketing efforts (customers, trade allies, etc.).
- Determine what communications channels will be used to communicate energy efficiency program information to each target audience (direct mail, bill inserts, workshops, website, key accounts managers).
- Develop marketing messages that will be effective for each target audience.
- Estimate a budget for marketing activities.

In addition to developing strategies to reach specific target audiences, the utility will want to include communications to mass audiences to raise awareness about the program in general. Utilities can gain tremendous good will from their customers by simply letting customers know that they are offering energy efficiency programs.

Use some or all of the following to communicate broadly with customers:

- Print materials (bill inserts and customer newsletters)
- Website content
- News releases
- A letter from the mayor, city administrator or other chief executive
- Community outreach (a booth at the local festival or farmer's market, a float in the annual parade)

In developing a marketing plan, general best practices to consider include:

- **Capitalize on community connections.** Since public power utilities are community-owned, they are well-positioned to target program offerings to address the unique needs of their communities. Public power utilities can capitalize on that knowledge in developing effective marketing strategies.
- **Use market research to develop effective messages.** As discussed in the Market Research chapter, there are informal, low-cost market research approaches—such as creating opportunities for direct dialog with customers and trade allies during the program planning process—that can lead to a better understanding of the messages will be most effective in driving energy efficiency improvement.
- **Use market segmentation to target marketing messages to key audiences.** There are important differences between residential and commercial customers. Increase the effectiveness of marketing efforts by segmenting the customer market into its key components, and tailor messages and marketing strategies to meet the needs and priorities of different audiences.

The Rapid Deployment Energy Efficiency Planning Guide provides general guidelines on marketing expenditures and discusses customer targeting and marketing strategies for ten featured energy efficiency programs. According to the Guide, residential programs typically allocate 10-15 percent of the budget to

marketing, and nonresidential programs typically allocate 3-10 percent of the budget to marketing.

Resources

- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.
- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 11: Program planning and design

Policies & procedures

Before the program is launched, it is important to define the policies and procedures that will govern participation, incentive payment, and measurement and verification requirements. Program managers need to strike a delicate balance between requiring sufficient documentation to validate energy savings and reduce the risk of fraud, while keeping the participation process as simple and straightforward as possible to minimize barriers to participation.

Policies and procedures typically address the following areas:

- **Customer eligibility:** Target market for the energy efficiency program, including any specific eligibility requirements for program participation (facility size, peak demand, etc.)
- **Energy efficiency measure eligibility:** Definition of incentive-eligible measures and/or projects. In addition to required efficiency specifications for new equipment, in some cases the program will also specify requirements for base equipment that is being replaced.
- **Incentive levels:** Description of incentives available to customers and/or trade allies. Define whether incentives are on a per-unit, per-kW, or per-kWh basis. Specify any applicable incentive caps such as per-project limits or per-customer limits.
- **Participation process:** Description of each stage of the participation process. In addition to a narrative description, a graphical representation of the process flow is often useful. Typical stages in the participation process include:
  - **Application:** Customer submits the required application form and supporting documentation necessary to verify purchase of incentive-eligible equipment.
  - **Pre-Installation Inspection:** In some cases, a program may require verification of base case equipment before the efficiency improvement is made. (Whether pre-installation inspection is necessary depends on program-specific measurement and verification requirements).
  - **Reservation:** Programs targeting complex, longer-term projects may include an incentive reservation process, wherein the customer notifies the utility of a potential project and, if the reservation is approved, the incentive is reserved pending project completion.
  - **Implementation:** All necessary work to implement the energy efficiency project is conducted.
  - **Verification:** Utility verifies the project has been completed in accordance with program requirements.
  - **Incentive payment:** Utility pays the incentive.

A written policies and procedures manual is a useful reference for program staff as well as contractors supporting program implementation or evaluation. It may also be necessary to provide a policies and procedures manual to participating customers and trade allies, particularly in the case of programs targeting large, complex projects. Manuals developed by other utilities can be used as models and adapted to meet utility-specific needs:

- Colorado Springs Utilities: Peak Demand Rebate Program Procedures Manual
- Salt River Project: FY10 PowerWise Standard Business Solutions Program Manual

Resources

- Colorado Springs Utilities: Peak Demand Rebate Program Procedures Manual
- Salt River Project: FY10 PowerWise Standard Business Solutions Program Manual

CHAPTER 11: Program planning and design

Incentives

Cost-effectiveness analysis determines the maximum level of incentive that can be paid. Market research can also be useful to inform the level of incentive that is necessary to motivate efficiency improvements.

As a general rule, incentives are based on the type of efficiency investment:

- **Lost opportunity measures (equipment replacement and new construction):** Incentive is based on the incremental cost difference between the energy efficiency measure and the standard efficiency alternative.
- **Retrofit measures (efficiency upgrades to installed equipment and operational/maintenance improvements):** Incentive is based on the installed cost of the energy efficiency measure (capital cost plus installation cost).

The table below summarizes common incentive strategies and typical applications.

COMMON INCENTIVE STRATEGIES AND TYPICAL APPLICATIONS

TYPE	DEFINITION	APPLICATION
Subsidy	Incentive that comes in the form of a rebate or discount that reduces the cost of an energy efficiency measure.	Subsidies are the most common incentive approach, and can address any type of efficiency improvement, from simple to complex.
Financing	Loan covering the up-front cost of the efficiency measure which is paid back over time.	Often used for capital-intensive measures where up-front cost is significant barrier, such as comprehensive home retrofits or renewable energy installations (see chapter on Energy Efficiency Financing Models for additional information).
Prescriptive incentive	Standard incentive for a pre-defined energy efficiency measure—for example, a $2 rebate for a CFL.	Common energy efficiency measures with relatively consistent per-unit energy savings across most applications.
Custom incentive	Incentives based on expected energy savings/demand reduction from efficiency measures or projects that are not pre-defined. Typically offered on a per-kW or per-kWh basis.	Site-specific efficiency opportunities where savings vary substantially depending on the application. Most commonly used in C&I programs, targeting large or complex energy-saving projects, in some cases affecting multiple end uses.
Direct installation	Free installation of energy efficiency measures by program staff.	Common low-cost energy efficiency measures such as CFLs, low flow showerheads, and faucet aerators. Often offered as part of an energy audit program, or in programs for hard-to-reach markets like low income, multifamily, and small business.
Downstream approach	Incentive strategy that targets end users.	Common approach used in a variety of program models.
Upstream approach	Incentive strategy that targets trade allies.	Incentives for contractors, equipment suppliers, home builders, and other upstream actors to motivate them to sell energy efficient products and services to their customers. Many programs offer training and marketing support as an alternative to (or in addition to) financial incentives.

(click image to view larger version)

Other incentive strategies to consider include:

- Offering higher incentives for measures that have a significant impact on peak demand.
- Offering higher incentives for multi-measure projects (for example, energy efficient lighting combined with

occupancy sensors) to motivate more comprehensive approaches to efficiency improvement.

Innovative approach

Waverly Light and Power pays incentives for ENERGY STAR qualified appliances in "Waverly Dollars," currency offered through a Waverly Chamber of Commerce program that encourages community members to "buy local." This partnership keeps incentive funds in the community and is another example of how public power energy efficiency programs can support local economic development.

Periodic review of program incentives ensures that they remain a cost-effective use of program resources. Programs revise incentive offerings in response to changes in the market penetration of energy efficiency measures and changes in technology costs. Periodic assessment of emerging technologies also helps to identify new incentives that can be incorporated into program offerings.

Resources

- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.
- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 11: Program planning and design

Costs & savings

To estimate program expenditures and develop reasonable savings targets, it is helpful to view costs and savings as a function of program participation. Performance metrics from similar programs—ideally programs administered by other public power utilities of a similar size—can be used to estimate program costs and savings. Useful performance metrics include:

- Cost per participant
- Cost per kWh/kW/therm
- Incentive vs. non-incentive expenditures

The best way to obtain such data is through peer networking. The American Public Power Association's Database of Energy Efficiency Programs is one resource that provides high-level information on programs other utilities are offering. More detailed program data can often be acquired by contacting program staff. If data from similar utility programs are not available, other sources of information provide benchmarks that can be used develop reasonable estimates. For example, the Program matrix presented in the Program Models chapter provides typical program cost allocations between incentive and non-incentive expenditures, and also provides information on cost per lifetime kWh and therm. The Rapid Deployment Energy Efficiency (RDEE) Planning Guide and Implementation Guide also contains useful cost and savings metrics based on program results.

Resources

- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.
- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 11: Program planning and design

Forms

Application forms collect the necessary information to verify customer eligibility to participate, verify that the energy efficiency measures are eligible for incentives, and collect relevant customer information needed for tracking and verification purposes.

Forms developed by other programs can often be used as a model and adapted to meet utility-specific needs. The table below provides links to forms for energy efficiency programs that are often part of utility portfolios.

ENERGY EFFICIENCY PROGRAM FORM EXAMPLES

SECTOR	PROGRAM MODEL	EXAMPLE APPLICATION FORM
RESIDENTIAL	ENERGY STAR® lighting and appliance program	Blooming Prairie Public Utilities ENERGY STAR Product Rebate Program Application
	Home energy audit program	Austin Energy Multifamily PowerSaver Audit Request Form
	Efficient heating and cooling program	Snohomish PUD Ductless Heat Pump Program Application
	ENERGY STAR Homes program	LIPA Builder Incentive Application
COMMERCIAL	Prescriptive incentive program	Salt River Project PowerWise Rebate Application
	Custom incentive program	Rochester Public Utilities Custom Efficiency Rebate Application
	Retrocommissioning program	SMUD Retrocommissioning Program Application Information

Resources

- Blooming Prairie Public Utilities ENERGY STAR Product Rebate Program Application
- Austin Energy Multifamily PowerSaver Audit Request Form
- Snohomish PUD Ductless Heat Pump Program Application
- LIPA Builder Incentive Application

- Salt River Project PowerWise Rebate Application
- Rochester Public Utilities Custom Efficiency Rebate Application
- SMUD Retrocommissioning Program Application Information

CHAPTER 12: Implementation

Administration

Administration of energy efficiency programs includes the following functions:

- **Budgeting and accounting:** Managing the fiscal resources devoted to energy efficiency initiatives.
- **Contract administration:** Issuing requests for proposal (RFPs), selecting winning bidders, and administering contracts for any consultants or contractors needed to perform program planning, delivery, marketing or evaluation functions.
- **Quality assurance and oversight:** Ensuring that program participants as well as any contractors/consultants involved in program implementation adhere to program policies and procedures.
- **Tracking and reporting:** Monitoring program performance against goals and reporting results to governing boards/oversight entities on a regular basis.

Administrative functions ensure that individual programs and the energy efficiency portfolio as a whole are performing as expected, and that oversight entities receive regular updates on the status of energy efficiency efforts. These functions also help to identify any problems that may require adjustments to program strategy and/or reallocation of staffing or funding resources. Administrative functions are typically managed in-house rather than outsourced.

Best practices for sound administration of energy efficiency program portfolios include:

- **Designate management responsibility.** As discussed in Starting the Energy Efficiency Plan, designating primary responsibility to a single individual will streamline administrative/management functions and facilitate coordination.
- **Foster good internal communications.** Particularly for larger utilities where energy efficiency programs impact staff across multiple departments, it is important to develop good internal communications practices and avoid silos. Ensure that staff directly involved in program planning and implementation have regular opportunities to exchange information with staff engaged in marketing, customer service, and account management.
- **Develop metrics to monitor performance at the program and portfolio level.** Develop a clear set of performance metrics such as cost per unit of energy savings and cost per participant. Develop tracking and reporting capabilities that make it easy to review performance at the program and portfolio levels. The Program Tracking chapter provides a more detailed discussion of tracking and reporting functions.

Resources

- National Energy Efficiency Best Practices Study: Portfolio Best Practices Report

CHAPTER 12: Implementation

Marketing

General best practices for marketing energy efficiency initiatives are discussed in Chapter 11.

Successful energy efficiency marketing strategies include the following:

Leverage existing communications channels
Public power utilities have a variety of communications vehicles—including web sites, call centers, newsletters, and bill inserts—that can be leveraged to distribute energy efficiency information to the community. Feature customer and trade ally success stories in newsletters to encourage broader program participation.

Train staff
Ensure that customer service representatives and other key staff that interact with customers are familiar with energy efficiency program offerings. Conduct internal trainings and provide scripts with relevant program information.

Expand web capabilities
Dedicated energy efficiency program web pages make it easy for customers to find relevant information, including downloadable incentive applications and information about program eligibility. Online energy audits and other informational tools help customers identify common energy savings opportunities. Some utilities allow customers to access historical energy consumption data via the web.

- **Public power example:** City Utilities of Springfield's EnergyWise web page makes it easy for residential and commercial customers to find rebate information, request an energy audit, and access web-based informational tools.
- **Public power example:** Salt River Project's Home Energy Manager features an interactive tool where residential customers can get energy savings tips and information, and a home energy analysis tool where customers can estimate how much they would saving by upgrading to efficient lighting, appliances, and heating and cooling systems.

Partner with ENERGY STAR
The ENERGY STAR program, jointly administered by the U.S. Department of Energy and the U.S. Environmental Protection Agency, provides a powerful marketing platform that utilities can leverage in energy efficiency promotions. By partnering with ENERGY STAR, utilities can access downloadable ENERGY STAR logos as well as a variety of other free resources—including publications, web tools, and national campaigns—that can be incorporated into the utility's marketing efforts.

- **Public Power Example:** Washington EMC's web site links to the ENERGY STAR @ Home web tool and encourages customers to take the ENERGY STAR Pledge.

Leverage trade allies
Make sure retailers, equipment suppliers, contractors and other program partners are aware of energy efficiency program offerings and understand how they can leverage programs to benefit their businesses. Conduct outreach through organizations trade allies already belong to (local home builders associations, chapters of heating and cooling contractor associations, etc.). Create a dedicated web page for trade ally information. Develop informational and marketing materials that trade allies can use to communicate energy efficiency information to their customers. Investigate opportunities for point-of-purchase signage to communicate information on available incentives. Consider funding cooperative advertising with trade allies.

Develop case studies showing how trade ally businesses have benefited from partnering in energy efficiency promotions.

- **Public power example:** Long Island Power Authority's trade ally web site provides guidelines for participating in energy efficiency programs, an online message board, and newsletters featuring program updates and trade ally success stories.

Leverage program participants
Particularly for business customers, participant success stories are an effective strategy to motivate participation among peers and competitors. Case studies are one mechanism for sharing information about energy efficiency projects that received program support.

- **Public power example:** Austin Energy provides online templates so that residential and commercial customers can submit information on their green building projects and features completed case studies on their web site.

Sponsor demonstration projects
Demonstration projects are a powerful way to educate customers about comprehensive energy efficiency improvement strategies such as whole-house retrofits and energy efficient new construction. They are also an effective educational and marketing tool for engaging local trade allies, such as home builders and contractors. Home energy makeover contests are one type of demonstration project that is growing in popularity. The utility administers the contest and pays for the efficiency improvements made by the grand prize winner. Homes with the highest energy use are selected from contest entries and receive comprehensive home energy diagnostic services (e.g., blower door test, infrared scan, duct blaster test). Local retailers and equipment suppliers donate energy efficient products and local contractors provide the upgrades. Some programs have partnered with local media organizations to feature coverage of both the diagnostic stage and implementation stage of the process.

- **Public power example:** A success story describing the home energy makeover contest sponsored by Delta-Montrose Electric Association provides additional details on this type of demonstration project.
- **Public power example:** Through the GreenMax Home program, WPPI Energy solicits proposals from individuals, builders or architects interested in receiving utility funds to build a "net zero energy home"—a home that, through energy-efficient construction techniques and the use of renewable energy systems, has the capacity to produce as much energy as it uses.

Leverage community groups
Civic groups, business associations, economic development agencies, churches, and other nonprofits make excellent community partners in spreading the word about energy efficiency program offerings. Seek opportunities to meet with community groups to share information about energy efficiency programs. Help groups distribute information to their membership. Partner with community groups in sponsoring public events that raise awareness about energy efficiency. Sponsor a CFL fundraiser, where schools and nonprofits raise money and educate the community through sales of energy efficient light bulbs.

- **Public power example:** A white paper from the proceedings of the ACEEE 2008 Summer Study describes CFL fundraisers sponsored by the Orlando Utilities Commission and Delta-Montrose Electric Association.

Conduct media outreach
Local press coverage helps to raise the profile of energy efficiency efforts in the community. Issue a press release to announce the launch of energy efficiency initiatives. Keep media informed about community events and demonstration projects.

Resources

- American Council for an Energy-Efficient Economy: Compendium of Champions: Chronicling Exemplary

Energy Efficiency Programs from Across the U.S.

- National Action Plan for Energy Efficiency: Rapid Deployment Energy Efficiency Toolkit
- U.S. Environmental Protection Agency: Quick Start Energy Efficiency Programs

CHAPTER 12: Implementation

Program delivery

Key components of energy efficiency program delivery include:

- **Customer education:** Providing energy efficiency information and services to customers, including education and training efforts, conducting energy audits, direct installation of energy efficiency measures, and providing technical assistance (e.g., engineering analysis, green building design expertise, feasibility studies).
- **Application processing:** Reviewing incentive applications and processing incentive payments.
- **Trade ally outreach:** Recruiting, training, and coordinating trade allies (retailers, contractors, equipment suppliers, etc.).

Consider outsourcing

A critical decision is whether to outsource delivery of individual programs or specific components of the program delivery process. Contractors can be hired to provide turnkey services that cover all facets of program delivery or to perform key functions such as incentive fulfillment or education and training. According to the National Energy Efficiency Best Practices Study, key questions to consider in determining whether to outsource program delivery or specific functions include:

- Does the utility have the necessary staff expertise to perform the functions in-house?
- Will outsourcing be more or less cost-effective than in-house delivery?
- Can in-house capacity be developed quickly enough to meet desired program delivery schedules?
- Are there restrictions, such as a hiring freeze or budget constraints, that limit the utility's ability to develop in-house capacity?

In most cases, utilities use a request-for-proposal (RFP) process to solicit bids from qualified contractors. The City of Palo Alto's Third Party Energy Efficiency Program RFP is one example of a solicitation for turnkey energy efficiency program delivery services.

Outsourcing best practices include:

- Legally-binding contract that specifies contractor and utility obligations, assignment of risks, and payment terms
- Clearly defined roles and responsibilities between utility and contractor
- Stipulated performance metrics for contractors to meet

Joint action agencies

Joint action agencies (JAAs) often play an important role in the development and implementation of energy efficiency programs. A number of JAAs develop turnkey programs that their members can elect to participate in and also offer tools and resources to support members' energy efficiency efforts. On behalf of their members, some JAAs conduct energy efficiency potential studies and market characterization studies, provide marketing support, and hire contractors to conduct independent program evaluations. By offering energy efficiency services across their membership, JAAs can create economies of scale that reduce costs and avoid the need

for individual members to "reinvent the wheel." By facilitating a degree of consistency in program design and delivery, energy efficiency offerings from JAAs can reduce confusion among retailers and other trade allies that operate across multiple member service territories.

Best practices for successful JAA energy efficiency initiatives include:

- Designing initiatives that address gaps in member offerings rather than duplicating efforts.
- Offering a menu of energy efficiency for members, from turnkey program design and implementation to specific marketing, research, data collection, tracking and evaluation services.
- Working collaboratively to define the respective roles and responsibilities for JAAs and retail providers, particularly when it comes to customer and trade ally interactions.

Resources

- American Public Power Association: 2009 Joint Action Workshop
- National Energy Efficiency Best Practices Study: Best Practices Benchmarking for Energy Efficiency Programs
- City of Palo Alto's Third Party Energy Efficiency Program RFP

CHAPTER 12: Implementation

Measurement & verification

Measurement and verification (M&V) quantifies the energy savings and demand reduction impacts resulting from individual energy efficiency projects. While evaluation, measurement, and verification (EM&V) activities are often referred to collectively, M&V measures impacts at the project level while evaluation measures impacts at the program level. (See Chapter 14 for a discussion of program evaluation). M&V activities provide valuable information for assessing program results and also improve the credibility of data used in planning and program design processes (equipment installation rates, building operations characteristics, project costs, savings, etc.).

To ensure the transparency and credibility of M&V efforts, it is important to follow established industry protocols for measuring energy savings impacts such as the International Performance Measurement and Verification Protocol (IPMVP) and the California protocols.

There are varying levels of M&V rigor which can be classified into three main categories:

- **Deemed savings.** Stipulated savings values based on equipment characteristics and operating conditions in typical applications (base equipment being replaced, hours of operation, etc.). This method is appropriate for common energy efficiency measures where savings are relatively consistent across different applications (e.g., CFLs, appliances, commercial lighting).
- **Basic M&V.** Engineering calculations that rely on typical equipment characteristics and operating conditions, combined with verification of operating conditions and end use or facility-level metering for a sample of projects.
- **Full M&V.** More rigorous measurement of savings through longer-term metering projects, billing analysis or computer simulation approaches.

For an individual energy-saving project, the appropriate level of M&V rigor depends in large part on two factors: (1) the predictability of equipment operation under different applications and (2) the magnitude of M&V costs in comparison with the value of energy savings benefits produced by the project.

Generally speaking, programs targeting common, predictable energy efficiency measures with low per-unit savings primarily focus on reviewing customer incentive applications and associated purchase documentation (sales receipts, invoices, etc) for accuracy and completeness. Program evaluators may use customer surveys to assess the degree to which the program influenced the customer's purchase, to verify that purchased equipment was actually installed, and to test assumptions about operating characteristics. More rigorous approaches are appropriate for programs targeting larger and more complex projects where site-specific savings vary significantly, and individual projects have a more significant effect on overall program savings.

Resources

- American Public Power Association: Measuring Savings from Energy Efficiency Programs: What it Means, Why it is Necessary, and How to Do It
- California Public Utilities Commission: The California Evaluation Framework
- California Public Utilities Commission: California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals

- Efficiency Valuation Organization: Information on the International Performance Measurement and Verification Protocol (IPMVP)
- National Action Plan for Energy Efficiency: Model Energy Efficiency Program Impact Evaluation Guide

CHAPTER 13: Program tracking

Information management is vital to the successful administration of energy efficiency program portfolios. Tracking and reporting functions are used to assess program performance against goals, to monitor program expenditures, and to manage information about program participants. Evaluators use tracking system data in their independent assessments of program performance.

Given the small size of many public power utilities, there are often limited resources to support the development of comprehensive information management systems. Many smaller utilities have billing systems that were not designed to collect and store information needed for program tracking. Many lack sophisticated customer relationship management databases. However, a variety of tracking system options are available to meet basic portfolio management objectives. The least-cost option generally involves the use of an off-the-shelf software package such as Microsoft Excel or Access. Customizable internet-based software packages are at the other end of the cost spectrum.

In its Portfolio Best Practices Report, the National Energy Efficiency Best Practices Study identifies key recommendations for successful tracking and reporting of energy efficiency program results. A number of these best practice recommendations are applicable no matter the scope or sophistication of the tracking system:

- **Determine the information that will be tracked**. Data tracking needs are primarily based on established goals and objectives for the energy efficiency program portfolio. The tracking system should be able to deliver all necessary information for measuring the success of the program and the overall portfolio.
- **Design the tracking system so that it is useful to all potential user groups**. Potential users include portfolio-level administrators, program managers, outside consultants/contractors, and program evaluators. If possible, consult with program evaluators during the planning stage so that they can provide input on their data requirements. Ensuring that the necessary data are collected from the start of program implementation will save time and money during the evaluation process.
- **Include cost tracking functions**. Even if direct interoperability between the program tracking system and the utility's accounting system is not feasible, it is useful to include high-level financial tracking capability in the tracking system so that program savings results can be easily measured against program costs. Cost information is often disaggregated between incentive costs and administrative (non-incentive) costs.
- **Institute a regular process for reviewing tracking system data**. Use the tracking system as a portfolio management tool for assessing the performance of individual programs and the entire portfolio on a regular basis—at least monthly. Develop a clear set of performance metrics and build in reporting capabilities that make it easy to review performance benchmarks. Common performance metrics include program cost per unit of energy savings and program cost per participant.
- **Include capability for monitoring the progress of customer projects**. For programs that involve long, multi-stage projects (e.g., new construction programs; custom incentive programs), it is useful to include capability for tracking program status by stage (e.g., feasibility assessment; implementation; verification; incentive payment). This will allow the program manager to track the status of projects in the pipeline before incentives are paid.

For utilities that are able to allocate resources to developing a state-of-the-art tracking system, desirable features to consider include:

- Web-based systems that facilitate data entry and reporting by a variety of different users

- Systems that offer interoperability between other utility databases (billing systems; accounting systems; customer relationship management systems)
- Automated data validation systems that streamline data quality verification processes
- Automated reporting functions

Resources

- Johnson Consulting Group: Best Practices for Developing Cost Effective Evaluation, Measurement, and Verification Plans: Lessons Learned from 12 Northern California Municipal Utilities
- National Action Plan for Energy Efficiency Report
- National Energy Efficiency Best Practices Study: Portfolio Best Practices Report

CHAPTER 14: Program evaluation

Introduction

Evaluation involves a systematic assessment of energy efficiency program performance. Evaluations fall into two main categories:

- **Impact evaluations** measure quantitative results (usually energy savings) and are used to assess program performance against goals.
- **Process evaluations** provide information on how the program is working in the market and are used to inform adjustments in program design and implementation strategy.

There are several reasons why evaluating energy efficiency program performance is important. Evaluation helps to ensure accountability and transparency in the use of public funds. It provides independent validation of the amount of energy savings that result from program activities, which is particularly important when energy efficiency resource acquisition is pursued as an alternative to supply-side investment. As key assumptions used in resource planning efforts are updated based on evaluation findings, the reliability of planning estimates increases. In addition, energy efficiency program design is ideally an iterative process (see "Energy Efficiency Planning Cycle" flow chart in Setting Goals and Budgets chapter). Evaluation helps to determine whether market interventions are working as expected, informing adjustments to program strategy and allocation of program resources.

Program evaluation provides numbers and compelling narratives to tell to utility governing bodies, the city council and other customers. When good tracking, reporting and evaluation models are used, the utility has all of the data needed to communicate effectively about the program portfolio.

In some cases, evaluation activities are governed by specific regulatory requirements. In the future, the importance of rigorous evaluation protocols will likely grow given the potential for new federal regulation governing carbon emissions. Such regulations will likely stipulate the evaluation methodologies that are acceptable for measuring the carbon reduction impacts that result from energy efficiency program activities.

Evaluation best practices

Whether involving a quantitative assessment of program impacts or qualitative assessment of how the program is working in the market, evaluation efforts should align with overall goals for the energy efficiency portfolio. If a utility is responsible for meeting energy savings targets, impact evaluation is necessary to verify savings results. If a utility has qualitative goals (e.g., increase customer satisfaction), evaluation can be structured to assess whether programs have achieved those objectives.

To ensure that evaluation funds are well spent, it is important to create feedback mechanisms so that program strategies can be adjusted in response to evaluation findings. The National Energy Efficiency Best Practices Study summarizes approaches used by leading programs to ensure that evaluations lead to improvement in program designs and delivery strategies:

- Upper management support for evaluation
- Organizational culture that emphasizes continuous improvement
- Internal communications strategy that ensures staff have a clear understanding of the value of evaluation and how results will be used

- Direct dialog between evaluators and program staff to discuss evaluation findings and next steps for implementing evaluation recommendations
- Internal processes that facilitate timely adoption of evaluation results (i.e., as part of annual program review/planning process)

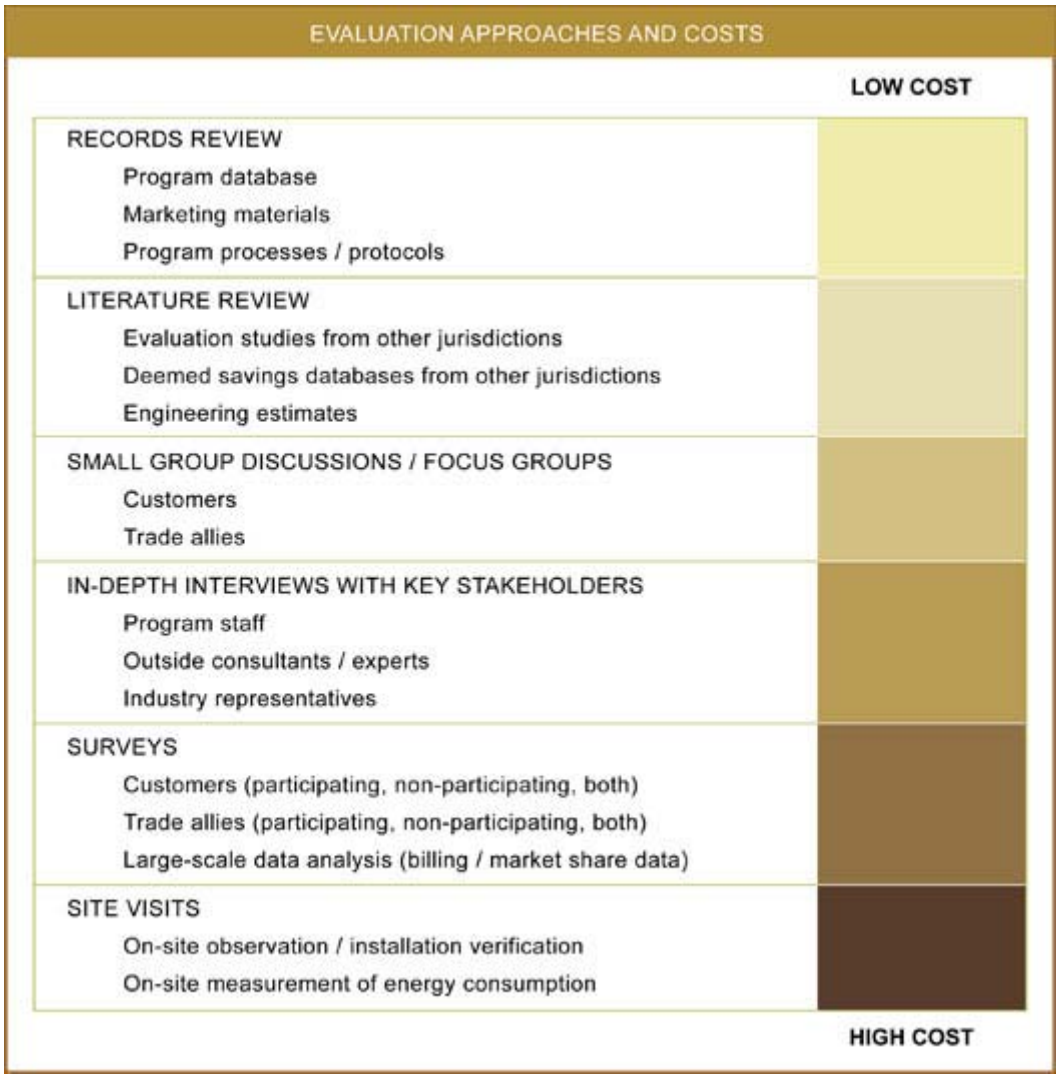
For accountability and transparency reasons, evaluations are conducted by independent third parties. Utilities typically outsource evaluation functions to consulting firms experienced in conducting energy efficiency program evaluations. Such firms are familiar with established industry protocols such as the California Energy Efficiency Evaluation Protocols which are used as a reference by evaluation professionals across the country. Use of standard protocols enhances the credibility of evaluation results.

Planning for evaluation activities ideally should occur in conjunction with energy efficiency program design, or shortly thereafter. Understanding how a program will be evaluated helps to ensure that the necessary data are collected from the outset, saving time and resources during the evaluation process. Evaluators can also provide useful input during program planning stages, given their professional experience in evaluating energy efficiency programs in other markets. However, it is also important to retain arms-length distance between evaluators and program staff to ensure evaluator independence and the credibility of evaluation findings.

According to the National Action Plan for Energy Efficiency, program administrators typically allocate between two and five percent of the energy efficiency portfolio budget to evaluation. Evaluation resources should target the areas of largest savings and greatest uncertainty. It may also make sense to devote greater resources to evaluation in the early years of program implementation, so that timely adjustments can be made if market interventions are not working as expected.

Evaluation approaches

A variety of data collection and analysis approaches are used in evaluating energy efficiency programs, and costs range widely depending on the complexity and level of effort required. The graphic below presents the range of typical evaluation approaches, from low-cost to high-cost.



Adapted from: K. Johnson, Johnson Consulting Group (June 2009). Presentation during the proceedings of the ECEEE 2009 Summer Study: Best Practices for Developing Cost Effective Evaluation, Measurement, and Verification Plans: Lessons Learned from 12 Northern California Municipal Utilities.

Determining the appropriate evaluation approach for any given program depends on a number of factors:

- The level of precision that is necessary to meet portfolio management objectives and/or regulatory requirements
- The magnitude of program savings as a percentage of the overall portfolio
- The complexity and scale of individual energy-saving projects within the program
- The amount of funding available for evaluation efforts

Even when evaluation funding resources are limited, low-cost approaches can provide useful information to program managers. For impact evaluations, a low-cost strategy could consist of the following approaches:

- Installation verification through review of invoices or other purchase documentation submitted with the incentive application
- Telephone surveys of a sample of participants/non-participants
- Comparison of deemed savings values with values used in other jurisdictions

- Review of attribution factors (net-to-gross ratios) from studies conducted in other jurisdictions

The Measurement & Verification section provides more detailed information on assessing the energy savings impacts from individual customer projects.

For process evaluations, a low-cost strategy could consist of the following approaches:

- Review tracking database to identify areas where reporting functions can be streamlined (e.g., creation of standardized templates/reports)
- Review marketing materials with a small group of customers to determine the effectiveness of the message
- Conduct interviews with program and customer service staff to assess what is working well in addition to areas for improvement
- Conduct focus groups or interviews with key outside partners (large customers, trade allies) to assess what is working well and to identify areas that need improvement
- Review program design to ensure it is well-founded and logical, and to identify any risk factors that require further investigation

In all cases, utilities should contract with an experienced and independent evaluator to implement the low-cost evaluation strategies listed above.

Resources

- American Public Power Association: Measuring Savings from Energy Efficiency Programs: What it Means, Why it is Necessary, and How to Do It
- American Public Power Association: Evaluating Your Utility's Energy Services Programs
- Association of Energy Services Professionals: Market Research & Evaluation Topic Committee
- California Public Utilities Commission: The California Evaluation Framework
- California Public Utilities Commission: California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals
- Efficiency Valuation Organization: Information on the International Performance Measurement and Verification Protocol (IPMVP)
- International Energy Program Evaluation Conference (IEPEC):
  - Papers, abstracts, and agendas from previous conferences
  - Resources for evaluation professionals
- Johnson Consulting Group: Best Practices for Developing Cost Effective Evaluation, Measurement, and Verification Plans: Lessons Learned from 12 Northern California Municipal Utilities
- National Action Plan for Energy Efficiency: Model Energy Efficiency Program Impact Evaluation Guide
- National Energy Efficiency Best Practices Study: Portfolio Best Practices Report
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy : Program Evaluation Resources
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy: EERE Guide for Managing General Program Evaluation Studies

CHAPTER 15: Operational challenges

Staff capacity challenges

As discussed in the chapter entitled Starting the Energy Efficiency Plan, public power utility employees often wear multiple hats and existing staff may have limited capacity for developing new initiatives while keeping up with current responsibilities. In addition, energy efficiency efforts require a diverse skill set, from marketing and public relations, to engineering and technical assistance, to general administrative functions. It may be necessary to hire new staff or provide training for existing staff in order to build sufficient in-house capacity to manage, administer, and deliver energy efficiency programs.

If the utility has sufficient resources to add staff capacity, it may make sense to hire a coordinator to manage energy efficiency initiatives. Even in today's struggling economy, individuals with experience in the energy efficiency field are in high demand. Though an ideal candidate would have a background in energy efficiency program design, implementation, or marketing, there are also ways to provide sufficient on-the-job training to build the necessary energy efficiency-related expertise. Good candidates for an energy efficiency coordinator position would have the following skills:

- Excellent written and oral communications abilities
- Relationship management skills
- Budget management skills

A recent job announcement for an energy efficiency coordinator position at River Falls Municipal Utility illustrates how one utility has summarized key duties and required skills.

A number of organizations provide training and educational resources to support staff development. APPA offers energy efficiency education for members through conferences, trainings and webinars. Other organizations, such as ACEEE, CEE, and AESP, provide training opportunities, conferences, and publications on energy efficiency topics. Utilities can also seek opportunities to learn from public power peers. Reach out to utilities that already have energy efficiency programs in place and find out what strategies have worked best for them and what lessons they have learned.

Challenges of scale

Scale is a critical issue when it comes to the cost of energy efficiency initiatives, as there are a certain number of fixed costs associated with planning, marketing, and administrative functions. For this reason, on the basis of cost per unit of energy saved (kWh or therm), the cost of administering a small portfolio of energy efficiency programs is in many cases higher than it is for a large portfolio of programs.

Even though it may be difficult for a small utility to take advantage of economies of scale, strategic partnerships can help utilities develop a broader scope of energy efficiency program offerings at a lower cost than they would be able to achieve on their own.

As discussed in the Implementation chapter, joint action agencies (JAAs) often play an important role in the development and implementation of energy efficiency programs. JAA support for member energy efficiency initiatives ranges from turnkey program design and implementation to customized services in areas such as research, training, and marketing. By offering energy efficiency services across their membership, JAAs can create economies of scale that reduce costs and avoid the need for individual members to "reinvent the wheel." If JAAs do not currently provide energy efficiency-related services but there is sufficient interest within the

membership to develop such offerings, members and JAAs can collaborate to identify needs and determine the best ways to meet those needs.

Another option is for smaller public power utilities to form a voluntary partnership with similar entities in the same geographic area and outsource program delivery or specific functions such as evaluation, market research, or training. Through this type of partnership, a consortium of public power utilities would pool funds and hire third party contractors to provide specified services across all participating service territories.

In a few cases, there are statewide energy efficiency programs that public power utilities can elect to take part in. In Wisconsin, for example, a number of public power utilities have opted to participate in the state-administered energy efficiency and renewable energy program, Focus on Energy. By contributing funds to Focus on Energy, public power utilities give their customers access to state-run programs. Many of these utilities have also elected to supplement Focus-provided programs by developing additional energy efficiency offerings for their customers.

Challenges for single-fuel utilities

As discussed in the Program Models chapter, a growing number of utilities are offering programs that promote "whole building" strategies for energy efficiency improvement (e.g., design assistance and incentives for energy efficient new construction, deep shell retrofits in the residential market, energy performance benchmarking and continuous improvement strategies for commercial buildings). Despite the benefits of a more comprehensive approach to energy efficiency improvement, the cost-effectiveness of the program may depend on the utility's ability to capture the benefits of both electricity and natural gas savings. These types of programs may not pass the cost-effectiveness screen for single fuel utilities.

In some areas, single-fuel utilities have collaborated in developing whole building program offerings. Due to the complexities associated with joint program administration, usually either the electric or natural gas provider takes the lead in program design and implementation. The other provider contributes funding, provides input into program development, and typically supports customer marketing efforts. Such arrangements are most often pursued when there is already a strong foundation of coordination and communications between electric and gas providers.

Resources

- River Falls Municipal Utility: Energy efficiency coordinator position

CHAPTER 16: Community planning and policy options

Introduction

Though this Guidebook focuses on opportunities for public power utilities to expand energy efficiency program offerings for their customers, there are two additional energy-saving strategies that should not be overlooked: (1) increasing the energy efficiency of municipal facilities and vehicle fleets, and (2) local public policy initiatives. Given their ownership structure and strong community ties, public power utilities are uniquely positioned to advance these types of initiatives.

Increasing municipal energy efficiency

By undertaking a strategic effort to increase the energy efficiency of city-owned buildings and vehicle fleets, municipalities can reduce operating costs and demonstrate leadership on energy-related issues in the community. Similar to the development of a customer-oriented energy efficiency strategy, typical steps required to develop a municipal energy efficiency initiative involve conducting a baseline assessment of the municipality's current energy demand (facilities and vehicles), establishing goals, creating a plan for achieving the goals, implementation, and evaluation.

Significant savings can often be found by targeting the largest energy-users: water and wastewater treatment plants, municipal office buildings, public parking structures, and vehicle fleets. EPA's free online tool, Portfolio Manager, can be used to benchmark the energy consumption of municipal buildings against that of similar buildings across the country, and can also serve as a tool for monitoring the energy performance and water consumption of government buildings on an ongoing basis. Municipalities can also incorporate energy efficiency requirements into their procurement policies—for example, requiring that all new office equipment be ENERGY STAR qualified. They can also specify that new municipal facilities be constructed in accordance with the U.S. Green Building Council's LEED standards.

Municipal efforts can broaden beyond energy efficiency to include water saving initiatives, waste generation/disposal projects (e.g., recycling, procurement of office supplies with recycled content, recovering landfill methane to produce energy), and transportation opportunities (e.g., purchasing fuel-efficient or renewable fuel vehicles; encouraging employees to replace driving with public transportation, car pooling, or bicycles).

Public power utilities can support municipal energy efficiency initiatives in a number of ways:

- Providing energy consumption data to support baseline assessments of energy use and energy consumption benchmarking
- Providing technical experts to conduct energy audits and provide technical assistance in identifying energy saving projects
- Making energy efficiency improvements at utility-owned facilities
- Converting utility fleets to energy efficient or renewable fuel vehicles
- Supporting community awareness/outreach by co-sponsoring local events, advertising campaigns, and other marketing initiatives

Local public policy initiatives

There are a variety of policy options that municipalities can pursue to promote energy efficiency, water

conservation, and environmental sustainability at the local level. Four policy options are summarized in the table below, along with examples from municipalities that have enacted such policies.

PUBLIC POLICY OPTIONS

POLICY	DESCRIPTION	EXAMPLE
Establish local policy goals	Set municipal targets for energy savings, environmental sustainability, or greenhouse gas emissions reductions	Fort Collins City Council first adopted a citywide Electric Energy Supply Policy in 2003, which set specific targets for reducing energy consumption and peak demand. Greenhouse gas reduction targets were set in 2008, and the city's Electric Energy Supply Policy was updated in 2009.
Adopt energy-related ordinances for new construction	Options include establishing processes to ensure enforcement of existing code requirements, modifying building codes to include stringent energy efficiency requirements, and/or offering expedited permitting options for energy efficient new construction	In addition to requiring that new construction and major renovation of municipal facilities meet energy efficiency requirements, Albuquerque's Green Path program offers expedited permitting, technical assistance during the design process, and a Green Path Certificate for buildings that meet program requirements.
Adopt energy-related ordinances for home sales	Require that energy assessments be conducted as part of the sales transaction process, and that energy-related information be disclosed to prospective buyers	For houses that are more than ten years old, Austin's Energy Conservation Audit and Disclosure (ECAD) Ordinance requires that energy audits be conducted at the time of sale, and that energy information be disclosed to prospective purchasers. Of the 310 homes audited so far under this new policy, 86% were found to have excessive duct leakage, with an average leakage rate of 22%.
Include a discussion of energy efficiency in the city's planning documents	Including an energy element in the general plan helps to create strategic linkages between energy planning and land use planning efforts	Energy elements from general plans: • Chandler, AZ • City of Pasadena, CA • City of Pleasanton, CA (draft)

Resources

- Ann Arbor's Municipal Energy Fund for financing energy-related improvements to city facilities
- California Energy Commission: 2006 Integrated Energy Policy Report Update. Contains information on California cities with green building ordinances.
- California Local Energy Efficiency Program (CALeep): General Plan Policy Options for Energy Efficiency in New and Existing Development
- Columbus Water & Light Environmental Initiatives
- ENERGY STAR Resources for Government
- Fort Collins City Council: 2009 Energy Policy
- ICLEI – Local Governments for Sustainability
- Renewable and Appropriate Energy Laboratory (RAEL), UC Berkeley: Guide to Energy Efficiency & Renewable Energy Financing Districts for Local Governments

CHAPTER 17: Getting help

A number of organizations provide tools and resources to assist public power utilities with energy efficiency program planning, design, implementation, and evaluation. Several key support options are summarized below:

- American Public Power Association (APPA) provides training and technical information to help public power utilities deliver energy efficiency programs in their communities. The Energy Efficiency Resource Central website is the clearinghouse for energy efficiency-related information from APPA.
- Clean and Efficient Energy Program (CEEP) is a nationwide initiative promoting public power investment in energy efficiency and clean energy. CEEP is building on the existing base of successful strategies and case studies of energy efficiency programs, refining them into topical "tool kits" for use by public power managers. These resources will be available on the web and deployed through regional workshops. CEEP is a partnership of APPA, the Large Public Power Council (LPPC), and the Alliance to Save Energy.
- The Energy Center of Wisconsin is an independent nonprofit that explores ideas and identifies solutions to energy challenges. Based in Madison, the Energy Center conducts objective research to better understand how consumers use energy and to identify barriers that may prevent more efficient energy use. Initiatives include technical assistance and continuing education for architects, engineers and builders and field research to improve the performance of new and existing buildings. Our expertise in program evaluation and market research improves the design and delivery of energy efficiency and renewable energy programs.
- The American Council for an Energy-Efficient Economy (ACEEE) conducts research, disseminates information, and assists with the design and implementation of utility-sector energy efficiency policies and programs. ACEEE's reviews of exemplary energy efficiency programs provide information on best practices for program design and implementation. National conferences provide opportunities for learning and information exchange.
- The Association of Energy Services Professionals (AESP) promotes the transfer of knowledge and experience through a network of energy practitioners. Networking and informational opportunities include local chapter meetings, topic committees that convene via teleconference, brown bag webinars, and national conferences. AESP also offers professional development training in a variety of areas, including a training on principles and practices of demand-side management.
- The Consortium for Energy Efficiency (CEE) is a consortium of efficiency program administrators from across the U.S. and Canada who work together on common approaches to advancing energy efficiency. CEE members work together on committees that address specific program areas, such as residential HVAC and appliances, industrial motor systems, and commercial buildings. When there is significant opportunity and member interest, CEE develops national initiatives that can be used as templates for individual energy efficiency programs.
- ENERGY STAR provides a platform for utilities, state agencies, and other organizations implementing energy efficiency programs to make a bigger difference in their communities. ENERGY STAR provides technical specifications for energy efficient products, marketing resources, and proven program strategies for improving energy efficiency in the residential and commercial market. Regional account managers are available to answer questions and help utility partners leverage ENERGY STAR tools and resources. Information about partnership and utility resources is available through the ENERGY STAR web site.
- The Rapid Deployment Energy Efficiency (RDEE) Toolkit is designed to help state and local governments choose successful programs as they advance energy efficiency program funding opportunities through the American Recovery and Reinvestment Act (ARRA) of 2009. A Help Line is available by calling 866-602-

7333 or e-mailing RDEE@icfi.com.

- Regional energy efficiency organizations are another source of information and expertise to support design and delivery of energy efficiency programs. A number of these organizations also provide opportunities to participate in regional energy efficiency programs such as energy efficient lighting and appliance promotions and Building Operator Certification™ training courses.
  - Midwest Energy Efficiency Alliance
  - Northeast Energy Efficiency Partnerships
  - Northwest Energy Efficiency Alliance
  - Southeast Energy Efficiency Alliance
  - Southwest Energy Efficiency Project

ENERGY EFFICIENCY GUIDEBOOK FOR PUBLIC POWER COMMUNITIES

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