6: Energy Efficiency Program Best Practices

Energy efficiency programs have been operating successfully in some parts of the country since the late 1980s. From the experience of these successful programs, a number of best practice strategies have evolved for making energy efficiency a resource, developing a cost-effective portfolio of energy efficiency programs for all customer classes, designing and delivering energy efficiency programs that optimize budgets, and ensuring that programs deliver results.

Overview

Cost-effective energy efficiency programs have been delivered by large and small utilities and third-party program administrators in some parts of the country since the late 1980s. The rationale for utility investment in efficiency programming is that within certain existing markets for energy-efficient products and services, there are barriers that can be overcome to ensure that customers from all sectors of the economy choose more energy-efficient products and practices. Successful programs have developed strategies to overcome these barriers, in many cases partnering with industry and voluntary national and regional programs so that efficiency program spending is used not only to acquire demand-side resources, but also to accelerate market-based purchases by consumers.

Leadership Group Recommendations Applicable to Energy Efficiency Program Best Practices

- Recognize energy efficiency as a high priority energy resource.
- Make a strong, long-term commitment to cost-effective energy efficiency as a resource.
- Broadly communicate the benefits of, and opportunities for, energy efficiency.
- Provide sufficient and stable program funding to deliver energy efficiency where cost-effective.

A list of options for promoting best practice energy efficiency programs is provided at the end of this chapter.

Challenges that limit greater utility investment in energy efficiency include the following:

- The majority of utilities recover fixed operating costs and earn profits based on the volume of energy they sell. *Strategies for overcoming this throughput disincentive to greater investment in energy efficiency are discussed in Chapter 2: Utility Ratemaking & Revenue Requirements.*
- Lack of standard approaches on how to quantify and incorporate the benefits of energy efficiency into resource planning efforts, and institutional barriers at many utilities that stem from the historical business model of acquiring generation assets and building transmission and distribution systems. *Strategies for overcoming these challenges are addressed in Chapter 3: Incorporating Energy Efficiency in Resource Planning.*
- Rate designs that are counterproductive to energy efficiency might limit greater efficiency investment by large customer groups, where many of the most cost-effective opportunities for efficiency programming exist. *Strategies for encouraging rate designs that are compatible with energy efficiency are discussed in Chapter 5: Rate Design.*
- Efficiency programs need to address multiple customer needs and stakeholder perspectives while simultaneously addressing multiple system needs, in many cases while competing for internal resources. *This chapter focuses on strategies for making energy efficiency a resource, developing a cost-effective portfolio of energy efficiency programs for all customer classes, designing and delivering efficiency programs that optimize budgets, and ensuring that those programs deliver results are the focus of this chapter.*

Programs that have been operating over the past decade, and longer, have a history of proven savings in megawatts (MW), megawatt-hours (MWh), and therms, as well as on customer bills. These programs show that energy efficiency can compare very favorably to supply-side options.

This chapter summarizes key findings from a portfolio-level[1] review of many of the energy efficiency programs that have been operating successfully for a number of years. It provides an overview of best practices in the following areas:

- Political and human factors that have led to increased reliance on energy efficiency as a resource.
- Key considerations used in identifying target measures[2] for energy efficiency programming in the near- and long-term.
- Program design and delivery strategies that can maximize program impacts and increase cost-effectiveness.
- The role of monitoring and evaluation in ensuring that program dollars are optimized and that energy efficiency investments deliver results.

Background

Best practice strategies for program planning, design and implementation, and evaluation were derived from a review of energy efficiency programs at the portfolio level across a range of policy models (e.g., public benefit charge administration, integrated resource planning). The box on page 6-3 describes the policy models and Table 6-1 provides additional details and examples of programs operating under various policy models. This chapter is not intended as a comprehensive review of the energy efficiency programs operating around the country, but does highlight key factors that can help improve and accelerate energy efficiency program success. Organizations reviewed for this effort have a sustained history of successful energy efficiency program implementation (See Tables 6-2 and 6-3 for summaries of these programs) and share the following characteristics:

- Significant investment in energy efficiency as a resource within their policy context.
- Development of cost-effective programs that deliver results.
- Incorporation of program design strategies that work to remove near- and long-term market barriers to investment in energy efficiency.
- Willingness to devote the necessary resources to make programs successful.

Most of the organizations reviewed also have conducted full-scale impact evaluations of their portfolio of energy efficiency investments within the last few years.

The best practices gleaned from a review of these organizations can assist utilities, their commissions, state energy offices, and other stakeholders in overcoming barriers to significant energy efficiency programming, and begin tapping into energy efficiency as a valuable and clean resource to effectively meet future supply needs.

1 For the purpose of this chapter, *portfolio* refers to the collective set of energy efficiency programs offered by a utility or third-party energy efficiency program administrator.

2 *Measures* refer to the specific technologies (e.g., efficient lighting fixture) and practices (e.g., duct sealing) that are used to achieve energy savings.

Energy Efficiency Programs Are Delivered Within Many Policy Models

Systems Benefits Charge (SBC) Model

In this model, funding for programs comes from an SBC that is either determined by legislation or a regulatory process. The charge is usually a fixed amount per kilowatt-hour (kWh) or million British thermal units (MMBtu) and is set for a number of years. Once funds are collected by the distribution or integrated utility, programs can be administered by the utility, a state agency, or a third party. If the utility implements the programs, it usually receives current cost recovery and a shareholder incentive. Regardless of administrative structure, there is usually an opportunity for stakeholder input.

This model provides stable program design. In some cases, funding has become vulnerable to raids by state agencies. In areas aggressively pursuing energy efficiency as a resource, limits to additional funding have created a ceiling on the resource. While predominantly used in the electric sector, this model can, and is, being used to fund gas programs.

Integrated Resource Plan (IRP) Model

In this model, energy efficiency is part of the utility's IRP. Energy efficiency, along with other demand-side options, is treated on an equivalent basis with supply. Cost recovery can either be in base rates or through a separate charge. The utility might receive a shareholder incentive, recovery of lost revenue (from reduced sales volume), or both. Programs are driven more by the resource need than in the SBC models. This generally is an electric-only model. The regional planning model used by the Pacific Northwest is a variation on this model.

Request For Proposal (RFP) Model

In this case, a utility or an independent system operator (ISO) puts out a competitive solicitation RFP to acquire energy efficiency from a third-party provider to meet demand, particularly in areas where there are transmission and distribution bottlenecks or a generation need. Most examples of this model to date have been electric only. The focus of this type of program is typically on saving peak demand.

Portfolio Standard

In this model, the program adminstrator is subject to a portfolio standard expressed in terms of percentage of overall energy or demand. This model can include gas as well as electric, and can be used independently or in conjunction with an SBC or IRP requirement.

Municipal Utility/Electric Cooperative Model

In this model, programs are administered by a municipal utility or electric cooperative. If the utility/cooperative owns or is responsible for generation, the energy efficiency resource can be part of an IRP. Cost recovery is most likely in base rates. This model can include gas as well as electric.

Table 6-1. Overview of Energy Efficiency Programs

Policy Model/ Examples	Funding Type	Shareholder Incentive[1]	Lead Administrator	Role in Resource Acquisition	Scope of Programs	Political Context
SBC with utility implementation: • California • Rhode Island • Connecticut • Massachusetts	Separate charge	Usually	Utility	Depends on whether utility owns generation	Programs for all customer classes	Most programs of this type came out of a restructuring settlement in states where there was an existing infrastructure at the utilities
SBC with state or third-party implementation: • New York • Vermont • Wisconsin	Separate charge	No	State agency Third party	None or limited	Programs for all customer classes	Most programs of this type came out of a restructuring settlement
IRP or gas planning model: • Nevada • Arizona • Minnesota • Bonneville Power Administration (BPA) (regional planning model as well) • Vermont Gas • Keyspan	Varies: in rates, capitalized, or separate charge	In some cases	Utility	Integrated	Program type dictated by resource need	Part of IRP requirement; may be combined with other models
RFP model for full-scale programs and congestion relief	Varies	No	Utility buys from third party	Integrated – can be T&D only	Program type dictated by resource need	Connecticut and Con Edison going out to bid to reduce congestion
Portfolio standard model (can be combined with SBC or IRP): • Nevada • California • Connecticut • Texas	Varies	Varies	Utility may implement programs or buy to meet standard	Standard portfolio	Programs for all customer classes	Generally used in states with existing programs to increase program activity
Municipal utility & electric cooperative: • Sacramento Municipal Utility District (CA) • City of Austin (TX) • Great River Energy (MN)	In rates	No	Utility	Depends on whether utility owns generation	Programs for all customer classes	Based on customer and resource needs; can be similar to IRP model

1 A shareholder incentive is a financial incentive to a utility (above those that would normally be recovered in a rate case) for achieving set goals for energy efficiency program performance.

Key Findings

Overviews of the energy efficiency programs reviewed for this chapter are provided in Table 6-2 and 6-3. Key findings drawn from these programs include:

- Energy efficiency resources are being acquired on average at about one-half the cost of the typical new power sources, and about one-third of the cost of natural gas supply in many cases—and contribute to an overall lower cost energy system for rate-payers (EIA, 2006).

- Many energy efficiency programs are being delivered at a total program cost of about $0.02 to $0.03 per lifetime kilowatt-hour (kWh) saved and $0.30 to $2.00 per lifetime million British thermal units (MMBtu) saved. These costs are less than the avoided costs seen in most regions of the country. Funding for the majority of programs reviewed ranges from about 1 to 3 percent of electric utility revenue and 0.5 to 1 percent of gas utility revenue.

- Even low energy cost states, such as those in the Pacific Northwest, have reason to invest in energy efficiency, as energy efficiency provides a low-cost, reliable resource that reduces customer utility bills. Energy efficiency also costs less than constructing new generation, and provides a hedge against market, fuel, and environmental risks (Northwest Power and Conservation Council, 2005).

- Well-designed programs provide opportunities for customers of all types to adopt energy savings measures and reduce their energy bills. These programs can help customers make sound energy use decisions, increase control over their energy bills, and empower them to manage their energy usage. Customers can experience significant savings depending on their own habits and the program offered.

- Consistently funded, well-designed efficiency programs are cutting electricity and natural gas load—providing annual savings for a given program year of 0.15 to 1 percent of energy sales. These savings typically will accrue at this level for 10 to 15 years. These programs are helping to offset 20 to 50 percent of expected energy growth in some regions without compromising end-user activity or economic well being.

- Research and development enables a continuing source of new technologies and methods for improving energy efficiency and helping customers control their energy bills.

- Many state and regional studies have found that pursuing economically attractive, but as yet untapped energy efficiency could yield more than 20 percent savings in total electricity demand nationwide by 2025. These savings could help cut load growth by half or more, compared to current forecasts. Savings in direct use of natural gas could similarly provide a 50 percent or greater reduction in natural gas demand growth. Potential varies by customer segment, but there are cost-effective opportunities for all customer classes.

- Energy efficiency programs are being operated successfully across many different contexts: regulated and unregulated markets; utility, state, or third-party administration; investor-owned, public, and cooperatives; and gas and electric utilities.

- Energy efficiency resources are being acquired through a variety of mechanisms including system benefits charges (SBCs), energy efficiency portfolio standards (EEPSs), and resource planning (or cost of service) efforts.

- Cost-effective energy efficiency programs for electricity and natural gas can be specifically targeted to reduce peak load.

- Effective models are available for delivering gas and electric energy efficiency programs to all customer classes. Models may vary based on whether a utility is in the initial stages of energy efficiency programming, or has been implementing programs for a number of years.

Table 6-2. Efficiency Measures of Natural Gas Savings Programs

Program Administrator	Keyspan (MA)	Vermont Gas (VT)	SoCal Gas (CA)
Policy Model	Gas	Gas	Gas
Period	2004	2004	2004
Program Funding			
Average Annual Budget ($MM)	12	1.1	21
% of Gas Revenue	1.00%	1.60%	0.53%
Benefits			
Annual MMBtu Saved [1] (000s MMBtu)	500	60	1,200
Lifetime MMBtu Saved [2] (000s MMBtu)	6,000	700	15,200
Cost-Effectiveness			
Cost of Energy Efficiency ($/lifetime MMBtu)	2	2	1
Retail Gas Prices ($/thousand cubic feet [Mcf])	11	9	8
Cost of Energy Efficiency (% Avoided Energy Cost)	19%	18%	18%
Total Avoided Cost (2005 $/MMBtu) [3]	12	11	7

[1] SWEEP, 2006; Southern California Gas Company, 2004.

[2] Lifetime MMBtu calculated as 12 times annual MMBtu saved where not reported (not reported for Keyspan or Vermont Gas).

[3] VT and MA avoided cost (therms) represents all residential (not wholesale) cost considerations (ICF Consulting, 2005).

- Energy efficiency programs, projects, and policies benefit from established and stable regulations, clear goals, and comprehensive evaluation.
- Energy efficiency programs benefit from committed program administrators and oversight authorities, as well as strong stakeholder support.
- Most large-scale programs have improved productivity, enabling job growth in the commercial and industrial sectors.
- Large-scale energy efficiency programs can reduce wholesale market prices.

Lessons learned from the energy efficiency programs operated since inception of utility programs in the late 1980s are presented as follows, and cover key aspects of energy efficiency program planning, design, implementation, and evaluation.

Summary of Best Practices

In this chapter, best practice strategies are organized and explained under four major groupings:

- Making Energy Efficiency a Resource
- Developing an Energy Efficiency Plan
- Designing and Delivering Energy Efficiency Programs
- Ensuring Energy Efficiency Investments Deliver Results

For the most part, the best practices are independent of the policy model in which the programs operate. Where policy context is important, it is discussed in relevant sections of this chapter.

Making Energy Efficiency a Resource

Energy efficiency is a resource that can be acquired to help utilities meet current and future energy demand. To realize this potential requires leadership at multiple levels, organizational alignment, and an understanding of the nature and extent of the energy efficiency resource.

- *Leadership* at multiple levels is needed to establish the business case for energy efficiency, educate key stakeholders, and enact policy changes that increase investment in energy efficiency as a resource. Sustained leadership is needed from:

— Key individuals in upper management at the utility who understand that energy efficiency is a resource alternative that can help manage risk, minimize long-term costs, and satisfy customers.

— State agencies, regulatory commissions, local governments and associated legislative bodies, and/or consumer advocates that expect to see energy efficiency considered as part of comprehensive utility management.

— Businesses that value energy efficiency as a way to improve operations, manage energy costs, and contribute to long-term energy price stability and availability, as well as trade associations and businesses, such as Energy Service Companies (ESCOs), that help members and customers achieve improved energy performance.

— Public interest groups that understand that in order to achieve energy efficiency and environmental objectives, they must help educate key stakeholders and find workable solutions to some of the financial challenges that limit acceptance and investment in energy efficiency by utilities.[3]

- *Organizational alignment.* With policies in place to support energy efficiency programming, organizations need to institutionalize policies to ensure that energy efficiency goals are realized. Factors contributing to success include:

— Strong support from upper management and one or more internal champions.

— A framework appropriate to the organization that supports large-scale implementation of energy efficiency programs.

— Clear, well-communicated program goals that are tied to organizational goals and possibly compensation.

— Adequate staff resources to get the job done.

— A commitment to continually improve business processes.

- *Understanding of the efficiency resource* is necessary to create a credible business case for energy efficiency. Best practices include the following:

— Conduct a "potential study" prior to starting programs to inform and shape program and portfolio design.

— Outline what can be accomplished at what costs.

— Review measures for all customer classes including those appropriate for hard-to-reach customers, such as low income and very small business customers.

Developing an Energy Efficiency Plan

An energy efficiency plan should reflect a long-term perspective that accounts for customer needs, program cost-effectiveness, the interaction of programs with other policies that increase energy efficiency, the opportunities for new technology, and the importance of addressing multiple system needs including peak load reduction and congestion relief. Best practices include the following:

- Offer programs for all key customer classes.

- Align goals with funding.

3 Public interest groups include environmental organizations such as the National Resources Defense Council (NRDC), Alliance to Save Energy (ASE), and American Council for an Energy Efficient Economy (ACEEE) and regional market transformation entities such as the Northeast Energy Efficiency Partnerships (NEEP), Southwest Energy Efficiency Project (SWEEP), and Midwest Energy Efficiency Alliance (MEEA).

Table 6-3. Efficiency Measures of Electric and Combination Programs

	NYSERDA (NY)	Efficiency Vermont (VT)	MA Utilities (MA)	WI Department of Administration[12]	CA Utilities (CA)
Policy Model	SBC w/State Admin	SBC w/3rd Party Admin	SBC w/Utility Admin	SBC w/State Admin	SBC w/Utility Admin & Portfolio Standard
Period	2005	2004	2002	2005	2004
Program Funding					
Spending on Electric Energy Efficiency ($MM) [1]	138	14	123	63	317
Budget as % of Electric Revenue [2]	1.3%	3.3%	3.0%	1.4%	1.5%
Avg Annual Budget Gas ($MM)	NR [10]	NA	3 [11]	NA	NA
% of Gas Revenue	NR [10]	NA	NA	NA	NA
Benefits					
Annual MWh Saved / MWh Sales [3,4]	0.2%	0.9%	0.4%	0.1%	1.0%
Lifetime MWh Saved [5] **(000s MWh)**	6,216	700	3,428	1,170	22,130
Annual MW Reduction	172	15	48	81	377
Lifetime MMBtu Saved [5] **(000s MMBtu)**	17,124	470	850	11,130	43,410
Annual MMBtu Saved (000s MMBtu)	1,427	40	70	930	3,620
Non-Energy Benefits	$79M bill reduction	37,200 CCF of water	$21M bill reduction 2,090 new jobs created	Value of non-energy benefits: Residential: $6M C/I: $36M	NR
Avoided Emissions (tons/yr for 1 program year) (could include benefits from load response, renewable, and DG programs)	NO_X: 470 SO_2: 850 CO_2: 400,000	Unspecified pollutants: 460,000 over lifetime	NO_X: 135 SO_2: 395 CO_2: 161,205	NO_X: 2,167 SO_2: 4,270 CO_2: 977,836 (annual savings from 5 program years)	NR
Cost-Effectiveness					
Cost of Energy Efficiency					
$/lifetime (kWh) [6]	0.02	0.02	0.03	0.05	0.01
$/lifetime (MMBtu)	NA	NA	0.32	NA	NA
Retail Electricity Prices ($/kWh)	0.13	0.11	0.11	0.07	0.13
Retail Gas Prices ($/mcf)	NA	NA	NR	NA	NA
Avoided Costs (2005$) [7,8]					
Energy ($/kWh)	0.03	0.07	0.07	0.02 to 0.06 [13]	0.06
Capacity ($/kW)[9]	28.20	3.62	6.64		
On-Peak Energy ($/kWh)			0.08		
Off-Peak Energy ($/kWh)			0.06		
Cost of Energy Efficiency as % Avoided Energy Cost	89%	29%	10%	90%	23%

C/I = Commercial and Industrial; CO_2 = Carbon Dioxide; $MM = Million Dollars; N/A = Not Applicable; NR = Not Reported; NO_X = Nitrogen Oxides; SO_2 = Sulfur Dioxide

1 NYSERDA 2005 spending derived from subtracting cumulative 2004 spending from cumulative 2005 spending; includes demand response and research and development (R&D).

2 ACEEE, 2004; Seattle City Light, 2005.

3 Annual MWh Saved averaged over program periods for Wisconsin and California Utilities. NYSERDA 2005 energy efficiency savings derived from subtracting cumulative 2004 savings from 2005 cumulative reported savings.

4 EIA, 2006; Austin Energy, 2004; Seattle City Light, 2005. Total sales for California Utilities in 2003 and SMUD in 2004 were derived based on growth in total California retail sales as reported by EIA.

5 Lifetime MWh savings based on 12 years effective life of installed equipment where not reported for NYSERDA, Wisconsin, Nevada, SMUD, BPA, and Minnesota. Lifetime MMBtu savings based on 12 years effective life of installed equipment.

Table 6-3. Efficiency Measures of Electric and Combination Programs (continued)

Nevada	CT Utilities (CT)	SMUD (CA)	Seattle City Light (WA)	Austin Energy	Bonneville Power Administration (ID, MT, OR, WA)	MN Electric and Gas Investor-Owned Utilities (MN)
IRP with Portfolio Standard	SBC w/Utility Admin & Portfolio Standard	Municipal Utility	Municipal Utility	Municipal Utility	Regional Planning	IRP and Conservation Improvement Program
2003	2005	2004	2004	2005	2004	2003
Program Funding						
11	65	30	20	25	78	52
0.5%	3.1%	1.5%	3.4%	1.9%	NR	NR
NA	NA	NA	NA	NA	NA	$14
NA	NA	NA	NA	NA	NA	0.50%
Benefits						
0.1%	1.0%	0.5%	0.7%	0.9%		0.5%
420	4,400	630	1,000	930	3,080	3,940
16	135	14	7	50	47.2	129
NA	NA	NA	NA	10,777	NA	22,010
NA	NA	NA	NA	1,268	NA	1,830
NR	lifetime savings of $550M on bills	NR	lifetime savings of $430M on bills created	Potentially over 900 jobs created Residential: $6M C/I: $36M	NR	NR
NR	NO_X: 334 SO_2: 123 CO_2: 198,586	NO_X: 18	CO_2: 353,100 (cummulative annual savings for 13 years)	NO_X: 640 SO_2: 104 CO_2: 680,000 over lifetime	NR	NR
Cost-Effectiveness						
0.03	0.01	0.03	0.02	0.03	0.03	0.01
NA	NA	NA	NA	2.32	NA	0.06
0.09	0.10	0.10	0.06	0.12	Wholesaler - NA	0.06
NA	NA	NA	NA	NA	NA	5.80
	0.07		NR	NR	Wholesaler - NA	NR
36.06	20.33					
		0.08				
		0.06				
Not calculated	21%	63%		Not calculated	Not calculated	Not calculated

6 Calculated for all cases except SMUD; SMUD data provided by J. Parks, Manager, Energy Efficiency and Customer R&D, Sacramento Municipal Utility District (personal communication, May 19, 2006).

7 Avoided cost reported as a consumption ($/kWh) not a demand (kW) figure.

8 Total NSTAR avoided cost for 2006.

9 Avoided capacity reported by NYSERDA as the three-year averaged hourly wholesale bid price per MWh.

10 NYSERDA does not separately track gas-related project budget, revenue, or benefits.

11 NSTAR Gas only.

12 Wisconsin has a portfolio that includes renewable distributed generation; some comparisons might not be appropriate.

13 Range based on credits given for renewable distributed generation.

- Use cost-effectiveness tests that are consistent with long-term planning.
- Consider building codes and appliance standards when designing programs.
- Plan to incorporate new technologies.
- Consider efficiency investments to alleviate transmission and distribution constraints.
- Create a roadmap of key program components, milestones, and explicit energy use reduction goals.

Designing and Delivering Energy Efficiency Programs

Program administrators can reduce the time to market and implement programs and increase cost-effectiveness by leveraging the wealth of knowledge and experience gained by other program administrators throughout the nation and working with industry to deliver energy efficiency to market. Best practices include the following:

- *Begin with the market in mind.*

— Conduct a market assessment.

— Solicit stakeholder input.

— Listen to customer and trade ally needs.

— Use utility channels and brands.

— Promote both energy and non-energy (e.g., improved comfort, improved air quality) benefits of energy efficient products and practices to customers.

— Coordinate with other utilities and third-party program administrators.

— Leverage the national ENERGY STAR program.

— Keep participation simple.

— Keep funding (and other program characteristics) as consistent as possible.

— Invest in education, training, and outreach.

— Leverage customer contact to sell additional efficiency and conservation.

- *Leverage private sector expertise, external funding, and financing.*

— Leverage manufacturer and retailer resources through cooperative promotions.

— Leverage state and federal tax credits and other tax incentives (e.g., accelerated depreciation, first-year expensing, sales tax holidays) where available.

— Build on ESCO and other financing program options.

— Consider outsourcing some programs to private and not-for-profit organizations that specialize in program design and implementation through a competitive bidding process.

- *Start with demonstrated program models—build infrastructure for the future.*

— Start with successful program approaches from other utilities and program administrators and adapt them to local conditions to accelerate program design and effective implementation.

— Determine the right incentives, and if incentives are financial, make sure that they are set at appropriate levels.

— Invest in educating and training the service industry (e.g., home performance contractors, heating and cooling technicians) to deliver increasingly sophisticated energy efficiency services.

— Evolve to more comprehensive programs.

— Change measures over time to adapt to changing markets and new technologies.

— Pilot test new program concepts.

Ensuring Energy Efficiency Investments Deliver Results

Program evaluation helps optimize program efficiency and ensure that energy efficiency programs deliver intended results. Best practices include the following:

- *Budget, plan and initiate* evaluation from the onset; formalize and document evaluation plans and processes.

- *Develop program and project tracking systems* that support evaluation and program implementation needs.

- *Conduct process evaluations* to ensure that programs are working efficiently.

- *Conduct impact evaluations* to ensure that mid- and long-term goals are being met.

- *Communicate evaluation results* to key stakeholders. Include case studies to make success more tangible.

Making Energy Efficiency a Resource

Energy efficiency programs are being successfully operated across many different contexts including electric and gas utilities; regulated and unregulated markets; utility, state, and third-party administrators; and investor-owned, public, and cooperatively owned utilities. These programs are reducing annual energy use by 0.15 to 1 percent at spending levels between 1 and 3 percent of electric, and 0.5 and 1.5 percent of gas revenues—and are poised to deliver substantially greater reductions over time. These organizations were able to make broader use of the energy efficiency resource in their portfolio by having:

- Leadership at multiple levels to enact policy change.

- Organizational alignment to ensure that efficiency goals are realized.

- A well-informed understanding of the efficiency resource including, the potential for savings and the technologies for achieving them.

Examples of leadership, organizational alignment, and the steps that organizations have taken to understand the nature and extent of the efficiency resource are provided in the next sections.

Leadership

Many energy efficiency programs reviewed in this chapter began in the integrated resource plan (IRP) era of the electric utilities of the 1980s. As restructuring started in the late 1990s, some programs were suspended or halted. In some cases (such as California, New York, Massachusetts, Connecticut, and Rhode Island), however, settlement agreements were reached that allowed restructuring legislation to move forward if energy efficiency programming was provided through the distribution utility or other third-party providers. In many cases, environmental advocates, energy service providers, and state agencies played active roles in the settlement process to ensure energy efficiency was part of the restructured electric utility industry. Other states (such as Minnesota, Wisconsin, and Vermont) developed legislation to address the need for stable energy efficiency programming without restructuring their state electricity markets. In addition, a few states (including California, Minnesota, New Jersey, Oregon, Vermont, and Wisconsin) enacted regulatory requirements for utilities or other parties to provide gas energy efficiency programs (Kushler, et al., 2003). Over the past few years, the mountain states have steadily ramped up energy efficiency programs.

In all cases, to establish energy efficiency as a resource required leadership at multiple levels:

- *Leadership* is needed to establish the business case for energy efficiency, educate key stakeholders, and enact policy changes that increase investment in energy efficiency as a resource. Sustained leadership is needed from:

— Key individuals in upper management at the utility who understand that energy efficiency is a resource alternative that can help manage risk, minimize long-term costs, and satisfy customers.

— State agencies, regulatory commissions, local governments and associated legislative bodies, and/or consumer advocates that expect to see energy efficiency considered as part of comprehensive utility management.

— Businesses that value energy efficiency as a way to improve operations, manage energy costs, and contribute to long-term energy price stability and availability, as well as trade associations and businesses, such as ESCOs, that help members and customers achieve improved energy performance.

– Public interest groups that understand that in order to achieve energy efficiency and environmental objectives, they must help educate key stakeholders and find workable solutions to some of the financial challenges that limit acceptance and investment in energy efficiency by utilities.

The following are examples of how leadership has resulted in increased investment in energy efficiency:

- In Massachusetts, energy efficiency was an early consideration as restructuring legislation was discussed. The Massachusetts Department of Public Utilities issued an order in D.P.U. 95-30 establishing principles to "establish the essential underpinnings of an electric industry structure and regulatory framework designed to minimize long-term costs to customers while maintaining safe and reliable electric service with minimum impact on the environment." Maintaining demand side management (DSM) programs was one of the major principles the department identified during the transition to a restructured electric industry. The Conservation Law Foundation, the Massachusetts Energy Efficiency Council, the National Consumer Law Center, the Division of Energy Resources, the Union of Concerned Scientists, and others took leadership roles in ensuring energy efficiency was part of a restructured industry (MDTE, 1995).

- Leadership at multiple levels led to significantly expanded programming of Nevada's energy efficiency program, from about $2 million in 2001 to an estimated $26 million to $33 million in 2006:

  "There are 'champions' for expanded energy efficiency efforts in Nevada, either in the state energy office or in the consumer advocate's office. Also, there have been very supportive individuals in key positions within the Nevada utilities. These individuals are committed to developing and implementing effective DSM programs, along with a supportive policy framework" (SWEEP, 2006).

  Public interest organizations, including SWEEP, also played an important role by promoting a supportive policy framework (see box on page 6-13, "Case Study: Nevada Efficiency Program Expansion" for additional information).

- Fort Collins City Council (Colorado) provides an example of local leadership. The council adopted the Electric Energy Supply Policy in March 2003. The Energy Policy includes specific goals for city-wide energy consumption reduction (10 percent per capita reduction by 2012) and peak demand reduction (15 percent per capita by 2012). Fort Collins Utilities introduced a variety of new demand-side management (DSM) programs and services in the last several years in pursuit of the energy policy objectives.

- Governor Huntsman's comprehensive policy on energy efficiency for the state of Utah, which was unveiled in April 2006, is one of the most recent examples of leadership. The policy sets a goal of increasing the state's energy efficiency by 20 percent by the year 2015. One key strategy of the policy is to collaborate with utilities, regulators, and the private sector to expand energy efficiency programs, working to identify and remove barriers, and assisting the utilities in ensuring that efficiency programs are effective, attainable, and feasible to implement.

Organizational Alignment

Once policies and processes are in place to spearhead increased investment in energy efficiency, organizations often institutionalize these policies to ensure that goals are realized. The most successful energy efficiency programs by utilities or third-party program administrators share a number of attributes. They include:

- Clear support from upper management and one or more internal champions.
- Clear, well-communicated program goals that are tied to organizational goals and, in some cases, compensation.
- A framework appropriate to the organization that supports large-scale implementation of energy efficiency programs.
- Adequate staff resources to get the job done.
- Strong regulatory support and policies.
- A commitment to continually improve business processes.

"Support of upper management is critical to program success" (Komor, 2005). In fact, it can make or break a program. If the CEO of a company or the lead of an agency is an internal champion for energy efficiency, it will be truly a part of how a utility or agency does business. Internal champions below the CEO or agency level are critical as well. These internal champions motivate their fellow employees and embody energy efficiency as part of the corporate culture.

Case Study: Nevada Efficiency Program Expansion

Nevada investor-owned utilities (IOUs), Nevada Power, and Sierra Pacific Power Company phased-out DSM programs in the mid-1990s. After 2001, when the legislature refined the state's retail electric restructuring law to permit only large customers (>1 megawatt [MW]) to purchase power competitively, utilities returned to a vertically integrated structure and DSM programs were restarted, but with a budget of only about $2 million that year.

As part of a 2001 IRP proceeding, a collaborative process was established for developing and analyzing a wider range of DSM program options. All parties reached an agreement to the IRP proceeding calling for $11.2 million per year in utility-funded DSM programs with an emphasis on peak load reduction but also significant energy savings. New programs were launched in March 2003.

In 2004, the Nevada public utilities commission also approved a new policy concerning DSM cost recovery, allowing the utilities to earn their approved rate of return plus 5 percent (e.g., a 15 percent return if the approved rate is 10 percent) on the equity-portion of their DSM program funding. This step gave the utilities a much greater financial incentive to expand their DSM programs.

In June 2005, legislation enacted in Nevada added energy savings from DSM programs to the state's Renewable Portfolio Standard. This innovative policy allows energy savings from utility DSM programs and efficiency measures acquired through contract to supply up to 25 percent of the requirements under the renamed clean energy portfolio standard. The clean energy standard is equal to 6 percent of electricity supply in 2005 and 2006 and increases to 9 percent in 2007 and 2008, 12 percent from 2009 to 2010, 15 percent in 2011 and 2012, 18 percent in 2013 and 2014, and 20 percent in 2015 and thereafter. At least half of the energy savings credits must come from electricity savings in the residential sector.

Within months of passage, the utilities proposed a large expansion of DSM programs for 2006. In addition to the existing estimated funding of $26 million, the Nevada utilities proposed adding another $7.5 million to 2006 DSM programs. If funding is approved, the Nevada utilities estimate the 2006 programs alone will yield gross energy savings of 153 gigawatt-hours/yr and 63 MW (Larry Holmes, personal communication, February 28, 2006).

Source: Geller, 2006.

Tying energy efficiency to overall corporate goals and compensation is important, particularly when the utility is the administrator of energy efficiency programs. Ties to corporate goals make energy efficiency an integral part of how the organization does business as exemplified below:

- Bonneville Power Administration (BPA) includes energy efficiency as a part of its overall corporate strategy, and its executive compensation is designed to reflect how well the organization meets its efficiency goals. BPA's strategy map states, "Development of all cost-effective energy efficiency in the loads BPA serves facilitates development of regional renewable resources, and adopts cost-effective non-construction alternatives to transmission expansion" (BPA, 2004).

- National Grid ties energy efficiency goals to staff and executive compensation (P. Arons, personnel communication, June 15, 2006).

- Sacramento Municipal Utility District (SMUD) ties energy efficiency to its reliability goal: "To ensure a reliable energy supply for customers in 2005, the 2005 budget includes sufficient capacity reserves for the peak summer season. We have funded all of the District's commercial and residential load management programs, and on-going efficiency programs in Public Good to continue to contribute to peak load reduction" (SMUD, 2004a).

- Nevada Power's Conservation Department had a "Performance Dashboard" that tracks costs, participating customers, kWh savings, kW savings, $/kWh, $/kW, customer contribution to savings, and total customer costs on a real time basis, both by program and overall.

- Austin Energy's Mission Statement is "to deliver clean, affordable, reliable energy and excellent customer services" (Austin Energy, 2004).

- Seattle City Light has actively pursued conservation as an alternative to new generation since 1977 and has tracked progress toward its goals (Seattle City Light, 2005). Its longstanding, resolute policy direction establishes energy conservation as the first choice resource. In more recent years, the utility has also been guided by the city's policy to meet of all the utility's future load growth with conservation and renewable resources (Steve Lush, personal communication, June 2006).

From Pacific Gas and Electric's (PG&E's) Second Annual Corporate Responsibility Report (2004):

"One of the areas on which PG&E puts a lot of emphasis is helping our customers use energy more efficiently."

"For example, we plan to invest more than $2 billion on energy efficiency initiatives over the next 10 years. What's exciting is that the most recent regulatory approval we received on this was the result of collaboration by a large and broad group of parties, including manufacturers, customer groups, environmental groups, and the state's utilities."

— Beverly Alexander, Vice President,
Customer Satisfaction, PG&E

Having an appropriate framework within the organization to ensure success is also important. In the case of the utility, this would include the regulatory framework that supports the programs, including cost recovery and potentially shareholder incentives and/or decoupling. For a third-party administrator, an appropriate framework might include a sound bidding process by a state agency to select the vendor or vendors and an appropriate regulatory arrangement with the utilities to manage the funding process.

Adequate resources also are critical to successful implementation of programs. Energy efficiency programs need to be understood and supported by departments outside those that are immediately responsible for program delivery. If information technology, legal, power supply, transmission, distribution, and other departments do not share and support the energy efficiency goals and programs, it is difficult for energy efficiency programs to succeed. When programs are initiated, the need for support from other departments is greatest. Support from other departments needs to be considered in planning and budgeting processes.

As noted in the Nevada case study, having a shareholder incentive makes it easier for a utility to integrate efficiency goals into its business because the incentive offsets some of the concerns related to financial treatment of program expenses and potential lost revenue from decreased sales. For third-party program administrators, goals might be built into the contract that governs the overall implementation of the programs. For example, Efficiency Vermont's contract with the Vermont Department of Public Service Board has specific performance targets. An added shareholder return will not motivate publicly and cooperatively owned utilities, though they might appreciate reduced risks from exposure to wholesale markets, and the value added in improved customer service. SMUD, for example, cites conservation programs as a way to help customers lower their utility bills (SMUD, 2004b). These companies, like IOUs, can link employee compensation to achieving energy efficiency targets.

Business processes for delivering energy efficiency programs and services to customers should be developed and treated like other business processes in an organization and reviewed on a regular basis. These processes should include documenting clear plans built on explicit assumptions, ongoing monitoring of results and plan inputs (assumptions), and regular reassessment to improve performance (using improved performance itself as a metric).

Understanding the Efficiency Resource

Energy efficiency potential studies provide the initial justification (the business case) for utilities embarking on or expanding energy efficiency programs, by providing information on (1) the overall potential for energy efficiency and (2) the technologies, practices, and sectors with the greatest or most cost-effective opportunities for achieving that potential. Potential studies illuminate the nature of energy efficiency resource, and can be used by legislators and regulators to inform efficiency policy and programs. Potential studies can usually be completed in three to eight months, depending on the level of detail, availability of data, and complexity. They range in cost from \$100,000 to \$300,000 (exclusive of primary data collection). Increasingly, many existing studies can be drawn from to limit the extent and cost of such an effort.

The majority of organizations reviewed in developing this chapter have conducted potential studies in the past five years. In addition, numerous other studies have been conducted in recent years by a variety of organizations interested in learning more about the efficiency resource in their state or region. Table 6-4 summarizes key findings for achievable potential (i.e., what can realistically be achieved from programs within identified funding parameters), by customer class, from a selection of these studies. It also illustrates that this potential is well represented across the residential, commercial, and industrial sectors. The achievable estimates presented are for a future time period, are based on realistic program scenarios, and represent potential program impacts above and beyond naturally occurring conservation. Energy efficiency potential studies are based on currently available technologies. New technologies such as those discussed in Table 6-9 will continuously and significantly increase potential over time.

The studies show that achievable potential for reducing overall energy consumption ranges from 7 to 32 percent for electricity and 5 to 19 percent for gas, and that demand for electricity and gas can be reduced by about 0.5 to 2 percent per year. For context, national electricity consumption is projected to grow by 1.6 percent per year, and gas consumption is growing 0.7 percent per year (EIA, 2006a).

The box on page 6-17, "Overview of a Well-Designed Potential Study" provides information on key elements of a potential study. Related best practices for efficiency programs administrators include:

- Conducting a "potential study" prior to starting programs.
- Outlining what can be accomplished at what cost.
- Reviewing measures appropriate to all customer classes including those appropriate for hard-to-reach customers, such as low income and very small business customers.

Table 6-4. Achievable Energy Efficiency Potential From Recent Studies

State/Region	Study Length (Years)	Achievable Demand Reduction (MW)			Achievable Gas Consumption Reduction (MMBtu)			Achievable GWh Reduction			Demand Savings as % of 2004 State Nameplate Capacity [10]	Annual % MW Savings	Electricity Savings as % of Total 2004 State Usage [11]	Annual % GWh Savings	Gas Savings as % of Total 2004 State Usage[12]	Annual % MMBtu Savings
		Residential	Commercial	Industrial	Residential	Commercial	Industrial	Residential	Commercial	Industrial	Electricity		Electricity		Gas	
U.S. (Clean Energy Future) [1]	20	n/a	n/a	n/a	500,000,000	300,000,000	1,400,000,000	392,732	281,360	292,076	n/a	n/a	24%	1.2%	10%	0.5%
Con Edison [2]	10	n/a	n/a	n/a	11,396,700	10,782,100	231,000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	19%	1.9%
Pacific NW [3]	20	n/a	n/a	n/a	n/a	n/a	n/a	11,169	9,715	5,011	n/a	n/a	12.5%	0.6%	n/a	n/a
Puget Sound [4]	20	133	148	16	n/a	n/a	n/a	1,169	1,293	139	9.3%	0.5%	9.5%	0.5%	n/a	n/a
Connecticut [5]	8	240	575	93	n/a	n/a	n/a	1,655	2,088	723	12.5%	1.6%	13.4%	1.7%	n/a	n/a
California [6]	9	1,800	2,600	1,550	27,500,000	20,600,000	-	9,200	11,900	8,800	9.6%	1.1%	11.8%	1.3%	10%	1.1%
Southwest [7]	17	n/a	n/a	n/a	n/a	n/a	n/a	24,593	50,291	-	n/a	n/a	32.8%	1.9%	n/a	n/a
New York [8]	19	3,584	8,180	602	n/a	n/a	n/a	15,728	2,948	8,180	23.1%	1.2%	14.3%	0.8%	n/a	n/a
Illinois [9]	17	n/a	n/a	n/a	n/a	n/a	n/a	-	-	67,000	n/a	n/a	43.2%	2.5%	n/a	n/a
										AVERAGE:		1.1%		1.3%		1.2%

MW = Megawatt; MMBtu = Million British thermal units.

[1] ORNL, 2000.
[2] NYSERDA/OE, 2006.
[3] NPCC, 2005.
[4] Puget Sound Energy, 2003.
[5] GDS Associates and Quantum Consulting, 2004.
[6] KEMA, 2002; KEMA & XENERGY, 2003a; KEMA & XENERGY, 2003b.
[7] SWEEP, 2002.
[8] NYSERDA/OE, 2003.
[9] ACEEE, 1998.
[10] EIA, 2005a.
[11] EIA, 2005b.
[12] EIA, 2006b.

Overview of a Well-Designed Potential Study

Well-designed potential studies assess the following types of potential:

Technical potential assumes the complete penetration of all energy-conservation measures that are considered technically feasible from an engineering perspective.

Economic potential refers to the technical potential of those measures that are cost-effective, when compared to supply-side alternatives. The economic potential is very large because it is summing up the potential in existing equipment, without accounting for the time period during which the potential would be realized.

Maximum achievable potential describes the economic potential that could be achieved over a given time period under the most aggressive program scenario.

Achievable potential refers to energy saved as a result of specific program funding levels and incentives. These savings are above and **beyond those that would occur naturally** in the absence of any market intervention.

Naturally occurring potential refers to energy saved as a result of normal market forces, that is, in the absence of any utility or governmental intervention.

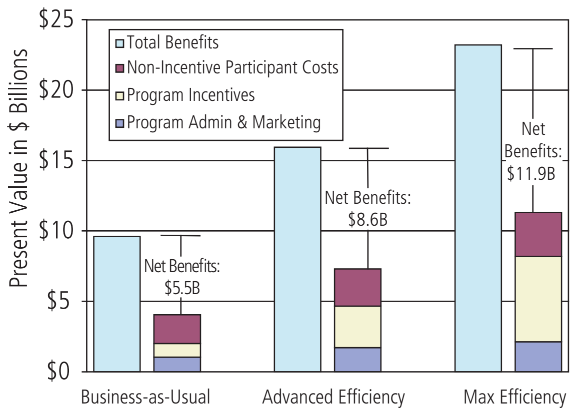
The output of technical and economic potential is the size of the energy efficiency resource in MW, MWh, MMBtu and other resources. The potential is built up from savings and cost data from hundreds of measures and is typically summarized by sector using detailed demographic information about the customer base and the base of appliances, building stock, and other characteristics of the relevant service area.

After technical and economic potential is calculated, typically the next phase of a well-designed potential study is to create program scenarios to estimate actual savings that could be generated by programs or other forms of intervention, such as changing building codes or appliance standards.

Program scenarios developed to calculate achievable potential are based on modeling example programs and using market models to estimate the penetration of the program. Program scenarios require making assumptions about rebate or incentive levels, program staffing, and marketing efforts.

Scenarios can also be developed for different price assumptions and load growth scenarios, as shown below in the figure of a sample benefit/cost output from a potential study conducted for the state of California.

Benefits and Costs of Electric Energy Efficiency Savings, 2002-2011



Source: KEMA, 2002

- Ensuring that potential state and federal codes and standards are modeled and included in evaluation scenarios

- Developing scenarios for relevant time periods.

In addition, an emerging best practice is to conduct uncertainty analysis on savings estimates, as well as other variables such as cost.

With study results in hand, program administrators are well positioned to develop energy efficiency goals, identify program measures and strategies, and determine funding requirements to deliver energy efficiency programs to all customers. Information from a detailed potential study can also be used as the basis for calculating program cost-effectiveness and determining measures for inclusion during the program planning and design phase. Detailed potential studies can provide information to help determine which technologies are replaced most frequently and are therefore candidates to deliver early returns (e.g., an efficient light bulb), and how long the savings from various technologies persist and therefore will continue to deliver energy savings. For example, an energy efficient light bulb might last six years, whereas an efficient residential boiler might last 20 years. (Additional information on measure savings and lifetimes can be found in *Resources and Expertise*, a forthcoming product of the Action Plan Leadership Group.)

Developing an Energy Efficiency Plan

The majority of organizations reviewed for this chapter are acquiring energy efficiency resources for about \$0.03/lifetime kWh for electric programs and about \$1.30 to \$2.00 per lifetime MMBtu for gas program (as shown previously in Tables 6-1 and 6-2). In many cases, energy efficiency is being delivered at a cost that is substantially less than the cost of new supply—on the order of half the cost of new supply. In addition, in all cases where information is available, the costs of saved energy are less than the avoided costs of energy. These organizations operate in diverse locations under different administrative and regulatory structures. They do, however, share many similar best practices when it comes to program planning, including one or more of the following:

- Provide programs for all key customer classes.

- Align goals with funding.

- Use cost-effectiveness tests that are consistent with long-term planning.

- Consider building codes and appliance standards when designing programs.

- Plan for developing and incorporating new technology.

- Consider efficiency investments to alleviate transmission and distribution constraints.

- Create a roadmap that documents key program components, milestones, and explicit energy reduction goals.

Provide Programs for All Customer Classes

One concern sometimes raised when funding energy efficiency programs is that all customers are required to contribute to energy efficiency programming, though not all customers will take advantage of programs once they are available, raising the issue that non-participants subsidize the efficiency upgrades of participants.

While it is true that program participants receive the direct benefits that accrue from energy efficiency upgrades, all customer classes benefit from well-managed energy efficiency programs, regardless of whether or not they participate directly. For example, an evaluation of the New York State Energy Research and Development Authority's (NYSERDA's) program portfolio concluded that: "total cost savings for all customers, including non participating customers [in the New York Energy $mart Programs] is estimated to be \$196 million for program activities through year-end 2003, increasing to \$420 to \$435 million at full implementation" (NYSERDA, 2004).

In addition, particularly for programs that aim to accelerate market adoption of energy efficiency products or services, there is often program "spillover" to non-program participants. For example, an evaluation of National Grid's Energy Initiative, Design 2000plus, and other small commercial and industrial programs found energy efficient measures were installed by non-participants due to program influences on design professionals and vendors. The analysis indicated that "non-participant spillover from the programs amounted to 12,323,174 kWh in the 2001 program year, which is approximately 9.2 percent of the total savings produced in 2001 by the Design 2000plus and Energy Initiative programs combined" (National Grid, 2002).

Furthermore, energy efficiency programming can help contribute to an overall lower cost system for all customers over the longer term by helping avoid the need to purchase energy, or the need to build new infrastructure such as generation, transmission and distribution lines. For example:

- The Northwest Power Planning and Conservation Council found in its Portfolio Analysis that strategies that included more conservation had the least cost and the least risk (measured in dollars) relative to strategies that included less conservation. The most aggressive conservation case had an expected system cost of $1.8 billion lower and a risk factor of $2.5 billion less than the strategy with the least conservation (NPPC, 2005).

- In its 2005 analysis of energy efficiency and renewable energy on natural gas consumption and price, ACEEE states, "It is important to note that while the direct benefits of energy efficiency investment flow to participating customers, the benefits of falling prices accrue to all customers." Based on their national scenario of cost-effective energy efficiency opportunities, ACEEE found that total costs for energy efficiency would be $8 billion, and would result in consumer benefits of $32 billion in 2010 (Elliot & Shipley, 2005).

- Through cost-effective energy efficiency investments in 2004, Vermonters reduced their annual electricity use by 58 million kWh. These savings, which are expected to continue each year for an average of 14 years, met 44 percent of the growth in the state's energy needs in 2004 while costing ratepayers just 2.8 cents per kWh. That cost is only 37 percent of the cost of generating, transmitting, and distributing power to Vermont's homes and businesses (Efficiency Vermont, 2004).

- The Massachusetts Division of Energy noted that cumulative impact on demand from energy efficiency measures installed from 1998 to 2002 (excluding reductions from one-time interruptible programs) was significant—reducing demand by 264 megawatt (MW). During the summer of 2002, a reduction of this magnitude meant avoiding the need to purchase $19.4 million worth of electricity from the spot market (Massachusetts, 2004).

Despite evidence that both program participants and non-participants can benefit from energy efficiency programming, it is a best practice to provide program opportunities for all customer classes and income levels. This approach is a best practice because, in most cases, funding for efficiency programs comes from all customer classes, and as mentioned above, program participants will receive both the indirect benefits of system-wide savings and reliability enhancements and the direct benefits of program participation.

All program portfolios reviewed for this chapter include programs for all customer classes. Program administrators usually strive to align program funding with spending based on customer class contributions to funds. It is not uncommon, however, to have limited cross-subsidization for (1) low-income, agricultural, and other hard-to-reach customers; (2) situations where budgets limit achievable potential, and the most cost-effective energy efficiency savings are not aligned with customer class contributions to energy efficiency funding; and (3) situations where energy efficiency savings are targeted geographically based on system needs—for example, air conditioner turn-ins or greater new construction incentives that are targeted to curtail load growth in an area with a supply or transmission and distribution need. For programs targeting low-income or other hard-to-reach customers, it is not uncommon for them to be implemented with a lower benefit-cost threshold, as long as the overall energy efficiency program portfolio for each customer class (i.e., residential, commercial, and industrial) meets cost-effectiveness criteria.

NYSERDA's program portfolio is a good example of programs for all customer classes and segments (see Table 6-5).

Table 6-5. NYSERDA 2004 Portfolio

Sector	Program	% of Sector Budget
Residential	Small Homes	23%
	Keep Cool	19%
	ENERGY STAR Products	20%
	Program Marketing	16%
	Multifamily	10%
	Awareness/Other	12%
Low Income	Assisted Multifamily	59%
	Assisted Home Performance	17%
	Direct Install	8%
	All Other	16%
Business	Performance Contracting	36%
	Peak Load Reduction	12%
	Efficient Products	9%
	New Construction	23%
	Technical Assistance	10%
	All Other	10%

Nevada Power/Sierra Pacific Power Company's portfolio provides another example with notable expansion of program investments in efficient air conditioning, ENERGY STAR appliances, refrigerator collection, and renewable energy investments within a one-year timeframe (see Table 6-6).

Align Goals With Funding

Regardless of program administrative structure and policy context, it is a best practice for organizations to align funding to explicit goals for energy efficiency over the near-term and long-term. How quickly an organization is able to ramp up programs to capture achievable potential can vary based on organizational history of running DSM programs, and the sophistication of the marketplace in which a utility operates (e.g., whether there is a network of home energy raters, ESCOs, or certified heating, ventilation, and air conditioning [HVAC] contractors).

Utilities or third-party administrators should set long-term goals for energy efficiency designed to capture a significant percentage of the achievable potential energy savings identified through an energy efficiency potential study. Setting long-term goals is a best practice for administrators of energy efficiency program portfolios, regardless of policy models and whether they are an investor-owned or a municipal or cooperative utility, or a third-party program administrator. Examples of how long-term goals are set are provided as follows:

- In states where the utility is responsible for integrated resource planning (the IRP Model), energy efficiency must be incorporated into the IRP. This process generally requires a long-term forecast of both spending and savings for energy efficiency at an aggregated level that is consistent with the time horizon of the IRP—generally at least 10 years. Five- and ten-year goals can then be developed based on the resource need. In states without an SBC, the budget for energy efficiency is usually a revenue requirement expense item, but can be a capital investment or a combination of the two. (As discussed in Chapter 2: Utility Ratemaking & Revenue Requirements, capitalizing efficiency program investments rather than expensing them can reduce short-term rate impacts.)

- Municipal or cooperative utilities that own generation typically set efficiency goals as part of a resource planning process. The budget for energy efficiency is usually a revenue requirement expense item, a capital expenditure, or a combination of the two.

Table 6-6. Nevada Resource Planning Programs

	2005 Budget	2006 Budget
Air Conditioning Load Management	$3,450,000	$3,600,000
High-Efficiency Air Conditioning	2,600,000	15,625,000
Commercial Incentives	2,300,000	2,800,000
Low-Income Support	1,361,000	1,216,000
Energy Education	1,205,000	1,243,000
ENERGY STAR Appliances	1,200,000	2,050,000
School Support	850,000	850,000
Refrigerator Collection	700,000	1,915,000
Commercial New Construction	600,000	600,000
Other – Miscellaneous & Technology	225,000	725,000
Total Nevada Resource Planning Programs	$14,491,000	$30,624,000
SolarGenerations	1,780,075	7,220,000
Company Renewable – PV	1,000,000	1,750,000
California Program	370,000	563,000
Sierra Natural Gas Programs	—	820,000
Total All Programs	$17,641,075	$40,977,000

- A resource portfolio standard is typically set at a percentage of overall energy or demand, with program plans and budgets developed to achieve goals at the portfolio level. The original standard can be developed based on achievable potential from a potential study, or as a percentage of growth from a base year.

- In most SBC models, the funding is determined by a small volumetric charge on each customer's utility bill. This charge is then used as a basis for determining the overall budget for energy efficiency programming—contributions by each customer class are used to inform the proportion of funds that should be targeted to each customer class. Annual goals are then based on these budgets and a given program portfolio. Over time, the goal of the program should be to capture a large percentage of achievable potential.

- In most gas programs, funding can be treated as an expense, in a capital budget, or a combination (as is the case in some of the electric examples shown previously). Goals are based on the budget developed for the time period of the plan.

Once actual program implementation starts, program experience is usually the best basis for developing future budgets and goals for individual program years.

Use Cost-Effectiveness Tests That Are Consistent With Long-Term Planning

All of the organizations reviewed for this chapter use cost-effectiveness tests to ensure that measures and programs are consistent with valuing the benefits and costs of their efficiency investments relative to long-term supply options. Most of the organizations reviewed use either the total resource cost (TRC), societal, or program administrator test (utility test) to screen measures. None of the organizations reviewed for this chapter used the rate impact measure (RIM) test as a primary decision-making test.[5] The key cost-effectiveness tests are described as follows, per Swisher, et al. (1997), with key benefits and costs further illustrated in Table 6-7.

- *Total Resource Cost (TRC) Test.* Compares the total costs and benefits of a program, including costs and benefits to the utility and the participant and the avoided costs of energy supply.
- *Societal Test.* Similar to the TRC Test, but includes the effects of other societal benefits and costs such as environmental impacts, water savings, and national security.
- *Utility/Program Administrator Test.* Assesses benefits and costs from the program administrator's perspective (e.g., benefits of avoided fuel and operating capacity costs compared to rebates and administrative costs).
- *Participant Test.* Assesses benefits and costs from a participant's perspective (e.g., the reduction in customers' bills, incentives paid by the utility, and tax credits received as compared to out-of-pocket expenses such as costs of equipment purchase, operation, and maintenance).
- *Rate Impact Measure (RIM).* Assesses the effect of changes in revenues and operating costs caused by a program on customers' bills and rates.

Another metric used for assessing cost-effectiveness is the cost of conserved energy, which is calculated in cents per kWh or dollars per thousand cubic feet (Mcf). This measure does not depend on a future projection of energy prices and is easy to calculate; however, it does not fully capture the future market price of energy.

An overall energy efficiency portfolio should pass the cost-effectiveness test(s) of the jurisdiction. In an IRP situation, energy efficiency resources are compared to new supply-side options–essentially the program administrator or utility test. In cases where utilities have divested generation, a calculated avoided cost or a wholesale market price projection is used to represent the generation benefits. Cost-effectiveness tests are appropriate to screen out poor program design, and to identify programs in markets that have been transformed and might need to be redesigned to continue. Cost-effectiveness analysis is important but must be supplemented by other aspects of the planning process.

If the TRC or societal tests are used, "other resource benefits" can include environmental benefits, water savings, and other fuel savings. Costs include all program costs (administrative, marketing, incentives, and evaluation) as well as customer costs. Future benefits from emissions trading (or other regulatory approaches that provide payment for emission credits) could be treated as additional benefits in any of these models. Other benefits of programs can include job impacts, sales generated, gross state product added, impacts from wholesale price reductions, and personal income (Wisconsin, 2006; Massachusetts, 2004).

Example of Other Benefits

The Massachusetts Division of Energy Resources estimates that its 2002 DSM programs produced 2,093 jobs, increased disposable income by $79 million, and provided savings to all customers of $19.4 million due to lower wholesale energy clearing prices (Massachusetts, 2004).

At a minimum, regulators require programs to be cost-effective at the sector level (residential, commercial, and industrial) and typically at the program level as well. Many program administrators bundle measures under a single program umbrella when, in reality, measures are delivered to customers through different strategies and marketing channels. This process allows program admin-

5 The RIM test is viewed as less certain than the other tests because it is sensitive to the difference between long-term projections of marginal or market costs and long-term projections of rates (CEC, 2001).

Table 6-7. Overview of Cost-Effectiveness Tests

	Benefits					Costs			
Test	**Externalities**	**Energy Benefits G, T&D**	**Demand Benefits G, T&D**	**Non-Energy Benefits**	**Other Resource Benefits**	**Impact On Rates**	**Program Implementation Costs**	**Program Evaluation Costs**	**Customer Costs**
Total Resource Cost Test		X	X		X		X	X	X
Societal Test	X	X	X	X	X		X	X	X
Utility Test/ Administrator Test		X	X				X	X	
Rate Impact Test		X	X			X	X	X	
Participant Test		X	X	X					X

G, T&D = Generation, Transmission, and Distribution

istrators to adjust to market realities during program implementation. For example, within a customer class or segment, if a high-performing and well-subscribed program or measure is out-performing a program or measure that is not meeting program targets, the program administrator can redirect resources without seeking additional regulatory approval.

Individual programs should be screened on a regular basis, consistent with the regulatory schedule—typically, once a year. Individual programs in some customer segments, such as low income, are not always required to be cost-effective, as they provide other benefits to society that might not all be quantified in the cost-effectiveness tests. The same is true of education-only programs that have hard-to-quantify benefits in terms of energy impacts. (See section on conducting impact evaluations for information related to evaluating energy education programs.)

Existing measures should be screened by the program administrator at least every two years, and new measures should be screened annually to ensure they are performing as anticipated. Programs should be reevaluated and updated from time to time to reflect new methods, technologies, and systems. For example, many programs today include measures such as T-5 lighting that did not exist five to ten years ago.

Consider Building Codes and Appliance Standards When Designing Programs

Enacting state and federal codes and standards for new products and buildings is often a cost-effective opportunity for energy savings. Changes to building codes and appliance standards are often considered an intervention that could be deployed in a cost-effective way to achieve results. Adoption of state codes and standards in many states requires an act of legislation beyond the scope of utility programming, but utilities and other third-party program administrators can and do interact with state and federal codes and standards in several ways:

- In the case of building codes, code compliance and actual building performance can lag behind enactment of legislation. Some energy efficiency program administrators design programs with a central goal of improving code compliance. Efficiency Vermont's ENERGY STAR Homes program (described in the box on page 6-24) includes increasing compliance with Vermont Building Code as a specific program objective.

The California investor owned utilities also are working with the national ENERGY STAR program to ensure availability of ENERGY STAR/Title 24 Building Code-compliant residential lighting fixtures and to ensure overall compliance with their new residential building code through their ENERGY STAR Homes program.

- Some efficiency programs fund activities to advance codes and standards. For example, the California IOUs are funding a long-term initiative to contribute expertise, research, analysis, and other kinds of support to help the California Energy Commission (CEC) develop and adopt energy efficiency standards. One rationale for utility investment in advancing codes and standards is that utilities can lock in a baseline of energy savings and free up program funds to work on efficiency opportunities that could not otherwise be realized. In California's case, the IOUs also developed a method for estimating savings associated with their codes and standards work. The method was accepted by the California Public Utilities Commission, and is formalized in the California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Require-ments for Evaluation Professionals (CPUC, 2006).

Regardless of whether they are a component of an energy efficiency program, organizations have found that it is essential to coordinate across multiple states and regions when pursuing state codes and standards, to ensure that retailers and manufacturers can respond appropriately in delivering products to market.

Program administrators must be aware of codes and standards. Changes in codes and standards affect the baseline against which future program impacts are measured. Codes and standards should be explicitly considered in planning to prevent double counting. The Northwest Power and Conservation Council (NWPCC) explicitly models both state codes and federal standards in its long-term plan (NWPCC, 2005).

Plan for Developing and Incorporating New Technology

Many of the organizations reviewed have a history of providing programs that change over time to accommodate changes in the market and the introduction of new technologies. The new technologies are covered using one or more of the following approaches:

- They are included in research and development (R&D) budgets that do not need to pass cost-effectiveness tests, as they are, by definition, addressing new or experimental technologies. Sometimes R&D funding

Efficiency Vermont ENERGY STAR Homes Program

In the residential new construction segment, Efficiency Vermont partners with the national ENERGY STAR program to deliver whole house performance to its customers and meet both resource acquisition and market transformation goals. Specific objectives of Efficiency Vermont's program are to:

- Increase market recognition of superior construction
- Increase compliance with the Vermont Building Code
- Increase penetration of cost-effective energy efficiency measures
- Improve occupant comfort, health, and safety (including improved indoor air quality)
- Institutionalize Home Energy Rating Systems (HERS)

Participating homebuilders agree to build to the program's energy efficiency standards and allow homes to be inspected by an HERS rater. The home must score 86+ on the HERS inspection and include four energy efficient light fixtures, power-vented or sealed combustion equipment, and an efficient mechanical ventilation system with automatic controls. When a home passes, builders receive a rebate check, program certificate, an ENERGY STAR Homes certificate, and gifts. **Efficiency Vermont ENERGY STAR Homes Program saved more than 700 MWh with program spending of $1.4 million in 2004.**

Source: Efficiency Vermont, 2005

comes from sources other than the utility or state agency. Table 6-8 summarizes R&D activities of several organizations reviewed.

- They are included in pilot programs that are funded as part of an overall program portfolio and are not individually subject to cost-effectiveness tests.

- They are tested in limited quantities under existing programs (such as commercial and industrial custom rebate programs).

Technology innovation in electricity use has been the cornerstone of global economic progress for more than 50 years. In the future, advanced industrial processes, heating and cooling, and metering systems will play very important roles in supporting customers' needs for efficient use of energy. Continued development of new, more efficient technologies is critical for future industrial and commercial processes. Furthermore, technology innovation that targets improved energy efficiency and energy management will enable society to advance and sustain energy efficiency in the absence of government-sponsored or regulatory-mandated programs. Robust and competitive consumer-driven markets are needed for energy efficient devices and energy efficiency service.

The Electric Power Research Institute (EPRI)/U.S. Department of Energy (DOE) Gridwise collaborative and the Southern California Edison (SCE) Lighting Energy Efficiency Demand Response Program are two examples of research and development activities:

- *The EPRI IntelliGrid Consortium* is an industry-wide initiative and public/private partnership to develop the technical foundation and implementation tools to evolve the power delivery grid into an integrated energy and communications system on a continental scale. A key development by this consortium is the IntelliGrid Architecture, an open-standards-based architecture

Table 6-8. Research & Development (R&D) Activities of Select Organizations

Program Administrator	R&D Funding Mechanism(s)	R&D as % of Energy Efficiency Budget	Examples of R&D Technologies/ Initiatives Funded
PG&E	CEC Public Interest Energy Research (PIER) performs research from California SBC funding (PG&E does not have access to their bills' SBC funds); other corporate funds support the California Clean Energy Fund	**1%**[a,b]	California Clean Energy Fund - New technologies and demonstration projects
NYSERDA	SBC funding	**13%**[c,d]	Product development, demonstration and evaluation, university research, technology market opportunities studies
BPA	In rates	**6%**[e,f]	PNL / DOE GridWise Collaborative, Northwest Energy Efficiency Alliance, university research
SCE	CEC Public Interest Energy Research (PIER) performs research from California SBC funding (SCE does not have access to their bills' SBC funds). Procurement proceedings and other corporate funds support Emerging Technologies and Innovative Design for Energy Efficiency programs.	**5%**[g,h,i]	Introduction of emerging technologies (second D of RD&D)

[a] [Numerator] $4 million in 2005 for Californial Clean Energy Fund (CCEF, 2005).

[b] [Denominator] $867 million to be spent 2006-2008 on energy efficiency projects not including evaluation, measurement, and validation (CPUC, 2005). 1/3 of full budget used for single year budget ($289 million).

[c] [Numerator] $17 million for annual energy efficiency R&D budget consists of "residential ($8 M), industrial ($6 M), and transportation ($3 M)" (G. Walmet, NYSERDA, personal communication, May 23, 2006).

[d] [Denominator] $134 M for New York Energy $mart from 3/2004-3/2005 (NYSERDA, 2005b).

[e] [Numerator] BPA funded the Northwest Energy Efficiency Alliance with $10 million in 2003. [Denominator] The total BPA energy efficiency allocation was $138 million (Blumstein, et al., 2005).

[f] [Note] BPA overall budgetting for energy efficiency increased in subsequent years (e.g., $170 million in 2004 with higher commitments going to an average of $245 million from 2006-2012) (Alliance to Save Energy, 2004).

[g] Funding for the statewide Emerging Technologies program will increase in 2006 to $10 million [Numerator] out of a total budget of $581 million [Denominator] for utility energy-efficiency programs (Mills and Livingston, 2005).

[h] [Note] Data from Mills and Livingston (2005) differs from $675 million 3-yr figure from CPUC (2005).

[i] Additional 3% is spent on Innovative Design for Energy Efficiency (InDEE) (D. Arambula, SCE, personal communication, June 8, 2006).

for integrating the data communication networks and smart equipment on the grid and on consumer premises. Another key development is the consumer portal—essentially, a two-way communication link between utilities and their customers to facilitate information exchange (EPRI, 2006). Several efficiency program administrators are pilot testing GridWise/Intelligrid as presented in the box below.

- *The Lighting Energy Efficiency Demand Response Program* is a program proposed by SCE. It will use Westinghouse's two–way wireless dimmable energy efficiency T-5 fluorescent lighting as a retrofit for existing T-12 lamps. SCE will be able to dispatch these lighting systems using wireless technology. The technology will be piloted in small commercial buildings, the educational sector, office buildings, and industrial facilities and could give SCE the ability to reduce load by 50 percent on those installations. This is an excellent example of combining energy efficiency and direct load control technologies.

Both EPRI and ESource (a for-profit, membership-based energy information service) are exploring opportunities to expand their efforts in these areas. ESource is also considering developing a database of new energy efficiency and load response technologies. Leveraging R&D resources through regional and national partnering efforts has been successful in the past with energy efficiency technologies. Examples include compact fluorescent lighting, high-efficiency ballasts and new washing machine technologies. Regional and national efforts send a consistent signal to manufacturers, which can be critical to increasing R&D activities.

Programs must be able to incorporate new technologies over time. As new technologies are considered, the programs must develop strategies to overcome the barriers specific to these technologies to increase their acceptance. Table 6-9 provides some examples of new technologies, challenges, and possible strategies for overcoming these challenges. A cross-cutting challenge for many of these technologies is that average rate designs do not send a price signal during periods of peak demand. A strategy for overcoming this barrier would be to investigate time-sensitive rates (see Chapter 5: Rate Design for additional information).

Pilot Tests of GridWise/Intelligrid

GridWise Pacific Northwest Demonstration Projects
These projects are designed to demonstrate how advanced, information-based technologies can be used to increase power grid efficiency, flexibility, and reliability while reducing the need to build additional transmission and distribution infrastructure. These pilots are funded by DOE's Office of Electricity Delivery and Energy Reliability.

Olympic Peninsula Distributed Resources Demonstration
This project will integrate demand response and distributed resources to reduce congestion on the grid, including demand response with automated control technology, smart appliances, a virtual real-time market, Internet-based communications, contract options for customers, and the use of distributed generation.

Grid-Friendly Appliance Demonstration
In this project, appliance controllers will be used in both clothes dryers and water heaters to detect fluctuations in frequency that indicate there is stress in the grid, and will respond by reducing the load on that appliance.

These pilots include: Pacific Northwest National Laboratory, Bonneville Power Administration, PacificCorp, Portland General Electric, Mason County PUD #3, Clallam County PUD, and the city of Port Angeles.

Table 6-9. Emerging Technologies for Programs

Technology/ Program	Description	Availability	Key Challenges	Key Strategies	Examples
Smart Grid/ GridWise technologies	Smart grid technologies include both customer-side and grid-side technologies that allow for more efficient operation of the grid.	Available in pilot situations	Cost Customer Acceptance Communication Protocols	Pilot programs R&D programs	GridWise pilot in Pacific NW
Smart appliances/ Smart Homes	Homes with gateways that would allow for control of appliances and other end-uses via the Internet.	Available	Cost Customer Acceptance Communication Protocols	Pilot programs Customer education	GridWise pilot in Pacific NW
Load control of A/C via smart thermostat	A/C controlled via smart thermostat. Communication can be via wireless, power line carrier (PLC) or Internet.	Widely available	Cost Customer acceptance	Used to control loads in congested situation Pilot and full-scale programs Customer education	Long Island Power Authority (LIPA), Austin Energy, Utah Power and Light, ISO New England
Dynamic pricing/critical peak pricing/ thermostat control with enhanced metering	Providing customers with either real time or critical peak pricing via a communication technology. Communication can be via wireless, PLC, or Internet. Customers can also be provided with educational materials.	Available	Cost Customer acceptance Split incentives in deregulated markets Regulatory barriers	Pilot and full-scale Programs Used in congested areas Customer education	Georgia (large users) Niagara Mohawk, California Peak Pricing Experiment, Gulf Power
Control of lighting via wireless, power line carrier or other communication technologies	Using direct control to control commercial lighting during high price periods.	Recently available	Cost Customer acceptance Contractor acceptance	R&D programs Pilot programs	SCE pilot using wireless NYSERDA pilot with power line carrier control
T-5s	Relatively new lighting technology for certain applications.	Widely available	Cost Customer acceptance Contractor acceptance	Add to existing programs as a new measure	Included in most large-scale programs
New generation tankless water heaters	Tankless water heaters do not have storage tanks and do not have standby losses. They can save energy relative to conventional water heaters in some applications. Peak demand implications are not yet known.	Widely available	Cost Customer acceptance Contractor acceptance	Add to existing programs as a new measure	More common in the EU

Some load control technologies will require more than R&D activities to become widespread. To fully capture and utilize some of these technologies, the following four building blocks are needed:

- *Interactive communications.* Interactive communications that allow for two-way flow of price information and decisions would add new functionality to the electricity system.

- *Innovative rates and regulation.* Regulations are needed to provide adequate incentives for energy efficiency investments to both suppliers and customers.

- *Innovative markets.* Market design must ensure that energy efficiency and load response measures that are advanced by regulation become self-sustaining in the marketplace.

- *Smart end-use devices.* Smart devices are needed to respond to price signals and facilitate the management of the energy use of individual and networked appliances.

In addition, the use of open architecture systems is the only long-term way to take existing non-communicating equipment into an energy-efficient future that can use two-way communications to monitor and diagnose appliances and equipment.

Consider Efficiency Investments to Alleviate Transmission and Distribution Constraints

Energy efficiency has a history of providing value by reducing generation investments. It should also be considered with other demand-side resources, such as demand response, as a potential resource to defer or avoid investments in transmission and distribution systems. Pacific Gas and Electric's (PG&E) Model Energy Communities Project (the Delta Project) provides one of the first examples of this approach. This project was conceived to test whether demand resources could be used as a least cost resource to defer the capital expansion of the transmission and distribution system in a constrained area. In this case, efforts were focused on the constrained area, and customers were offered versions of existing programs and additional measures to achieve a significant reduction in the constrained area (PG&E, 1993). A recently approved settlement at the Federal Energy Regulatory Commission (FERC) allows energy efficiency along with load response and distributed generation to participate in the Independent System Operator New England (ISO-NE) Forward Capacity Market (FERC, 2006; FERC, 2005). In addition, Consolidated Edison has successfully used a Request For Proposals (RFP) approach to defer distribution upgrades in four substation areas with contracts totaling 45 MW. Con Ed is currently in a second round of solicitations for 150 MW (NAESCO, 2005). Recent pilots using demand response, energy efficiency, and intelligent grid are proving promising as shown in the BPA example in the box on page 6-29.

To evaluate strategies for deferring transmission and distribution investments, the benefits and costs of energy efficiency and other demand resources are compared to the cost of deferring or avoiding a distribution or transmission upgrade (such as a substation upgrade) in a constrained area. This cost balance is influenced by location-specific transmission and distribution costs, which can vary greatly.

Create a Roadmap of Key Program Components, Milestones, and Explicit Energy Use Reduction Goals

Decisions regarding the key considerations discussed throughout this section are used to inform the development of an energy efficiency plan, which serves as a roadmap with key program components, milestones, and explicit energy reduction goals.

A well-designed plan includes many of the elements discussed in this section including:

- Budgets (see section titled "Leverage Private-Sector Expertise, External Funding, and Financing" for information on the budgeting processes for the most common policy models)

— Overall

— By program

- Kilowatt , kWh, and Mcf savings goals overall and by program

— Annual savings

— Lifetime savings

- Benefits and costs overall and by program

- Description of any shareholder incentive mechanisms

Bonneville Power Administration (BPA) Transmission Planning

BPA has embarked on a new era in transmission planning. As plans take shape to address load growth, constraints, and congestion on the transmission system, BPA is considering measures other than building new lines, while maintaining its commitment to provide reliable transmission service. The agency, along with others in the region, is exploring "non-wires solutions" as a way to defer large construction projects.

BPA defines non-wires solutions as the broad array of alternatives including, but not limited to, demand response, distributed generation, conservation measures, generation siting, and pricing strategies that individually, or in combination, delay or eliminate the need for upgrades to the transmission system. The industry also refers to non-wires solutions as non-construction alternatives or options.

BPA has reconfigured its transmission planning process to include an initial screening of projects to assess their potential for a non-wires solution. BPA is now committed to using non-wires solutions screening criteria for all capital transmission projects greater than $2 million, so that it becomes an institutionalized part of planning. BPA is currently sponsoring a number of pilot projects to test technologies, resolve institutional barriers, and build confidence in using non-wires solution.

For each program, the plan should include the following:

- Program design description
- Objectives
- Target market
- Eligible measures
- Marketing plan
- Implementation strategy
- Incentive strategy
- Evaluation plan
- Benefit/cost outputs
- Metrics for program success
- Milestones

The plan serves as a road-map for programs. Most program plans, however, are modified over time based on changing conditions (e.g., utility supply or market changes) and program experience. Changes from the original roadmap should be both documented and justified. A plan that includes all of these elements is an appropriate starting point for a regulatory filing. A well-documented plan is also a good communications vehicle for informing and educating stakeholders. The plan should also include a description of any pilot programs and R&D activities.

Energy Efficiency Program Design and Delivery

The organizations reviewed for this chapter have learned that program success is built over time by understanding the markets in which efficient products and services are delivered, by addressing the wants and needs of their customers, by establishing relationships with customers and suppliers, and by designing and delivering programs accordingly.

- They have learned that it is essential to program success to coordinate with private market actors and other influential stakeholders, to ensure that they are well informed about program offerings and share this information with their customers/constituents.

- Many of the organizations reviewed go well beyond merely informing businesses and organizations, by actually partnering with them in the design and delivery of one or more of their efficiency programs.

- Recognizing that markets are not defined by utility service territory, many utilities and other third-party program administrators actively cooperate with one another and with national programs, such as ENERGY STAR, in the design and delivery of their programs.

This section discusses key best practices that emerge from a decade or more of experience designing and implementing energy efficiency programs.

Begin With the Market in Mind

Energy efficiency programs should complement, rather than compete with, private and other existing markets for energy efficient products and services. The rationale for utility or third-party investment in efficiency programming is usually based on the concept that within these markets, there are barriers that need to be overcome to ensure that an efficient product or service is chosen over a less efficient product or standard practice. Barriers might include higher initial cost to the consumer, lack of knowledge on the part of the supplier or the customer, split incentives between the tenant who pays the utility bills and the landlord who owns the building, lack of supply for a product or service, or lack of time (e.g., to research efficient options, seek multiple bids—particularly during emergency replacements).

Conduct a Market Assessment

Understanding how markets function is a key to successful program implementation, regardless of whether a program is designed for resource acquisition, market transformation, or a hybrid approach. A market assessment can be a valuable investment to inform program design and implementation. It helps establish who is part of the market (e.g., manufacturers, distributors, retailers, consumers), what the key barriers are to greater energy efficiency from the producer or consumer perspectives, who are the key trend-setters in the business and the key influencers in consumer decision-making, and what approaches might work best to overcome barriers to greater supply and investment in energy efficient options, and/or uptake of a program. A critical part of completing a market assessment is a baseline measurement of the goods and services involved and the practices, attitudes, behaviors, factors, and conditions of the marketplace (Feldman, 1994). In addition to informing program design and implementation, the baseline assessment also helps inform program evaluation metrics, and serves as a basis for which future program impacts are measured. As such, market assessments are usually conducted by independent third-party evaluation professionals. The extent and needs of a market assessment can vary greatly. For well-established program models, market assessments are somewhat less involved, and can rely on existing program experience and literature, with the goal of understanding local differences and establishing the local or regional baseline for the targeted energy efficiency product or service.

Table 6-10 illustrates some of the key stakeholders, barriers to energy efficiency, and program strategies that are explored in a market assessment, and are useful for considering when designing programs.

Solicit Stakeholder Input

Convening stakeholder advisory groups from the onset as part of the design process is valuable for obtaining multiple perspectives on the need and nature of planned programs. This process also serves to improve the program design, and provides a base of program support within the community.

Once programs have been operational for a while, stakeholder groups should be reconvened to provide program feedback. Stakeholders that have had an ongoing relationship with one or more of the programs can provide insight on how the programs are operating and perceived in the community, and can recommend program modifications. They are also useful resources for tapping into extended networks beyond those easily accessible to the program providers. For example, contractors, building owners, and building operators can be helpful in providing access to their specific trade or business organizations.

Table 6-10. Key Stakeholders, Barriers, and Program Strategies by Customer Segment

Customer Segment	Key Stakeholders	Key Program Barriers	Key Program Strategies
Large Commercial & Industrial Retrofit	• Contractors • Building owners and operators • Distributors: lighting, HVAC, motors, other • Product manufacturers • Engineers • Energy services companies	• Access to capital • Competing priorities • Lack of information • Short-term payback (<2 yr) mentality	• Financial incentives (rebates) • Performance contracting • Performance benchmarking • Partnership with ENERGY STAR • Low interest financing • Information from unbiased sources • Technical assistance • Operations and maintenance training
Small Commercial	• Distributors: lighting, HVAC, other • Building owners • Business owners • Local independent trades	• Access to capital • Competing priorities • Lack of information	• Financial incentives (rebates) • Information from unbiased sources • Direct installation • Partnership with ENERGY STAR
Commercial & Industrial New Construction	• Architects • Engineers • Building and energy code officials • Building owners • Potential occupants	• Project/program timing • Competing priorities • Split incentives (for rental property) • Lack of information • Higher initial cost	• Early intervention (ID requests for hook-up) • Design assistance • Performance targeting/benchmarking • Partnership with ENERGY STAR • Training of architects and engineers • Visible and ongoing presence in design community • Education on life cycle costs
Residential Existing Homes	• Distributors: appliances, HVAC, lighting • Retailers: appliance, lighting, windows • Contractors: HVAC, insulation, remodeling • Homeowners	• Higher initial cost • Lack of information • Competing priorities • Inexperience or prior negative experience w/technology (e.g., early compact florescent lighting) • Emergency replacements	• Financial incentives • Partnership with ENERGY STAR • Information on utility Web sites, bill inserts, and at retailers • Coordination with retailers and contractors
Residential New Homes	• Contractors: general and HVAC • Architects • Code officials • Builders • Home buyers • Real estate agents • Financial institutions	• Higher initial cost • Split incentives: builder is not the occupant	• Partnership with ENERGY STAR • Linking efficiency to quality • Working with builders • Building code education & compliance • Energy efficient mortgages
Multifamily	• Owners and operators • Contractors • Code officials • Tenants	• Split incentives • Lack of awareness	• Financial incentives • Marketing through owner and operator associations
Low Income	• Service providers: Weatherization Assistance Program (WAP), Low-Income Home Energy Assistance Program (LIHEAP) • Social service providers: state and local agencies • NGOs and advocacy groups • Credit counseling organizations • Tenants	• Program funding • Program awareness • Bureaucratic challenges	• Consistent eligibility requirements with existing programs • Direct installation • Leveraging existing customer channels for promotion and delivery • Fuel blind approach

To be successful, stakeholder groups should focus on the big picture, be well organized, and be representative. Stakeholder groups usually provide input on budgets, allocation of budgets, sectors to address, program design, evaluation, and incentives.

Listen to Customer and Trade Ally Needs

Successful energy efficiency programs do not exist without customer and trade ally participation and acceptance of these technologies. Program designs should be tested with customer market research before finalizing offerings. Customer research could include surveys, focus groups,

Best Practice: Solicit Stakeholder Input

Minnesota's Energy Efficiency Stakeholder Process exemplifies the best practice of engaging stakeholders in program design. The Minnesota Public Utility Commission hosted a roundtable with the commission, utilities, and other stakeholders to review programs. Rate implications and changes to the programs are worked out through this collaborative and drive program design (MPUC, 2005).

Successful stakeholder processes generally have the following attributes:

- Neutral facilitation of meetings.
- Clear objectives for the group overall and for each meeting.
- Explicit definition of stakeholder group's role in program planning (usually advisory only).
- Explicit and fair processes for providing input.
- A timeline for the stakeholder process.

forums, and in-depth interviews. Testing of incentive levels and existing market conditions by surveying trade allies is critical for good program design.

Use Utility Channels and Brand

Utilities have existing channels for providing information and service offerings to their customers. These include Web sites, call centers, bill stuffers, targeted newsletters, as well as public media. Using these channels takes advantage of existing infrastructure and expertise, and provides customers with energy information in the way that they are accustomed to obtaining it. These methods reduce the time and expense of bringing information to customers. In cases where efficiency programming is delivered by a third party, gaining access to customer data and leveraging existing utility channels has been highly valuable for program design and implementation. In cases such as Vermont (where the utilities are not responsible for running programs), it has been helpful to have linkages from the utility Web sites to Efficiency Vermont's programs, and to establish Efficiency Vermont as a brand that the utilities leverage to deliver information about efficiency to their customers.

Promote the Other Benefits of Energy Efficiency and Energy Efficient Equipment

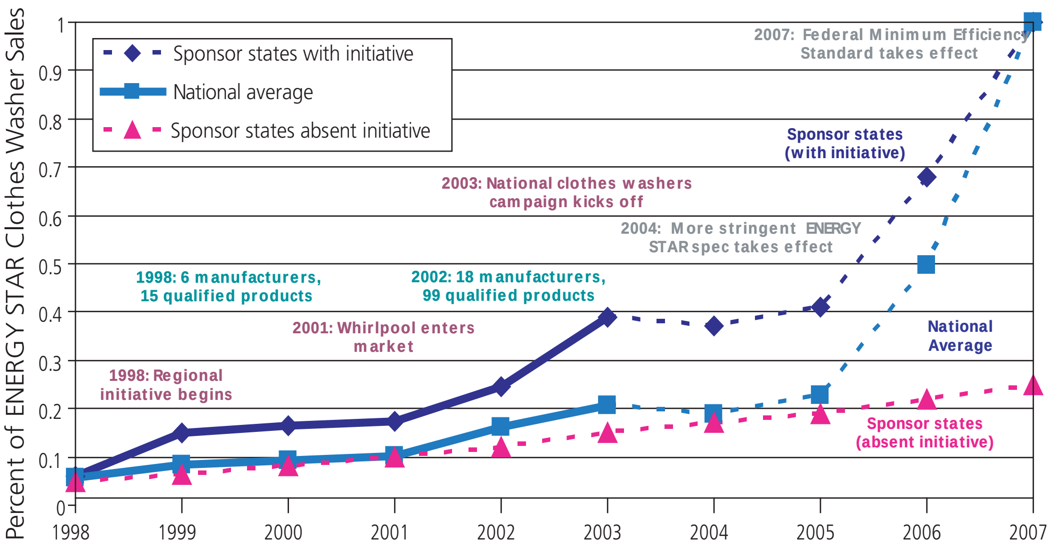
Most customers are interested in reducing energy consumption to save money. Many, however, have other motivations for replacing equipment or renovating space that are consistent with energy efficiency improvements. For example, homeowners might replace their heating system to improve the comfort of their home. A furnace with a variable speed drive fan will further increase comfort (while saving energy) by providing better distribution of both heating and cooling throughout the home and reducing fan motor noise. It is a best practice for program administrators to highlight these features where non-energy claims can be substantiated.

Coordinate With Other Utilities and Third-Party Program Administrators

Coordination with other utilities and third-party program administrators is also important. Both program allies and customers prefer programs that are consistent across states and regions. This approach reduces transaction costs for customers and trade allies and provides consistent messages that avoid confusing the market. Some programs can be coordinated at the regional level by entities such as Northeast Energy Efficiency Partnership (NEEP), the Northwest Energy Efficiency Alliance, and the Midwest Energy Efficiency Alliance. Figure 6-1 illustrates the significant impact that initiative sponsors of the Northeast Lighting and Appliance Initiative (coordinated regionally by NEEP) have been able to have on the market for energy-efficient clothes washers by working in coordination over a long time period. **NEEP estimates the program is saving an estimated 36 million kWh per year, equivalent to the annual electricity needs of 5,000 homes** (*NEEP, undated*).

Similarly, low-income programs benefit from coordination with and use of the same eligibility criteria as the federal Low-Income Home Energy Assistance Program (LIHEAP) or Weatherization Assistance Program (WAP). These programs have existing delivery channels that can

Figure 6-1. Impacts of the Northeast Lighting and Appliance Initiative



be used to keep program costs down while providing substantial benefit to customers. On average, weatherization reduces heating bills by 31 percent and overall energy bills by $274 per year for an average cost per home of $2,672 per year. Since 1999, DOE has been encouraging the network of weatherization providers to adopt a whole-house approach whereby they approach residential energy efficiency as a system rather than as a collection of unrelated pieces of equipment (DOE, 2006). The Long Island Power Authority's (LIPA) program shown at right provides an example.

Leverage the National ENERGY STAR Program

Nationally, ENERGY STAR provides a platform for program implementation across customer classes and defines voluntary efficiency levels for homes, buildings, and products. ENERGY STAR is a voluntary, public-private partnership designed to reduce energy use and related greenhouse gas emissions. The program, administered by the U.S. Environmental Protection Agency (EPA) and the DOE, has an extensive network of partners including equipment manufacturers, retailers, builders, ESCOs, private businesses, and public sector organizations.

Since the late 1990s, EPA and DOE have worked with utilities, state energy offices, and regional nonprofit organizations to help leverage ENERGY STAR messaging, tools, and strategies to enhance local energy efficiency programs. Today more than 450 utilities (and other efficiency program administrators), servicing 65 percent of U.S. households, participate in the ENERGY STAR program. (See box on page 6-34 for additional information.) New Jersey and Minnesota provide examples of states that have leveraged ENERGY STAR.

Long Island Power Authority (LIPA): Residential Energy Affordability Partnership Program (REAP)

This program provides installation of comprehensive electric energy efficiency measures and energy education and counseling. The program targets customers who qualify for DOE's Low-Income Weatherization Assistance Program (WAP), as well as electric space heating and cooling customers who do not qualify for WAP and have an income of no more than 60 percent of the median household income level. **LIPA's REAP program has saved 2.5 MW and 21,520 MWh 1999 to 2004 with spending of $12.4 million.**

Source: LIPA, 2004

- *New Jersey's Clean Energy Program.* The New Jersey Board of Public Utilities, Office of Clean Energy has incorporated ENERGY STAR tools and strategies since the inception of its residential products and Warm Advantage (gas) programs. Both programs encourage customers to purchase qualified lighting, appliances, windows, programmable thermostats, furnaces, and boilers. The New Jersey Clean Energy Program also educates consumers, retailers, builders, contractors, and manufacturers about ENERGY STAR. **In 2005, New Jersey's Clean Energy Program saved an estimated 60 million kWh of electricity, 1.6 million therms of gas, and 45,000 tons of carbon dioxide (CO_2).**

ENERGY STAR Program Investments

In support of the ENERGY STAR program, EPA and DOE invest in a portfolio of energy efficiency efforts that utilities and third-party program administrators can leverage to further their local programs including:

- *Education and Awareness Building.* ENERGY STAR sponsors broad-based public campaigns to educate consumers on the link between energy use and air emissions, and to raise awareness about how products and services carrying the ENERGY STAR label can protect the environment while saving money.

- *Establishing Performance Specifications and Performing Outreach on Efficient Products.* More than 40 product categories include ENERGY STAR-qualifying models, which ENERGY STAR promotes through education campaigns, information exchanges on utility-retailer program models, and extensive online resources. Online resources include qualifying product lists, a store locator, and information on product features.

- *Establishing Energy Efficiency Delivery Models to Existing Homes.* ENERGY STAR assistance includes an emphasis on home diagnostics and evaluation, improvements by trained technicians/building professionals, and sales training. It features online consumer tools including the Home Energy Yardstick and Home Energy Advisor.

- *Establishing Performance Specifications and Performing Outreach for New Homes.* ENERGY STAR offers builder recruitment materials, sales toolkits, consumer messaging, and outreach that help support builder training, consumer education, and verification of home performance.

- *Improving the Performance of New and Existing Commercial Buildings.* EPA has designed an Energy Performance Rating System to measure the energy performance at the whole-building level, to help go beyond a component-by-component approach that misses impacts of design, sizing, installation, controls, operation, and maintenance. EPA uses this tool and other guidance to help building owners and utility programs maximize energy savings.

Additional information on strategies, tools, and resources by customer segment is provided in the fact sheet "ENERGY STAR—A Powerful Resource for Saving Energy," which can be downloaded from *www.epa.gov/cleanenergy/pdf/napee_energystar-factsheet.pdf.*

- *Great River Energy, Minnesota.* In 2005, Great River Energy emphasized cost-effective energy conservation by offering appliance rebates to cooperative members who purchase ENERGY STAR qualifying refrigerators, clothes washers, and dishwashers. Great River provided its member cooperatives with nearly $2 million for energy conservation rebates and grants, including the ENERGY STAR rebates, as a low-cost resource alternative to building new peaking generation. In addition to several off-peak programs, Great River Energy's residential DSM/conservation program consists of:

— Cycled air conditioning

— Interruptible commercial load response/management

— Interruptible irrigation

— Air and ground source heat pumps

— ENERGY STAR high-efficiency air conditioning rebate

— ENERGY STAR appliance rebates

— ENERGY STAR compact fluorescent lamp rebate

— Low-income air conditioning tune-ups

— Residential and commercial energy audits

Keep Participation Simple

Successful programs keep participation simple for both customers and trade allies. Onerous or confusing participation rules, procedures, and paperwork can be a major deterrent to participation from trade allies and customers. Applications and other forms should be clear and require the minimum information (equipment and customer) to confirm eligibility and track participation by customer for measurement and verification (M&V) purposes. Given that most energy efficiency improvements are made at the time of either equipment failure or retrofit, timing can be critical. A program that potentially delays equipment installation or requires customer or contractor time for participation will have fewer participants (and less support from trade allies). Seattle City Light's program shown above has two paths for easy participation.

A Seattle City Light Example of a Simple Program

Seattle City Light's $mart Business program offers a "per-fixture" rebate for specific fixtures in existing small businesses. Customers can use their own licensed electrical contractor or select from a pre-approved contractor list. Seattle City Light provides the rebate to either the installer or participating customer upon completion of the work. Completed work is subject to onsite verification.

Since 1986, Seattle City Light's $mart Business program has cumulative savings (for all measures) of 70,382 MWh and 2.124 MW.

Source: Seattle City Light, 2005

Keep Funding (and Other Program Characteristics) as Consistent as Possible

Over time, both customers and trade allies become increasingly aware and comfortable with programs. Disruptions to program funding frustrate trade allies who cannot stock appropriately or are uncomfortable making promises to customers regarding program offerings for fear that efficiency program administrators will be unable to deliver on services or financial incentives.

Invest in Education, Training, and Outreach

Some of the key barriers to investment in energy efficiency are informational. Education, outreach, and training should be provided to trade allies as well as customers. Some programs are information-only programs; some programs have educational components integrated into the program design and budget; and in some cases, education is budgeted and delivered somewhat independently of specific programs. In general, stand-alone education programs do not comprise more than

10 percent of the overall energy efficiency budget, but information, training, and outreach might comprise a larger portion of some programs that are designed to affect long-term markets, when such activities are tied to explicit uptake of efficiency measures and practices. This approach might be particularly applicable in the early years of implementation, when information and training are most critical for building supply and demand for products and services over the longer term. KeySpan and Flex Your Power are examples of coordinating education, training, and outreach activities with programs.

Leverage Customer Contact to Sell Additional Efficiency and Conservation Measures

Program providers can take advantage of program contact with customers to provide information on other program offerings, as well as on no or low-cost opportunities to reduce energy costs. Information might include proper use or maintenance of newly purchased or installed equipment or general practices around the home or workplace for efficiency improvements. Education is often included in low-income programs, which generally include direct installation of equipment, and thus already include in-home interaction between the program provider and customer. The box below provides some additional considerations for low-income programs.

Leverage Private-Sector Expertise, External Funding, and Financing

Well-designed energy efficiency programs leverage external funding and financing to stretch available dollars and to take advantage of transactions as they occur in

KeySpan Example

KeySpan uses training and certification as critical parts of its energy efficiency programs. KeySpan provides building operator certification training, provides training on the Massachusetts state building code, and trains more than 1,000 trade allies per year.

Source: Johnson, 2006

California: Flex Your Power Campaign

The California Flex Your Power Campaign was initiated in 2001 in the wake of California's rolling black-outs. While initially focused on immediate conservation measures, the campaign has transitioned to promoting energy efficiency and long-term behavior change. The program coordinates with the national ENERGY STAR program as well as the California investor-owned utilities to ensure that consumers are aware of energy efficiency options and the incentives available to them through their utilities.

Low-Income Programs

Most utilities offer energy efficiency programs targeted to low-income customers for multiple reasons:

- Low-income customers are less likely to take advantage of rebate and other programs, because they are less likely to be purchasing appliances or making home improvements.
- The "energy burden" (percent of income spent on energy) is substantially higher for low-income customers, making it more difficult to pay bills. Programs that help reduce energy costs reduce the burden, making it easier to maintain regular payments.
- Energy efficiency improvements often increase the comfort and safety of these homes.
- Utilities have the opportunity to leverage federal programs, such as LIHEAP and WAP, to provide comprehensive services to customers.
- Low-income customers often live in less efficient housing and have older, less efficient appliances.
- Low-income customers often comprise a substantial percentage (up to one-third) of utility residential customers and represent a large potential for efficiency and demand reduction.
- Using efficiency education and incentives in conjunction with credit counseling can be very effective in this sector.

the marketplace. This approach offers greater financial incentives to the consumer without substantially increasing program costs. It also has some of the best practice attributes discussed previously, including use of existing channels and infrastructure to reach customers. The following are a few opportunities for leveraging external funding and financing:

- *Leverage Manufacturer and Retailer Resources Through Cooperative Promotions.* For example, for mass market lighting and appliance promotions, many program administrators issue RFPs to retailers and manufacturers asking them to submit promotional ideas. These RFPs usually require cost sharing or in-kind advertising and promotion, as well as requirements that sales data be provided as a condition of the contract. This approach allows competitors to differentiate themselves and market energy efficiency in a way that is compatible with their business model.

- *Leverage State and Federal Tax Credits Where Available.* Many energy efficiency program administrators are now pointing consumers and businesses to the new federal tax credits and incorporating them in their programs. In addition, program administrators can educate their customers on existing tax strategies, such as accelerated depreciation and investment tax strategies, to help them recoup the costs of their investments faster. Some states offer additional tax credits, and/or offer sales tax "holidays," where sales tax is waived at point of sale for a specified period of time ranging from one day to a year. The North Carolina Solar Center maintains a database of efficiency incentives, including state and local tax incentives, at *www.dsireusa.org*.

- *Build on ESCO and Other Financing Program Options.* This is especially useful for large commercial and industrial projects.

The NYSERDA and California programs presented at right and on the following page are both good examples of leveraging the energy services market and increasing ESCO presence in the state.

New York Energy $mart Commercial/ Industrial Performance Program

The New York Energy $mart Commercial/Industrial Performance Program, which is administered by NYSERDA, is designed to promote energy savings and demand reduction through capital improvement projects and to support growth of the energy service industry in New York state. Through the program, ESCOs and other energy service providers receive cash incentives for completion of capital projects yielding verifiable energy and demand savings. By providing $111 million in performance-based financial incentives, this nationally recognized program has leveraged more than $550 million in private capital investments. M&V ensures that electrical energy savings are achieved. **Since January 1999, more than 860 projects were completed in New York with an estimated savings of 790 million kWh/yr.**

Sources: Thorne-Amann and Mendelsohn, 2005; AESP, 2006

- *Leverage Organizations and Outside Education and Training Opportunities.* Many organizations provide education and training to their members, sometimes on energy efficiency. Working with these organizations provides access to their members, and the opportunity to leverage funding or marketing opportunities provided by these organizations.

In addition, the energy efficiency contracting industry has matured to the level that many proven programs have been "commoditized." A number of private firms and not-for-profit entities deliver energy efficiency programs throughout the United States or in specific regions of the country. "The energy efficiency industry is now a $5 billion to $25 billion industry (depending on how expansive one's definition) with a 30-year history of developing and implementing all types of programs for

California Non-Residential Standard Performance Contract (NSPC) Program

The California NSPC program is targeted at customer efficiency projects and is managed on a statewide basis by PG&E, SCE, and San Diego Gas & Electric. Program administrators offer fixed-price incentives (by end use) to project sponsors for measured kilowatt-hour energy savings achieved by the installation of energy efficiency measures. The fixed price per kWh, performance measurement protocols, payment terms, and other operating rules of the program are specified in a standard contract. This program has helped to stimulate the energy services market in the state. **In program year 2003, the California NSPC served 540 customers and saved 336 gigawatt-hours and 6.54 million therms.**

Source: Quantum Consulting Inc., 2004

utilities and projects for all types of customers across the country" (NAESCO, 2005). These firms can quickly get a program up and running, as they have the expertise, processes, and infrastructure to handle program activities. New program administrators can contract with these organizations to deliver energy efficiency program design, delivery, and/or implementation support in their service territory.

Fort Collins Utilities was able to achieve early returns for its Lighting with a Twist program (discussed on page 6-39) by hiring an experienced implementation contractor through a competitive solicitation process and negotiating cooperative marketing agreements with national retail chains and manufacturers, as well as local hardware stores.

The Building Owners & Managers Association (BOMA) Energy Efficiency Program

The BOMA Foundation, in partnership with the ENERGY STAR program, has created an innovative operational excellence program to teach property owners and managers how to reduce energy consumption and costs with proven no- and low-cost strategies for optimizing equipment, people and practices. The BOMA Energy Efficiency Program consists of six Web-assisted audio seminars (as well as live offerings at the BOMA International Convention). The courses are taught primarily by real estate professionals who speak in business vernacular about the process of improving performance. The courses are as follows:

- Introduction to Energy Performance
- How to Benchmark Energy Performance
- Energy-Efficient Audit Concepts & Economic Benefits
- No- and Low-Cost Operational Adjustments to Improve Energy Performance
- Valuing Energy Enhancement Projects & Financial Returns
- Building an Energy Awareness Program

The commercial real estate industry spends approximately $24 billion annually on energy and contributes 18 percent of the U.S. CO_2 emissions. According to EPA and ENERGY STAR Partner observations, a 30 percent reduction is readily achievable simply by improving operating standards.

Fort Collins Utilities Lighting With a Twist

Fort Collins Utilities estimates annual savings of 2,023 MWh of electricity with significant winter peak demand savings of 1,850 kW at a total resource cost of $0.018/kWh from its Lighting with a Twist program, which uses ENERGY STAR as a platform. The program was able to get off to quick and successful start by hiring an experienced implementation contractor and negotiating cooperative marketing agreements with retailers and manufacturers—facilitating the sale of 78,000 compact fluorescent light bulbs through six retail outlets from October to December 2005 (Fort Collins Utilities, et al., 2005).

Start Simply With Demonstrated Program Models: Build Infrastructure for the Future

Utilities starting out or expanding programs should look to other programs in their region and throughout the country to leverage existing and emerging best programs. After more than a decade of experience running energy efficiency programs, many successful program models have emerged and are constantly being refined to achieve even more cost-effective results.

While programs must be adapted to local realities, utilities and state utility commissions can dramatically reduce their learning curve by taking advantage of the wealth of data and experience from other organizations around the country. The energy efficiency and services community has numerous resources and venues for sharing information and formally recognizing best practice programs. The Association of Energy Service Professionals (*www.aesp.org*), the Association of Energy Engineers (*www.aeecenter.org*), and the American Council for an Energy Efficient Economy (*www.aceee.org*) are a few of these resources. Opportunities for education and information sharing are also provided via national federal programs such as ENERGY STAR (*www.energystar.gov*) and the Federal Energy Management Program (*www.eere.energy.gov/femp*). Additional resources will be provided in *Energy Efficiency Best Practices Resources and Expertise* (a forthcoming product of the Leadership Group). Leveraging these resources will reduce the time and expense of going to market with new efficiency programs. This will also increase the quality and value of the programs implemented.

Start With Demonstrated Program Approaches That Can Easily Be Adapted to New Localities

Particularly for organizations that are new to energy efficiency programming or have not had substantial energy efficiency programming for many years, it is best to start with tried and true programs that can easily be transferred to new localities, and be up and running quickly to achieve near term results. ENERGY STAR lighting and appliance programs that are coordinated and delivered through retail sales channels are a good example of this approach on the residential side. On the commercial side, prescriptive incentives for technologies such as lighting, packaged unitary heating and cooling equipment, commercial food service equipment, and motors are good early targets. While issues related to installation can emerge, such as design issues for lighting, and proper sizing issues for packaged unitary heating and cooling equipment, these technologies can deliver savings independent from how well the building's overall energy system is managed and controlled. In the early phase of a program, offering prescriptive rebates is simple and can garner supplier interest in programs, but as programs progress, rebates might need to be reduced or transitioned to other types of incentives (e.g., cooperative marketing approaches, customer referrals) or to more comprehensive approaches to achieving energy savings. If the utility or state is in a tight supply situation, it might make sense to start with proven larger scale programs that address critical load growth drivers such as increased air conditioning load from both increased central air conditioning in new construction and increased use of room air conditioners.

Determine the Right Incentives and Levels

There are many types of incentives that can be used to spur increased investment in energy-efficient products and services. With the exception of education and

Table 6-11. Types of Financial Incentives

Financial Incentives	Description
Prescriptive Rebate	Usually a predetermined incentive payment per item or per kW or kWh saved. Can be provided to the customer or a trade ally.
Custom Rebate	A rebate that is customized by the type of measures installed. Can be tied to a specific payback criteria or energy savings. Typically given to the customer.
Performance Contracting Incentive	A program administrator provides an incentive to reduce the risk premium to the ESCO installing the measures.
Low Interest Financing	A reduced interest rate loan for efficiency projects. Typically provided to the customer.
Cooperative Advertising	Involves providing co-funding for advertising or promoting a program or product. Often involves a written agreement.
Retailer Buy Down	A payment to the retailer per item that reduces the price of the product.
MW Auction	A program administrator pays a third party per MW and/or per MWh for savings.

training programs, most programs offer some type of financial incentive. Table 6-11 shows some of the most commonly used financial incentives. Getting incentives right, and at the right levels, ensures program success and efficient use of resources by ensuring that programs do not "overpay" to achieve results. The market assessment and stakeholder input process can help inform initial incentives and levels. Ongoing process and impact evaluation (discussed below) and reassessment of cost-effectiveness can help inform when incentives need to be changed, reduced, or eliminated.

Invest in the Service Industry Infrastructure

Ultimately, energy efficiency is implemented by people—home performance contractors, plumbers, electricians, architects, ESCOs, product manufacturers, and others—who know how to plan for, and deliver, energy efficiency to market.

While it is a best practice to incorporate whole house and building performance into programs, these programs cannot occur unless the program administrator has a skilled, supportive community of energy service professionals to call upon to deliver these services to market. In areas of the country lacking these talents, development of these markets is a key goal and critical part of the program design.

In many markets—even those with well established efficiency programs—it is often this lack of infrastructure or supply of qualified workers that prevents wider deployment of otherwise cost-effective energy efficiency programs. Energy efficiency program administrators often try to address this lack of infrastructure through various program strategies, including pilot testing programs that foster demand for these services and help create the business case for private sector infrastructure development, and vocational training and outreach to universities, with incentives or business referrals to spur technician training and certification.

Examples of programs that have leveraged the ESCO industry were provided previously. One program with an explicit goal of encouraging technical training for the residential marketplace is Home Performance with ENERGY STAR, which is an emerging program model being implemented in a number of states including Wisconsin, New York, and Texas (see box on page 6-41 for an example). The program can be applied in the gas or electric context, and is effective at reducing peak load, because the program captures improvements in heating and cooling performance.

Austin Energy: Home Performance with ENERGY STAR

In Texas, Austin Energy's Home Performance with ENERGY STAR program focuses on educating customers, and providing advanced technical training for professional home performance contractors to identify energy efficiency opportunities, with an emphasis on safety, customer comfort, and energy savings. Participating Home Performance contractors are given the opportunity to receive technical accreditation through the Building Performance Institute.

Qualified contractors perform a top-to-bottom energy inspection of the home and make customized recommendations for improvements. These improvements might include measures such as air-sealing, duct sealing, adding insulation, installing energy efficient lighting, and installing new HVAC equipment or windows, if needed. In 2005, Austin Energy served more than 1,400 homeowners, with an average savings per customer of $290 per year. **Collectively, Austin Energy customers saved an estimated $410,000 and more than 3 MW through the Home Performance with ENERGY STAR program.**

Source: Austin Energy, 2006

Evolve to More Comprehensive Programs

A sample of how program approaches might evolve over time is presented in Table 6-12. As this table illustrates, programs typically start with proven models and often simpler approaches, such as providing prescriptive rebates for multiple technologies in commercial/industrial existing building programs. In addition, early program options are offered for all customer classes, and all of the programs deliver capacity benefits in addition to energy efficiency. Ultimately, the initial approach taken by a program administrator will depend on how quickly the program needs to ramp up, and on the availability of service industry professionals who know how to plan for, and deliver, energy efficiency to market.

As program administrators gain internal experience and a greater understanding of local market conditions, and regulators and stakeholders gain greater confidence in the value of the energy efficiency programs being offered, program administrators can add complexity to the programs provided and technologies addressed. The early and simpler programs will help establish internal relationships (across utility or program provider departments) and external relationships (between program providers, trade allies and other stakeholders). Both the program provider and trade allies will better understand roles and relationships, and trade allies will develop familiarity with program processes and develop trust in the programs. Additional complexity can include alternative financing approaches (e.g., performance contracting), the inclusion of custom measures, bidding programs, whole buildings and whole home approaches, or additional cutting edge technologies. In addition, once programs are proven within one subsector, they can often be offered with slight modification to other sectors; for example, some proven residential program offerings might be appropriate for multi-family or low-income customers, and some large commercial and industrial offerings might be appropriate for smaller customers or multifamily applications. Many of the current ENERGY STAR market-based lighting and appliance programs that exist in many parts of the country evolved from customer-based lighting rebates with some in-store promotion. Many of the more complex commercial and industrial programs, such at NSTAR and National Grid's Energy Initiative program evolved from lighting, HVAC, and motor rebate programs.

The Wisconsin and Xcel Energy programs discussed on page 6-43 are also good examples of programs that have become more complex over time.

Change Measures Over Time

Program success, changing market conditions, changes in codes, and changes in technology require reassessing the measures included in a program. High saturations in the market, lower incremental costs, more rigid codes, or

Table 6-12. Sample Progression of Program Designs

Sector	Program Ramp Up			Energy & Environmental Co-Benefits (In Addition to kWh)			
	Early (6 Months -2 YRS)	Midterm (2-3 YRS)	Longer Term (3 To 7 YRS)	Other Fuels	Peak (S = Summer, W = Winter)	Water Savings	Other
Residential: Existing Homes	Market-based lighting & appliance program			X	S, W	X	Bill savings and reduced emissions
	Home performance with ENERGY STAR pilot	Home performance with ENERGY STAR		X	S, W		
		HVAC rebate	Add HVAC practices	X	S		
Residential: New Construction	ENERGY STAR Homes pilot (in areas without existing infrastructure)	ENERGY STAR Homes		X	S, W	X	Bill savings and reduced emissions
			Add ENERGY STAR Advanced Lighting Package		S, W		
Low-Income	Education and coordination with weatherization programs			X	W		Bill savings and reduced emissions
		Direct install		X	S, W	X	Improved bill payment
			Add home repair				Improved comfort
Multifamily	Lighting, audits				S, W		Bill savings and reduced emissions
		Direct install		X	S, W		
Commercial: Existing Buildings	Lighting, motors, HVAC, pumps, refrigeration, food service equipment prescriptive rebates				S, W		Bill savings and reduced emissions
		Custom measures			S, W	X	
	ESCO-type program		Comprehensive approach				
Commercial: New Construction	Lighting, motors, HVAC, pumps, refrigeration, food service equipment prescriptive rebates				S, W		Bill savings and reduced emissions
		Custom measures and design assistance			S, W	X	
Small Business	Lighting and HVAC rebates				S, W		Bill savings and reduced emissions
		Direct install			S, W		

the availability of newer, more efficient technologies are all reasons to reassess what measures are included in a program. Changes can be incremental, such as limiting incentives for a specific measure to specific markets or specific applications. As barriers hindering customer investment in a measure are reduced, it might be appropriate to lower or eliminate financial incentives altogether. It is not uncommon, however, for programs to continue

Wisconsin Focus on Energy: Comprehensive Commercial Retrofit Program

Wisconsin Focus on Energy's Feasibility Study Grants and Custom Incentive Program encourages commercial customers to implement comprehensive, multi-measure retrofit projects resulting in the long-term, in-depth energy savings. Customers implementing multi-measure projects designed to improve the whole building might be eligible for an additional 30 percent payment as a comprehensive bonus incentive. **The Comprehensive Commercial Retrofit Program saved 70,414,701 kWh, 16.4 MW, and 2 million therms from 2001 through 2005.**

Sources: Thorne-Amann and Mendelsohn, 2005; Wisconsin, 2006.

Xcel Energy Design Assistance

Energy Design Assistance offered by Xcel, targets new construction and major renovation projects. The program goal is to improve the energy efficiency of new construction projects by encouraging the design team to implement an integrated package of energy efficient strategies. The target markets for the program are commercial customers and small business customers, along with architectural and engineering firms. The program targets primarily big box retail, public government facilities, grocery stores, healthcare, education, and institutional customers. The program offers three levels of support depending on project size. For projects greater than 50,000 square feet, the program offers custom consulting. For projects between 24,000 and 50,000 square feet, the program offers plan review. Smaller projects get a standard offering. The program covers multiple HVAC, lighting, and building envelope measures. The program also addresses industrial process motors and variable speed drives. **Statewide, the Energy Design Assistance program saved 54.3 GWh and 15.3 MW at a cost of $5.3 million in 2003.**

Source: Minnesota Office of Legislative Auditor, 2005; Quantum Consulting Inc., 2004

monitoring product and measure uptake after programs have ceased or to support other activities, such as continued education, to ensure that market share for products and services are not adversely affected once financial incentives are eliminated.

Pilot New Program Concepts

New program ideas and delivery approaches should be initially offered on a pilot basis. Pilot programs are often very limited in duration, geographic area, sector or technology, depending upon what is being tested. There should be a specific set of questions and objectives that the pilot program is designed to address. After the pilot period, a quick assessment of the program should be conducted to determine successful aspects of the program and any problem areas for improvement, which can then be addressed in a more full-scale program. The NSTAR program shown below is a recent example of an emerging program type that was originally started as a pilot.

Table 6-13 provides a summary of the examples provided in this section.

NSTAR Electric's ENERGY STAR Benchmarking Initiative

NSTAR is using the ENERGY STAR benchmarking and portfolio manager to help its commercial customers identify and prioritize energy efficiency upgrades. NSTAR staff assist the customer in using the ENERGY STAR tools to rate their building relative to other buildings of the same type, and identify energy efficiency upgrades. Additional support is provided through walk-through energy audits and assistance in applying for NSTAR financial incentive programs to implement efficiency measures.

Ongoing support is available as participants monitor the impact of the energy efficiency improvements on the building's performance.

Table 6-13. Program Examples for Key Customer Segments

Customer Segment	Program	Program Administrator	Program Description/ Strategies	Program Model		Key Best Practices
				Proven	Emerging	
All	Training and certification components	KeySpan	KeySpan's programs include a significant certification and training component. This includes building operator certification, building code training and training for HVAC installers. Strategies include training and certification.		X	Don't underinvest in education, training, and outreach. Solicit stakeholder input. Use utilities channels and brand.
Commercial, Industrial	Non-residential performance contracting program	California Utilities	This program uses a standard contract approach to provide incentives for measured energy savings. The key strategy is the provision of financial incentives.	X		Build upon ESCO and other financing program options. Add program complexity over time. Keep participation simple.
Commercial, Industrial, New Construction	Energy design assistance	XCEL	This program targets new construction and major renovation projects. Key strategies are incentives and design assistance for electric saving end uses.	X		Keep participation simple. Add complexity over time.
Commercial, Industrial	Custom incentive program	Wisconsin Focus on Energy	This program allows commercial and industrial customers to implement a wide array of measures. Strategies include financial assistance and technical assistance.	X		Keep participation simple. Add complexity over time.
Large Commercial, Industrial	NY Performance Contracting Program	NYSERDA	Comprehensive Performance Contracting Program provides incentives for measures and leverages the energy services sector. The predominant strategies are providing incentives and using the existing energy services infrastructure.	X	Does allow for technologies to be added over time	Leverage customer contact to sell additional measures. Add program complexity over time. Keep participation simple. Build upon ESCO and other financing options.
Large Commercial, Industrial	ENERGY STAR Benchmarking	NSTAR	NSTAR uses EPA's ENERGY STAR benchmarking and Portfolio Manager to assist customers in rating their buildings.	X		Coordinate with other programs. Keep participation simple. Use utility channels and brand. Leverage ENERGY STAR.
Small Commercial	Smart business	Seattle City Light	This program has per unit incentives for fixtures and is simple to participate in. It also provides a list of pre-qualified contractors.	X		Use utility channels and brand. Leverage customer contact to sell additional measures. Keep funding consistent.
Residential	Flex Your Power	California IOU's	This is an example of the CA utilities working together on a coordinated campaign to promote ENERGY STAR products. Lighting and appliances were among the measures promoted. Strategies include incentives and advertising.	X		Don't underinvest in education, training, and outreach. Solicit stakeholder input. Use utilities channels and brand. Coordinate with other programs. Leverage manufacturer and retailer resources. Keep participation simple. Leverage ENERGY STAR.
Residential - Low Income	Residential affordability program	LIPA	Comprehensive low-income program that installs energy saving measures and also provides education. Strategies are incentives and education.	X		Coordinate with other programs. Keep participation simple. Leverage customer contact to sell additional measures.

Table 6-13. Program Examples for Key Customer Segments (continued)

Customer Segment	Program	Program Administrator	Program Description/ Strategies	Program Model		Key Best Practices
				Proven	Emerging	
Residential Existing Homes	Home Performance with ENERGY STAR	Austin Energy	Whole house approach to existing homes. Measures include: air sealing, insulation, lighting, duct-sealing, and replacing HVAC.		X	Start with proven models. Use utilities channels and brand. Coordinate with other programs.
Residential New Construction	ENERGY STAR Homes	Efficiency Vermont	Comprehensive new construction program based on a HERS rating system. Measures include HVAC, insulation lighting, windows, and appliances.	X		Don't underinvest in education, training, and outreach. Solicit stakeholder input. Leverage state and federal tax credits. Leverage ENERGY STAR.
Residential Existing Homes	Residential program	Great River Coop	Provides rebates to qualifying appliances and technologies. Also provides training and education to customers and trade allies. Is a true dual-fuel program.	X		Start with proven models. Use utilities channels and brand. Coordinate with other programs.
Residential Existing Homes	New Jersey Clean Energy Program	New Jersey BPU	Provides rebates to qualifying appliances and technologies. Also provides training and education to customers and trade allies. Is a true dual-fuel program.	X		Start with proven models. Coordinate with other programs.
Commercial Existing	Education and training	BOMA	Designed to teach members how to reduce energy consumption and costs through no- and low-cost strategies.		X	Leverage organizations and outside education and training opportunities. Leverage ENERGY STAR.

Ensuring Energy Efficiency Investments Deliver Results

Program evaluation informs ongoing decision-making, improves program delivery, verifies energy savings claims, and justifies future investment in energy efficiency as a reliable energy resource. Engaging in evaluation during the early stages of program development can save time and money by identifying program inefficiencies, and suggesting how program funding can be optimized. It also helps ensure that critical data are not lost.

The majority of organizations reviewed for this paper have formal evaluation plans that address both program processes and impacts. The evaluation plans, in general, are developed consistent with the evaluation budget cycle and allocate evaluation dollars to specific programs and activities. Process and impact evaluations are performed for each program early in program cycles. As programs and portfolios mature, process evaluations are less frequent than impact evaluations. Over the maturation period, impact evaluations tend to focus on larger programs (or program components), and address more complex impact issues.

Most programs have an evaluation reporting cycle that is consistent with the program funding (or budgeting) cycle. In general, savings are reported individually by sector and totaled for the portfolio. Organizations use evaluation results from both process and impact evaluations to improve programs moving forward, and adjust their portfolio of energy efficiency offerings based on evaluation findings and other factors. Several organizations have adopted the International Performance Measurement and Verification Protocol (IPMVP) to provide guidelines for evaluation approaches. California has its own set of formal protocols that address specific program types. Key methods used by organizations vary based on program type and can include billing analysis, engineering analysis, metering, sales data tracking, and market effects studies.

Table 6-14 summarizes the evaluation practices of a subset of the organizations reviewed for this study.

Table 6-14. Evaluation Approaches

	NYSERDA (NY)	Efficiency Vermont (VT)	Electric Utilities NSTAR (MA)	WI Department of Administration (WI)	CA Utilities (CA)	MN Electric and Gas Investor-Owned Utilities (MN)	Bonneville Power Administration (ID, MT, OR , WA)
Policy Model	SBC w/state administration	SBC w/3rd party administration	SBC w/utility administration	SBC w/state administration	SBC w/utility administration	IRP and Conservation Improvement Program	Regional Planning Model
Program Funding Source	Annual appropriation. 8-year renewable portfolio standard program. 5-year public benefit programs.	Not available	SBC	SBC — electric ratepayers	Not available	Utilities, by order of state legislature, to spend a percent of revenues on efficiency programs.	Not available
Program Budgeting Cycle	Annual	3 years	Annual from SBC	Annual	Current funding cycle is 3 years. Previous periods were only 2 years.	Currently a 2-year cycle, but a 4-year cycle is recommended. Natural gas submits plans 1 year; electricity the next.	Dependent upon rate case, can be every 2 to 5 years. Generally amortized annually.
Evaluation Funding Cycle	Annual	Not available	Annual; evaluation is a line item in budgeting process.	Annual	Ongoing, every year. Upcoming contracts will be 3 year evaluation with annual reporting.	Funded as needed	Evaluation funded periodically when necessary. Starting to do more frequent evaluations than in previous years.
Evaluation Reporting Cycle	Quarterly and annually	Annually and as needed	Annually but not every program every year	Twice per year	Annual	Annual status reports	Not available
Role of Deemed Savings (i.e., pre-determined savings)	Estimate savings. Program planning and goals.	Estimate savings.	DOER for report to legislature. Program planning and design.	Estimate savings. Program planning and goals.	Planning. Inputs for TRC analysis. Adjusted regularly based on evaluation results.	Not available	Determine payment schedule for efficiency measures with established savings records.
Report Gross Savings (usually kWh, kW)	No	No	Yes	Yes	Yes	Not available	Yes. Gross savings forms basis for regional power plans.
Report Net Savings (usually kWh, kW)	Yes	Yes	Yes	Yes	Yes	Not available	Yes. Used to evaluate the efficiency of measures and fine-tune programs. Savings netted out depends upon program.
Net Savings Components							
Installation Verification	Yes		Yes	Yes	Yes		Not available
Engineering Review	Yes		Yes	Yes	Yes		Not available
Free Ridership	Yes	Yes	Yes	Yes	Yes	Yes	Not available
Spillover or Market Effects	Yes	Yes	Yes	Yes	Yes		Not available
Retention	Yes	Yes	Yes	Yes			Not available
Non-Energy Benefits	Yes					Yes	Not available
Other Not Specified						Yes	

Table 6-14. Evaluation Approaches (continued)

	NYSERDA (NY)	Efficiency Vermont (VT)	Electric Utilities NSTAR (MA)	WI Department of Administration (WI)	CA Utilities (CA)	MN Electric and Gas Investor-Owned Utilities (MN)	Bonneville Power Administration (ID, MT, OR , WA)
Education and Training in EE Budget	Yes	Not available	Yes	Not available	Yes	Not available	Yes
Education and Training Evaluated	Yes	Not available	Depends on program	Initial years only	Yes	Not available	No
Evaluation Funding as Percent of Program Budget	Not available	<1%	2%	8% increase from 4.25%	No more than 3% of minimum efficiency spending requirement.	<1%	
Evaluation Budget	Not available	Not available	Varies annually dependent upon project portfolio and other demands.	Not Available	$160MM over 3 years.	Not available	$1MM
Financial Evaluation	Internal State Comptroller CPA	CPA	Internal CPA	CPA	Not avaiable	Internal. Reviewed by Department of Commerce. Reviewed by Legislature.	Internal
Cost-Effectiveness Analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing	Annually	Triennially	Varies annually dependent upon project portfolio and other demands.	Periodically (less frequent than funding cycle)	Not available	2 years	Periodically
Test Used (RIM, TRC, Utility, Other)	TRC; Other	Utility Cost Test and Societal Cost-Benefit Test	TRC	Societal; also includes economic impacts	TRCPAC (program administrator test)	Societal; Utility; Participant; Ratepayer	TRC
Who Evaluates	Independent evaluators	Independent experts under contract to DPS	Utilities manage independent evaluators through RFP process	One independent team of evaluators	Independent evaluators hired for each program via RFP process	Department of Commerce Legislature Audit Commission, if deemed necessary	Independent evaluators
Oversight of evaluation	NYSERDA provides ongoing oversight. Public Utilities Commission final audience.	Department of Public Service	Evaluations are reviewed in collaborative and filed with the Massachusetts Department of Telecommunications and Energy	WI Department of Administration	California Public Utilities Commission and CEC	Department of Commerce	Power Council
Protocols	IPMVP	Not available	Not available	None	Has had statewide protocols for many years. New protocols were recently adopted.	Not available	IPMVP as reference

Best practices for program evaluation that emerge from review of these organizations include the following:

- Budget, plan, and initiate evaluation from the onset.
- Formalize and document evaluation plans.
- Develop program tracking systems that are compatible with needs identified in evaluation plans.
- Conduct process evaluations to ensure that programs are working efficiently.
- Conduct impact evaluations to ensure that mid- and long-term goals are being met.
- Communicate evaluation results.

Budget, Plan, and Initiate Evaluation From the Onset

A well-designed evaluation plan addresses program process and impact issues. *Process evaluations* address issues associated with program delivery such as marketing, staffing, paperwork flow, and customer interactions, to understand how they can be improved to better meet program objectives. *Impact evaluations* are designed to determine the energy or peak savings from the program. Sometimes evaluations address other program benefits such as non-energy benefits to consumers, water savings, economic impacts, or emission reductions. Market research is often included in evaluation budgets to assist in assessing program delivery options, and for establishing baselines. An evaluation budget of 3 to 6 percent of program budget is a reasonable spending range. Often evaluation spending is higher in the second or third year of a program. Certain evaluation activities such as establishing baselines are critical to undertake from the onset to ensure that valuable data are not lost.

> "We should measure the performance of DSM programs in much the same way and with the same competence and diligence that we monitor the performance of power plants."
>
> **—Eric Hirst (1990), Independent Consultant and Former Corporate Fellow, Oak Ridge National Laboratory**

Develop Program and Project Tracking Systems That Support Evaluation Needs

A well-designed tracking system should collect sufficiently detailed information needed for program evaluation and implementation. Data collection can vary by program type, technologies addressed, and customer segment; however, all program tracking systems should include:

- *Participating customer information.* At a minimum, create an unique customer identifier that can be linked to the utility's Customer Information System (CIS). Other customer or site specific information might be valuable.
- *Measure specific information.* Record equipment type, equipment size or quantity, efficiency level and estimated savings.
- *Program tracking information.* Track rebates or other program services provided (for each participant) and key program dates.
- *All program cost information.* Include internal staffing and marketing costs, subcontractor and vendor costs, and program incentives.

Efficiency Vermont's tracking system incorporates all of these features in a comprehensive, easy-to-use relational database that includes all program contacts including, program allies and customers, tracks all project savings and costs, shows the underlying engineering estimates for all measures, and includes billing data from all of the Vermont utilities.

Conduct Process Evaluations to Ensure Programs Are Working Efficiently

Process evaluations are a tool to improve the design and delivery of the program and are especially important for newer programs. Often they can identify improvements to program delivery that reduce program costs, expedite program delivery, improve customer satisfaction, and better focus program objectives. Process evaluation can also address what technologies get rebates or determine rebate levels. Process evaluations use a variety of qualitative and quantitative approaches including review of program documents, in-depth interviews, focus groups, and surveys. Customer research in general, such as regular customer and vendor surveys, provides program administrators with continual feedback on how the program is working and being received by the market.

Conduct Impact Evaluations to Ensure Goals Are Being Met

Impact evaluations measure the change in energy usage (kWh, kW, and therms) attributable to the program. They use a variety of approaches to quantify energy savings including statistical comparisons, engineering estimation, modeling, metering, and billing analysis. The impact evaluation approach used is a function of the budget available, the technology(ies) addressed, the certainty of the original program estimates, and the level of estimated savings. The appliance recycling example shown at right is an example of how process and impact evaluations have improved a program over time.

Measurement and Verification (M&V)

The term "measurement and verification" is often used in regard to evaluating energy efficiency programs. Sometimes this term refers to ongoing M&V that is incorporated into program operations, such as telephone confirmation of installations by third-party installers or measurement of savings for selected projects. Other times, it refers to external (program operations) evaluations to document savings.

California Residential Appliance Recycling Program (RARP)

The California RARP was initially designed to remove older, inefficient second refrigerators from participant households. As the program matured, evaluations showed that the potential for removing old second refrigerators from households had decreased substantially as a result of the program. The program now focuses on pick-up of older refrigerators that are being replaced, to keep these refrigerators out of the secondary refrigerator market.

Organizations are beginning to explore the use of the EPA Energy Performance Rating System to measure the energy performance at the whole-building level, complement traditional M&V measures, and go beyond component-by-component approaches that miss the interactive impacts of design, sizing, installation, controls, and operation and maintenance.

While most energy professionals see inherent value in providing energy education and training (lack of information is often identified as a barrier to customer and market actor adoption of energy efficiency products and practices), few programs estimate savings directly as a result of education efforts. Until 2004, California assigned a savings estimate to the Statewide Education and Training Services program based on expenditures.

Capturing the energy impacts of energy education programs has proven to be a challenge for evaluators for several reasons. First, education and training efforts are often integral to specific program offerings. For example, training of HVAC contractors on sizing air conditioners might be integrated into a residential appliance rebate program. Second, education and training are often a small part of a program in terms of budget and estimated savings. Third, impact evaluation efforts might be expensive compared to the education and training budget and anticipated savings. Fourth, education and training efforts are not always designed to achieve direct benefits. They are often designed to inform participants or market actors of program opportunities, simply to familiarize them with energy efficiency options. Most evaluations of

Best Practices in Evaluation

- Incorporating an overall evaluation plan and budget into the program plan.
- Adopting a more in-depth evaluation plan each program year.
- Prioritizing evaluation resources where the risks are highest. This includes focusing impact evaluation activities on the most uncertain outcomes and highest potential savings. New and pilot programs have the most uncertain outcomes, as do newer technologies.
- Allowing evaluation criteria to vary across some program types to allow for education, outreach, and innovation.
- Conducting ongoing verification as part of the program process.
- Establishing a program tracking system that includes necessary information for evaluation.
- Matching evaluation techniques to the situation in regards to the costs to evaluate, the level of precision required, and feasibility.
- Maintaining separate staff for evaluation and for program implementation. Having outside review of evaluations (e.g., state utility commission), especially if conducted by internal utility staff.
- Evaluating regularly to refine programs as needed (changing market conditions often require program changes).

energy education and training initiatives have focused on process issues. Recently, there have been impact evaluations of training programs, especially those designed to produce direct energy savings, such as Building Operator Certification.

In the future, energy efficiency will be part of emissions trading initiatives (such as the Regional Greenhouse Gas Initiative [RGGI]) and is likely to be eligible for payments for reducing congestion and providing capacity value such as in the ISO-NE capacity market settlement. These emerging opportunities will require that evaluation methods become more consistent across states and regions, which might necessitate adopting consistent protocols for project-level verification for large projects, and standardizing sampling approaches for residential measures such as compact fluorescent lighting. This is an emerging need and should be a future area of collaboration across states.

Communicate Evaluation Results to Key Stakeholders

Communicating the evaluation results to program administrators and stakeholders is essential to enhancing program effectiveness. Program administrators need to understand evaluation approaches, findings, and especially recommendations to improve program processes and increase (or maintain) program savings levels. Stakeholders need to see that savings from energy efficiency programs are realized and have been verified independently.

Evaluation reports need to be geared toward the audiences reviewing them. Program staff and regulators often prefer reports that clearly describe methodologies, limitations, and findings on a detailed and program level. Outside stakeholders are more likely to read shorter evaluation reports that highlight key findings at the customer segment or portfolio level. These reports must be written in a less technical manner and highlight the impacts of the program beyond energy or demand savings. For example, summary reports of the Wisconsin Focus on Energy programs highlight energy, demand, and therm savings by sector, but also discuss the environmental benefits of the program and the impacts of energy savings on the Wisconsin economy. Because the public benefits budget goes through the state legislature, the summary reports include maps of Wisconsin showing where Focus on Energy projects were completed. Examples of particularly successful investments, with the customer's permission, should be part of the evaluation. These case studies can be used to make the success more tangible to stakeholders.

Recommendations and Options

The National Action Plan for Energy Efficiency Leadership Group offers the following recommendations as ways to promote best practice energy efficiency programs, and provides a number of options for consideration by utilities, regulators, and stakeholders.

Recommendation: Recognize energy efficiency as a high-priority energy resource. Energy efficiency has not been consistently viewed as a meaningful or dependable resource compared to new supply options, regardless of its demonstrated contributions to meeting load growth. Recognizing energy efficiency as a high priority energy resource is an important step in efforts to capture the benefits it offers and lower the overall cost of energy services to customers. Based on jurisdictional objectives, energy efficiency can be incorporated into resource plans to account for the long-term benefits from energy savings, capacity savings, potential reductions of air pollutants and greenhouse gases, as well as other benefits. The explicit integration of energy efficiency resources into the formalized resource planning processes that exist at regional, state, and utility levels can help establish the rationale for energy efficiency funding levels and for properly valuing and balancing the benefits. In some jurisdictions, existing planning processes might need to be adapted or new planning processes might need to be created to meaningfully incorporate energy efficiency resources into resource planning. Some states have recognized energy efficiency as the resource of first priority due to its broad benefits.

Option to Consider:

- Quantifying and establishing the value of energy efficiency, considering energy savings, capacity savings, and environmental benefits, as appropriate.

Recommendation: Make a strong, long-term commitment to cost-effective energy efficiency as a resource. Energy efficiency programs are most successful and provide the greatest benefits to stakeholders when appropriate policies are established and maintained over the long-term. Confidence in long-term stability of the program will help maintain energy efficiency as a dependable resource compared to supply-side resources, deferring or even avoiding the need for other infrastructure investments, and maintains customer awareness and support. Some steps might include assessing the long-term potential for cost-effective energy efficiency within a region (i.e., the energy efficiency that can be delivered cost-effectively through proven programs for each customer class within a planning horizon); examining the role for cutting-edge initiatives and technologies; establishing the cost of supply-side options versus energy efficiency; establishing robust M&V procedures; and providing for routine updates to information on energy efficiency potential and key costs.

Options to Consider:

- Establishing appropriate cost-effectiveness tests for a portfolio of programs to reflect the long-term benefits of energy efficiency.
- Establishing the potential for long-term, cost-effective energy efficiency savings by customer class through proven programs, innovative initiatives, and cutting-edge technologies.
- Establishing funding requirements for delivering long-term, cost-effective energy efficiency.
- Developing long-term energy saving goals as part of energy planning processes.
- Developing robust M&V procedures.
- Designating which organization(s) is responsible for administering the energy efficiency programs.
- Providing for frequent updates to energy resource plans to accommodate new information and technology.

Recommendation: Broadly communicate the benefits of, and opportunities for, energy efficiency. Experience shows that energy efficiency programs help customers save money and contribute to lower cost energy systems. But these impacts are not fully documented nor recognized by customers, utilities, regulators, and policy-makers. More effort is needed to establish the business case for energy efficiency for all decision-makers, and to show how a well-designed approach to energy efficiency can benefit customers, utilities, and society by (1) reducing customers bills over time, (2) fostering financially healthy utilities (return on equity [ROE], earnings per share, debt coverage ratios), and (3) contributing to positive societal net benefits overall. Effort is also necessary to educate key stakeholders that, although energy efficiency can be an important low-cost resource to integrate into the energy mix, it does require funding, just as a new power plan requires funding. Further, education is necessary on the impact that energy efficiency programs can have in concert with other energy efficiency policies such as building codes, appliance standards, and tax incentives.

Options to Consider:

- Communicating the role of energy efficiency in lowering customer energy bills and system costs and risks over time.

- Communicating the role of building codes, appliance standards, tax and other incentives.

Recommendation: Provide sufficient and stable program funding to deliver energy efficiency where cost-effective. Energy efficiency programs require consistent and long-term funding to effectively compete with energy supply options. Efforts are necessary to establish this consistent long-term funding. A variety of mechanisms have been, and can be, used based on state, utility, and other stakeholder interests. It is important to ensure that the efficiency programs providers have sufficient program funding to recover energy efficiency program costs and implement the energy efficiency that has been demonstrated to be available and cost-effective. A number of states are now linking program funding to the achievement of energy savings.

Option to Consider:

- Establishing funding for multi-year periods.

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