Energy Efficiency:
Principles and Practices

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Preface

Energy seems to be on the mind of everyone these days—from my neighbor down the street who just completed a home energy audit, to the newly formed town energy committee, to regulators, legislators, energy efficiency (EE) program administrators, and energy service companies. The interests vary depending on the perspective. Local neighbors and citizens want a way to combat rising energy costs and help the environment. Regulators and legislators want to form policy that creates the support structure for a sustainable energy future. Program administrators are interested in how to create or rapidly expand programs to meet the increased demand for EE solutions. Energy service companies are interested in developing new technologies and services to support implementation of EE solutions. This book is designed to be a primer for the many stakeholders interested in EE solutions.

Program administrators, whether they are expanding existing EE programs or building brand-new ones, must create a EE culture that is grounded on a solid business case. A successful culture understands how programs and portfolios of programs move through the EE life cycle to ultimately achieve market transformation. Policy creates the framework by which EE is funded and operated. A good policy framework sets the stage for sustainable EE investments by resolving the inherent conflict between the utilities' incentive to increase sales and society's goal to increase end-use efficiency.

Delivering EE involves understanding the market and designing effective programs that are valued by the market. Hence, excellent programs are based on a strong understanding of the targeted audiences, including information on their current energy profiles and end-use applications, as well as how they value investments in energy solutions. Successful program design uses communication channels and delivery channels that reach the targeted audience. The types of programs delivered to the residential and commercial audiences include not only energy efficiency but also demand response and distributed generation.

Finally, successful program administrators are never satisfied with program performance. Rather, they are always looking for ways to improve or optimize programs. Active involvement in organizations that have missions to advance EE is an excellent way to learn new ideas. Evaluation of programs and portfolios is used by program administrators to validate the program achievements and also identify opportunities to improve

program performance. With the landscape of EE changing so rapidly, savvy program administrators are also keeping an eye on the future and ensuring that they are well positioned from a people, process, and technology perspective to succeed in the long term

Chapter

Build the Business Case for Energy Efficiency

Many of us remember the gas lines of the 1970s, when fuel prices hit all-time highs. Society responded by advocating for change. As a result, building codes were enhanced, appliance standards were adopted, many Americans moved to more fuel efficient cars and homes, and early energy efficiency (EE) programs began.

In the early 1980s, EE incentives were first implemented to accelerate advancement of energy efficiency programs. In 1988, the National Association of Regulatory Utility Commissioners (NARUC) passed a resolution urging regulators to "make the least cost plan the utility's most profitable resource plan."[1]

When the wave of competitive energy supply swept the country, the belief prevailed that the competitive market would offer energy efficiency services, thus avoiding the need for regulatory intervention in the form of rates to fund and utility incentives to offer EE services. Indeed, as Trevor Lauer, vice president of marketing for DTE Energy, remarked, "Once deregulation swept through the country, energy efficiency wasn't so cool; deregulation was the sexy piece. Everyone felt it was better to save 10 to 15 percent on a kilowatt-hour, versus saving kilowatt-hours."[2] Today, 10 years since the beginning of competitive energy supply, competitive offerings have not materialized. As a result, policy makers are renewing discussions on how to expand energy efficiency.

Today the concern about energy and the environment has reached unprecedented levels. Unlike the fuel crisis of the 1970s, which created short-term passion for energy conservation, there is a real concern—and a sense of urgency—to protect our global environment not only for our generation but also for our children's generation. Interest in and awareness of potential climate change impacts is at an all-time high, powered by messages in the popular media and by political debate.

The forecast is that within 25 years, our nation's population will have grown by 25% and electricity usage by 40%.[3] Most of this usage, over 70%, will be consumed in our homes, business, schools, governments, and industry.[4]

to address generic policy issues. These organizations also will research and prepare communication materials that aid in advancing discussions on appropriate regulatory structures that support expanded EE.

In the case of employee communications, the establishment of a business case for change is the foundation. A change-management communications plan can be developed to effectively communicate the business case to all levels of employees, as appropriate.

Customer communications are fundamental to the success of EE programs. The most successful program administrators integrate energy efficiency communications and information into all customer touch points, including the call center, World Wide Web, and customer bill.

Summary

A EE culture is founded by building a business case for investment in EE. As issues related to global warming receive more press and the country's focus on conservation increases, the opportunity for EE becomes even greater. Utilities, along with other providers, will play a significant role in delivering EE programs. Building a business case for investment in EE is important for all parties, especially utilities, regulators, and consumers.

A successful business case starts with a definition of EE. This definition can center on energy efficiency but may also include DSM efforts like demand response and distributed generation. The business case should help stakeholders to understand why EE is necessary; therefore, it needs to document the benefits that EE brings both to consumers and to program administrators. There are many barriers that will surface when launching EE programs. A business case documents the barriers and the development of mitigation plans addressing those barriers.

Program administrators across the country have created or are creating a EE culture. The EE culture is based on a business case that resonates with all stakeholders and serves as the foundation on which EE programs can be designed, delivered, and maximized.

References

1 Statement of Position of the NARUC Energy Conservation Committee on Least-Cost Planning Profitability (July 26, 1988), as cited in Steven M. Nadel, Michael W. Reid, and David R. Wolcott, eds. 1992. *Regulatory Incentives for Demand-Side Management*. Washington, DC: American Council for an Energy-Efficient Economy, p. 25.

A system benefits charge (SBC) is another form of rate-based recovery mechanism. The SBC is a charge on the customer's bill that collects funds for energy efficiency programs. Benefits of this type of approach are that it provides stable program funding and that it is transparent to the consumer. Many states have successfully achieved significant energy savings by establishing and maintaining an SBC as a funding mechanism.

A downside to the SBC is that it is not tied to energy resource planning or procurement. Rather, the typical policy rational for an SBC is to simply maintain the general energy, economic, and environmental benefits of energy efficiency programs. The charge, usually set as a cost per kWh, limits program funding to a cap adopted from the perspective of limiting short-term rate impacts, regardless of the long-term value of efficiency as a reliable resource cheaper than supply-side resources. Systems benefit–funded programs are administered by an energy efficiency team within the utility, by a state agency or authority, or by a third party.

Capitalizing energy efficiency costs

In this model, costs of energy efficiency programs are amortized. This model has been employed by Vermont, for example. The downside to this approach is that recovery is delayed and can be diminished in future rate cases. In fact, Vermont has discontinued capitalizing energy efficiency and expenses all costs. To be successful, the utilities need a policy that defines the allowable return and identifies which costs are eligible.

Resource procurement funding

This mechanism places demand-side procurement on par with supply-side procurement. In this model, regulators require utilities to consider energy efficiency as a resource and to spend dollars to procure energy efficiency resources, just as they would for generation resources. This spending is typically part of the utility's revenue requirement and might appear to the customer as part of the supply or fuel charge, explicitly or embedded.

Rate Structures

Utilities have an obligation to provide safe, reliable service. In some cases, this means providing adequate supplies to meet customer

Gathering commercial data is complex and expensive because of the number of different footprints, sizes, and operating schedules in the commercial market. Because the studies are so complex, they are often not completed or are out of date. In these situations, program managers must attempt to formulate an understanding of their market by using other means. Tapping into the Standard Industrial Classification (SIC) codes that are often maintained on customer information databases allows utility program administrators to segment the C&I market by business type. If these SIC codes have been well maintained, they can augment customer research and can provide managers with a good understanding on the market and associated energy efficiency opportunities. Customer research can add richness to the SIC codes and usage data by providing further understanding and data about building type, business characteristics, and end uses.

The industrial market represents some of the largest users, but energy demand varies across regions on the basis of the level and mix of economic activity, technology development, and raw materials. Generally, information gathered on the industrial sector will not be assembled through formal studies; rather, it represents a combination of data available from the customer information system, with knowledge from strategic account managers and others who are familiar with the business customers in the territory. C&I program managers will attempt, either with the benefit of formal studies or by use of less statistically based methods, to understand the attributes associated with the businesses represented in their territory, including the profiles, characteristics, and end uses.

Business profile

Commercial research will attempt to characterize C&I segments based on premises-level information. One benefit the C&I program manager has over the residential program manager is that the customer database already has business customers segmented using the SIC codes and includes related information on rate and usage history. Augmenting this knowledge with research helps to identify trends and characteristics associated with specific segments. Table 4–2 outlines common commercial segments.

Program administrators. Combining with other administrators in the same region to deliver joint programs allows program management dollars to be stretched further. When program administrators partner or collaborate, they work together to promote energy efficient technologies, create common energy efficiency programs, educate consumers, and promote contractor training and awareness. In this program delivery model, economies of scale are achieved. Organizations working together can reach their goals far more cost-effectively than any one organization can working alone. Program consistency is an important benefit from a regional effort as it reduces customer and contractor confusion and provides the ability to share program costs, such as marketing and administration.

Retailers. Because product accessibility is key for consumers, as rebates are very attractive to the residential market, working with retailers is imperative. A couple of traditional approaches can be used by program managers in working with retailers. One approach is to offer consumers rebates at the point of sale. In this model, program managers will work with retailers to train sales personnel on the availability of a rebate, the benefits of promoting higher-efficiency products, and consumer eligibility requirements. Depending on the rebate-processing design, this model may allow retailers to provide the consumer with instant or time-of-sale mail-in rebate forms.

Program managers may also work upstream to tap into the supply-side infrastructure of manufacturers, retailers, distributors, and others who have the opportunity to influence an end user's purchasing decisions. This is sometimes called a *push* strategy of the marketplace to get initiatives launched.

Energy service companies. Many program administrators secure energy service companies to deliver programs. Energy service companies have expertise in delivering energy efficiency programs to the consumer owing to their resources and experience in delivering programs at the implementation level. Program managers can tap into the knowledge and best practices inherent in energy service companies owing to their experience across many different programs across the nation.

Trade allies. Trade allies are a key source of information for consumers as they consider new construction or major equipment replacement. As such, developing partnership with contractor groups constitutes an important communication channel. Program managers find great investment value in educating contractors and installers not only on the various types and characteristics of efficient energy products but also on the proper installation and maintenance of these products. In turn, this

Chapter 7

Demand Response

The United States is experiencing new highs in peak demand. In fact, many regions reached demand levels that were not forecasted to occur for several more years. According to the North American Electric Reliability Council, peak demand will grow by 19% over the next decade; this demand is highly concentrated in the top 1% of hours during the year.[1] Demand response is a tool that helps shave the peak demand as an alternative to building power plants. As such, it is an important tool used by utilities and grid operators to effectively manage their grid under extreme stress.

Demand response is when energy users lower energy consumption during peak periods in return for receiving savings on their bills. Those savings can be a result of energy prices that are higher during peak hours or through payments made in return for specific actions such as reducing energy use to lower agreed-on usage threshold.[2] Research by the Federal Energy Regulatory Commission (FERC) indicates that about 37,500 megawatts (MW) of demand response potential exists across the United States. This represents the capability to reduce peak demand in most regions by between 3% and 7% of total.[3]

Utilities have a long tradition of designing grid systems that meet the expected energy demand from consumers. In fact, most utilities are generally required to build and maintain their systems to serve the highest expected total use of consumers, also known as the *peak demand*. However, weather, equipment malfunctions, and other unexpected events can create situations when the demand for energy exceeds the capacity to deliver; furthermore, new developments and redevelopment bring central air and high-tech loads to feeders not originally designed for this purpose. To avoid rolling blackouts, utilities and grid operators consider all available options to deal with capacity shortcomings—hence, the critical role of demand response. Bob Laurita, supervisor of demand resources at ISO New England, has observed that demand response is "a resource that