Energy Efficiency and Electric System Reliability:

A Look at Reliability-Focused Energy Efficiency Programs Used to Help Address the Electricity Crisis of 2001

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EXECUTIVE SUMMARY

The year 2001 was a remarkable and memorable one for issues relating to the electric industry. As the year began, California was experiencing an electric system crisis, with rolling blackouts and soaring wholesale electricity costs. The effects of this crisis were rippling throughout the western states, and across the country electric systems were confronting the prospect of growing demand and tight supply, amidst an aging transmission and distribution infrastructure.

These circumstances led to a strongly renewed interest in "demand-side" program strategies as an important category of resources that could help alleviate these electric system reliability problems. A number of key states, including California and New York, announced major increases in funding for energy efficiency program efforts. Policymakers, regulators, utilities, and other stakeholders were looking for creative approaches to help bring demand-side resources into play.

The Current Study

Recognizing the importance of those emerging events, in early 2001 ACEEE launched a project to carry out a study of "reliability-focused energy efficiency programs" implemented for the summer of 2001 (i.e., energy efficiency programs that were specifically designed, modified, or ramped-up to address electric system reliability concerns). The focus of the project was specifically on energy efficiency because that niche of the demand-side portfolio of policies and programs had been receiving relatively less attention than "peak demand" oriented options such as load management and "demand response," and also because energy efficiency provides certain additional benefits not encompassed by those other demand-side strategies.

As the year unfolded, ACEEE conducted a comprehensive national search for reliability-focused energy efficiency programs, ultimately culminating in a set of 22 case studies presented in Appendix C of this document.

This report describes the methodologies and results of this research project, including a discussion of various policy responses and programs implemented in states across the country in response to electric reliability concerns during 2001. Some preliminary impact estimates obtained from program administrators are provided (see the table in Appendix B), as well as a discussion of "lessons learned." The following are some of the lessons cited by program administrators in their interviews with research project staff:

1. Select programs that are practical and realistic, and can be designed and implemented quickly and easily.
2. Be realistic about estimated program impacts—don't over-promise; rather, over-deliver.
3. Select programs that either are based on proven designs or otherwise are highly certain of achieving goals. Some innovation and experimentation can be useful, but not as the backbone of a menu of programs.

4. Initiate effective marketing and media campaigns, which are essential to large-scale program success.
5. Establish and incorporate effective evaluation plans, including protocols and provisions for measurement and verification.
6. Establish streamlined, "user-friendly" processes for both participation in programs and selection of any program contractors.
7. Take advantage of the tremendous opportunities that arise during times of public crisis and high visibility to expand the promotion of energy efficiency to affect more long-term, sustainable changes in the market for energy efficiency products and services (e.g., use the opportunity to leverage improved building codes).
8. Use as many tools as you can for promoting energy efficiency, including rebates, other types of financial incentives, marketing, rate levels and structures, education, and program outreach. Build on and use existing program experience.
9. Coordinate efforts with key market participants—especially retailers and manufacturers—in advance in order to help ensure an adequate supply of energy efficiency equipment.
10. Try to provide a strong base of consistent support for energy efficiency so that efforts don't have to begin from scratch when reliability concerns arise. (In particular, California's extensive experience and infrastructure in these areas helped provide the necessary platform for obtaining the significant results achieved in 2001.)

Policy Implications

In addition to this program-focused information, the study also provided some broader findings that may have policy-related implications. These include the following observations:

- Electric reliability concerns were fairly widespread. A total of 21 states, representing most regions of the country, reported reliability problems or "close calls" during 2001.

- While use of load management programs was almost universal (45 out of 51 jurisdictions), the reported use of energy efficiency programs as a deliberate strategy to help with electric reliability was much more limited (7 states at most).

- There appears to be a fairly widespread lack of conceptual differentiation between energy efficiency and load management, even among the senior regulatory staff (Electric Division Directors or their equivalent) targeted in this study. When asked if utilities in their states had programs "particularly designed to save energy to help with electric system reliability this summer," respondents from 25 states said yes—but three-fourths of those respondents only cited load management programs as their examples.[1]

[1] This seems to correspond with other recent research by ACEEE (Kushler & Witte 2001), which found that load management appeared to be the "default" choice for demand-side response by utility companies, and that special policy emphasis was necessary to make energy efficiency programs happen.

- The results suggest that the potential for the use of energy efficiency programs to help address electric reliability concerns may be greater than is currently being realized. Although 21 different states indicated that they had reliability problems or close calls during 2001, only seven states reported that they were using energy efficiency programs as a deliberate strategy to help improve electric system reliability.

- In terms of preparation and readiness, it appears that having an established program infrastructure in place for pursuing energy efficiency is extremely important in providing the ability to roll out accelerated programs in an emergency. Existing institutions with authority and experience are crucial to achieving a rapid ramp-up of activity in the field.

Final Comments

One of the key goals of this project was to provide information to policymakers, regulators, utilities, and other interested parties regarding the potential role of reliability-focused energy efficiency programs in helping to address electric system reliability concerns. The 22 case study programs documented in this report provide concrete illustrations of how such programs are being used in a number of states around the nation.

In reviewing these programs, it is useful to keep in mind that there are of course multiple policy objectives for these programs, such as avoiding blackouts, saving energy, reducing customer bills, providing environmental benefits, reducing the market power of suppliers, etc. Different technologies and programs from the case studies may be better suited for different aspects of those objectives. However, the ability to contribute to the reliability issue is a very salient underlying theme that unites this collection. Hopefully the program examples given in this report, and the lessons learned from their experience, can help expand the effective use of energy efficiency as one strategy to help enhance electric system reliability, while capturing many of those other objectives in the process.

INTRODUCTION

This report is the result of a project launched by ACEEE in early 2001 to identify and compile information on reliability-focused energy efficiency programs[2] operated during the summer of 2001. The report is a companion effort to ACEEE's National Conference on Energy Efficiency and Reliability, which was held in Berkeley, California in October 2001.[3] The fundamental purpose of the overall project was to document and focus attention on current examples of states and/or utilities using energy efficiency programs as a mechanism to help address electric system reliability concerns.

Background

Heading into 2001, it was clear that this was going to be a very interesting year for electric reliability issues. For each of the previous three years, electric system reliability problems had been headline news in several areas of the country. In 1998 there were power interruptions, brownouts, and requests for voluntary curtailments in Chicago, Colorado, Michigan, and New York; in 1999 blackouts occurred in New York City, Chicago, Long Island, New Jersey, the Delmarva Peninsula, and the South Central states; and in 2000 rolling blackouts occurred in California and there were close calls in several regions, including the Pacific Northwest, Pennsylvania/New Jersey, and New England (Nadel, Gordon & Neme 2000). As 2001 began, California was experiencing an electric system crisis, with rolling blackouts and soaring wholesale electricity costs. Across the country electric systems were confronting the prospect of growing demand and tight supply, amidst an aging transmission and distribution infrastructure.

Explanations for the problems varied somewhat with different regional circumstances but it is clear that the movement toward electric restructuring had contributed to the problem in two significant ways. First, the uncertainty surrounding the timing and ultimate resolution of electric restructuring led to a general reluctance by utilities and independent suppliers to invest in new generating facilities (or new transmission capacity either, for that matter). Second, the economic incentives and disincentives created by restructuring had led to a steep decline in utility energy efficiency spending. Indeed, since the movement toward restructuring began in the mid-1990s, total national electric utility spending on energy efficiency programs had been cut in half.[4] Regardless of the particular causes, however, the onset of 2001 found the U.S. electric industry in what was arguably its deepest crisis in sixty years.

These circumstances led to a strongly renewed interest in “demand-side” program strategies as an important category of resources that could help alleviate these electric system reliability problems. A number of key states, including California and New York, announced

[2] This project defines "reliability-focused energy efficiency programs" as energy efficiency programs that are specifically designed, modified, and/or ramped-up to produce energy savings intended to help address electric system reliability concerns.

[3] Information about that conference, including copies of the presentation overheads used by presenters at that conference, can be accessed through the ACEEE website [www.aceee.org].

[4] See Nadel & Kushler (2000). Some of the reasons underlying that decline are discussed in Kushler & Suozzo (1999).

major increases in funding for energy efficiency program efforts. Policymakers, regulators, utilities, and other stakeholders were looking for creative approaches to help bring demand-side resources into play.

The Current Project

In response to these circumstances, ACEEE developed a proposal and solicited funding[5] to carry out a study of reliability-focused energy efficiency programs implemented for the summer of 2001. Two aspects of that basic description of this project are worthy of some elaboration.

First, the focus of the project was specifically on energy efficiency,[6] rather than other "demand-side" strategies such as load shifting, demand response, or load curtailment programs. These latter "load management" types of demand-side response were already receiving considerable attention nationally in the trade press and at conferences and seminars, and ACEEE felt that the use of energy efficiency as a strategy to help address electric system reliability concerns deserved some specific attention.[7] Moreover, the additional benefits[8] produced by the more permanent energy savings achieved by energy efficiency, rather than the brief temporary load reductions produced by load management, also help make energy efficiency worthy of some additional public policy attention.[9]

Second, the focus of the project also tended to be on programs intended to produce an impact in the summer of 2001. This was because, for most jurisdictions in the United States, electric reliability problems associated with peak system loads occur during the summer season. The summer months are particularly stressful for an electric system as soaring temperatures lead to increased peak demand from consumers and businesses cranking up their air conditioners to stay cool. The greatest demand for air conditioning generally occurs in the mid-afternoon and early evening hours, coinciding with the highest demand for other electricity uses such as lighting businesses, powering factories, and meeting household needs as residents return from work. High temperatures also negatively impact the performance of electricity generation, transmission, and distribution equipment, reducing the availability of generation and transmission capacity and increasing the likelihood of distribution system failures. As a result, the electricity system is called on to meet the highest demand at the time when its components are most prone to problems. Consequently, reliability-focused energy efficiency programs, for practical purposes, tend to feature actions and measures that (among other things) produce good energy savings during hot summer weekdays.

[5] The organizations that funded this project are listed earlier in this document, in the Acknowledgments section.
[6] We define energy efficiency as actions or measures that result in producing the same or better levels of amenities (e.g., light, space conditioning, motor drivepower, etc.) using less energy.
[7] The results of the "50-State Screening Survey" discussed later in this report shed some interesting light on the load management versus energy efficiency distinction in typical utility demand-side activities.
[8] For example, energy efficiency reduces customer bills throughout the year, reduces the total consumption of energy resources, and provides significant environmental benefits (whereas load management has little effect on, or may even increase, total energy consumption and total environmental emissions).
[9] An additional practical advantage for energy efficiency is that it is compatible with any typical utility rate structure, whereas load management and demand response technologies tend to be dependent on special tariff mechanisms (and often special metering equipment).

Within that basic framework, ACEEE set out to identify and examine current reliability-focused energy efficiency programs from around the nation.

METHODOLOGY

Scope

The scope of the research effort for this project is national, with a special emphasis on California. This special emphasis on California was justified on two grounds. First, at the more mundane level, the majority of the funding for this project came from California sources and they required a thorough consideration of California programs as part of the scope of work. Second, and more importantly, the level of reliability-focused energy efficiency activity in California during 2001 merited a substantial share of the research focus. As a result of the extreme electric system crisis faced by California in 2001, that state earmarked, from various sources, over $800 million in funding for energy efficiency—an amount that likely exceeded the rest of the nation combined.

Therefore, not surprisingly, over half of the programs identified and targeted for case studies in this project are from California. Nevertheless, the project was also able to identify and include case studies of programs operated in nine other states from across the nation.

Process

This project deliberately began the research process by "casting a broad net" to identify any examples of reliability-focused energy efficiency programs from around the country. The process began with a "50-State Screening Survey" of the public utility regulatory commissions in each of the 50 states plus the District of Columbia. The Directors of the Electric Divisions (or their equivalent) were identified through the National Association of Regulatory Utility Commissioners (NARUC) 2001 Membership Directory, and targeted to receive a brief telephone survey (see Appendix A). After some persistent follow-up, all 51 jurisdictions were successfully surveyed.

All examples of reliability-focused energy efficiency programs identified through this survey were put into the “pool” for further investigation and consideration as case studies. (Overall results from the screening survey are discussed later in this document.)

This screening survey was supplemented by two additional methods of identifying candidate programs. The first was informal solicitation of nominations by the project staff through various networks (including the broadcast of a request for suggested programs to the entire ACEEE email list of utility and public benefits-related contacts). The second was the organization and hosting by ACEEE of the first National Conference on Energy Efficiency and Reliability, where many additional sources of information about current reliability-focused energy efficiency programs were pursued.

Data Collection

Once promising candidate programs were identified, project staff pursued additional information about the programs. Key contact persons were interviewed (usually by telephone, sometimes in person) and program documents and website information were reviewed.

Out of this process, a total of 22 programs were selected for inclusion as case studies in this report. The overall results of this research are presented and discussed in the next two sections of this report, including a summary of the 22 programs in Table 1. The detailed descriptive information for each case study is presented in Appendix C.

CORE RESULTS

The research findings of this project can be categorized into two major segments for the purposes of this report. This section presents the core results in terms of the primary mission of this project: the identification and description of reliability-focused energy efficiency programs operated during 2001. The subsequent sections present several additional important related issues examined during this research project.

50-State Screening Survey

A key component of the core mission of this project was the survey of the Directors of the Electric Division (or their equivalent) at the public utility regulatory commission in each of the 50 states (plus the District of Columbia). As the name implies, the primary function of this survey was to "screen" the various states to identify those states that had reliability-focused energy efficiency programs in operation for 2001. In addition, however, the survey did also pursue a few other related areas of interest. The following material presents the highlights of the survey results.

Existence of Reliability-Focused Energy Efficiency Programs

Respondents were asked whether their state had any utility or state programs that "are particularly designed to save energy to help with electric system reliability this summer." A total of 25 respondents said yes.

The respondents were then asked to provide the name and a brief description of each program they felt fell into that category. Interestingly, when these descriptions were assessed, it turned out that only seven of the respondents actually described an energy efficiency program as one of their examples. The other 18 states all described programs that are actually load management programs (e.g., time-of-use rates, air conditioner interruption programs, various Commercial and Industrial [C&I] load curtailment programs, etc.).

The seven states identified (California, Florida, Idaho, New York, Oregon, Utah, and Washington) were targeted for further research to investigate specific programs that might be included in this study.

Existence of Any Energy Efficiency Programs

Respondents who answered "no" to the initial question about energy efficiency programs designed to help with electric reliability this summer or who gave only load management programs as examples were asked whether the utilities in their state offer any type of energy efficiency programs at all. After this further probing, it was determined that a total of 23 jurisdictions[10] (including the original seven states) had utilities that offered actual energy efficiency programs.

[10] This includes 22 states plus the District of Columbia.

Prevalence of Load Management Programs

After the surveys were completed, an assessment was made of all the program examples provided by the respondents. It is noteworthy that although they were never actually asked about load management, respondents for 45 of the 51 jurisdictions mentioned and described load management programs operated by their utilities. Based on this quick assessment, it is interesting to observe that utilities in at least nine out of ten states offer load management programs, while less than half provide energy efficiency programs.

Reliability Problems

In another segment of the survey, respondents were asked whether their state had experienced any electric system reliability problems in 2001, or whether there had been any "close calls." A total of 21 jurisdictions replied "yes," including states in almost all regions of the country (New England, Mid-Atlantic, Midwest, Southwest, and West Coast).

The respondents were also asked to rate the general perception of their state's reliability over the next couple of years, on a 4 point scale ("more than enough system capacity…," "adequate…," "just barely enough…," and "not enough…"). A few states refused to answer, saying they couldn't or didn't want to be quoted. A total of nine states rated their system as "just barely enough system capacity to meet demand."

Summary

Key findings from this screening survey are listed below.

- Electric reliability concerns were fairly widespread. A total of 21 states, representing most regions of the country, reported reliability problems or "close calls" during 2001.

- While use of load management programs was almost universal (45 out of 51 jurisdictions), the reported use of energy efficiency programs as a deliberate strategy to help with electric reliability was much more limited (7 states at most).

- There appears to be a fairly widespread lack of conceptual differentiation between energy efficiency and load management, even among the senior regulatory staff (Electric Division Directors or their equivalent) targeted in this study. When asked if utilities in their states had programs "particularly designed to save energy to help with electric system reliability this summer," respondents from 25 states said yes—but three-fourths of those respondents only cited load management programs as their examples.

- The results suggest that the potential for the use of energy efficiency programs to help address electric reliability concerns may be greater than is currently being realized. Although 21 different states indicated that they had reliability problems or close calls during 2001, only seven states reported that they were using energy efficiency programs as a deliberate strategy to help improve electric system reliability.

Identification of Reliability-Focused Energy Efficiency Programs

The other key component of the core mission of this project was the selection of noteworthy examples of reliability-focused energy efficiency programs as case studies for presentation in this report. Through the use of the 50-state Screening Survey, informal searches through the network of energy efficiency contacts available to the project staff, and inquiries at the National Conference on Energy Efficiency and Reliability, a pool of candidate programs was identified for possible inclusion as case studies in this project.[11]

The project staff then made preliminary inquiries with program administrators, reviewed pertinent documents, etc. to gather additional information about the programs that would be helpful in the selection process. One of the objectives of this process was to achieve a good diversity in types of programs represented. Factors considered in this process included such things as the operational features of the program, the sector(s) targeted, the regional location, the size of the program, and the availability of useful information about the program and its effects. Ultimately, this investigation and data collection process resulted in a final set of 22 reliability-focused energy efficiency programs selected for presentation as case studies in this report.

Table 1 provides a list of the 22 programs selected by this project as case studies. It also includes information about a number of key aspects of the programs (e.g., administrative organization, sectors targeted, funding level, etc.) as well as a brief program description. This table allows the selected programs to be quickly compared and contrasted on various key elements. The more detailed individual case studies for each program are then presented in Appendix C.

Table 1: Programs Selected as Case Studies (see Table 1.xls)

Overview of Key Characteristics of the Case Study Programs

For convenience, the following material provides a summary of some of the key descriptive characteristics regarding the set of selected case study programs.

Geographic Location

The selected set of case studies contains programs from a total of 10 different states.[12] These include California (14 programs), Idaho (2), Illinois (1), Montana (1), New York (2),

[11] Unfortunately, this pool was rather constrained in terms of geographic location. As discussed previously, most states did not operate "reliability-focused" energy efficiency programs during 2001. As a result, the pool of programs, with few exceptions (e.g., New York), tended to focus on states in the West and Northwest regions. (Not surprisingly, the programs tended to cluster in areas that had the most significant electric reliability concerns during 2001.)

[12] In viewing this list of states, it is important to keep in mind the operational definition used by this project for "reliability-focused energy efficiency programs": energy efficiency programs that were specifically designed, modified, and/or ramped-up in order to address electric system reliability concerns. There are certainly other

Oregon (2), Texas (2), Utah (2), Washington (3), and Wyoming (1).[13] As might be expected, this group of states tends to heavily represent areas of the country that experienced the most serious electric system reliability concerns during 2001, including California, the Western region, the Northwest, and New York.

Sector Served

In part, the programs were selected for inclusion in this list in order to represent a good diversity of targeted customer sectors. The most common individual sector is residential, with eight programs, while the C&I sectors together have five programs included. However, six other programs are cross-cutting, affecting all customer sectors. In addition, three programs target special market niches rather than broad customer sectors (i.e., special programs for state buildings, traffic signals, and vending machines).

Program Mechanisms

The case study programs were also selected with an eye toward including a good diversity of program delivery mechanisms. The strategies incorporated in the targeted programs include rebates, direct installation, "standard offer" payments, rate discount-based incentives, and mass-market information campaigns. The programs themselves include everything from residential low-income conservation, to residential and commercial new construction, to retrofitting traffic signals with light-emitting diode (LED) lights.

Administrative Entity

The targeted list also represents a great diversity in terms of the type of organization in charge of administering the program. Administrative entities identified in this set of programs include investor-owned utilities (IOUs), municipal utilities, state agencies, a federal power authority, and a nonprofit community organization.

Evaluation Status

For each of the programs included in this priority list, inquiries were made regarding the availability of evaluation information about the program. Of the 22 programs, almost none had evaluations completed as of early 2002. Twelve of the programs had evaluations in process or planned, with most due to become available some time in 2002. Ten of the programs had no current plans for formal evaluations (although almost all had basic reporting requirements on such things as the number of participants served, measures installed, etc.).[14]

states that operate commendable energy efficiency programs that do have beneficial effects on electric system reliability in the normal course of operation. But the programs were not included in our set of case studies because they did not meet the "specifically designed, modified, and/or ramped-up" criteria for this project. Some of these other states will be discussed in a later section of this report.

[13] The numbers in parenthesis add to more than 22 because a few of the targeted programs are multi-state efforts.

[14] While an actual analysis of savings impacts was beyond the time frame and scope of this project, initial savings impact projections were obtained from the administrators of the case study programs wherever possible. These projections are provided in a table in Appendix B.

Summary

One of the objectives of this project was to attempt to identify a broad range of programs that would fit within the category of reliability-focused energy efficiency programs. The results would appear to confirm that there is quite a range of energy efficiency programs that are being applied to address electric system reliability concerns, including programs for all customer sectors and a wide variety of measures and intervention strategies. Appendix C provides individual descriptive summaries for the 22 programs selected as case studies. Program contact sources are also provided in case the reader wishes to pursue more detailed information.

Additional Important Issues

In addition to the core results of this study (i.e., the identification and examination of reliability-focused energy efficiency programs from around the nation), this project also identified several additional important related issues that are worthy of some discussion. These include: (1) a look at a somewhat different category of state response to electric system reliability concerns, which we have termed a "policy response" (rather than a specific "program"); (2) a more detailed examination of the three key regions of activity in 2001, including a special emphasis on the California experience (which was unique in both overall size of effort and breadth of activity); and (3) a discussion of the important role of states that have what might be called a "long-standing commitment" to energy efficiency, but did not have programs selected as case studies in this project because they didn't meet the criteria of energy efficiency programs "…specifically designed, modified, and/or ramped-up to address electric system reliability concerns…." (This type of steady and consistent support for energy efficiency can have many benefits, including contributing to electric system reliability. Thus a section on these states is included in this report as sort of an "honorable mention" category.) These three additional issues are discussed in the next three sections of this report.

OTHER POLICY RESPONSES TO RELIABILITY CONCERNS

In addition to specific programs, we also reviewed state policies and actions designed to use energy efficiency to help address concerns about electric system reliability. While the programs we profiled as case studies in effect represent policy responses taken to address reliability and efficiency (i.e., most of these programs resulted from decisions made by a government authority—regulatory body, legislature, or executive branch), there is an additional category of "policy response" that is not really a "program" per se. These types of policy responses are the focus of this section.

Such policy responses fall into three broad categories according to the type of governing body taking the action. Policy responses have been taken by legislatures, utility regulators, and executive offices within state government (governors' offices or departments of administration). The material below provides some examples of state policy responses intended to use energy efficiency to address electric system reliability concerns.

Executive Policy Responses

A variety of executive branch policy responses were used to address immediate concerns for reliability in the summer of 2001. Executive orders and other public proclamations do not require lengthy deliberations to enact. They are well suited to elicit direct, immediate responses. They can be used to increase visibility and raise public awareness of impending problems and to mobilize customer responsiveness to such problems.

Not surprisingly, California provides perhaps the leading illustration of the use of executive branch policy responses to address electric reliability concerns. Here are a few examples. In January 2001, Governor Gray Davis proclaimed a State of Emergency to exist due to the energy shortage, putting in motion a variety of state responses, setting overall energy savings goals for the state, and establishing minimum peak electricity demand reduction objectives for state facilities. In March, he issued an executive order calling for reductions in outdoor lighting and another calling for the "20/20" rebate program for electricity customers in the state. In May, he authorized the use of revenues from the Electric Power Fund to pay for various energy efficiency programs. Among the more interesting responses was the whole "Flex Your Power" campaign carried out in California through much of 2001. Although certain aspects of that effort can be categorized as a "program" (and hence, Flex Your Power is described as a case study in this report), other aspects were more ad hoc components of an overall comprehensive policy and public education response by the executive branch. (California's policy responses are discussed in more detail in a later section of this report.)

Executive policy announcements can also be used to "set an example" by taking actions in state facilities to reduce energy use. The state of Montana offers an example of an executive policy response. Governor Judy Martz issued Executive Order 03-01 on March 29, 2001, which directed conservation measures to be taken in state buildings. Below is an excerpt from this order, clearly showing the reliability focus of this directive:

> "Whereas, the more efficient use of electricity will help alleviate reliability concerns and provide economic benefits to the State of Montana;…. I, Judy Martz… do hereby order all state government agencies to incorporate conservation strategies in the operation of their facilities and to set forth a goal of achieving a ten percent reduction in the consumption of electricity…. Agencies are asked to be conservation models for all Montanans."

A similar example would be Idaho's Governor Dirk Kempthorne, who issued an Executive Order entitled "Energy Conservation Considerations in State Buildings." The order specified 14 energy-saving measures that were to be applied to all buildings owned or leased by the state.

Other examples of executive branch actions could be seen in the state of Washington, where a program was created to do energy audits for all state buildings and public schools, and where the State Building Code Council approved stricter energy efficiency standards for all new buildings.

Executive responses can also take the form of collective action. For example, the Western Governors Association agreed to work together on emergency, short-term energy conservation measures to avert shortages in many states and mitigate higher future energy prices. This agreement was announced in a joint proclamation on January 9, 2001 (WGA 2001a). The governors participating in this joint action (those of Idaho, Arizona, Colorado, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) issued a document that outlined their strategies:

- Conduct a coordinated state-by-state media campaign to inform people about the severity of the problem and to highlight their responsibility for achieving short-term solutions.
- Encourage each state to develop specific strategies for providing personal and practical information to households, public agencies, and businesses that detail steps they can take to reduce energy use and manage costs during times of energy shortage.
- In states with immediate shortages, encourage utilities to establish and expand voluntary programs for electricity users to reduce non-essential consumption of electricity.
- Encourage public agencies across the Western states, especially in those areas with immediate shortages of energy, to conserve energy.

In August 2001, the Western Governors Association announced an additional energy Policy Resolution (WGA 2001b), including the following items:

- Encourage rate structures that give utilities and customers an incentive to reduce consumption.
- Encourage long-term stability of government and utility conservation programs.
- Accelerate the development and deployment of new, more energy-efficient products in the marketplace.

- Review and improve the energy efficiency of building codes in Western states and tribal lands.
- Accelerate the development of federal government appliance efficiency technologies applicable to the growing Western region.
- Support federal, state, and tribal tax incentives to accelerate the introduction of new energy-efficient technologies.
- Develop mechanisms to encourage energy efficiency measures in air quality planning documents.

Finally, a particularly interesting example of cross-state collaboration occurred in October 2001 at the Bonneville Dam, where Governor Gary Locke of Washington and Governor John Kitzhaber of Oregon held a joint press event to commit their respective state governments to new conservation plans and to call on homeowners and businesses to adopt various energy-saving actions to help avert electric system reliability problems in the winter. (The Northwest tends to be a winter-peaking electric system.) The relatively unique nature of this event reportedly helped garner significant coverage and publicity in the respective states.

Legislative Policy Responses

Legislative responses, in contrast to executive actions, tend to address larger-scale responses to reliability concerns. The legislative process generally is not well-suited to address quick near-term actions. Instead, legislative responses are better directed to long-term concerns, infrastructure development, and major funding decisions.

The clear winner in terms of overall magnitude of response during the 2000/2001 timeframe has got to be California. During that time period, the California legislature passed several pieces of legislation setting policy and allocating funding for energy efficiency programs. In all, these bills provided over $1.1 billion in funding for demand-side programs of one type or another, with about $850 million of that going specifically for energy efficiency programs. (More details on these California legislative actions are provided in a later section of this report.)

Another good example of legislative policy response to reliability concerns is Wisconsin. In October 1999 the Governor of Wisconsin, Tommy Thompson, signed the New Law on Electric Utility Regulation, better known as “Reliability 2000” because of its main objective—to assure long-term system reliability in Wisconsin. This bill was developed as part of the 1999 Wisconsin Act 9 (the 1999–2001 Biennial Budget Act). A broad coalition of stakeholders in Wisconsin’s electricity markets—utilities, environmentalists, consumers, and businesses—collaborated to create the initial proposal to the Wisconsin Legislature. This package contained provisions relating to public utility holding companies, electric power transmission markets, and public benefits. All these provisions addressed system reliability. It did not restructure Wisconsin’s utility industry. Rather, Reliability 2000 sought to improve the functioning of wholesale power markets (a more robust generation market and a more effective transmission system) and create a statewide public benefits program. These provisions were viewed as essential to ensure economical, reliable power supply in Wisconsin, which had faced threats of rolling black-outs in the summers of 1998 and 1999.

Wisconsin's law specifically stipulates that the main priorities of the efficiency programs to be implemented as a result of this law are:

- Improvement in energy efficiency markets that are least competitive
- Environmental protection
- Electric system reliability
- Rural economic development

As Wisconsin moves ahead with its public benefits programs, the administrators of these programs will evaluate their results relative to meeting the above objectives.

Yet another example from the upper Midwest is the Minnesota Energy Security and Reliability Act passed in 2001. Among other things, this legislation expanded the energy efficiency funding requirements for municipal utilities and electric cooperatives in order to bring them more in line with the significant energy efficiency funding requirements placed on investor-owned utilities. Minnesota's strong energy efficiency policy requirements are discussed further in a later section of this report.

Moving to a very different region of the country, Texas provides a very interesting example of using energy efficiency to help assure future electric reliability. Texas' electric restructuring legislation (SB7 of 1999) specifically required that all electric retailers in Texas develop and implement efficiency programs that reduce load growth by 10% each year. Although Texas has not recently experienced much in the way of electric reliability problems, this is an excellent example of legislative policy to require the implementation of reliability-focused energy efficiency programs.

Regulatory Policy Responses

Utility regulators typically are the driving force behind utility programs addressing reliability and energy efficiency. This is true regardless of the status of utility industry restructuring in the state. Assuring economical, reliable electric power supply has long been the primary goal of regulatory authorities, and a number of state public utility commissions have used their authority to take action to address reliability concerns.

As in the other categories, California is also a leading state in terms of energy efficiency policy responses from utility regulators. In July 2000, the California Public Utilities Commission (CPUC) adopted the "Summer Initiative" as a "rapid response procedure" to expedite energy and demand savings in the state (Decision 00-07-017). Over $72 million of unspent utility energy efficiency funds from prior years were allocated to a process whereby CPUC called for proposals and selected priority rapid response energy efficiency programs. (More details on this example are provided in the next section and in the "Summer Initiative" case study in Appendix C.) In further action to respond to the electric reliability crisis, CPUC in January 2001 authorized the utilities to re-design their existing energy efficiency programs to focus on immediate energy savings and demand reduction rather than longer-term "market transformation" types of activities. In a somewhat different regulatory arena, the California

Energy Commission (CEC) also conducted expedited proceedings to establish updated building codes.

Regulators in other states have also been proactive in addressing system reliability through energy efficiency and conservation. For example, PacifiCorp in Utah had proposed to implement a "20/20" program to provide customers 20% credit on their bills for reducing use by 20%. This proposal itself was PacifiCorp's response to an order from the Public Service Commission (PSC) of Utah to develop efficiency programs that could reduce load and improve system reliability. PSC responded by requiring PacifiCorp to add a "10/10" provision to the proposed program as a means to boost the participation and impact of the program. (Note: this program is described in one of the case studies in Appendix C.) PSC also accelerated its approval process for these programs to ensure that the programs were operational when needed at the start of summer 2001.

Another example of regulatory policy response was in Idaho, where the Public Utilities Commission took action in an Idaho Power rate case to reinstate demand-side management and ordered the utility to prepare comprehensive conservation and efficiency programs by August 2001.

KEY REGIONS OF THE UNITED STATES IN 2001

In assessing the scope of electric system reliability concerns in 2001 and the magnitude of response in terms of reliability-focused energy efficiency, there were really three key regions in the United States: California, the Northwest, and New York. This section gives a special focus to those three regions, beginning with the most emphasis on the state that was most responsible for raising the visibility of the electric reliability issue in 2001.

California

The state of California deserves special attention in this report for a number of reasons. To begin, as described below, the magnitude of the electric system reliability problems it faced in 2001 was unprecedented. Moreover, the size and scope of its public policy response to that challenge, particularly in terms of energy efficiency efforts, were similarly unparalleled in U.S. history. This section provides a brief overview of the California experience with regard to reliability-focused energy efficiency programs.

Background: The Reliability Crisis

In the summer of 2000, the California Independent System operator declared 32 days of emergencies, the majority of which were Stage 2, where operating reserves are below 5% and interruptible loads are curtailed. Although electrical demand declined in the fall and winter months, the situation became worse during these months, resulting in 40 days of electrical emergencies, the majority of which were Stage 2 and Stage 3, where operating reserves fall below 1.5% and rotating outages begin. Prices for both electricity and natural gas were significantly higher in December and January than in the same time period the two previous years, seriously impacting the financial viability of the state's investor-owned utilities, the California Independent System Operator, and the California Power Exchange. In January and February 2001, the California Energy Commission projected electricity supply and demand for the summer of 2001 under various temperature scenarios: one analysis showed that the state faced a potential shortfall of 5,000 megawatts (MW) during the months of June through September. Continuing incidences of "rolling blackouts" were predicted for throughout that time period.

Policy Response

In response to this electricity crisis, California policymakers and utility regulators established a substantial set of policies and programs that involved significant additional funding for existing energy efficiency programs and the development of new initiatives. More than $1.1 billion in funding was authorized for demand-reduction initiatives, representing a 250% increase from spending in 2000 (Messenger 2001). About 70% of total demand-side funding (about $850 million) was directed at energy efficiency programs, which focused on reducing overall electricity use, while $300 million was allocated for demand response/load management programs, which aim to reduce usage specifically during periods of peak demand and/or high electricity price signals. The recipients of these funds were primarily CPUC, California's IOUs, and CEC. The CPUC programs and funding represent

the largest source of permanent energy efficiency improvement of all the agencies, while the programs offered by the other agencies emphasized either behavioral modification by consumers, or load shifting or demand responsive activities (which typically focus on temporary reductions in energy demand) (CPUC 2001).

The specific policy responses in 2000 and 2001 were varied. The public goods charge (PGC) energy efficiency programs, funded by electric and gas ratepayers through a surcharge on energy bills,[15] run every year and represent the backbone of energy efficiency programs in California. Legislation (AB 995) extending the PGC through 2012 was signed by Governor Davis in September 2000, and overall this new legislation authorized $5 billion for energy efficiency, low-income, renewables, and research and development programs over that time period. In August 2000, the State Legislature passed AB 970 and appropriated $50 million in general fund expenditures to CEC to run additional programs beyond the CPUC's ongoing programs. This legislation also required a fast-track update of California's building standards (Title 24) and a fast-track standard setting of appliance standards. In April 2001, the Governor signed SBx 5 and AB 29x, which appropriated $859 million for the general fund for CEC, CPUC and other state agencies (see Executive Order D-36-01; Office of the Governor 2001a). These funds were to be used for energy efficiency investment programs, public education on energy efficiency, real-time meters, low-income bill assistance, and renewable energy.[16]

In July 2000, CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). Over $72 million from utilities' unspent energy efficiency funds from program year 1999 and earlier were set aside for the Summer Initiative. It was specifically designed "to provide maximum impact of demand and energy usage reductions" during the summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Utilities and other parties were directed to provide CPUC with "program options that will bring about the largest reductions in electric demand and/or electric usage reductions in the shortest period of time." In August 2000, CPUC approved a group of programs for funding through December 31, 2001, which were to be implemented by September 11, 2000.

As noted above, the governor of California was very involved and active in promoting energy efficiency as one part of the solution for addressing the energy crisis. Even before calling a State of Emergency in January 2001 (Office of the Governor 2001b), the governor announced in early January a plan to reduce California's energy use by at least 5% within a week of his announcement (Office of the Governor 2001c). The plan included provisions for: (1) a statewide public outreach campaign coordinated by the Department of Consumer Affairs and state departments to promote energy efficiency through newsletters, letters, websites, and public forums; (2) reductions at peak of 200 MW in energy use by state government, including state prisons, state office buildings, and the University of California

[15] The PGC was initially established in the state's restructuring legislation in 1996. The electric and natural gas surcharges comprise approximately 1.0% and 0.7%, respectively, of each customer's monthly bill.

[16] Not all of these funds were spent. Unexpended funds were returned to the State Treasury for easing California's debt problems. However, many programs were implemented.

and California State University system; and a CEC-led effort to reduce peak load reductions by cities and counties by 300 MW. And in March 2001, the governor announced in Executive Order No. D-30-01 a "20/20 Energy Rebate Program" for the summer of 2001 (Office of the Governor 2001d). Under this plan, customers would receive a 20% rebate on summer 2001 bills if the customers achieved 20% or greater reduction in electricity consumption between June and September versus last year. Residential and small commercial customers rebates would be based on 20% reduction of total consumption, while other commercial and industrial rebates would be based on 20% reduction of peak load. (One of the case studies in Appendix C focuses on the 20/20 rebate program approach.)

Overall Results

It is still too early to provide definitive results of these programs, since end-of-the-year program data (especially on programs or projects for which funds have been committed but for which installation of equipment is not yet completed) are still being collected and planned evaluations of many of these programs have not been completed. However, based on estimates from the California Public Utilities Commission (CPUC 2001) and the California Energy Commission (CSCSA 2002), it appears that California's energy efficiency and energy conservation-related efforts during 2001 saved nearly 3,700 MW. Table 2 breaks out these savings impacts according to different categories of program funding identified in the California reports cited above.

The synergistic effect of all the California programs and policies, including the massive public information campaigns, was even more impressive. In 2001, California averaged a 10% cut in peak demand during the summer months (with a record reduction of 14% in June) and overall energy use declined in 2001 by 6.7%, after adjusting for economic growth and weather (CSCSA 2002). Perhaps the most meaningful result of all was that California experienced no incidences of rolling blackouts for the entire summer or the rest of 2001.

Table 2: California Energy Efficiency and Conservation Programs

Programs	2001 Funding ($Million)	Summer MW Savings Goal	MW Savings Achieved (10/1/01)
California Public Utilities Commission—Existing Funding[1]	275	NA	282
California Public Utilities Commission—New Funding[2]	209	196	238
California Energy Commission—New Funding[3]	362	1,025	454
Other Agencies[4]	125	2,040	2,694
Total	971		3,668

Notes:
NA = not available
[1] Source: CPUC 2001, page 7.
[2] Source: CSCSA 2002, Table 1, page 7.
[3] Source: CSCSA 2002, Table 2, page 8.
[4] Source: CSCSA 2002, Table 3, page 11. These numbers only represent data for programs that include energy efficiency—they exclude purely load management programs such as air conditioner cycling, load curtailment, and interruptible rates.

Results for the Case Study Programs

This project selected a number of the California programs as case studies in order to illustrate some of the most important reliability-focused energy efficiency programs implemented in 2001. These programs were designed, modified, and/or ramped-up to address the electricity system reliability concerns noted above. Accordingly, we do not include programs focused on gas savings (although many of the programs in this report did lead to both electricity and gas savings) nor those focused on purely load management (although many of the programs in this report resulted in both kilowatt-hour and kilowatt savings). For each of these programs, we provide a brief case study that contains the following sections: an overview of the program; program modifications during the summer of 2001 in response to reliability concerns; program performance (including kilowatt-hour and kilowatt-hour savings), lessons learned, and sources of program information (including websites, references, and program contacts). This case study information for the individual programs is provided in Appendix C.

Direct Impacts: The group of California programs selected as case studies in this report were very well received, as reflected by the unprecedented level of customer response and vendor/retailer participation. For example, the IOUs committed their funds for the Standard Performance Contracting programs early in 2001 (sometimes as early as in the second quarter of 2001) so that waiting lists had to be developed should additional funding become available. In the residential sector, almost 40,000 refrigerators and freezers were recycled in selected PG&E and SDG&E service areas, and 70,000 in the SCE service area, achieving the highest unit volume since the program's inception in 1994. The IOU residential rebate programs resulted in purchases of ENERGY STAR®-qualified refrigerators, dishwashers, and clothes washers at all-time program highs: e.g., PG&E provided rebates for approximately 100,000 refrigerators (compared to 17,000 in 2000), while SCE paid more than 80,000 rebates (for all ENERGY STAR-qualified equipment), substantially higher than the previous year when only 13,000 rebates were paid in 2000. One national retailer indicated it had sold over 10 million compact fluorescent lamps (CFLs) in California, including 6 million in PG&E's service territory (nearly 2.5 million CFLS with rebates), a 200% increase in sales over 2000. Not surprisingly, estimated market share for CFLs increased from 0.6% to 8.5% during 2001. Light-emitting diode traffic signal penetration levels are expected to rise as a result of the LED programs in 2001, increasing from 26% to 33% on average across the IOU service territories. (Details on these various examples are provided in the case studies in Appendix C.)

Based on available utility filings, together with personal interviews with program staff, we estimate that the group of 12 case study programs listed in Table 3 accounted for over 700 MW and nearly 1.7 million MWh (1,700 gigawatt-hours [GWh]) of savings from activities through the summer of 2001.

Market Transformation Effects: In addition to their direct impacts, it is expected that the success of these programs will lead to significant changes in the marketplace—in some cases, these programs will have "transformed" the market or will lead to market transformation. There is already evidence of these types of effects, such as the following examples.

Table 3: Savings Estimates for California Programs Selected as Case Studies

Programs[1]	$Million[2]	MW Savings Achieved (10/1/01)	MWh Savings Achieved (10/1/01)
2001 Low-Income Energy-Efficiency Program	142.80	7	31,679
2001 Standard Performance Contract Program	27.00	18	103,295
Summer 2000 Energy Efficiency Initiative	72.00	129	283,040
2001 State Buildings and Public Universities Programs[3]	13.50	62	21,922
SMUD's 2001 Enhancements to its Energy Efficiency Programs	16.60	18	63,400
2001 Residential Lighting Programs[4]	26.00	51	234,252
2001 LED Traffic Signals Programs[5]	34.50	23	37,675
Designing Commercial New Construction (2001)[6]	25.50	18	61,333
2001 Residential Refrigerator and Freezer Recycling Program	8.50	11	122,237
2001 Building Code Development and Assistance[7]	NA	262	212,000
2001 Express Efficiency Program	38.60	96	470,948
2001 Statewide Residential Rebate Programs[8]	41.10	14	35,368
Total	**446.10**	**707**	**1,677,149**

Notes:
NA = not available
[1] Source: case studies, based on utility filings for third quarter of 2001 and personal interviews.
[2] For many programs, source of funding is public goods charge and state general fund.
[3] Excludes MWh savings from non-utility efforts since they are unknown.
[4] Excludes costs, and MW and MWh savings from California Conservation Corps efforts since the latter two are unknown.
[5] Excludes MWh savings from non-utility efforts since they are unknown.
[6] Excludes costs, and MW and MWh savings from Oakland's efforts since the latter two are unknown.
[7] Excludes utility efforts since energy savings are not required to be reported.
[8] Savings are for the Residential Appliance Program.

Based on its experience with the city of Oakland's energy efficiency program, the Best Buy company plans to improve the energy efficiency of the design of their stores nationally. Due to the residential lighting programs in California and elsewhere, manufacturers have moved towards smaller CFLs, thus increasing the number of potential sockets and allowing for more retrofits to take place. Due to the program efforts and related work that had been conducted by the utilities prior to the LED traffic signal program, the availability of technical specifications, and the lower cost of LED modules, CEC incorporated LED traffic signal modules into its Building and Appliance Standards; starting in 2003, all traffic signals sold in California must be LEDs and must meet the California Department of Transportation's specification and maximum wattage requirements. The efforts of the utilities and the California Energy Commission to develop new energy efficiency standards for residential and nonresidential buildings will have long-lasting effects in these sectors. Finally, the Summer Initiative developed by CPUC, initially adopted as a "rapid response procedure" in the summer of 2000, represented a significant milestone in the role of CPUC in designing a portfolio of energy efficiency programs for California. Based on this regulatory process innovation, CPUC adopted new energy efficiency policy rules and criteria for utilities and

non-utility parties to use in applying for energy efficiency funding for 2002 and, in some cases, 2003.[17]

The Pacific Northwest

The Pacific Northwest also faced a very serious power crisis during the summer of 2001. A severe draught greatly reduced the availability of hydropower, which forms the backbone of the electricity supply system in this region. California's own power crisis also contributed to problems in the Pacific Northwest since California placed great demands on power exports from this region. Black-outs and large rate increases seemed imminent as the Pacific Northwest looked ahead to the summer of 2001.

Despite the dire outlook, the Pacific Northwest made it through this period with no black-outs and also avoided large rate increases. The region achieved this successful outcome through extraordinary actions taken by electric utilities, state governments, and consumers that greatly reduced demand and increased the availability of supply resources.

The Bonneville Power Administration (BPA) used its central role in the Northwest as a major power producer to lead efforts to reduce demand as a key strategy in addressing reliability and related cost problems. According to John Pyrch, Acting Vice President for Energy Efficiency, the region drew upon its conservation resource through a variety of efforts, including:

- Accelerated and enhanced conservation programs. Programs were implemented sooner than planned and new initiatives were added to existing programs in order to boost participation and impacts.
- Appeals to the public. Governors of the states in the region appealed to customers to reduce electricity consumption by 10% (more details on specific executive actions are given in the "Policy Response" section).
- Appeals to BPA customers. BPA asked customers to reduce demand by 10% to avoid large potential rate increases (250% or more).
- Marketing and conservation awareness campaigns. BPA and other utilities launched a variety of conservation awareness campaigns and marketing programs throughout the region (Pyrch 2001).

The conservation and efficiency impacts achieved as a result of these actions were dramatic. BPA estimates that demand in the Pacific Northwest was reduced by 4,000 MW, broken down as follows:

- 2,500 MW was achieved by curtailment of aluminum smelter operations.
- 300 MW from irrigation load buybacks.

[17] It should be noted that the efficacy of this new regulatory approach is yet to be determined. Also, since this recent CPUC activity is being challenged by the IOUs in regulatory rulemaking procedures, it is too early to say whether this latter change will be a permanent feature of the California regulatory landscape.

- 500 MW from industries' responses to high open market prices (curtailment, self-generation).
- 160 MW from suppliers paying consumers and industries to reduce demand.
- 150 MW from consumers responding to rate increases.
- 390 MW from other responses, including accelerated/enhanced conservation programs, appeals to the public, and other influences.

Most of the above load reductions were achieved by load management—reducing load via curtailments or load shifting. However, energy efficiency still played an important role in this overall effort. Secretary of Energy Spencer Abraham commented, "Utilities and the public responded vigorously to the energy crisis last year [2001]. …Those savings will stretch far into the future in the form of efficient lighting in homes and commercial buildings, energy-saving appliances and other measures."

BPA noted that one of its most successful initiatives was promotion of the sale of compact fluorescent light bulbs in partnership with the Northwest Energy Efficiency Alliance. BPA and its utility customers estimated that about five million bulbs were installed as a result of this program, saving more than 4 MW of power during the year. BPA accelerated many energy efficiency programs to address electricity shortages and rising energy costs. BPA reported that 132 utilities throughout the region are receiving credit from BPA on their wholesale power bills for actions taken to conserve energy (BPA 2002).

One example of BPA's accelerated efforts for energy efficiency is its Conservation and Renewable Discount Program. According to Steve Wright, acting BPA administrator, "When the energy crisis hit, we asked customers to respond quickly, and 20 utilities brought in 54 projects for a total of ten megawatts of savings." (BPA 2002). Other savings achieved through BPA's programs in 2001 include:

- commercial lighting improvements (5 MW)
- vending machines (4.4 MW) (see case study on Vending Mi$er, Appendix C)
- lighting at federal generating facilities (5 MW)
- hatchery and waste-water treatment facilities (1.6 MW)

Other factors also contributed to the success the Pacific Northwest achieved in responding to the tremendous challenges it faced to avoid rotating outages and large rate increases. These include greatly increased public awareness of the problems because of extensive media coverage and the corresponding responsiveness of customers to the challenges they faced.

This dramatic conservation and efficiency response in the Pacific Northwest Energy is especially noteworthy because of the long history of accomplishment in this region for energy efficiency and energy conservation. Since the passage of the Northwest Power Planning Act in 1980, key decisions in this region have been guided by the Northwest Planning Council. This body has long taken an integrated approach to meeting system needs through both demand and supply options. The region has a strong record of investing in

energy efficiency, yet when pressed with impending shortages, the Pacific Northwest still was able to "dig deeper" into the demand-side reservoir and achieve more savings.

Looking ahead, BPA plans to build on the gains made in energy efficiency in 2001. It estimates that energy efficiency will yield 100 MW of new savings in 2002. In ten years, BPA intends to achieve 1,000 MW of savings through funding a comprehensive, long-term conservation strategy. As one measure of its commitment, BPA's Conservation and Renewable Discount Program will be fully operational for its 130 power customers. BPA's budget for this program is $200 million over the next five years.

New York

The state of New York faced a constrained power supply market as it approached the summer of 2001. The forecasted summer peak electricity demand suggested that the system would have a tight reserve margin, particularly in certain areas of the state (e.g., New York City). NYSERDA, along with the New York Power Authority (NYPA), the Long Island Power Authority (LIPA), and the New York Independent System Operator (NYISO), responded to this situation by initiating specific load management and energy efficiency programs.

To garner additional savings from energy efficiency, NYSERDA focused its efforts in three primary areas:[18]

- Commercial and institutional efficiency incentives
- Peak load reduction incentives and emergency demand reduction program (see case study, Appendix C)
- Residential efficiency incentives (Keep Cool, New York Program—see case study, Appendix C)

New York was able to avoid outages and large rate increases in the summer of 2001. The efficiency and load management efforts of NYSERDA, the public power authorities (NYPA and LIPA), and NYISO all contributed to this successful outcome. NYSERDA estimated that its load management and energy efficiency programs yielded a total system peak demand reduction of approximately 263 MW. Of this total, 88 MW are attributable to specific energy efficiency program initiatives. Voluntary appeals and general public response to increased awareness of this problem yielded an estimated additional 2 to 10 MW peak demand reduction, which is not included in the program total above (263 MW).

Brian Henderson, Director of Energy Efficiency Services for NYSERDA, offered a couple of important lessons learned from the summer of 2001 (Henderson 2001).

[18] It should be noted that these three areas were targeted for specific enhancements to address summer 2001 reliability concerns. NYSERDA already offers and manages a comprehensive set of efficiency programs as part of New York's public benefits programs.

- NYSERDA was able to build on its past experience and existing menu of programs to accelerate, enhance, and initiate programs to target near-term needs to reduce summer peak demand.

- NYSERDA found that energy efficiency enhancements provide a peak demand reduction "kicker"—such efforts yield long-term electricity (kilowatt-hour) savings, but also can deliver more immediate peak demand (savings).

Like the Pacific Northwest and California, New York's efforts to address reliability concerns for the summer of 2001 were built on top of a strong, lengthy record of achievement for demand-side management—both load management and energy efficiency improvements. For the period 1990–2000, New York spent a total of $2.8 billion in energy efficiency programs, which yielded cumulative annual electric reductions of 5,834 GWh and 1382 MW peak summer demand (NYSERDA 2001). New York remains firmly committed to continued improvement in energy efficiency through its public benefits programs and related activities. For the period 1998–2006 (the entire duration of both systems benefits funding cycles to date), NYSERDA projects that its programs will achieve a total cumulative peak demand reduction of 858 MW and electricity savings of 11,655 GWh for total costs of $741.7 million.

Overall Impacts from 2001 Efforts

To get some sense of the overall magnitude of effects from the energy efficiency and conservation programs implemented for 2001 in these three key regions, Table 4 presents the projected demand savings impacts from these efforts. While these figures do not represent precise final evaluation data, they should serve as a good indicator of the substantial nature of the contribution that these programs made toward addressing reliability concerns in 2001.

Table 4 clearly demonstrates the success that each of these states and regions achieved in the summer of 2001 in reducing demand through energy efficiency- and conservation-related programs. Certainly the crisis atmosphere faced in these areas contributed greatly to these successes. Regulators, utilities, state government, and key allies led the intensified efforts to reduce demand as a critical strategy to maintain system reliability and avoid large rate increases. Customers—from individual homeowners to large industries—responded positively to the programs and calls for action. It was their collective actions that achieved the impressive results shown in Table 4.

The conditions that existed in the summer of 2001 may have been unique—at least in terms of the severity of potential outages in each area. But assuring the reliability of electrical supply is an ongoing problem as demand continues to grow at rates that stress electricity supply systems. As the states and regions depicted in Table 4 look ahead, they all have taken the lessons learned from the summer of 2001 and applied them to their plans to meet future needs. The experiences of 2001 simply have reaffirmed the effectiveness of demand-side solutions to power system problems in these geographic areas—all which have strong records of past achievement in demand-side management.

Table 4. Estimated 2001 Costs and Impacts from Energy Efficiency and Conservation Related Programs

	Program spending ($million)	Estimated Savings (MW)
California	971	3,668
Northwest	150	390
New York	72	263

Notes

California: CPUC 2001; CSCSA 2002—data obtained from Tables 1–3 of that report, excluding purely load management programs such as air conditioner cycling, load curtailment, and interruptible tariffs.
Northwest: Pyrch 2001—note that the peak savings in megawatts reported for the Northwest is in terms of "average megawatt" demand reductions because the Northwest's hydropower-dominated supply system is constrained by its ability to deliver power over sustained periods, not relatively short peak periods as are fossil-fuel-dominated systems.
New York: Henderson 2001—New York data are for programs administered by NYSERDA only.

The future commitments to energy efficiency and other demand-side strategies by California, New York, and BPA are as equally impressive as the results they achieved in 2001. For example, NYSERDA projects that its programs for the period 1998–2006 will achieve a total cumulative annual peak demand reduction of 858 MW and electricity savings of 11,655 GWh at a total program cost of $741.7 million (NYSERDA 2001).

California's commitment to energy efficiency and demand-side management also remains strong. The Governor's Conservation Team (a multi-agency task force) concluded, "While California enjoyed great success this year in reducing its electricity consumption, continued reductions are needed to reduce the chance of future electricity shortages and to benefit California's economy" (CSCSA 2002). In addition to the continuation of the previously existing public goods charge-funded programs (approximately $275 million in annual funding), a new agency, the California Power Authority (CPA), is receiving $1 billion in revenue bond financing recently authorized for energy efficiency financing projects. CPA is currently working with CPUC, CEC, and other entities to determine the most effective programs to use this funding source.

In the Northwest, BPA is working with its utility customers to fund a long-term conservation strategy to "get off the roller coaster funding cycle" (Pyrch 2001). BPA's strategy is to achieve 1,000 average MW demand reduction through a continued and comprehensive approach to energy efficiency. In Phase 1, BPA plans to achieve a 300 MW "conservation power plant" in three years. As noted by Larry Cassidy, Chairman of the Northwest Power Planning Council, "The energy crisis of 2001 showed us how important it is to reduce our demand for power in the future." He added that the lesson is: "The more we reduce our demand for power, the more we insulate ourselves from the impacts of energy shortages and high prices" (NPPC 2002).

LONG-STANDING COMMITMENTS TO ENERGY EFFICIENCY PROGRAMS AS A MEANS TO HELP ASSURE ELECTRIC SYSTEM RELIABILITY

Using energy efficiency programs to address reliability concerns is not a new development. In this report, the main focus is describing the programs that addressed near-term reliability concerns for the summer of 2001 through accelerated, enhanced, and targeted efficiency programs. However, while many states and regions of the United States did not face pressing reliability problems during this time, some of these geographic areas continued to rely on the implementation of energy efficiency programs as one means of assuring that these areas would not face the types of reliability problems experienced elsewhere. In fact, some of these states point to their long records of achievement in demand-side management (which included energy efficiency programs) as a key reason their power systems have remained reliable and economical without the type of headline-grabbing problems experienced elsewhere.

In this section we note a few examples of states that have significant records of achievement with energy efficiency programs, which have helped their utility systems avoid reliability problems. This is not an exhaustive or complete survey but just a small, representative sample. The intent is to complete a full picture of how energy efficiency can be used to address both near-term and long-term reliability. In addition to the examples below, some other states that could be included in this group are Connecticut, Florida, New Jersey, Oregon, Rhode Island, Vermont, Washington, and Wisconsin. These states generally established and implemented integrated resource planning and demand-side management sometime in the 1980s or early 1990s. The efficiency and load management programs that resulted have yielded significant savings for their utility systems. Such savings have helped maintain adequate reserve margins and assure ongoing reliable power supplies. In some of these states that still have experienced reliability problems, it is likely that the savings from energy efficiency programs have lessened the severity of the problem and may have provided the margin needed to keep the system from failing.

Minnesota

Minnesota is a state with a long record of accomplishment in using energy efficiency as part of an integrated approach to its utility planning and operation. Minnesota's experience with efficiency programs began in 1983 when it first required its utilities to offer "Conservation Improvement Programs." A subsequent 1991 Energy Omnibus Bill defined specific dollar amounts (as a percentage of total revenues) that utilities are required to invest in these programs. This bill also created financial incentives for the utilities to achieve the conservation targets established in these programs. These changes gave a significant boost to the effectiveness and ultimate savings impacts of the programs.

Minnesota's Conservation Improvement Programs have yielded impressive savings results. Since their inception, the programs have achieved about 1,400 MW in peak demand savings and about 3,000 GWh of electricity savings (Strom 2001). These programs comprise an important element of Minnesota's integrated resource planning, which requires utilities to submit long-range plans (15 years) every two years that address meeting projected forecasts

through both demand and supply options. Minnesota's utilities also have applied specific load management strategies and technologies to help assure reliable power supply, such as controlling residential air conditioning load via remote switching.

Minnesota has maintained reliable and affordable electricity through these efficiency and load management efforts, as well as effective management of its generation and supply resources. Minnesota has maintained or exceeded the minimum reserve margin (about 16%) required by the Mid-America Power Pool (MAPP). Minnesota recently examined the future of its electric utility system. The findings are summarized in a report released by the Minnesota Department of Commerce*, Keeping the Lights On: Securing Minnesota's Energy Future* (MDOC 2000). A key conclusion of this collaborative public process was that a move to retail competition in Minnesota would be "unwise." It found no compelling reasons for such a dramatic change to the system in Minnesota that has worked so well to provide reliable, economical power—a system that also has made significant progress in reducing environmental impacts and improving the overall efficiency of energy use among households, businesses, and industries.

Minnesota has enacted significant new energy legislation, the Energy Security and Reliability Act (2001 Minnesota Laws, CH. 212), that includes numerous provisions to improve the electric utility industry in Minnesota without adopting retail competition. Among these provisions are several requirements that support energy efficiency, such as a requirement that all new state buildings are built according to sustainable guidelines and that all public buildings establish and implement an energy conservation plan.

Looking ahead, the Department of Commerce's *Minnesota Energy Planning Report* forecasts that even with continued levels of conservation programs, the state needs to provide resources to fill a projected 2,000 MW capacity shortfall. The report notes:

> Care must be taken not to reduce our focus on energy conservation. Any increased efforts to conserve will benefit the system, ratepayers and the environment. Any decrease in efforts will increase the projected capacity shortage. (MDOC 2001)

Minnesota clearly sees the benefits of supporting programs that can yield greater levels of energy efficiency in its economy. The state is building upon nearly 20 years of experience with its conservation programs to continue to use energy efficiency as a means to address growing demands and maintain system reliability.

Massachusetts

Massachusetts has a long record as a leader in the successful deployment of demand-side management to help maintain and provide reliable, economical electricity. Since the late 1980s, electric utilities in Massachusetts have worked in cooperation with the Massachusetts' Department of Telecommunications and Energy (DTE) and other stakeholders in the design and delivery of comprehensive demand-side programs and services. In the late 1980s, Massachusetts and other New England states faced rapidly increasing demand for electricity,

which threatened to exceed supply and adversely affect the corresponding reliability and cost of the system. A major program for new major central generating stations was planned. Consumers and environmental groups responded by examining the situation and producing an important policy report, *Power to Spare* (New England Energy Policy Council 1987), that presented an alternative vision of New England's energy future, with much greater energy efficiency practiced by households, businesses, and industries.

Massachusetts responded to this alternative vision by enacting comprehensive demand-side management programs. The major utilities in four New England States (Massachusetts, New Hampshire, Rhode Island, and Connecticut) have invested close to $1 billion and realized nearly $3 billion in electricity savings in the commercial/industrial sectors alone (Boston Edison 1999). These utility and related energy efficiency efforts helped avoid the types of reliability problems faced elsewhere in the United States in the summer of 2001. In the residential sector, utilities' programs in Massachusetts achieved average annual energy savings of 72 GWh for the period 1995–1999. Commercial and industrial programs over this same period achieved average annual energy savings of 181 GWh. Such significant electricity savings also provide significant reductions in peak demand.

While Massachusetts has an impressive record of past achievement, it recently confirmed its commitment to energy efficiency while looking ahead to future system needs. Massachusetts has restructured its electric utility industry. During the initial transition to a restructured market, the state maintained a public benefits charge to continue funding for energy efficiency and related programs. Under the leadership of the Massachusetts Division of Energy Resources (DOER), research was conducted to examine the potential for additional improvements in the energy efficiency of the Massachusetts economy. This research (RLW & SFMC 2001) concluded that while Massachusetts had made significant gains in energy efficiency as the result of past programs, there remained significant potential for continued improvements. This research estimated that residential programs could continue to achieve an average of 67 GWh of savings each year for the period 2003–2007. For the commercial and industrial sectors, the research similarly estimated that programs could achieve about 170 GWh per year.

Massachusetts' commitment to energy efficiency has been continued in recent legislation signed into law on February 28, 2002 by the governor. This law (House 4006) mandates that:

> For the period January 1, 2003 through December 31, 2006, investor owned electric companies in Massachusetts shall collect 2.5 mills for each kilowatt-hour sold and invest it in energy efficiency activities.

DOER estimates that about $585 million will be collected over this five-year period, or an average of about $117 million per year. This action clearly demonstrates that Massachusetts is a prime example of a state that has established and reaffirmed its commitment to energy efficiency as a key strategy for meeting current and future customer needs for reliable, economical electricity.

Iowa

The Iowa Legislature in 1990 passed legislation that required the state of Iowa to create *The Iowa Comprehensive Plan,* a long-term planning document for Iowa's electric utility industry. Updates of progress towards the objectives given in this plan are published every two years. In this plan, the state of Iowa has established two goals for effectively managing its energy resources:

1. To meet all future demand for energy by increasing efficiency rather than supply; and
2. To increase the use of alternative energy resources from 2% of Iowa's total energy resource consumption to 5% by the year 2005 and 10% by 2015.

This 1990 law required Iowa's electric and gas utilities to spend 2% of gross revenues on demand-side management programs. This law resulted in the development and implementation of comprehensive demand-side management programs—including energy efficiency—that offered services to all customers.

A 1996 law that was intended to be a precursor to more comprehensive restructuring legislation dropped this spending requirement. Instead, the Iowa Board of Public Utilities was to perform a comprehensive energy efficiency feasibility study to assess the potential for demand-side management and establish goals for utility demand-side programs. As the movement and investigation of comprehensive restructuring intensified in the late 1990s, this activity sidetracked completion of the DSM feasibility/potential study. Consequently, no DSM goals were established. Utilities mostly maintained the pre-1996 levels of spending and DSM program activity, although some momentum was lost.

Legislation to restructure Iowa's utility industry and introduce retail competition failed in 2000. It is unlikely to be proposed again in the near term. Since this failure, the Iowa Board of Public Utilities has begun to re-examine efficiency as a preferred resource option and is now working to implement the 1996 legislation. The Board expects to complete its demand-side management feasibility study sometime in 2002 and use it to establish utility demand-side goals.

Iowa has enjoyed economical, reliable power supply throughout the 1990s and into the 2000s. Iowa has established and maintained a strong commitment to energy efficiency as a resource that has contributed to this desirable outcome. The state remains committed to this course and is re-emphasizing its efforts to improve the energy efficiency of its households, businesses, public facilities, and industries.

Summary

Earlier in this report it was explained that the focus of this project was on energy efficiency programs "specifically designed, modified, and/or ramped-up to address electric system reliability concerns" and that this focus led to the exclusion of programs from some states that had more of a long-term, steady commitment to energy efficiency and hadn't needed a short-term accelerated response. The purpose of this section of the report was to

give recognition to states[19] that have had that kind of steady commitment and to acknowledge that helping to assure the reliability of the electric system is one of the important benefits of that type of approach.

[19] It should be noted that the selection of the three states described in this section is not meant to imply that these are the "best" of this category of states. They were merely selected to be illustrative examples.

CONCLUSION

Heading into 2001, ACEEE recognized that the year would be a time of remarkable challenges for the U.S. electric system. In response, ACEEE launched this project to locate, identify, and describe noteworthy examples of reliability-focused energy efficiency programs that were implemented for the summer of 2001 (i.e., energy efficiency programs that were specifically designed, modified, or ramped-up to address electric system reliability concerns during that time).

Identification of Programs

The fundamental objective of the project was successfully completed. A substantial pool of reliability-focused energy efficiency programs was identified, and a total of 22 programs were selected for presentation as case studies in this report. This group of programs reflects a great deal of diversity, encompassing 10 different states and representing a wide variety of program approaches, customer sectors, and administrative organizations. Clearly, if policymakers, regulators, and/or utilities are looking for energy efficiency programs that can be used to help respond to electric system reliability concerns, there are a number of interesting examples to examine.

Lessons Learned

Many lessons were learned during the design, implementation, and preliminary evaluation of these programs, and these lessons are described in the individual case studies. In addition to program-specific lessons, more general lessons were found that should be of value to program managers and policy makers around the country who need to design and implement programs to reduce energy demand very quickly. The following are some of the lessons cited by program administrators in their interviews with project staff:

1. Select programs that are practical and realistic, and that can be designed and implemented quickly and easily.
2. Be realistic about estimated program impacts—don't over-promise; rather, over-deliver.
3. Select programs that either are based on proven designs or otherwise are highly certain of achieving goals. Some innovation and experimentation can be useful, but not as the backbone of a menu of programs.
4. Initiate effective marketing and media campaigns, which are essential to large-scale program success.
5. Establish and incorporate effective evaluation plans, including protocols and provisions for measurement and verification.
6. Establish streamlined, "user-friendly" processes both for participation in programs and for selection of any program contractors.

7. Take advantage of the tremendous opportunities that arise during times of public crisis and high visibility to expand the promotion of energy efficiency to affect more long-term, sustainable changes in the market for energy efficiency products and services (e.g., use the opportunity to leverage improved building codes).
8. Use as many tools as you can for promoting energy efficiency, including rebates, other types of financial incentives, marketing, rate levels and structures, education, and program outreach. Build on and use existing program experience.
9. Coordinate efforts with key market participants—especially retailers and manufacturers—in advance in order to help ensure an adequate supply of energy efficiency equipment.
10. Try to provide a strong base of consistent support for energy efficiency so that efforts don't have to begin from scratch when reliability concerns arise. (In particular, California's extensive experience and infrastructure in these areas helped provide the necessary platform for obtaining the significant results achieved in 2001.)

Program Impacts

In terms of the quantification of program impacts, one of the lessons learned from this project is that even in the case of programs implemented quickly to address near-term reliability concerns, the measurement and reporting of actual evaluation results takes a considerable amount of time. In almost all cases, the formal evaluation results of the programs selected as case studies in this project were not yet available at the time of this report. However, most of the programs did have information on projected kilowatt-hour and kilowatt savings, using engineering estimates based on actual completed measures. Whatever information was available is provided in the individual case study descriptions. Those interested in further information are encouraged to communicate with the program contact sources identified in the case studies.

Policy Implications

A number of findings from this research may have useful policy implications. Among the more important observations from this study are the following:

- Electric reliability concerns were fairly widespread. A total of 21 states, representing most regions of the country, reported reliability problems or "close calls" during 2001.

- While use of load management programs is almost universal (45 out of 51 jurisdictions), the reported use of energy efficiency programs as a deliberate strategy to help with electric reliability is much more limited (7 states at most).

- There appears to be a fairly widespread lack of conceptual differentiation between energy efficiency and load management, even among the senior regulatory staff (Electric Division Directors or their equivalent) targeted in this study. When asked if utilities in their states had programs "particularly designed to save energy to help with electric system reliability this summer," respondents from 25 states said yes—but

three-fourths of those respondents only cited load management programs as their examples.[20]

- The results suggest that the potential for the use of energy efficiency programs to help address electric reliability concerns may be greater than is currently being realized. Although 21 different states indicate that they had reliability problems or close calls during 2001, only seven states report that they are presently using energy efficiency programs as a deliberate strategy to help improve electric system reliability.

- In terms of preparation and readiness, it appears that having an established program infrastructure in place for pursuing energy efficiency is extremely important in providing the ability to roll out accelerated programs in an emergency. Existing institutions with authority and experience are crucial to achieving a rapid ramp-up of activity in the field.

Final Comments

One of the key goals of this project was to provide information to policymakers, regulators, utilities, and other interested parties regarding the potential role of reliability-focused energy efficiency programs in helping to address electric system reliability concerns. The 22 case study programs documented in this report provide a concrete illustration of how such programs are being used in a number of states around the nation.

In reviewing these programs, it is useful to keep in mind that there are of course multiple policy objectives for these programs, such as avoiding blackouts, saving energy, reducing customer bills, providing environmental benefits, reducing the market power of suppliers, etc. Different technologies and programs in the case studies may be better suited for different aspects of those objectives. However, the ability to contribute to the reliability issue is a very salient underlying theme that unites this collection. Hopefully the program examples given in this report, and the lessons learned from their experience, can help expand the effective use of energy efficiency as one strategy to help enhance electric system reliability, while capturing many of those other objectives in the process.

[20] This seems to correspond with other recent research by ACEEE (Kushler & Witte 2001) that found that load management appeared to be the "default" choice for demand-side response by utility companies, and that special policy emphasis was necessary to make energy efficiency programs happen.

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APPENDIX A: 50-STATE SCREENING SURVEY INSTRUMENT

[State: _____]

STATE SURVEY TO IDENTIFY PROGRAMS

Fill in once completed:

State: _____
Person: _____ Agency: _____
Phone #: _____ Date completed: _____

Can you tell me who I should talk to in order to find out about any electric energy efficiency or demand-side management programs operated in your state?

Name: _____ Phone #: _____

Also get name of person making the referral, if possible: _____

[Once you have correct person:]

Hello. I was referred to you by _____. This is _____ _____ from the Center for Energy and Environment in Minnesota, and we are assisting in a national study of state and utility responses to electric system reliability concerns this summer.

We are calling the public utility commissions in each state in order to identify any utility or state programs that are particularly designed to save energy to help with electric system reliability this summer. Do your utilities, or your state, offer any programs of this type?

[If asked for more explanation: i.e., programs that are designed to provide good summertime electricity savings.]

Yes ____ **[Go to 1a.]**
No ____ **[If no:** Do your utilities offer any energy efficiency programs?
Yes ___ **[Go to 1a.]**
No ___

Not sure ____ Can you tell me who I should talk to about this?
Name: _____ Phone #: _____

1. a.) **[if yes]** What programs are those? **[if numerous, see if you can get a written list, annual report, etc. But still get info. on key programs below.]**

[Get program names and a brief description, and who offers them, and contact number.]

Program 1. name: _____
Description:_____
_____
Who offers: _____

Contact person: _____ Phone: _____

Program 2. name: _____
Description:_____
_____
Who offers: _____
Contact person: _____ Phone: _____

Program 3. name: _____
Description:_____
_____
Who offers: _____
Contact person: _____ Phone: _____

Note: If they only mention load management type programs (e.g., load curtailment, time of use rates, etc.) ask:

Do they have any energy efficiency type programs to reduce summer electricity use?

Program 4. name: _____
Description:_____
_____
Who offers: _____
Contact person: _____ Phone: _____

Program 5. name: _____
Description:_____
_____
Who offers: _____
Contact person: _____ Phone: _____

[When they are done listing programs, ask:

1. b.) Can you think of any other programs or policies in _____ [state] that are designed to help with electricity system reliability by reducing electricity use? **[If yes, describe below.]**

Program/policy name: _____
Description:_____
_____
Who offers: _____
Contact person: _____ Phone: _____

1. Has your state experienced any electric system reliability problems this summer?

[e.g., blackouts, brownouts or voltage reductions, transmission and/or distribution failures due to high loads, etc.]

Yes ____
No ____
Don't know _____

[If yes: Please describe what those problems have been.

_____
_____
_____

[If no: Have there been any close calls?

Yes _____
No _____
Don't know ____

[If yes: Please describe. _____

2. Finally, I'd like to ask you to rate what the general perception among regulators and policymakers is in _____ **[state]** of the reliability of your electricity system over the next couple of years. Would they say _____ **[state]** has:

[read choices:

a. more than enough system capacity to meet demand
b. adequate system capacity to meet demand
c. just barely enough system capacity to meet demand
d. not enough system capacity to meet demand

THAT'S ALL THE QUESTIONS WE HAVE. THANK YOU VERY MUCH FOR YOUR HELP WITH THIS SURVEY.

APPENDIX B: SAVINGS ESTIMATES FOR CASE STUDY PROGRAMS

(see Appendix B.xls)

Appendix B Notes

NA= Not Available

(1) Source: case studies, based on utility filings for third quarter of 2001 and personal interviews
(2) For many programs, source of funding is public goods charge and state general fund
(3) Excludes MWh savings from non-utility efforts, since they are unknown
(4) Excludes Costs, MW and MWh savings from California Conservation Corps efforts, since the latter two are unknown
(5) Excludes MWh savings from non-utility efforts, since they are unknown
(6) Excludes Costs, MW and MWh savings from Oakland's efforts, since the latter two are unknown
(7) Excludes utility efforts, since energy savings are not required to be reported
(8) Savings are for the Residential Appliance Program

APPENDIX C: CASE STUDIES OF RELIABILITY-FOCUSED ENERGY EFFICIENCY PROGRAMS

California Investor-Owned Utilities' 2001 Low-Income Energy-Efficiency Program

SUMMARY

In 2001, the Low-Income Energy Efficiency (LIEE) Program offered free energy-efficiency services to low-income households. In some cases, homes were serviced with stand-alone electric measures (refrigerators, compact fluorescent bulbs, evaporative coolers); in other cases, the home was assessed and treated with all feasible weatherization measures. Where possible, customer homes were serviced with all eligible measures: e.g., weatherization measures and appliances (refrigerators, evaporative coolers, furnace repair and replacement). In 2001, legislation was passed (SBx1-5) that provided additional funding under a Rapid Deployment program. Under this program, several measures were added to the list of measures provided to low-income customers, including: energy-efficient replacement air conditioners (room or central), duct sealing and repair, whole house fans, energy-efficient replacement water heaters (gas or electric), set back thermostats, and evaporative cooler maintenance.

PROGRAM OVERVIEW

The LIEE Program helps low-income customers reduce their energy consumption and costs while increasing their comfort and safety, thereby reducing energy-related hardship. In 2001, the program provided free home weatherization services, energy education, and energy-efficient replacement appliances to qualified low-income customers. Eligibility for LIEE was based on household size and household income. Income guidelines are set at 175% of the Federal income poverty guidelines (with income adjustments for family size). The qualifying criteria were 200% of the Federal poverty guidelines for heads of households who were 60+ years old and/or permanently disabled.

Weatherization included, where feasible, the following measures for any eligible single-family, multi-family, or mobile home dwelling unit: attic insulation, caulking, weather stripping, low-flow showerhead, water-heater blanket, and door and building envelope repairs that reduce air infiltration. Weatherization also included other building conservation measures, energy-efficient appliances, and energy education programs. The following building conservation measures were also included in the utilities' LIEE programs: attic venting, attic access weatherstripping, evaporative cooler covers, outlet gaskets, water heater pipe wrap, faucet aerators, and compact fluorescent lights. Hard-wired porch light fixtures were also available to those who owned their home. A list of eligible measures for each utility is provided in Table 1.[21]

[21] All four investor-owned utilities offered the same list of measures, except for furnace filters—the only measure that only PG&E offered.

Table 1. List of Measures in LIEE Programs

		SCE/SCG Overlap Area (1)			
Measure	**SCE Non-Overlap Area (1)**	**SCG Program**	**SCE Program**	**SDG&E**	**PG&E**
Attic Insulation	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Low-Flow Showerheads	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Water Heater Blankets	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Door Weatherstripping	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Caulking	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Outlet gaskets	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Faucet aerators	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Pipe wrap	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Evaporative coolers	**Yes (2)**	**No**		**Yes (2)**	**Yes (2)**
Furnace repair/replacement	**Yes**	**Yes**	**No (6)**	**Yes**	**Yes**
Refrigerator replacement	**Yes**	**No**	**Yes (5)**	**Yes**	**Yes**
Attic ventilation	**No (4)**	**No (4)**	**No (6)**	**Yes (3)**	**Yes (3)**
Evaporative cooler covers	**No**	**Yes**	**No (6)**	**Yes**	**Yes**
Hard-wired CFL Porch Light Fixtures	**Yes**	**No**	**Yes (5)**	**Yes**	**Yes**
Thread-in CLF	**Yes**	**No**	**Yes (5)**	**Yes**	**Yes**
Furnace Filter Replacement	**No**	**No**	**No**	**No**	**Yes**
Duct Register Sealing	**No**	**No**	**No (6)**	**Yes (7)**	**No**

1. In certain parts of California, SCE and SCG serve the same customers ("overlap area"), while in other parts SCE operates the program by itself ("non-overlap area").
2. PG&E offers a portable evaporative cooler, while the other electric utilities offer a window/wall unit.
3. Offered in conjunction with attic insulation, and as a measure on a pilot basis.
4. Offered only in conjunction with attic insulation.
5. Not offered by SCG, but offered by SCE outside the jointly administered SCG/SCE program.
6. Offered to SCE customers by SCG under joint utility agreement.
7. Mobile homes only.

The refrigerator replacement component of the program provided free energy-efficient replacement refrigerators to low-income customers who owned their refrigerator and whose refrigerator was at least 10 years old. Two refrigerator sizes, 14 and 18 cubic feet, were offered to customers based on existing refrigerator size. This service included delivery, installation, and the environmentally safe appliance removal and recycling of the inefficient units being replaced. The utilities also provided portable evaporative coolers to owner-occupied units with existing inefficient air conditioning in warm, dry climates where this technology is most cost effective. The Southern California Edison Company (SCE) also provided evaporative coolers to renters in these dwellings.

Energy education was provided to customers to help them understand how they use energy and provided them with specific strategies to reduce their costs. For example, in 2001, some of the utilities offered one home visit and a follow-up mailer to reinforce the energy-efficiency concepts. Others offered in-home energy education as well as workshops conducted on-site through various community-based organizations.

The LIEE program was marketed primarily through program implementation contractors and community-based organizations. Each utility could add other marketing features. For example, the utilities sent public speakers to local community fairs and other local

community events. In the Southern California Gas Company's (SCG) service territory, a Spanish language television station ran a feature story of their LIEE program, showing a home being weatherized. And in the Pacific Gas and Electric Company's (PG&E) service area, the program was also mentioned during television and radio advertisements related to blackouts (but PG&E did not pay for LIEE-specific advertising).

While the utilities administered the program, LIEE contractors, which included private contractors and community based organizations, delivered the weatherization and energy education services. Hence, some contractors conducted some outreach through targeted marketing efforts (the utilities provided names of participants in their CARE programs to contractors for marketing the LIEE program, since CARE used the same base income guidelines as LIEE), while others canvassed low-income neighborhoods.

All four major investor-owned utilities (IOUs) operate LIEE programs. Including the mid-year energy-crisis-inspired additions to the program under the California Public Utilities Commission's (CPUC) rapid deployment strategy, the 2001 LIEE program was funded at $142.8 million (PG&E: $62.1 million; SCE: $29.6 million; SCG: $38.3 million; and SDG&E: $12.8 million).

SUMMER 2001 AND RELIABILITY

Under Decision 01-05-033 (May 3, 2001), the CPUC mandated a Rapid Deployment (RD) effort under the LIEE program and specified particular measures that it wanted to see implemented. In 2001, State Legislation (SBx1-5) provided additional funds that the CPUC allocated to the four IOUs to implement its rapid deployment strategy. Although the weatherization program offered after May 2001 is a mix of regular LIEE program and RD measures, at least one utility program manager believed that the CPUC looked at this program primarily as an RD program. The RD measures included: high-efficiency window/wall air conditioners, high-efficiency central air conditioners, high-efficiency gas water heaters, programmable and setback thermostats, duct repair and sealing, whole house fans, and evaporative cooler maintenance. Guidelines were changed for other appliances (refrigerators and air-conditioners): e.g., under the RD programs, renters, who did not own their refrigerator or evaporative cooler, could also obtain these measures for free, except when the landlord owned the appliance and paid the energy bill for the dwelling. Further, renters and homeowners could receive gas water heater replacements under SCG's water heater replacement program. In 2001, electric system reliability became an explicit feature of this program when the CPUC added measures that would reduce peak energy use in a short period of time, as part of its rapid deployment strategy.

PROGRAM PERFORMANCE

According to PG&E's program manager, PG&E's 2001 rapid deployment efforts started out slowly. The RD strategy was adopted in May 2001, and it took time to develop new contracts between the CPUC and the utilities: rapid deployment measure installation specifications had to be written, contractors had to be trained to follow installation standards, new measures had to be described to customers, and a sufficient supply of refrigerators, air

conditioners, water heaters, etc. had to be obtained. According to SCE's program manager, the rapid deployment strategy was possibly an easier rollout for a single-source electricity utility. While pilot programs were added to the mix of measures offered, a majority of the funds were utilized to expand existing programs. Currently, the utilities' LIEE programs are operating pretty much at full speed and will continue to do so until RD funding is exhausted at the end of 2002.

The LIEE and RD programs achieved substantial energy savings: 31, 679 MWh, 6.7 MW, and 1,262,039 therms (as of October 31, 2001).

Table 2. Estimated Energy Savings for LIEE Programs (as of Oct. 30, 2001)

	MWh	MW	Therms
PG&E	11,704	1.4	609,242
SCE	16,014	4.3	0
SDG&E	3,961	1	138,983
SCG	0	0	513,814
Statewide Program Total	**31,679**	**6.7**	**1,262,039**

LESSONS LEARNED

According to PG&E's program manager, it is difficult to implement a new energy-saving program, or significantly expand an existing program, in a short amount of time. The LIEE rapid deployment strategy treated the whole house with all measures that were feasible to install, in contrast to energy-efficiency rebate programs that rebate single measures after the homeowner has installed them. This takes a long time especially if electrical contractors are needed to install some of the electric measures, as experienced in the rapid deployment approach. The utilities needed time to design implementation processes for the rapid deployment strategy. This meant the LIEE program did not produce energy savings as rapidly as some of the other utility programs. The LIEE programs were originally mandated by the legislature to ensure that low-income Californians who pay for energy-efficiency programs in their rates, but who cannot afford to buy energy-efficient appliances and other measures, are able to help reduce the state's energy usage. Adding electric appliance measure replacement to the programs to increase electric peak load reduction under the CPUC's rapid deployment strategy helped to address the energy crisis, but the program's whole house approach may not have been the speediest way to reduce statewide peak electric demand.

In the case of SCE, the rapid deployment strategy did not present the set of problems experienced by dual-fuel utilities. Since the limited number of low-income customers living in all-electric homes restricts the number of homes receiving weatherization, stand-alone electric measures (such as refrigerators, evaporative coolers, and air-conditioning systems) comprised the bulk of measures and savings for customers.

There were also state energy-efficiency programs that were targeted to low-income customers: e.g., federal weatherization and bill assistance programs administered by the State Department of Community Services and Development (CSD). The utilities were encouraged by the CPUC to work with these state programs to leverage resources. PG&E's program manager felt that this was a difficult task, since CSD agencies operating in PG&E's service

area also received a large budget increase under SBx1-5to implement additional LIEE measures under its CAL-LIHEAP weatherization program. Therefore, there was pressure on each agency to spend all of its authorized funding within specific time frames or risk losing the funds. It was difficult to work out leveraging arrangements because many of the agencies were not staffed to complete their utility/state goals simultaneously and were placed in the position of having to choose which goal to focus on and which to set aside.

The case was different for some of the other utilities. For example, the San Diego Gas and Electric Company (SDG&E) was already contracting and leveraging resources with local CSD agencies under its regular LIEE program, so the rapid deployment strategy and new state CAL-LIHEAP funding didn't cause any problems in SDG&E's service area. SCE was able to coordinate the delivery and installation of refrigerators with state-funded agencies in several ways. SCE purchased refrigerators in bulk and provided these refrigerators to state-funded agencies at lower prices than they could obtain these products in the retail market. In addition, SCE provided refrigerators to these same agencies at no cost, provided the state would pick up the costs for installing and grounding the refrigerator.

FUTURE

There will be an evaluation of the rapid deployment strategy in 2002. Low-income RD programs are still operating and will continue in 2002 until the money runs out—probably through the first quarter of 2003.

WEBSITE

PG&E website: www.pge.com/001_res_svc/fin_assist_index.shtml
SCE website: www.sce.com
SDG&E website: www.sdge.com
SCG website: www.socalgas.com

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California Investor-Owned Utilities' 2001 Standard Performance Contract Program

SUMMARY

In 2001, the Standard Performance Contract (SPC) program was a performance-based program that offered incentives (posted price) to customers or Energy Efficiency Service Providers (EESPs) for installation of energy-efficient equipment at customer facilities. The SPC was standardized statewide, and included incentive levels, procedures, and contracts, with some program differences to reflect different service territory needs. Incentive levels were based on measure end use and the type of energy-savings verification plan. In 2001, the Summer Initiative program in this area did not add funding but did change the scope of the program to increase peak energy savings from the program: (1) additional incentives were offered for peak demand reductions; (2) the requirement for measurement activity was waived; and (3) the application forms and the application review process were simplified.

PROGRAM OVERVIEW

The Standard Performance Contract Program was a standard offer, pay-for-performance energy-efficiency incentive program. The program offered fixed-rate incentives (posted price) to customers or EESPs for energy-efficiency measures that produced verified (measured) energy savings at commercial and industrial facilities. Incentive levels were based on measure end use and the type of energy-savings verification plan. The program was a standardized statewide program that featured standard procedures, pricing, and contract. The Pacific Gas and Electric Company (PG&E), the Southern California Edison Company (SCE), and the San Diego Gas and Electric Company (SDG&E) administered the program; there were some program differences to reflect different service territory needs. The utilities promoted and administered the program with EESPs, and utility account services representatives promoted energy-efficient projects to customers. There were some mailings and "customer events," and for the mass market, direct mailings and website marketing were used.

The program contained two components: one for large customers, and another for small customers. The Large Customer SPC (LCSPC) Program was similar to the Small Customer SPC (SCSPC) Program, except the former targeted large commercial, industrial and agricultural customers (greater than 500 kW or 250,000 annual therms), EESPs, contractors, and engineering firms, while the latter targeted small and medium commercial, industrial, and agricultural customers with electric demand equal to or less than 500 kW or 250,000 annual therms (a customer may self-sponsor a SCSPC project in 2001). The SCSPC Program paid higher incentives (10-20%) than the LCSPC Program.

The program has been in operation since 1998 with a primary focus on energy savings. The program started out as a collaborative between the California Public Utilities Commission (CPUC) and the utilities. Non-utility stakeholders started participating in public forums in the late 1990s.

SUMMER 2001 AND RELIABILITY

Electric reliability was an explicit concern behind the revision of this program. Beginning in 2000, with the onset of generation shortages and reliability concerns, certain changes were made to the program to emphasize load reductions: additional incentives were offered for peak demand reduction. For example, the utilities offered additional financial incentives for installations completed before Summer 2001, and payments for peak demand savings were added (an average of $100/kW in addition to the energy-savings incentive). The application forms and the application review process were also simplified.

Until 2001, a formal evaluation methodology and a two-year measurement activity were normally required of participants. However, in 2001, the requirement for extensive measurement activity was waived. Instead, savings were estimated prescriptively; there was some run-time measurement, but no long-term metering. Savings estimates are now based on calculations for each project—conducted by the customer and reviewed by the program administrator. This option eliminates the need for extensive field monitoring of energy savings. About 80% of utility applications received used this calculated method. In contrast to previous years, where savings were "trued up" based on measured results, there is now no follow-up measurement, so that estimated savings are not changed after a project is implemented.

In 2001, the budget for the LCSPC Program was $23.7 million, and the budget for the SCSPC was $3.3 million (funds for this program had been shifted over to the LCSPC). These funds were Public Goods Charge monies, and they represented the average amount over the last four years.

Table 1. Budgets for SPC Programs

	Authorized Budget PY 2001 ($ millions)	
	LCSPC Program	SCSPC Program
PG&E	13.21	1.00
SCE	6.5	1.5
SDG&E	4	0.81
Statewide Program Total	**23.71**	**3.31**

PROGRAM PERFORMANCE

The demand for this program is very strong. In PY 2000, the program achieved its largest level of participation (e.g., PG&E received 348 applications, 60% more than the previous year, and SCE received 287 applications). In PY 2001, the program budget was reduced as compared with PY 2000, and the program was subscribed early:[22] PG&E and SCE committed their LCSPC funds in the second quarter, and SDG&E committed their LCSPC

[22] In 2001, the California Public Utilities Commission (CPUC) placed a high priority on securing energy-efficiency projects that could be installed prior to June 2001, thereby resulting in maximum summer peak demand reduction. Since the SPC program is more appropriate for the more complicated and longer lead time projects, emphasis was placed on providing ample incentive dollars for programs designed for quick application approval and project completion (e.g., Express Efficiency). Hence, the budget for the SPC program for 2001 was less than for 2000. If the budgets for 2000 and 2001 had been the same, it is likely that the programs would have been fully subscribed, as reflected in the extensive wait list for this program.

funds in the third quarter. PG&E, SCE and SDG&E committed their SCSPC funds in the second quarter. A projects wait list has been developed should additional funding become available.

The mix of projects was about the same for 2001 as in past years, but there was an increase in the applications for incentives, earlier in the year. There was a slight increase in the number of projects completed before and during the summer.

As shown in Table 2, a significant amount of energy was saved, with the largest customers saving the most energy: as of Sept. 30, 2001, 82,657 MWh and 13 MW were saved in the LCSPC Program, and 20,938 MWh and 4.7 MW were saved in the SCSPC Program.

Table 2. Estimated Electricity Savings for SPC Programs (as of Sept. 30, 2001)

	MWh		MW	
	LCSPC	**SCSPC**	**LCSPC**	**SCSPC**
PG&E	36,515	5,488	5.14	1.53
SCE	28,554	7,948	4.82	1.56
SDG&E	17,588	7,502	3.06	1.61
Statewide Program Total	**82,657**	**20,938**	**13.02**	**4.70**

LESSONS LEARNED

This program could have achieved significantly more savings if more funds were available. The program was over-subscribed, and the utilities had waiting lists of customers interested in participating in the program. The added payments for the peak reduction savings were an important contributor to this over-subscription, as well as the simplification of forms and the reduction of monitoring and verification requirements. In particular, the introduction of the calculated savings approach in 2001 encouraged more self-sponsorship. In the past, several customers did not have the expertise to address the M &V activities, and if they did not want to use a third-party sponsor, they simply chose not to apply for SPC incentives. Finally, another reason for the increase in participation was that customers and third parties had been familiar with the SPC program since the late 1990s, resulting in repeat business by some applicants.

According to the SCE program manager, incentives were very instrumental in obtaining participation. However, the ability of incentives to change practices may not be the most effective way of making change for some customers, because it is prohibitively expensive to change. You can get customers' attention, but it is difficult for some customers to come up with their part of the money to get something done quickly. Thus, for some large commercial and industrial customers, the increased incentives did not change their investment behavior. Their projects were very capital intensive, and it was difficult to change procurement, budgeting, and project management processes in midstream. Other peak-reducing programs (e.g., those offered by the California Energy Commission) that offered higher incentives and covered a large percentage of the costs of projects were able to influence customers' investments, but most of this was lighting. Lighting measures are easier to implement since there is usually an adequate supply of equipment and contractors are available. And the most

recent evaluation of this program indicates that a significant share of end user participants reported that participation in the program did lead to changes in their decision-making processes related to energy efficiency (XENERGY 2001b). On the other hand, most EESPs reported that the program had minimal effects on their business practices.

The understanding and ability of the industry to measure savings was less than what the utilities expected. There was a general awareness of energy-savings measurement techniques and energy-savings calculations, but it was less than what the utilities had expected.

Customers did not value the measurement of energy savings as the utilities thought they would. Customers were confident that they were achieving savings without paying extra for it: i.e., the cost of measurement and evaluation outweighed the benefits of evaluation. They liked better quality lighting and equipment, and more reliable equipment, but were not willing to pay to measure the savings.

In addition to these key lessons learned, several other findings have been produced from the extensive evaluations of this program (XENERGY 1999, 2001a, 2001b, 2001c).

FUTURE

There will be an evaluation of this program in 2002. The utilities plan to continue this program through the first quarter of 2002. The CPUC will decide if this program will continue beyond the first quarter of 2002.

WEBSITES

SCE website: www.scespc.com
PG&E website: www.pge.com
SDG&E website: www.sdge.com

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California Public Utility Commission's Summer 2000 Energy Efficiency Initiative

SUMMARY

With public goods funds that the California investor-owned utilities had not spent in previous years, the California Public Utilities Commission (CPUC) developed and funded the Summer 2000 Energy Efficiency Initiative (Summer Initiative) to obtain demand and energy savings quickly. The approved programs either modified existing programs or created new programs that could be quickly implemented to achieve demand and energy savings by the summer of 2001. Many different delivery mechanisms and providers were implemented. About half of the programs were administered by utilities and the other half by non-utilities.

SUMMER 2001

In July 2000, the CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). The Summer Initiative was specifically designed "to provide maximum impact of demand and energy usage reductions" during the Summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Utilities and other parties were directed to provide the CPUC with "program options that will bring about the largest reductions in electric demand and/or electric usage reductions in the shortest period of time." In August 2000, the CPUC approved a group of programs for funding through December 31, 2001 and which were to be implemented by September 11, 2000.

PROGRAM OVERVIEW

In Decision 00-07-017, the CPUC adopted the Summer Initiative, directed that the utilities' unspent energy-efficiency funds from program year 1999 and earlier be set aside for the Summer Initiative, and created a process for the utilities and other interested parties to provide "program options that will bring about the largest reductions in electric demand and/or electric usage reductions in the shortest period of time." The CPUC directed that proposals for funding under the Summer Initiative be filed and served by July 21, 2000, that comments on the proposals be filed and served by July 31, 2000,[23] and that the programs be approved and implemented by September 1, 2000. The CPUC authorized the Assigned Commissioners and Administrative Law Judge to approve program suggestions for implementation on or before August 21, 2000.

The CPUC received a wide range of program proposals and recommendations from 24 different parties, including the investor-owned utilities, manufacturers, vendors, energy service companies, consultants, municipal corporations, government entities, research and advocacy groups, and electric end users, proposing over 50 different programs. The CPUC staff reviewed the proposals, using the following criteria: (1) provide verifiable demand-side electric energy-efficiency or peak savings; (2) be cost-effective; (3) address market failures;

[23] An Administrative Law Judge Ruling extended the deadline for submitting comments to August 4, 2000.

and (4) provide benefits by the end of 2001. Based on these criteria, the CPUC chose to fund the following programs (name of program, followed by provider):

1. Beat the Heat: Replacement of Halogen Torchieres in Commercial and Institutional Buildings—Ecos Consulting
2. Residential Refrigerator Recycling—Appliance Recycling Centers of America
3. Third Party Initiatives for Summer Demand Reduction—Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas and Electric Company (SDG&E)
4. Pool Efficiency Programs—PG&E, SCE, and SDG&E
5. Campus Energy Efficiency Projects—University of California and California State Universities
6. Residential Hard to Reach (Multi-family) Program—All Utilities
7. LED Traffic Signal Rebate Program—PG&E, SCE, and SDG&E
8. Large and Small Standard Performance Contract (SPC) Program Revisions—PG&E, SCE, and SDG&E
9. Express Efficiency Program Revisions—All Utilities
10. Energy Efficiency Design Improvement—City of Oakland
11. Green LED Traffic Lights—City of Oakland
12. Museum Chiller Improvement Project—City of Oakland
13. Whole House Fans—SDG&E
14. Halogen Torchiere Turn-in—SDG&E
15. Energy Efficiency Measures—Humboldt Creamery
16. Energy Efficiency Measures—Presidio Trust
17. Pumping Efficiency Projects—California Oil Producers Electric Cooperative (COPE)

A total of $72,295,000 was allocated to these programs (see Tables 1–4). Some programs started in September 2000, while others started in December 2000.

RELIABILITY

Electric system reliability was an explicit concern behind the development of this program. As part of the July decision, the CPUC recounted the events and analyses of the problems with energy supply and demand that underscored the need to aggressively pursue demand-side measures that can moderate load growth and energy usage on a permanent basis. As noted above, the Summer Initiative was seen as a "rapid response procedure" for providing "measurable demand and energy usage reductions beginning in summer 2000."

PROGRAM PERFORMANCE

Some programs were successful, while others were not as effective. Three successful programs were the LED Traffic Signal Rebate Program, the City of Oakland's program on providing design assistance at the point of building/remodeling, and the residential refrigerator/freezer recycling program.

The LED Traffic Signal Rebate Program was designed to encourage the retrofit of traffic lights from traditional incandescent bulbs to LED traffic lamps. Due to program efforts, the

availability of technical specifications, and the lower cost of LED modules, the California Energy Commission has incorporated LED traffic signal modules into its Building and Appliance Standards.

The City of Oakland received funds to provide energy design and technical assistance to new construction projects. The City provided assistance to 19 commercial sites (totaling 3.8 million square feet and nearly 700 multifamily units), and, based on their experience in this program, the Best Buy Company intends to improve the energy efficiency of their other stores in the U.S.

The Residential Refrigerator and Freezer Recycling Program targeted residential consumers who operated spare refrigerators and freezers and used financial incentives ($75/refrigerator or freezer) to take the spare units out of service by recycling them. Approximately 37,000 refrigerators and freezers were recycled in PG&E and SDG&E service areas of "transmission and distribution constraint."

The Summer Initiative is estimated to have saved 283,040 MWh and 129 MW (see Tables 5–8). Monitoring and verification data are being collected on most of the programs. Utilities will be doing this as part of their contractor requirements. They will provide these data to the CPUC next year as part of their annual report (May 2002).

These programs are described in more detail as separate case studies.

LESSONS LEARNED

The Summer Initiative represented a significant milestone in the role of the CPUC in designing a portfolio of energy-efficiency programs for California. Based on this regulatory process innovation, the CPUC adopted new energy-efficiency policy rules and criteria for utilities and non-utility parties to use in applying for energy-efficiency funding for program year (PY) 2002 and in some cases 2003 (Decision 01-11-066). In this interim decision, the CPUC set aside funding for utility proposals for statewide and local programs, and also set aside $100 million for non-utility programs in 2002 and 2003. These funds constitute approximately 20% of the overall 2002 budget for energy-efficiency programs, and approximately 65% of the funding for local programs. Statewide programs will continue to be the backbone of the energy-efficiency approach for 2002, but the CPUC also set aside funds for local programs to take advantage of local relationships and networks to increase participation.

According to the CPUC program manager, the CPUC learned that it is important to be more specific about what they wanted. Some people did not understand the context or rules on how the Summer Initiative was being developed. In the CPUC request in July, there was very little specification; the CPUC simply asked for good ideas. After receiving many proposals, the CPUC eliminated proposals that did not meet existing CPUC guidelines and regulations: e.g., fuel switching, supply-side, and purely load shifting projects.

It is still too early to tell how individuals programs did, since the programs ended December 31, 2001.

FUTURE

The Summer Initiative ended December 31, 2001. Utilities and non-utilities have submitted proposals for 2002, some of which are based on the programs in the Summer Initiative, in response to the CPUC request for proposals in its November 2001 decision (01-11-066).

WEBSITE

www.cpuc.ca.gov

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Table 1. Budget for PG&E's Summer Initiative (SI) Programs[1]

PG&E Programs	2000/2001 Authorized Budget [2]
SI-Torchiere Replacement ECOS	350,000
SI-Refrigerator Recycling ARCA	5,500,000
SI-Pool Pump Timer Program	2,500,000
SI-UC/CSU Campus Energy Efficiency	2,500,000
SI-Hard To Reach Program[3]	3,700,000
SI-Energy Efficiency Design Improvement—Oakland	300,000
~~SI-Green LED Traffic Lights—Oakland~~ [4]	0
SI-Museum Chiller Replacement—Oakland	291,000
SI-LED Rebate Program [5]	13,004,000
SI-EE Measures Humboldt Creamery	100,000
SI-EE Measures Presidio Trust	500,000
SI-COPE Pumping Efficiency	2,500,000
Third Party Initiatives	3,500,000
Total	**$34,745,000**

1. SI Programs are funded through 12/31/2001 pursuant to OP5 of Ruling of Assigned Commissioners and AI 2000 Energy Efficiency Initiative, dated August 21, 2000. Therefore, the spending reflects combined 2(activities.
2. 2000/2001 authorized budget is for implementation costs only.
3. Hard to Reach Program budget does not include the additional $700,000 approved in Resolution G-3323 datec 2001.
4. City of Oakland withdrew application on 12/5/2000. ALJ Bytof's Ruling, dated 12/19/2000, approved the shift from City of Oakland to PG&E for use in the statewide LED rebate program.
5. LED Rebate Program impacts include a forecast from the City of Oakland Green LED Project.

Table 2. Budget for SDG&E's Summer Initiative (SI) Programs

SDG&E Programs	2000/2001 Authorized Budget
Beat The Heat—ECOS Consulting	150,000
Residential Refrigerator Recycling—ARCA	3,000,000
Pool Efficiency Program	500,000
Campus Energy Efficiency Programs	
UC—UC San Diego	1,125,000
CSU—San Marcos	875,000
Residential Hard To Reach	1,500,000
LED Traffic Signal Rebate Program	4,000,000
Whole House Fans	100,000
Halogen Torchiere Turn-In	50,000
Third Party Initiatives	1,000,000
Total	**$12,300,000**

Table 3. Budget for SCE's Summer Initiative (SI) Programs

SCE Programs	2000/2001 Authorized Budget
Beat The Heat—ECOS Consulting	250,000
Residential Refrigerator Recycling—ARCA	1,200,000
Pool Efficiency Program	3,000,000
Campus Energy Efficiency Programs	3,500,000
Residential Hard To Reach	2,600,000
LED Traffic Signal Rebate Program	7,500,000
COPE	1,500,000
Third Party Initiatives	1,700,000
Total	**$21,250,000**

Table 4. Budget for SCG's Summer Initiative (SI) Programs

SCG Program	2000/2001 Authorized Budget
Residential Hard To Reach	**$4,000,000**

Table 5. Electricity Savings for PG&E's Summer Initiative Programs

PG&E Programs	Savings Estimate Made by Program Proposer [1]	Savings Estimate Made by Program Proposer [1]
	kWh	kW
SI-Torchiere Replacement ECOS	0	3,567
SI-Refrigerator Recycling ARCA	35,919,000	6,740
SI-Pool Pump Timer Program—PG&E Program	0	13,646
SI-UC/CSU Campus Energy Efficiency	9,009,000	5,719
SI-Hard To Reach Program[3]	4,363,000	4,270
SI-Energy Efficiency Design Improvement—Oakland	1,200,000	300
~~SI-Green LED Traffic Lights—Oakland~~ [4]	0	0
SI-Museum Chiller Replacement—Oakland	300,000	60
SI-LED Rebate Program—PG&E Program [5]	3,000,000	10,000
SI-EE Measures Humboldt Creamery	417,000	14
SI-EE Measures Presidio Trust	1,780,000	290
SI-COPE Pumping Efficiency	34,000,000	4,600
Third Party Initiatives	0	6,647
Total	89,988,000	55,853

1. Savings Estimate made by Program Proposer represents contractual commitments or initial estimates of total impacts provided by contractors and have not been audited for accuracy. Actual accomplishments may exceed these initial estimates in some cases.
2. SI Programs are funded through 12/31/2001 pursuant to OP5 of Ruling of Assigned Commissioners and ALJ on Summer 2000 Energy Efficiency Initiative, dated August 21, 2000.
3. Hard to Reach "Yet to Be Done" Projections do not yet include impacts from additional $700,000 added as of October 10, 2001 (Resolution G-3323).
4. City of Oakland withdrew application on 12/5/2000. ALJ Bytof's Ruling, dated 12/19/2000, approved the shift of $504,000 from City of Oakland to PG&E for use in the statewide LED rebate program.
5. LED Rebate Program impacts include a forecast from the City of Oakland Green LED Project.

Table 6. Electricity Savings for SDG&E's Summer Initiative Programs

SDG&E Programs	Savings Estimate kWh	Savings Estimate kW
Beat The Heat--ECOS Consulting	—	—
Residential Refrigerator Recycling—ARCA	86,318,312	4,376.2
Pool Efficiency Program	14,546,491	15,315.6
Campus Energy Efficiency Programs	—	—
UC—UC San Diego	4,762,530	747.0
CSU—San Marcos	1,350,707	360
Residential Hard To Reach	1,716,389	471.8
LED Traffic Signal Rebate Program	10,251,431	1,170.2
Whole House Fans	148,541	1,800.9
Halogen Torchiere Turn-In	90,170	85.0
Third Party Initiatives	5,421,133	1,165.0
Total	**124,605,704**	**25,492**

Table 7. Electricity Savings for SCE's Summer Initiative Programs

SCE Programs	Savings Estimate kWh	Savings Estimate kW
Beat The Heat—ECOS Consulting	—	—
Residential Refrigerator Recycling—ARCA	14,038,000	2,400
Pool Efficiency Program	1,494,000	28,580
Campus Energy Efficiency Programs	7,423,000	2,320
Residential Hard To Reach	9,731,000	4,700
LED Traffic Signal Rebate Program	25,424,000	5,700
COPE	7,423,000	2,300
Third Party Initiatives	2,120,000	690
Total	**67,653,000**	**46,690**

Table 8. Electricity Savings for SCG's Summer Initiative Programs

SCG Program	Savings Estimate kWh	Savings Estimate kW
Residential Hard To Reach	**793,000**	**1,000**

California Investor-Owned Utilities' and the California Energy Commission's 2001 State Buildings and Public Universities Programs

SUMMARY

In 2001, both the California Energy Commission (CEC) and California's investor-owned utilities (IOUs) targeted state buildings and public universities for reducing summer peak demand and for promoting energy efficiency. The objective of the CEC program was to reduce summer peak demand by 50 MW in state buildings and university and state college campuses. In contrast to the focus on peak load management in the CEC program, the IOUs primarily implemented energy-efficiency measures, since the IOU programs were funded by the legislatively mandated Public Goods Charge which does not allow funding for load management programs (only energy-efficiency programs).

PROGRAM OVERVIEW

The objective of the CEC program was to reduce summer peak demand by 50 MW in state buildings and universities. This was to be accomplished primarily by providing information on what demand-reducing actions building managers should take under electrical emergencies. Four state agencies and one private-sector firm implemented projects to reduce long-term demand through efficiency improvements and through immediate actions taken during Stage 2 and Stage 3 emergencies.

These entities were: (1) the Department of General Services (DGS)—DGS prepared peak load reduction plans describing what actions building managers should take under electrical emergencies and installed some equipment and internet-connected utility meters to track building loads at 176 buildings across the state; (2) the Department of Corrections (DC)—DC developed customized peak load reduction plans for 33 correction facilities and conducted on-site customized training for operators at each facility; (3) Grueneich Resource Advocates (GRA)—GRA primarily facilitated the development of peak load reduction plans at 31 campuses, and. developed the University of California (UC)/California State University's (CSU) bid into the California's Independent System Operator (ISO) Demand Relief program[24]; (4) the University of California at Santa Barbara (UCSB) and the University of California at Los Angeles (UCLA)—UCSB installed chilled water improvements and UCLA installed energy-efficiency lighting; and (5) CSU—six campuses from the CSU campus system installed energy-efficiency measures (e.g., efficient lighting systems and controls, variable speed drives and controls on building fans, and replacement of rooftop air conditioners with more efficient central-plant cooling).

The main objective of the CEC program was not to install equipment, but to develop studies known as Peak Load Reduction Plans (PLRPs). These PLRPs directed what actions to take in order to reduce load under electrical emergencies. Some money ($750,000) was available to DGS buildings to buy equipment to reduce loads, e.g., occupancy sensors, lights, and voltage regulation equipment. Additional funds were available to UC and CSU to install

[24] GRA did not aggregate the UC and CSU campuses, but served as coordinator and facilitator by bringing the campuses and another contractor together.

energy-efficiency projects. The CEC also promoted energy efficiency by providing financial incentives for energy-efficiency measures, making available CEC handbooks on implementing energy efficiency, and discussing at length the current energy-efficiency programs that were in place with each of the university or state building's management staff.

As directed by the California Public Utilities Commission (CPUC), the IOUs signed contracts with the public university systems providing them funding for energy-efficiency retrofits, but no funding for peak load management per se. In addition, the IOU Standard Performance Contracting and Express Efficiency rebate programs for nonresidential customers were available to all nonresidential customers, including state buildings and public universities. In 2000, the CPUC authorized $8 million of Public Goods Charge (PGC) funding for the UC/CSU-proposed Campus Energy-Efficiency Projects Program as part of the Summer Initiative, to reduce on-peak energy use at various UC and CSU campuses. The Pacific Gas and Electric Company (PG&E) funded projects at CSU San Luis Obispo, CSU Hayward, and UC Davis, the San Diego Gas and Electric Company (SDG&E) funded projects at UC San Diego and CSU San Marcos, and the Southern California Edison Company (SCE) funded projects at CSU Long Beach and CSU Pomona. For the SCE projects, the incentive budget of $3.5 million was split between the two campuses based on projected energy savings. As directed by the CPUC, incentives through this program were paid to the respective campuses in increments of 50% up front, 40% at project completion, and 10% up delivery of a final project report (which will provide information on project costs and actual per unit demand and energy savings).

The CEC's State and University program received $5.5 million from the State General Fund via state legislation (AB 970). The utilities' Campus Energy-Efficiency Projects Program received a total of $8 million from the Public Goods Charge funds (PG&E—$2.5 million; SCE—$3.5 million; and SDG&E—$2 million).

SUMMER 2001 AND RELIABILITY

Electric reliability was an explicit concern behind the development of these programs. In July 2000, the CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). The Summer Initiative was specifically designed "to provide maximum impact of demand and energy usage reductions" during the Summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Electric system reliability was an explicit concern behind the development of this program. As part of the July decision, the CPUC recounted the events and analyses of the problems with energy supply and demand that underscored the need to aggressively pursue demand-side measures that can moderate load growth and energy usage on a permanent basis. Hence, the CPUC Summer Initiative program was seen as a "rapid response procedure" for providing "measurable demand and energy usage reductions beginning in summer 2000." The CEC program was a direct response by the State Legislature to reduce energy use and peak demand in institutional buildings.

PROGRAM PERFORMANCE

According to CEC's program manager, the CEC program results were excellent, given the short timeline in implementing the program. Preliminary results have been very good, and the feedback from operators has been very positive. All of the operators can pull out laminated peak load reduction plans to save energy in the future: on a good day, these buildings should be able to collectively save 100 MW– primarily through modified equipment operation and shutting things off. (e.g., using variable frequency drives, changing temperatures—increase the temperature by 2 degrees and save approximately 10% in compressor energy, turning banks of lights off which also carries the added benefit of reducing cooling loads, etc.).

Over 50 MW of demand savings were verified for the CEC program. These savings include:

California State University—1MW

Department of Corrections—10 MW

Department of General Services—27 MW

Grueneich Resource Advocates—13 MW[25]

University of California—0.6 MW

These target amounts include both efficiency measures (that reduce demand continuously) and demand reductions that can be made during Stage 2 and 3 emergencies. More detailed results by participant are found in the evaluation report (Nexant 2001). An evaluator has been collecting load verification data on this program: verified results for this program indicate approximately 52 MW out of a projected 57 MW is being achieved (Nexant 2001).

Results for the PGC-funded Campus Energy-Efficiency Projects program are expected to be 21,922 MWh and 10.0 MW (Table 1).

Table 1. Estimated Electricity Savings for State Buildings and Public Universities Programs (as of Sept. 30, 2001)

	MWh	MW
PG&E	9,000	5.7
SCE*	6,809	2.9
SDG&E	6,113	1.4
Statewide Program Total	**21,922**	**10.0**

*Actual reported results

The UC and CSU campuses will be submitting final reports to the utilities and the CPUC in 2002.

[25] This is the bid amount that was accepted by the ISO to participate in the ISO's Demand Relief Program. The original bid was higher (around 25 MW).

LESSONS LEARNED

According to CEC's program manager, the following lessons were learned:

1. This was a "fast and furious" program –reality checks were critical. For example, June 1 was an important deadline for the program in terms of getting things in place, and he had to make sure that all approved projects had a very good chance of being completed by that date. Lighting and variable frequency drives were relatively easy to install, but hybrid chiller plant installations, for example, were not installed because of the June 1, 2001 deadline. Hence, it is important to pick projects that are realistic—the simpler the better.
2. During the development of peak load reduction plans for 176 buildings, one must go on as many site visits as possible to ensure the right data are being collected.
3. One needs to have a monitoring and verification contractor on board as soon as possible, to check on what has been done. This person needs to conduct site visits as frequently as possible to monitor the projects. This makes everyone aware that they are accountable for the results.
4. One needs to set up a temporary, streamlined, in-house, contract process early on in the program. For example, the CEC started in September, guidelines were in place in November, and contracts were in place by December. Once contracts were in place, the program was off and running.

According to the evaluator of CEC's program, the following lessons were learned (Nexant 2001):

1. Take advantage of existing energy-management programs wherever possible. Implementing efficiency measures at the UC and CSU systems proceeded relatively smoothly and quickly, due in large part to the active participation and interest of the campus energy managers. Since many of the campuses had already been implementing efficiency measures, they did not have to start new programs.
2. Streamline the bidding process or keep selected contractors on retainer. Bidding for every job adds time and effort and detracts from project implementation.
3. Concentrate less on meeting target goals and more on project implementation. It is better to complete fewer, smaller projects than to have more ambitious projects that might not get built.
4. Include measurement and verification discussions early in program and project development, so that it is clear what information will be collected and by whom, and what limitations shall be placed on its use and distribution. Measurement and verification is not an "add-on" process to be performed after the fact, but an integral part of the project itself. As a result, significant opportunity was lost to perform baseline inspections or to install metering equipment in a timely manner.
5. Reducing loads at correction facilities (prisons), where security is their primary concern, is complex and difficult to do consistently. The installation of energy-efficiency measures

might be more appropriate for these facilities, instead of control strategies that require disrupting schedules, locking down inmates, or otherwise risk compromising security.

The emphasis in the state program was on developing demand-responsive action plans for Stage 2 and 3 emergencies. Efficiency gains were for the most part an afterthought (exceptions being CSU and UC campuses), although assumptions about energy efficiency were reviewed to ensure that demand reductions were accurate. Future programs for state buildings will need to identify and evaluate energy-efficiency opportunities.

Finally, there is a direct conflict with the current demand-responsive incentive structure and any efficiency improvements that would occur. Decreasing long-term energy use (via energy efficiency or usage reduction) reduces the ability to curtail demand in the short term. As a result, there is anecdotal evidence suggesting that some customers "gamed" the system by running unneeded equipment (e.g., space heaters, unneeded lights) that could be shut off at a moment's notice and, thereby, realize an instant demand reduction with no sacrifice on their part (Menn 2001).

FUTURE

For 2002, the CPUC ordered utilities to file proposals for statewide programs and a limited amount of local programs by December 14, 2001. The CPUC decision also solicited local program proposals from non-utility entities, due by January 15, 2002. The CPUC will make a decision on the utility proposals before the end of first quarter 2002 and on the non-utility proposals before the end of the second quarter. Local programs were defined as programs that were offered to geographic areas smaller than an entire utility service territory. The Public Goods Charge funding level for these programs remains the same as in all years since 1997. However, in 2002 there will not be supplemental funding provided from the state general fund by the state legislature, as there was in 2001. 2001 funds committed to projects in 2001 will continue to be paid out in 2002 as projects are completed.

For the CEC program, some existing contracts will continue (e.g., AB 970 calls for the Peak Load Reduction Program measures to be maintained for 3 years beyond 2001). However, no new projects are planned, due to the state's budget deficit.

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Sacramento Municipal Utility District's 2001 Enhancements to its Energy-Efficiency Programs

SUMMARY

This case study is being provided as an example of a comprehensive response by a municipal utility to a statewide electric system reliability crisis. Since 1976, the Sacramento Municipal Utility District (SMUD) has promoted energy-efficiency and peak energy-reduction programs in the residential, commercial, and industrial sectors. The addition of state funding and an increase in its own public-goods funding to address the reliability crisis during 2001 allowed SMUD to aggressively expand existing and add new energy-efficiency programs designed particularly to reduce summer peak load.

PROGRAM OVERVIEW

SMUD has been funding its public goods programs (energy efficiency; low income; renewable energy; and research, development and demonstration) at $24.2 million per year since California began deregulating the state's utility industry and required public-goods funding from all electric utilities. Consistent with its long-term commitment to public-goods programs, SMUD's investment each year through 2000 has exceeded the minimum-required spending, representing 3.7% of its 1994 revenue; SMUD's actual public-goods spending in 2001 and approved budget for 2002 are even higher. Of the original 2001 public-goods budget, $13.1 million was slated for energy efficiency with another $0.86 million for low-income weatherization. An additional $1.7 million for load-management programs was budgeted outside of the public-goods funding.

In 2001, SMUD's existing residential energy-efficiency programs included the following: residential services, solar domestic hot water, shade trees, multifamily, equipment efficiency, appliance efficiency, new construction, and retail lighting. Existing commercial and industrial energy-efficiency programs included new construction and various retrofit programs for lighting, HVAC, small C&I HVAC tune-up, retrocommissioning, and pump testing. Many of the residential and C/I programs promoted ENERGY STAR-qualified products.

Financial incentives were a key component of many programs. The Appliance Efficiency Program offered rebates of $75-$125 to promote the purchase of energy- and water-efficient clothes washers, $50 rebates were offered for ENERGY STAR-qualified room air conditioners, and $125 rebates were offered for ENERGY STAR-qualified refrigerators. In the Residential Retail Lighting Program, SMUD offered participating retailers $2.50 for each ENERGY STAR-qualified "subcompact" CFL bulb purchased. Rebates of $300 were offered to residential HVAC distributors for sale of ENERGY STAR-qualified central air conditioners and heat pumps to local contractors for installation in the SMUD service area. Up to $250 in consumer rebates were available for duct testing and sealing.

In the Commercial and Industrial Retrofit Program, customers and SMUD-qualified contractors who installed high-efficiency HVAC and process energy-efficiency measures received $250/kW, and energy reduction measures were eligible for $0.04/kWh for lighting

and $0.08/kWh for HVAC, process, and other equipment. The program also offered incentives of $60-$120/ton to contractors who installed high-efficiency HVAC equipment in retrofit and replacement applications. Incentives of $10 per CFL were offered to contractors in large- and medium-sized commercial applications, to a maximum of 50% of the project cost. Incentives for efficient motors ranged from $25 for a 1-hp motor to $630 for a 200-hp motor.

In addition to rebates, SMUD provided home audit software, mail-in audits (computer-based audit), and a home-energy audit upon request. Energy audits for SMUD's C&I customers were also offered as an incentive to improve efficiency. For schools, SMUD added a Resource Conservation Manager Program, in which 50% of the salary of a conservation manager is paid for first two years of the program. By the end of two years, each conservation manager is expected to identify enough energy and other resource savings to more than pay the position's salary.

Also offered as an incentive, was competitive customer financing for purchase and installation of a variety of measures in both residential and commercial customer sectors. Qualifying measures included high-efficiency windows and central air conditioning and attic and wall insulation. The 2001 budget for customer loans—separate from the energy-efficiency budget—was $24 million.

SUMMER 2001

SMUD received additional funding from several sources in 2001 to address the reliability crisis. The largest grant was $8 million from the state General Fund (SBx1-5). Fifty percent of these funds were to be spent within the first five months of the contract, and the remainder by the end of 2002. This additional state funding represented a 27% increase in SMUD's revised 2001 energy-efficiency budget. As a result, the utility was able to increase its budget for rebates to stimulate investment in energy efficiency and peak load reduction in the following areas: a "vending miser" program for soft drink vending machines, old-refrigerator pickup & recycling, high-efficiency central air conditioning for both existing and new homes, and small-commercial and industrial lighting. The first two programs were new and contractor-implemented, while the others were expansions of existing programs—the state funding permitted SMUD to increase rebate levels, thus "ramping up" participation. Rebates for residential central air conditioning were changed from distributors to consumers, and in 2002 minimum-EER and thermal-expansion-valve requirements were added.

Other sources of additional funding included $2.0 million from the state (AB 970) to greatly expand SMUD's Cool Roofs Program and $1.325 million (AB 970 and SBx1-5) to establish two new price-responsive load-management programs. Cool Roofs offers rebates of 20 cents per square foot of roof area. Also, SMUD augmented its own $13.9 million budget with $1.5 million for energy-efficiency programs to further address the reliability crisis. The augmentation helped fund $125 consumer rebates for ENERGY STAR-qualified refrigerators, thereby helping to accelerate introduction of the higher-efficiency models to the market; and it funded a new residential ENERGY STAR lighting program that offers consumer rebates and retailer/manufacturer cooperative-advertising dollars. This budget augmentation has since been made permanent, to fund any energy-efficiency program.

RELIABILITY

Electric system reliability has always been an important factor in developing and implementing SMUD's programs. For example, by the end of 2000, SMUD's energy-efficiency and load-management resources were reducing summer peak load by 256 MW through permanent efficiency improvements and averaging another 200 MW of summer peak-load reduction through load-management programs. Combined, these represented approximately 28% of SMUD's power supply (excluding long-term purchased-power contracts). With the statewide energy crisis in 2001, state funding targeted peak-load reduction. SMUD used its share designated for reliability-focused energy-efficiency programs[26] to promote high-efficiency central air conditioners and heat pumps (retrofit and new construction) and to permanently remove old, inefficient refrigerators and freezers. In the commercial sector, state-funded programs targeted HVAC, motor, compressed air, cool-roof, and lighting retrofits.

PROGRAM PERFORMANCE

As a result of state funding and budget augmentation, SMUD implemented programs that increased its original peak-load savings goals for the end of 2001 from 6.8 MW to 13.7 MW. Price-responsive load management will add another 27 MW. Energy savings goals increased from 18.7 million kWh based on the original budget to 37.9 million kWh. According to one SMUD program manager, SMUD's programs are regarded as highly successful, as reflected in the "overwhelming response" by the public to these programs. It is too early for providing information on "head counts" (e.g., number of measures installed, number of participants in programs), but SMUD hopes to have this type of information in late January or February. They have exceeded their GWh and MW goals (see below).

Table 1. SMUD's 2001 Energy-Efficiency Goals and Budgets (actuals through December)

Program	Budget (millions $)	Actual Spending (millions $)	Annual Goal		Achieved	
			MW	GWh	MW	GWh
Original Energy Efficiency Budget/Goal	$13.1		6.8	18.7		
With Additional $1.5 Million	$14.6	$14.6	8.8	24.2		
With SBx1-5Funding ($6.2 million in 2001)	$20.8	$16.6*	13.7	37.9	17.6	63.4

* SBx1-5goals were achieved even though the 2001 SBx1-5budget was under-spent. Remaining 2001 SBx1-5funds are fully committed and will roll over to 2002.

LESSONS LEARNED

SMUD learned very quickly that the crisis situation offered tremendous opportunities for expanded promotion of energy efficiency. SMUD took greater advantage of marketing opportunities, such as the ENERGY STAR program, to affect more long-term, sustainable changes in the market for energy-efficiency products and services. In an energy crisis,

[26] Reliability-focused energy-efficiency programs are energy-efficiency programs that are particularly designed, modified, and/or ramped up to address electricity system reliability concerns.

customers are interested in energy use, and they showed that by their willingness to participate and "conserve in a pinch." SMUD's customers responded not only by their greater participation in programs but also by their greater appreciation for their utility's efforts.

The combination of financial incentives, marketing, higher electricity rates, and the daily bombardment of energy-crisis news had a significant, symbiotic affect on consumer awareness of their energy use. Financial incentives definitely had an impact, but they were not the only decision-making factor. For example, statewide advertising and media reports played a significant role in consumer awareness: many people in California became aware of the energy crisis and this led to many people taking action.

The Small Commercial and Industrial Lighting Program was particularly interesting. The program is basically contractor driven: the contractor is responsible for recruiting customers and facilitating the project. SMUD started the program with high incentives (around $900/kW), but they were not sure about the impact of these incentives. After a slow start, one contractor increased his sales force and was responsible for booking the majority of the rebates within a few weeks. SMUD allocated additional funds to the program, but they had to shut down the program in order to control spending. In sum, SMUD learned that one contractor with a lot of initiative can really make an impact on the program.

The SMUD Board of Directors helped to facilitate the approval of SMUD's programs, when needed. Due to the energy crisis, the Board gave full approval at a single Board meeting (instead of two), increasing the speed with which SMUD implemented their programs.

FUTURE

SMUD has been and continues to be committed to energy efficiency as a long-term, cost-effective energy resource and business strategy. All of SMUD's programs are scheduled to continue, with the exception of those funded by state grants—these will continue through 2002 or until the money has been spent, whichever comes first. Even if there was not a reliability crisis, SMUD would continue with its own energy-efficiency programs because these programs help implement SMUD's mission of providing customers with quality, reliable, and affordable energy services in an environmentally responsible manner. For SMUD, energy efficiency offers benefits to its customers and to the community at large, and for SMUD it serves as a good business strategy.

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www.smud.org

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California Investor-Owned Utilities' and the California Conservation Corps' 2001 Residential Lighting Programs

SUMMARY

In 2001, California's investor-owned utilities' (IOUs) Residential Lighting Programs were designed to promote energy savings and peak demand savings and to help customers save money on their energy bill through a comprehensive set of actions that are coordinated statewide. In 2001, the State Legislature provided funding to the California Conservation Corps for distributing CFLs to 475,000 residences in California.

PROGRAM OVERVIEW

The Residential Lighting Programs focused on three main areas: (1) enhancing the manufacture and competitive pricing of energy-efficient lighting products; (2) enhancing the distribution and marketing of energy-efficient lighting products through established retail channels to consumers; and (3) building consumer understanding of how to purchase and use energy-efficient lighting products. Each of the three utilities implementing these programs emphasized one aspect of these programs: upstream delivery (primarily working with manufacturers) or downstream delivery (primarily working with customers and retailers) mechanisms.

The Pacific Gas and Electric Company (PG&E) emphasized the **upstream** with retailers to pass on the $3/CLF instant discount and de-emphasized downstream information and education. Information and education efforts were designed to reach consumers and multi-family property operators to make lighting changes in their homes. The primary focus was to promote ENERGY STAR® labeled lighting products with emphasis placed on improving market recognition of the energy and non-energy benefits of energy-efficient lighting products, The program was targeted towards retailers carrying Energy STAR® qualified and labeled CFLs. Retailers had to be able to scan the product in their retail systems, yet there were some exceptions (representing a small percentage of sales: for example, some retailers did not have scanning systems—they used a manual system to track sales). For those retailers carrying CFLs, PG&E used a mail and phone campaign to solicit participation. The mail campaign was broad: every hardware store listed in the utility's customer database was contacted. PG&E was cautious at the beginning and did not know whether the dollars could be issued equitably. Initially, large retailers were targeted. Soon, the issue of equity arose, and PG&E opened the program up to smaller retailers. PG&E designed this program to be consumer friendly: customers received rebates for qualifying measures at the time of purchase (without completing an application or submitting a coupon). Using this approach, PG&E felt confident that they could achieve energy and demand savings quickly.

Other utilities relied on upstream channels with manufacturers. For example, the Southern California Edison Company (SCE) placed less emphasis on retailer training and education and significantly increased financial incentives to manufacturers to immediately reduce the price of energy-efficient lighting products to residential customers. Customers

received a $3 discount per unit off the purchase price of Energy STAR® qualified CFLs and a $10 discount per unit for a torchiere or hardwired indoor/outdoor lighting fixtures.

In addition to the upstream lighting program that all utilities were participating, the San Diego Gas and Electric Company (SDG&E) created a Downstream Lighting program that targeted the replacement of inefficient halogen torchiere lamps and/or incandescent bulbs with energy-efficient Energy STAR® qualified replacement products. This free promotion was targeted at lower income and elderly customers located in SDG&E's service territory.

For 2001, the initial source of funds was the Public Goods Charge: $11.2 million (PG&E: $6.4 million, SCE: $3.2 million, and SDG&E: $1.6 million). This was later supplemented by funds from the State General Fund (via SBx1-5), so that total funding for these utility programs was more than $26 million. Separately, in 2001, the California Conservation Corps was given $20 million to distribute CFLs and conservation literature to low-income neighborhoods ("the Mobile Efficiency Brigade").

SUMMER 2001 AND RELIABILITY

Electric reliability was an explicit concern behind the development of these programs: they were developed at the time when California was experiencing rolling blackouts during the winter, and there were several "energy alerts" during Stage 1 and Stage 2 days. Hence, these programs were designed to reduce summer peak demand in the residential sector by June 2001. Starting at the end of January 2001, the CPUC directed the IOUs to revamp their programs to prioritize immediate energy savings. Before the end of the first quarter of 2001, the first retailers began offering the $3 per lamp discount on Energy STAR® -qualified and labeled CFLs, torchieres, and hardwired fixtures. During this period, the CFL became the state's symbol for how to counteract the energy crisis. For example, evening news cameras filmed retailers passing out "rainchecks" to consumers lined out the door because their shelves were bare of discounted products. And consumer advocate shows highlighted the great bargains from installing CFLs, when all the costs were considered. In 2001, the State Legislature provided additional funds to the utilities as well as to the California Conservation Corps to promote energy-efficient lighting in the residential sector.

PROGRAM PERFORMANCE

According to the PG&E program manager, this program was very successful: the number of participating retailers, CFLs sold, energy saved, and the increased public awareness of the Energy STAR® products. For example, in PG&E's program, the rebates attracted customers and retailers drove prices down. By the end of December 2001, 40 retailers, representing over 400 retail locations in Northern and Central California, participated in PG&E's Instant Discount Retailer Program, providing instant $3 point-of-sale discounts. Customers purchased nearly 7 million CFLs using PG&E's rebates. In the previous year, PG&E had only rebated 36,836 CFL torchieres.

One national retailer indicated it had sold over 10 million CFLs in California by September 2001, including 6 million in PG&E's service territory (nearly 2.5 million CFLs

with rebates), a 200% increase in sales over 2000. Over 1,450 ten-dollar home improvement lighting rebates were paid. Eight retailers within PG&E's service territory who have 10 or more locations in California participated in the CFL instant discount lighting program. And 35,085 energy-efficient torchieres had been shipped via the Upstream Manufacturer program.

A total of 13 retailers participated in SCE's program. By the end of September 2001, they were able to move 356,533 bulbs, 16,282 fixtures, and 58,394 torchieres into the retail market.

The downstream and upstream lighting programs achieved substantial energy savings: 236,089 MWh, and 52.2 MW (through Sept. 30, 2001). These savings are based on engineering estimates; a statewide study on market share is being conducted, and an evaluation of the program will be completed in 2002 for the CPUC.

Table 1. Estimated Electricity Savings for Residential Lighting Programs (as of Sept. 30, 2001)

	MWh	MW
PG&E—Improved CFL and Emerging Technologies: Downstream Lighting)	197,793	24
SDG&E: Downstream Lighting	1,910	0.2
PG&E: Upstream Lighting	7,129	0.9
SCE: Upstream Lighting	27,420	25.1
SDG&E: Upstream Lighting		0.5
Statewide Program Total	**234,252**	**50.7**

The California Conservation Corps had a goal of 2 million CFLs and 100 MW, but no evaluation has been conducted on this program. Reportedly, 650,000 households in working class neighborhoods throughout the state were reached through a 17-week campaign and were provided CFLs and energy efficiency information.

LESSONS LEARNED

According to PG&E's program manager, many factors contributed to the success of the program.

1. **Education/Groundwork:** For many years, the IOUs have been promoting energy-efficiency measures, including CFLs. In the late 1990s, IOUs began concerted efforts to educate consumers and other market actors (e.g., manufacturers and retailers) about the economic and environmental benefits of Energy STAR® products. CFLs were one of the leading measures for saving energy and dollars for consumers. The IOUs multi-million dollar promotion of the Energy STAR® brand in 2000 earned them substantial notoriety and recognition for their efforts, and this groundwork helped to pave the way for substantially increased consumer acceptance of Energy STAR® CFLs in 2001.

2. **Quality**: In the late 1990s, the Energy Star program developed a quality-testing program of products that was available to the public across the country to verify that the Energy

STAR® specification was being met in the products being bought by the public. This commitment to quality helped to alleviate concerns by consumers who were not familiar with Energy STAR® products.

3. **Price:** Studies in the 1990s indicated that the cost of CFLs was a major barrier to customer adoption of CFLs. At the time, the majority of retailers were selling products from a low of $12 to a high of $29 per unit. In 2001, qualified products were sold at less than $1.70/lamp when 3-lamp packages were purchased at certain retailers, and, more recently, one retailer is selling 5 packs of 13 or 14-watt lamps (labeled as 60-watt incandescent equivalents) at $19.99. This is the equivalent of $4/lamp at regular price. During certain times, with utility discounts, these products could be purchased for $1 per lamp. Rebates were key!

4. **Size:** Manufacturers have moved towards smaller CFLs, increasing the number of potential sockets and allowing for more retrofits to take place. For example, several manufacturers introduced a small (< 15-watt) unit that was comparable in size to an incandescent lamp. Based on preliminary sales information, the smaller units outsold all the larger sizes and wattages.

5. **Accessibility:** During 2001, several national retailers redirected shipments of products destined for other locations to the west coast markets. In addition, the source of CFLs changed in 2001. For the majority of consumers through the 1990s, access to CFLs had been via large hardware and "big box" retailer chain stores that were geared towards home improvement products. Some studies indicated that these types of retailers controlled over 50% of total bulb sales (incandescent and fluorescent). However, PG&E and others identified the food and drug chains as having significant bulb sales. PG&E was successful in raising the interest of numerous food and drug retailers and was able to have a major drug store and a midsize food retailer participate. These retailers provided outlets at over 150 locations that had previously never carried CFLs. At least one major drug chain participating in 2001 will continue to sell CFLs, and two major food retailers are now selling CFLs outside of PG&E's program.

   Independent retailers were also solicited and encouraged to participate in PG&E's program. Of the 42 retail entities that participated, 8 were major retailers with 10 or more locations in the service area that accounted for 378 of the 432 locations. The remaining 30 retailers, some of which had multiple sites, provided reach into communities that may not have had access to the major retailers, with 2 providing sales promotion over the internet.

6. **Competitive Marketplace:** Some retailers participated in this program because a competitor had started selling CFLs or began pricing the product at a lower level. The pressure to maintain or increase the retailer's competitive position was a major driver in the extremely difficult retail environment. Retailers that claimed lowest cost (or everyday low cost) were assessing how to utilize the utility program to leverage their business, especially when a competitor was already leveraging the IOU program.

7. **Consumer-Friendly Purchasing and Reduced Administrative Costs.** Having consumers buy the product from participating retailers without filling in forms, invoices, or other paperwork was a departure on the part of IOUs from programs of the past. Recognizing the administrative cost savings of implementing the program in this fashion, as opposed to gathering customer-level information, was a major shift in program design, but worth the change due to savings in administrative costs.

FUTURE

The utilities proposed coordinated statewide lighting programs for 2002, and the CPUC will make a decision on them in 2002.

WEBSITE

Since the programs have ended, there are no current websites promoting rebates; instead, the sites are providing information about saving energy.

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California Investor-Owned Utilities' and the California Energy Commission's 2001 Light-Emitting Diode (LED) Traffic Signals Programs

SUMMARY

Light-Emitting Diode (LED) Traffic Signal Programs are designed to encourage the retrofit of traffic lights from traditional incandescent bulbs to LED traffic lamps. Utility and state programs were designed to achieve demand reductions by June 2001 and have been critical in transforming the market for LED traffic signal modules.

PROGRAM OVERVIEW

In California, there are an estimated 1.8 million traffic signals operating at 40,000 intersections. Replacing incandescent traffic bulbs with LED modules can reduce the energy consumption of the affected signal head by 80-90% (Nexant 2001).

The California investor-owned utilities' (IOUs) LED Traffic Signal Program was a component of the California Public Utilities Commission's (CPUC) Summer Initiative Program, and it was designed to encourage the retrofit of traffic lights from traditional incandescent bulbs to LED traffic lamps. This program was available to traffic authorities receiving service from the IOUs. This program had been offered for the Summer 2000 problem and was offered again in 2001, but with reduced incentives. Because of the high cost of LED modules (30-80 times more costly than incandescent lamps), incentives were provided to governmental agencies and cities on a statewide basis, for the retrofit of all colors of traffic lights (except for yellow, non-flashing lights), individually or as a package. The program was designed to achieve demand reductions by June 2001. Incentives were provided for up to 100% of the hardware cost (installation cost and sales tax were the responsibility of the participant). For signals installed after June 2001, incentives were reduced by 50%. The program was directly marketed by the utilities (via websites and account representatives) to cities and municipalities.

The California Energy Commission's (CEC) LED Traffic Signals Program provided grants to local and state governments to encourage the replacement of incandescent traffic signals with those using LED technology. Grants could be used to pay for part of the material and labor costs for installing the LED traffic signal modules. Incentives ranged from $25/module to $100/module. The grants provided by this program covered about half the project cost, which was about 25% lower than the incentives offered by the investor owned utilities. The grants applied to all colors of traffic lights.

Three IOUs funded the program in 2001 for $24.5 million (Pacific Gas and Electric Company (PG&E): $13 million; Southern California Edison Company (SCE): $7.5 million; and San Diego Gas and Electric Company (SDG&E): $4 million), and it was funded from Public Goods Charge monies. The CEC program was initially funded at $10 million from the General Treasury funds authorized by AB 970.

SUMMER 2001 AND RELIABILITY

In July 2000, the CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). The Summer Initiative was specifically designed "to provide maximum impact of demand and energy usage reductions" during the Summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Electric system reliability was an explicit concern behind the development of this program. As part of the July decision, the CPUC recounted the events and analyses of the problems with energy supply and demand that underscored the need to aggressively pursue demand-side measures that can moderate load growth and energy usage on a permanent basis. Hence, as part of the Summer Initiative, this program was seen as a "rapid response procedure" for providing "measurable demand and energy usage reductions beginning in summer 2000."

PROGRAM PERFORMANCE

According to the PG&E program manager, the utility program worked very well: (1) the rebates attracted many cities and municipalities (since the rebates paid for almost the entire cost of the installation), and (2) lifecycle costs were reduced (e.g., instead of replacing lights annually, they only needed to be replaced every 7-9 years). The program also provided municipalities with valuable exposure to, and familiarity with, this new technology, while also considerably lowering municipal maintenance costs in the process (Nexant 2001). In PG&E's program, 47 cities participated in their program with the following types of lights committed for installation: 4,057 reds, 20,387 greens, and 806 yellows (flashing). There were initially 43 grantees in CEC's LED program (12 local governments were later added).

Expected savings for the different types of LED modules are shown in Table 1. As shown in Table 2, a significant amount of energy has been saved (as of September 30, 2001): 37,675 MWh and 16.9 MW. These savings numbers are engineering estimates.

Table 1. Estimated Ex-Ante Electricity Savings for Measures Associated with LED Traffic Signal Programs (Quantum 2001)

	kW impact/unit	kWh impact /unit/year
12" Red Balls	0.076	670
12" Red Arrows	0.113	988
8" Red Balls	0.034	294
12" Green Balls	0.057	497
12" Green Arrows	0.028	244
8" Green Balls	0.024	210
12" Flashing Amber Beacons	0.064	561
8" Flashing Amber Beacons	0.028	245
Pedestrian Hand	0.047	413
Pedestrian Hand/Man Combination	0.054	473

Table 2. Estimated Electricity Savings for IOU's LED Traffic Signal Programs (as of Oct. 30, 2001)

	MWh	MW
PG&E	3,000	10
SCE	24,424	5.7
SDG&E	10,251	1.2
Statewide Program Total	**37,675**	**16.9**

It is expected that the CEC program will achieve 6 MW. Utility billing analyses were completed for 33 projects, and a program realization rate of 94% was calculated by averaging the realization rates of the 33 projects (Nexant 2001). The cost effectiveness of the CEC program was calculated to be $367/kW, which is higher compared to other state-funded energy programs, but less costly than adding additional capacity, which is generally estimated to cost between $750/kW and $1,000/kW (Nexant 2001).

Over the past five years, a significant amount of LED traffic signal retrofit activity has occurred in California, primarily conducted by the investor-owned utilities (IOUs) and by the California Energy Commission. By Spring/Summer 2001, the saturation level of LED traffic signals across the IOU territories was approximately 26% (ranging from 10% in Southern California Edison territory to 43% in San Diego Gas and Electric territory) (Quantum 2001). LED traffic signal penetration levels are expected to continue to increase as a result of these programs, to an average of 33% across the IOUs. Further increases are expected due to the revised Title 20, Appliance Energy Efficiency Standards, that will be effective on March 1, 2003 (Section 1605.3 (m) sets maximum wattages for traffic signal modules and lamps).

LESSONS LEARNED

According to the PG&E program manager, the following lessons were learned:

1. One needs to make sure there is an adequate supply of the technology that is being promoted. The IOU program had some close calls in ensuring an adequate supply of LED modules.
2. One needs to make sure there is a standard for implementing the program. The utilities used the Energy Star rating as a requirement for the program.
3. One needs to be clear on what is being offered. For example, the maximum amount of a rebate was $40. If a light cost $80, the customer could only receive $40.
4. Energy savings for yellow lights are not cost-effective; hence, the program provided rebates only to green, red, and yellow flashing lights.[27]

In addition to the short-term energy savings, one needs to consider the effects of market transformation (Nexant 2001):

[27] According to the CEC program manager, if a local government were changing all of the lights at the same time, the average payback would probably be less than 5 years (using today's rates). Also, an all-LED intersection allows local governments to install battery backup and operate that intersection like a normal intersection during power outages.

> "By promoting market transformation of this valuable energy-saving technology, there should be greater availability of the technology at reduced costs. Increasing the awareness of the technology within California is an additional benefit. These benefits should make it easier for other cities and counties to follow in incorporating LED traffic signal technology at possibly a lower cost. . . . the LED traffic signals element provides one of the most sustainable solutions to the energy crisis."

Due to program efforts and related work that has been conducted by utilities prior to this program, the availability of technical specifications, and the lower costs of the modules, the CEC has established maximum wattage requirements for traffic signal modules and lamps. These requirements have been incorporated into the revised Title 20, Appliance Energy Efficiency Standards, that will be effective March 1, 2003 (CEC 2001). Section 1605.3 (m) sets maximum wattages for traffic signals and lamps. This is a good example of how shorter-term, reliability-focused energy-efficiency programs can lead to longer-term market transformation effects.[28]

FUTURE

The utility program will not be evaluated. The utilities may propose a similar program to the CPUC for 2002. The funding for these programs has been depleted. Once the AB 970 funds have been depleted, the CEC will no longer have grants for LED traffic signals. However, the CEC will continue to have a loan program that can finance the conversion to LED traffic signals. The interest rate changes periodically and is currently 3 percent.

WEBSITES

PG&E website: www.pge.com
SCE website: www.sce.com
SDG&E website: www.sdge.com
CEC website: www.energy.ca.gov/peakload/program_summary.html

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[28] Reliability-focused energy-efficiency programs are energy-efficiency programs that are particularly designed, modified, and/or ramped up to address electricity system reliability concerns.

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California Investor-Owned Utilities' and the City of Oakland's Designing Commercial New Construction (2001)

SUMMARY

In 2001, California's investor owned utilities (IOUs) and the City of Oakland developed programs to increase the energy efficiency of building design, as well as the efficiency of the technologies employed in buildings.

PROGRAM OVERVIEW

In 2001, the IOUs implemented two statewide programs aimed at improving the design of new construction in the commercial sector. The **Savings By Design** (SBD) Program fosters integrated building design techniques and practices that contribute to energy-efficient facilities. The program addressed both large and small commercial new construction market segments including the public, private, and speculative construction markets. The program targeted decision makers at multiple levels within the new construction industry including building owners, financial officers, architects, engineers, contractors, builders, developers, energy consultants, and facilities personnel in all commercial new construction projects. In addition to design assistance, incentives were offered to building owners, based on the overall efficiency of the building design, and to design teams.

The **Energy Design Resources** (EDR) Program is an integrated package of design and performance tools, techniques, information, and educational resources that promote the design and construction of high-performance buildings. The program targeted designers (architects, engineers, lighting designers, and energy consultants); developers who establish the characteristics of new building projects through design and construction; and decision-makers who set the programmatic requirements for new building projects and can create a demand for energy efficient facilities and design expertise (building owners, developers, lenders, appraisers, and contractors). The program's website offers online training courses, tools, and brochures.

Both programs were marketed through utility account representatives and the Pacific Energy Center.

Under the California Public Utilities Commission's (CPUC) Summer Initiative program, the City of Oakland received funds to provide energy design and technical assistance to new construction projects that are already underway. By using the City's building and zoning plan check and permit issuance department, Oakland attempted to contact all of the numerous new large construction projects within the city. Oakland targeted multi-family (primarily), single-family, and low-income dwelling units that were at the design stage and could benefit from design assistance, but did not have the funds to pay for such assistance. The program was implemented mainly through Oakland's Economic Development Agency. The Agency worked with City staff and talked to potential participants, prepared and distributed flyers at energy venues (e.g., the Building Owners and Managers Association (BOMA) had an energy venue), placed ads on television, and conducted outreach to interest groups (e.g., architects).

The Development Agency provided some modeling assistance, engineering assistance, and simple payback analysis.

The SBD and EDR programs received $22.9 million and $2.6 million, respectively, from the Public Goods Charge funds (see Table 1). The City of Oakland received $300,000, also from the Public Goods Charge funds.

Table 1. Budgets for Commercial New Construction Design Assistance Programs

	Authorized Budget PY 2001 ($ millions)	
	SBD Program	EDR Program
PG&E	10	2
SCE	7.1	0.1
SDG&E	4.6	0.5
SCG	1.2	0
Statewide Program Total	22.9	2.6

SUMMER 2001 AND RELIABILITY

The Savings By Design Program was rolled out on a statewide basis in June 1999 by the Pacific Gas and Electric Company (PG&E), the Southern California Edison Company (SCE), and the San Diego Gas & Electric Company (SDG&E); the Southern California Gas Company (SCG) joined in July of 2000, introducing gas measures and incentives into the program structure. The Energy Design Resources Program was rolled out in 1998 by SCE and became a statewide program in 2000; SCG has not participated, but participation is planned in 2002.

Electric reliability was an explicit concern behind the development of the SBD Program in 2000 and 2001: budget, scope and goals increased. In July 2000, the CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). The Summer Initiative was specifically designed "to provide maximum impact of demand and energy usage reductions" during the Summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Electric system reliability was an explicit concern behind the development of this program. As part of the July decision, the CPUC recounted the events and analyses of the problems with energy supply and demand that underscored the need to aggressively pursue demand-side measures that can moderate load growth and energy usage on a permanent basis. Hence, the Summer Initiative was seen as a "rapid response procedure" for providing "measurable demand and energy usage reductions beginning in summer 2000."

The SBD Program was revamped and revised in response to the new Title 24 standards that went into effect on June 1, 2001. By June 10, 2001, a new energy savings calculator was in place for the program. The SBD Program adopted ASHRAE's 90.1 Tier 1 standards for HVAC and doubled the HVAC incentive for systems approach applications. The SBD program emphasized daylighting systems in 2001 because their inclusion ensured the most efficient building while reducing peak demand. The EDR Program was realigned with the SBD program to directly support its kW, kWh, and therm savings goals. Funding for the

EDR Program was shifted to the SBD Program, reducing the amount of material to be developed by the EDR Program.

For the City of Oakland, reliability was an important concern, but the impacts from this program would occur after the summer of 2001, as buildings were being built. As a result, the City focused more on energy-efficiency measures which would help to reduce peak demand: e.g., energy-efficient chillers, variable frequency drives for motors, electronic ballasts, and compact fluorescent lamps.

PROGRAM PERFORMANCE

According to SCE's program manager, the program worked very well. There was an incredible surge in interest in the programs: more people were calling directly (instead of the utility calling customers), there were more requests for utility presentations, more workshops and seminars were presented, and more Web "hits" (exponentially). SCE "committed" more projects for the SBD Program in 2001 than in past years: 267 versus 172 in 2000 and 177 in 1999.

For the IOUs, as of Sept. 30, 2001, they expect an energy savings of 61,333 MWh and 17.5 MW from the SBD program (the EDR Program is principally an information program, and the utilities do not estimate energy savings for this program).

Table 2. Estimated Electricity Savings for the Savings by Design Program (as of Sept. 30, 2001)

	MWh	MW
PG&E	27,209	13.4
SCE	20,573	2.4
SDG&E	10,251	1.2
SCG	3,300	0.5
Statewide Program Total	**61,333**	**17.5**

Based on commitments for the year, SCE expects to achieve 27,300 MWh and 4.3 MW savings from renovation and remodeling and another 82,600 MWh and 14.0 MW savings from new construction—the first time that SCE exceeded 100,000 MWh.

The utility savings were based on computer simulation analysis, using either a whole building approach or a systems approach. Utilities will be providing an evaluation report on the SBD Program to the CPUC in 2002. An evaluation of the EDR Program will be started in 2002.

Through September 30, 2001, the City of Oakland had provided assistance to 19 commercial sites (totaling 3.8 million square feet and nearly 700 multifamily units) that were interested in receiving energy-efficiency design assistance. Oakland had contacted 18 others about the project. The goal for the City of Oakland is 1,200 MWh and 0.3 MW (as of Sept. 30, 2001), and the recommended savings have already exceeded 4,000 MWh. A report of the program will be completed in late January 2002. An evaluation of the program will be conducted in 2002. One example of a "success story" in Oakland's program: based on their

experience in Oakland, the Best Buy Company intends to improve the energy efficiency of their design of other stores around the country.

LESSONS LEARNED

According to SCE's program manager, the following lessons were learned:

1. The most efficient building designs are those that are created by integrating all systems to optimize the performance of the whole building, and this process must begin at the very start.

2. Improvements to specific building types, such as schools, have been accomplished by working closely with all the key players and agencies involved in their design, construction, funding, regulation, etc.

3. Knowing which efficiency strategies are most effective in specific building types, such as the use of skylighting in large distribution centers, is the key to a successful program.

According to the City of Oakland's program manager, the following lessons were learned:

1. It takes time to implement a program through a city bureaucracy like Oakland's. Fortunately, the City staff had the "interest" and "tenacity" to deliver the services; otherwise, the services would not get delivered.

2. Program implementation varies by staff level: "sporadic passion" was shown by the different levels of commitment among staff.

3. Everything is not cut and dry: cost-effective measures are not always implemented.

4. "Perception is reality:" once people hear about the poor performance of a specific technology, they will become "skittish" and reluctant to install that measure.

FUTURE

The utilities' program will continue through March 31, 2002, and they have proposed programs for the rest of 2002. The EDR Program will be funded at a reduced level, due to the utility focus on resource acquisition. The CPUC will make a decision on their proposal in 2002. The City of Oakland's program concluded at the end of 2001.

WEBSITE

Utility websites: www.savingsbydesign.com and www.energydesignresources.com

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California Public Utilities Commission's Summer Initiative Program and Two California Investor-Owned Utilities' 2001 Residential Refrigerator and Freezer Recycling Program

SUMMARY

In 2000, the California Public Utilities Commission (CPUC) directed California's investor-owned utilities (IOUs) to develop a coordinated program to remove spare refrigerators and freezers. The program was very successful: over 36,000 refrigerators and freezers were recycled in the Pacific Gas and Electric Company (PG&E) and the San Diego Gas and Electric Company (SDG&E) service territories.

PROGRAM OVERVIEW

As part of the CPUC's Summer Initiative, the Residential Refrigerator and Freezer Recycling Program targeted residential consumers who operated spare refrigerators and freezers, and used financial incentives ($75/refrigerator or freezer) to take the spare units out of service by recycling them. Customers had to own the appliance, or have the owner's written consent. Landlords and rental property owners/managers were not eligible for the program, but tenants who owned their appliances were eligible. Participants had to be residential electrical customers of PG&E or SDG&E living in one of the counties that were likely areas of possible energy supply disruptions ("areas of transmission and distribution constraint"). Southern California Edison Company (SCE) customers were not part of this Summer Initiative program, because SCE was already running its own program that had started in 1993. As with other programs selected by the CPUC from third-party proposals submitted in the CPUC's Summer Initiative process, the utilities were directed by the CPUC to award a contract for program implementation to the third party who had proposed the program. In this case, because of SCE's contract experience with the contractor and the program, the CPUC requested SCE to award and manage the contract with the Appliance Recycling Centers of America (ARCA), the contractor for SCE's program, on behalf of the other utilities. The budget for this program was $8.5 million ($5.5 million for PG&E and $3 million for SDG&E), funded from Public Goods Charge monies.

SUMMER 2001 AND RELIABILITY

In July 2000, the CPUC adopted the Summer Initiative as a "rapid response procedure" to provide "measurable demand and energy usage reductions beginning in summer 2000" (Decision 00-07-017). The Summer Initiative was specifically designed "to provide maximum impact of demand and energy usage reductions" during the Summer 2000 energy capacity shortage and for the potential energy shortage projected over the next few years. Electric system reliability was an explicit concern behind the development of this program. As part of the July decision, the CPUC recounted the events and analyses of the problems with energy supply and demand that underscored the need to aggressively pursue demand-side measures that can moderate load growth and energy usage on a permanent basis. Hence, as part of the Summer Initiative, this program was seen as a "rapid response procedure" for providing "measurable demand and energy usage reductions beginning in summer 2000."

PROGRAM PERFORMANCE

According to ARCA, the program was very successful in that it achieved substantial energy savings: 122,237 MWh and 11.1 MW (Table 1). In a recent report, ARCA noted that they had recycled 36,703 refrigerators and freezers in the PG&E and SDG&E areas (23,750 from PG&E and 12,935 from SDG&E) (ARCA 2001).[29] The total lifetime savings of the program were 375,416 MWh (over a 6 year measure life period), and a 9.6 MW summer peak reduction. The cost of conserved energy was $0.023/kWh. These savings are based on engineering estimates. Monitoring and verification data are being collected and will be provided to the CPUC next year as part of their annual report (May 2002).

Table 1. Estimated Electricity Savings for Summer Initiative Residential Refrigerator and Freezer Recycling Program (as of Sept. 30, 2001)

	MWh	MW
PG&E	35,919	6.7
SDG&E	86,318	4.4
Statewide Program Total	**122,237**	**11.1**

The program was completed in 12 months, two months ahead of schedule, and recycling captured over 25,000 tons of scrap metal, 13,500 pounds of refrigerants and 2,600 gallons of compressor oil, properly managed nearly 2,300 pounds of PCB-laden capacitors, and recovered over a pound of mercury.

The rebates were critical in getting people to participate in the program. However, the program only reached approximately 3% of the eligible market, leaving the vast potential for energy savings residing in the remaining 97% of the market. For example, ARCA estimates that a modest 10% increase in participation that, if funded, would collect approximately 100,000 refrigerators and freezers (out of a total eligible inventory of 1,136,334 refrigerators and freezers in PG&E's and SDG&E's service territories) while yielding over 159,000 MWh and a 28 MW reduction in peak usage (ARCA 2001).

LESSONS LEARNED

According to an ARCA spokesperson, one needs to be careful what you say to the press. For example, an article in a local newspaper indicated that this Summer Initiative program was almost over, and the next day, the customer call service center was swamped with over 10,000 phone requests for information on the program in one day, triple the historical call volume (ARCA 2001). These feature stories caused a dramatic increase in customer requests that resulted in the development of a backlog of orders in the areas where the stories

[29] SCE also implemented its largest program in 2001, capturing an estimated 70,000 units. At the end of the third quarter, the program had exceeded volume for all of 2000 by approximately 15,000 units (59,000 versus 45,000). By the end of 2001, the program will have achieved the highest unit volume since its inception in 1994. And SCE did this with a lower incentive in 2001 ($35 or a 5-pack of CFL bulbs, which normally sell for $50 retail) than in 2000 ($50 rebate and a cooler was offered as an extra bonus for part of the year). The main reason for the increased participation level in 2001 was the California energy crisis: daily media coverage of the threats of blackouts, consumers' perception of price gouging by electricity suppliers, and high electricity prices; sharply increased energy prices; and a new advertising campaign by the State, increasing awareness of refrigerator energy use and ways to conserve.

appeared. The uneven intake of orders from public relations efforts was not anticipated and required an extraordinary response from ARCA that included the addition of inbound telephone lines and the supporting switching equipment in the customer call center. In addition, the transportation department found it necessary to adjust its operation in order to accommodate the increase in volume in the affected areas.

Retailers were very helpful in generating leads, as they used ARCA's marketing materials as a sales tool for promoting energy-efficient refrigerators and freezers.

An SCE representative points out the substantial difference in results and costs between this third-party Summer Initiative program and the SCE program, which was implemented by ARCA with SCE support. The independent third-party program recycled only about half as many refrigerators despite offering more than double the rebate amount. The difference, SCE believes, is due to three interrelated factors: (1) SCE's multi-year marketing of the program and information about old refrigerator energy use; (2) the higher level of customer trust engendered by utility sponsorship of the program; and (3) SCE (rather than third-party) marketing activities for the program.[30]

FUTURE

This Summer Initiative program is over. In May 2001, the CPUC awarded a one-year contract to ARCA, using SBx1-5 funds ($15 million) from the State Legislature, to continue a modified program design in PG&E and SDG&E service territories (ARCA 2002). Modifications included the addition of room air conditioners, the adjustment of incentives ($50 for each working refrigerator or freezer and $25 for each working room air conditioner), and the expansion of the program to California's Central Valley. Enrollment in this program began in earnest in September 2001, and the contract will be completed in May 2002. By the end of this program, approximately 80,000 refrigerators, freezers, and room air conditioners will have been retired and recycled, over 633,000 MWh of energy will be conserved over the lifetime of the program, and peak demand will have been reduced by 21 MW. The utilities did propose programs for 2002, and the CPUC will make a decision on them in 2002.

WEBSITE

Since the Summer Initiative program has ended, there is no current website. However, there is a website for the second program: www.8005995795.com

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[30] Note: SCE indicated that it continues to express a fundamental objection to the basic approach of the CPUC requiring utilities to sign contracts for programs with CPUC specified third parties, using CPUC determined terms. This objection is based on general principles and practical concerns, and not related to the particular contractor specified in this program.

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California Investor-Owned Utilities' and the California Energy Commission's 2001 Building Code Development and Assistance

SUMMARY

In 2000, the California Energy Commission (CEC) was asked by the Governor of California to develop new Energy Efficiency Standards for Residential and Nonresidential Buildings (also known as Title 24 Energy Standards) in 120 days, and they were able to do it in 119 days! At the same time, California's investor-owned utilities (IOUs) worked with the CEC in developing these new upgrades in standards and codes.

PROGRAM OVERVIEW

California's Energy Efficiency Standards for Residential and Nonresidential Buildings (also known as Title 24 Energy Standards) were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy-efficiency technologies and methods. On January 3, 2001, the 2001 AB 970 Residential and Nonresidential Energy Efficiency Standards were adopted by the California Energy Commission. The new standards took effect June 1, 2001. The most impressive feature of this process is the speed in which the new standards were developed. Under an "Emergency Rulemaking Process," the CEC was asked to develop new building standards in 120 days, and the CEC was able to do it in 119 days! And they did this by following existing procedures and laws. There were two public review periods: one was 45 days after the first set of standards was developed, and another was conducted later. The standards had to go through the Building Standards "commission review," and then they had to be published in Title 24. The Commissioners approved the building standards on January 3 and re-adopted them permanently on April 1.

The most significant changes to the residential portion of the standards are:

1. Duct sealing is required in all climate zones when using Prescriptive Package D.
2. HERS raters must use duct blasters to verify the HVAC system has leakage less than 6% of the fan flow.
3. Spectrally Selective glazing is required in Package D.
4. Radiant Barriers are required in Package D.
5. Thermostatic Expansion Valves (TXVs) are required for split-system central air-conditioners in specified climate zones when using Package D for compliance (TXVs help regulate the refrigerant flow that the indoor unit performs more efficiently).
6. Compliance credit for interior shading (such as roller shades and mini-blinds) has been eliminated, and designers may no longer move shading devices for compliance credit to different orientations when using the Multiple Orientation Alternative.
7. Compliance credit is available for "cool roofs" (roofs that reflect, rather than absorb, the sun's rays).

The most significant changes to the non-residential portion of the standards affect glazing and lighting requirements:

1. In many climate zones, nonresidential buildings that complied using single glazing under the 1998 Standards may need to have dual glazed, high performance windows to comply with the new 2001 Standards.
2. All permanently installed exterior luminaires attached to or powered by the electrical service in the building must either have a minimum efficiency value of 60 lumens/watt or be controlled by a motion sensor.
3. No exceptions for occupancy sensors or automatic time switches with manual override from the bi-level control requirements (which are required in all spaces larger than 100 square feet and having a lighting load greater than 0.8 Watts per square foot).

As part of their Statewide Building Code Development and Assistance Program, California's investor-owned utilities worked with the CEC in developing the new upgrades in standards. Utilities also conducted building code training for residential and nonresidential builders, architects and engineers, standard-setting organizations (e.g., American Society of Heating, Refrigeration and Air Conditioning Engineers, CEC, and the U.S. Department of Energy), and enforcement authorities (e.g., city and county building departments).

When they were not attending code-development meetings, utilities developed codes and standards enhancement (C.A.S.E.) studies for promising design practices and technologies, and presented them to standards/code-setting bodies and manufacturers in a coordinated manner. For example, the Pacific Gas and Electric Company (PG&E) is developing approximately 30 C.A.S.E. studies for future code revisions. These code revisions tighten current standards or support "exceptional method applications" to incorporate new technologies into Title 24 building standards. The scope of C.A.S.E. studies covers appliances, residential buildings, and nonresidential buildings. The Southern California Edison Company (SCE) is developing a C.A.S.E. study on high ambient testing of HVAC equipment.

The utilities' Statewide Building Code Development and Assistance Program received a total of $2.8 million from the Public Goods Charge funds (PG&E—$1.5 million; SCE—$0.7 million; SDG&E—$0.3 million; and SCG—$0.3 million).

SUMMER 2001 AND RELIABILITY

Electric reliability was an explicit concern behind the development of the new building codes and standards. All of the utility efforts were targeted to ensuring the CEC would meet its deadline of 120 days.

PROGRAM PERFORMANCE

The CEC was able to accomplish their goal in time. The standards are estimated to result in a 10% improved energy efficiency, leading to a savings of approximately 131 GWh per

year and 230 MW per year for the residential building standards and 81 GWh and 32 MW for the nonresidential building standards (there are also gas savings, but this is not the focus of this report) (Heschong Mahone Group 2001). Since the utility efforts are primarily information and technical assistance programs, they do not report energy savings for their efforts.

LESSONS LEARNED

According to CEC's program manager, the legislative deadline of 120 days was the most important factor in getting the codes revised quickly. The deadline created a "crisis schedule" that all parties had to adhere to. While the meeting days were long, all parties were committed to meeting the legislative deadline.

Utilities played a key role in helping the standards get in place. The utilities provided training to building departments, and their new construction programs helped push building practices beyond existing Title-24 standards. This was echoed by a program evaluator who stated that much of this work could not have been accomplished without the help and analysis of interested third parties, especially the IOUs who were the most active and provided the greatest amount of assistance (Heschong Mahone Group 2001).

According to one utility program manager, it is important to get all participants to say early on what the best areas are for code enhancement, in order to complete studies in a timely fashion and in order to be prepared. One should expect to spend a lot of time early on discussing where to target the code enhancement efforts, especially when people bring with them different perspectives and backgrounds on education, training, emerging technologies, etc.

FUTURE

The utilities proposed building code assistance programs for 2002, and the CPUC will make a decision on them in 2002.

The CEC is in the process of developing the next version of standards to be approved in July 2003 (to go into effect in 2005).

WEBSITE

CEC website: www.energy.ca.gov/title24/index.html
PG&E website: www.pge.com
SCE website: www.sce.com
SDG&E website: www.sdge.com
SCG website: www.socalgas.com

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California Investor-Owned Utilities' 2001 Express Efficiency Program

SUMMARY

In 2001, the Express Efficiency Program provided standard rebates to nonresidential customers and, in some cases, to contractors and Energy Efficiency Service Providers (EESPs) for installation of energy-efficient equipment. This was a statewide program implemented by California's investor-owned utilities, with differences to reflect different service territory needs. Under the Summer Initiative program, the California Public Utilities Commission (CPUC) allowed rebate amounts to be increased for measures that provided high peak demand reduction impacts.

PROGRAM OVERVIEW

Under the Express Efficiency Program, all utilities implemented the same incentive pricing structure on a statewide basis. The Express Efficiency Program marketed directly to customers, with some direct mail and some outreach to business organizations, trade shows, and presentations at special events (e.g., Chambers of Commerce and California Department of Trade and Development). The utilities promoted the program to vendors by encouraging them to be proactive with small business customers. Assigned customer utility representatives also contacted customers to inform them about this program. Finally, utility program representatives held vendor program kick-off meetings, gave presentations to customers, and attended events in their service territory. In order to keep administrative costs down, there was no advertising on television or radio, or in magazines and newspapers.

The Express Efficiency Program was principally a rebate program, designed to work with other programs—e.g., customers could request audits, attend educational seminars, and training classes; educational seminars were provided in utility service territories; local utility offices provided resources; and utility websites contained a searchable database with rebate information on motors, packaged air conditioners, and electronic ballasts, as well as technical information and guidelines on how to choose a vendor. Each utility decided on how to distribute rebate dollars: e.g., the Pacific Gas and Electric Company (PG&E) provided bonuses to vendors, while the Southern California Edison Company (SCE) and the San Diego Gas and Electric Company (SDG&E) provided all of their rebate dollars to customers.

SUMMER 2001 AND RELIABILITY

Nonresidential rebate programs have been implemented by individual utilities since the 1980s. However, 2001 was the third year of the Express Efficiency Program as a coordinated statewide program. In 2001, the focus of the program was the reduction of peak energy demand. Under the Summer Initiative program, the CPUC allowed rebate amounts to be increased for measures that provided high peak demand reduction impacts, but the new rebates could only be offered to customers making new applications to the program. In 2001, PG&E and SCE extended the Express Efficiency Program to large customers to capture additional energy savings and demand reduction.[31] SDG&E did not add any new measures to their program until

[31] SDG&E funded a Third Party Initiative Program that offered rebates to large customers.

October, when they added rebates for high bay lighting for T-5 lamps and residential refrigerators for the commercial sector, and higher rebates for reflective window films in selected geographic areas. The programs were aggressively promoted at the beginning of 2001, so savings could occur before or during the summer of 2001. Hence, small customers for all the utilities received a bonus for peak-reducing measures if they were installed prior to June 1 (i.e., the rebate was twice the normal amount). For PG&E, the time period for their program was extended to August 15, although the rebates were less than the previous time period. For SDG&E, the program was extended twice, first until June 30 and a second time to the end of September.

In 2001, the budget for the Express Efficiency Program was $38.6 million from the Public Goods Charge (PG&E—$22.8 million; SCE—$13.2 million; SDG&E—$2.1 million; Southern California Gas Company (SCG)—$0.5 million).

PROGRAM PERFORMANCE

This program was very successful: e.g., PG&E received a flood of applications by June 1, committed all its allocated funding on August 15, and subsequently closed the program. PG&E had 7,000 customer applications, resulting in an estimated savings (based on engineering specifications) of 42 MW and 235 million kWh, most of which came in the summer. SCE's program was fully committed by the end of the third quarter of 2001, SDG&E's program by the end of October 2001, and SCG by the end of December 2001.

As shown in Table 1, a significant amount of energy has been saved: as of Sept. 30, 2001, 470,948 MWh and 95.6 MW.

Table 1. Estimated Electricity Savings for Express Efficiency Program (as of Sept. 30, 2001)

	MWh	MW
PG&E	259,792	45.9
SCE	193,594	44.6
SDG&E	17,562	5.1
SCG	0	0
Statewide Program Total	**470,948**	**95.6**

LESSONS LEARNED

According to the PG&E program manager, it takes a combination of efforts to make a successful program: e.g., education (on how energy-efficient technologies work and in helping customers determine what projects they can implement in their facilities), rebates (offsetting higher first costs, so customers invest), and substantial personal efforts (small businesses need lots of information and require face-to-face contact). This can be quite expensive but necessary.

It helps to have clear and non-conflicting goals. For 2001, the Express Efficiency Program focused on peak demand savings, before the onset of the summer, and the utilities were successful in obtaining substantial energy demand savings.

If you want small customers to participate in an energy-efficiency program, expect it to be more expensive than programs targeting large commercial and industrial programs. In the latter programs, one can achieve more savings per dollar effort.

According to the SDG&E program manager, extensive program outreach was critical in the success of this program, making it the most popular program that was offered. They also discovered that statewide contractors would go to other utility service territories where large commercial customers were allowed (e.g., PG&E) or where vendor bonuses were offered, thereby limiting participation in SDG&E's program.

FUTURE

There will be an evaluation of this program next year. The utilities plan to continue this program through the first quarter of 2002. The CPUC will decide if this program will continue beyond the first quarter of 2002. If the utilities obtain CPUC approval, the Express Efficiency Program will have only one program component: downstream program for business customers.

WEBSITE

PG&E website: www.pge.com
SCE website: www.sce.com
SDG&E website: www.sdge.com
SCG website: www.socalgas.com

REFERENCES

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California Investor-Owned Utilities' 2001 Statewide Residential Rebate Programs

SUMMARY

In 2001, California's investor-owned utilities (IOUs) implemented a statewide coordinated rebate program for residential customers. This program provided customers with financial incentives for the purchase and installation of qualifying energy-efficient heating and cooling equipment, refrigerators, attic and wall insulation, windows, and other measures. Due to the energy crisis, customers' high bills, and aggressive promotional efforts, purchases of ENERGY STAR® qualified refrigerators, dishwashers and clothes washers set all-time program record highs.

PROGRAM OVERVIEW

The statewide coordinated residential rebate program contained two elements: downstream rebates to customers and upstream incentives to manufacturers and retailers. Customer incentives were offered for ENERGY STAR® qualified appliances that reduced energy and peak demand: e.g., clothes washers, dishwashers, refrigerators, room air conditioners, energy-efficient heating and cooling equipment, and residential energy-efficient retrofit measures. The Pacific Gas and Electric Company (PG&E) also offered 'in-store' rebates for energy-efficient compact fluorescent lamps (CFLs).

In the area of home appliances, each utility emphasized different aspects of this program. In addition to providing incentives, PG&E focused on information and education strategies designed and targeted to reach consumers who were making planned or emergency appliance purchase decisions. The primary focus was to promote ENERGY STAR® qualified appliances with emphasis placed on improving market recognition of the energy and non-energy benefits of energy efficient appliances. The program was marketed via bill inserts and by working with retail partners and manufacturers. PG&E also offered a Manufacturer Upstream Coop Advertising and Marketing program. The Southern California Edison Company (SCE) and the Southern California Gas Company (SCG) (for 2001, this program was implemented jointly by the two utilities) provided rebates to consumers and promotional incentives to participating appliance manufacturers to increase the sales and distribution of ENERGY STAR® qualified refrigerators. The San Diego Gas and Electric Company (SDG&E) offered both a "downstream appliance rebates" program (customer rebates for qualifying appliances) and "statewide upstream appliance" program (working with appliance manufacturers to promote awareness and interest in qualifying appliances).

Rebates for Energy Star qualified appliances were: $50 for dishwashers, $75 for clothes washers, $50 for room air conditioners, $125 for refrigerators, and $300 for gas furnaces. The IOUs also provided rebates for other home energy-efficient improvement measures. For example, PG&E promoted over 30 home energy-efficient retrofit measures with various incentive dollar amounts in some of their other programs. And SCG offered the following incentives in their residential rebate programs: $150 for a variable speed drive gas furnace, $20 for a programmable thermostat, $0.15 per square foot of attic and wall insulation, $75 for an efficient gas water heater, $3 for low-flow showerheads, $5 per five feet of water heater

pipe insulation, $1 per square foot of high performance windows, $50 for duct testing for single-family houses and $200 for duct sealing for a single-family house.

The funding for the Statewide Appliance Rebate program was $22.6 million, from the Public Goods Charge (PG&E—$10.9 million; SCE—$4.2 million; SDG&E—$1.6 million; SCG: $5.9 million). Funding from the State Legislature (SBx1-5) provided additional money for rebates (e.g., $5.7 million for SCG, and SCE added $7.1 million to its downstream rebate program from SBx1-5funds, for a total of $11.4 million for both downstream and upstream programs).

SUMMER 2001 AND RELIABILITY

Utilities have conducted residential rebate programs for over 20 years. But in 2001, the program focused more on demand reduction, and in particular to the timing of programs and promotion. For example, PG&E offered a "super rebate" for two months (June and July 2001)—a $200 rebate instead of $125 for one of the most efficient ENERGY STAR® qualified refrigerators. In addition, the utilities made sure manufacturers were aware of California's rebate programs and were willing to ship these products to the utility service territories prior to program implementation. Additional funding was provided by the State Legislature (SBx1-5) for rebates.

PROGRAM PERFORMANCE

The rebates, information, and education resulted in purchases of ENERGY STAR® qualified refrigerators, dishwashers and clothes washers at all-time program record highs. For example, in the third quarter alone, PG&E processed rebates for over 47,405 refrigerators, 11,935 clothes washers, 9,326 dishwashers, 731 room air conditioners, and 1,068 portable evaporative coolers. In another example, PG&E processed $200 "super rebates" for 40,000 refrigerators for the two-month period of availability. And when the rebate was lowered to $125 (from August 1 to October 10), rebates were provided for over 22,000 energy-efficient refrigerators. If one were to include the number of refrigerators that received $75 rebates for refrigerators (since the start of 2001), then the total number of refrigerators receiving rebates was approximately 100,000 (compared to 17,000 in 2000)! A significant number of other appliances was also rebated in PG&E's service territory: 30,000 clothes washers (compared to 27,000 in 2000), 24,000 dish washers (compared to 17,000 in 1999—no rebates in 2000), 1,400 room air conditioners, and 1,800 portable evaporative coolers. And 426 stores participated in PG&E's program, providing point-of-purchase marketing materials and rebates. Finally, 4 manufacturers participated in PG&E's Manufacturer Upstream Coop Advertising and Marketing Program.

In SCE's service territory alone, there were 12 different measures offered which resulted in nearly 22 MWh and 30 MW savings as of the end of Nov. 2001, and involved over 70,000 customers. SCE installed over 7,000 whole house fans, 40,000 energy-efficient refrigerators, 492,000 square feet of energy-efficient windows, 5,000 ENERGY STAR® qualified programmable thermostats, and more than 8,000 ENERGY STAR® qualified central air or heat pump systems. Thus, through December 2001, SCE paid more than 80,000 rebates. These

figures are substantially higher than the previous year when only 13,000 rebates were paid in 2000.

SCG paid over $2.7 million in rebates (as of Dec. 15, 2001) and expects to pay over $4 million when all the applications "in process" have been reviewed. Most of their rebate money was provided for the following measures: gas furnaces (3,329), clothes washers (8,290), attic insulation (3,180), high performance windows (8,143), duct sealing (434) and water heaters (4,792). In 2000, SCG committed $2,352,496 to customer rebates. When compared to the $4.1M committed in 2001, SCG's successful consumer rebate programs showed a 75% increase in committed funds over 2000.

As one would expect, significant energy savings were achieved in the Statewide Appliance program: 35,368 MWh and 14.3 MW (as of Sept. 30, 2001). As of December 31, 2001, SCE achieved 20 MWh and 31 MW. This program also had gas savings, but this is not the focus of this report. These are estimated savings based on engineering calculations. An evaluation of the program will be completed in 2002.

Table 1. Estimated Electricity Savings for Residential Appliance Program (as of Sept. 30, 2001)

	MWh	**MW***
PG&E	26,635	5
SCE	7,914	9.2
SDG&E	819	0.1
SCG	0	0
Statewide Program Total	**35,368**	**14.3**

*The MW impact is the "net capacity demand reduction" in the utility's transmission and distribution system at the time of the utility's system peak period. Each end use has a certain usage and burden on the electricity system ("capacity h-factors") which will vary for each utility due to different climates and different definitions of the system peak period. Hence, the differences in MWh/MW ratios for the different utilities.

LESSONS LEARNED

According to PG&E's program manager, coordination with retailers and manufacturers is very important. For example, if these market players had not been aware of utility rebates and the timing of the education programs, then retailers and manufacturers would have had a difficult time in responding to customer questions and making sure there was an adequate supply of equipment.

There was a lot of value and benefit in the groundwork that was laid by the utilities and other parties in the last few years (under the "market transformation" umbrella). For example, customer education and retail training were very helpful, enabling the utilities to implement their programs expeditiously. Program implementation would have been quite different without having this groundwork in place.

It was important in getting people to understand the importance of the concept and value of "early retirement" of an appliance. The "super rebate" made an enormous difference in giving customers the needed "push" for them to turn in their old refrigerator. An ongoing refrigerator recycling program was also helpful in this regard: customers were told that they could receive additional funds for turning in their old refrigerator.

According to SCG's program manager, it is important to try to reduce customer confusion as much as possible. In addition to utility rebates there were manufacturers and other utilities offering rebates in the marketplace. Customers were often unsure to whom they should apply (or even who their utilities were).

FUTURE

The utilities proposed similar appliance rebate programs and other home energy-efficient retrofit measure incentive programs for 2002, and the California Public Utilities Commission (CPUC) will make a decision on these programs in 2002.

WEBSITE

PG&E website: www.pge.com
SCE website: www.sce.com
SDG&E website: www.sdge.com
SCG website: www.socalgas.com

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New York State Energy Research and Development Authority's Peak Load Reduction Program (PLRP)

SUMMARY

NYSERDA's PLRP was initially focused on establishing a load management program designed to reduce summer time peak demands through load curtailments, load shifting and dispatchable back-up generation in support of the New York Independent System Operator's (NYISO) Emergency Demand Response Program (EDRP). To implement long-term base load reductions, NYSERDA also included in the scope of this program a component that seeks permanent demand reduction through efficiency improvements.

The PLRP greatly exceeded its goal, although permanent demand reductions were a small fraction of the program total. The program goal was 70 MW, and the program achieved a total demand reduction capacity of about 115 MW. Permanent demand reductions achieved about 3 MW of this total. The program will continue in 2002. NYSERDA plans to increase emphasis on the permanent load reduction component of this program, including increased incentives and greater marketing to increase awareness and participation.

PROGRAM OVERVIEW

This program seeks to reduce summer peak demand to avoid capacity shortfalls and other reliability concerns. NYSERDA's PLRP takes an integrated approach to offer customers a range of strategies for reducing peak electric requirements, including information, technical support and incentives to invest in advanced technologies through either curtailment opportunities or through permanent electric efficiency improvements and associated demand reductions. Incentives offered to participants cover up to 75% (with caps) of the expenses incurred to implement measures.

The program has four main components:

1. *Permanent Demand Reduction Efforts (PDRE):* measures that result in base-load reductions and long-term coincident system peak demand reduction.

2. *Short-Duration Load Curtailment Measures (SDLC):* measures that enable facilities to curtail loads to reduce system demand at times of a statewide capacity shortfall in response to an emergency call from the NYISO or one of the distribution utilities.

3. *Dispatchable Emergency Generator Initiatives (DEGI):* (ConEd Service Territory only) measures that enable owners of existing emergency generators to offload all or a portion of their electrical load to these generators to reduce system demand at times of a statewide capacity shortfall. Generator operation only occurs in response to an emergency call from the NYISO or one of the distribution utilities.

4. *Interval Meters (IM):* the program provides incentives for the purchase and installation of interval meters required by customers participating in load reduction programs such as the NYISO load management programs.

Participants in the program apply directly to NYSERDA. The participant may be the building owner, but also could be an aggregator, third party (turn key) contractor, energy service company, or utility. The applicant receiving the award bears responsibility for the project implementation and must submit a technical assessment, which examines the project's feasibility. NYSERDA staff review applications and consultants to NYSERDA provide quality control services. Applicants are encouraged to aggregate all facilities. Successful applicants get a purchase order to proceed with their projects. Field verifications and copies of invoices are required for applicants to receive incentive payments. This program targets large commercial and industrial customers.

Eligible measures include, but are not limited to, operation and maintenance services, HVAC, lighting systems, motors, motor drives, energy management system upgrades, advanced metering controls and scheduling improvements. Renewable energy technologies, such as building integrated photovoltaic systems, were eligible and encouraged as measures to implement under the program. Permanent demand reduction and PV measures must be activated in an automatic mode or as an integrated function of the operation of the building systems or equipment. Eligible project costs include engineering services, procurement and installation of capital equipment, metering equipment and other services and equipment necessary to achieve the permanent demand reductions.

Incentives provide up to 75% of the cost of installed measures, up to the following caps:

Installed, Operational and Field Verified* by:	**Permanent Demand Reduction Efforts**		**Short Duration Load Curtailment**		**Dispatchable Emergency Generator Initiative**	**Interval Meters**
	Con-Edison Service Territory	**Non-Con-Edison Service Territory**	**Con-Edison Service Territory**	**Non-Con-Edison Service Territory**	**Con-Edison Service Territory only**	**Statewide**
12/31/01	**$375/kW**	**$125/kW**	**$150/kW**	**$50/kW**	**$100/kW**	**$2,000/meter**

* Field Verification is not required for Interval Meter (IM)-only Projects

The PLRP is funded through **New York Energy $mart^{SM}** program, which is financed by a System Benefits Charge established by the New York State Public Service Commission on the State's investor-owned utilities to ensure that important research and development and energy efficiency services continue during the utilities' transition to competition. The total budget for 2001 was about $13.5 million, with about $3 million of this targeted for research and development on photovoltaic projects. Through September 30, 2001 the program had expended about $7 million.

SUMMER 2001

NYSERDA's PLRP was initially focused on establishing a load management program designed to reduce summer time peak demands through load curtailments, load shifting and dispatchable back-up generation in support of the New York Independent System Operator's (NYISO) Emergency Demand Response Program (EDRP). Reliability concerns in 2001 caused NYSERDA to expand the scope of this program to include a component that seeks to achieve permanent demand reduction through efficiency improvements.

NYSERDA recognized market opportunities to pick up additional system energy savings—and corresponding peak demand reductions—by targeting projects that could be implemented with short lead times (5 months or less) that would achieve long-term savings (5 or more years). NYSERDA believed that providing some financial incentives for these short-lead time efficiency improvements would fill a void in the market for projects that were too small or otherwise ill-suited to energy performance contracting. For example, a chain of approximately 40 auto parts stores applied and got approved for changing out T-12 lamps to T-8s with electronic ballasts, reducing demand by 379 kW. Another example is a stone quarry that changed out machinery to improve its process efficiency reducing demand by 720 kW. Both projects illustrated the flexibility and benefits of the PLRP.

RELIABILITY

NYSERDA recognized the value that a well-functioning, time-of-use market would have for achieving peak demand reductions. Consequently, a key element of this program was to support the costs for obtaining and installing interval meters. NYSERDA also saw a great potential for commercial and industrial customers to identify long-term permanent opportunities for load shifting, curtailment and efficiency as they became more aware of their energy use characteristics, including time-of-use profile.

Reliability concerns in New York vary by region. The downstate area is the greatest concern for reliability issues. The events of 9/11/01 caused potential grid capacity restrictions. The destruction of a portion of the grid infrastructure and other impacts (such as relocation of high energy intensity businesses within Manhattan) have compounded the situation. The Long Island Power Authority (LIPA) and ConEd territories were facing potential capacity shortfalls prior to these events. NYSERDA and others hope to make energy efficiency an integral part of the rebuilding of lower Manhattan.

PROGRAM PERFORMANCE

The total program goal was about 70 Megawatts from all installed and operational measures. The program achieved far more than this goal—about 115 MW installed or in process. However, these estimates are for all four program components, not just the permanent demand reductions. The permanent demand reductions were a relatively small fraction of this total. Through September 30, 2001, the total installed measures achieved a peak demand reduction of 108 MW. After completion of all applications that are in process and the corresponding measures are installed, NYSERDA estimates that the total peak

demand reduction from the program will be about 115 MW. From this estimate, about 3 MW is due to permanent demand reductions. The projected savings are based on field verified installed measures.

LESSONS LEARNED

Overall, this program has been very successful. It achieved far greater demand savings than the initial program goal. However, most of these reductions were through load management, not the permanent demand reductions sought through efficiency improvements. Lee Smith, NYSERDA Project Manager, observes, "We didn't get the activity with the permanent demand reduction component of the program that we had hoped for—our reductions were on the light end of intended impacts." Smith offers other lessons learned from NYSERDA's experience with this program, including:

- It was the first year of the program; the program structure worked, but needs refinement and clarification.
- Because of the independent system operator's (NYISO) focus and programs, the load curtailment and shifting components of the Peak Demand Reduction Program got more attention than the permanent demand reduction components.
- The program needs a more robust effort in marketing for the permanent demand reduction component of the program.
- NYSERDA offers a number of programs through the **New York Energy $mart**[SM] initiative. The PLRP requires clear marketing strategies to identify customers for the PLRP.
- The program was new, as well as the NYISO's EDRP, and customers were somewhat confused with the NYSERDA and NYISO connection.
- The program needs to provide additional technical assistance to less sophisticated customers.

FUTURE

The PLRP will be continued in 2002. The next Program Opportunity Notice (PON 620-01) has been released and is similar in structure to the PON issued for this program initially (PON 577-00). The budget for 2002 is $10.5 million. Applications will be accepted through August 1, 2002.

Likely program changes will include more marketing and related efforts to emphasize permanent demand load reductions as program options. The incentive levels have been increased as shown below:

Installed, Operational and Field Verified[1] by:	PDRE		SDLC		DEGI	IM
	Con-Edison Service Territory	Non-Con-Edison Service Territory	Con-Edison Service Territory	Non-Con-Edison Service Territory	Con-Edison Service Territory only	Statewide
5/31/02	$450/kW	$150/kW	$180/kW	$60/kW	$90/kW	$3,000/meter
7/31/02	NA	NA	$ 120/kW	$40/kW	$60/kW	$3,000/meter
12/31/02	$360/kW	$120/kW	[2]	[2]	[2]	$3,000/meter

1. Field Verification is not required for Interval Meter (IM)-only Projects.
2. If the NYISO EDRP is extended beyond October 31, 2002, NYSERDA will extend the July 31, 2002 Installed, Operational and Field Verified date for SDLC and DEGI to December 31, 2002.

The regional differences in reliability problems and program funding create a slight mismatch. The source of funds for this program is the New York System Benefits Charge. New York's public power authorities—NYPA and LIPA do not pay this charge and offer their own load reduction programs. However, the greatest need for relief from demand reduction measures is in the downstate area, which both NYPA and LIPA serve (NYPA provides power to many New York City municipal customers). NYSERDA is working with NYPA and LIPA to offer similar programs to all customers in New York.

WEBSITE

http://www.nyserda.org/577pon.html (closed)

For information on current (Summer 2002) program, see Program Opportunity Notice (PON) 620-01 at http://www.nyserda.org/620pon.html

REFERENCES

1. Personal communication with Lee Smith, NYSERDA, Nov. 20, 2001.
2. "Program Opportunity Notice (PON) No. 577-00, revised 6/18/2001.", NYSERDA.
3. Presentation by Lee Smith at the ACEEE National Conference on Energy Efficiency and Reliability: Lessons Learned in 2001, Berkeley, California, October 29-30, 2001. http://www.aceee.org/conf/smith_lee.pdf

For more information

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New York State Energy Research and Development Authority's Keep Cool, New York Program

SUMMARY

NYSERDA created this program as a direct response to address summer reliability concerns. The program targets residential room air conditioners, offering customers a rebate for purchase of a new, energy-efficient unit. To receive the rebate customers must retire their old units and turn them in at the time they purchase a new unit. While offered initially in 2000, the success and impact of the program increased significantly in 2001.

PROGRAM OVERVIEW

The New York Energy $mart Keep Cool program combines energy efficiency with peak load reduction by offering residential customers $75 when they surrender an old room air conditioner (RAC) and purchase a new ENERGY STAR® model. Participating retailers act as drop off sites for the old RACs, which are regularly collected for deconstruction and recycling. The Keep Cool Program, offered jointly by NYSERDA, the New York Power Authority (NYPA) and Long Island Power Authority (LIPA), also fosters market development through partnerships with manufacturers and retailers, and energy efficiency tips for consumers.

The goals of the program are to:

- Control and reduce load on NY state's electric utility systems
- Mitigate the impacts of electricity rate increases
- Increase overall knowledge of energy efficiency (among residential customers)
- Invigorate market transformation by the further penetration of ENERGY STAR® room air conditioners into the market

The program targets residential electricity customers with existing, inefficient room air conditioners. Customers receive an initial benefit from the $75 rebate and will receive on-going benefits due to reduced electricity consumption of their new, energy-efficient air conditioners.

The program includes a "hotline" for consumer and retailer questions. There were over 62,000 calls to this hot-line in 2001. The program also held special promotions in target markets in 2001. Consumers were offered discounts on compact fluorescent bulbs (two for one) and coupons redeemable for free timers for residential air conditioners. These promotions also included a letter from Governor Pataki. These promotions resulted in the distribution of 34,854 timers and the sale of over 144,000 CFLs.

The program also includes components that address retailer participation and recycling/demanufacturing of retired units. The program offers training to participating retailers, which includes information on the program's bounty payment process for handling

of retired units. Retailers and other drop-off sites receive $25/unit after successfully following the protocol established to ensure that units are recycled and disposed properly.

SUMMER 2001 AND RELIABILITY

NYSERDA created this program to target a very specific market—residential room air conditioners—that is a significant and direct contributor to summer system peak demand in New York. NYSERDA initially offered the program in 2000, but both NYPA and LIPA did not participate in this initial program year. The program expanded statewide in 2001 because of the large need for system load relief in NYPA and LIPA service territories.

PROGRAM PERFORMANCE

The program has achieved significant summer peak demand reduction. Removing old RACs from service and replacing them with new, more efficient ENERGY STAR® models provides relatively certain savings for each unit replaced.

The program experienced a dramatic increase in participation from 2000 to 2001, as shown below in Table 1.

Table 1. Keep Cool, New York Participation

	2000	2001
Number of participants (units sold)	721	38,206
Number of participating retailers	205	400

NYSERDA estimates that the program achieves 0.3 kW/unit peak demand savings. Given the number of new units sold, this yields a total program impact for 2001 of 11.4 MW. The total program impact is estimated at 13 MW, which includes savings from the timers and CFLs promoted as part of this program. NYSERDA also estimates that an additional 2-10 MW savings were achieved as a result of behavioral changes from program advertising and increased consumer awareness.

According to NYSERDA Project Manager Lydia Perez, "The program worked very well this year, although it didn't work so well in 2000."

LESSONS LEARNED

The dramatic increase in participation from 2000 to 2001 may be attributable to several factors, according to Perez. These include:

- The program was started sooner (about 1 ½ months earlier in 2001 compared to 2000—in 2000 the program began on June 21st and in 2001 it began on May 1st).
- There were more retailers participating in the program (almost double).
- There was more advertising to increase awareness and participation.

- There were spill-over effects from California's situation.

FUTURE

The program will be offered in 2002. The contract will be re-bid. Aspen Systems Corporation was the program contractor for the initial two years of the program, 2000-2001.

WEBSITE

http://www.nyserda.org

REFERENCES

1. Personal communication with Lydia Perez, NYSERDA, Dec. 5, 2001.
2. Personal communication with Karen Villeneuve, NYSERDA, Nov. 29, 2001.
3. Presentation by Karen Villeneuve at the ACEEE National Conference on Energy Efficiency and Reliability: Lessons Learned in 2001, Berkeley, California, October 29-30, 2001. http://www.aceee.org/conf/villeneuve.pdf

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Bonneville Power Administration's Vending Mi$er™ Program

SUMMARY

Bonneville Power Administration established a regional turn-key program and buyers' cooperative for the procurement and installation of the "Vending Mi$er™". The Vending Mi$er™ supplier and contractor work directly with bottlers in a utility territory to install the devices. BPA pays the costs for the device and installation in its load following utilities.

The program was proposed and rejected in 1999, but was reconsidered and adopted in light of reliability concerns for the summer of 2001. The program has been very popular among BPA's participating utilities and their customers who receive this technology.

PROGRAM OVERVIEW

The program is designed as a regional turn-key program and buyers' cooperative for the "VendingMi$er™"—a device installed on beverage vending machines that cycles the units off when not in use. The program is designed to secure favorable volume prices for procurement and installation of these devices. Bayview Technology is the manufacturer and supplier of the device.

The program objective is to establish a region-wide program at a volume fixed price of $120 for the unit and $35 for installation and reporting services, for a total of $155 each. The units are normally priced around $185 each excluding installation.

Bayview supplies the devices. Installations are accomplished through soft drink distributors and major bottlers or through specially trained installation teams. Utilities may choose other means for installing the devices, but BPA advises that allowing Bayview teams to complete the installations is generally the lowest cost alternative.

Bayview tracks the type and location of installation. All participating utilities receive a detailed report on installations in their service territories. The "turn-key" implementation strategy is intended to achieve significant load reduction quickly and effectively with minimal administrative and marketing costs.

The target market is large. There are an estimated 120,000 vending machines in Washington, Oregon, Idaho and western Montana—this will increase to an estimated 175,000 machines in another five years.

BPA purchases and pays for the installation of the devices for all its load-following customers (utilities). Other utilities participating in the program pay for these costs themselves, but benefit from the cooperative buying agreement to receive these units at a significant discount. There are some additional provisions for other types of BPA customers (non-load-following utilities) to receive payment, such as those eligible for the "Conservation and Renewable Discount" or those that reduce the amount of load that BPA is required to serve commensurate with reductions to be achieve through program participation. While

BPA does not pay the costs for non-load-following utilities, it coordinates the program with them. Some of these other utilities, such as Puget Sound Energy, provide rebates to customers for the devices.

BPA ratepayer funds are used to cover the program costs for participating load-following utilities. Other utilities may use their own funds or regional systems benefits charges, such as utilities in Montana. The budget is $4.6 million over 2+ years (2001-2002). Through October 2002 the program has budgeted about $3 million of this total.

RELIABILITY AND SUMMER 2001

This program was developed specifically to address reliability concerns for the summer of 2001 and beyond. The program had been proposed in 1999, but was not adopted. However, the proposal was re-examined in light of reliability concerns of 2001, and was adopted to address this problem.

The VendingMi$er™ units save an estimated 1292 kWh/year for illuminated machines; 861 kWh/year for non-illuminated machines. The average savings per machine is 46%. 30% of these savings are estimated to occur on-peak. System wide the program will achieve an estimated 7.25 MW peak demand reduction—about 4.4 MW in BPA load-following utilities alone. This assumes that 30,000 units will be installed.[32]

PROGRAM PERFORMANCE

Overall the program has worked very well. The total target for BPA load-following utilities is 30,000 units. Through February 2002 there have been approximately 10,000 or more units installed. Many more are in process. In 2001, 97 utilities signed up for the program; 83 of these or 91% are load-following utilities of BPA.

The program estimates that the savings can be achieved at costs of $1050/kW or less than 15.5 mills ($0.015/kWh).[33]

LESSONS LEARNED

According to Rick Miller, BPA Energy Efficiency Representative, "The program is an ideal rate mitigation program because it is a complete turn-key program for a technology that is:

- Inexpensive
- Quick to install (around 15 minutes/unit)—a 'plug and play' device
- Delivers immediate, reliable savings."

[32] Energy savings are based on engineering estimates developed by a "Regional Technical Forum," a group of energy experts from utilities, private firms, non-profit groups and others who were convened to evaluate the device and estimate potential regional savings.

[33] This savings estimate is based on a cost of $155/installed unit and the energy savings developed by the Regional Technical Forum."

Miller cites additional attributes of the program. He notes that it is attractive to customers as there is no need to contract with them individually. The supplier works directly with bottlers, who best know the market and have instant credibility with customers. The bottlers are well positioned to have an immediate and widespread impact for participating in the program. The bottlers also report that customers are very satisfied with the product—a boost for the bottlers as they are viewed as offering greater service to their customers. Consequently, the bottlers have been very receptive and cooperative with the program.

Mark Geman of Bayview Technology, offered additional observations and lessons learned from his perspective as the supplier of the technology. "The beauty of the program is that it provides us a complete area to concentrate on, making it easy for marketing." Bayview also found that working directly with bottlers is an efficient mechanism for reaching customers and getting devices installed. Geman concluded, "VendingMi$er™ is a simple, elegant solution to a growing problem."

FUTURE

The program will be continued in 2002. There is no formal evaluation planned. The supply contractor, Bayview Technology, is required to file periodic reports that summarize program activity, including tracking the number of units delivered and installed by participating utilities.

WEBSITE

BPA does not have a website devoted to the program. It has used mailings to its members to provide them program information and materials. Information on Vending Mi$er can be found at http://www.bayviewtech.com

REFERENCES

1. Personal communication with Rick Miller, Nov. 19, 2001.

2. Personal communication with Mark Geman, Nov. 20, 2001.

3. Program proposal, "VendingMi$er™ Pacific Northwest Regional Turnkey Program and Buyers' Cooperative."

For more information

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Reliant Energy HL&P's ENERGY STAR® Homes Program

SUMMARY

The ENERGY STAR® Homes Program is a new residential program designed to increase the demand for energy-efficient new residential single-family homes. Reliant Energy HL&P offered this program on a ramp-up scale in 2001. It is one of the efficiency program templates approved by the Texas Public Utility Commission. All electricity retailers in Texas must reduce incremental load growth by 10% using selected programs that follow the approved templates.

In 2001 the ENERGY STAR® Homes Program paid incentives to aggregators who successfully facilitated the construction of new homes according to the program requirements. The aggregators are home energy raters, not builders or developers. Because the infrastructure for home energy raters is relatively weak in Texas, the incentives will go directly to builders for the next program year (2002).

The ENERGY STAR® Homes Program was quite successful in its first year. Reliant Energy HL&P's 2001 program achieved a savings of 1.69MW by certifying 1,409 homes as ENERGY STAR®.

PROGRAM OVERVIEW

The ENERGY STAR® Homes Program seeks to save energy through the increased sales of ENERGY STAR® homes within Reliant Energy HL&P's electric service territory. The program targets new, single-family homes.

There are three types of participants within the program:

1. Aggregators—facilitate construction of homes to the program's requirements and receive incentives for each home they deliver
2. Program Marketer—generates interest and participation in the program among builders, homebuyers, and other market actors such as real estate agents and lenders
3. Builders and Homebuyers—not eligible to receive incentives under this program in 2001, but enjoy benefits associated with ENERGY STAR® homes.

In the first year of the program (2001), Reliant Energy HL&P paid participating aggregators of ENERGY STAR® homes an incentive based on a bid submitted earlier in 2001 for each certified ENERGY STAR® home built. Program funds also were used to foster consumer awareness and demand through an expansive consumer outreach campaign.

The marketer for Reliant Energy HL&P's program, ICF Consulting, is responsible for program marketing and recruitment of participants. In 2001, the program paid incentives to aggregators, who are home energy raters, not the developers or builders. The home energy raters are individuals or businesses that verified compliance with program requirements after

facilitating their construction and delivery. The incentive payment to the aggregators in 2001 was between $225 and $325 per house.

The program incentive budget in 2001 was approximately $1 million. When the program is expanded in 2002, the incentive budget will increase to about $1.5 million. While Reliant Energy HL&P had not offered the ENERGY STAR® homes program before, the company had offered a *Good Cents New Home Program* earlier in the 1990s. This program had been discontinued, but did give Reliant Energy HL&P experience with new residential construction energy efficiency programs.

SUMMER 2001 AND RELIABILITY

Texas did not face major system reliability concerns in the summer of 2001. Texas utilities had sufficient reserve margins to accommodate projected peak demands. However, this and other efficiency programs mandated by the Texas PUC address long-term load growth concerns. Each electricity retailer in Texas must reduce incremental load growth by 10% through programs such as the ENERGY STAR® Homes Program. This program is especially beneficial to address more localized distribution network concerns since more energy efficient new homes can reduce the number and/or size of substations and related distribution system equipment needed to serve new load.

PROGRAM PERFORMANCE

Al Dugas, Reliant Energy HL&P Program Manager, observes, "The program went well this year [2001], even though we did not achieve our first year projected goal of 1,500 homes; however, we greatly exceeded our filed goal of 0.5MW by achieving 1.69MW." Dugas notes the target was 1500 homes, and he states that the program reached 1,409 homes.

Reliant Energy HL&P estimates that each ENERGY STAR® home constructed in compliance with program requirements can save an average of 1.2 kW of peak demand and 2,891 kWh in annual energy. Based on these values, the total program impact in 2001 is about 1.69 MW of peak demand reduction and about 4,071 megawatt-hours electricity savings. There is no independent program evaluation planned although the program marketer, ICF Consulting, will file a program report in March 2002.

LESSONS LEARNED

Al Dugas reports the biggest lesson learned is that the incentive payment should be paid directly to the home builder, not the home energy rater, to increase participation in the program. The infrastructure of homer energy raters in Texas is weak, which resulted in lower than expected participation among builders in the program. The program is being substantially revised according to this lesson learned.

This type of program is not well suited to a quick response. It takes time to build the network of program participants and, in turn, transform the new home construction market. However, once in place, the savings achieved are persistent.

Reliant Energy HL&P and its program marketer, ICF Consulting, found that builders are more motivated by advertising and promotion than by the dollar incentives offered by the program. In many cases the builders are willing to provide their own promotional dollars. A related marketing lesson learned is that it is critical to target consumer interests and identify their key information sources.

FUTURE

Reliant Energy HL&P is currently revamping the ENERGY STAR® Homes Program for the 2002 program year based on these lessons learned. The new program is set to launch in March of 2002, and the incentive payments will go directly to the builders in order to encourage greater program participation and deliver more ENERGY STAR® homes. The 2002 Reliant Energy HL&P program has a projected goal of 4,500 homes which will account for a savings of 4.95MW. Another major change will be to recruit more home builders into the program, who together will run a cooperative advertising campaign with each builder contributing to this campaign. This will enable each builder to reach a much wider audience and penetrate the market in a more effective manner. The intent is to increase ENERGY STAR® brand recognition. The builders in the Reliant Energy HL&P program will collectively run advertising on billboards, newsprint, radio, television, and other media to promote ENERGY STAR® homes. For the 2002 program, after the builders' contributions, the cooperative advertising budget will be in excess of $550,000. Another change is that the responsibility for recruiting builders to participate in the program will be shifted from the aggregators to the program marketer, ICF Consulting.

Funds have been allocated for 2003 and 2004. By 2005, Reliant Energy HL&P expects this program to have reached a total of 8,000 homes, which will reduce peak demand by nearly 9.0 MW and save about 9,304 megawatt-hours of electricity.

WEBSITE

http://www.reliantefficiency.com/energystar/index.htm
http://www.houstonenergystarhomes.com

REFERENCES

1. Personal communication with Al Dugas, Reliant Energy HL&P, Nov. 29, 2001 and Feb. 2, 2002.
2. Presentation by Val Jensen, ICF Consulting, at the ACEEE National Conference on Energy Efficiency and Reliability: Lessons Learned in 2001, Berkeley, California, October 29-30, 2001. http://www.aceee.org/conf/jensen.pdf
3. Website: http://www.reliantefficiency.com/energystar/index.htm

For more information

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Reliant Energy HL&P's Residential Air-Conditioner Distributor Program

SUMMARY

The state of Texas Public Utility Commission (TPUC) established several efficiency program *templates* in conjunction with its restructuring activities. The Residential Air Conditioner Distributor Program is one of these program templates. Reliant Energy HL&P chose to implement this program to address the significant load represented by residential air conditioning. The program provides incentives to air conditioner distributors for selling high efficiency central air-conditioning units. The program is designed to increase energy efficiency awareness and expand the use of high efficiency units in the residential market. Reliant Energy HL&P offered this program initially in 2001 on a ramp-up scale. Some start-up problems resulted in the program not meeting its initial year goals. Consequently, several changes are being made to the program for 2002, its first year of full-scale implementation.

PROGRAM OVERVIEW

Air-conditioner distributors receive incentives for selling at least 1,000 tons of high efficiency central air-conditioning equipment during a 12-month period that is installed in single-family homes within Reliant Energy HL&P's distribution territory. The program is designed to increase energy efficiency awareness and expand the use of high efficiency units in the residential market. The program seeks to transform this market. It is up to each participating distributor to develop and implement a program to encourage its dealers to participate.

The program incentives are directed upstream to distributors rather than downstream to individual dealers, contractors or consumers. Participating distributors are paid a fixed incentive upon submitting the required forms and documentation for eligible systems installed. The program requires Manual J load sizing calculations and matched systems. This requirement is to assure proper sizing of systems, which is important to achieve optimal system efficiency. Qualifying units must have a minimum SEER of 13.0. The baseline is 11.1 SEER. Units must be split systems with a maximum size of 5.4 tons for single-family home replacement or retrofit.

Reliant Energy HL&P offered this program on a ramp-up scale in 2001. The program began at the end of March and ran through early December. The company awarded participation contracts to five distributors in the Houston area; each received an allotment of 500 units to receive the sales incentives. This allocation was driven by a requirement of the TPUC that no single distributor may receive more than 20% of available incentive funds. The goal in this first year of operation was approximately the sale of 2,500 units (about 7,500 tons) of qualifying residential high-efficiency cooling equipment. The program pays an incentive of $80/ton of high efficiency air conditioning equipment to distributors.

Reliant Energy HL&P contracted with ICF Consulting to market and implement the program. Reliant Energy HL&P verifies 10% of submitted installations for accuracy to meet program template requirements established by the TPUC.

The program budget in 2001 was $750,000. In 2002 the budget will be $1.5 million. The program is likely to be continued in 2003-2004, but this will depend on success in 2002.

SUMMER 2001 AND RELIABILITY

This program directly targets reduction of summer peak demand. Texas did not face the kinds of reliability problems that other states experienced in the summer of 2001, such as California. Texas has been adding significant amounts of new generation plants to meet its growing demand. Consequently, overall system reliability in Texas is not a pressing concern.

This program will help Reliant Energy HL&P meets its requirement to reduce incremental peak demand by 10%--a TPUC mandate for all retail suppliers of electricity in Texas. Because of this mandate by the TPUC, utilities and other electricity retailers in Texas are more focused on the reliability and cost of efficiency programs in achieving the established efficiency targets.

PROGRAM PERFORMANCE

The target number of systems in 2001 was 2,500 units. At an average size of 3 tons/unit, this equals a target of 7,500 tons of high efficiency cooling equipment to be sold. Reliant Energy HL&P estimates that the program will not reach this target, but will have affected sales of about 1400-1500 units.

In 2001 the program reduced peak demand by about 0.6 MW. This is based on anticipated sales and savings of 0.221 kW/ton for high efficiency units. Reliant Energy HL&P is not performing an independent evaluation of the program. The contractor for the program, ICF Consulting, is required to file a report in March 2002 on program results. For the 2002 program year ICF will submit both a mid-year and end-of-year report.

LESSONS LEARNED

Keri Harris, Reliant Energy HL&P Program Manager, observes that there were problems with the program in its initial year, which resulted in the program not meeting its targets. She reports that after she become involved with the program later in the summer of 2001, Reliant Energy HL&P made some changes to the program. The company will implement additional changes for 2002.

Harris identified the following problems and the company's responses to them:

- **Basis for contract awards too complicated.** The initial basis for awarding contracts was a "SEER distribution"—meaning distributors won contracts based on how many high efficiency units at various SEER levels they committed to sell (for example, 80 units at SEER 16.0, 30 units at 15.0, etc.) This was too complicated. Reliant Energy HL&P is simplifying this for 2002—making the only requirement that distributors sell units at SEER 13.0 and higher.

- **Difficulty getting required load calculations completed.** The TPUC-mandated program template requires load calculations to be completed for all installations to ensure proper sizing of systems. Reliant Energy HL&P found it difficult to get the dealers and system installation technicians to complete these required load calculations. Next year the program will focus on a simplifying the form and will offer training on completing the form, as well as provide a related tutorial CD.

- **Difficulty getting dealers to fill out necessary paperwork.** Reliant Energy HL&P relied on the distributors to get their dealers to complete this—meaning Reliant Energy HL&P had much less hands-on contact with the dealers. Reliant Energy HL&P believes this contributed greatly to a problem with getting the required paperwork from the participating distributors. In 2002 the program will require participating distributors to have a marketing plan that shows clearly how they will meet their goals. Reliant Energy HL&P expects them to increase their training and contacts with dealers to improve program effectiveness and increase compliance with required paperwork submissions.

Other changes are planned for 2002. One major change will be to vary the allocation of program funding based on distributor goals. In 2001 the allocation was based more on equal shares among participating distributors. Varying this by distributor goals will allocate funds more proportional to participants who set higher sales goals. Reliant Energy HL&P also will assess actual participation levels by July. Based on this mid-program year assessment, the program may switch funds from distributors who are not meeting their targets to other participating distributors who are achieving their goals.

There were also lessons learned about the residential A/C market in the Houston area. The marketing and program contractor, ICF Consulting, reports that about 90% of all residential HVAC sales in the Houston market are made through dealer service technicians rather than by commissioned salespeople. ICF also observed that there is very little early replacement activity (replacing units before failing) in the Houston market and the program did not appear to change that behavior. Another feature of the market is that technicians are rarely trained in the areas of sales and load calculation procedures.

FUTURE

The program will be operated at full scale in 2002 incorporating the changes discussed above. In 2002 Reliant Energy HL&P expects to achieve 3.3 MW in peak demand reductions if the targets are met (5,250 units or 15,750 tons of cooling systems). Operation in 2003 and 2004 will depend on program results in 2002.

WEBSITE

http://www.reliantefficiency.com/ac_distr/index.htm

REFERENCES

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2. Presentation by Val Jensen, ICF Consulting, at the ACEEE National Conference on Energy Efficiency and Reliability: Lessons Learned in 2001, Berkeley, California, October 29-30, 2001. http://www.aceee.org/conf/jensen.pdf
3. Website: http://www.reliantefficiency.com/ac_distr/index.htm

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State of Utah, Pacificorp and other Public and Private Partners' Power*Forward*

SUMMARY

The state of Utah together with its utilities, media and a number of other key public and private partners established Power*Forward,* a comprehensive media and consumer education campaign designed to enlist direct customer response for conservation during times of system constraints. The program achieved a significant impact—about 100 MW peak demand reduction—on a very modest budget. The campaign called for customers to take voluntary steps to reduce individual energy use and demand at times of alert. The program modeled the colors and symbolism of traffic lights to issue daily messages about system status: green—no immediate problem; yellow—conditions are threatening; and red—conditions are severe. Messages about daily system status were delivered through conventional media outlets—radio, TV and newspapers—in addition to other outlets such as the web.

PROGRAM OVERVIEW

Power*Forward* is a collaborative, statewide energy conservation information campaign. The campaign is designed to inform consumers of days during the summer when conservation of electricity is necessary to maintain affordable and reliable power supplies. Besides alert messages (green, yellow or red—depending on the system status) provided through the media (radio, TV and print), a Power*Forward* website provides information to consumers on practical, voluntary and low- or no-cost measures that individuals and businesses can take to reduce non-essential electricity use at times of high system alert.

The foundation of the program is the Power*Forward* alert network. The alert system is keyed to three familiar colors used in traffic signals—green, yellow and red. Each color indicates the relative amount and urgency of conservation needed on a given day. Green indicates no anticipated system problems. Consumers are asked to practice routine conservation. The message is "Utah's inexpensive electricity is too precious to waste." Yellow indicates conditions may result in electricity supply shortfalls or extremely high market conditions. Consumers are asked to take aggressive conservation measures to help avoid system problems. Red indicates a high alert condition—times when generation reserve margins and/or transmission system capabilities are very constrained and the threat of black-outs or other supply interruptions is severe. Under these conditions consumers are asked to take all possible measures to reduce electricity use.

The Utah Energy Office declares the color designation for each day based on information the office receives from utilities and other sources on weather conditions, projected demand, regional power supplies and wholesale power prices. The Power*Forward* designation for each day is announced a day ahead at 3:00 pm and forwarded to the media outlets and email subscribers to the alert system.

Power*Forward* targets customers in all sectors—residential, commercial and industrial. The program does not offer any financial incentives to customers to take actions. The

program appeals to consumers' sense of collective action. Funding for the program was provided by the state of Utah, PacifiCorp, Utah Associated Municipal Utility Systems, Utah Municipal Power Systems and Utah Rural Electric Cooperative Association. Total funding for the program was $95,000. Contributions to the total were based on size of load served. In addition to the direct financial support, Power*Forward* received significant in-kind contributions from program partners.

The campaign spread its message through a variety of outlets, including:

- Media: public service announcements, earned media and paid media
- Website and email system
- Community outreach: business-to-business partners, business to consumer partners, and various community events

Jeff Burks of the Center for Policy and Planning in the Utah Department of Natural Resources directed this program. The Utah Energy Office provided staff assistance. Burks notes, "We relied heavily on our public relations firm to help staff, design and implement the program. They [the contracted public relations firm] were the recipients of most of the program funds."

SUMMER 2001 AND RELIABILITY

The program was created as a direct response to projections of possible reliability problems in the summer of 2001. Utility planners and energy officials recognized the threat to the physical supply of electricity because of the unique market and weather conditions (long-term drought) that existed in the summer of 2001. They also were concerned about potential price and cost impacts to consumers should Utah's power markets experience strong price peaks as had occurred in California due to system supply constraints. The response of utility planners and energy officials was to develop Power*Forward*—a program designed to achieve significant peak demand reductions and able to be implemented in a very short time.

The program was inaugurated with an Executive Order from Governor Michael Leavitt issued on June 21, 2001 that called upon all Utah residents to participate in Power*Forward* and directed all state facilities to take actions to reduce their electricity use.

PROGRAM PERFORMANCE

A preliminary evaluation of the program was performed in the fall of 2001. These results indicate that on declared "yellow" Power*Forward* days, Utah consumers reduced electricity loads by an average of 100 MW, representing about 3.5% of the total electric demand in the state.

The program leveraged a relatively modest program budget into an extensive media presence. The program made an estimated 4.4 million media "contacts"—information bits

received through media and other marketing efforts. The estimated value of these contacts is $344,000.

The direct total program costs ($95,000) and the program's estimated impact yield a cost per peak demand reduction of $0.95/kW.

LESSONS LEARNED

Jeff Burks, director of the program, attributes the program's media partners (TV, radio, print) as keys to the success of the program. By enlisting the mainstream media as partners, the program generated high visibility and resulted in high consumer awareness and response.

Another lesson learned is that a media campaign can be developed very quickly and with a very modest budget by enlisting a wide variety of media partners who carry the messages as part of their service to the public.

Utah Governor Michael O. Leavitt expressed a long-term objective for Power*Forward* in a press statement on June 21, 2001*:*

> Our hope is that the Power*Forward* campaign will help educated people that simple conservation measures can be adopted easily with minor lifestyle changes. If all of us do our part, we can make a big difference.

FUTURE

Representatives from the state of Utah met with program sponsors in October 2001. Based on preliminary results they all agreed the program should be continued next summer. One of the program enhancements for 2002 will be an "agreed-to-metrics" and protocol for a more rigorous program evaluation.

Other improvements and enhancements to the program for 2002 may include:

- A direct alert system for large customers
- Improved real-time communications
- Media stories
- Leveraging related activities of key partners, including utility programs, state programs and business-to-consumer programs.

WEBSITE

http://www.powerforward.utah.gov

REFERENCES

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3. http://www.powerforward.utah.gov/NASApp/powerforward/index.jsp

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California State and Consumer Services Agency's and Department of Consumer Affairs' Flex Your Power Campaign

SUMMARY

The state of California enacted a comprehensive media campaign, *Flex Your Power,* to create awareness of what businesses and households could do to help alleviate the stresses faced by California's electricity supply system in the summer of 2001. The campaign used all major media—television, radio, print and electronic—to spread its messages. The program called for customers to take direct action as well as learn more about other programs and resources available to them to take additional action.

The overall message is "Thank you for conserving and committing to do as much as you can!" The program appears to have been very successful in eliciting direct consumer responses to conserve energy and cutback use during peak demand periods. It also appears that this campaign may have boosted participation in other efficiency programs and activities available to consumers and businesses in California.

PROGRAM OVERVIEW

The state of California's Flex Your Power Campaign is comprised of several interrelated initiatives to reach as many people as possible with conservation and efficiency messages in response to California's electricity supply problems. The campaign includes a major statewide public education effort to reach all Californians—in homes, through businesses, non-profits, community-based organizations, schools, and governments about the energy situation, what can be done to help, and what resources are available to help Californians save money and keep conserving. The message is "Thank you for conserving and committing to do as much as you can." The campaign addressed several motivations for consumers to take action, including:

- Fear of blackouts
- Fear of high rates
- Direct economic benefits to the consumers (saving money)
- Appeals to contributing to the common good ("It's the right thing to do)

The backdrop for this campaign was a very visible and real crisis situation with the electricity supply system. Consumers had experienced rotating outages, large rate increases and had witnessed their major utilities struggle financially—some even filing bankruptcy. These conditions made energy a top issue among households and businesses in California. The State and Consumer Services Agency coordinated the campaign, and the Department of Consumer Affairs handled the paid media.

The major elements of the program are:

- *Media Campaign*—At the heart of this program is a multi-million dollar radio, print, web and advertising campaign with major distribution of public education materials. This campaign included TV advertising with a series of commercials

that were effective in getting the attention of the public and spreading the main message of the campaign. The messages mostly addressed conservation actions, such as shutting down appliances or shifting use to off-peak periods.

- *Local Government*—Through a partnership with the California League of Cities, the California Association of Counties and the California Special Districts Association, the campaign challenges local governments to reduce energy use in their facilities by 15% in addition to asking them to develop plans to save energy in local facilities and in their communities, and encouraging them to participate in other "Flex Your Power" initiatives.

- *State Government*—This initiative focuses on decreasing energy use in state government buildings. It is a joint effort of the Administration and the Legislature.

- *Large Business*—This initiative is comprised of several jointly developed declarations whereby a business and/or the workers that service major buildings commit themselves to conservation goals and a course of action to achieve them.

- *Grocery Store Customer Awareness*—This initiative coordinates grocery stores across the state that have agreed to participate in the Flex Your Power campaign.

- *Appliances*—This initiative coordinates with national manufacturers and retail stores to provide adequate quantities of energy-efficient appliances and lighting to California and to encourage the sale of those appliances.

- *Non-profits and Community Based Organizations (CBOs)*—This initiative encourages non-profits and community groups across the sate to commit to energy savings, and also targets low-income communities with an energy conservation message and energy efficiency materials.

- *Schools*—The Kids' Flex Your Power Energy Challenge targets school participation in energy conservation and efficiency measures.

The total budget for this campaign is "multi-millions of dollars," according to Wally McGuire, McGuireco, a contractor that coordinated this campaign. McGuire notes that determining an exact amount that could be attributed solely to this campaign would be very difficult due to its size and complexity (in terms of its relationship to marketing efforts for other programs).

SUMMER 2001 AND RELIABILITY

The program very clearly targeted system reliability. It sought a direct and immediate response by individual consumers, businesses and industries to curtail their use of electricity to alleviate system stresses. The rotating outages experienced by many Californians during the winter of 2001 created conditions for greatly heightened awareness and urgency to take

individual actions to avoid similar problems during the summer. Consequently, the media campaign was able to leverage these conditions to achieve its objectives.

PROGRAM PERFORMANCE

California avoided rotating outages during the summer of 2001 due to a variety of factors; favorable weather was certainly a major one. However, the California Energy Commission estimates that during time of highest system peak, savings from direct customer response for curtailment and conservation was about 14%. *Flex Your Power* played a central role in achieving this reduction, so managers of the campaign feel it was very successful.

The program was highly visible. The TV campaign averaged 300 points per week across the state (a point is a measure of media exposure).

There is an evaluation underway. Results should be available early in 2002.

LESSONS LEARNED

The major lesson learned is that a comprehensive media campaign can be effective in eliciting a significant direct customer response to calls for curtailment and conservation because of reliability concerns. California faced unique conditions and consumers had actually experienced rotating outages—the condition the campaign addressed directly. Therefore, it is not clear how well this kind of program would be in a non-crisis atmosphere.

Another lesson that seems to be emerging is the synergy this extensive media campaign had on customer response to other programs and resources available to reduce their demand through energy efficiency improvements.

FUTURE

The program will be continued in 2002.

WEBSITE

http://www.consumerenergycenter.org/flex/index.html

REFERENCES

1. Abstract and presentation by Wally McGuire at the ACEEE National Conference on Energy Efficiency and Reliability: Lessons Learned in 2001, Berkeley, California, October 29-30, 2001.
2. Personal communication with Wally McGuire, Dec. 5, 2001.

For more information

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Various California and Western Utilities' 10/10 and 20/20 Programs (Conservation Incentive Programs)

SUMMARY

Utilities in California and other western states implemented *10/10* and *20/20 (or conservation incentive)* programs to offer customers direct credit on their bills for achieving established tiers of energy savings—either 10-19% or 20% and higher. These established tiers correlated to the amounts of the credits. Customers reaching the 10% tier received a 10% credit. Customers reaching the 20% tier received a 20% credit. Savings were determined relative to the same billing period the previous year (2000). In California customers were only offered the 20/20 savings/credit tier. PacifiCorp's *Customer Energy Challenge* offered both 10/10 and 20/20 tiers to its customers in Idaho, Oregon, Utah, Washington and Wyoming, but only 20/20 in its area in California.

Utilities implemented the conservation incentive programs to yield a direct and immediate response to heightened concerns over system reliability in the summer of 2001. The program concept was simple and rapidly implemented. Program participation and incentive payment was automatic from the customers' perspective. No enrollment was required; credits were paid monthly as customers qualified. The results of the programs exceeded expectations. Participation rates were high—generally from one-fourth to one-third of eligible customers qualified for the incentives. Incentive payments in California from its three major investor-owned utilities—Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric—were about $296 million. PacifiCorp reports that it gave customers nearly $10 million in credits across the states it serves (which includes a small part of California). Administrative costs for these programs were relatively small.

These programs appear to have been very successful in achieving peak demand reductions and energy savings. Preliminary estimates are that California's utilities paid incentives to customers for total peak demand reduction of 2200 megawatts and 2800 gigawatt-hours of electricity savings. These savings resulted from many influences, including other programs and marketing, not just the customer conservation incentive programs. The structure of these programs was that customers were paid for savings regardless of how or why the savings were achieved. PacifiCorp estimates that its Customer Energy Challenge program yielded a net peak demand reduction of 71 megawatts and gross electricity savings of 326,249 megawatt-hours across all the states in which it offered the program.

PROGRAM OVERVIEW

The conservation incentive programs are voluntary "limited-term rate reward" conservation programs. For the summer of 2001 the programs offered bill credits for customers who reduced their summer 2001 electricity use compared to the same billing period in 2000. In California the programs generally were offered to all customer classes—residential, commercial and industrial by the state's three major investor-owned utilities—Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric. California's major municipal utilities—Sacramento Municipal Utility District and Los

Angeles Department of Water and Power—did not offer this type of program. However, there appears to have been a significant "spill-over" effect from the program activities of the state's investor-owned utilities. PacifiCorp—an investor-owned utility that serves a small segment of California's population—offered this type of program to residential customers in California, Idaho, Oregon, Washington, and Wyoming. PacifiCorp's program was called the *Customer Energy Challenge.* In Utah, PacifiCorp offered the program to both residential and small commercial customers.

In California, utilities offered only the 20/20 program. They did not include the 10/10 tier for lower levels of savings and corresponding bill credit. The rationale was the great need to achieve significant savings above the 10% threshold already called for and reached by many citizens. As a result, the threshold savings level was set relatively high to challenge customers and to avoid significant numbers of "free riders"—customers whose energy use decreased but not due to any specific actions they took to reduce energy use.

A key attribute of the conservation incentive programs is the speed with which they can be developed and implemented. Program conception to regulatory approvals of tariff applications generally only took about two months. Programs then commenced almost immediately—with the next month's billing cycle. For example, PacifiCorp reports that the program idea arose from a teleconference with various California stakeholders held on March 14, 2001. PacifiCorp filed its tariffs in six states beginning 32 days later and received necessary regulatory approvals in May. Implementation began in June. The experience of California's investor-owned utilities is similar. The state of California—through an inter-governmental group led by the Governor's office—directed the utilities in spring 2001 to develop and implement these programs by the start of the summer.

Another program attribute is the widespread eligibility for program participation. With few exceptions, almost all customers in a designated class—residential, commercial or industrial—are eligible to participate. Other types of programs often have a much smaller eligible population within a customer class, such as new home buyers. State utility regulators were especially concerned that programs be available to as many types of customers as possible so all could contribute to resolving the reliability problems they were facing.

The conservation incentive programs generally consisted of the following elements:

- No enrollment. All eligible customers' bills are analyzed to determine if they qualify for the program credits and, if so, receive the credits automatically.
- Customers generally are required to have been receiving service in the same home or facility the previous year, although there are provisions to extend eligibility to households with more recent hook-ups.
- The comparison of billing is made for actual electricity usage for the months of June through September.
- The basis of comparison is electricity usage per day for the billing period, which accounts for varying billing period length.

- Adjustments are not made for weather, changes to energy using equipment, change in household size, or other variations that were not the result of specific customer actions to conserve energy.
- Credits are paid monthly as customers qualify. Customers may qualify one month and not the next.
- Promotion and marketing through diverse media outlets—company public relations, bill inserts, advertising (radio, TV and print) and bill messages.

PacifiCorp's philosophy in program design typifies that of all companies offering these types of programs. PacifiCorp followed the following principles in design of its Customer Challenge Program:

- Keep the program simple to customers. This meant not adjusting for free riders, weather, major household appliance changes, vacations, and other variations. Such simplicity is considered more important than the greater accuracy that might be achieved through such adjustments.
- Keep the program simple to promote.
- Keep the program simple to implement. This was achieved by requiring no enrollment and providing the payment automatically on customers' bills each month as they qualify.

SUMMER 2001 AND RELIABILITY

The conservation incentive programs played a major role in addressing summer 2001 reliability problems. The programs were viewed as a rapid and immediate response to achieve significant levels of needed peak demand reductions. The programs emphasized curtailment and conservation—shedding or shifting load. The programs also carried a message of improving customer energy efficiency through purchase of more efficient products and taking actions that would yield more permanent efficiency gains.

PROGRAM PERFORMANCE

The conservation incentive programs achieved dramatic results. In California the number of customers qualifying to receive credits was very high—much higher than expected. By the end of June 29% of PG&E's customers received credits. In July SDG&E reports that 39% of its customers received credits, and by the end of August, Southern California Edison reported that 33% of its customers received the credits. About a third of all California residential and commercial users received credits worth about $296 million through the summer months of 2001.

Certainly the crisis atmosphere in California in the summer of 2001 created unique circumstances to boost participation levels so high. However, PacifiCorp's Customer Energy Challenge, which was offered in several other western states in which there were not quite the same perceptions about impending power problems, still elicited relatively high participation rates. PacifiCorp reports that that residential participation in its Customer

Energy Challenge across all the states in which it was offered averaged a total of 24%—about one-quarter of all its eligible customers.

High participation rates are just part of the story. What matters most is the system impacts such participation yields. In all cases the energy and demand savings appear to be significant. These programs have been very successful in achieving peak demand reductions and energy savings. Preliminary estimates are that California's utilities paid incentives to customers for total peak demand reduction of 2200 megawatts and 2800 gigawatt-hours of electricity savings. These savings resulted from many influences, including other programs and marketing, not just the conservation incentive programs. The structure of these programs was that customers were paid for savings regardless of how or why the savings were achieved. No evaluation data is available yet that estimates savings attributable solely to the 20/20 programs in California.

PacifiCorp has completed a preliminary evaluation of its Customer Energy Challenge Program. PacifiCorp estimates that the program yielded a net peak demand reduction of 71 megawatts and gross electricity savings of 326,249 megawatt-hours across all the states in which the program was offered.

California made it through the summer of 2001 without any rolling outages, despite all the dire warnings and predictions that had been made going into the summer. According to data tracking and analysis by the California Energy Commission, California's electricity consumption was cut by 12% and peak demand by 14% after adjusting for weather. Customers clearly reduced their energy use and power demand. System-wide conservation from all programs and individual customers saved an estimated 4-5000 megawatts of peak capacity.

An evaluation is being completed and results should be available in spring 2002. These results should yield more accurate and thorough assessments of the 20/20 programs' impacts across the state of California.

Quantec, a contractor, has already completed an evaluation of PacifiCorp's Customer Energy Challenge. The values cited in this case study are from this evaluation.

LESSONS LEARNED

These programs were very effective at achieving significant reductions in energy use and peak demand through offering customers direct credit for saving energy. Programs were developed and implemented very quickly—about 3 months from program conception to full program launching. The programs had a universal and easily understood message. Participation was automatic for eligible customers, no enrollment was required and there was no paperwork to file. The customer incentives were relatively immediate; savings in one month yield credits on that month's bill.

These programs clearly represent a proven option for addressing short-term reliability problems. Utility managers can roll out these programs on relatively short notice and the

results from summer 2001 show that they can effectively reduce peak demand as needed. Their ability to affect longer consumer behavior and levels of energy efficiency is not yet determined.

Thom Kelly, Assistant Executive Director at the California Energy Commission, observes that California's 20/20 programs had much higher response rates compared to other states where similar programs were offered because of the impact that the media campaign, "Flex Your Power," had on raising consumer awareness of the problems and call to action. Kelly cited market research showing that customer awareness of the 20/20 program was about 80% in California, but about 45% elsewhere in states offering similar programs.

Doug O'Connor, PacifiCorp Program Manager, notes that the most important lesson learned from his company's perspective is the need to add a price floor to the program so that if electricity prices "go south," that PacifiCorp will not be paying more for customers to save energy than it is worth on the market. Western power markets did experience wholesale price drops in the summer of 2001. PacifiCorp's evaluation of this program cites other lessons learned, including:

- Cost effectiveness of the 20% tier appears to be higher than the combination (both 20/20 and 10/10 tiers included) program.
- Weather adjustment would not be very advantageous to the program. According to the evaluator's analysis, weather adjustments would not have had a significant impact on the awarding of credits to customers. And the complexity and confusion to customers of making such adjustments negates any possible gain in accuracy of recognizing true conservation improvements.

FUTURE

As of January 2002 the decisions to offer these programs again have not been made either in California or for PacifiCorp operations in other states. These decisions will largely lie in the assessments and forecasts of system reliability for the summer of 2002. These programs targeted largely short-term curtailments and conservation to address immediate reliability system concerns. If system reserves and reliability look adequate, it is doubtful that the program would be offered in 2002.

WEBSITES

Programs have ended. Web pages no longer current.

REFERENCES

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The Chicago "Community Energy Cooperative" Project, Delivering Geographically Targeted Energy and Demand Savings

SUMMARY

Following the occurrence of serious electric system reliability problems at the distribution level in Chicago in the Summer of 1999, Commonwealth Edison agreed to partner with a local nonprofit organization (the Center for Neighborhood Technology) to create a "Community Energy Cooperative". This Cooperative was designed to pursue energy efficiency and demand management opportunities, targeted in geographic locations where there were concerns about distribution system reliability. The Cooperative developed a set of programs which were implemented in mid-2000 and 2001.

PROGRAM OVERVIEW

Because of its focus on specific communities and neighborhoods, the Community Energy Cooperative (Cooperative) has tended to feature programs targeted at residential and small commercial customers. These programs include: cash incentives for window air conditioner turn-in and replacement with a new Energy Star model; rebates for central air conditioner replacement with a properly sized high efficiency model; free CFL lighting distribution as a Co-op recruitment incentive; and cash incentives and direct installation of small commercial lighting retrofits. The one program targeted at large C&I customers (load greater than 200 kW) was a load-shedding co-op, where customers were given an incentive of $75/kW in exchange for curtailing load when signaled on high peak demand days.

The Cooperative funding comes from several sources, including: "start-up" funds from ComEd; some cash payments from ComEd for savings achieved; and some co-funding for certain projects from the state of Illinois and the City of Chicago. The total annual budget for 2001 was approximately $6 million.

SUMMER 2001 AND RELIABILITY

The Chicago Cooperative project was explicitly developed to address electric system reliability concerns (although in contrast to most programs in this report, the concern was at the distribution rather than generation level). One of the key features of the Cooperative project is the concept of geographic targeting, to ensure that energy and demand savings efforts are targeted to areas where there are distribution reliability concerns.

Co-op staff worked with ComEd staff to identify a list of 75 distribution substations and feeders that were “stressed” and in need of reliability improvements. Those in need of immediate hardware upgrades were taken off the list because there would not be time to field a community intervention, and candidates with near to mid-term needs were identified. From that group, a “short list” of specific communities served by those stressed substations and feeders were identified as candidates for the initial program efforts.

PROGRAM PERFORMANCE

Reflecting its status as a brand new organization, initial Cooperative activities focused primarily on creating an identity and establishing a presence in the community. A number of outreach meetings were held with community leaders from the business, religious and non-profit sectors. Energy program efforts focused primarily on two measures: replacement window air conditioners and energy efficient lighting.

In these initial efforts, these measures were used as much to develop recognition and membership in the Cooperative as they were to capture energy savings. Through raffles and other promotional activities 1,300 members joined the Cooperative, and over 200 received new high-efficiency window air conditioners to replace older, inefficient units. (The units selected for the program exceeded Energy Star qualifying efficiency levels, with a SEER rating of 10, and were sized at the lowest applicable capacity for the particular dwelling. They were acquired by the Cooperative in a bulk purchase arrangement.) Membership in the Cooperative cost five dollars, and members received an energy efficiency kit with three compact fluorescent light bulbs and other low-cost energy efficiency items (total cost approximately $45).

In addition to these primary residential strategies during 2000, there was a torchiere turn-in event and some limited distribution of high efficiency replacement refrigerators, using funding from the state energy office (the Department of Commerce and Community Affairs, DCCA). In the commercial sector, the Cooperative was able to conduct some lighting audits in preparation for initiating lighting retrofits, but no retrofits were actually conducted during 2000.

For 2001, program activities began in earnest in four targeted communities. By the end of summer, the annual goal of 5000 window A/C unit replacements had been exceeded by 300 units; the goal for central A/C replacements was nearly two-thirds accomplished; the small commercial lighting retrofit goal of 2.5 MW in savings was 90% installed or under contract; and the large C&I program had reached its goal of having 25 MW of curtailable load under contract in target communities.

LESSONS LEARNED

According to personnel involved with the project, the following are some of the key lessons learned from this project to date.

Consumers throughout the Cooperative's target areas responded very positively to the Cooperative's offers. During the peak summer period of the Cooperative's air conditioner trade-in program, the pace of response taxed the Cooperative's ability to deliver the program. Participants are aware of energy consumption issues, and are interested in strategies to save money on their electric bill.

The small business lighting program received significant response, in spite of post-September economic slowdowns and reluctance to commit additional spending. A longer-

term program which enables companies to plan expenditures into their next budget year would enable significantly more companies to participate.

Partnerships with local community-based organizations enhanced the program's outreach and response. In each community, the Cooperative developed key relationships with existing community based organizations, cooperatives, churches, and local government. In some cases, this included utilizing these organizations as distribution agents for the Cooperative. These relationships helped establish credibility for the Cooperative

Utility structure and tradition present significant challenges to this type of community-based program. This program addresses a number of issues traditionally managed from different areas of the company, e.g. power purchase, marketing, distribution planning, that are not used to coordinating in other efforts. This can lead to "turf" squabbles or a complicated communications and planning structure. In this environment, it's critical to have key working relationships that transcend the individual departments.

In addition, this program takes a different type of approach than the established approach. For example, the Distribution Planning Department may have traditionally focused completely on "hardware" solutions to capacity issues. To them a "community-based demand-side" effort can seem "fuzzy" and undependable, and getting their cooperation (which is crucial) requires openness on both 'sides' to new approaches and problem-solving.

At another level, most utilities do have some kind of on-going demand-side programs (e.g., interruptible rates, load-shed agreements, etc.). It is easy for existing program staff to view a new "outside" effort as a nuisance, if not a threat. In this situation, high level coordination, and clear operating guidelines and boundaries are essential in order to avoid "stepping on each other's toes" in the field.

Challenges regarding the relationship with the utility are greatly compounded when the utility staff are in an environment of organizational restructuring, as was unfortunately the case with ComEd and their corporate merger with PECO. These circumstances can create a general climate of uncertainty and anxiety, which makes coordination and new program development more difficult. In addition, there is a heightened risk of losing key utility personnel. (This happened in the ComEd case, when a key vice president who had helped develop the project left the company.) Finally, the merger increased the already-present pressure to focus on short-term financial results.

Support of top management in the utility is absolutely crucial. Each of the challenges in the preceding paragraph are examples of problems that would be difficult, if not impossible, to overcome without solid support from utility top management. The Chicago Cooperative has been very fortunate to have a utility CEO that was in on the initiation of the project and has provided continuing support for the effort. There have been junctures in the process where the project might not have continued without that support.

Establishing appropriate payment levels for the load reduction impacts is a very difficult, yet crucial, issue. Estimating localized distribution system avoided costs can be a very difficult and contentious issue. Avoided costs can be defined in different ways, and can change significantly over time as local load patterns change. Much time and effort was spent examining this issue in the Cooperative project, and in the end the initial $150/kW compensation level agreed to for the C&I load management program was a subjective compromise intended to fall within a "zone of reasonableness".[34] It was adopted with the explicit recognition that it was an initial value to get the project started, and would likely be modified over time. There is still no consensus agreement on what is the "right" amount.

An additional complicating factor is the issue of what value will be assigned to load reduction benefits at the generation and transmission level. This issue was seriously confounded in the Cooperative case by two factors: the structural separation of generation under Illinois restructuring legislation, and the organizational structure of the utility after the merger with PECO. These developments left it very unclear as to what corporate entity would be realizing these benefits and how compensation from them might be obtained. In the end, the compromise compensation level essentially ignored the value of transmission and generation avoided costs. Ideally, community demand-side efforts in other jurisdictions would succeed in achieving appropriate compensation for benefits in all segments of the system: generation, transmission and distribution. Failure to recognize the full range of benefits, and focusing solely on the distribution level benefits, can severely limit the amount of demand-side resources that will appear cost-effective in any given jurisdiction

FUTURE

The Community Energy Co-op is being evaluated by an independent evaluation contractor selected through an RFP process. The evaluation is due in mid 2002. Distribution system improvements in specific stressed areas and a current excess supply situation for ComEd's parent company are making it more difficult to reach agreement on a value for future targeted energy and capacity savings such as those achieved to date. The Cooperative has continuing 'base' organizational funding available from ComEd through 2003, and is working with ComEd to design and implement a pilot demand response pricing program for both residential and small commercial customers.

WEBSITE

The Community Energy Cooperative's website is: www.energycooperative.net

[34] It should be noted that good geographic targeting is the essential key to justifying compensation amounts at that level for distribution savings. There are areas within the distribution system where distribution avoided costs would be far below that level.

REFERENCES

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2. Kushler, M. 2001. *Using A Community Energy Co-op to Address Electric Distribution System Reliability: A Description and Assessment of Initial Experience in Chicago.* Proceedings of the International Energy Program Evaluation Conference, August 2001.

For More Information

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Seattle City Light's '10 Plus 10' Incentive Bonus Offer

SUMMARY

Seattle City Light is a municipal utility with a 25-year history of pursuing energy conservation. They still utilize Integrated Resource Planning, and by policy, energy conservation is their "first choice" resource. Seattle City Light spends over 4% of total revenues on energy efficiency. In 2001, in the face of regional reliability and price concerns, their planning process called for doubling the normal energy conservation output. One of the centerpieces of that effort was the "10 Plus 10 Incentive Bonus Offer".

PROGRAM OVERVIEW

One of the core energy efficiency programs operated by Seattle City Light for medium and large commercial and industrial customers is their Energy Smart Services program of financial incentives for retrofits and new construction. Under this program, financial incentives of up to 70% of installed measure costs are provided for a full range of energy efficiency measures (e.g., lighting, HVAC, motors, controls, refrigeration and process equipment), based on verifiable savings from the project. Incentives for a given project are calculated based on formulas tied to the amount of energy savings and the lifetime of the measures involved. Incentive amounts typically range from 9 cents to 26 cents per first year kWh. With the impending electric system problems facing Seattle City Light in 2001, the standard program was modified by creating a "10 Plus 10 Incentive Bonus Offer". On top of the normal incentive, a customer could get a 10% "signing bonus" if they committed to a project by July 31st, and another 10% "completion bonus" if the project was completed by November 30th (Seattle City Light is a winter peaking utility). The normal incentive "cap" was also waived for qualifying projects. The program was marketed through workshops, print advertisements, utility account representatives, and direct mail to customers and trade allies.

SUMMER 2001 AND RELIABILITY

Coming into 2001, Seattle City Light was confronting a serious situation. There was a widespread power crisis in the Western region, compounded by a drought in the Northwest. Seattle City Light only generates about 70% of the power needed by their customers, with the rest coming from BPA and wholesale power purchases, so they have much exposure to the wholesale market. For them, the crisis was not so much a threat of blackouts per se, but a financial crisis due to the very high wholesale market prices for electricity. The "10 Plus 10 Incentive Bonus Program" was very much a direct response to this reliability/cost crisis in 2001.

PROGRAM PERFORMANCE

Customers and trade allies responded very positively to the modified program. For the year as a whole, customer participation and energy savings achieved were more than double

what was achieved the prior year under the standard program. For 2001, there were 347 projects, receiving $12.7 million in incentives, and achieving an estimated 80,000 MWh and 9.1 MW of savings. (Estimates based on engineering analyses of installed projects.) Program personnel indicate that customers were very enthusiastic about the program and that trade allies considered the bonus features a "stroke of genius". It was reported that the program enhancements allowed a number of customers to pursue projects that were previously rejected as not meeting their internal payback requirements under the standard program (but were nonetheless still cost-effective for the utility under the incentive bonus offer).

LESSONS LEARNED

According to Seattle City Light program management, some of the key lessons learned were:

- It is possible to ramp up an accelerated energy conservation program and achieve strong participation (even in a utility service territory which has had over 20 years of energy efficiency programs).
- Media news coverage of the energy crisis, and positive publicity efforts for conservation by the Governor, by the City Council, and by the utility, all played an important role in boosting participation in the program (i.e., through increased awareness of the energy crisis and increased motivation to take action to reduce energy use).

Among the key challenges were:

- Staffing up quickly to meet accelerated demand;
- managing the much larger program effort within available management budgets; and
- dealing with customer and contractor requests for exceptions and extensions. (The program had to explain that no exceptions could be granted, but they did all they could to help customers complete projects in time.)

FUTURE

The plan for 2002 is to return to the standard Energy Smart Services program, without the "10 plus 10" Incentive Bonus Offer. However, they will consider using the bonus offer technique in the future on a selective basis (e.g., to promote specific new technologies) or if they face another electric system crisis such as in 2001. There is no plan for a formal evaluation of the 2001 bonus offer experience, but they have concluded that it was a very effective technique for accelerating program participation.

WEBSITE

www.EnergySmartServices.com

REFERENCES

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