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 (view Table 1)

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 (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.

REFERENCES

[Boston Edison] Boston Edison, NEES Companies, and Northeast Utilities. 1999. *A Decade of Progress with Business Energy Efficiency in New England.* Boston, Mass.: Boston Edison.

[BPA] Bonneville Power Administration. 2002. "Northwest Makes Major Cuts in Energy Consumption." Available online: http://www.bpa.gov/Corporate/KCC/nr/02nr/nr011702.shtml. January 17.

[CPUC] California Public Utilities Commission. 2001. "CPUC 2001 Energy Efficiency and Conservation Programs." *Report to the Legislature.* San Francisco, Calif.: California Public Utilities Commission.

[CSCSA] California State and Consumer Services Agency. 2002. *The Summer 2001 Conservation Report.* Prepared by the California Energy Commission. San Francisco, Calif.: California State and Consumer Services Agency.

Henderson, Brian. 2001. "Lessons Learned in 2001." Panel presentation at the ACEEE National Conference on Energy Efficiency and Reliability, Berkeley, Calif., October 29–30. Available online: http://www.aceee.org/conf/henderson.pdf. Washington, D.C.: American Council for an Energy-Efficient Economy.

Kushler, M. and M. Suozzo. 1999. *Regulating Electric Distribution Utilities As If Energy Efficiency Mattered.* ACEEE-U993. Washington, D.C.: American Council for an Energy-Efficient Economy.

Kushler, M. and P. Witte. 2001. *A Revised 50-State Status Report on Electric Restructuring and Public Benefits.* ACEEE-U005. Washington, D.C.: American Council for an Energy-Efficient Economy.

Messenger, M. 2001. "Balancing Customer Needs with System Reliability Concerns in California." Presentation at the ACEEE National Conference on Energy Efficiency and Reliability, Berkeley, Calif., October 29–30. Available online: http://www.aceee.org/conf/messenger.pdf. Washington, D.C.: American Council for an Energy-Efficient Economy.

[MDOC] Minnesota Department of Commerce. 2000. *Keeping the Lights On: Securing Minnesota's Energy Future.* St. Paul, Minn.: Minnesota Department of Commerce.

———. *Minnesota Energy Planning Report.* St. Paul, Minn.: Minnesota Department of Commerce.

Nadel, S., F. Gordon, and C. Neme. 2000. *Using Targeted Energy Efficiency Program to Reduce Peak Electrical Demand and Address Electric System Reliability Problems.* ACEEE-U008. Washington, D.C.: American Council for an Energy-Efficient Economy.

Nadel, S. and M. Kushler. 2000. "Public Benefit Funds: A Key Strategy for Advancing Energy Efficiency." *The Electricity Journal*, October, 74–84.

New England Energy Policy Council. 1987. *Power to Spare: A Plan for Increasing New England's Competitiveness through Energy Efficiency.* New England Energy Policy Council. As cited in NEES. 1999. *A Decade of Progress with Business Energy Efficiency*

in New England. Boston, Mass.: Boston Edison Company, NEES Companies and Northeast Utilities System.

[NPPC] Northwest Power Planning Council. 2002. "Council Urges Continued Regionwide Energy Conservation Challenge." Press release. Available online: http://nwcouncil.org/library/releases/2002/0116.htm. January 16.

[NYSERDA] New York State Energy Research and Development Authority. 2001. *Draft 2002 State Energy Plan and Draft Environmental Impact Statement.* Albany, N.Y.: New York State Energy Research and Development Authority.

Office of the Governor. 2001a. "Governor Signs Landmark Energy Conservation Package." Press Release. April 11. Sacramento, Calif.: Office of the Governor.

———. 2001b. "Proclamation by the Governor of the State of California." January 17. Sacramento, Calif.: Office of the Governor.

———. 2001c. "Governor Davis Announces Plan to Slash State Energy Use." Press Release. January 12. Sacramento, Calif.: Office of the Governor.

———. 2001d. "Governor Davis Unveils 20/20 Energy Rebate Program for Summer 2001." Press Release. March 13. Sacramento, Calif.: Office of the Governor.

[PSCU] Public Service Commission of Utah. 2001. *In the Matter of Revisions to PACIFICORP's Tariff P.S.C.U. No. 43, Re: Schedule 2020, The Implementation of the New 20/20 Customer Challenge Program Rider.* Supplemental Order. Docket No. 01-035-T07. Salt Lake City, Utah: Public Service Commission of Utah. June 19.

Pyrch, J.B. 2001. "PNW Demand Responses to Reliability Challenges." Panel presentation at the ACEEE National Conference on Energy Efficiency and Reliability, Berkeley, Calif., October 29–30. Available online: http://www.aceee.org/conf/pyrch.pdf. Washington, D.C.: American Council for an Energy-Efficient Economy.

[RLW & SFMC] RLW Analytics and Shel Feldman Management Consulting. 2001. *The Remaining Electric Energy Efficiency Opportunities in Massachusetts, Final Report.* Boston, Mass.: Massachusetts Division of Energy Resources.

Strom, S. 2001. "Energy Efficiency and Reliability in Minnesota." Presentation at the ACEEE National Conference on Energy Efficiency and Reliability, Berkeley, Calif., October 29–30. Available online: http://www.aceee.org/conf/strom.pdf. Washington, D.C.: American Council for an Energy-Efficient Economy.

[WGA] Western Governors Association. 2001a. "Governors Announce Emergency Energy Conservation Strategies; Energy Roundtable Scheduled." Press Release. Available online: http://www.westgov.org/wga/press/energy%20conservation.htm. January 9.

———. 2001b. *WGA Policy Resolution 01-01: Western States' Energy Policy Roadmap.* Available online: http://www.westgov.org. August 14.