# Using Energy Efficiency to Help Address Electric System Reliability: An Initial Examination of 2001 Experience

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**ABSTRACT**

This paper presents the highlights from a study of "reliability-focused energy-efficiency programs" implemented for the summer of 2001. We define these types of programs as those that were specifically designed, modified, or ramped-up to address electric system reliability concerns. After first describing the methodology of the project, we present the results of a 50-State Screening Survey, followed by a description of 22 reliability-focused energy efficiency programs identified and selected as "case studies" in this project. We then discuss examples of three other different types of energy efficiency policy responses that were taken to address reliability concerns. Finally, we conclude by providing some preliminary aggregate impact estimates and outlining some lessons learned during the 2001 experience.

## Introduction

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 close calls were experienced in several regions, including the Pacific Northwest, Pennsylvania/New Jersey, and New England. 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.

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 programs. Policymakers, regulators, utilities, and other stakeholders were looking for creative approaches to help bring demand-side resources into play.

This paper presents the highlights from a study of "reliability-focused energy-efficiency programs" (which we define as energy efficiency programs that were specifically designed, modified, or ramped-up to address electric system reliability concerns[1]) implemented for the summer of 2001 (see Kushler, Vine, and York 2002). This paper is

[1] In practical terms, for most locations, this generally means energy efficiency programs that delivered energy efficiency savings during hot summer weekdays.

organized in the following way. After first describing the methodology of the project, we present the results of the 50-State Screening Survey, followed by a discussion of the 22 reliability-focused energy efficiency programs selected as case studies in this project. The next sections provide examples of three other different types of policy responses that have been used to apply energy efficiency strategies to reliability concerns. We conclude by presenting some preliminary aggregate impact estimates, which suggest that these demand-side efforts did have some positive effects, and by providing some lessons learned during the 2001 experience, based on feedback from those involved in administering these efforts in the various states.

## Methodology

This project deliberately began the research process by "casting a broad net" to identify 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. 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.

We supplemented this screening survey with two additional methods of identifying candidate programs. The first was the informal solicitation of nominations by the project staff through various networks (including the broadcast of a request for suggested programs to the entire ACEEE e-mail 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 (October 2001), where we identified many additional sources of information about current reliability-focused energy efficiency programs

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. 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. Out of this process, a total of 22 programs were selected for inclusion as case studies in this 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). 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. Following are the key findings from this screening survey.

- 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 appeared to be a fairly widespread lack of conceptual differentiation between energy efficiency and load management, even among the senior regulatory staff (directors of the electric division 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.[2]

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 presently using energy efficiency programs as a deliberate strategy to help improve electric system reliability.[3]

## Reliability-Focused Energy Efficiency Programs

Although we only identified 7 states in the initial screening survey as offering reliability-focused energy efficiency programs, we later identified a few additional states offering programs that fit this definition through our supplemental research. From among that combined group of states, we selected a set of programs to be used as case studies. This selection was based on a number of qualitative factors, as listed earlier in the "Methodology" section of this paper.

Table 1 provides a list of the 22 programs selected during this project as case studies. The table includes information on several 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 listed in Table 1 are described in Kushler, Vine, and York (2002). The following section summarizes some of the key characteristics of these programs.

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[2] The essential distinction is that energy efficiency programs are designed to reduce total energy use through more efficient buildings or equipment, whereas load management programs seek to lower peak demand by temporarily curtailing or shifting energy usage to different time periods. Utilities and other electricity suppliers tend to prefer load management because it lowers peak demand during the highest cost time periods without really reducing their total sales or throughput of electricity.

[3] There are many possible contributing factors to this situation (e.g., the disinclination of utilities to pursue programs that reduce total sales, a lack of information about energy efficiency program effectiveness in reducing peak demand, a lack of policy infrastructure in many states, etc.). However, further exploration of this issue was beyond the scope of this study.

**Table 1. Programs Selected as Case Studies**

| Program Name | State(s) | Administrative Organization | Sector(s) Targeted | Program Type | Annual Funding | Funding Source | Program Description |
|---|---|---|---|---|---|---|---|
| 2001 Low-Income Energy Efficiency Program | CA | All IOUs | Residential (low income) | Direct install & information | $60.7 M | Public goods funds and general fund | Free energy efficiency services to low-income households, including audit, weatherization, direct installation, A/C replacement (room or central), duct sealing and repair, whole house fan, water heater replacement (gas or electric), set back thermostats, and evaporative cooler maintenance. |
| 2001 Standard Performance Contract Program | CA | All IOUs | Commercial, industrial, and agricultural | Standard performance contracting | $30.8 M | Public goods funds | The Standard Performance Contract (SPC) program was a performance-based program that offered incentives (posted price) to customers or energy efficiency service providers (EESPs) for installation of energy-efficient equipment at customer facilities; some changes were enacted to achieve greater peak demand reductions. |
| Summer 2000 Energy Efficiency Initiative | CA | CPUC/ IOUs and others | All sectors | Rebates & information | $72.3 M | Public goods funds | With unspent funds from utility programs, CPUC developed new programs and modified existing programs to obtain demand and energy savings quickly. Many different delivery mechanisms and providers were implemented. |
| 2001 State Buildings and Public Universities Programs | CA | CEC and CPUC/ utilities | Institutional | Rebates & information | State: $5.5 M; IOUs: $8 M | Public goods funds and general fund | CEC and California's IOUs targeted state buildings and public universities for reducing summer peak demand and promoting energy efficiency. |
| SMUD's 2001 Enhancements to its Energy Efficiency Programs | CA | SMUD | All sectors | Rebates & information | $37.2 M over two years | Public goods funds & rates | The addition of state funding and an increase in its own public-goods funding to address the reliability crisis during 2001 allowed SMUD to aggressively expand existing and add new energy efficiency programs designed particularly to reduce summer peak load. |
| 2001 Residential Lighting Programs | CA | All IOUs/ state | Residential | Rebates & information | State: $20 M; IOUs: $14 M | Public goods funds and general fund | California's IOUs Residential Lighting Programs were designed to promote energy savings and peak demand savings and to transform the market for residential lighting products through a comprehensive set of market interventions that were coordinated statewide. |

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|---|---|---|---|---|---|---|---|
| Designing Commercial New Construction (2001) | CA | All IOUs/ CPUC/ Oakland | Commercial | Design assistance & information | Oakland: $0.3 M IOUs: $25.2 M | Public goods funds | California's IOUs and the City of Oakland developed programs to increase the energy efficiency of building design, as well as the efficiency of the technologies employed in buildings: (1) **Savings By Design** (SBD), which fosters integrated building design techniques and practices, and (2) **Energy Design Resources** (EDR), which is an integrated package of design and performance tools, techniques, information, and educational resources. |
| 2001 Residential Refrigerator and Freezer Recycling Program | CA | CPUC/ PG&E and SDG&E/AR CA | Residential | Rebates & recycling | $8.5 M | Public goods funds | A coordinated program to remove spare refrigerators and freezers. This program targeted residential consumers who operated spare refrigerators and freezers, and used financial incentives to take the spare units out of service by recycling them. |
| 2001 Building Code Development and Assistance | CA | CEC/ All IOUs | Residential and Commercial | Information | IOUs: $2.8 M | Public goods funds | The governor of California asked CEC to develop new Energy Efficiency Standards for Residential and Nonresidential Buildings (also known as Title 24 Energy Standards), which it did in collaboration with CA's IOUs. |
| 2001 Express Efficiency Program | CA | All IOUs | Commercial, industrial, and agricultural | Rebates & information | $38.6 M | Public goods funds | The Express Efficiency Program provided standard rebates to small commercial customers, contractors, and EESPs for installation of energy-efficient equipment. This was a statewide program implemented by California's IOUs. |
| 2001 Statewide Residential Rebate Programs | CA | All IOUs | Residential | Rebates & information | $27.2 M | Public goods funds and general fund | California's IOUs implemented a statewide coordinated rebate program for residential customers for the purchase and installation of qualifying energy-efficient heating and cooling equipment, refrigerators, attic and wall insulation, windows, and other measures. |
| Peak Load Reduction Program | NY | NYSERDA | Large C/I | Incentive payments for qualified measures (both load control and efficiency) | $13.5 M | NY systems benefits charge | This program pays incentives up to 75% of the measure costs for installing equipment that enable customers to reduce system peak demand through load management or efficiency improvements. |
| Keep Cool, New York Program | NY | NYSERDA | Residential room air conditioners | Incentive payments for purchase of efficient units and turning in old units | About $13 M statewide (all costs, including LIPA and NYPA) | NY systems benefits charge | Residential customers receive a $75 payment when they surrender an old room air conditioner and purchase a new ENERGY STAR model. |

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| Vending Mi$er | ID, MT, OR, WA | BPA | Beverage vending machines | Purchase and installation of "plug and play" devices | $4.6 M for 2 years (2001–2002). About $3 M spent in 2001. | BPA rate-payer funds for load-following utilities; others use rate-payers or SBC | This is regional turn-key program and buyers' cooperative for the "VendingMi$er"—a device installed on beverage vending machines that cycles the units off when not in use. The program is designed to secure favorable volume prices for procurement and installation of these devices. |
| ENERGY STAR Homes Program | TX | Reliant Energy HL&P | Residential single family homes, new construction | Incentives and marketing | $500,000 in 2001; about $1+ M for 2002 | Utility rates | The program promotes and provides incentives for increased sales of ENERGY STAR-rated homes. |
| Residential Air Conditioner Distributor Program | TX | Reliant Energy HL&P | Residential central air conditioning systems | Incentives for qualified systems | $750,000 in 2001; about $1.5 M in 2002 | Utility rates | Air conditioner distributors receive incentives for selling at least 1,000 tons of high-efficiency air conditioning equipment during a 12-month period that is installed in single-family homes within Reliant Energy HL&P's service territory. |
| Power-*Forward* | UT | PacifiCorp in collaboration with other IOUs, public utilities, state of UT government, and media | All electricity uses | Appeals for voluntary conservation | $95,000 | NA | Power*Forward* is a collaborative, statewide energy conservation information campaign. The campaign is designed to provide timely information that alerts consumers to days during the summer when conservation of electricity is necessary to maintain affordable and reliable power supplies. |
| Flex Your Power Campaign | CA | California State and Consumer Services Agency, and Dept. of Consumer Affairs | All electricity users | Appeals for voluntary conservation and efficiency | NA | Systems benefits charges | The state of California's Flex Your Power Campaign is comprised of several interrelated initiatives to reach as many people as possible with conservation and efficiency messages in response to California's 2001 electricity supply problems. |
| Conservation Incentive Programs | OR, WA, ID, UT, WY, CA | PacifiCorp's operating companies (Pacific Power and Utah Power); CA's major IOUs (PG&E, SoCalEd, and SDGE) | PacifiCorp: mostly residential, some small commercial; CA— all sectors | Receive a credit (10 or 20%) for savings on kWh/day compared to previous year | PacifiCorp: admin. costs—$348,534 and credit payments $9,736,902; credit payments in CA total of $200 M | Pacifi-Corp: utility rate-payers (non-CA); CA—utility rate-payers | The conservation incentive programs (20/20 and 10/10 programs) offer customers credits for reducing energy use relative to the same period the previous year. Customers reducing their use by 20% receive a 20% credit on their bills; customers who reduce their use by 10% receive a 10% credit. |

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| Community Energy Coopera-tive | IL | Center for Neighbor-hood Technology | Residential and Small Commercial | Rebates, turn-ins, and direct install | $1 M | ComEd general revenues & some govt. funds | The Community Energy Cooperative offers energy efficiency programs to residential and small commercial customers in targeted communities in Chicago in order to reduce load to help with distribution system reliability concerns. These programs particularly focus on residential air conditioning (programs for both window and central A/C) and commercial lighting. |
| "10 + 10" Incentive Bonus Offer | WA | Seattle City Light | Medium and large C&I | Rebates | $7.5 M originally budgeted, $13 M spent | Utility rates | The normal C&I rebate program was modified to respond to unprecedented wholesale price increases and reliability concerns in 2001. A 10% "signing bonus" for projects committed by July 31st and another 10% bonus if completed by Nov. 30th. Also, the usual 70% incentive cap was waived. Program received a huge response from customers. |

Note: IOU = investor-owned utility and NYSERDA = New York State Energy Research and Development Authority.

## Geographic Location

The selected set of case studies contains programs from a total of 10 different states.[4] These include: California (14 programs); Idaho (2); Illinois (1); Montana (1); New York (2); Oregon (2); Texas (2); Utah (2); Washington (3); and Wyoming (1).[5] Not surprisingly, 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

The programs were selected for inclusion in this list, in part, to represent a good diversity of targeted customer sectors. The most common individual sector is residential, with eight programs, while the commercial and industrial (C&I) sectors together have five programs. 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).

[4] 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, i.e., energy efficiency programs that were specifically designed, modified, and/or ramped-up in order to address electric system reliability concerns. There are certainly other states that operate commendable energy efficiency programs that have beneficial effects on electric system reliability in their normal course of operation. But they 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.

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

### 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, utility bill discount conservation 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 LED lights.

### Administrative Entity

The 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 IOUs, municipal utilities, state agencies, a federal power authority, and a nonprofit community organization.

## Other Policy Responses to Reliability Concerns

The primary focus of our research was to identify and describe examples of "reliability-focused energy efficiency programs." However, in addition to specific programs, many states also pursued other types of energy efficiency policy responses to concerns about electric system reliability. In this section we briefly review such policy responses to provide background information on other ways in which various government authorities have used energy efficiency as part of their efforts to assure a reliable electricity system.

### 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. The orders are well suited to elicit direct, immediate responses and can be used to increase visibility and raise public awareness of impending problems and to mobilize customer responsiveness to such problems.

California clearly provides a leading illustration of the use of executive branch policy responses to address electric reliability concerns. In January 2001, the governor 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 issued another executive order calling for the "20/20" rebate program for electricity customers in the state.[6] In May, he authorized the use of revenues from the Electric Power Fund to pay for various energy efficiency programs. Among the most visible efforts that resulted from this action was the "Flex Your Power" media and outreach campaign carried out in California through much of 2001.

[6] Under this program, customers would receive a 20% rebate on Summer 2001 bills if they achieved 20% or greater reduction in electricity consumption between June and September versus the previous year. We profile this and other "conservation incentive programs" in Kushler, Vine, and York (2002).

In many states, executive policy announcements were also used to "set an example" by taking actions in state facilities to reduce energy use. In Montana, the governor issued Executive Order 03-01 in March 2001, which directed conservation measures to be taken in state buildings. In Idaho, the governor issued an Executive Order entitled "Energy Conservation Considerations in State Buildings," which 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 were seen in the state of Washington, where a program was created to conduct energy audits in all state buildings and public schools, and where the State Building Code Council approved stricter energy efficiency standards for all new buildings.

In an interesting example of cross-state collaboration, the governors of Washington and Oregon held a joint press event in October 2001 at the Bonneville Dam, where they committed their respective state governments to new conservation plans and called on homeowners and businesses to adopt various energy-saving actions to help avert electric system reliability problems in the winter. The relatively unique nature of this event reportedly helped garner significant coverage and publicity in the respective states. The Western Governors Association (WGA) provided another example of collective executive policy responses when WGA issued several joint proclamations during 2001 regarding coordinated energy efficiency related efforts.

**Legislative Policy Responses**

In contrast to executive actions, legislative 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 longer-term concerns, infrastructure development, and major funding decisions.

Like its executive response, California's legislative policy response was of a magnitude commensurate with the magnitude of the challenges presented by its electricity crisis. During the 2000–2001 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.

Legislatures in other states that weren't facing such immediate problems as California also have taken proactive steps to address system reliability. In 1999, Wisconsin's Legislature passed 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 contained system reliability provisions relating to public utility holding companies, electric power transmission markets, and the creation of statewide public benefits programs, including energy efficiency. These provisions were viewed as essential to ensure an economical, reliable power supply in Wisconsin, which had faced threats of rolling black-outs in the summers of 1998 and 1999.

In Minnesota, the Energy Security and Reliability Act (passed in 2001) 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 IOUs.

In 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 had not experienced 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 often 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.

Parallel to actions by its governor and legislature, California provides clear examples of energy efficiency policy responses from its 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). In further action to respond to the electric reliability crisis, the 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.

Regulators in other states were also 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 of Utah (PSCU) to develop efficiency programs that could reduce load and improve system reliability. PSCU 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.[7] PSCU also accelerated its approval process for these programs to ensure that the programs were operational when needed at the start of summer 2001. In Idaho, 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.

## Estimating Impacts

It was well beyond the scope and timing of this project to attempt to assess the actual demand and energy savings impacts of the various energy efficiency policies and programs implemented in 2001. Indeed, in most cases the formal evaluations of these efforts are not yet completed as of the writing of this paper. However, it is possible to gain a sense of the scale of impact of these efforts by considering the reported impact projections from three key areas of the country.

As is evidenced by the locations of the case studies identified in this project, the most significant reliability-focused energy efficiency efforts during 2001 tended to cluster in three geographic areas: California, the Northwest region, and New York.[8]

[7] Customers reducing their energy use by 10% received a 10% credit on their utility bill.

[8] This is not surprising, since those were the locations where the major electric system reliability concerns occurred during 2001.

Through information available from the appropriate administrative and regulatory agencies in those areas, we were able to identify spending levels and projected impacts from programs operated for 2001. These data are presented in Table 2.

While information in Table 2 is based on engineering estimates of impacts rather than ex-post formal evaluations, it does provide a rough indicator of the magnitude of effects that comprehensive energy efficiency-oriented demand-side interventions can achieve. Future research will hopefully proceed to more specifically identify the costs and impacts of individual programs.

**Table 2. 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 |

**Sources and notes:**
California: CPUC (2001) and CSCSA (2002)—data obtained from Tables 1–3 of CSCSA (2002), excluding the purely load management programs of air conditioner cycling, load curtailment, and interruptible tariffs.
Northwest: Pyrch (2001)—note that the peak savings in megawatts reported for the Northwest are in terms of "average megawatts" 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.

As one final indicator of overall aggregate effects, it is most impressive to note that the combined impact of all efforts in California (programs, rate design, public appeals, etc.) in 2001 was a 10% cut in peak demand and a 6.7% reduction in total electricity use, after taking into account economic growth and weather (CSCSA 2002).

## Lessons Learned from Programs Reviewed

Many lessons were learned during the design, implementation, and preliminary evaluation of the 22 programs reviewed, analyzed, and profiled in our case studies. Specific lessons learned are described in the individual case studies in the full project report (Kushler, Vine, and York 2002). In addition to program-specific lessons, we observed more general lessons that should be valuable to program managers and policy makers around the country who need to design and implement programs to reduce energy demand very quickly. Following are some of the lessons cited by program administrators in their interviews with project staff.

1. 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.
2. 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.
3. 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).

4. Select programs that are either based on proven designs or otherwise highly certain of achieving goals. Some innovation and experimentation can be useful, but not as the backbone of a menu of programs.
5. Establish streamlined, "user-friendly" processes both for participation in programs and for selection of any program contractors.
6. Coordinate efforts with key market participants—especially retailers and manufacturers—in order to help ensure an adequate supply of energy efficiency equipment.
7. Implement effective marketing and media campaigns, which are essential to large-scale program success.
8. Select programs that are practical and realistic—programs that can be designed and implemented quickly and easily.
9. Be realistic about estimated program impacts—don't over-promise; rather, over-deliver.
10. Establish and incorporate effective evaluation plans, including protocols and provisions for measurement and verification.

Perhaps the single most emphasized lesson learned was the importance of having an existing infrastructure in place—some kind of ongoing efficiency programs—in order to maximize the ability of energy efficiency to quickly contribute to addressing reliability concerns. Having a solid foundation available to call upon was repeatedly cited as a crucial factor in the success of the reliability-focused energy efficiency programs identified in this study.

## Conclusion

Our research was able to document many examples of how energy efficiency was used as an important resource to address short-term reliability concerns in the summer of 2001. We have observed innovation in program design, as well as reliance on proven program designs, to deliver energy and demand savings over a very short time horizon. We also identified examples in which utilities "dug deeper" into their well of demand-side resources and achieved higher levels of energy savings than planned as the result of extensive ongoing and past programs. These examples illustrate that demand-side resources can be ramped-up even in places that have strong past and ongoing records of achievement.

Yet our results indicate that from a national perspective, the potential use of energy efficiency programs to help address reliability concerns is much greater than is currently being realized. Fortunately, the results from states that have been active in this area suggest that significant benefits can be realized from "reliability-focused energy efficiency" programs to meet both near- and long-term electric system reliability needs. Such programs should be an important, ongoing part of public policy responses to electric system reliability concerns.

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