A Follow-up Assessment of the Status of Reliability-Focused Energy Efficiency Programs Launched During the Electricity Crisis of 2001: Implications for Policy

Martin Kushler, Ph.D., and Patti Witte, M.A.

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1001 Connecticut Avenue, N.W., Suite 801, Washington, D.C. 20036
(202) 429-8873 phone, (202) 429-2248 fax, http://aceee.org website

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EXECUTIVE SUMMARY

This report presents as its primary focus the results of a follow-up survey of the 22 reliability-focused energy efficiency programs that ACEEE profiled as case studies in its April 2002 report *Energy Efficiency and Electric System Reliability: A Look at Reliability-Focused Energy Efficiency Programs Used to Help Address the Electricity Crisis of 2001*. The results of this follow-up are encouraging in terms of the viability of the concept of using energy efficiency programs to help address electric system reliability concerns. Most (17 out of 22) of the programs were given additional funding and operated through 2002, and are projected to be continued in 2003. A handful of programs were allowed to expire because their initial funding ran out and/or the crisis conditions had abated, but none of the programs were halted due to poor performance. Moreover, administrators for nearly all (20 out of 22) of the programs unequivocally responded that the programs would be used again if electric system reliability concerns re-occurred.

A second focus of this report was to examine the findings of a recent ten-year national electric reliability assessment, *Summary of Reliability Assessment 2002–2011, The Reliability of Bulk Electric Systems in North America*, by the North American Electric Reliability Council (NERC 2002). This report concluded that the NERC assessment found no cause for alarm at the national level, but clearly outlined a number of factors (e.g., financial distress in the generation industry, continuing transmission needs, possible natural gas cost and/or delivery problems, etc.) that could lead to reliability difficulties, and also identified a number of states and regions still facing current reliability challenges.

Taken in combination, the results of the case study follow-up and the near-term electric reliability assessment present positive implications for energy efficiency. The track record of actual experience by the case study programs demonstrates that reliability-focused energy efficiency programs can be a practical and viable tool for helping to address electric reliability concerns, and current projections indicate that significant challenges to electric system reliability remain in many regions of the country. Together, the results of this study suggest that policymakers and regulators should regard the incorporation of reliability-focused energy efficiency programs as a highly desirable policy strategy.

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INTRODUCTION

This report is a follow-up to ACEEE's 2000–2002 national research project to identify and compile information on reliability-focused energy efficiency programs[1] operated during the summer of 2001. That project resulted in the first National Conference on Energy Efficiency and Reliability, held in the fall of 2001, and also the comprehensive final report *Energy Efficiency and Electric System Reliability: A Look at Reliability-Focused Energy Efficiency Programs Used to Help Address the Electricity Crisis of 2001*, published in April of 2002. The purpose of the current report is to provide an updated look at these issues, including specific follow-up information on the current status and future plans for the 22 reliability-focused energy efficiency programs that were profiled as case studies in that earlier report.[2]

Background

In the wake of the movement toward electric industry restructuring, electric system reliability began to emerge as a serious concern in the late 1990s. 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, and 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.

ACEEE was one of the first organizations to recognize the implications that these developments could have on the prospects for energy efficiency. In late 1999, we initiated a project to identify high-priority energy efficiency opportunities to address electric reliability concerns, and published in 2000 the report *Using Targeted Energy Efficiency Programs to Reduce Peak Electrical Demand and Address Electric System Reliability Problems*.

In late 2000, in response to the accelerating electric system reliability concerns, ACEEE developed a proposal and solicited funding to carry out a study of reliability-focused energy efficiency programs implemented to address anticipated problems in the summer of 2001. Particularly noteworthy was the fact that ACEEE focused specifically on energy efficiency,[3] rather than other "demand-side" strategies such as load shifting, demand response, or load curtailment programs. Those 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

[1] ACEEE 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.

[2] See the appendix for a table that lists and briefly describes those 22 case study programs.

[3] 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 drive power, etc.) using less energy.

electric system reliability concerns deserved some specific attention.[4] Moreover, the additional benefits[5] 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.[6]

As described above, ACEEE's research culminated in the first National Conference on Energy Efficiency and Reliability, which was held in Berkeley, California, in October 2001, and also the widely distributed national report *Energy Efficiency and Electric System Reliability: A Look at Reliability-Focused Energy Efficiency Programs Used to Help Address the Electricity Crisis of 2001*.

The Current Project

The purpose of the current project was to conduct a follow-up study to the 2001/2002 ACEEE research effort regarding reliability-focused energy efficiency. This report presents the results of that follow-up work, including

- The findings from a follow-up survey of the 22 reliability-focused energy efficiency programs presented as case studies in the earlier report, including an assessment of their current status and plans for 2003.

- As a part of that follow-up survey, an assessment of the respondents' perceptions of the electric system reliability in those states during this past year (2002) and expectations for 2003.

- A summary of the North American Electric Reliability Council's recent assessment regarding near-term electric system reliability around the country.

- A discussion of the implications of all of the above in terms of the prospects for reliability-focused energy efficiency programs over the next couple of years.

PROJECT FINDINGS

Follow-Up Survey on the Reliability-Focused Energy Efficiency Case Study Programs

ACEEE conducted a follow-up survey in November and December of 2002 to attempt to interview administrators from each of the 22 reliability-focused energy efficiency programs that were profiled as case studies in the 2002 ACEEE report (Kushler, Vine, and York 2002).

[4] Research by ACEEE had documented that while load management types of programs were present in almost all states, energy efficiency programs targeted at electric system reliability were present in less than one-fifth of the states (Kushler, Vine, and York 2002).

[5] For example, energy efficiency reduces customer bills throughout the year and the total consumption of energy resources, and provides significant environmental benefits (whereas load management has little effect, or may even increase, total energy consumption and total environmental emissions).

[6] 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).

With some persistence, administrators from each of the 22 programs were successfully interviewed. The following material presents the highlights from that follow-up survey.

Current Status

Overall, 17 of the 22 reliability-focused energy efficiency programs from the summer of 2001 were still operating as of the end of 2002. For the five programs that were no longer in operation, the following reasons were given for their discontinuance.

- One ended because it was a special rate program tied to the electricity crisis and the crisis had passed.
- One ended because the market for the technology being promoted (LED traffic lights in California) was essentially transformed.
- One ended because it was funded through a one-time use of carry-over funds that were used up.
- One ended because the utility financial structure changed and no longer was it credited with the resource value of the savings.
- One program essentially continued, but without the special extra financial incentive that had been added during the electricity crisis.

Perhaps what is most noteworthy is that none of the 22 profiled programs were terminated due to poor program results. Indeed, the qualitative assessment of the programs was almost universally positive.

Plans for 2003

Fifteen of the seventeen programs that operated in 2002 will be continued in 2003. Of the two that will not continue, one will stop because the special funding that created it in 2001 has been fully spent out, and one will be halted because it has achieved sufficient market saturation of the high-efficiency technology. Once again, none of the original 22 programs has been terminated for poor performance.

Local Assessment of Effectiveness

Respondents were asked what the qualitative conclusion had been about the ability of the program "to contribute to improving electric system reliability." Eighteen of the nineteen respondents who were able to answer that question indicated that the programs were regarded as having had a successful impact on demand reduction and therefore something that would help with electric system reliability. One respondent mentioned that the program effects were primarily on baseload usage and probably not on peak usage.

Future Use of the Program

All respondents were also asked if their state/utility would use the program again if there were electric reliability concerns in the future. Twenty of the twenty-two programs received an unequivocal "yes." One respondent said "probably not" because the market for that technology had been essentially transformed and one wasn't sure and didn't want to speak for the utility.

Summary of Assessments of the 22 Case Study Programs

The results of this follow-up survey suggest that overall, the 22 reliability-focused energy efficiency programs profiled as case studies in our earlier ACEEE report are still characterized as having been quite successful. Most (17) were given additional funding and operated through the following year (2002), and none of the five that did not continue were halted due to poor program performance (but rather, in most cases, because they were perceived as being no longer needed).

Respondents overwhelmingly indicated that the programs were regarded as successful in reducing customer demand and helping with electric system reliability and in 20 of 22 cases, respondents indicated that the state/utility would use the program again if reliability problems re-occurred in the future.

Clearly, these results demonstrate that it is possible to design and implement reliability-focused energy efficiency programs and that these programs have been successfully delivered by a wide variety of states and utilities.

Follow-Up Survey Information on the Targeted States

The 22 case study programs were distributed across a total of seven states (California, Illinois, New York, Oregon, Texas, Utah, and Washington). As a part of the follow-up survey, respondents were asked a few questions about the electric reliability situation in their state and the use of energy efficiency and load management as tools to help address electric system reliability. The results are summarized below.

Reliability Concerns During 2002

Of the seven states represented by the case study programs, respondents from two of them (Texas and Illinois) reported that there were no reliability problems during 2002 ("no concerns at all, plenty of capacity"). Respondents from four states (California, New York, Utah, and Washington) indicated that there were at least moderate concerns about electric system reliability. The respondent from one state (Oregon) didn't wish to offer an opinion.

Reliability Prospects for 2003

Respondents from all but one of the states (Utah) felt that electric system reliability in 2003 would be "likely about the same in 2003" as it was in 2002. For Utah, the prognosis was that

reliability might be a little better in 2003. Overall, this would seem to indicate that most of these respondents expect electric reliability to be a moderate, but not extreme, concern in their states in the near term.

Level of Policy Support for Energy Efficiency in General

Respondents were asked to rate the level of general policy support for energy efficiency in their state, using four categories ("strong," "moderate," "weak," or "no visible support"). Representatives from four states rated the support in their states as "strong" (New York, Oregon, Texas, and Utah). Across the many respondents from California, most rated the state as "strong," but there were a few "moderates." The respondent from Washington rated that state as "moderate," but their own utility (Seattle City Light) as "strong." Finally, the respondent from Illinois rated that state as "weak" in its support for energy efficiency.

Specific Support for Energy Efficiency to Address Electric System Reliability

Respondents were then asked if their state has any "specific policy support for using energy efficiency programs to help assure electric system reliability." Respondents from four states (California, New York, Utah, and Texas) said "yes" and from one state (Illinois) said "no." Respondents from the two Pacific Northwest states explained that their hydro-based system really didn't have the same kind of peak demand-based reliability concerns as most regions, so it was difficult to answer that question.

Specific Support for Load Management to Address Electric System Reliability

Respondents were then asked a parallel question about whether their state had any "specific policy support for using load management or demand-response programs to help assure electric system reliability." This time, respondents from all five of the non-Northwest states replied "yes," while respondents from the two Northwest states again explained that theirs was not a peak demand-focused electric system.

Summary of the State Reliability Assessment

Across these seven states, the assessment of electric reliability concerns can be characterized as mixed. While clearly not at the crisis levels of 2001, several states still had moderate concerns in 2002 and most of those expected similar concerns in 2003. In these circumstances, it is noteworthy that most of these states maintained policy support for energy efficiency as a strategy to help address electric system reliability. (This is also evidenced by the fact that most of the 22 case study programs from 2001 were maintained through 2002 and most of those are projected to continue in 2003.)

One interesting additional observation is that specific policy support for energy efficiency as a reliability strategy was nearly as prevalent in these states as support for load management. That distinguishes this group of states from our earlier research on the full United States, which found that specific support for load management programs was nearly universal across

the 50 states, but specific energy efficiency program support was present in less than half of the states (Kushler, Vine, and York 2002).[7]

National Reliability Assessment: Highlights from the North American Electric Reliability Council Reliability Assessment for 2002–2011

In October 2002, NERC published a report entitled "Summary of Reliability Assessment 2002–2011, The Reliability of Bulk Electric Systems in North America." In this report, NERC assessed electric and transmission reliability for North America from 2002–2011, discussed the key issues affecting reliability and provided separate assessments of electric reliability for the individual NERC regions. Brief summaries of some of the highlights of that report are provided below.

National Resource Adequacy

The average annual U.S. electric peak demand growth over the next ten years is projected to be 2%, slightly down from the country's historical growth demand over the last ten years (2.3%). The NERC authors concluded that there would be adequate electric generation in the country over the next ten years given the timely construction of new electric power plants. One caveat to that assessment is that due to the recent financial difficulties being experienced by both the individual plant developers and the country in general, many generation projects have been suspended. However, large amounts of new capacity are still projected for 2005 and later.

National Transmission Adequacy

In general, the NERC authors concluded that the electric transmission system in the United States would perform reliably over the next ten years. There are several areas in the country, however, where generating units are experiencing problems transmitting their electric output to targeted markets. In the long term, reliable electricity transmission will be dependent on the improved coordination of generation and transmission planning and construction. For the near term, this is an area where regional and local concerns are the most problematic.

Fuel Supply Adequacy

The NERC report indicated that the national fuel supply appears to be adequate for the next ten years with the following caveats:

1. Hydroelectric resources will be dependent on sufficient precipitation (which is difficult to predict for the long term); and

2. The fact that generating plants in the United States are increasingly using natural gas as their primary fuel has several implications.

[7] The difference in this sample, of course, is attributable to the fact that these seven states were selected originally because they operated specific reliability-focused energy efficiency programs during the crisis summer of 2001.

- Although adequate supplies of natural gas are available in Canada, the Rocky Mountains, and the deep waters of the Gulf of Mexico, the extraction of the gas may require new technology or significant expenditures.

- The natural gas industry doesn't have reliability standards like the electric industry, which require companies to demonstrate that they can operate reliably given a first contingency failure. At this point, the reliability of the natural gas fuel supply is dependent on the historical relationship of natural gas pipeline owners who have typically cooperated with each other despite the absence of a standard.

- Currently, there is no independent review ensuring that the natural gas pipeline delivers the gas at pressures needed to generate electricity. The reliable delivery of natural gas will be dependent on the coordination and cooperation between gas and electric operating centers.

- The Northeast and Western regions of the United States have significantly increased their reliance on natural gas as the primary resource used to generate electricity. These areas are dependent on the timely construction of new natural gas pipelines for the delivery of adequate electricity supplies.

Environmental Issues

The NERC authors surmised that environmental requirements of electricity generation plants must allow adequate time for (1) mandated equipment installation and fuel conversions and (2) the availability of commercial technologies to comply with the requirements, or else they may interfere with reliable electric generation.

Problem Areas

Although each NERC region is confronted with the above-mentioned generation, transmission, and/or fuel supply issues to varying degrees, the NERC report identified several areas in the United States that are facing some of the most significant reliability problems.

- Aging plants in the East Central Area Reliability Coordination Agreement (ECAR)[8] present some concerns about increasing downtimes for maintenance, etc. By 2011, almost 75% of the capacity in the region will be 30 years old or more and about 39% will be 40 years old or more.

- The ECAR region is also in need of additional transmission. Without it, the region is vulnerable to transmission overloads. The timely completion of the Wyoming-to-Jacksons Ferry transmission line, for example, scheduled in 2006, is necessary to help the area prevent outages.

[8] ECAR membership covers 194,000 square miles covering all or parts of Michigan, Indiana, Kentucky, Ohio, Virginia, West Virginia, Pennsylvania, Maryland, and Tennessee.

- The *Dallas-Fort Worth and Houston* areas in the Electric Reliability Council of Texas (ERCOT)[9] currently experience major transmission problems. Generation facilities have been built outside of these areas due to economic and environmental considerations. Although a number of large projects are planned to improve the transmission of electricity into these areas, lengthy construction times will require the implementation of congestion management over the next ten years.

- In the Mid-America Interconnected Network (MAIN)[10] region, import capabilities into Wisconsin and Iowa are marginal. A number of transmission line additions are planned to avert problems.

- Transmission problems have been identified in the Mid-Continent Area Power Pool (MAPP)[11] region in the *Minneapolis-St. Paul to Iowa and Wisconsin* areas and in the *North Dakota-north Minnesota* area. Transmission system alternatives are being considered.

- Projections indicate that *New York City and Long Island*, located in the Northeast Power Coordinating Council (NPCC),[12] are dependent on demand-side management programs and the addition of 850 megawatts (MW) to meet demand beyond 2002. If current proposed projects and programs are implemented, these two areas should be able to meet their future electric demand.

- Also in NPCC, *Southwestern Connecticut* has severe reliability problems due to the inability to adequately import electricity into the area and transport the electricity within the area. The Connecticut state government is designing a comprehensive energy plan for the state and has placed a moratorium on all generation and transmission projects until the completion of the plan.

- Major transmission additions are required in the SERC[13] region where several areas with stability concerns have been identified.

- Although short-term generation capacity for the Southwest Power Pool Region (SPP)[14] appears to be adequate, the region is highly dependent on either market resources or new, uncommitted resources to provide needed electricity after 2005.

- Adequate generation in the Western Electric Coordinating Council (WECC)[15] over the next ten years is dependent on the timely construction of over 81,000 MW of new

[9] The ERCOT region is responsible for approximately 85% of the electric demand in Texas.
[10] The MAIN region includes parts of Iowa, Illinois, Missouri, and Wisconsin, and most of Michigan's Upper Peninsula.
[11] MAPP covers all or parts of Iowa, Illinois, Minnesota, Nebraska, North Dakota, South Dakota, Michigan, Montana, Wisconsin, Manitoba, and Saskatchewan.
[12] NPCC includes New York, the six New England states, Ontario, Quebec, New Brunswick, and Nova Scotia.
[13] SERC covers approximately 464,000 miles and includes portions of 13 states in the southeastern United States.
[14] The SPP serves 18 million people in a geographic area covering 400,000 square miles including Arkansas and Ohio.

generation capacity. This is significantly higher than the 56,849 MW of net new capacity reported in last year's NERC assessment. In the California-Mexico Area specifically, restructuring has made generation projections difficult. For example, due to financial and market uncertainties, over 60 projects in the area were cancelled in the 18 months before this NERC report was written. Transmission is also an issue in the California-Mexico Area. San Diego, for example, is dependent on additions proposed for 2005. Delays of the projects could make the San Diego area vulnerable to reliability problems.

Summary and Interpretation

Overall, the NERC analysis suggests that U.S. electric reliability should generally be adequate over the next 10 years, but with several important caveats covering such uncertainties as the financial health of the independent generation industry; the ability to address transmission needs; the challenges associated with natural gas supply, costs, and delivery; and still emerging environmental factors. In addition, NERC identified a number of specific states and regions where particular threats to electric reliability exist.

Taken as a whole, the NERC assessment indicates no current cause for national alarm regarding electric reliability, but at the same time gives no reason to be sanguine. One can identify several factors that could easily lead to widespread threats to reliability, plus there are a number of states/regions where situational factors mean that prudent action is needed now. Together these results suggest that policies to help ensure electric system reliability will continue to be important for the foreseeable future.

CONCLUSIONS AND IMPLICATIONS

This follow-up study sought to examine information that would be pertinent to assessing the future prospects for the use of energy efficiency programs to help address electric system reliability in the United States. To address this objective, two different approaches were taken: one focusing on the recent experience and current status of reliability-focused energy efficiency programs that were launched during the electricity crisis of 2001; and one focusing on near-term projections of electric system reliability concerns in the United States. The first focus provides important information about the practical viability of energy efficiency as a mechanism to help address electric reliability, and the second focus gives insights into whether, and where, such reliability-focused energy efficiency efforts might be needed in the relatively near future.

To address the issue of the practical viability of energy efficiency to address electric reliability, a follow-up survey was conducted of the 22 reliability-focused energy efficiency programs operated during the electricity crisis of 2001 that were profiled in ACEEE's earlier report, *Energy Efficiency and Electric System Reliability: A Look at Reliability-Focused Energy Efficiency Programs Used to Help Address the Electricity Crisis of 2001*.

[15] WECC includes 14 western states, two Canadian provinces, and a portion of Baja California Norte, Mexico. The region is divided into four major regions: the Northwest Power Pool Area; The Rocky Mountain Power Area; the Arizona-New Mexico-Southern Nevada Power Area; and the California-Mexico Power Area.

The results of this follow-up survey were quite encouraging. Most of the programs were given additional funding and operated through 2002 and are projected to continue in 2003. A handful of programs were allowed to expire because their initial funding ran out and/or the crisis conditions had abated, but none of the programs were halted due to poor performance. Moreover, administrators for nearly all (20 out of 22) of the programs unequivocally responded that the programs would be used again if electric system reliability concerns re-occurred.

To address the issue of potential future reliability concerns, two approaches were used: administrators in the seven states covered by the case study programs were asked to assess current and near-term electric reliability situation in their state; and the recent national assessment from the North American Electric Reliability Council was examined.

Results from the seven state survey were mixed, but at least four states (California, New York, Utah, and Washington) indicated that there was at least a moderate level of ongoing concern about electric reliability. The NERC assessment similarly found no cause for alarm at the national level, but clearly outlined a number of factors (e.g., financial distress in the generation industry, continuing transmission needs, possible natural gas cost and/or delivery problems, etc.) that could lead to reliability difficulties, and also identified a number of states and regions still facing current reliability challenges.

Taken in combination, the results of the case study follow-up and the near-term electric reliability assessment present positive implications for energy efficiency. The track record of actual experience by the case study programs demonstrates that reliability-focused energy efficiency programs can be a practical and viable tool for helping to address electric reliability concerns,[16] and current projections indicate that significant challenges to electric system reliability remain in many regions of the country. Together, the results of this study suggest that policymakers and regulators should regard reliability-focused energy efficiency programs as a highly desirable policy strategy.

[16] Perhaps the most impressive testimonial to the ability of energy efficiency and conservation to contribute to electric system reliability is of course the results achieved in California during its recent electricity crisis. Total statewide energy use for the year 2001 was reduced by a phenomenal 6.7% and summer peak electricity demand was reduced by approximately 10% (CSCSA 2002).

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APPENDIX: CASE STUDY SUMMARY TABLE

Program Name	State	Administrative Organization	Sector(s) Targeted	Program Type	Annual Funding	Funding Source
2001 Low-Income Energy Efficiency Program	CA	All IOUs	Residential (low income)	Direct install and information	$60.7 M	Public goods funds and general fund
2001 Standard Performance Contract Program	CA	All IOUs	Commercial, industrial, and agricultural	Standard performance contracting	$30.8 M	Public goods funds
Summer 2000 Energy Efficiency Initiative	CA	CPUC/IOUs and others	All sectors	Rebates and information	$72.3 M	Public goods funds
2001 State Buildings and Public Universities Programs	CA	CEC and CPUC/utilities	Institutional	Rebates and information	State: $5.5 M; IOUs: $8 M	Public goods funds and general fund
SMUD's 2001 Enhancements to its Energy Efficiency Programs	CA	SMUD	All sectors	Rebates and information	$37.2 M over two years	Public goods funds and rates
2001 Residential Lighting Programs	CA	All IOUs/state	Residential	Rebates and information	State: $ 20 M; IOUs: $ 14 M	Public goods funds and general fund
2001 Light-Emitting Diode Traffic Signals Programs	CA	All IOUs/state	Public sector	Rebates	State: $10 M; IOUs: $ 24.5 M	Public goods funds and general fund
Designing Commercial New Construction (2001)	CA	All IOUs/CPUC/ Oakland	Commercial	Design assistance and information	Oakland: $0.3 M IOUs: $ 25.2 M	Public goods funds
2001 Residential Refrigerator and Freezer Recycling Program	CA	CPUC/PG&E and SDG&E/ARCA	Residential	Rebates and recycling	$8.5 M	Public goods funds

Program Description
In 2001, the Low-Income Energy Efficiency (LIEE) Program offered free energy efficiency services to low-income households. The home was assessed and treated with all feasible measures: e.g., weatherization measures and appliances (refrigerators, evaporative coolers, and furnace repair and replacement). In 2001, the Rapid Deployment program was created and added several measures to increase peak energy savings from the LIEE: air conditioner replacement (room or central); duct sealing and repair; whole house fan; water heater replacement (gas or electric); set back thermostats; and evaporative cooler maintenance.
In 2001, the Standard Performance Contract (SPC) program was a performance-based program that offered incentives (posted price) to customers or energy efficiency service providers (EESPs) for installation of energy-efficient equipment at customer facilities. The SPC was standardized statewide and included incentive levels, procedures, and contracts, with some program differences to reflect different service territory needs. Incentive levels were based on measure end-use and the type of energy savings verification plan. In 2001, the Summer Initiative program in this area did not add funding but did change the scope of the program to increase peak energy savings from the program: (1) additional incentives were offered for peak demand reductions; (2) the requirement for measurement activity was waived; and (3) the application forms and the application review process were simplified.
With public goods funds that the California investor-owned utilities had not spent in previous years, the CPUC developed and funded the Summer 2000 Energy Efficiency Initiative (Summer Initiative) to obtain demand and energy savings quickly. The approved programs either modified existing programs or created new programs that could be quickly implemented to achieve demand and energy savings by the summer of 2001. Many different delivery mechanisms and providers were selected by the CPUC. About half of the programs were proposed by utilities and the other half by non-utilities.
In 2001, both CEC and California's IOUs targeted state buildings and public universities for reducing summer peak demand and promoting energy efficiency. The objective of the CEC program was to reduce summer peak demand by 50 MW in state buildings and university and state college campuses. In contrast to the focus on peak load management in the CEC program, the IOUs primarily implemented energy efficiency measures as part of their expanded non-residential energy efficiency programs.
This case study is provided as an example of a comprehensive response by a municipal utility to a statewide electric system reliability crisis. Since 1976, the Sacramento Municipal Utility District (SMUD) has promoted energy efficiency and peak energy reduction programs in the residential, commercial, and industrial sectors. The addition of state funding and an increase in its own public-goods funding to address the reliability crisis during 2001 allowed SMUD to aggressively expand existing and add new energy efficiency programs designed particularly to reduce summer peak load.
In 2001, California's IOU's 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 are coordinated statewide. The Residential Lighting Programs focused on three main areas: (1) enhancing the manufacture and competitive pricing of energy-efficient lighting products; (2) enhancing the distribution and marketing of energy-efficient lighting products through established retail channels to consumers; and (3) building consumer understanding of how to purchase and use energy-efficient lighting products. Each of the three utilities implementing these programs emphasized one aspect of these programs: upstream delivery mechanisms.(primarily working with manufacturers) or downstream delivery mechanisms (primarily working with customers and retailers). In 2001, the State Legislature provided funding to the California Conservation Corps for distributing CFLs door to door.
LED Traffic Signal Programs are designed to encourage the retrofit of traffic lights from traditional incandescent bulbs to LED traffic lamps. Utility and state programs were designed to achieve demand reductions by June 2001 and have been critical in transforming the market for LED traffic signal modules. CEC's LED Traffic Signals Program provided grants to municipalities encouraging the replacement of incandescent traffic signals with those using LED technology. For the utility programs, incentives of up to 100% of the hardware cost (installation cost and sales tax were the responsibility of the participant) were offered for signals installed by this time. For signals installed after June 2001, incentives were reduced by 50%. In the CEC program, the grants were used to pay for part of the material and labor costs for installing the LED traffic signal modules. Incentives ranged from $25/module to $100/module. The grants provided by this program covered about half the project cost, which was about 25% lower than the incentives offered by the investor-owned utilities.
In 2001, 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. In 2001, the IOUs implemented two statewide programs aimed at improving the design of new construction in the commercial sector: (1) **Savings By Design** (SBD) fosters integrated building design techniques and practices that contribute to energy-efficient facilities; and (2) **Energy Design Resources** (EDR) is an integrated package of design and performance tools, techniques, information, and educational resources that promote the design and construction of high-performance buildings. In 2001, the SBD program was revamped and revised in response to the new Title 24 standards that went into effect on June 1. By June 10, a new energy savings calculator was in place for the program. The SBD program also adopted ASHRAE's 90.1 Tier 1 standards for HVAC and doubled the HVAC incentive for systems approach applications. The EDR program was realigned with the SBD program to directly support its kW, kWh, and therm savings goals. Under the CPUC's Summer In
In 2000, the CPUC directed California's IOUs to develop a coordinated program to remove spare refrigerators and freezers. This program targeted residential consumers who operated spare refrigerators and freezers, and used financial incentives ($75/refrigerator) to take the spare units out of service by recycling them. The program was very successful: over 36,000 refrigerators and freezers were recycled in PG&E and SDG&E service territories. In addition, the SCE shifted more funding to its program (ongoing since 1994) and recycled over 70,000 units.

Program Name	State	Administrative Organization	Sector(s) Targeted	Program Type	Annual Funding	Funding Source
2001 Building Code Development and Assistance	CA	CEC/All IOUs	Residential and commercial	Information	IOUs: $ 2.8 M	Public goods funds
2001 Express Efficiency Program	CA	All IOUs	Commercial, industrial, and agricultural	Rebates and information	$38.6 M	Public goods funds
2001 Statewide Residential Rebate Programs	CA	All IOUs	Residential	Rebates and information	$27.2 M	Public goods funds and general fund
Peak Load Reduction Program	NY	NYSERDA	Large C/I	Incentive payments for qualified measures (both load control and efficiency)	$13.5 M total; $3 M of this for PV R&D	NY systems benefits charge
Keep Cool, New York Program	NY	NYSERDA	Residential room air conditioners	Incentive payments for purchase of efficient units and surrendering of inefficient units	About $13 M statewide (all costs, including LIPA and NYPA)	NY systems benefits charge
Vending Mi$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 ratepayer funds for participating load-following utilities; others may use ratepayers or SBC
ENERGY STAR Homes Program	TX	Reliant Energy HL&P	Residential single-family homes, new construction	Incentives and marketing	$1 M in 2001, about $1.5 M for 2002	Utility rates
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
Power Forward -- information and media alerts for conservation and peak demand reductions	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
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
Conservation Incentive (10/10 and 20/20) 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	Paciticorp: mostly residential, some small commercial; CA -- all sectors	Recieve 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 $296 M	Utility ratepayers
Community Energy Cooperative	IL	Center for Neighborhood Technology	Residential and small commercial	Rebates, turn-ins, and direct install	$6 M	ComEd general revenues and some gov't funds
"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

Program Description
In 2000, the CEC was asked by the governor of California to develop new Energy Efficiency Standards for Residential and Nonresidential Buildings (also known as Title 24 Energy Standards) in 120 days, and it was able to do it in 119 days! At the same time, California's IOUs worked with the CEC to develop these new upgrades in standards and codes.
In 2001, the Express Efficiency Program provided standard rebates to small commercial customers, contractors, and ESPs for installation of energy-efficient equipment. This was a statewide program implemented by California's IOUs, with differences to reflect different service territory needs. Under the Summer Initiative program, the CPUC allowed rebate amounts to be increased for measures that provided high peak demand reduction impacts.
In 2001, California's IOUs implemented a statewide coordinated rebate program for residential customers. This program provided customers with financial incentives for the purchase and installation of qualifying energy-efficient heating and cooling equipment, refrigerators, attic and wall insulation, windows, and other measures. Due to the energy crisis, customers' high bills, and aggressive promotional efforts, purchases of ENERGY STAR-qualified refrigerators, dishwashers, and clothes washers set all-time program record highs.
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. While initially conceived as strictly a load control program to address summer 2001 reliability concerns, NYSERDA expanded the program scope to include measures that achieve permanent reductions in demand through energy efficiency improvements.
Residential customers received a $75 payment when they surrendered an old room air conditioner and purchased a new ENERGY STAR model. Participating retailers acted as drop-off sites for the old units, which are regularly collected for deconstruction and recycling. The program was offered jointly by NYSERDA, the New York Power Authority, and the Long Island Power Authority. The program was offered in 2000, but had limited participation and impact. Many changes were made for the 2001 program in order to increase participation and impact to respond to reliability concerns. Changes included more marketing and recruitment of participating retailers.
This is regional turn-key program and buyers' cooperative for the "VendingMi$er" -- a device installed on beverage vending machines that cycles the units off when not in use, periodically repowering them automatically to keep the product cold. The program is designed to secure favorable volume prices for procurement and installation of these devices. Bayview Technology is the manufacturer and supplier. Installations are accomplished through soft drink distributors and bottlers by specially trained installation teams. Utilities may choose other means for installation, which only takes about 15 minutes. Initial program concept first proposed in 2000, but rejected. Proposal reconsidered and adopted to address summer 2001 reliability concerns.
The program promotes and provides incentives for increased sales of ENERGY STAR-rated homes. Reliant Energy-HL&P pays participating aggregators of ENERGY STAR homes an incentive that is based on a bid submitted earlier in 2001 for each certified ENERGY STAR home built. Program funds are also used to foster consumer awareness of and demand for ENERGY STAR homes through an expansive consumer outreach campaign. Program design is one of PUC-approved "templates" to address efficiency and reliability in conjunction with state's restructuring.
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. Program incentives are directed upstream to distributors rather than downstream to individual dealers, contractors, or consumers. Participating distributors are paid a fixed incentive ($80/ton) upon submitting the required paperwork for eligible systems installed. The program requires Manual J load sizing calculations and matched systems. Program design is one of PUC's approved templates to address efficiency and reliability in conjunction with state's restructuring.
PowerForward 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. Besides message alerts (green, yellow or red -- depending on system status) provided through the media, a PowerForward website provides information to consumers on practical, voluntary and low- or no-cost measures that individuals and businesses can take to reduce non-essential electricity use at times of high system alert.
The 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. It includes a major statewide public education effort to reach all Californians about the energy situation and what customers can do to help, as well as what resources are available to help Californians save money and keep conserving. The message is, "Thank you for conserving and committing to do as much as you can."
The 20/20 and 10/10 programs offer customers credits for reducing energy use relative to the same period the previous year. PacifiCorp offered both 10/10 and 20/20 options under its "Customer Energy Challenge." California's IOUs offered only the 20/20 option. Customers reducing their use by 20% received a 20% credit on their bills; customers who reduced their use by 10% received a 10% credit. Programs were conceived and designed to generate a quick and effective response to summer 2001 reliability problems.
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.
The normal C&I rebate program was modified to respond to unprecedented wholesale price increases and reliability concerns in 2001. A 10% "signing bonus" was 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.