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Analysis of Successful Demand-Side Management at Publicly Owned Utilities

Ted Flanigan
Stan Hadley

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ANALYSIS OF SUCCESSFUL DEMAND-SIDE MANAGEMENT AT PUBLICLY OWNED UTILITIES

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August, 1994

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ATTRIBUTES OF DSM PROGRAM SUCCESS	Austin	Burlington	Sacramento	Seattle	Waverly
High rates	Not true	True	Partly true	Not true	Partly true
Economic factors	True	True	True	Not true	True
Heightened environmental awareness	True	True	Not true	True	Not true
State emphasis on IRP/DSM	Not true	Partly true	True	True	Partly true
Local political support	True	True	True	True	True
Large-sized utilities	True	Partly true	True	True	Not true
Presence of a champion	Partly true	Partly true	True	True	True

True = ■ Partly true = ▒ Not true = □

SUMMARY

There are 2,017 publicly owned utilities in the United States that provide electricity to approximately 16 million customers nationally, or 14% of the country's 113 million utility customers. According to data prepared by the U.S. Department of Energy, only 20% of these utilities operated demand-side management (DSM) programs in 1992. Because of the large number without DSM programs, we thought it might be worthwhile to understand some of the factors that have caused DSM programs to be developed at those utilities that have excelled in its implementation.

This report is fundamentally based on five case studies of publicly owned utilities that have had marked success with demand-side management. IRT Environment staff visited Austin, Texas; Burlington, Vermont; Sacramento, California; Seattle, Washington; and Waverly, Iowa to try and uncover the ingredients that led to each city's success with DSM.

In Austin, a nuclear plant settlement originally funded what has now become one of the nation's leading publicly owned utility DSM programs. Burlington Electric Department has had success with DSM bolstered by a progressive political environment with a focus on social programs. Sacramento Municipal Utility District (SMUD) is a case study of a significant utility turnaround. Because of problems at its Rancho Seco nuclear power plant, SMUD was forced to raise rates several times and was suffering from a lack of public confidence and a demoralized staff. By investing in demand-side management, SMUD was transformed in a matter of five years and has become a national DSM leader and a prominent promoter of renewable energy resources. Seattle City Light shows that utilities can effectively offer DSM services in regions characterized by low power rates. The case study of Waverly Light and Power demonstrates what an average-sized publicly owned utility can accomplish with limited staff and resources.

In an attempt to uncover any requirements for successful DSM, a set of indicators were identified that seemed to be conducive to the success of DSM programs. On the opposite page is a matrix showing the seven attributes and the utilities to which they applied. Local political support appeared important to all of the utilities, but as the report presents, this support can come from a variety of means. Other attributes identified were important at only some of the utilities. High rates, a variety of economic drivers, environmental awareness, state emphasis, large-sized utilities, and internal champions were all recognized as helpful, but not necessary, ingredients to successful DSM programs.

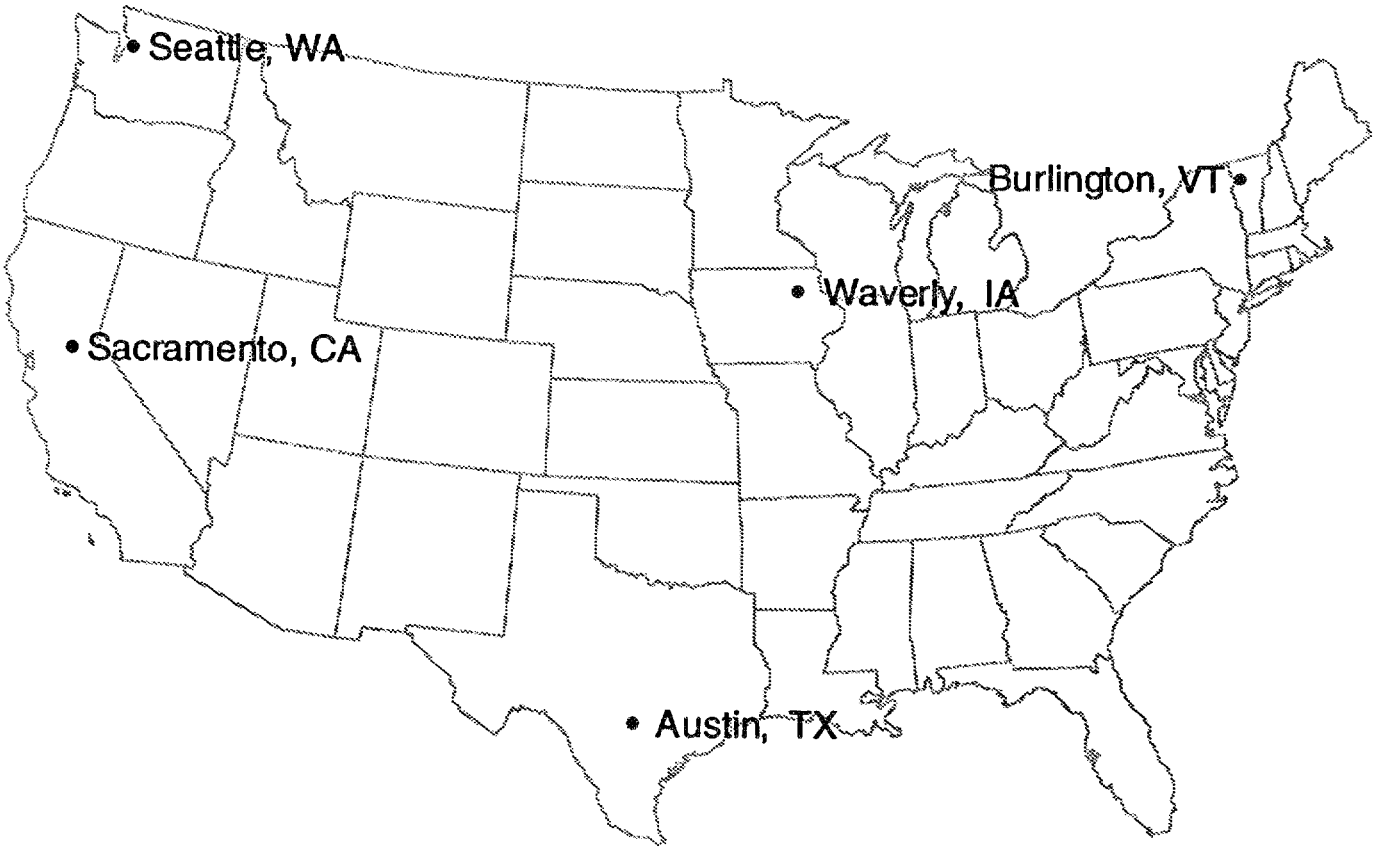
The main finding of this report is that no specific set of prerequisites are necessary for effective DSM programs. Based on this result, the opportunity exists for many other publicly owned utilities across the country to develop successful DSM programs for the benefit of their communities. It is hoped that through the examples set by these case studies, other utilities may identify the attributes they currently have or could develop in order to succeed with their own DSM programs.

CONVENTIONS & ACRONYMS

All dollar figures presented in this report reflect nominal dollars (unlevelized) for the years reflected. Annual savings refer to the annualized values of increments of energy and capacity installed in a given year (the first full year effect of the measures installed in a given year). Cumulative savings represent the savings in a given year for all measures installed to date by the program.

AC	Air Conditioning
APPA	American Public Power Association
BPA	Bonneville Power Administration
BED	Burlington Electric Department
CEC	California Energy Commission
C&I	Commercial and Industrial (customers)
DSM	Demand-side management
EIA	Energy Information Administration
EMSD	Seattle's Energy Management Services Division
ESD	Austin's Energy Services Department
EV	Electric vehicle
FTE	Full-time equivalent
GM	General Manager
GWh	Gigawatt-hour
HVAC	Heating, Ventilating, and Air Conditioning
IOU	Investor-owned utility
IRP	Integrated resource planning
ORNL	Oak Ridge National Laboratory
MW	Megawatt
POU	Publicly owned utility
SCL	Seattle City Light
SMUD	Sacramento Municipal Utility District
STP	South Texas Project (nuclear complex)
TRC	Total Resource Cost test
WLP	Waverly Light and Power
WPPSS	Washington Public Power Supply System

LOCATION OF THE FIVE CASE STUDIES



INTRODUCTION

The primary purpose of this report is to present an analysis of case studies of publicly owned utilities that have made cost effective investments in demand-side management (DSM) and which have had marked success to date[1]. Through this analysis we hope to determine some of the factors that have contributed to their success in order to help identify other utilities which may be strong candidates for future DSM program development.

While many investor-owned utilities have not yet implemented DSM programs and thus also have the occasion to exploit this resource option, public power utilities appear to have an exceptional opportunity based on their charters. Publicly owned utilities can focus first and foremost on their customers, who are in fact their owners. This clear link between utility benefit and customer benefit presents itself as an opportunity for publicly owned utilities.

To carry out the scope of this project, IRT Environment staff first sought to identify publicly owned utilities that have had success with DSM. To that end, IRT Environment conferred with staff at Oak Ridge National Laboratory and at the American Public Power Association, and conducted a limited number of telephone calls to leading public power officials seeking "clear winner" programs. Rather than a scientific exercise with specific selection criteria, final selection was instead based on utilities' reputations with demand-side management. From a list of two dozen utilities, five utilities were chosen.

IRT Environment then visited each utility for two days during the fall and winter of 1993-1994. At each utility carefully planned visits resulted in comprehensive meetings with DSM program staff, including planners, implementers, evaluators, and senior management. Field visits were conducted in each city as well, providing an important complement to extensive meetings at the utilities' headquarters. In addition to formal interviews at each utility an effort was made to interact informally with utility personnel. These meetings added greatly to IRT Environment's understanding of the political and social forces at work in each community.

While IRT Environment focused on the site visits and exemplary DSM programs at publicly owned utilities, Oak Ridge National Laboratory prepared an analysis of average conditions related to DSM at publicly owned utilities. Using the Energy Information Administration's EIA-861 database described later in the report, ORNL provided a snapshot of the state of DSM at the nation's publicly owned utilities. In addition, ORNL research in the Southeast uncovered some of the key barriers to DSM faced by these utilities.

---

[1] "Demand-side management refers to utility-led programs intended to affect the timing or amount of customer electricity use. These include energy efficiency programs aimed at reducing the energy needed to serve customer needs and programs that shift electricity demand to reduce peak loads or to make more economic use of utility resources." U.S. Congress, Office of Technology Assessment, *Energy Efficiency: Challenges and Opportunities for Electric Utilities*, OTA-E-561 (Washington, DC: U.S. Government Printing Office, September 1993), p2.

THE STATUS OF DEMAND-SIDE MANAGEMENT IN THE UNITED STATES

A) THE STRUCTURE OF THE U.S. ELECTRIC UTILITY INDUSTRY

Before presenting data to illustrate the status of DSM in the United States as a whole, and the differences between investor-owned and publicly owned utilities, a quick review of the structure of the U.S. electric utility industry is in order.

There are four basic types of utilities in the United States: publicly owned utilities, investor-owned utilities, federal power marketing agencies, and rural electric cooperatives. This report focuses on publicly owned utilities including state and municipal utilities. Of the 3,232 total utilities in the United States, fully 62% or 2,017 are publicly owned.[2] Publicly owned utilities, however, sold only 14% of the total electricity and earned only 13% of the total income. Investor-owned utilities, on the other hand, are few in number but sell three-quarters of the energy and earn nearly four-fifths of the total revenues. In 1992, all utilities in the United States combined to sell 2,763 TWh of electricity for a grand total of $188.5 billion. Publicly owned utilities sold 386.8 TWh of the total and earned revenues of $24.44 billion.[3]

U.S. ELECTRIC UTILITY INDUSTRY IN 1992	Number of Utilities / Percentage		TWh Sold / Percentage		Revenue in Billions / Percentage	
Investor-owned utilities	262	8%	2,099.9	76%	$148.52	79%
Publicly owned utilities	2,017	62%	386.8	14%	$24.44	13%
Federal power agencies	10	1%	221.04	8%	$13.16	7%
Rural electric coops	943	29%	55.2	2%	$1.88	1%
Totals	3,232	100%	2,763	100%	$188.50	100%

[2] Several sources provide conflicting information on the number of publicly owned utilities. While EIA-861 claims 2,056, APPA claims 2,029, and in other documents EIA claims 2,017, the number presented herein for 1992.

[3] Energy Information Administration, *Electric Power Annual 1992*, DOE/EIA-0348(92), (Washington, DC: U.S. Government Printing Office, January 1994).

B) THE NATIONAL IMPACTS OF DEMAND-SIDE MANAGEMENT

Since the onset of demand-side management some 15 years ago (beginning with the federally mandated Residential Conservation Service) DSM has evolved dramatically. There are thousands of DSM programs today and spending on DSM nationally has increased proportionately.[4] The number of programs is impressive and yet only 55% of IOUs have planned or currently active DSM programs and only 20% of publicly owned utilities have programs. However, the 20% of publicly owned utilities sell almost 60% of the electricity sold by publicly owned utilities. Despite this, DSM's overall impacts have been relatively small. Energy savings from 1992 DSM programs nationally represented just over one percent of energy sales. These figures suggest large potentials for other utilities' entries into DSM.

1992 DSM PROGRAMS & SAVINGS DATA	# with DSM Programs	% with DSM Programs	Energy Savings	Capacity Savings
Investor-owned utilities	142	55%	1.1%	5.3%
Publicly owned utilities	401	19.5%	1.2%	9.9%

Data from 1992 shows total savings of 31,800 GWh and potential peak demand savings of 32,900 MW, equivalent to 1.2% of national electricity use and 6.0% of peak demand. Private utilities saved 1.1% of total sales through energy efficiency programs or 24,000 GWh, while public utilities saved 1.2% or 7,800 GWh. Peak demand savings, which are largely the result of load management programs, were more significant as private utilities saved 5.3% of peak demand and publics saved 9.9%. Despite the fact that publics outstripped private utilities in terms of both energy and demand savings, the public utilities did so at less overall cost in terms of a percentage of gross revenues. Private utilities spent 1.4% of their total revenues on DSM, while public utilities spent only 0.9%.[5]

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[4] Electric Power Research Institute, *1992 Survey of Utility Demand-Side Management Programs*, prepared by Plexus Research and Scientific Communications, TR-102193, Volumes 1 & 2, May 1993; Electric Power Research Institute, *Principles and Practice of Demand-Side Management*, prepared by Barakat & Chamberlin, Inc., EPRI TR-102556s, August 1993; President's Commission on Environmental Quality, *Energy Efficiency Resource Directory: A Guide to Utility Programs*, prepared by Barakat and Chamberlin, September 1992.

[5] Hirst, Eric, *Costs and Effects of Electric-Utility DSM Programs: 1989 through 1997*, Oak Ridge National Laboratory, ORNL/CON-392, 1994.

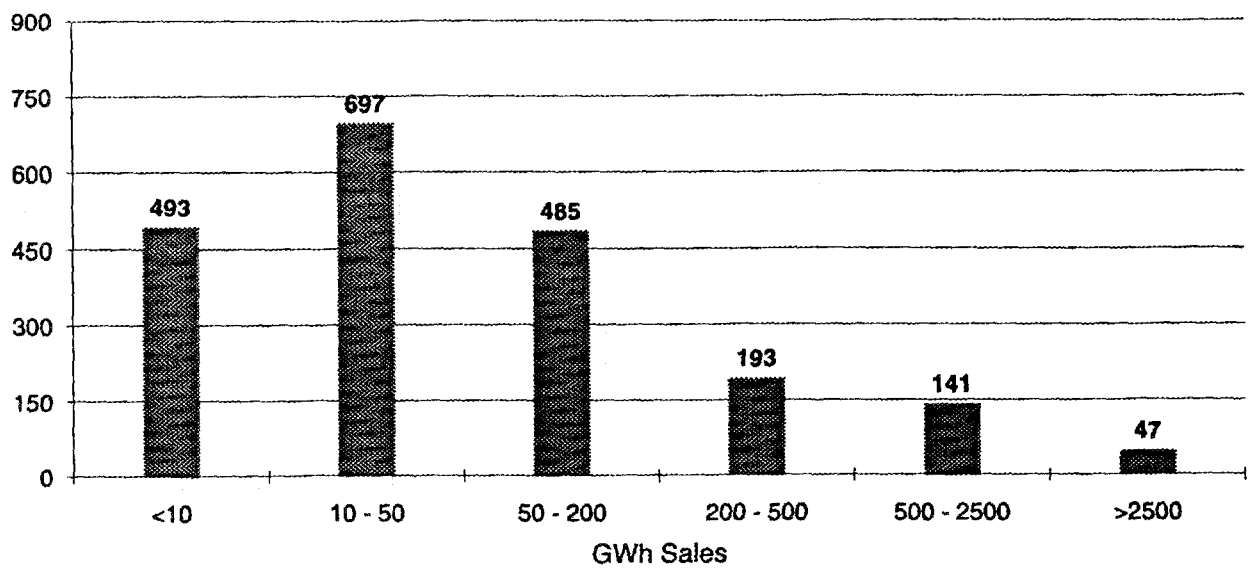
THE STATUS OF DSM AT PUBLICLY OWNED UTILITIES

A) PUBLICLY OWNED UTILITIES IN FOCUS

Publicly owned electric utilities are nonprofit local government agencies established to serve their communities and nearby consumers at cost, returning excess funds to the consumer in the form of community contributions, economic and efficient facilities, and lower rates. Publicly owned utilities include municipal utilities, public power districts, state authorities, irrigation districts, and other state organizations.[6] Federal utilities and electric cooperatives are not included in this study.

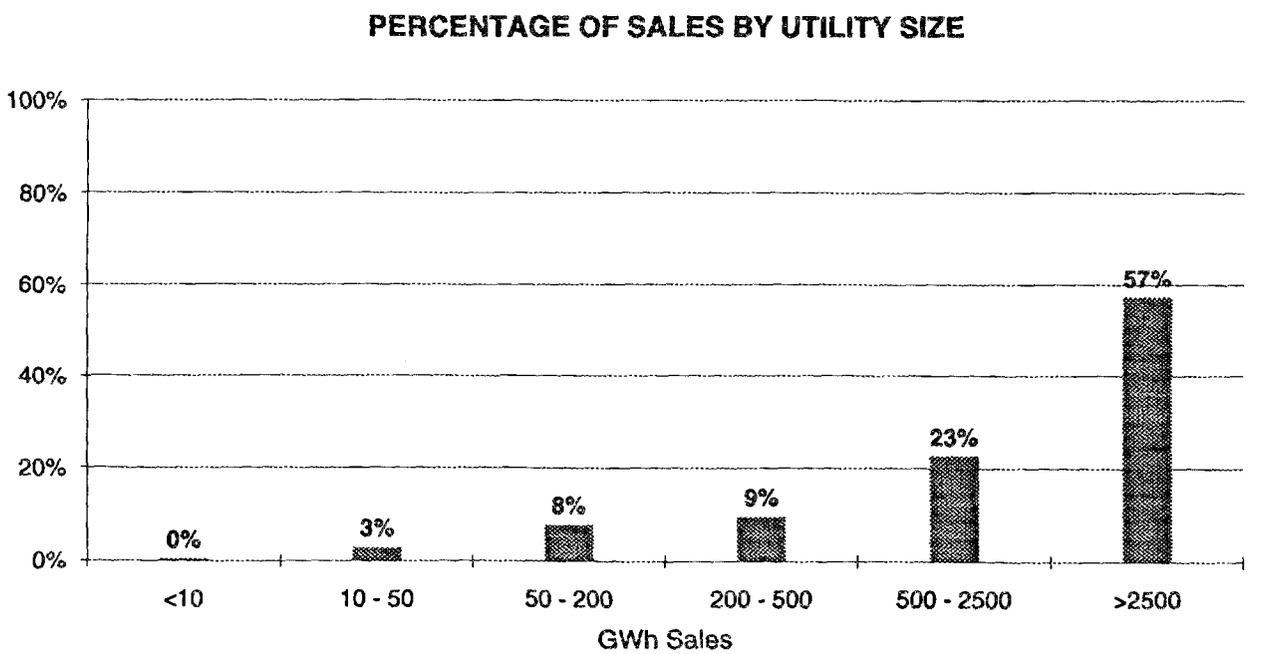
There are 2,017 public power agencies in the United States, about ten times as many as the investor-owned utilities, and most of these are very small. Of these publicly owned utilities, almost 1,700 sell less than 200 GWh, equivalent to an average load of less than 25 MW. Many of these serve towns or small districts and have average annual revenues of $2.5 million.

NUMBER OF PUBLICLY OWNED UTILITIES BY SIZE



[6] Energy Information Administration, *Electric Power Annual 1992*, DOE/EIA-0348(92), (Washington, DC: U.S. Government Printing Office, January 1994).

Despite the large number of relatively small publicly owned utilities, most of the electricity is generated and sold by the largest publicly owned utilities. Over 57% of the electricity is sold by the top 2% of utilities in size. These have average sales of almost 8,000 GWh representing an average annual demand of almost 900 MW and an average annual revenue of $395 million. They include those that serve some of the larger cities in the United States such as Los Angeles, Seattle, Memphis, and San Antonio; state-owned agencies that wholesale power to other utilities such as the New York Power Authority; and coalitions of municipal utilities that jointly own and operate large generating plants.



The next smaller grouping of utilities (those with sales between 500 and 2,500 GWh) represent 7% of the market and account for another 23% of sales. These include smaller cities and other political entities across the country. However, their average annual revenue is over $56 million.

B) DSM AT PUBLICLY OWNED UTILITIES

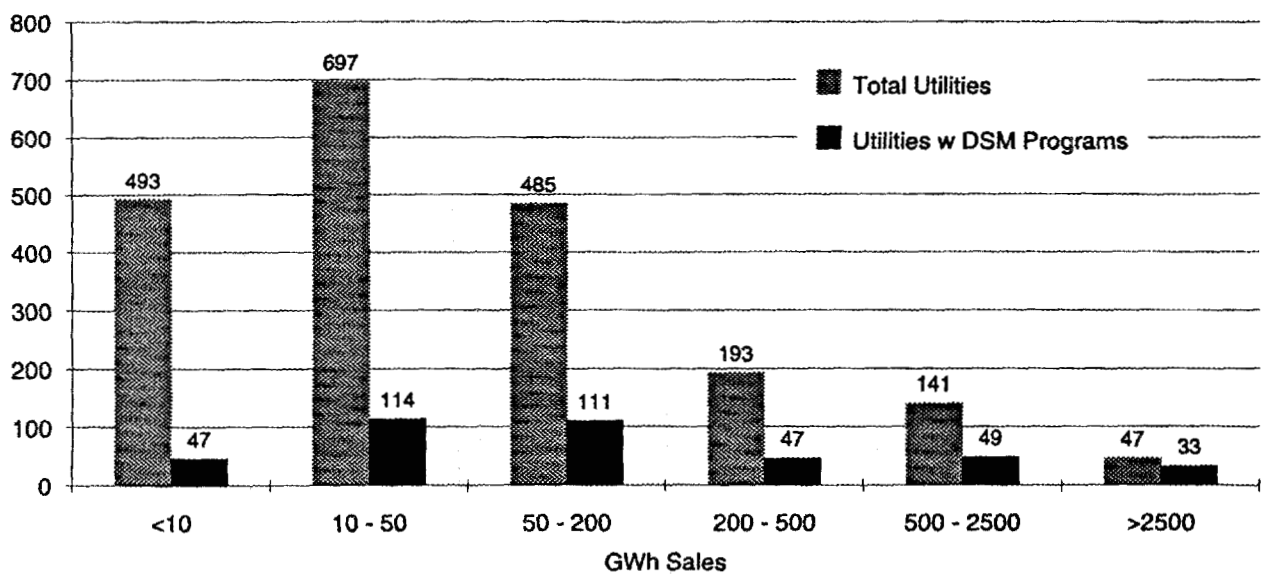
There are two key sources which provide information on the state of DSM at publicly owned utilities. First, each year all utilities that sell more than 120 GWh annually are required to report data to the EIA on Form EIA-861, including information on sales, power generation, number of customers, as well as detailed information on their DSM programs. The latest information available is from 1992 and indicates that 401 publicly owned utilities (or 19.5%) currently have DSM programs. While utilities that sell less than 120 GWh are not required to report their DSM program status, fully 239 of the 401 utilities reporting were these small utilities who reported voluntarily.[7]

[7] Of the 401 utilities reporting DSM activity, only 384 claimed to currently have DSM programs.

Second, in 1991 the American Public Power Association (APPA) surveyed its members regarding DSM.[8] "Demand-Side Management in Public Power: The Quiet Revolution," provides insights into the state of demand-side management at utilities including those which sell less than 120 GWh of power annually. The survey found that 408 publicly owned utilities operate DSM programs. (It was this survey that prompted the EIA to change its Schedule V requirements for 1993 to cover utilities of all sizes.) APPA found that 56% of the utilities with DSM programs, or 227 utilities, use an integrated resource planning process, often providing justification for DSM expenditures through cost effectiveness analysis.

According to the APPA survey the most popular DSM programs run by public power agencies have consistently been energy audits and load management programs. Energy audits provide a time to identify opportunities for efficiency and to promote other programs, such as load management programs that shave peak demand. Load management programs have resulted in impressive participation levels in public power. Utilities with programs report an average 25% participation rate in both air conditioner/heat pump and water heater direct load control programs. APPA found that the average small public power utility is able to cut its peak demand by 21%. These utilities are able to enlist the cooperation of well over 90% of their customers, often completely in the absence of customer incentives.

NUMBER OF PUBLICLY OWNED UTLITIES WITH DSM PROGRAMS



A greater proportion of large publicly owned utilities have DSM programs than small utilities. Fully 70% of the largest utilities have active DSM programs and of the top 20 largest publicly owned utilities, ranked according to sales statistics, only two did not have DSM programs in 1992. APPA's data reinforces the point that the largest public power agencies are active with demand-side management

[8] American Public Power Association, *Demand-Side Management in Public Power: The Quiet Revolution*, January 1992.

and that public power agencies with DSM programs represent 57% of retail electric sales in public power.[9] On the other hand, the APPA survey found little correlation on the percentage of gross revenues spent on DSM by utility size, suggesting that of the survey respondents with DSM programs there is not a strong correlation between the intensity of DSM activity and utility size.

One of the direct effects of utility size relates to the number of staff that can be devoted to DSM. Staff size varies with utility size and has been a key barrier to the implementation of DSM at small utilities. APPA reports that DSM staff sizes range from less than one for utilities with less than 3,000 meters, to about one DSM staff person for utilities with 15,000 customer-meters, to 39 for utilities with greater than 100,000 customer meters. DSM employees at small utilities often have other responsibilities, thus the smallest utilities report a fraction of full-time equivalent devoted to energy management.

The most broad-based support for DSM at publicly owned utilities in any state was in Iowa where 49% of the utilities had DSM programs. A number of other states also have a wide proportion of utilities with programs of some sort. Percent of POUs with DSM Programs by State (p.9), shows that DSM programs were active around the country, with most widespread support (in terms of percentage of utilities) on both coasts and the upper Midwest. Percent of POU Revenues Spent on DSM by State (p.9) adjusts the data for relative spending as a percentage of utility revenue. It shows that the states along the Pacific coast were the most active overall in DSM. Other states with high percentages typically had one or two utilities actively involved with DSM programs with the rest either very small programs or none. Many states had no publicly owned utilities with DSM programs.

According to EIA, Oregon leads with 2.4% of publicly owned utilities' revenues spent on DSM. Washington is next with 2.0% of revenues and California publicly owned utilities spent 1.5% of revenues. In Oregon, of the 17 municipals in the database, seven have DSM programs and five of those seven spent more than 2.5% of revenues. The City of Eugene represented over three-fourths of the total spent on DSM and spent almost 6% of their revenues on DSM.

In Washington, only 11 of the 43 publicly owned utilities in the database reported DSM spending in 1992. However, the three largest utilities, Seattle City Light, Snohomish County PUD, and the City of Tacoma, all reported significant DSM programs. Port Angeles, a medium-sized utility with revenues around $20 million, spent over 5% of revenues on DSM.

By far the most active of California's publicly owned utilities was Sacramento Municipal Utility District (SMUD), which spent over 6% of revenues on DSM. SMUD is profiled in more detail later in this report. Los Angeles and Palo Alto also had relatively large programs spending almost 1.17% and 1.34% of revenues, respectively. The rest of the 50 California publicly owned utilities showed smaller or no DSM programs.

C) TYPES OF DSM PROGRAMS RUN BY PUBLICLY OWNED UTILITIES

In terms of types of programs run by publicly owned utilities, the EIA-861 data separate the effects of DSM program into energy effects (kWh saved), potential peak reduction (kW that can be saved if needed), and actual peak reduction (kW that were saved). Over 95% of the energy saved in the

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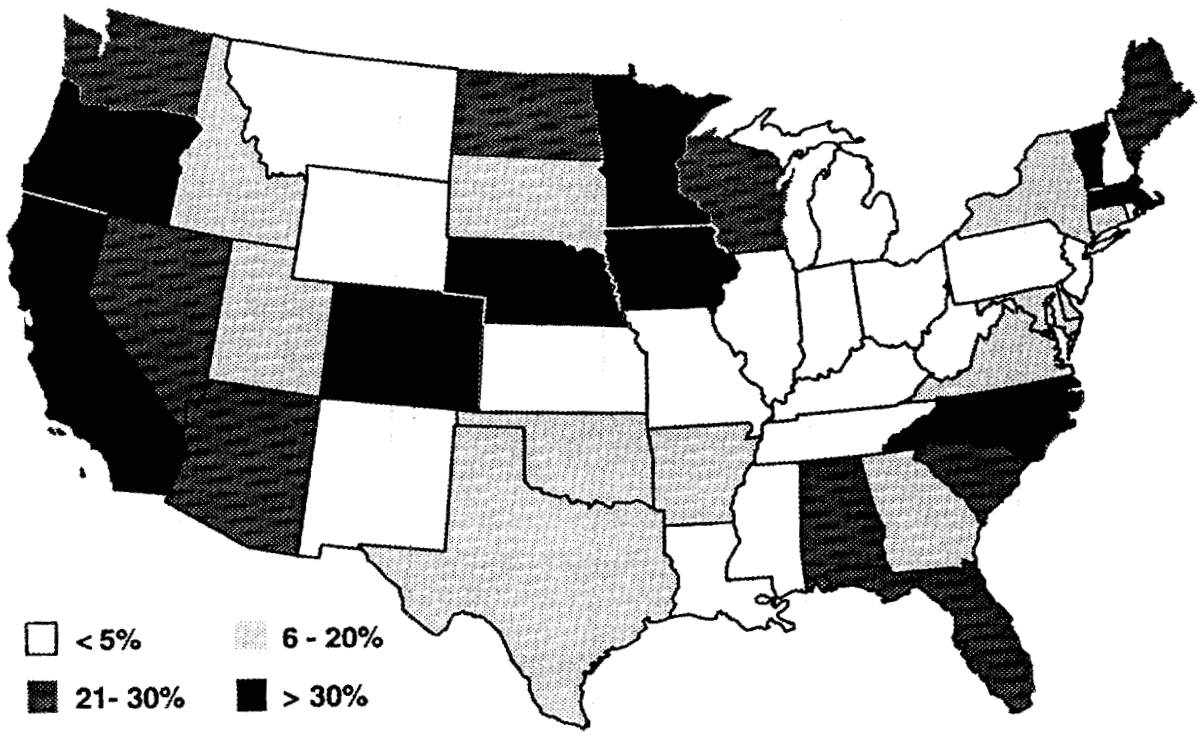
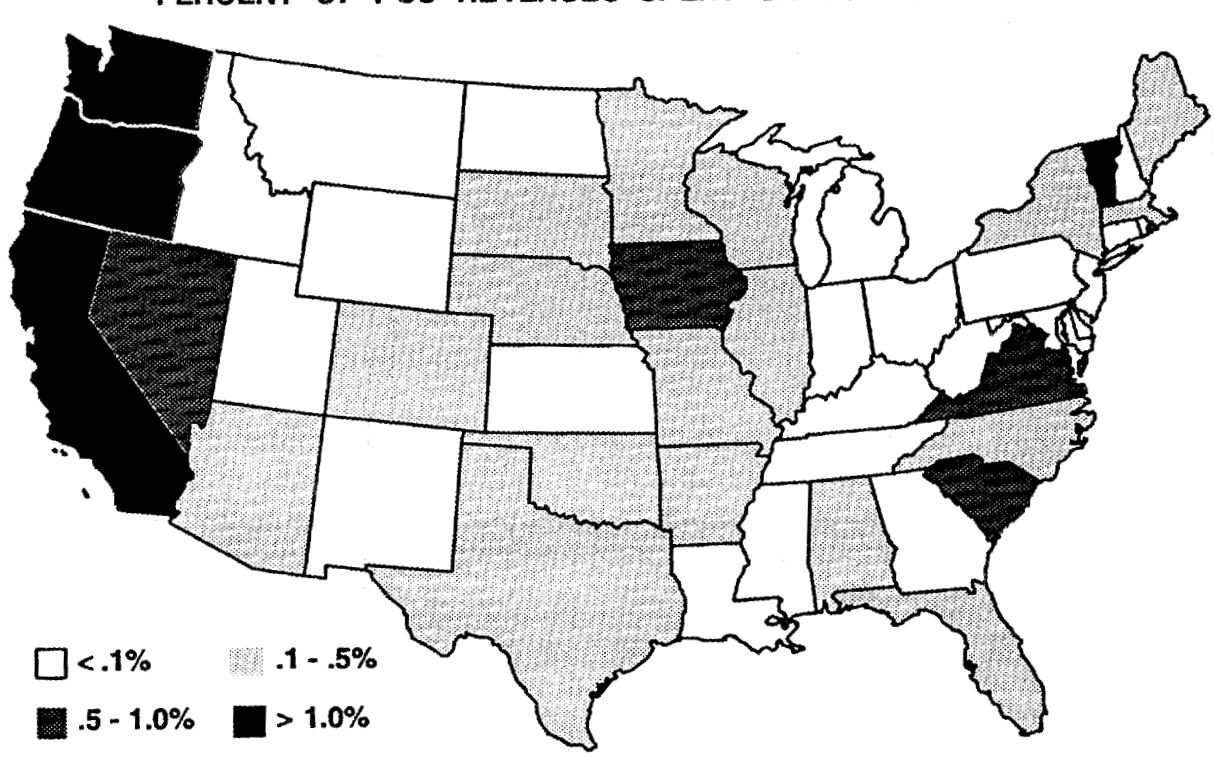
[9] Barry Moline, Manager, Demand-Side Programs, American Public Power Association, personal communication, March 1994.

PERCENT OF POUs WITH DSM PROGRAMS BY STATE



PERCENT OF POU REVENUES SPENT ON DSM BY STATE



residential and commercial sectors of publicly owned utilities has been the result of energy efficiency programs. These include activities such as weatherization, water heater wraps, efficient lighting, and high efficiency appliances.

Capacity savings are a very important aspect of DSM. Over 637 MW were potentially available to publicly owned utilities in 1992 through such programs as direct load control or interruptible loads. Because not all of this reduction was needed, actual peak production was reduced only 548 MW by the reported DSM programs. In the industrial sector, the greatest DSM effect is the result of interruptible load programs and other load management programs. These involve utilities interrupting power to customers who have volunteered for the programs and receive lower electricity prices in return.

The Southeastern Power Administration polled its utility customers in the summer of 1993 as to their DSM programs. They found that the ten most prevalent programs, starting with the most popular programs, were load control devices on appliances, voltage reduction technologies, heat pump programs, high efficiency lighting, street lighting/high efficiency lighting, large system load management, home energy audits, time-of-day rates/interruptible rates, cogeneration, and new construction.[10]

These represent a mixture of energy-efficiency programs and load reduction programs, with the latter being the most used. The first two on the list are used to reduce load during peak periods; the third reduces energy use, but especially during times of peak load (air-conditioning or heating). As one utility has stated, utilities are mainly looking at peak reduction but are also concerned about energy use. For many programs these two go "hand-in-hand."

FIVE CASE STUDIES OVERVIEW (1992 DATA)	Number of Customers	Generating Capacity (MW)	Engergy Sales (GWh)	Rank Among POUs
1. Austin	276,000	2,420	7,129	17
2. Burlington	18,000	90	329	206
3. Sacramento	468,671	2,155	8,471	14
4. Seattle	333,000	1,974	8,762	12
5. Waverly	3,870	29	86	605

ORNL contacted a number of publicly owned utilities in the Southeast to determine the reasoning behind the existence or lack of a DSM program. Those with DSM programs gave reasons such as the high cost of additional power from their suppliers, customer support, and encouragement from their governing boards such as the city council. Those without programs often mentioned the difficulty of limited staff resources, insufficient expertise, lack of customer interest, and little push from public

[10] Bill Stewart, Southeastern Power Administration, personal communication, January 1994.

officials. Many publicly owned utilities are very concerned with controlling rates and the adverse rate impact of many DSM programs cause some aversion.

The following section of this report presents five case studies of publicly owned utilities that have had marked success with demand-side management. They range from very large utilities with significant amounts of generation capability to a small utility that is very typical in size to most of the publicly owned utilities and which purchases most of its energy and capacity.

Seattle City Light, Sacramento Municipal Utility District, and the city of Austin's Environmental and Conservation Services Department all are in the largest of the six blocks (>2500 GWh) shown in Number of Publicly Owned Utilities by Size (p.5). These utilities are ranked numbers 12, 14, and 17 respectively in terms of the largest public power agencies in the United States. Burlington Electric Department is in the fourth of the six blocks (200-500 GWh) and is the 206th largest publicly owned utility in the country. Waverly Light and Power is in the third block (50-200 GWh) and is 605th largest public power agency in the United States. Each of these public power agencies has different drivers and rationale for their DSM programs and tips on how they have made their programs a success. Their case studies are in the next chapter followed by the concluding analysis.

SUCCESSFUL PUBLICLY OWNED UTILITY CASE STUDIES WITH DSM

A. AUSTIN, TEXAS

Background

While there are several factors that keep demand-side management strong in Austin, it was the lawsuit settlement over the South Texas Nuclear Plant (STP) with $60 million earmarked for energy conservation programs that started energy efficiency there in 1986. DSM continues today for a number of reasons including the key role that has been carried out by Mike Myers, Director of Austin's Energy Services Division (ESD) and his staff, the high education level of the people of Austin, their basic support for energy efficiency as a resource option, and the resulting political support of the Austin City Council.

The most unusual aspect of Austin's success with energy efficiency is that its DSM activities have not been conducted by the municipal utility. Instead all DSM initiatives have been the responsibility of another City agency, the Environmental and Conservation Services Department and its Energy Services Division (ESD). This split was originally made because the public was concerned that the utility would not pursue DSM aggressively.

By now, energy efficiency has become institutionalized in Austin. The ESD staff has developed a strong rapport with many different groups in the community who support the ongoing initiatives with

AUSTIN 1993 STATISTICS

		Reserve Margin	53%
Number of Customers	291,785	**Average Electric Rates**	
Electric Revenues	$474.3 Million	Residential	7.29 ¢/kWh
Energy Sales	6,967 GWh	Commercial	6.86 ¢/kWh
Peak Demand	1,581 MW	Industrial	5.39 ¢/kWh
Generating Capacity	2,420 MW	Government	6.11 ¢/kWh

energy efficiency and even "green building" for sustainability. Thus DSM has been driven not only by the Energy Services Division, but by ongoing political support that has resulted from the favorable attitude of the voters towards energy efficiency.

Austin, located in southeast central Texas, is the State's capitol, strongly influencing its social fabric. Federal, state, and local governments provide 27.8% of Austin jobs. State government is the single largest employer in Austin with more than 20,000 employees at the University of Texas alone. Austin has a highly-educated population and with 32% of its total labor force having 16 or more years of education, Austin ranks number one in this respect nationally for cities of more than 250,000.

Austin had a population of 476,908 in 1993. Major high-tech companies in the area include IBM, Texas Instruments, Motorola, and Dell Computer. Although high-tech manufacturing is considered to be the catalyst for future growth in Austin, government positions have historically been the stabilizing factor in local employment.

In 1993, The City of Austin Electric Utility sold power to 291,785 customers and earned revenues of $474.3 million. The utility's service territory encompasses 184 square miles within the City of Austin and 237 square miles of surrounding Travis and Williamson Counties. In 1993 the average rate for residential customers was 7.29 ¢/kWh, 6.86 ¢/kWh for commercial customers, and 5.39 ¢/kWh for industrial customers.

Peak demand for 1993 was 1,581 MW and Austin's capacity was 2,420 MW, creating a reserve margin of 53%. This reserve margin has decreased to 28% due to the February 1993 closure of the STP nuclear plant. (The City is a 16% owner in the South Texas Project, a nuclear plant that previously provided 400 MW of capacity to Austin but has yet to reopen.) In 1993, the Electric Utility sold 6,967 GWh of electricity with sales for 1993 down by 2.3% from 1992. From 1986 through 1992 the utility's annual growth rate in terms of energy sales has ranged from a high of 5.5% in 1986 to a low of 1.4% in 1987.

All of Austin's electricity comes from utility plants at least partially owned by the City. The City is a 50% owner in the Fayette Power project, a coal-fired plant which provides 570 MW of capacity. The Decker Power Station is also a gas-fired plant with 910 MW of capacity. The City also has a 300 kW photovoltaic installation at the Decker station.

The City's Holly Street Power Plant is a gas-fired plant with oil backup that currently provides 540 MW of capacity but which has drawn the ire of nearby residents. They want to close and permanently decommission the plant because of its downtown location and proximity to neighborhoods. The City has issued a request for proposals for 300 MW of capacity. If this much capacity can be cost effectively supplied, the Holly Street plant may be closed, leaving the Electric Utility with a still-respectable 20% reserve margin.

Incorporated in 1839, Austin operates under a Council-Manager form of government with the City Council appointing the City Manager who is the chief administrator and executive officer of the City. The City Council consists of a Mayor and six council members elected for three-year, staggered terms. The City Council is the direct governing body for the utility and its DSM branch located separately within the Energy Services Division. The City Manager's duties include the supervision of all City departments.

Austin's residents are keenly involved in political issues and environmental issues in particular, ranging from air quality to water to land use. There are also many non-profit groups in the area

including Greenpeace and other citizen action and ratepayer groups. The Sierra Club is perhaps the strongest of the local environmental action groups.

The History of Demand-Side Management

In December 1973, the City of Austin was admitted to the South Texas Nuclear Project (STP) with a 16% ownership share. Other project participants were Houston Lighting and Power Company, City Public Service of San Antonio, and Central Power and Light Company. The goal of the project was to license, construct, and operate two 1,250 MW nuclear generating units. There was much debate as to whether Austin should participate in STP. Although the public was opposed the City Council voted to participate. The City viewed the plant as a cheap, long term, reliable source of energy. Both units became operational by June 1989.

In December 1981, project participants filed suit against Brown & Root, the firm responsible for building the twin reactors at the plant. The suit charged Brown & Root with substandard work and breach of contract. A settlement was reached in December 1985 and Austin's share of the settlement was $120 million to be paid over a seven-year period. Austin's City Council designated $60 million of these proceeds to be used to fund Austin's energy conservation programs which would be located in Austin's Environmental and Conservation Services Department, Energy Services Division (ESD). ESD began its operations in 1986. (The other $60 million from the lawsuit was earmarked for utility debt relief.)

Concurrently, in November 1981, the citizens of Austin authorized City Council to sell its interest in STP. Austin has been trying to sell its share in the plant ever since but has been unable to do so. STP was temporarily shut down in 1993 due to a poor operating schedule and may never reopen.

Through 1991 the settlement was the sole funding for Austin's energy efficiency efforts. Then in 1992 the City Council decided to use the remaining unbudgeted funds ($30 million) which had previously been earmarked to fund energy conservation programs, to buy-down the utility's outstanding bond

AUSTIN DSM PROGRAMS

Residential

Energy Audits
Appliance Efficiency Program (AEP)
Whole House Rebates
Home Energy Loan
Free Home Weatherization
Multi Family Audits / Rebates
Green Builder / Energy Star Rating
Trees For Energy

Residential Gas

Gas Water Heater Wraps
Furnace Rebates
Free Home Weatherization
Combo Heater Rebates
Space Heater Replacements
Natural Gas Vehicle Rebates

Commercial

Commercial Energy Mgmnt. Partnership (CEMP) - Audits / Menu Rebates
New Construction
Gas Technologies

debt. The Council then required the Electric Utility to fund energy efficiency programs carried out by the ESD. Thus conservation funding is now secured through the utility's electric rates which provide about $11 million annually for energy efficiency programs. (The current Council-approved goal for the ESD is to save approximately 270 MW between 1994 and 2002, or approximately 30 MW annually on top of the possible 300 MW replacement capacity from both demand and supply-side resources related to the Holly Street plant. The proposed budget for FY 1995 is approximately $15 million, with a goal to save 40 MW.) Without the jumpstart of funding from the STP settlement, however, it is very unlikely that Austin would have been able to implement the scale of DSM programs that it has.

The Current Status of Demand-Side Management

Austin is clearly at a nexus in terms of resource planning. Although its utility presently has a large reserve margin, there are several wild card issues which threaten this security and which in turn bolster the importance of DSM as a resource. Austin's reserve margin could diminish rapidly and completely in the next few years for two reasons: First, the South Texas Project may continue to have operating delays or problems lessening if not eliminating Austin's 400 MW share of the plants' output. Second, the possible accelerated closure of the Holly Street plant could strip another 540 MW of capacity from Austin. If these two scenarios occurred concurrently, Austin's reserve margin could shrink to essentially zero in a matter of years. Another factor relates to a downtown transmission bottleneck. The 69 kV transmission line serving the inner city is overburdened, a situation that must be rectified by increasing transmission capacity or reducing demand.

AUSTIN DSM OVERVIEW	Annual DSM Expenditure (x1000)	Annual Capacity Savings (MW)
1986	$4,140	20.84
1987	$4,959	13.27
1988	$5,295	12.90
1989	$4,139	11.69
1990	$4,990	21.61
1991	$6,441	26.56
1992	$8,800	19.12
1993	$9,500	23.04
Total	$48,264	149.03

Given these factors which jointly or independently will dramatically impact Austin's resource scenario, the City has begun its first integrated resource planning process. Integrated resource planning in Austin is a joint responsibility of the Electric Utility and the ESD. This collaboration is performed through a committee with representatives of the Energy Services Division's Evaluation Group and the

Electric Department. To date there have been few conflicts, largely due to the fact that City Council has passed the resolution mentioned above which is explicit about the City's long-term energy savings goals. The first IRP was intended to be completed by the end of 1993 but a great deal of staff time was required to deal with the potential closing of the Holly Street plant, so the completion date has been delayed.

Until recently program evaluation focused on peak demand savings only. Now Austin can get emissions credits for avoided sulfur dioxide emissions from U.S. Environmental Protection Agency (a provision enabled by the Clean Air Act Amendments of 1990), perking Austin's interest in documenting energy savings. In fact, Austin was the first municipal utility in the United States to get emissions credits from the EPA and one of the first five of all utilities in the country to do so. The current IRP incorporates energy savings into the planning equation, tying in well with the City Council's overriding objectives for DSM which include avoiding additional capacity needs; promoting economic development through energy efficiency; providing environmental protection; and ensuring equity among customer classes.

B. BURLINGTON, VERMONT

Background

At Burlington Electric Department several key ingredients have come together to support a strong energy efficiency program. Burlington, a progressive community with interest and involvement in energy efficiency dating back to the oil crises of the 1970s, has evolved into a leader among municipal utilities with regard to IRP and DSM due to a combination of factors. These include the election of progressive politicians beginning in the early 1980s, community support of utility DSM programs expressed through bond issue approvals, the high priority that the utility has placed on energy conservation since the early 1980s due to its view of customers as "consumer-owners," major power supply contracts that expire within ten years, and the high incidence of electric heat in the residential rental sector.

Burlington Electric Department (BED) serves the City of Burlington, Vermont (population 38,700 including 8,000 students) covering a service area of approximately ten square miles. The utility, with 160 employees has more than 18,000 customers of which about 15,000 are residential customers, 2,900 are small commercial customers, and 700 are large commercial and industrial customers.

BURLINGTON 1993 STATISTICS

		Generating Capacity	90 MW
Number of Customers	18,000	Reserve Margin	51 %
Number of Employees	160	**Average Electric Rates**	
Electric Revenues	$32 Million	Residential	8.81 ¢/kWh
Energy Sales	329 GWh	Small Commercial	13.50 ¢/kWh
Winter Peak Demand	60 MW	Large C&I	6.94 ¢/kWh

In terms of Burlington's electricity growth rate, BED energy sales increased 1.9% from 323 GWh to 329 GWh from 1992 to 1993. For 1993 BED had gross electric revenues of about $32 million. Based on total capacity of 90 MW (including purchases) and a winter peak demand of 59.5 MW, the utility has a reserve margin of 51%. Of the 90 MW available to BED, approximately 50 MW is owned by BED with 23.9 MW from the Burlington gas turbine plant and 26.5 MW from the McNeil wood-chip fired plant. The 50 MW McNeil plant operated by Burlington Electric Department is one of the largest wood-fired generating stations in the world.

In 1993, BED sold 90 GWh to the residential sector, 19.5 GWh to small commercial customers, 216.4 GWh to large commercial and industrial customers, and 2.7 GWh went to street lighting. These total over 328.5 GWh. Residential sales decreased 1.9% and small commercial sales decreased 0.65% from 1992 to 1993, while C&I and street lighting increased 3.9% and 0.82% respectively. The net effect was an increase in kWh sales of 1.9%. The net growth rate has decreased roughly 1%, due mainly to the economy, weather, and DSM. Small commercial customers pay the highest rate for electricity at 13.5¢/kWh. Large C&I customer rates are 6.9¢/kWh while residential customer rates are 8.8¢/kWh. Rates have increased 18% over the past four years, after remaining stable for the six years prior, and no increase is projected for the next few years.

Unlike many municipal utilities, BED is regulated at the state level as well as the local level with both the Vermont Public Service Board (PSB) and Burlington's Board of Electric Commissioners establishing policies and guidelines for utility operations. The PSB consists of three people appointed by the Governor of Vermont. Under Docket 5270, approved in April 1990, the PSB has made integrated resource planning a requirement for municipal utilities and required that an IRP be produced every three years. The PSB maintains the authority to approve or disapprove utility plans.

Burlington's Board of Electric Commissioners consists of five people appointed by the Burlington City Council for terms of up to three years. Offering complete support since its inception, the Board is not only pro-IRP and DSM but it also urged BED's managers to expedite the entire process. They have wanted integrated resource plans completed professionally and DSM implemented quickly.

The chain of command for approving rate increases runs from the City's Board of Electric Commissioners, to City Council, to the Vermont Public Service Board. In general there have been very few interveners in BED's rate cases despite a series of rather large rate increases. These rate increases were needed largely because of decreases in revenues and the need to reduce BED's short-term debt, as well as the ensuing recession and the McNeil plant debt.

The people of Burlington strongly support DSM as proven by their overwhelming approval of a 1990 bond issue for $11.3 million earmarked for DSM. This bond approval occurred in spite of the fact that voters were warned by BED that this would raise electric rates substantially. In fact the direct result of the bond approval was a rate increase of 5.2%.

In 1983, Socialist Bernie Sanders narrowly won the Burlington mayoral race and then fostered changes in the structure of electric rates as well as major changes in City administration. During the mid-1980s there were stiff rate hikes in Burlington due to construction of the McNeil wood-chip plant. Mayor Sanders was a strong advocate for the poor and to counter the adverse and regressive effects of the rate hikes he sought to control rent and decrease electric bills for the poor. After three terms Mayor Sanders became a U.S. Representative for Vermont and in 1989 Peter Clavelle was elected as Burlington's Mayor. In terms of BED's DSM focus, Clavelle continued the same policies.

The History of Demand-Side Management

In the late 1970s BED reacted to the oil crisis and in 1980 a BED bond issue authorized $2.3 million for an energy conservation program that provided electric water heater tank wraps as well as water conservation measures. The program ran through 1984 with about 7,000 customers or nearly half of the City's customers participating.

An energy-efficient building code was established in 1983. The utility also began providing Residential Conservation Service (RCS) audits in the early 1980s, offering audits and retrofits. The audits were free while financing for the retrofits was arranged with the contractors. More than 15,000 audits were performed statewide between 1980 and 1984. In Burlington a three-person audit team performed roughly four audits per day from 1980 to 1984. This resulted in approximately 1,200 audits annually and addressed about 9% of the housing stock at that time. Between 1985 and 1987 BED put one-half of the electric hot water tanks in the City under direct radio load control.

By 1987 BED was watching with great interest the strong commitment by California utilities to IRP and DSM. BED's 1988 Least-Cost Integrated Power Plan (IRP) reflected this interest, including DSM for the first time as a long-range power option.

The Current Status of Demand-Side Management

At present, BED's nine DSM programs are designed and implemented by the Energy Services Department which has a staff of six. Neighbor$ave provides residential efficiency services and includes the Smartlight compact fluorescent lamp leasing program. The Power Miser program provides direct load control of about half of the water tanks in town. Heat Exchange provides incentives for customers to switch from electric space and water heating to other primary fuels. The Small C/I program, called Energy Advantage, provides comprehensive retrofits, Smartlights (leased compact fluorescent lamps), and Heat Exchange services to this traditionally hard to reach market segment. The "Top 10" program is specifically targeted at BED's largest customers, including the University of Vermont, though the program is not limited to ten customers as its name infers. Each customer group is also offered a construction program which provides incentives to designers and builders to exceed energy efficiency levels required by code. According to BED staff, this "something for everyone" approach avoids non-participants and cross subsidy issues. To determine the cost effectiveness of its programs, BED uses the Total Resource Cost test as required by the PSB and the Rate Impact Measure test as a secondary tool.

BED DSM OVERVIEW	Annual DSM Expenditure (X1000)	Annual Energy Savings (GWh)	Winter Peak Capacity Savings (MW)
1990	$907	3.5	N/A
1991	$842	4.7	1.05
1992	$799	5.4	1.79
1993	$954	9.2	2.63
Total	$3,502	22.8	5.47

Tom Buckley is the Director of Energy Services and has headed up the department since 1986. He reports directly to BED's Resource Management Director. BED also has program managers for its large commercial and industrial program, its program for small C/I customers, and its residential DSM programs.

A driving factor for BED's DSM success is the forthcoming expiration of its power supply contracts. Several major contracts are due to expire in the next 10 years and this has solidified BED's commitment to DSM as a resource. Of the utility's current 90 MW capacity, its Vermont Yankee 18.5 MW contract expires in 2003, a Hydro-Quebec contract for 11.25 MW expires permanently in 1995, and the Merrimack (coal-fired power plant) contract for 10.2 MW expires in 1998. Thus BED must replace almost 40 MW or about 44% of its current capacity in the next ten years. BED plans on meeting the first contract expiration (Hydro-Quebec) by purchasing 5 MW of power and making up the remaining deficit through DSM.

BED DSM LIST

	Large Commercial and Industrial
Residential	Top Ten, Construction
Neighbor$ave, Smartlight, Power Miser	**Small Commercial**
Heat Exchange, Construction	Energy Advantage, Construction

Given this capacity situation, BED has utilized integrated resource planning to determine its most advantageous path for the City of Burlington. BED is required to present an IRP every three years to the State but elects to update them more frequently. The relationship between IRP and DSM is facilitated by the fact that the Director of Resource Planning has his office located directly adjacent to the Energy Services Department. Community input is also broadly solicited. For the upcoming IRP, BED will hold three citizen focus group meetings.

C. SACRAMENTO, CALIFORNIA

Background

Sacramento Municipal Utility District changed in a short time from a utility suffering from double-digit rate increases associated with its beleaguered nuclear power plant, Rancho Seco, to a national leader in energy efficiency and DSM. A key factor in this turn-around was S. David Freeman, SMUD General Manager through this change. His enthusiasm for public power and DSM and ability to communicate effectively with the community helped make the transition at the utility a success. However, he was not the lone factor as the public and SMUD's Board of Directors were ready to make this change. If not, Freeman would not have been hired in the first place.

The major factor which caused the public and Board to want to change was the series of problems with Rancho Seco. After several malfunctions and expensive repairs, the Rancho Seco nuclear plant was

closed by voter referendum in 1989. This eliminated a major portion of the utility's generating capacity. Between 1974 and 1985 Rancho Seco's 913 MW provided approximately 55% of SMUD's generating capacity. This power was replaced by purchased power contracts with Pacific Gas & Electric and Southern California Edison. SMUD was fortunate to have sources available but under the terms of these contracts the prices for this purchased power will rise dramatically in 1995 adding pressure to raise rates. Strategically deployed energy efficiency is seen as a cost-effective path to reducing SMUD's dependence on expensive purchased power. Using the Utility Cost Test to determine program cost effectiveness, SMUD determined that it would cost less to buy efficiency than additional purchased power.

S. David Freeman took the helm at SMUD in June 1990 and resigned in January of 1994 to become Chairman of the New York Power Authority. During his tenure at SMUD he reversed the decline in morale and attitudes within the utility. He was expert in using the local media to improve SMUD's public image and to garner support for its new directions with efficiency and solar energy. Freeman's strong, charismatic personality was a key element in SMUD's transition.

Under Freeman, DSM programs were ramped up substantially in all respects, especially in terms of the percentage of operating revenues spent on DSM. In 1992 SMUD invested 6.2% of its operating revenues in DSM, one of the highest percentages in the nation and on a par with Seattle City Light. With "net loans" included as DSM expenses, the percentage increases further to 8.0%.

Sacramento Municipal Utility District was established in 1923 and began operations on December 31, 1946. Its service territory encompasses 900 square miles within and around the City of Sacramento. SMUD is the fourteenth largest public power agency in the United States in terms of energy sales and its 2,411 employees served 467,177 customers in 1993.

Given the hot, dry climate that marks Sacramento's summers, and its mild winters, it's not surprising that SMUD is a summer peaking utility. In 1993 the utility experienced a peak demand of 2,145 MW after its load management programs were dispatched. Between purchased power and utility-owned power SMUD had a peak capacity of 2,357 MW, creating a reserve margin of 10%. In 1993, the utility had customer electric sales of 8,448 GWh.

In 1993, 1,618 MW or 69% of SMUD's total power supply of 2,357 MW was purchased. The remainder of the power came from hydroelectric sources, geothermal sources, gas turbines, and photovoltaics. Even prior to Rancho Seco's closure, SMUD had been forced to dramatically increase its use of purchased power because of repeated problems at the nuclear plant. For instance, in 1988 Rancho Seco generated 2,812 GWh, but by 1989 this generation dropped off to 1,439 GWh. This drop-off was in large part due to plant closure in June of 1989.

Several factors further embellish SMUD's current situation. The utility has a very small industrial customer base. The region has low gas prices and thus significant use of natural gas supplied by Pacific Gas & Electric. It has also had slowed economic growth due to the recession. During 1992 SMUD gained 5,000 new customers while the net population of Sacramento decreased for the first time ever. Energy sales, however, have increased annually by 1.3 - 2.3% since 1989.

SMUD has effectively tapped the DSM resource to offset some degree of power purchases in the short term, and in the next few years SMUD must entirely replace the power that is currently being purchased. After a competitive bidding process and extended public discussion SMUD developed a

resource plan featuring three major power "blocks," in sharp contrast with the traditional utility approach of building a large central plant. These increments will provide SMUD with flexibility until all blocks are operational in the year 2000. The first block includes four natural gas cogeneration plants. A second block of power will be purchased from British Columbia and generated by natural gas cogeneration. SMUD views natural gas, the fuel for the first and second blocks, as an important "transition fuel" that can be used until renewable resources are available. SMUD's third block of power will come from renewables and advanced technologies.

SMUD 1993 STATISTICS		Summer Peak Demand	2,145 MW
		Generating Capacity	2,357 MW
Number of Customers	467,177	Reserve Margin	10 %
Number of Employees	2,411	**Average Electric Rates**	
Electric Revenues	$654.2 Million	Residential	8.11 ¢/kWh
Energy Sales	8,448 GWh	Comm / Ind / Other	7.46 ¢/kWh

SMUD has not raised its electric rates since January 1990. Residential customers pay an average of 8.11 ¢/kWh, while commercial and industrial and all other customers pay 7.46 ¢/kWh, making the utility's rates among the lowest in the state. Rates are a major issue at SMUD because the utility believes it is essential to keep its rates substantially below PG&E's for competitive purposes.

SMUD is an independent agency governed by a five-member Board of Directors with members elected by the public for staggered, four-year terms. As of 1995, the Board will expand to seven members. There is no formal connection between SMUD and city or county government or any other local government agencies. The Board is responsible for setting rates, establishing District policy, and appointing the General Manager who in turn is responsible for utility operations and hiring staff.

During the late 1980s the citizens of Sacramento elected three Board members who strongly favored conservation. Then in January 1990 after the closure of Rancho Seco, the Board set forth the goal to make energy efficiency the District's priority resource. What really catalyzed the Board's direction, however, was the series of events that resulted in the closure of the Rancho Seco nuclear plant. Rancho Seco was closed for slightly more than two years after its fifth significant cooling accident in December 1985. As a result of this outage, SMUD undertook an extensive program of upgrades to plant and personnel to improve the plant's reliability and availability. Plant costs spiralled and utility rates went up. A community action group placed an initiative on the local ballot during this period to close the Rancho Seco plant immediately and permanently.

The SMUD Board countered with a referendum to operate the plant for 18 months and then decide its fate based on the level of operation achieved during that period. The community initiative failed, while the Board's initiative passed. The plant was restarted in March 1988 but continued to suffer breakdowns. A second referendum, permitting continued operation of the plant, was rejected by voters in June 1989 and SMUD was forced to retire the plant.

During the latter part of Rancho Seco's choppy tenure the local media was very critical of SMUD. The community, not surprisingly, shared similar views. With the arrival of David Freeman and the substantial ramping up of DSM activities since 1990, both the media portrayal and public opinion of SMUD greatly improved. Freeman recognized the utility's image problem and actively pursued positive media coverage. This coupled with no rate increases and the major expansion of residential, commercial, and industrial energy efficiency services changed the opinion of most customers regarding the utility.

The History of Demand-Side Management

SMUD began its energy conservation efforts in 1976 with the creation of a Conservation Department. Initially the Department focused on customer education and basic residential efficiency measures such as attic insulation retrofits, rebates for energy-efficient new construction, and a test of direct load control for air conditioners. During the late 1970s SMUD's Board and General Manager were generally indifferent towards conservation.

Conservation efforts were expanded in the early/mid 1980s in part as a response to additional State and Federal mandates such as the California Energy Commission's (CEC) Load Management Standards and the U.S. Department of Energy's (DOE) Residential Conservation Service program. As these programs were proven to be successful, popular, and cost effective, participation in the residential air conditioner cycling program was dramatically increased and the overall residential program was expanded to include more measures to induce larger participation and increase savings.

In response to needle peaks resulting from Sacramento's significant air conditioning load, SMUD developed and adopted a Load Management Business Plan in 1987. Implementation of this plan expanded the load management programs with a continued focus on residential air conditioning units and a new emphasis on commercial and industrial curtailable efforts, thermal energy storage incentives, and time of use rates.

The utility entered a new and aggressive phase of conservation efforts in late 1990 as a result of the closure of the Rancho Seco nuclear power plant and a changing corporate vision of the utility's role as a provider of energy. Since 1990 SMUD's expenditures on DSM have been reflected in its aggressive portfolio of programs. All facets of SMUD's DSM activities followed suit. During 1990 and 1991 the Energy Efficiency Department grew from 80 to 250 staff members. Prior to Freeman's arrival DSM was generally considered a customer service. After his arrival it was more fully integrated as a resource and the Energy Efficiency staff was more fully integrated in the organization.

The year 1990 marked a significant turning point for SMUD. To facilitate its changes the utility developed its first integrated resource plan (IRP) in 1991. SMUD's 1993 Integrated Resource Plan is an update of the plans set forth in the "General Manager's Recommendations for Power System Additions," and adopted by the Board in its November 20, 1991 "Scoping Report of the Board Policy Committee on Power System Additions." Every two years the resource plan is updated. IRP is the responsibility of the Resource Planning Department.

The current IRP emphasizes SMUD's goal of building a "conservation power plant" with DSM programs meeting all new load growth. It reiterates the goal of reducing peak load to 2,000 MW by the year 2000, reducing the need for purchased power through emphasis on energy conservation and renewable energy. By the year 2000 the utility plans to have installed 600-700 MW of summer peak capacity savings through its DSM programs, an amount equal to SMUD's projected demand growth.

SMUD DSM OVERVIEW	Annual DSM Expenditure (x1000)	Annual Energy Savings (GWh)	Annual Summer Capacity Savings (MW)
1978	$1,800	negligible	13
1979	$2,500	"	1
1980	$3,000	"	2
1981	$5,000	"	3
1982	$5,000	"	6
1983	$5,000	"	6
1984	$6,000	"	9
1985	$7,000	"	16
1986	$6,000	"	15
1987	$6,000	"	14
1988	$8,000	"	22
1989	$8,000	"	36
1990	$10,000	9	40
1991	$40,001	51	33
1992	$37,200	113	51
1993	$36,300	96	35
Total	$186,801	269	302

At the Board's direction, each DSM program must be judged cost effective under the Utility Cost test which compares the avoided cost of a new gas-fired cogeneration plant with the utility's cost of implementing the program. For certain programs, such as lost opportunity programs (new construction) and low-income efforts, the Board approved the use of the avoided cost of renewable power or advanced technologies specified in the latest utility resource plan as the value of program benefits.

The Current Status of Demand-Side Management

As stated earlier, SMUD's commitment to DSM can be measured by examining its percentage of operating revenues dedicated to DSM. While the industry-wide average for utility DSM spending as a percentage of gross revenues was 1.2% in 1992, SMUD's 1993 DSM expenditures including net customer loans were 7.9% of operating revenues, one of the highest percentages in the nation. In addition, SMUD's conservation staff has almost tripled in size since 1990 and is at a current level of 245 conservation employees who make up more than 10% of the utility's total workforce. Currently the evaluation unit is staffed with eight professionals.

SMUD DSM PROGRAMS

Residential Retrofit

Direct Investment

Community Partners

Retail Lighting

Shade Trees

Solar Domestic Water Heating

Load Management

Residential Peak Corps

Commercial Peak Corps

Water Pump Load Management

Commercial / Industrial Load Management

Pool & Spa

Equipment Efficiency

Energy Efficient Refrigerators

Residential Equip. Efficiency Improvement

C/I Equipment Efficiency Improvement

Commercial / Industrial Retrofit

Small C/I Retrofit

Large C/I Retrofit

DSM Bid

Schools & Public Buildings

Multi-Family Retrofit

New Construction

Residential New Construction

Commercial / Industrial New Construction

Residential Thermal Energy Storage

Commercial Thermal Energy Storage

Education

Total School Energy Management

With the obvious exception of load management programs, most of the utility's DSM programs target both energy and capacity savings. This focus is in direct contrast to SMUD's efforts prior to 1990 that were almost exclusively capacity oriented. In fact, energy savings from SMUD's DSM efforts are negligible prior to 1990.

SMUD's 1993 energy efficiency programs achieved annual energy savings of 96 GWh, more than one-half again the savings of 51 GWh achieved in 1991 and equivalent to 1.1% of that year's total electricity sales. The utility spent $36 million on DSM in 1993, and loaned another $13 (net of repayments) to its customers for energy efficiency improvements. Virtually all of SMUD's 1993 energy savings were the result of retrofits with 48.9 GWh coming from residential retrofits, 43.5 GWh the result of commercial retrofits, and 4.0 GWh from new construction. More than 56,000 conservation measures were installed through all of SMUD's conservation programs in 1993. The utility paid customers a total of $17.7 million in incentives, with the average incentive for commercial customers reaching $7,185 and an average incentive for residential customers of $140.

SMUD estimates its total summer demand reduction from all conservation programs through 1993 at 302 MW. Of this total demand-side capacity, approximately 37% has come from the Peak Corps load management program, 19% is attributed to the various C/I load management programs, 7% comes from the pool and spa load management program, 20% are due to retrofit programs, while 16% of savings come from pre-1990 conservation programs, and the remaining 1% is assigned to "other" activities.

In an effort to refine its DSM activities, the utility underwent a review of its energy-efficiency programs by the Conservation Law Foundation and the Natural Resources Defense Council during 1992. This review resulted in recommendations that SMUD improve its methodology for cost effectiveness screening to more accurately portray the combined benefits of reducing peak demand and saving energy, to implement direct installation programs for residential customers to improve participation, to encourage retrofits at the time of equipment/appliance replacement, and to expand evaluation efforts.

D. SEATTLE, WASHINGTON

Background

Energy efficiency has deep roots in Seattle and at Seattle City Light (SCL). In fact, integrated resource planning and energy conservation there began in the mid-1970s thanks to an unusual combination of factors. Perhaps the most surprising aspect of Seattle's success relates to its utility context. Seattle is located in the heart of the Pacific Northwest, a region characterized by the lowest power rates in the country due in large part to hydroelectric generation along the Columbia River and the role of the Bonneville Power Administration (BPA), a federal power marketing agency with the additional role of fostering demand-side management in the Northwest.

A combination of factors paved the road for SCL's progressive actions and posture with what by the mid-1980s became commonly known as demand-side management. The utility's decision not to invest in the proposed Washington Public Power Supply System (WPPSS) nuclear units was based in large part on public disapproval and an ensuing lawsuit. This legal action turned the tide at SCL and ushered in an era of conservation. Since the utility was not able to invest in WPPSS it began to think about demand-side resources as opposed to a strictly supply-side orientation. Seattle's rejection of WPPSS was considered a radical action at the time. The genesis of the decision was rooted in the social fabric of Seattle. The people of Seattle are generally liberal and environmentally-oriented and active in political affairs. They were also aware of the opportunity to invest in conservation and were cognizant of its risks and costs.

One of the strengths of SCL's conservation staff is their long tenure at the utility. A few of the core staff have been with in the Energy Management Services Division (EMSD) since its inception in the mid-1970s. Many of the staff there today have been working on DSM since the early 1980s. The staff is a close-knit unit and together has weathered many challenges to the unit and its purpose. They have been able to relish early and ongoing successes with energy efficiency.

SCL staff report that the comradery of the EMSD staff has been essential. In its early years, EMSD staff felt they were not welcomed into the utility by its other divisions. While hard to bear at the time, in retrospect staff believe that this distancing actually helped to create a cohesive, dedicated group.

Furthermore, the EMSD staff was determined to fulfill the mandate of the City's legislation which promoted energy efficiency as an alternative to WPPSS and to carry "the banner of energy efficiency" at a time when it was generally unpopular at the utility as a whole.

The Seattle City government has also played a key role and has been fairly supportive of DSM and IRP since the mid-1970s in large part due to the fact that the public actively supports conservation. Voter opinion, of course, has a major impact on City policy. Randy Revelle, one of Seattle's City Councilmen in the late 1970s and early 1980s, was extremely supportive of conservation. He headed the City's Energy Committee which covered all energy issues, including electricity, and was perhaps the key driving factor in establishing SCL's conservation capability.

Recognition of future power costs has also played a part. SCL's managers realize that the utility's dependence on low-cost hydroelectric power cannot last forever. Thus the utility has been seeking to diversify its energy base to fulfill increased power demands brought on by a sharply increasing population.

The role of the Bonneville Power Administration (BPA) has also had a major impact on conservation efforts at SCL (SCL Annual DSM Expenditures, p.28). BPA provides inexpensive power to 174 wholesale customers in the Northwest including Seattle City Light. While BPA provided no early funding for SCL's pioneering conservation efforts from 1977 through 1981, during 1982 and 1983 BPA provided about half of SCL's conservation budget through its "buy-back" provision for DSM resources from its retail utilities. By buying energy efficiency, BPA has been able to buy-back its preference power and thus extend use of the power for more applications. BPA's funding for conservation, however, has been inconsistent and dropped off considerably from 1984 through 1991. Overall, BPA resources have provided approximately 22% of SCL's total conservation expenditures from 1977-1992.

Part of the reason for the inconsistencies in BPA's buy-back provision was in the late 1970s and early 1980s BPA projected a capacity deficit by 1983. This projection turned out to be incorrect but proved to be an early catalyst for DSM at SCL. During 1992 and 1993 BPA once again increased its cost share of SCL's conservation programs, providing about 43% of the direct costs and 22% of the total costs of SCL's conservation budget in 1992. Now with federal government hearings to determine whether to wean BPA of ongoing federal support and with the prospect of recreating BPA as a quasi-private corporation, SCL expects to be on its own again without BPA support for its demand-side management programs in the near future. According to staff, this uncertainty is the major issue facing DSM programs in Seattle today.

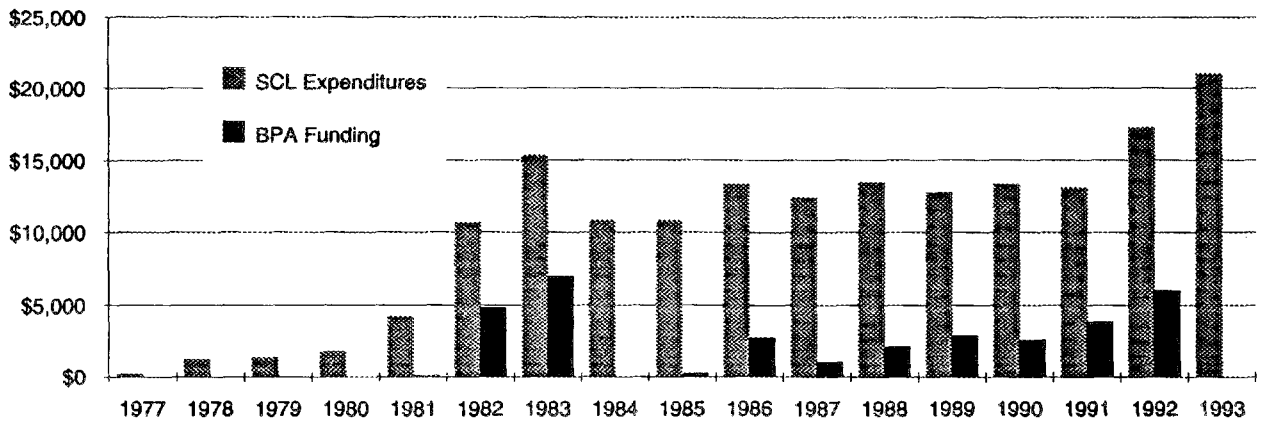
Seattle City Light is the largest municipal electric utility in the Pacific Northwest. It provides power to more than 333,000 customers. Its service area covers 131 square miles and a population of 680,000. Residential customers make up 89% of the total number of customers but accounted for only 36.6% of electric sales in 1993. In the same year the residential sector accounted for 3,261 GWh of sales, commercial customers purchased 3,361 GWh (37.7%), and the industrial sector bought 1,421 GWh (15.9%). Government and other sales totaled 878 GWh (9.9%).

SCL had total electric revenues of $320.4 million in 1993. Electric sales increased slightly in 1993 to 8,915 GWh, up from 8,762 GWh in 1992. Average energy consumption per residential customer remained fairly steady at 10,810 kWh, up slightly from 10,313 kWh in 1992.

One of the great ironies of SCL's success with energy conservation is that it provides power to its customers at extremely low rates, at least theoretically a big disincentive to energy efficiency. SCL rates in 1993 were 3.72 ¢/kWh for residential customers, 3.58 ¢/kWh for commercial customers, and 3.15 ¢/kWh for industrial customers. These rates, approved by the Seattle City Council, are among the lowest in the United States and are about one-third of the national average. Because of the low rates and a history of abundant hydroelectricity, electric space heating and water heating are still prevalent in SCL's service territory making it a winter-peaking utility. Air conditioning is rare in homes, but is commonly used in commercial buildings throughout the year.

In 1993 SCL had a peak demand of 1,875 MW which was delivered using SCL's 1,974 MW generating capacity creating a reserve margin of 5%. The utility owns and operates more than 75% of its hydroelectric-based resource mix, purchasing the remainder from Bonneville Power Administration and other utilities. The BPA contract expires in 2001 and during 1992 provided about 200 aMW. (One average megawatt is equal to 8,760,000 kWh annually.) Seattle also acquires energy from two public utility districts, three irrigation districts, and a power exchange corporation. During 1993 the power purchased under these contracts totaled 106 aMW. Seattle also buys 100% of the net output of the Lucky Peak hydroelectric facility, equal to 35 aMW in 1992. SCL obtains about 36 aMW annually from the Ross Dam hydroelectric plant in British Columbia. The utility also gets power from its 8% ownership share in the Centralia coal-fired steam electric plant. Other power transactions are conducted under short term agreements and interchanges of secondary power with utilities in response to seasonal resource and demand variations.

SCL ANNUAL DSM EXPENDITURES (X1000)



The History of Demand-Side Management

SCL's success with energy efficiency had a rocky beginning. In fact, the utility and City government didn't initially spearhead the effort at all. In 1976 the City of Seattle was sued by several environmental groups organized under the umbrella of the Washington Environmental Council. These groups challenged SCL's load forecasts, economic forecasts, and proposed investments in the WPPSS Nuclear Plants #4 and #5. Settlement of the lawsuit resulted in a policy report called the "Energy 1990" study.

The report was developed by a study group which consisted of SCL, consultants, and citizens, and recommended against investment in WPPSS. The Seattle City Council agreed. The report also recommended the use of econometric forecasting for load growth, rather than reliance on historical test years typically having 7% annual growth. The acceptance of the results of the "Energy 1990" study was a major step towards the beginning of energy conservation at SCL.

SCL 1993 STATISTICS

		Reserve Margin	5 %
Number of Customers	333,448	**Average Electric Rates**	
Electric Revenues	$320.4 Million	Residential	3.72 ¢/kWh
Energy Sales	8,915 GWh	Commercial	3.58 ¢/kWh
Winter Peak Demand	1,875 MW	Industrial	3.15 ¢/kWh
Generating Capacity	1,974 MW	Government	3.78 ¢/kWh

Seattle is a progressive, liberal, environmentally-aware community, especially in comparison to the rest of Washington state. There are many environmental activists in the community who have proven to be a benefit to SCL's Energy Management Services Division. Seattle's activists help to promote and catalyze energy efficiency and also continue to challenge proposed investments in supply-side resources by the utility. SCL has benefitted from its close ties with environmental activists in the community. EMSD uses activists as a resource and on several occasions has hired the most vocal of them, thereby using their insights for the benefit of the community and the utility.

SCL has been involved with load management since the early 1970s when it started the "Kill-a-Watt" program designed to reduce the winter peak demand. In 1976 the Seattle City Council initiated its commitment to conservation through "Energy 1990" as discussed above. This public planning process brought together utility planners and engineers, citizens, and elected officials to establish conservation goals as an alternative to participation in the regional construction of the WPPSS nuclear plants.

In July 1976, Seattle City Council Resolution 25259 established the Office of Conservation at SCL with the task of implementing the City's conservation agenda with respect to electricity. The Director for the Office of Conservation selected her staff from various other utility divisions, none of whom were familiar with energy conservation. The name of the office was changed to the Conservation and Solar Division and then again in 1988 to the present title of Energy Management Services Division (EMSD).

In 1977, BPA announced that its power supply would be insufficient by 1983, thus giving SCL a six-year window to make energy conservation work. In 1978 SCL offered its first energy conservation program which was focussed on low income grants for the elderly. In the same year DOE awarded SCL a 5-year, $2 million grant which allowed the utility to do research in areas such as financing energy conservation and standards. Also in 1978, following several years of drought, SCL raised its rates for the first time in 30 years, with rates increasing 10-20%.

In 1980 Larry Gunn became the Director of the Conservation and Solar Division and emphasized the need for program evaluation in order to establish credibility for the department and its programs. In the same year the Seattle City Council mandated the formation of an evaluation unit at SCL that provides program energy savings, cost-effectiveness information, and operational efficiency information. The City Council required that this evaluation unit be in-house as opposed to hiring external evaluators.

Larry Gunn established rigorous in-house evaluation methodologies and capabilities to provide for consistent measurement and evaluation. He also helped develop the triangular approach to program implementation (now used for all EMSD programs) with separate planning, evaluation, and operations groups. This approach has been an important ingredient in SCL's DSM program success. Having these groups work independently yet within the same department allows for constant reevaluation and redesign. As SCL's staff evolved it came to consist of a tremendous diversity of people with different backgrounds.

In 1980 the City's Legislative Analysis and Policy Development group put together a conservation and surplus policy at the request of City Council. The resulting Energy Resources Plan was the utility's first attempt at integrated resource planning. Thus SCL began to look at planning from five perspectives: cost of new generation; a societal perspective; a regional perspective; non-participant cost, and the participant test.

In 1983 the projected BPA energy and capacity shortfall did not materialize and thus during 1984 SCL was without BPA funding for conservation. BPA concluded that since its projected capacity shortfall did not occur there was no longer the urgent need to pursue DSM from as many sources as possible at least in the short term. At this time there were significant funding cuts for conservation at SCL as well as staff reductions. The conservation staff focussed on building capabilities, mitigating lost opportunities, and preserving infrastructure in the face of the regional capacity surplus and funding constraints. The Division's ability to mobilize a constituency for conservation outside of the utility (among activists and allies in City Hall) was a primary factor in preserving the existence of the Office of Conservation.

Over time the utility's conservation activities have become institutionalized and an important and visible aspect of SCL's operations. Staff suggest that by the mid-1980s the EMSD group had really become integrated into the utility's operations. EMSD annual expenditures had risen from an initial $168,000 to more than $17 million in 1992.

Regional energy forecasts have varied from deficit to surplus. Current forecasts predict an energy balance that often dips into deficit over the next 20 years. During 1992 the region was deficient in energy supplies. Though SCL has implemented its DSM programs regardless of energy supply, future forecasts make commitment to DSM even more crucial.

The Current Status of Demand-Side Management

In 1992 SCL restated its conservation vision and mission. Its vision is to make Seattle the most energy-efficient city in the United States. Its mission is to save enough electricity to meet all of SCL's load growth in the next decade while also serving as a catalyst for increased efficiency in non-electrical resource use.

SCL DSM OVERVIEW	Annual DSM Expenditure (x1000)	Cumulative Energy Savings (GWh)	Annual Capacity Savings (aMW)
1977	$168	0.1	0.10
1978	$1,233	1.8	0.21
1979	$1,371	9.0	1.03
1980	$1,788	17.6	2.01
1981	$4,259	29.7	3.39
1982	$10,661	78.9	9.01
1983	$15,349	123.7	14.12
1984	$10,858	136.7	15.60
1985	$10,871	159.7	18.23
1986	$13,343	178.8	20.41
1987	$12,403	190.0	21.69
1988	$13,472	200.7	22.90
1989	$12,757	214.0	24.43
1990	$13,326	228.3	26.06
1991	$13,092	252.2	28.79
1992	$17,299	296.4	34.02
1993	$21,035	334.0	38.10
Total	$173,285	2,452	

During 1992 there were several developments that supported SCL's IRP and DSM efforts for the future. A Citizens Conservation Committee that formed in 1990 provided SCL with input on its conservation programs. SCL has implemented the Committee's recommendations including a conservation goal of 100 aMW in the next ten years. Second, SCL shifted the focus of its DSM programs from the residential sector to the commercial/industrial sector. These goals were affirmed by the Mayor and City Council in 1992.

A Conservation Task Force was also launched in 1992 with a goal of quadrupling present levels of DSM savings. The Task Force included customers, interest groups, the utility, City Council staff, the City Office of Management and Budget, BPA, and the Northwest Power Planning Council. A Conservation Implementation Plan was submitted to the Mayor and City Council in 1993. It included a 10-year planning horizon, increased emphasis on the commercial/industrial sector, development of new program delivery mechanisms, reorganization of utility conservation personnel, and increased use of

private sector partners in conservation acquisition. Plans at SCL call for speeding up participation rates and introducing new programs. (As already stated, the most crucial element of SCL's conservation acceleration, however, relates to the availability of BPA funding.)

From 1977 through 1992 SCL has had total participation in its DSM programs of 306,677 service units, with 297,726 participants from the residential sector and 8,951 participants from the commercial and industrial sectors. Cumulative DSM savings for this period total 2,118 GWh. DSM expenditures have totaled $152 million from 1977-1992 with about one-fourth of total direct program costs reimbursed by the Bonneville Power Administration.

Staffing levels for EMSD have fluctuated from a low of 7.5 full-time equivalents (FTEs) in 1977 to a high of 118.5 FTEs in 1983. Staffing levels for 1992 totaled 83.5 FTEs. One of the cornerstones of SCL's DSM efforts has been its evaluation group. To date more than 100 evaluation studies have been completed while staffing for the evaluation group has remained fairly constant, with between four and five full-time equivalents. Approximately 2% of SCL's DSM budget has gone towards evaluation. Each year the evaluation group produces an updated "Energy Conservation Accomplishments: 1977 - Present Year," a report that tracks clearly the utility's success with the implementation of energy efficiency in the City of Seattle.

SCL DSM PROGRAMS	Multifamily Conservation
	Residential Efficiency Standards
Residential	**Commercial / Industrial**
Energy Efficient Water Heater Rebate	Energy Savings Plan
Home Water Savers	Energy Smart Design
Long-Term Super Good Cents	General Service Efficiency Standards
Low-Income Electric	Lighting Design Lab

In the coming years EMSD hopes to ramp-up its DSM efforts in the industrial sector because the residential sector has been the focus to date, and to avoid rate equity issues. The Division is also planning on increasing its conservation efforts that focus on water and gas, teaming up with the local gas and water utilities to leverage programs. EMSD also intends to experiment with implementing targeted DSM programs that focus on specific geographic areas in order to deal with transmission and distribution capacity bottlenecks. Retailer involvement with selling energy-efficient products will continue and likely increase. EMSD is currently trying to sign long-term energy conservation agreements with its largest customers such as the University of Washington. Finally, EMSD hopes to use utility staff outside of the division to help deliver conservation. This strategy will be used as a way to get conservation firmly entrenched in the mainstream at SCL.

E. WAVERLY, IOWA

Background

As with the other utilities, a combination of factors have contributed to the success of DSM at Waverly Light and Power (WLP), but the foundation of that success was the initiative of its Board of Trustees to pursue DSM back in 1990. They learned of its potential from another Iowa town of roughly the same size: Osage. They then hired an efficiency expert, Glenn Cannon, as their general manager in order to develop an aggressive DSM program.

Contributing factors include the rapid growth in demand and the future expiration of power contracts representing 55% of base power purchases in 1999. The area has a well educated population and has the highest literacy rate in the country. Also, the fact that the State of Iowa requires all utilities to report on their energy efficiency programs helped to spur an analysis of the potential benefits of demand-side management as a resource.

WAVERLY 1993 STATISTICS

		Generating Capacity	29.8 MW
Number of Customers	3,952	Reserve Margin	31 %
Number of Employees	26	**Average Electric Rates**	
Electric Revenues	$6.45 Million	Residential	8.3 ¢/kWh
Energy Sales	94.7 MWh	Commercial	7.7 ¢/kWh
Summer Peak Demand	22.8 MW	Industrial	5.4 ¢/kWh

Waverly Light and Power's 26 employees serve the City of Waverly, Iowa, a small farm town located in northeastern Iowa just 20 miles north of Waterloo. WLP has 3,952 customers in its service area of 33 square miles. The Town of Waverly is the home of Wartburg College, as well as a Carnation dairy products plant, and annually stages a nationally-renowned horse show. The community is ethnically diverse including many citizens of German heritage and an Amish community just 30 miles away. The town has a low 2% unemployment rate and an average detached single-family home costs around $50,000.

In 1993 WLP had gross revenues of $6.5 million and sold 95 GWh of electricity. Despite the small size of the utility its power supply arrangements are quite complex. WLP owns 29.4 MW of generating capacity of which it sells 17 MW to Midwest Power Systems (MPS) on a monthly basis for use during peak periods. In turn, ten megawatts of intermediate power and 7.3 MW of peaking power is purchased from MPS. This results in a total available capacity of 29.8 MW. Thus, 45% of WLP's needs are met with its own generation and 55% is purchased from MPS.

In Waverly Light and Power's earliest days, all of its power was generated by three hydroelectric turbines located in the center of town. These turbines are still in place today but now represent only 4.29% of the 45% of WLP's self generation. Nine diesel units, five of which are diesel and natural gas dual-fuel generators, make up another 0.79%, and one wind turbine accounted for 0.12% of generation for 1993. The vast majority of WLP-owned generation, 94.8%, comes from WLP's 5% ownership in the Louisa coal-fired generating station located on the Mississippi River some three hours away by car.

In 1993 WLP provided 45 GWh of energy for sale and purchased the remaining 50 GWh of sales from MPS. With a total capacity of 29.8 MW and a peak demand for 1993 of 22.8 MW, WLP has a reserve margin of 31%. WLP is a summer peaking utility due in large part to air conditioning load.

In 1992, for the first time in nine years, WLP increased rates in order to meet four goals: promote energy conservation, meet the costs of generating more electricity for a fast growing population as well as upgrading distribution systems, build a cash balance to purchase future power, and maintain the quality of the utility's financial condition. The electric rates are now 8.3¢ per kWh for residential customers and 5.4¢ per kWh for industrial customers.

WLP, like BED, is regulated at the state and local level. In 1990 the State of Iowa Code 476.1a and b and Senate File 2403 required non-ratepayer regulated utilities, including 138 Iowa municipal utilities, to report their energy efficiency plans and the results of their programs to date. Although these plans weren't required until 1992, Waverly not only presented the most comprehensive IRP but also was the first municipal utility in the state to do so.

At the local level, WLP is managed by a Board of Trustees consisting of five members appointed by the Mayor. The Board collaborates with the Mayor and the utility's General Manager to establish policies and guidelines for utility operations. Perhaps the most important Board action of the past decade was recruiting Glenn Cannon to become WLP's General Manager. Cannon had no experience as a general manager, instead the Board sought his extensive experience working at Santee Cooper (a utility located in South Carolina) promoting energy efficiency.

The History of Demand-Side Management

WLP's evolution to become a leading publicly owned utility regarding IRP and DSM began in 1989 when their Board of Trustees became concerned with how to meet the community's growing electric power needs. Since 1986, WLP's energy sales have grown at an average of 4.2% annually. Their peak demand also has increased at an average of 3.4% annually. Driving the recent growth are many factors: The Carnation plant accounts for 14% of the utility's total sales and had a 12% increase in consumption and a 5% increase in demand in 1993. Many residents in the growing downtown area have sold their properties to small businesses which use much more electricity. Pumps and dehumidifiers were in heavy use due to the floods of the summer of 1993. The population has also increased as people are moving to Waverly to raise families, benefitting from WLP's small town characteristics and good school system.

Thus by having attracted more economic activity Waverly found itself in quite a predicament, only amplified by its wholesale power purchase contract with Midwest Power Systems. While the contract has been highly beneficial for Waverly, thanks in large part to the fact that Waverly could fulfill all of its power demands on its own providing a good bargaining position, its termination is somewhat threatening. WLP currently purchases over 55% of its electricity from MPS with the contract expiring in

April of 1999. While Waverly will likely have the option to extend the contract, the merger between Iowa Power, a higher cost supplier, and Iowa Public Service to form Midwest Gas and Midwest Power will result in significantly higher costs should Waverly elect this option.

Waverly has greatly benefitted from the insights of at least two key trustees, Ivan Ackerman and Chris Schmidt. These two had heard of Wes Birdsall's success in the neighboring town of Osage. Birdsall implemented a series of DSM programs in Osage with marked success. Osage is similar in size to Waverly and had achieved virtually 100% participation in its programs. As a result, Osage had been able to lower rates and avoid load growth. Because of the similarities between Waverly and Osage, the Waverly Board was convinced by Birdsall of the tremendous potential for DSM in Waverly not only as a least-cost utility strategy but as a concurrent means of boosting the local economy.

Given its rather unsure power-supply future, Waverly's Board of Trustees made two important decisions: First, in 1990 it hired Glenn Cannon, an energy efficiency expert, to be its General Manager. Second, in 1992 it decided to write its first Integrated Resource Plan (IRP) as a means of determining how to best fulfill its resource requirements beyond 1999. The IRP not only provided a solid justification for WLP's interest in wind generation, but also proved the efficacy of DSM. To carry out the IRP, WLP retained the services of an independent consultant. Waverly's integrated resource plan considered four economic perspectives in determining cost effectiveness of potential DSM programs, but used the Total Resource Cost test as its primary screen.

WAVERLY DSM OVERVIEW	Annual DSM Expenditure (x1000)	Annual Energy Savings (GWh)	Annual Summer Capacity Savings (MW)
1992	$148	NA	NA
1993	$142	0.93	0.50
Total	$290	0.93	0.50

WLP's IRP development was a public process. Periodic updates to load forecasts, program costs, and marketing effectiveness were each reported to the public. Like all publicly owned utilities, Board meetings have been and continue to be announced in the local paper and are open to the public, though attendance has been limited. A second IRP process is just now getting under way.

A key next step was to find a manager for the new DSM initiative who was familiar with the Waverly community. They found a person, James Jebe, within the utility who had always had a keen interest in DSM, although no previous experience. He underwent a crash course in DSM, attending numerous conferences and seminars. His knowledge and local ties brought a large amount of credibility to the DSM initiatives and have complemented the General Manager's own knowledge and skills.

Waverly first got the word on efficiency out via radio spots and newspaper ad campaigns. Jebe had experience in marketing so he visited the civic clubs, told friends, and spread the word on DSM. One of the key marketing lessons learned was the importance of getting trade allies on board before imple-

menting programs. For example, Jebe had to convince refrigerator distributors to stock energy-efficient products prior to the Appliance Rebate program. In turn the refrigerator distributors carried the "marketing ball" notifying customers of incentives and rebates. This allowed them to sell more of their product. The people of Waverly have been very receptive to energy-efficiency programs especially if it meant saving money along with preserving the environment.

The Current Status of Demand-Side Management

WLP's first IRP was completed in 1992 and revealed that aggressive energy efficiency programs can effectively provide long-term, persistent energy savings for the utility and provide the best opportunity of reducing the need for future, more expensive baseload generation. The IRP found that DSM capacity savings could delay new capacity additions by six years that would otherwise be needed in 1999 when purchase contracts expire. Perhaps the most significant finding of the IRP was that the adoption of the DSM programs would at worst be revenue neutral. Staff believe that more than likely DSM will reduce revenue requirements in the long run.

WLP 1993 DSM PROGRAMS

Residential

Good Cents New Home

Good Cents Improved Home

Good Cents Home Loan Program

Nonresidential

Commercial and Industrial Lighting

Commercial and Industrial HVAC

Commercial and Industrial Motor

Commercial Audit

Other

Energy Efficiency Rate Structure

Trees Forever

Appliance Rebate

Waverly Light and Power currently offers 13 DSM programs for its commercial, residential, and industrial customers. Waverly spent $141,859 on DSM in 1993, equivalent to 2.32% of its gross revenues. In 1992 they spent roughly 4% of their gross revenues due to the higher administrative costs associated with launching their DSM initiatives and educating their energy specialist. An estimated 2-4% of peak demand has been avoided through the use of DSM in 1993 and by the year 2000 the IRP estimates nearly a 10% decrease. Less than 1% of electricity use has been avoided through DSM implementation for 1993 and a projected savings of roughly 3-6% is expected for 2000.

CONCLUSION

The five case studies presented provide a set of models of the potential for the 1,600 publicly owned utilities without demand-side management programs to invest in their customers' energy efficiency. The case studies also provide a myriad of lessons learned, though their diversity and small number obscure specific attributes of success that can be clearly identified and thus used to support subsequent efforts. In each case, for a particular set of reasons, these utilities have had pronounced success with both integrated resource planning and demand-side management.

The utility case studies presented are diverse in some ways and similar in others, making it difficult to draw explicit lessons learned. For instance, their reasons for investing in efficiency vary, while their size is relatively homogeneous. In each case, however, their current DSM program portfolios represented a rich set of energy efficiency opportunities for their constituents. And in each case, the use of integrated resource planning that "reflects the conscience of the community" effectively supports their demand-side management initiatives.

Three of the five utilities examined catalyzed their DSM efforts because of situations related to nuclear power. In Austin, a lawsuit regarding nuclear plant cost overruns created a pool of capital with which to begin DSM. In Sacramento, a nuclear plant was closed by voter referendum. In this case, DSM was a salvation as it could be bought for less cost than more conventional replacement power purchases. In Seattle, it was the City's decision not to invest in nuclear power that ushered in a new era with a focus on energy conservation.

The other two utilities were driven largely by the costs of planned supply-side additions. In Burlington, voters were concerned about the environmental costs associated with the construction of large hydroelectric dams in the James Bay region of northern Quebec. These costs were the basis for Burlington's voters decision to invest in energy efficiency. In Waverly relatively high cost power supply contracts provide part of the impetus for this small utility to take a new tack and invest in its customers' energy efficiency. In each of the five cases, the motivating factor has slipped away as the DSM program portfolios have matured and become institutionalized and have become part of the utilities' basic operations.

A) ATTRIBUTES OF SUCCESSFUL DSM PROGRAMS

What can be learned from these utilities to support the development of effective DSM in other jurisdictions? What features of these utilities' programs are indeed transferable to other utilities? What set of requirements are there that other utilities must fulfill before engaging on their own endeavors with DSM? Are there prerequisites for success that can be identified and then fulfilled by the 1,600 publicly owned utilities that do not currently provide DSM programs for their constituents?

If there are a set of attributes which can be identified, then other cities with similar attributes, or a subset of these attributes, may also be able to enjoy the success of Austin, Burlington, Sacramento, Seattle, and Waverly. Furthermore, by identifying these attributes, it may be possible for those utilities who have not yet become involved in DSM to develop those attributes within their communities to foster DSM over time.

- *High rates:* One of the most fundamental drivers for DSM at any utility is high rates. The higher the rates, the clearer the customer benefit from energy efficiency services. Customers not only have the opportunity for significant bill savings but can also realize short payback periods for efficiency investments. Surprisingly, this attribute seems less important that one might imagine. Of the five case studies presented, Austin's rates are below national averages; Burlington's are above; SMUD's are at the average; SCL's are significantly below; and Waverly's rates roughly reflect national averages. Thus little correlation can be made between high rates and DSM activity. The inverse is not necessarily true either. For instance, exceptionally low rates have certainly not stifled DSM in Seattle.

- *Economic factors:* There are three economic factors that are combined here into one attribute: high avoided costs, capacity shortfalls, and supply-side crises. Each of these factors have played a role in the case studies presented. For instance, high avoided costs would also seem to be a logical common attribute of utilities' successful DSM programs. Whenever marginal costs exceed average costs, utilities would seem to be better off investing in efficiency to keep rates in check. Indeed this was and continues to be the case in Sacramento and Waverly, but cannot be considered the primary impetus for early conservation initiatives in either Seattle or Burlington. In those cities, it was a high degree of environmental awareness that spurred efforts for efficiency. In those two cities, voter referenda initiated aggressive DSM initiatives as an explicit alternative to large-scale hydroelectric development in Quebec, in the case of Burlington, and to avoid participation in an expanded nuclear system in the Northwest in the case of Seattle. Thus high avoided costs appear to be a driver, but not a prerequisite for effective DSM programs.

Avoided costs become important as utilities move past their reserve margins and begin to assess their options for additional resources. Growth in demand can lead to supply shortfalls, forcing utilities to consider marginal resources and whenever integrated resource planning is used, to consider a range of options from a number of economic and environmental perspectives. In Sacramento the premature closure of Rancho Seco catalyzed action which resulted in aggressive DSM plus aggressive promotion of renewables and other power purchase contracts. SMUD has addressed its crisis with a diversity of approaches and resource options.

DSM initiatives in both Waverly and Burlington have been catalyzed by their impending need for additional capacity. Waverly faces the challenge of having to renew its power supply contract with a low-cost supplier that has recently merged with a high-cost supplier, a situation that will push power costs upward. In Burlington, capacity and energy shortfalls created a clear impetus for action, action which voters there directed towards what they considered the most environmentally benign alternative: energy efficiency.

One of the attributes shared by Austin and Sacramento in particular is a supply-side crisis. In Austin, it was the concern about the rate impacts from the South Texas Nuclear project, coupled with a profitable law suit, that created the capital to begin what has become one of the nation's most interesting DSM initiatives. In Sacramento, the failure of the Rancho Seco nuclear plant was clearly the driver for DSM.

(Less obvious, Burlington's supply-side crisis was related to a perceived environmental crisis; similarly Seattle's rejection of nuclear power was based on the perception of crisis related to nuclear plant construction and operation.) In both Burlington and Seattle there was no crisis per se, and in Waverly there is clearly no supply-side crisis, discounting the importance of this economic factor as a prerequisite for demand-side management success.

- *Heightened environmental awareness:* If economic factors cannot be directly related to publicly owned utilities' success with demand-side management, perhaps environmental awareness and a set of social and environmental values may be the drivers for successful customer energy efficiency programs. Indeed such a situation might provide for resource planning that reflects the conscience of the community and which could thus drive DSM as a socially and environmentally responsible resource policy. While three of the five cities examined clearly exhibit this attribute, this analysis does not support the hypothesis that this attribute is a requirement for DSM success.

Waverly's success, for example, certainly cannot be linked with the community's heightened sense of environmental awareness, yet the utility's set of DSM programs is comprehensive and progressive. Nor does Sacramento enjoy a reputation of being unusually environmentally aware. In both Waverly and Sacramento investing in efficiency has been based on economic criteria as well as being perceived as the right thing to do in the long term. To this end, both Sacramento and Waverly have also invested in wind generation and have justified their expenditures in doing so explicitly in their long-range resource plans.

Heightened environmental awareness within a community can certainly lead to a situation whereby utility resource planning reflects the community's conscience and desires. For instance, are utilities willing to implement DSM programs if the programs result in small rate increases? Are utilities willing to consider environmental costs in their resource planning decisions? When the community is interested in broader societal objectives, such as mitigating carbon dioxide emissions related to the possibility of global climate change, the DSM planners at the utility are encouraged to promote DSM. This is effectively done through the use of specific screens for the cost effectiveness of DSM programs. The more progressive the community, at least theoretically, the more societally oriented screens are used, which in turn promotes greater degrees of DSM investment.

The five utilities presented in this report use a range of tests to screen potential DSM programs for cost effectiveness. None use the limiting Rate Impact Measure test as a primary screen while three use the Total Resource Cost test, considered second most progressive of the tests commonly in use, as their primary screen for cost effectiveness. The Societal Cost test factors environmental costs into cost effectiveness calculations. Only Austin uses this as a primary screen, in line with its Green Builder Program and heightened environmental awareness. Thus while the use of specific screens can support DSM initiatives, no particular screen or degree of community input in the utilities' resource planning processes is required for DSM success.

- *State emphasis on IRP/DSM:* The degree to which a publicly owned utility's home state emphasizes IRP and DSM also appears important in Vermont, California, Washington, and Iowa. In Vermont, Burlington Electric Department is required to file integrated resource plans with the state every three years. There the Public Service Board has been strongly involved in utility regulation and the promotion of DSM for both investor-owned utilities and publicly owned utilities. However, Burlington's DSM program was started aggressively long before this requirement impacted the utility.

In California, the presence of Pacific Gas & Electric and Southern California Edison, two of the nation's leading investor-owned utilities in DSM, has likely had a spin-off effect on SMUD. In Washington, state involvement has been a contributing factor strongly supported by the regional involvement of the Bonneville Power Administration and the Northwest Power Planning Council. Iowa is an active state in terms of energy efficiency and publicly owned utilities there must file efficiency plans directly with the state. Note again, Waverly initiated its programs in 1990, three years before this requirement hit publicly owned utilities in Iowa. Austin, however, forged its own path with IRP and DSM success in the absence of significant state emphasis and requirements, undercutting the hypothesis that state emphasis in these areas is a prerequisite for successful activity. Regulation can indeed get programs going, but in the five case studies presented it was not a major driver.

■ ***Local political support:*** While state involvement has varied with the case studies presented, there is no question that publicly owned utilities need political support within their own jurisdictions. For each case study presented, IRP and DSM was enabled by local political support. Gaining this support, however, has taken different forms. For instance, in Burlington the City challenged its utility when BED's resource planners intended to purchase additional increments of power from Quebec. After City-funded analysis of the potentials for energy efficiency, the utility's resource plans were realigned with voters' wishes, ushering in an aggressive era of DSM. Once the utility changed its outloook, the City provided its whole-hearted support for DSM through bond issues and high levels of participation in the utility's programs.

In Waverly, the utility's Board of Directors was the first to embrace DSM. In turn, it was their job to sell DSM to City Hall which they successfully did, allowing for the recruitment of a DSM advocate to head the utility and manage its resource planning process. In Sacramento, the utility is isolated from city politics as its board members are directly elected by the public. Nevertheless, SMUD's turnaround and focus on demand-side management was enabled by the public's frustration with increasing power costs. Thus public dissatisfaction with the utility led to the election of a progressive board which in turn enabled the utility to hire a noted DSM advocate who was able to focus on DSM and renewable energy resources. Clearly, for a publicly owned utility to pursue DSM it needs voter support.

Local political support can not only allow for IRP and DSM, but can greatly accelerate the effect of DSM programs. When Burlington Electric Department realized its problem with a high concentration of electric space heating, the City working with BED developed laws to ban the installation of new electric resistance heating and require energy efficiency in new and renovated buildings. The City's actions addressed potential "lost opportunities" from new construction while the utility focused on its Heat Exchange program which provided incentives for customers to switch from electric to gas.

In Austin the link between the ESD and the City's objectives has been even more explicit: ESD has direct responsibility for developing building codes. Thus DSM programs stimulate markets for efficient goods and degrees of market transformation occur, allowing the City's codes to be revised to capitalize on the transformed market. In Sacramento, it was the close relationship between the City and utility that allowed for a basic provision enacted by SMUD to promote load management. SMUD's Rule 15 requires all new homes with central air conditioning to participate in its Peak Corps load management program.

■ ***Large-sized utilities:*** An unfortunate aspect of this study is that its five case studies are dramatically skewed towards the largest of publicly owned utilities. Even Waverly Light and Power, the smallest

utility by a factor of nearly five in terms of energy sales from the second smallest utility (which in turn is some twenty times smaller than the next), is the 605th largest of all publicly owned utilities.

Why have the largest publicly owned utilities been those to invest in DSM? Is it because they have drawn the greatest regulatory oversight? Is it because they tend to be located in politically progressive cities? Is large size a requirement for publicly owned utilities' success with DSM? While the answers to the first questions are elusive and beyond the scope of this study, Waverly presents itself as a model that indicates that large size is not necessary for success with DSM. In Waverly, a set of other attributes — high avoided costs, an impending termination of an important supply contract, the emergence of a clear champion — were enough to promote and achieve success with DSM.

Waverly presents itself as a model of success for a small utility, but the smaller the utility, the less likely the utility can employ a knowledgeable staffer to manage its DSM activities. Waverly is unique among utilities with 3,000 customer accounts in that it devotes more than a full-time equivalent to DSM. Not only does the utility have a Director of Energy Services, but DSM is the strong interest of the utility's General Manager and thus a considerable amount of his time is committed to DSM.

The average small publicly owned utility, however, does not provide this level of staff to DSM. APPA's 1991 survey found that of the 20% of public power agencies that have DSM programs, those with less than 3,000 customer meters typically have less than a single person devoted to DSM. For comparison, Burlington Electric Department with six FTEs dedicated to DSM has a ratio of 1 FTE:3,000 customers; Seattle has 1:4,000; and Sacramento 1:2,000. While these ratios indicate a rather narrow range, the staffing issue appears to become acute for smaller utilities which cannot devote a single person to DSM although this problem can be at least partially addressed through the use of joint action agencies and state associations to deliver DSM services.

■ ***Presence of a champion:*** Another successful program attribute is the role of "champions," key individuals who catalyze and lead a community in its programs and quest for success. Champions, however, rarely come into prominence on their own but are enabled by the utility's board of directors or by the community itself. Clearly David Freeman was a champion of DSM in Sacramento as was Larry Gunn in Seattle. Waverly has benefitted from Glenn Cannon's drive for DSM as has Austin where Mike Myers heads up the DSM efforts. On the other hand, Burlington has not had a champion per se and has developed a strong set of programs in the absence of a single and recognized advocate.

Clearly the presence of champions can jumpstart and promote successful DSM efforts, but they are not necessary for successful efforts. Furthermore, utilities whose programs depend on a single champion may not be as stable as those where DSM has broad political support and has become institutionalized. This is the case in Seattle and Burlington, two cities which seem to exhibit the greatest program resiliency.

B) SUMMARY

While trends emerge from our research at five successful utilities, perhaps this report's main finding is that while several factors play a part in the successful implementation of DSM at publicly owned utilities, there is neither one specific attribute nor a set of prerequisites that is absolutely required. Utilities that meet only some of the attributes determined in this report can implement successful DSM programs. Indeed, none of the utilities studies met all of the attributes identified.

Local political support appears the most decisive of the attributes studied. Because of the local control of the utility and the need for customer involvement in DSM programs, this attribute is important during both the creation and implementation stage of DSM. However, the political support may come from a variety of sources. In both Austin and Sacramento the public's dissatisfaction with costly nuclear power plants created a high degree of local support for DSM. In Burlington and Seattle a general environmental awareness created the political will to invest in energy efficiency as an alternative to supply additions. In Waverly, trustees of the utility garnered political support for energy efficiency in the local government, which consequently ushered in a comprehensive set of DSM programs. While the genesis of local political support varies, it appears to be an important and fundamental attribute of DSM success within municipalities.

ATTRIBUTES OF DSM PROGRAM SUCCESS	Austin	Burlington	Sacramento	Seattle	Waverly
High rates	Not true	True	Partly true	Not true	Partly true
Economic factors	True	True	True	Not true	True
Heightened environmental awareness	True	True	Not true	True	Not true
State emphasis on IRP/DSM	Not true	Partly true	True	True	Partly true
Local political support	True	True	True	True	True
Large-sized utilities	True	Partly true	True	True	Not true
Presence of a champion	Partly true	Partly true	True	True	True

True = ■ Partly true = ▒ Not true = □

While high rates can provide the impetus for DSM programs they are not necessary for DSM success. High avoided costs, current or impending supply-side problems, and supply-side crises help to fuel interest in energy efficiency, but do not necessarily catalyze DSM activity. Community awareness of environmental concerns plants the seeds of knowledge of other means to provide energy services beyond traditional supply-side methods, but does not automatically equate with success. Similarly, state emphasis on IRP/DSM increases the attention of utilities on the possibilities of using DSM but does not force them to adopt it. Large utilities are often more able to devote specialized resources to DSM, but this report shows that small utilities can implement effective DSM programs and share similar success. Finally, while champions within the community and/or utility can greatly support DSM success, they are not critical prerequisites. In sum, this analysis finds that no single requirement or set of prerequisites determines utilities' success with DSM.

Based on these results, many other publicly owned utilities across the country may have the opportunity to develop successful DSM programs. It is hoped that through the examples set by these case studies, other utilities may identify the attributes they currently have for DSM success or which they could develop in order to succeed in providing the optimal combination of supply and demand-side resources for the benefits of the cities and communities that they serve.

DSM PORTFOLIOS

1. AUSTIN ENVIRONMENTAL AND CONSERVATION SERVICES DEPARTMENT'S CURRENT PORTFOLIO OF DSM PROGRAMS

■ *Energy Star Homes program:* Austin's most progressive residential programs have been the Energy Star Home Rating and Green Builder initiatives. The Energy Star program began in 1985 and was incorporated into the more comprehensive Green Builder program in 1993. The Energy Star program promotes the construction and purchase of energy-efficient homes through a rating system. The program consists of two main components: rating new homes and marketing. In recent years builders have taken over much of the marketing responsibilities using Energy Star ratings as a selling point for homes. The program has succeeded in creating home buyer demand for energy-efficient homes and builders have responded in kind. Any new-home builder in Austin's service territory is eligible to participate.

Until 1994, energy-efficiency ratings were based on plans submitted to ESD by builders. A computer program designed specifically for the Energy Star program used the data about the home and generated a rating based on savings compared to a home built to minimum City energy-code standards. The Building Energy Thermal Analysis program used generated ratings from one to three stars, with one star denoting a home slightly above code, while three stars signified state-of-the-art, energy-efficient homes. A zero rating denoted a home built to the Austin energy code. One star homes are projected to save 5% in energy costs over a standard home, two star homes should save 12.5% above code, and three star homes are expected to save 20% in energy costs over a standard home. In the most recent fiscal year the Energy Star program achieved summer peak capacity savings of 720 kW, with cumulative peak capacity savings since the program's inception reaching 2.93 MW. The program cost almost $1 million from 1986 through April 1992.

Beginning in March 1994 ESD opted to dramatically restructure the program in order to simplify the process and alleviate the burden on ESD staff of rating homes. Two full time staff were required to spend eight hours every day performing ratings, and they couldn't keep up with the level of new construction in the Austin area. Now the burden has shifted from ESD staff to builders themselves who will use checklists to comply with various efficiency levels, still using a star system. (ESD staff will perform limited inspections in the field.) This will not only streamline the process, but will also serve to educate builders about the specific technologies they must use to achieve energy efficiency levels. While there has been some trepidation about turning the process over to builders, the City's code enforcement officials have agreed to allow ESD to use the new system. Note that the new system also shifts the type of information promoted by the program, from computer analysis performed in ESD's

offices to checklists of technologies that can make a difference in the field. (Naturally the Energy Star program has benefitted from its earlier incarnation, providing a foundation for this latest program evolution.)

■ *The Green Builder program:* The Green Builder program adds additional factors to the rating process from Energy Star including water-efficiency, material safety, and solid-waste disposal options. Interested builders are required to attend a half-day seminar before participating in the program. Builders must also attend at least one technical seminar annually on subjects including rainwater harvesting, greywater, heat pump technology, insulation, and recyclable products.

Both residential new construction programs place a strong emphasis on customer education. A primary goal for the future of the Green Builder program is expansion to the commercial sector. In fact many commercial builders have approached the ESD even though no formal program exists and no marketing has been done. Green Builder specifications are beginning to be written into local requests for proposals for commercial construction, providing an indication of the program's market transformation influence.

To support the Green Builder program, ESD published the Sustainable Building Sourcebook. The Sourcebook is designed to encourage the implementation of environmentally-responsible practices in home building and to address the options presented in the Green Building Guide. While focusing on the residential sector, many of the recommendations are relevant to commercial new construction. Although the Sourcebook focuses on Austin (regulatory issues, installation guidelines, etc.) much of the information is transferable to other areas and as such Austin has made an invaluable contribution raising awareness of the materials that become permanently embedded in new homes. (The original Green Builder Guide is no longer in print. A revised version will be complete in late 1994.)

The purpose of the Sourcebook is to provide the practical information needed to implement the options in the Green Building Guide. Topics covered include water, energy, building materials, and solid waste. Specific design considerations discussed include composting toilets, water-pervious materials, Xeriscape landscaping (which includes soil analysis, appropriate plant selection, efficient irrigation, and use of mulches), greywater irrigation (sub-surface distribution), harvested rain water, passive solar design, radiant barrier and ridge-and-soffit venting, earth sheltered design, solar heating and cooling systems, photovoltaics, gas water heating, earth materials, straw bale construction, and compost systems.

■ *Home Energy Audits:* ESD assists residential customers in arranging home energy audits so that they may then receive low interest loans or rebates from the City of Austin. Prior to October 1990 audits were provided for free. Following the energy audit, customers must submit the results of the audit and recommended work to ESD before work can begin. ESD provides audit forms free of charge to all local contractors. These forms are used as the basis to receive program funding.

■ *Whole House Rebate program:* Customers receiving approval for work are eligible for the Whole House Rebate program or Home Energy Loan program. These programs accounted for 4,077 kW in savings during FY 1992-93. The Whole House Rebate program provides rebates for customers with central or window air conditioning who weatherize their homes. Rebates range from $150 to 35% of the total job cost. Customers replacing their air conditioner or heat pump at the time of weatherization may qualify for a bonus rebate in addition to the rebate available through the Appliance Efficiency program.

■ *Home Energy Loan program:* With the Home Energy Loan program, customers receiving an energy audit are eligible for low interest loans of up to $6,000 for a single-family home or $9,000 for a duplex. Interest on the loans ranges from 0% for three or five year loans to 2% for seven years. Loans can be used for air conditioner/heater replacement, air infiltration control, solar screens/film, attic insulation, attic ventilation, duct repair and insulation, and AC servicing.

■ *Free Home Weatherization program:* Austin offers a Free Home Weatherization program for elderly, disabled, and low-income customers. ESD provides contractors and materials for energy improvements including attic insulation, caulking and weatherstripping doors and windows, solar screens, water saving devices, window glazing, attic ventilation, and duct repair. The program has recently added green building specifications to its guidelines.

■ *Appliance Efficiency program:* The Appliance Efficiency program offers rebates for retrofits of HVAC equipment. HVAC contractors or dealers help customers with rebate applications and program guidelines. Rebate applications must be submitted within 60 days of installation, and an energy audit is not required. Rebates range from $25 to $530 for qualifying air conditioners, heat pumps, and solar water heaters.

The Appliance Efficiency program accounted for savings of 3.8 MW in FY 1992-93. Rebates were used to ratchet up AC efficiency ratings, which in turn created a transformation of the market. Once market transformation was completed, the code was then also made more stringent. It is important to note that ESD has responsibility for the energy codes for the City and can ratchet code levels in harmony with its DSM efforts.

■ *Gas technologies programs:* Austin also offers a variety of gas conservation programs in cooperation with Southern Union Gas to Southern Union's customers. A Free Weatherization and Space Heater component is available for gas customers who are elderly, disabled, or low-income. A rebate of $50 is offered to gas customers who install gas furnaces with an 80% Annual Fuel Utilization Efficiency Rating (AFUE) or higher, equipped with an intermittent ignition device. Homeowners, facility managers, and apartment owners who install gas combination heaters may be eligible for a $125 rebate. In conjunction with the City's Residential Energy programs water heater wraps and pipe insulation are installed in homes that are audited by a registered contractor. At certain times of the year, water heater wraps and pipe insulation are installed for free in homes in targeted neighborhoods. The program provides funding for efficient gas engine chillers for commercial customers as well.

■ *Shade tree program:* ESD also offers Trees for Energy coupons to promote shading of homes, with two coupons available for each residential customer. Each coupon is worth $15 toward the purchase of a tree of more than 10 gallons in size.

■ *The Commercial Energy Management Partnership:* The Commercial Energy Management Partnership (CEMP) is the umbrella name for Austin's commercial DSM offerings. ESD offers technical and financial incentives to electric customers and qualifying Southern Union Gas customers. Rebates are offered in the following categories: Lighting, Building Envelope, Motors, Refrigeration, Air Conditioning, Gas Technologies, and Thermal Storage. A walk-through audit is required for all rebate categories except motors and refrigeration compressors. After the audit, customers submit a rebate application to ESD which in turn issues a Letter of Intent, itemizing the possible rebates. After installation an ESD inspection is required before rebates are paid. The minimum rebate is $25 per facility; the maximum

rebate amount of $100,000 was repealed by City Council. Rebates exceeding $35,000 must be approved by City Council. Rebates are also available for new construction projects.

The commercial programs began in 1985, taking over the utility's relamping program. This program was expanded in 1986/87 to the current group of programs. Austin has tried to use Pacific Gas & Electric's commercial DSM efforts as a model. Currently ESD only offers rebates because loans and leasing programs are seen as a potential liability risk by the City Council.

For 1993, commercial program savings goals increased to 12 MW from a 1992 goal of 6 MW. The commercial group is increasing its staff by 3 people and it is likely that incentive levels will be increased in the near future. During 1993 the commercial division spent approximately $200/kW saved. The goal for the entire ESD is to maintain spending of $400/kW saved.

Most commercial demand savings come from small commercial buildings, defined as buildings that demand between 200-500 kW, with 60% to 70% of these savings from lighting measures. Of the 23 MW saved in 1992 through all ESD programs approximately 7 MW of savings came from the commercial sector. In FY 1995, it is expected that commercial savings will exceed residential savings for the first time.

2. BURLINGTON ELECTRIC DEPARTMENT'S CURRENT PORTFOLIO OF DSM PROGRAMS

■ ***Neighbor$ave (Smartlight) program:*** The Neighbor$ave program began in 1990, providing residential customers with energy saving devices. Trained student employees traveled door to door installing faucet aerators, low-flow showerheads, water heater insulation blankets, and compact fluorescent lamps (Smartlights) into residents' homes at no charge. At the same time, the student employees reviewed household energy use and provided information on additional energy saving opportunities.

A primary component of Neighbor$ave has been Smartlight, which provides compact fluorescent lamps to customers who in turn pay a 20¢/month leasing fee on each lamp for a total of 60 months. Currently BED offers about 10 different lighting products through the Smartlight component. Initially Smartlight and Neighbor$ave were separate programs, but Smartlight did not fare well as a stand-alone, mail-order program and was combined with the Neighbor$ave program.

Through the Neighbor$ave program to date over 8,251 homes and apartments, out of a total eligible market of 14,400 units, have been visited and over 26,000 compact fluorescent bulbs have been installed. On average BED has installed 4.46 bulbs per participating customer. With the additional bulbs ordered via mail order and walk-in, the Smartlight program has distributed over 38,000 bulbs total. Of these, 6,422 bulbs have been returned. Some are returned because the customer was not happy with the performance or wished to trade bulbs. Many bulbs are returned when accounts close. These bulbs are cleaned and redistributed. Other bulbs are returned because of failure or breakage. Over 10,600 leases are inactive. These are bulbs in locations where the customers have closed their accounts. Some of these bulbs have moved to other locations in the city and others have left altogether.

The program peaked during the summers of 1990 and 1991 with 24 field personnel, 4 telemarketers, and 2 supervisors implementing the program, all of whom were college students.

BED representatives still visit about 1,000 homes annually for the Neighbor$ave program. In addition to the student implementers, which is scaled back to coincide with school, BED devotes about one and a half full-time equivalents to the program to handle 10 installations per week.

Although not formally evaluated, the Smartlight program is carefully monitored as all leasing information is tracked in a database for billing purposes. To date it has cost the utility $1.1 million and the customer $226,109. Since the inception of the Neighbor$ave/Smartlight program, a total savings of 5.43 GWh and a total peak coincident demand of 951 kW has resulted. A lifetime savings of 45.4 GWh is expected for the weighted measure lifetime of 8 years.

■ *Heat Exchange program:* In September 1989, the U.S. DOE awarded BED a $125,000 grant to develop and implement a pilot program for residential heat fuel switching. Using the results of this pilot program, BED initiated a full-scale residential electric heat conversion program. The full scale program began in April 1991 and has a goal of reaching 1,500 of the 2,200 electric heat homes. Approximately 70% of conversions to date have been to natural gas. The program places a special emphasis on rental housing because 68% of BED's electric space heat customers are renters.

Heat Exchange is attractive to both renters and landlords because heating bills are reduced drastically. Benefits to tenants are obvious, but owners also benefit because it is easier to attract and keep tenants with non-electric heat. With this program BED has the potential to reach all residential customers with electric heat because a ban on electric heat in new residences was passed in 1991. With a total of over 996 installations to date, this program has cost the utility $1.1 million and the customers $2.2 million. Energy savings have totaled 9.6 GWh and coincident peak demand reduction has totaled 3.2 GWh. Over the expected lifetime of 20 years 137 GWh is the projected savings. The weighted measure lifetime for the Heat Exchange program is 14 years.

Participation in the program begins with a free energy audit conducted by a BED contractor and a BED energy services specialist. A summary report is provided to the customer which includes details of the contractor designed heating system as well as any necessary weatherization work. Interested customers then have the option of selecting a loan or rebate. If the customer finances the work with a loan, BED oversees the project. If the customer selects the rebate option, the customer is responsible for dealing with the contractors. Rebates can be up to $1,000 and represent 50% of the project cost. With a loan the customer pays 60% of the first-year savings estimate every year for five years. Any remaining balance is paid by BED. Loans and rebates are monitored by a customized Paradox database. A total of 4 BED full time equivalents work on the program.

The largest Heat Exchange project to date is the Northgate housing complex. Northgate was the first tenant-organized buyout under Housing and Urban Development Corporation (Federal) Housing Preservation Guidelines. Through creative financing and a strong effort by the residents, community funds were raised from nine sources to buy the project and create Northgate Housing Inc. As part of the buyout the Northgate task force raised a total of $8.1 million which was spent on building rehabilitation, with approximately $2.1 million spent on energy efficiency improvements. Included in the improvements was the replacement of electric baseboard heaters with natural gas-fired, hydronic baseboard heaters. This fuel switching, or "heat exchange," took place from September 1989 through August 1990. BED contributed $267,000 directly to the effort.

In September 1990, the U.S. Department of Energy awarded a second grant to BED for $54,800 to support the efforts with energy efficiency at Northgate and to use it as a fuel substitution demonstration. The purpose of the grant was to document and disseminate the success of Northgate in reducing the costs of living in subsidized housing to affordable levels.

■ *The "Top 10" program:* The Top 10 program began in 1991 and provides a customized menu of energy-saving measures to the City's largest commercial and industrial electric customers by financing these energy efficient retrofits in their facilities. There are approximately 50 customers in the total eligible market who qualify for this program by having a peak annual demand greater than 200 kW. Despite the program name it actually deals with the 30 largest C/I customers. (Originally the program was targeted at the ten largest customers, but has since been expanded though the name stuck!)

BED works closely with the customer's management team to provide a positive cash flow for financing DSM measures, typically buying down the customer's payback to between 3 and 3 1/2 years. A project must have a payback of less than 5 years to participate. Loans are provided by local lenders and BED often helps secure financing. In one instance, BED provided project financing directly. Utility engineers and energy service representatives work directly with the customers. Many Top 10 projects include fuel switching from electric heat. The utility tries to be very flexible when dealing with its large C/I customers in order to maximize DSM participation.

The program design has been successful to date and has not required major modifications. Also very successful has been a series of energy efficiency seminars targeted at the facility managers for these large customers. It has produced very good results for this group, and participation has extended well beyond to the energy community at large.

BED has found it relatively easy to get its largest customers to participate because of longstanding relationships between the utility and the customer. With a total of 10 installations to date, this program has cost the utility $490,000 and the customer $1.03 million. Energy savings have totaled 3.5 GWh and coincident peak demand reduction has totaled 678 kWh. Over the expected lifetime of 20 years the program has projected savings of 52.8 GWh. The weighted measure lifetime for the Top Ten program is 15 years.

■ *Energy Advantage program:* Begun in 1991, this program, with a total eligible market of approximately 2300 customers, promotes energy efficiency to small C/I customers that have a demand under 200 kW. The utility provides free energy audits to interested customers. The program also offers direct installation as well as positive cash flow financing for a wide range of measures that are customized for each business. Like the Top 10 program BED will buy down customer paybacks to around 3 years. Rebates are available to customers who perform the installation work themselves or install more expensive systems. Lighting retrofits are the primary measure installed and the set-up is similar to Smartlight, but customers pay 36¢/month for about 33 months.

With a total of 63 installations to date, this program has cost the utility $190,000 and the customer $357,000. Energy savings have totaled 840 MWh and coincident peak demand reduction has totaled 181 kWh. The program has projected savings of 10.7 GWh over a 20-year lifetime. The weighted measure lifetime for the Energy Advantage program is 13 years.

BED encourages customers to install measures that go beyond the revised building code passed in 1991. The program has a participation goal of 1,500 customers out of a possible 3,500 customers. So far BED has achieved an 8% penetration rate after about 2 1/2 years of implementation. Energy Advantage has a low number of completed projects due in part to the long lag time between the energy audit and project completion. Another major factor affecting participation is the fact that BED has not formally marketed the Energy Advantage program at all. Nonetheless program savings are ahead of projected savings.

BED has found a greater challenge in marketing DSM to small C/I customers than it has with the Top 10 program. This is likely due to a high turnover rate in the small C/I sector as well as the lack of time that small business owners have to consider energy conservation as well as energy conservation ranking low on their priority list. Overall the utility has had better luck getting new construction projects to participate.

While the four programs listed above represent the core of BED's DSM programs, the utility also offers several other customer energy efficiency services. For residential, small commercial, and large commercial and industrial customers, BED offers new construction programs. For residential customers, BED's Power Miser program has installed direct load control switches on electric hot water heaters throughout Burlington.

3. SACRAMENTO MUNICIPAL UTILITY DISTRICT'S CURRENT PORTFOLIO OF DSM PROGRAMS

■ *Equipment Efficiency Improvement program:* During 1993, the Equipment Efficiency Improvement program provided rebates and/or financing to stimulate the purchase of more than 5,500 efficient heat pumps and air conditioners to replace inefficient electric heating and cooling systems. The program also resulted in over 3,600 ceiling and wall insulation and shade screen installations. Nearly $8 million in rebates and nearly $18 million in loans were provided through the program in 1993.

■ *Solar Water Heater program:* The Solar Water Heater campaign got off to a quick start with over 1,200 systems installed from the start of the program in 1992, of which 774 were installed in 1993. Savings for the program totaled 2 GWh and 0.3 MW in 1993. The program replaces inefficient electric water heaters with efficient solar water heaters, is contractor driven, and has high quality assurance standards and control. Rebates averaged $1,082 and financing averaged $2,286 in 1993.

■ *The Community Partners program:* The Community Partners low-income program has been implemented since 1990 and includes direct installation of various weatherization measures. In certain instances refrigerators are provided free, with 886 delivered in 1993 and over 2,300 delivered to date. Program delivery is performed by community-based organizations and local contractors.

■ *The Direct Investment program:* The Direct Investment program is available to all electric-heat customers and is delivered by local contractors working under contract to SMUD. This program was introduced in 1993 and offers, at no costs to these customers, improved insulation; plugging of leaks around ducts, windows, and doors; and other measures such as low-flow showerheads and compact fluorescents. In 1993, nearly 15,000 energy efficiency measures, including over 7,700 compact fluorescent light bulbs, were installed in 2,670 homes following audits of nearly 3,700 electrically-heated homes.

■ *The Shade Tree program:* This program is a joint effort with the Sacramento Tree Foundation and has resulted in the planting of over 109,000 shade trees in the yards of SMUD customers since 1990, of which over 44,000 were planted in 1993. Fully grown, these trees can reduce home cooling costs by up to 40% in the summer.

■ *The Peak Corps Air Conditioner Load Management program:* The Peak Corps Air Conditioner Load Management program is SMUD's largest DSM program in terms of capacity savings and allows SMUD to cycle participating customers' air conditioners during selected summer days. Installed summer peak capacity savings were estimated at 115 MW by the end of 1993 with more than 96,000

residential customers and nearly 33,000 tons of commercial air conditioning participating. Cycling occurs on average 10 to 16 days per summer. There are several types of participation options for residential customers, with the most stringent being "the Peak Performer" which cycles AC loads off up to four hours and saves customers up to $20 monthly from their summer bill. Currently 35% of participating customers have selected this option.

Participation in the Peak Corps program has benefitted greatly by SMUD's Rule 15 adopted in 1990. Rule 15 is a hook-up condition and requires that all newly-constructed homes with central air conditioning participate in Peak Corps unless the customer requests removal. Less than 20% of new homeowners have requested to withdraw from the program, and new construction currently accounts for about half of all new participants. In 1992 SMUD initiated a recorded message updated daily on the Sacramento Bee's (newspaper) BeeLine telephone information system. The recording alerts customers whether the utility will be cycling loads that day. Daily radio messages serve the same purpose.

■ *Auxiliary Power, Curtailable Service, and Fast Dispatch programs:* For large C/I customers there are three interruptible rate load management options. The Auxiliary Power program takes advantage of the on-site generators that many large agencies and firms — computer/data, telephone/telecommunication, hospitals — have as a means to maintain service when SMUD power is interrupted. These generators are used in place of SMUD connected power during peak periods as part of the program contract. Customers participating in the Curtailable Service program commit to turning off a prescribed amount of load within two hours of notification on peak days. The Fast Dispatch program participants are able to shed facility electric loads within ten minutes. By the end of 1993, 60 MW of dispatchable load were under contract.

■ *Pool and Spa Load Management program:* Started in 1978, the Pool/Spa Load Management program uses advertising, education, and free time clock trippers to encourage owners of pools and spas to shift the hours of operation of filtering pumps to off-peak hours. In 1993, from pools alone, the District realized approximately 18 MW of capacity shifted off-peak.

■ *Energy Efficient Refrigerator program:* SMUD's refrigerator program is comprised of two major elements: rebates for encouraging customers to buy the most efficient unit they can afford, and incentives to encourage the removal of older, inefficient models from service. New refrigerators must exceed 1993 Federal appliance efficiency standards by at least 15%. The old units are prematurely removed from the market by dismantling them, removing the refrigerant (which is sold back to a manufacturer), disposing of the capacitor and its oil, and selling the box as scrap. The refrigerator program is operated through a number of local appliance dealers who advertise the availability of SMUD's trade-in incentive and rebates on specified models. By the end of 1993, nearly 70,000 new high-efficiency refrigerators had been purchased, of which over 18,000 were purchased in 1993; and 63,000 old units were turned in and "recycled," of which over 20,000 were recycled in 1993.

■ *New Construction program:* A New Construction incentive program for all sectors seeks to make new buildings and homes 25% more energy-efficient than state codes. Builders receive incentives for advanced HVAC systems, efficient lighting, added insulation, and other measures. This program focuses on avoiding lost opportunities by providing design assistance and financial incentives based on incremental costs. The program seeks to transform the construction market by reaching building owners as well as designers and builders. Savings of 4.0 GWh and 2.5 MW were achieved through this program in 1993.

■ *Large and Small Commercial/Industrial Retrofit programs:* SMUD's C/I Retrofit programs offer C/I customers energy advisory services, energy use analysis and efficiency recommendations, and rebates and financing. Program participation is driven primarily by the 100 SMUD-approved electrical and mechanical contractors and vendors. In 1993, these programs resulted in 9.1 MW and 43 GWh of savings.

■ *DSM Bidding program:* Currently SMUD is implementing a pilot DSM Bidding program for C&I customers. The utility received 36 responses to its requests for bids, short-listed eight, and selected three. All of the bids are from energy service companies. Bids were required to come in under 3.5 ¢/kWh and provide at least 30% of savings from non-lighting measures. Approximately 10 MW of capacity savings are expected to be achieved by December, 1995.

■ *Multi-Family Retrofit program:* For SMUD's Multi-Family Retrofit program, residential buildings that have five or more dwelling units are considered multi-family. SMUD energy specialists provide on-site energy audits and recommendations for efficiency improvements. Custom rebates for the commercial accounts (common area lighting, pools, HVAC), prescriptive rebates for residential accounts, and direct installation of weatherization, water heating, and lighting measures are provided. Through 1993, over 7,700 apartment units have received energy audits.

■ *Schools and Public Buildings program:* SMUD's Schools and Public Buildings program offers advisory services, educational services and assistance, direct energy use audits, rebates, and lease/purchase financial arrangements for schools and public buildings (State, Federal, County, and City governments). The program provides comprehensive energy efficiency audits, identifying all cost-effective opportunities in existing schools and other public buildings. To assist schools and public agencies in financing and installing energy efficiency improvements, program staff can arrange for customer payment through a lease/purchase agreement with the District. A SMUD energy specialist may also act as a project manager to help a customer select a contractor, arrange installation, and oversee project quality. SMUD completed 73 audits in 1993.

■ *Total School Energy Management program:* SMUD has provided educational services to the community and schools for many years, focusing on safety, alternative fuels, generating sources, and energy and the environment. The goal of these programs is to institutionalize efficiency by educating its customers. With the Total School Energy Management program (TSEM) the utility hopes to change the behavior of children in grades K - 6 by educating them about environmental issues and energy consumption. By educating young children the program also hopes to reach their parents.

4. SEATTLE CITY LIGHT'S CURRENT PORTFOLIO OF DSM PROGRAMS

In 1992 SCL offered a total of 16 DSM programs including 8 residential programs, 6 commercial programs, and 2 industrial programs. Seattle's residential programs dominate its DSM roster in terms of savings and participation.

Another prominent feature of SCL's DSM portfolio is the Lighting Design Lab. SCL continues to operate the Lighting Design Lab, a project of several Northwest utilities and other organizations and one of the most exciting energy resource centers in the country. Overall, SCL's DSM efforts in 1992 achieved total savings of 34 aMW in 1992. Note that the savings below refer to 1992 participants only and do not reflect cumulative program activity.

■ *Home Water Savers program:* The Home Water Savers program was initiated in 1992 and was run in cooperation with the Seattle Water Department and Puget Sound Power & Light Company. The program distributed energy-efficient showerheads and faucet aerators to all 193,000 single-family customers in SCL's service territory saving 39 GWh and 4.4 aMW.

■ *Long-Term Super Good Cents program:* The Long-Term Super Good Cents program encourages contractors to build multi-family buildings that exceed state code. Incentives for 435 units were approved through this program in 1992.

■ *Multifamily Conservation program:* The Multifamily Conservation program provided grants for installation of energy conservation measures in 65 low-income buildings containing 1,021 residential units. Savings for 1992 participants are estimated at 1.9 GWh with $1.4 million in grants provided. Loan financing was also provided for measures in 53 non low-income buildings containing 1,014 residential units, with annual savings of 1.9 GWh. A Multifamily Common Area Lighting component was established in conjunction within the Energy Smart Design program, and 177 buildings with 3,187 units participated in 1992.

■ *Energy Efficient Water Heater Rebate program:* Rebates were provided to 4,636 residential customers in 1992 through the Energy Efficient Water Heater Rebate program with annual savings of 1.1 GWh.

■ *Home Energy Check program:* The Home Energy Check program completed its 14th and final year in 1992. Throughout the life of the program more than 35,000 homes were audited accounting for cumulative electric savings of 158 GWh. Audits were provided to non-electric as well as electric customers.

■ *Home Energy Loan program:* The Home Energy Loan program weatherized 210 single family homes, 45 rental homes, and 34 homes reentered the program for additional measures. A total of 58 multiplex buildings with 169 units received loans and in 1992 savings totaled 997 MWh for the program.

■ *Low Income Electric program:* The Low Income Electric program weatherized 411 residential units in 366 single-family and multiplex buildings, accounting for annual savings of 920 MWh in 1992.

Commercial energy management got a later start than did SCL's residential programs; in fact the first commercial DSM staff members were not hired until 1981. Then the initial programs primarily focused on energy management surveys and audits. SCL was not able to offer commercial incentive programs until late 1985 when the Washington State Constitution was amended in a manner similar to an amendment passed previously for residential programs. Then the Commercial Incentives Pilot program began in 1986 and ran through 1990 followed by the Energy Smart Design program.

■ *Energy Smart Design program:* The Energy Smart Design provides building owners and developers technical and financial assistance. The goal of the program is to increase the energy efficiency of new and remodeled commercial buildings by 10% to 30%. The program helped 413 commercial customers design and install energy-efficient technologies, saving 23.6 GWh through 1992. In 1993 there was a huge surge in demand for the program and the program's budget was exceeded for the first time ever. BPA bailed SCL out of this dilemma by providing an additional $8 million to the program beyond the original $5.9 million.

■ *Energy $avings Plan program:* The Energy $avings Plan is SCL's primary efficiency program for industrial customers. The program resulted in savings of 8,822 MWh in 1992 after beginning in late 1991. SCL's industrial sector is small with only 300 customers who account for 18% of total load.

■ *Lighting Design Lab:* As alluded to above, SCL's Lighting Design Laboratory (LDL) is perhaps the utility's most exciting DSM initiative. LDL was opened in 1988 and currently provides visitors with efficient lighting information and services through consultations, tours, classes, forums, videos, and newsletters. Though managed by SCL, the LDL is a regional venture. The original sponsors of the project were Natural Resources Defense Council, BPA, SCL, and Northwest Conservation Act Coalition, though many additional sponsors have been added since its inception. LDL is unquestionably the primary resource for lighting information in the Northwest and is responsible for ushering in a new type of DSM program nationwide: energy resource centers.

In addition to the programs listed above SCL also implements the Residential Efficiency Standards program, the Northwest Energy Code, the Industrial R&D Project, the commercial Energy Management Survey, General Service Efficiency Standards, and Street and Area Lighting programs.

5. WAVERLY LIGHT AND POWER'S CURRENT PORTFOLIO OF DSM PROGRAMS

■ *The Good Cents New and Improved Homes program:* WLP's most exemplary DSM program is the Good Cents New Home and Improved Home Program. The program, internationally marketed among utilities, promotes energy conservation measures in the construction of a new or improved home and additionally heating and cooling that home with energy efficient equipment thus yielding a 30 to 50 percent reduction in its total energy requirements. For qualifying homes WLP reduces the energy portion of the electric bill on a Good Cents home by 10% for a period of 10 years. So far, WLP estimates that its Good Cents homes have achieved energy savings of about 28% per home in a total of 7 homes. To date the program has been primarily customer driven.

WLP first offers a free residential audit for those customers considering improving their homes. To obtain a Good Cents Certification, a home must meet the program's prescriptive standards dealing with the insulation of floors, walls, ceilings, doors, windows, ventilation, and air distribution, as well as performance standards for water heating and HVAC. To date Waverly has seen extensive free ridership in its programs, especially the Good Cents programs. WLP does not plan to estimate free ridership nor does it plan to do impact analyses on its DSM programs in the near future.

■ *Residential Loan Program:* In April of 1994 WLP initiated its Residential Loan Program that finances Good Cents Home improvements in the areas of insulation, storm windows and doors, replacement windows, weatherization, hot water systems, HVAC systems, and other items approved by WLP. 100% financing will be offered to WLP customers at 8% for amounts from $1,000 to $15,000, with WLP buying down the interest rate from 3-5%, approving measures to be financed, and inspecting work prior to funds being disbursed. WLP will deposit their portion of the interest payments in a reserve account with each bank after utility inspection has been performed and the loans have been processed. The banks will draw from reserve accounts as necessary to make interest payments. WLP will receive interest earned on the reserve accounts which will reduce the cost of their subsidy. If loans are paid off early the banks will not draw down any further funds on that loan.

■ *Rate Restructuring:* In May of 1992 WLP's Board of Trustees approved a new rate structure that affords energy efficiency opportunities for all customers. A declining block rate, where rates go down dramatically after 1,000 kWh usage, is still offered for the few residential customers, around 30, having all electric homes. (Most all electric customers live in relatively small apartment units and do not use 1,000 kWh per month, making this socially-sensitive rate provision largely unnecessary.) However,

declining block rates have otherwise been eliminated for all other customer classes. A flat rate is WLP's standard for residential customers. A Commercial Time-Of-Day Pricing for commercial and general power rate riders is designed to provide an incentive for those customers who move a significant amount of usage to off-peak hours, along with an Interruptible Load Program where larger industrial customers interrupt part or all of their load during summer peak periods when asked to do so by the utility. Only a limited number of interruptions are required during a year to avoid creating new higher peak demands. A rate rider incentive of $2.00 per kW-month credit is offered for a pre-determined amount of load that could be interrupted. A Customer-Owned Generation Program is designed for customers that need or benefit from having on-site backup diesel generation. The customer receives an incentive of $2.00 per kW of generation per month if he agrees to run the generator during summer peak periods when requested by the utility.

- *Commercial/Industrial Audit program:* The Commercial Audit Program is a free service offered to all C&I customers in order to highlight efficiency opportunities and to view the potential for savings and possible rebates through the C&I Lighting, Motor and HVAC Programs. Audits include: a summary of the facility's condition, identification of energy conservation measures presently in effect, identification of potential energy conservation measures, provisions for average simple paybacks for motors and lights along with expected kW and kWh reductions, preparation of an electricity consumption report, estimation of savings if the energy conservation measures are implemented, and a summary of rebate and rate programs offered by WLP.

- *Commercial/Industrial Motor, Lighting, and HVAC Rebate program:* WLP's Commercial and Industrial Motor, Lighting, and HVAC Energy Efficiency Program pays a cash rebate of $100 per kW saved. The kW saved is based on the net coincident peak demand reduction from the improvement of the customer's choice. Lighting retrofits receive efficiency gains by 1) converting incandescent to fluorescent or high pressure sodium (HPS), 2) converting mercury vapor to HPS, 3) converting fluorescent to high efficiency fluorescent, and 4) adding occupancy sensors and day-lighting controls. The rebates for the HVAC retrofits include incentive levels that improve equipment payback for the customer for 1 to 3 years. Improvements include cooling towers, variable air volume systems, reduced ventilation rates, heat exchangers and window shades and films. Motor retrofits result in rebates for switching to variable speed drives and downsizing.

- *Appliance Rebate program:* WLP's Appliance Rebate Program offers a cash rebate of $100.00 or $110.00 in "Waverly Dollars" for a refrigerator that is 10% more efficient than 1993 federal standards, $75.00 or $82.52 in "Waverly Dollars" for a freezer that is 10% more efficient than 1993 federal standards, and a $50.00 or $55.00 in "Waverly Dollars" for an air conditioner with an EER of 10 or more. "Waverly Dollars" are rebates given to customers allowing them to spend the money at any Chamber of Commerce business.

- *Urban Forestry program:* In 1991, WLP made a five-year, $100,000 commitment to the Iowa Natural Heritage Foundation's Trees Forever (Urban Forestry) Program which has earned Waverly a "Tree City, USA" designation. On a per residential customer basis, WLP's tree planting commitment is 5 times greater than known programs of other utilities.

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