
Seattle City Light Comprehensive Municipal DSM Profile #103

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Executive Summary

Seattle City Light, one of the nation's largest municipal utilities, reinforces the notion that utilities can effectively offer demand-side management (DSM) services in regions characterized by low power rates. Despite rates that rank among the lowest in the nation, Seattle City Light (SCL) exemplifies dedication to public power and has proven that commitment to social concerns and energy efficiency can result in exemplary levels of savings through widespread participation in all sectors of the City's economy. SCL's success can also be measured by its DSM expenditures as a percentage of gross revenues: In 1993 SCL budgeted a precedent-setting 9.1% of gross revenues for DSM!

Ironically, Seattle City Light was not the instigator of its early emphasis on energy efficiency. Instead, a lawsuit overturned the utility's planned investment in the Washington Public Power Supply System (a proposed series of nuclear plants) and effectively changed the utility's course, paving the way for what has become one of the nation's leading examples of energy efficiency. This success has been supported by the Bonneville Power Administration which over time has funded nearly one-quarter of SCL's DSM expenditures. More fundamentally, however, Seattle's energy efficiency success is a reflection of Seattle citizens' wishes to save on their electricity bills. SCL wants to increase comfort and well-being for all citizens, while fulfilling the utility's resource requirements through the most socially responsible and least cost means possible.

A key feature of Seattle's DSM efforts has been its dedicated staff, some of which have been involved in its energy conservation programs since they began in the late 1970s. Another feature has been the utility's willingness to hire its own critics, reaping talent from unlikely places, gaining strength from adversity, and fully exploiting the talents of a broad array of Seattle's population to engage one of the nation's premier efficiency programs.

Coupled with this staff orientation has been a rock-solid focus on evaluation. Since 1980 SCL has developed and benefitted from a highly capable DSM Evaluation Unit. This group provided a solid justification for early energy efficiency initiatives and is now responsible for carefully assessing the impacts of SCL's DSM programs.

Seattle City Light has clearly demonstrated the power of collaboration. To support energy efficiency for the City's low-income residents, the utility has worked closely with Seattle's Department of Housing and Human Services. With many other regional utilities it created the Lighting Design Lab, one of the nation's first and most successful energy centers. To address water shortages in the region, it collaborated with other City departments and utilities to implement the highly successful Home Water Savers program. These types of collaborations, coupled with its unique business culture and commitment to its customer/owners, yield a truly exemplary model of municipal utility DSM success well worthy of examination and replication.

SEATTLE CITY LIGHT Comprehensive Municipal DSM

Sector: Residential, Commercial, Industrial
Measures: From weatherization, lighting, energy-efficient water heaters, and water efficiency measures to industrial and commercial efficiency improvements for motors and HVAC

Mechanism: Rebates, loans, and grants for energy-efficient measures; design assistance and energy audits for commercial and industrial sectors

History: Load management since the 1970s; developed first energy conservation program in 1978; formed evaluation unit and first IRP in 1980

1993 PROGRAM DATA

Energy savings: 52,629 MWh
Capacity savings: 5 aMW
Lifecycle energy savings: 885,294 MWh
Cost: \$21,678,000

CUMULATIVE DATA

Energy savings: 2,454,256 MWh
Lifecycle energy savings: 7,380,743 MWh
Capacity savings: 41 aMW
Costs: \$198,130,100

CONVENTIONS

For the entire 1994 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the U.S. Federal Reserve's foreign exchange rates.

The Results Center uses three conventions for presenting program savings. **ANNUAL SAVINGS** refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as 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. **LIFECYCLE SAVINGS** are calculated by multiplying the annual savings by the assumed average measure lifetime. **CAUTION:** cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

Utility Overview

Seattle City Light (referred to herein as SCL or City Light) is the largest municipal electric utility in the Pacific Northwest and provides power to 333,448 customers. SCL's service territory encompasses 131 square miles and a population of 680,000. Residential customers make up 90% of the total number of customers but accounted for only 36.6% of electric sales in 1993. In the same year, the residential sector consumed 3,261 GWh, 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%). [R#16]

Electric sales increased slightly in 1993 to 8,915 GWh, up from 8,762 GWh in 1992, while SCL's total electric revenues also increased to \$289 million in 1993, though the utility experienced a net loss for the year due to the Northwest's lingering drought. Average energy consumption per residential customer remained fairly steady at 10,810 kWh, up slightly from 10,313 kWh in 1992, but more importantly marking a ten-year gradual decline from 12,119 kWh in 1984. [R#5,16]

One of the great ironies of SCL's success with energy conservation is that it provides power to its customers at extremely low rates, typically a big disincentive to energy efficiency. SCL rates in 1993 were 3.35 ¢/kWh for residential customers, 3.23 ¢/kWh for commercial customers, and 2.84 ¢/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 "clean" hydroelectricity, electric space heating and water heating are still prevalent in SCL's service territory making it a winter-peaking utility and causing average residential customer consumption to be on the order of 1,000 kWh higher per year than national averages. Air conditioning, however, is rare in homes but is commonly used in commercial buildings throughout the year. [R#16]

SCL 1993 STATISTICS

<i>Number of Customers</i>	333,448
<i>Electric Revenues</i>	\$288.8 million
<i>Energy Sales</i>	8,915 GWh
<i>Winter Peak Demand</i>	1,875 MW
<i>Generating Capacity</i>	1,974 MW
<i>Reserve Margin</i>	5 %

Average Electric Rates

<i>Residential</i>	3.35 ¢/kWh
<i>Commercial</i>	3.23 ¢/kWh
<i>Industrial</i>	2.84 ¢/kWh
<i>Government</i>	3.41 ¢/kWh

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 (BPA) and other utilities. The BPA contract expires in 2001 and during 1993 provided about 215 aMW. (One average megawatt, a term used in hydro-based areas, 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 1993. SCL also obtains about 36 aMW annually from the Ross Dam hydroelectric plant in British Columbia. Other power transactions are conducted under short term agreements and interchanges of secondary power with utilities in response to seasonal resource and demand variations. [R#16] ■

Utility DSM Overview

SCL'S ROAD TO DEMAND-SIDE MANAGEMENT

City Light has an unusually long track record with energy efficiency. It 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," a public planning process which 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 Washington Public Power Supply System (WPPSS) nuclear plants. SCL decided not to invest in WPPSS in large part due to public disapproval and an ensuing lawsuit. This legal action turned the tide at SCL from its prior supply-side orientation and ushered in an era of conservation and what later became known as demand-side management. [R#1,2,3]

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 at the time. Subsequently 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). [R#1,2,3]

In 1977, Bonneville Power Administration, the large federal power marketing agency that developed and distributes the region's abundant hydroelectricity, announced that its power supply would be insufficient by 1983. SCL and other utilities in the area had long depended on BPA's surplus hydroelectricity to fulfill load growth. The announcement of ensuing hydroelectric deficit gave SCL a six-year window to make energy conservation work. In addition, Bonneville instituted its conservation buy-back provision such that utilities that purchased its power were able to be reimbursed for part of their DSM costs. [R#1,2,3]

In 1978 SCL offered its first energy conservation program which was focussed on low-income grants for the elderly. In the same year the U.S. Department of Energy (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%. [R#1]

In 1980 Larry Gunn became the Director of the Conservation

SCL DSM OVERVIEW	DSM EXPENDITURE (x1,000)	ENERGY SAVINGS (MWh)	CAPACITY SAVINGS (aMW)
1977	\$362	116	0
1978	\$2,472	1,680	0
1979	\$2,467	7,183	1
1980	\$2,837	8,641	1
1981	\$6,123	12,075	1
1982	\$14,440	49,590	6
1983	\$20,141	52,012	6
1984	\$13,658	28,217	1
1985	\$13,205	23,122	3
1986	\$15,911	23,134	2
1987	\$14,270	15,015	2
1988	\$14,884	19,181	1
1989	\$13,446	16,385	1
1990	\$13,326	18,991	2
1991	\$12,542	28,481	3
1992	\$16,367	70,147	6
1993	\$21,678	52,629	5
Total	\$198,130	426,599	41

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 formally mandated that conservation efforts be evaluated. Rigorous in-house evaluation methodologies and capabilities to provide for consistent measurement and evaluation were established. This emphasis on evaluation was later key to the survival of DSM at SCL and has served as an important justification for its efforts throughout the utility's lengthy experience with DSM. At this time, a long-range planning function was also established in order to strategically develop conservation efforts for the future. [R#1,2,3]

As SCL's staff evolved it came to consist of a tremendous diversity of people with different backgrounds. The Office of Conservation and the City began a trend of incorporating progressive thinkers into utility operations, deemed preferable

over using outside consultants. This too, has been an important aspect of the utility's success with DSM and the complexion of its programs. [R#1,3,11,12]

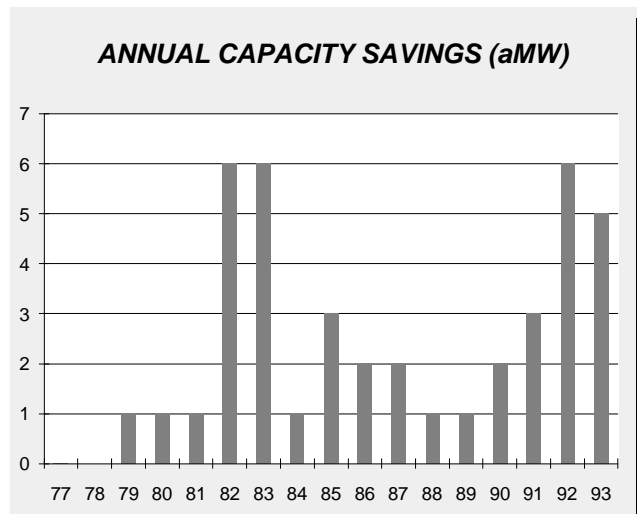
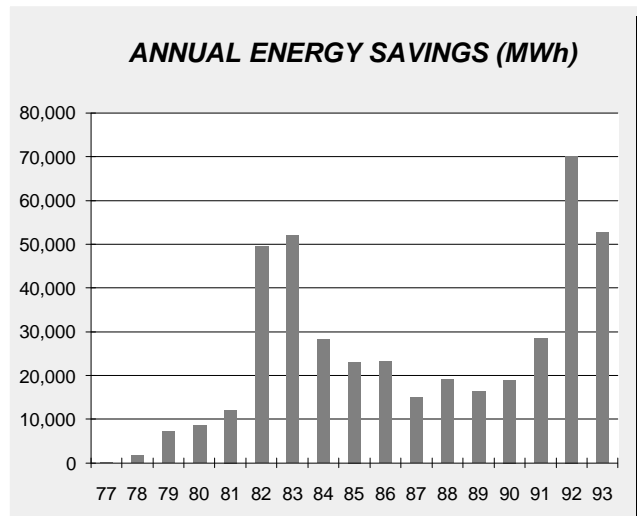
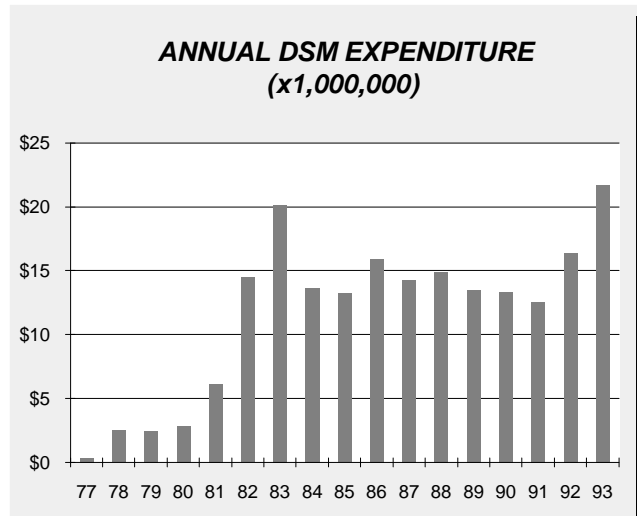
In 1980 the Conservation Legislative Analysis and Policy Development group assisted in the development of a conservation and surplus policy at the request of City Council. The resulting Energy Resources Plan was the utility's first attempt at integrated resource planning. Thus SCL began to look at planning from five perspectives: cost of new generation; a societal perspective; a regional perspective; the participant perspective; and the non-participant perspective. Of course, these five perspectives later have become key to utility planning for demand-side management across the nation. [R#1,2]

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. Larry Gunn and his staff weathered this threat to the division and 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 the environmental community and allies in City Hall) was also a primary factor in preserving its existence. [R#1,2,3]

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 Conservation Division had really become integrated into the utility's operations. This was also reflected in the utility's financial commitment to DSM. Annual Division expenditures have risen from an initial \$362,000 to over \$21.5 million in 1993. [R#1,2,3]

SCL'S CURRENT STATE 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. Furthermore, SCL wants to be seen in this leadership capacity and was pleased to be selected in 1993 by The Results Center, Oak Ridge National Laboratory, and the U.S. Department of Energy as one of the five best municipal utilities in the nation in regard to demand-side management. 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." ☞



Utility DSM Overview (continued)

During 1992 there were several developments that supported SCL's IRP and DSM efforts for the future including a task force that set goals for the utility's DSM efforts and a recommendation to place greater emphasis on commercial and industrial energy efficiency. Regional energy forecasts, which have varied from deficit to surplus over the years, also play an important role in SCL's DSM emphases. Current forecasts predict an energy balance that often dips into deficit over the next 20 years. During 1992 and 1993 due to drought, the region was deficient in energy supplies. Though SCL has maintained and implemented its DSM programs regardless of energy supply, future forecasts make its commitment to DSM even more crucial. [R#1,12]

PLANNING

The Conservation Task Force launched in 1992 included customers, interest groups, the utility, City Council staff, the City Office of Management and Budget, BPA, and the Northwest Power Planning Council. It set ambitious goals for the utility including a conservation goal of 100 aMW of additional capacity savings by the year 2003, quadrupling DSM savings. The Conservation Implementation Plan was submitted to the Mayor and City Council in 1993 and subsequently approved. Its 10-year planning horizon placed 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.

Seattle's City Council not only endorsed the Conservation Implementation Plan but unanimously passed an ordinance required to increase the 1993 budget to implement the Plan immediately. In 1993 commercial program savings tripled over 1992 values and commercial and industrial expenditures topped residential expenditures for the first time ever. Also in 1993, the DSM budget, as a percentage of gross revenues, reached an all-time high of 9.1%, surpassing 1992's extraordi-

narily high level of 7.7%. These levels signify the City's commitment to DSM and the utility's ability to effectively use significant sums to further improve the efficiency within the City. In comparison, many leading investor-owned utilities with DSM spend only 1-3% of gross revenues on DSM and have a hard time doing so effectively. [R#1,17]

Responsibility for implementing the conservation plan has fallen on the shoulders of Marc Sullivan who became the Conservation Director in 1992. Marc was well known and respected in the region as an environmental activist, having headed the Northwest Conservation Act Coalition. Ironically, Marc was also an active member of the now defunct SCL consumer watchdog group called the "Light Brigade." He has strengthened SCL's position as one of the key regional players in the energy/DSM arena by understanding the politics of the business.

In general, EMSD plans to continue to revise its residential programs in strategic ways and to continue to ramp-up its DSM efforts in the commercial/industrial sector, thereby serving these markets better while avoiding rate equity issues and in order to remain competitive as the broad restructuring of the electric utility industry takes place. The division is also planning on continuing its successful conservation efforts that focus on water and gas, teaming up with the local gas and water utilities to leverage program delivery. EMSD is proud of its experiment with implementing targeted DSM programs that focus on specific geographic areas both to deal with transmission and distribution capacity bottlenecks and to deliver conservation services more cost-effectively. Retailer involvement with selling energy-efficient products will continue and likely increase. Finally, EMSD hopes to use utility staff outside of the division, as well as staff within other City departments, to help deliver conservation. These strategies will be used to further the utility's expertise in demand-side management and to firmly root energy efficiency at Seattle City Light and throughout Seattle. [R#1,17] ■

Implementation

Since the inception of energy conservation programs at Seattle City Light in 1977, the utility has implemented 27 programs while 13 programs are currently active. Of the 12 residential programs that have been implemented in Seattle, seven are still in operation. Of the 15 commercial and industrial programs, six are currently active. SCL's Energy Conservation Accomplishments: 1977-1993 report, published by the Energy Management Services Division's Evaluation Unit, has served to carefully track SCL's DSM programs and is the source of much of the savings and expenditures data for this profile.

SCL's DSM programs are not only focused on information and providing incentives for energy-efficient equipment, but also focus on regulations. Besides maintaining an energy code for new residential and commercial construction, existing residential and commercial customers who want to add electric space heat must meet specific efficiency standards.

SCL uses a broad range of mechanisms within its programs designed to capture energy savings through greater levels of efficiency for its customers.

RESIDENTIAL PROGRAMS

Seattle City Light began its conservation programs with a strong emphasis on residential programs to address the preponderance of electric resistance space and water heating in the Northwest, coupled with lax insulation practices, both functions of historically low electricity costs. Given these factors and Seattle's marine climate, SCL is a winter peaking utility. Air conditioning is rare in homes, although common in commercial buildings year round.


The largest residential programs currently in operation are the Home Water Savers program, the Low-Income Electric program, and the Multifamily Conservation programs. Currently nearly all residential programs are financially supported by BPA: Home Water Savers program, Energy Efficient Water

Heater Rebate, and the Long-Term Super Good Cents program. Nearly all residential program savings past and present have been the result of financial incentives. (SCL's early efforts with promoting efficiency for commercial and industrial customers, on the other hand, relied to a far greater extent on informational programs.)[R#18]

Unquestionably, Blanket Seattle was one of SCL's most successful and noteworthy programs. Implemented between 1981-1983, this program provided 107,459 R-10 water heater wraps and temperature setbacks, literally blanketing the entire City. With a lifetime of ten years, the program provided customers having electric water heaters an average of 350 kWh annually in energy savings and provided the City with 313,652 MWh of total cumulative energy savings.

While the useful measure life for these wraps has now expired, potentially presenting SCL with the opportunity to return to this program, a far more attractive scenario has now unfolded. Since Federal standards require that all new hot water heaters purchased be energy-efficient, and new units exceed the efficiency of the old units with insulating wraps, the City has elected to provide rebates for super-efficient units through the Energy Efficient Water Heater Rebate program supported by BPA.[R#15]

Energy Efficient Water Heater Rebate program: The Energy Efficient Water Heater Rebate program (EEWHRP) began in 1992 in conjunction with Bonneville Power Administration. Its purpose is to increase the installation of energy-efficient electric water heaters that exceed federal standards during normal replacement. Any of SCL's 301,647 residential customers is eligible for the rebate. BPA provides a \$60 rebate per qualifying installed water heater. To be eligible for the rebate the water heater must have an energy efficiency factor exceeding current Federal standards.

While BPA sends rebate checks directly to customers, SCL is responsible for quality control as well as marketing the program to customers and dealer participants. An average single-family residence that participates in EEWHRP saves 280 kWh per year. Currently Seattle's program leads the Northwest region in the volume of rebate-eligible water heaters installed. Beginning in late 1994, the program began to serve SCL's 29,520 commercial customers as well.[R#18] 

Implementation (continued)

Home Energy Loan program: The Home Energy Loan program (HELP) has provided zero-interest loans to electrically heated households for implementing weatherization measures. The program also worked with landlords to serve rental as well as owner-occupied homes. Caulking and weatherstripping, wall insulation, storm windows, insulated glass, thermal patio door glass, and automatic clock thermostats were the available optional measures with lifetimes of 30 years. Private contractors, selected by the individual home owners, installed the measures while SCL managed and paid the contractors.

Since 1984, customers have had the option to choose a 50% rebate if they elect to repay the balance with cash in the first year instead of assuming a loan. In 1987 the terms of this offer were revised to require payment up-front (rather than anytime during the first year) to qualify for the 50% rebate. This program has served single-family and multiplex buildings with residents of moderate to high income. In late 1993, the City Council approved replacing HELP with a new program called the Warm Home Program. The goal is to serve electrically heated homes where the up-front costs of HELP were a barrier. [R#17,18]

Home Water Savers program: The Home Water Savers program (HWSP) initiated in 1992, is one of SCL's recent shining examples of success through collaboration and is run in cooperation with the Seattle Water Department, the Department of Housing and Human Services, and Puget Sound Power & Light Company. The program was developed to address the regional water shortages created by prolonged drought (which has also negatively affected SCL's hydroelectric generation). The Home Water Savers program distributed water and energy efficiency products to all single-family residences and multiplex buildings.

Within SCL's service area, Home Water Savers Kits containing measures were distributed door-to-door, free of charge, to approximately 117,941 residences with electric water heat. An additional 46,000 residences with gas or other fuel water heat received Kits funded by the Seattle Water Department. All customers, both gas and electric, received in their kits toilet water-savings products provided by the Water Department.

Each Home Water Savers Kit contained an efficient-flow showerhead rated at 2.5 gallons per minute (gpm), a 1.5 gpm bathroom faucet aerator, a toilet flow device, and toilet tank leak detection tablets, along with informational materials. Direct installation was provided for elderly and disabled customers requesting assistance.

This program has also provided direct installation of showerheads and faucet aerators in multifamily buildings having electric water heat. The goal is to directly install the efficient-flow products in 45,000 multifamily units. While the greatest residential annual energy savings in 1993 are being achieved through this program, advances in national and state plumbing codes will erode these savings over time as a result of remodelling and renovation activity. [R#18]

Long Term Super Good Cents program: The Long Term Super Good Cents program is a "beat the code" program designed to encourage builders of new residential dwellings with electric space heat to exceed the provisions of the Washington State Energy Code. It is offered by BPA under the Residential Conservation Agreement. Incentives are paid for measures that upgrade the building shell, lighting measures, and efficient appliances such as water heaters, refrigerators, and showerheads. Thermal envelope upgrades are based upon a computer analysis of heat loss and estimated savings per dwelling unit. These measures combined have an average lifetime of 29 years. The program serves new construction multifamily buildings. [R#18]

Low-Income Electric program: The Low Income Electric program (LIEP) was operated by the Department of Human Resources from 1981 to 1990 and jointly administered with SCL. It is now run through the Department of Housing and Human Services (DHHS). (See Profile #20: Seattle City Light: Low-Income Electric Program) Through this program, weatherization grants are provided to low-income households for mandatory ceiling, under-floor, and heating duct insulation; electric water heater insulation; and water heater thermostat setbacks. Optional measures include wall insulation, floor insulation in basements, caulking and weatherstripping, and smoke detectors.

LIEP's measures have an average installed lifetime of 30 years. Money for home repairs is included to ensure that the electricity savings are realized. Public contractors are selected through the program and assigned to individual homes to install the measures, while DHHS manages and pays the contractors. LIEP household income requirements are set at 70% of the Washington State median income for owner-occupants and 125% of the federally-defined poverty level for renters. [R#13,18]

Multifamily Conservation program: The Multifamily Conservation program (MFCP) began in 1986. It was preceded by a 15-building research and demonstration project. The MFCP provides financial and technical help to owners of apartment buildings with electric space heat for building insulation, lighting, and hot-water conservation measures. The available conservation measures include double-glazed replacement or conversion windows, attic or flat roof insulation, under-floor insulation, wall insulation, caulking and weatherstripping, efficient-flow showerheads, water heater wraps, temperature setbacks, pipe and duct wraps, and common-area lighting modifications. The average measure lifetime for these measures is 30 years for dwelling area measures and 16 years for common area lighting. [R#18]

Low-income building owners receive a full-cost grant, conditional upon agreement by the owner not to raise rents due to the implementation of conservation measures for a period of five years. Public contractors are selected through the program and assigned to individual buildings to install the measures while DHHS manages and pays the contractors.

Standard income building owners served by SCL qualify for 10-year, zero-interest loans with five-year deferred payments and 50% discounts for first-year payoff. Private contractors selected by the individual building owners or property managers install the measures while SCL manages and pays the contractors.

Beginning in 1993, SCL began to offer financial and technical help for common-area lighting modifications in buildings not likely to receive whole-building measures. These include oil and gas-heated buildings, condominiums of all heat sources,

and buildings constructed after the double-glazing code went into effect in 1980. The program pays for up to 70% of the installed measure cost through a rebate and a 70% discount for up-front payment. To date, no participants in this group have opted to take the 10-year, zero-interest loan despite the fact that it provides an avenue for program participation with no up-front costs.

At the end of 1991, SCL's service area contained 63,281 apartment and condominium units. At least 25% of these qualify as low-income units while around 47,461 units are standard-income units. A new targeted acquisition contract was signed in March 1993 between SCL and BPA. Under this contract BPA will fund common area lighting-only and whole-building measures installed in standard income buildings. [R#18]

Residential Efficiency Standards: Since January 1981 an energy standard required that all residential customers requesting new or enlarged service for electric space heat had to install ceiling, floor, wall or window, heating duct, and water-heater insulation. These standards for electric service connection were superseded by requirements of the Seattle Energy Code in cases of total remodeling of residential units.

In August 1988, the residential efficiency standards were revised in Section 5.1 of the Requirements for Electric Service Connection to require that only the portion of the unit being converted to full or partial electric heat needs to be insulated. Formerly the entire building was affected even if the home was heated by gas or oil. An exemption agreement is required if a new or enlarged electric service is required for uses other than space heat. The number of buildings needing new or enlarged service for electric space heat has declined markedly since 1982 due to changes over time in the relative prices of electricity and gas, so demand for this program has been very low in recent years. [R#18]

Targeted DSM activities: In addition to these residential programs, SCL has been using targeted demand-side management to mitigate distribution system bottlenecks. The Peak Energy Project, for one, is testing direct load control devices to address overloaded feeders in a discrete geographic area of ☞

Implementation (continued)

Seattle. SCL is also working with the University of Washington on an overall campus efficiency project to relieve another sub-station, thereby offering an alternative to expensive capital expansion projects.[R#17]

COMMERCIAL AND INDUSTRIAL PROGRAMS

While early efforts concentrated on the residential sector, commercial and industrial programs have been gradually gaining their share of savings and expenditures and have now reached a new level of fruition at SCL. In 1991, for the first time, the load reduction acquired by commercial and industrial programs overtook residential program production. In 1993, for the first time, C/I expenditures exceeded residential program expenditures.[R#18]

Unlike residential programs that have been largely driven by direct financial incentives, most commercial and industrial programs until 1986 relied on information such as audits and other forms of advice. The Energy Management Survey program, for example, that was implemented between 1984 and 1992 provided nearly 26% of total cumulative commercial and industrial energy savings. Similarly, its predecessor the Walk-Through Survey program ran from 1980 to 1983 and provided 12% of total cumulative energy savings in this sector. At the same time the Energy Management Partnership program was also implemented. These two programs were modified and then delivered as the Energy Management Survey program which provided C/I facilities with energy surveys, training in energy management practices and monitoring of consumption, and recommendations for energy efficiency measures.

Other now-defunct commercial and industrial programs were also of great importance to Seattle's savings. The Street and Area Lighting program, for example, provided 21% of total cumulative commercial and industrial savings and was implemented for a decade between 1982 and 1992. This program replaced mercury vapor street and other exterior lamps with high pressure sodium lamps. Typically, 1,000-watt mercury lamps were replaced by 400-watt sodium lamps. By the end of 1992, 60,984 lamps were converted.

Currently City Light is using record-level incentives to garner commercial and industrial savings. For example, in 1993 SCL presented its largest rebate check ever to the Boeing Com-

pany. A \$335,000 rebate convinced Boeing to install more energy-efficient equipment, saving the airplane manufacturer \$47,000 annually and freeing up 1.3 GWh of electricity annually for other uses.

Energy Savings Plan: The Energy Savings Plan (ESP) is a BPA-sponsored retrofit program available for all 286 of SCL's industrial customers. SCL claims that with this program it is "making slow progress towards its goals." The program pays incentives for energy conservation improvements in manufacturing, processing, and refining industries. In September 1991, SCL signed a contract with BPA to market the program to industrial customers, to assist them in identifying and evaluating energy efficiency opportunities, to monitor efficiency measure installation, and to verify energy savings. Since 1991, the ESP program has provided funding for energy reviews (audits), financial incentives for implementing energy conservation measures, and rebates for energy-efficient motors. (See Profile #18: Bonneville Power Administration, Energy Savings Plan)[R#17,18]

The audit analyzes an industrial plant to identify potential electric energy efficiencies and to estimate their associated costs and energy savings. BPA pays for the audit plus the administrative cost of preparing the project proposal. Under the incentive feature of the program, SCL pays 15 cents for each first year kilowatt-hour saved, up to 80% of the measure cost; 100% of this incentive amount is reimbursed by BPA. The Motor Rebate feature of the ESP program provides a standard, fixed payment to replace motors used as part of an industrial process or end use.

An SCL analyst assists interested firms in developing a proposal containing a project summary, descriptions of the energy conservation measures to be installed, a work schedule, project cost proposal, estimated energy savings, and energy savings verification methods. If the proposal is approved a contract between the customer and SCL is negotiated. Once approved by SCL and BPA, installation of measures can begin. Payment of installed measures is contingent on verified energy savings. Typical installed measures have varying lifetimes, however an average of 16 years is assumed by SCL.[R#18]

Energy Smart Design program: Since 1989, Energy Smart Design's (ESD) Design Assistance option has offered techni-

cal and financial assistance to building owners and developers for designing conservation measures to increase the energy efficiency of new and remodeled commercial buildings supported by BPA. The energy efficiency alternatives identified may be installed at the option of the building owner. (See Profile #37: Bonneville Power Administration, Energy Smart Design)

In 1991, the program was expanded to include financial assistance for installing conservation measures in both new and existing buildings. Customers could participate in the rebate option for the most common lighting, motor, heating, ventilating, and air conditioning measures. The rebates were offered to customers to pay a standard, fixed amount for the installation of energy-efficiency equipment in buildings. Site-based incentives were also available to customers for conservation measures not included on the rebate list.[R#18]

In October of 1993 the ESD program was redesigned so that two types of incentives are now offered to customers for installing conservation measures in their buildings. The first type, Standard Incentives, are for lighting, HVAC systems, and motor measures. Custom incentives are also available to customers for building envelope measures, energy management control systems, and other measures not covered by Standard Incentives. The new options will allow SCL to get more savings "for the buck," as incentives were reduced by 20%. [R#17,18]


The goal of the program is to increase the energy efficiency of new and remodeled commercial buildings by 10% to 30%. In 1993, SCL had 29,520 commercial and 1,975 government customers. Measures installed have a lifetime that ranges from 5 to 35 years, depending on the type of measure.

General Service Efficiency Standards: The General Service Efficiency Standards were adopted in June 1982. These require that commercial customers requesting new or enlarged electric service implement certain conservation measures. Mandatory measures may involve lighting or water heating conservation measures, or insulation of electric heating ducts. In addition, customers who add electric resistance space heat must have an electric energy analysis. The measure life is 10 years for measures installed between 1983 and 1985 and 18 years for measures installed between 1986 and 1992.[R#18]

Industrial Research & Demonstration Project: The Industrial Research & Demonstration Project (IRDP) was proposed by SCL in 1986 to develop overall goals for industrial conservation, construct industrial databases, estimate industrial conservation potential, define industrial program targets, and establish monitoring, assessment, and evaluation standards for future industrial programs. In 1993 the program was terminated after five years of successful operation.[R#18]

The central purpose of the IRDP was to test the energy savings and cost-effectiveness for a set of 15 pilot industrial retrofit projects. Consequently, the IRDP was not intended to become an ongoing industrial conservation program. Under the terms of the IRDP, SCL provided up to 70% of the cost of energy-efficient measures for these 15 industrial customers. These measures were installed between 1988 and 1992 and included high-efficiency furnace, motor, HVAC, air compressor, lighting, welding, and refrigeration measures. Measure lifetimes vary between 12 and 20 years and have a weighted measure lifetime of 15 years. Although the final IRDP project was completed in 1992, payments to participant and administrative costs continued through 1993.[R#18]

Lighting Design Lab: Lighting Design Laboratory (LDL), opened in 1989, is perhaps the utility's most exciting DSM initiative and one that represents a partnership between several Northwestern utilities. (See Profile #27: Seattle City Light, Lighting Design Lab) Its objectives are to provide energy-efficient lighting options to a wide variety of lighting professionals in the commercial sector and to provide visitors with efficient lighting information and services through consultations, tours, classes, forums, videos, and newsletters. A mock-up facility allows sample office and retail areas to be set up to illustrate and test various strategies in a variety of settings.[R#14,18]

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 including B.C. Hydro, the California Energy Commission, Idaho Power, the Northwest Power Planning Council, Pacific Power, Puget Sound Power and Light, Snohomish Public Utilities District #1, Tacoma City Light, the University of Washington, the Washington State Energy Office, and Washington Water Power. LDL is unquestionably 

Implementation (continued)

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. (For further information on energy resource centers see Profiles #27,55,84) [R#14,18]

Northwest Energy Code: The Northwest Energy Code program (NWECP) provides funding for inspection-based enforcement of the Seattle Energy Code (SEC). Under the NWECP, energy-related inspections are performed for commercial buildings receiving permits issued beginning in April 1989. Electrically-heated new construction commercial buildings, commercial remodels and additions, as well as single family and multiplex buildings with electric space heat are eligible. [R#18]

The NWECP provides payments for staff training, technical assistance, implementation, and enforcement, which are passed from BPA through local utilities to local building agencies. SCL provides this and other funding to the Seattle Department of Construction and Land Use for permit review, inspections, and consultation with prospective developers.

The NWECP also applies to any electric resistance heat home receiving a building permit within the State of Washington beginning July 1991. Through June 1995, these buildings having 2,000 square feet or less are eligible for a builder/consumer incentive payment to offset the additional costs of installing conservation measures now required by state law. The payment in 1991-1992 was \$900 per single-family dwelling or \$390 per unit for multiplex dwellings. The purpose of this payment is to assist builders for a period of time with the

additional cost of meeting code requirements until costs of newer-technology measures come down. Residential incentive payments will cease in 1995 at which time builders and developers are responsible for meeting the code without financial assistance. BPA pays 75% of the incentive amount. [R#18]

STAFFING REQUIREMENTS

The Energy Management Services Division of SCL is organized to carry out Seattle's commitment to energy conservation as a resource. In 1977 the conservation staff totaled 7.5 full-time equivalents (FTEs) and later peaked at 118.5 FTEs in 1983 during the period of expected energy resource deficits when substantial BPA funding was available for conservation. A cadre of up to six temporary staff was also utilized to perform the work. [R#4,18]

In 1993 the division employed 89.5 full-time staff in thirteen functional units. Ten of these units provide direct program services such as program coordination, field services, incentive services, finance services, implementation planning, and marketing for residential, commercial, and industrial conservation programs. The remaining three units provide systems development, program evaluation, and long-range strategic planning and policy analysis. [R#4,18]

In addition to the staff listed above, some conservation implementation is carried out by other City Light divisions (Appliance Repair, Customer Engineering) and by other City departments (Construction, Land Use, Housing and Human Services). These staff are not tabulated above. [R#13,18] ■

Monitoring and Evaluation

One of the cornerstones of SCL's DSM efforts has been its evaluation group. Unlike most utilities, SCL's emphasis on evaluation had a very early start. As noted in the SCL's Road to Demand-Side Management section, 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 new department and its programs. In the same year the Seattle City Council formally mandated that SCL provide verified program energy savings, cost-effectiveness information, and operational efficiency information in order to provide accountability to decision makers for its conservation efforts.[R#1,2]


Rigorous in-house evaluation methodologies and capabilities were established to provide for consistent measurement and evaluation. Larry also initiated the development of the triangular approach to program implementation now used for all Energy Management Services Division 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, program enhancement, and redesign as necessary.[R#1,2,11]

The Evaluation Unit has a clear mandate: It is in place not only to track program impacts and suggest program enhancements, but also to ensure that the energy savings counted as programmatic savings are truly due to program effects and not due to other factors such as customers' responses to increased electricity prices, other sources of conservation information, or year-to-year weather variations. Wherever possible, the Evaluation Unit determines "actual" savings by comparing the change in electricity use of program participants with that of a control group, essentially a group of like customers who have elected not to participate in the program, or who are unaware of the program.[R#15,18]

In addition, the Consumers Research and Evaluation and the Strategic Planning Research and Evaluation units at SCL survey the general customer population to assess customer satisfaction with its programs. In 1993, for example, staff found moderate customer satisfaction with DSM programs, with three of five customers (61%) rating programs with a 6 or 7 on a 7-point scale with 7 representing "totally satisfied" customers. SCL's goal is to raise the level to 75% by 1997. Customer satisfaction surveys also are used to gauge the effectiveness of program marketing efforts and to enhance them as necessary. [R#17,18]

Costs for SCL's DSM programs are tracked using the City's more generalized accounting system, called the Seattle Financial Management System, and City Light's own Management Information System. Evaluators, however, have found these to be "rather awkward tools for recapturing itemized program expenses" and look forward to improving conservation cost tracking in the future. (Plans to do so are reportedly underway.) In particular, staff have had difficulty assigning program costs to specific calendar years given time-related delays involved with new construction activities and loan programs where the system tracks total costs and has not been able to net out repaid portions of the loans.[R#18]

For nearly a decade the Evaluation Unit has published a thorough report titled, "Energy Conservation Accomplishments." This annual historical summary of DSM program activity clearly tracks the utility's program expenditures and impacts. The data contained within this profile is quoted from the Energy Conservation Accomplishments: 1977-1993 report. In addition to this annual summary, in-depth evaluations of specific programs are conducted on a routine basis, scheduled to reflect staff concerns and program enhancement needs. [R#11,15,18]

SCL's Evaluation Unit bases its electricity savings from its DSM programs upon results derived from evaluation studies tailored to meet the information needs of the utility. To date more than 100 evaluation studies have been completed which 

Monitoring and Evaluation (continued)

represent a range of techniques and methodologies deemed relevant to the types of customers and measures involved and the assumptions that staff believe ought to be checked and verified. For a complete bibliography of SCL's evaluations, readers are encouraged to call (206) 684-3209. Despite this remarkable level of output, staffing for the evaluation group has remained fairly constant, with between four and five full-time equivalents. In turn, approximately 2% of SCL's DSM budget has gone towards evaluation.[R#11]

The following synopses are intended to give a flavor for the sophistication of the evaluations performed by the Evaluation Unit, but of course are not intended to be inclusive of its activities:

Three recent evaluations of the Home Energy Loan (HELP) program have been completed: the "Longitudinal Evaluation of Energy Savings from the Home Energy Loan Program" in August 1988; "Energy Savings for Multiplex Buildings in the Home Energy Loan Program" in September 1988; and "Energy Savings for Windows-Only Participants in the Home Energy Loan Program" in March 1990. Using these evaluations as opportunities to revise impact data, savings for the HELP program for single-family buildings were estimated by a time-series, cross-sectional regression model applied to weather-normalized annual consumption. Multiplex building net savings were estimated by an in-depth energy analysis.[R#18]

For the recent Home Water Savers program, installation and persistence rates for single-family and multiplex residents have been estimated from evaluation survey research documented in "Survey Research for the Home Water Savers Program, Phase I Report" in April 1993 and "Phase II Report" in March 1994. (A third report which will draw upon three metering studies to estimate energy and water savings and program cost-effectiveness, is scheduled for completion in the spring of 1995.) The first survey found that within the first five months after kit distribution, 43% of residents had installed the showerhead (net of 9% free ridership), and 29% had installed the bathroom faucet aerator. Another 11% of residents felt they already had efficient flow showerheads in place. The second survey, one year after distribution, assessed longer-term

installation and persistence rates. It found that 64% of residents who received a kit still had showerheads installed at that time. Net of 9% free ridership, 56% of single-family residents had installed the showerhead as a result of the program alone and 40% had installed the bathroom aerator.[R#18]

For the Low-Income Electric program, savings calculations for single-family buildings are documented in the "Evaluation of the Low-Income Electric Program" completed in July 1983. The Multifamily Conservation program, in turn, derives its savings estimates from "The Multifamily Conservation Program: Evaluation of Electricity Savings and Costs," completed in July 1991. This evaluation also uses analysis of covariance and regression analysis to estimate weather-normalization savings for low-income and medium-income customers. A pilot evaluation, "Evaluation of Multifamily Conservation Lighting in the Energy Smart Design Program" was completed in February 1993.[R#18]

The Energy Savings Plan program tracks its projects via an ESP Industrial Tracking System. Evaluations of the program conducted by BPA include: "Impact Evaluation of an Adjustable Speed Drive Installed at Ball-Incon Glass Packaging Corporation Under the Energy Savings Plan" completed by Pacific Northwest Laboratories in May 1993; "Energy Savings Plan Installed Measures for Seattle City Light Customers" by Autherine Brown; and "Impact Evaluation of an Energy Savings Plan Project at Holnam Incorporated" completed in May 1993.[R#18]

The Lighting Design Lab has been assessed by a series of reports on user satisfaction with LDL's services. These reports include: "Users' Perceptions of Lighting Design Lab Services" (February 1991), "Lighting Design Lab Monthly Evaluation Report" (December 1991), "Lighting Design Lab Quarterly Status Report: First Quarter (June 1992)," "Second Quarter (July, 1992)," and "Lighting Design Lab 1992 Annual Status Report (February 1993)." In addition, two process evaluations were completed: "Evaluation of the Lighting Design Lab's Consultation Program (December 1991)" and "Evaluation of the Lighting Design Lab's Consultation and Mock-Up Services (July 1994)."[R#18] ■

Program Savings

SAVINGS OVERVIEW	ENERGY SAVINGS (MWh)	CUMULATIVE ENERGY SAVINGS (MWh)	LIFECYCLE SAVINGS (MWh)	CAPACITY SAVINGS (aMW)	CUMULATIVE CAPACITY SAVINGS (aMW)
1977	116	116	1,160	0	0
1978	1,680	1,796	16,800	0	0
1979	7,183	8,979	65,490	1	1
1980	8,641	17,620	110,860	1	2
1981	12,075	29,695	153,944	2	4
1982	49,590	78,906	652,509	5	9
1983	52,012	123,719	875,624	6	15
1984	28,217	136,650	601,258	1	16
1985	23,122	159,655	464,454	3	19
1986	23,134	178,827	479,360	2	21
1987	15,015	190,037	317,727	2	23
1988	19,181	200,033	375,817	1	24
1989	16,385	211,304	324,884	1	25
1990	18,991	225,353	372,389	2	27
1991	28,481	248,041	533,677	3	30
1992	70,147	300,650	1,149,496	6	36
1993	52,629	342,875	885,294	5	41
Total	426,599	2,454,256	7,380,743	41	


From 1977 through 1993, conservation programs at SCL have resulted in a total cumulative savings of 2,454,256 MWh and 41 average megawatts (aMW) of capacity. Of the total savings, residential programs have provided 1,312,072 MWh (53% of the total) and 17.97 aMW (44% of the total) while commercial and industrial programs have saved 1,142,181 (47%) and 21.18 aMW (54%). The average load reduction in 1993 was 39.1 aMW of which residential accounted for 17.97 aMW, commercial 16.4 aMW, industrial/governmental 4.7 aMW. Note that SCL takes a 5.2% transmission and distribution credit for capacity savings to reach an average load reduction in 1993 of 41 aMW.[R#18]

The annual and cumulative savings presented are from both active and inactive programs. These savings acquired since the start of all programs are enough to provide electricity to about 188,000 homes for a year. Energy savings in 1993 from cumulative participants with active measures are enough to provide power to 26,000 homes for a year.[R#18]

Seattle City Light's Evaluation Unit has carefully assessed cumulative energy savings, adjusting annual energy savings for attrition of measures and other changes. As such, cumulative

figures presented in the Savings Overview table are not simple arithmetic values taken from the annual energy savings column, but have been much more carefully tabulated. The Evaluation Unit has prepared detailed spreadsheets for each program that allow for longitudinal analyses of savings and which have carefully assessed not only attrition of measures (whereby participants' measures no longer provide savings) and degradation of measures' savings (whereby measures perform at a lower level than when initially installed), but also changes that occur before the useful measure life is terminated, evaluated and adjusted using control groups specifically selected for each program.[R#15,18]

In 1993 annual energy savings resulting from all of SCL's residential, commercial, and industrial DSM programs totaled 52,629 MWh and provided 5 aMW. Of this, residential programs provided 17,592 MWh (33% of the total) while commercial and industrial programs provided 35,037 MWh (67% of the total).[R#18]

To date the program that has saved the most energy in Seattle has been the Blanket Seattle program with total cumulative energy savings of 313,652 MWh. However, due to the longer 

Program Savings (continued)

SAVINGS OVERVIEW BY PROGRAM	START DATE	END DATE	1993 ANNUAL SAVINGS (MWh)	CUMULATIVE CAPACITY SAVINGS (aMW)	TOTAL CUMULATIVE SAVINGS (MWh)
Active Residential					
<i>Energy Efficient Water Htr.</i>	1992		1,866	0.344	4,159
<i>Home Energy Loan</i>	1981	1993	769	2.739	190,777
<i>Home Water Savers</i>	1992		9,479	5.686	90,135
<i>Long Term Good Cents</i>	1992		1,273	0.145	1,274
<i>Low-Income Electric</i>	1981		443	3.747	292,689
<i>Multifamily Conservation</i>	1986		3,770	2.507	79,830
<i>Res. Efficiency Stds.</i>	1981		15	0.318	28,686
Inactive Residential					
<i>Blanket Seattle/Water Htr. Ins.</i>	1977	1983	0	0.000	313,652
<i>Home Energy Check</i>	1987	1992	0	0.541	163,243
<i>Neighborhood Workshops</i>	1978	1982	0	0.000	11,530
<i>Residential Insulation</i>	1978	1980	0	0.107	13,477
<i>Water Heater Rebate</i>	1983	1990	0	1.830	122,621
Commercial					
<i>Energy Savings Plan</i>	1988		5,071	1.371	25,834
<i>Energy Smart Design</i>	1989		29,883	6.256	86,957
<i>Gen. Service Efficiency Stds.</i>	1983		83	0.335	17,247
<i>Industrial R&D Project</i>	1988	1992	0	0.365	11,378
<i>Lighting Design Lab.</i>	1987		NA	0.000	0
<i>Northwest Energy Code</i>	1989		NA	0.000	0
Inactive Commercial					
<i>BPA Comm. Tank Wrap</i>	1982	1983	0	0.570	5,701
<i>Comm. Incentive Pilot</i>	1986	1991	0	2.474	102,022
<i>En. Code Major Projects Rqmt.</i>	1984	1991	0	1.022	45,624
<i>En. Mgmt. Partnership</i>	1980	1983	0	0.788	82,947
<i>En. Mgmt. Survey</i>	1984	1992	0	4.177	296,431
<i>Lighting Incentive</i>	1981	1983	0	0.000	61,055
<i>Lighting Survey</i>	1979	1983	0	0.000	28,210
<i>Street and Area Lighting</i>	1982	1992	0	3.008	239,344
<i>Walk-Through Survey</i>	1980	1983	0	1.321	139,432
TOTAL			52,652	39	2,454,256

average lifetimes of measures installed in the Low-Income Electric program and the Home Energy Loan program, these programs' savings are expected to eclipse the Blanket Seattle program over time. In 1993, the Home Water Savers program resulted in the greatest annual residential energy savings with 9,479 MWh and the greatest load reduction of 5.7 aMW. [R#15,18]

Within the realm of commercial and industrial programs, there has been a marked shift in orientation. Nearly half of the early savings are attributable to information-based programs such as the Energy Management Survey program and the Walk-Through Survey program. More recently, the emphasis has shifted from information to direct incentives. For instance, Energy Smart Design resulted in the greatest annual energy sav-

PARTICIPATION	RESIDENTIAL	COML/ INDL	TOTAL
1977	232	0	232
1978	2,703	0	2,703
1979	6,840	51	6,891
1980	9,189	48	9,237
1981	8,290	177	8,467
1982	74,871	685	75,556
1983	49,166	1,045	50,211
1984	10,237	442	10,679
1985	10,691	345	11,036
1986	10,666	251	10,917
1987	8,968	193	9,161
1988	8,381	137	8,518
1989	8,022	530	8,552
1990	4,188	1,059	5,247
1991	2,187	899	3,086
1992	86,946	704	87,650
1993	10,540	909	11,449
Total	312,117	7,475	319,592

ings in 1993 with 29,883 MWh and a load reduction of 6.3 aMW. [R#18]

CUSTOMER BILL SAVINGS

From a customer's perspective, bill savings, increased property value, and increased comfort are the major attractions of conservation programs. In "nominal" dollars (those of each year as they occur) SCL calculates that customer savings from 1977 through 1993 totaled \$98.7 million. Over the entire 17-year period, 66% of these bill savings, or \$65.1 million, went to customers in the residential sector; commercial customers have enjoyed 31% of the bill savings, or \$30.6 million; while industrial customers have saved 3% or \$3.0 million. [R#18]

PARTICIPATION RATES

Participation for SCL's DSM programs is defined as the number of "service units." A service unit is a building receiving one or more conservation measures, be it a single-family home, multiplex, or multifamily building or a commercial and industrial building. Since the inception of DSM at SCL, all programs combined have involved 319,592 service units in a service area of 333,448 customers. While there certainly has been some

PARTICIPATION	START DATE	1993 PARTICIPATION	PARTICIPATION TO DATE	1993 SAVINGS PER PARTICIPANT (kWh)
Residential				
Energy Efficient Water Htr.	1992	7,663	12,299	244
Home Energy Loan	1981	289	12,221	2,661
Home Water Savers	1992	2,255	117,941	4,204
Long Term Good Cents	1992	21	21	60,667
Low-Income Electric	1981	172	10,519	2,576
Multifamily Conservation	1986	133	841	28,346
Res. Efficiency Stds.	1981	7	1,328	2,143
Commercial				
Energy Savings Plan	1988	12	23	422,583
Energy Smart Design	1989	249	664	119,912
Gen. Service Efficiency Stds.	1983	21	746	3,952
Industrial R&D Project	1988	0	15	0
Lighting Design Lab.	1987	6,768	27,130	NA
Northwest Energy Code	1989	64	1,378	NA
Total		17,654	185,126	

Program Savings (continued)

overlap in customer participation, Seattle's overall participation rate is quite impressive. Of the total participants, 312,117 have been from the residential sector and 7,475 have been from the commercial sector.[R#18]

SCL's peak of 74,871 residential participants in 1982 shows the dramatic impact of the Blanket Seattle program that installed over 107,000 free water-heater wraps from 1981 to 1983. Participation in commercial and industrial programs peaked in 1983 while the commercial water heater wrap program was operating. Another peak in residential participation with 86,946 service units resulted in 1992 when 92,000 households in 81,000 buildings installed efficient-flow showerheads through the Home Water Savers program. In 1990, commercial and industrial programs hit a second peak at 1,059 participants and have sustained a heightened level of activity from 1991 to 1993.[R#18]

The individual program with the highest participation for 1993 was the relatively new Energy Efficient Water Heater program with 7,663 units installed. The active program with the largest participation to date has been the Home Water Savers which began in 1992 and has since accrued 83,213 participant buildings having 117,941 residential units.[R#18]

For 1993 participants, The Results Center has calculated that the commercial Energy Savings Plan program resulted in the greatest energy savings per participant with annual savings of 422,583 kWh. The residential program with the largest savings per participant was the Long Term Super Good Cents program with 60,667 kWh per participant.

FREE RIDERSHIP

Overall, Seattle City Light has not addressed free ridership with the vigor of some regulated utilities. It simply hasn't been a focus of the Evaluation Unit since SCL's public power philosophy – with its heightened focus on serving its customer/owners – has prevailed, making free ridership and free drivership less of an issue that it might otherwise be. That said, SCL addresses free ridership in two ways.[R#15,18]

First, for programs where significant levels of free ridership have been assumed, it has been assessed. For instance, due to the high level of public awareness of the prolonged drought in Seattle, free ridership was carefully assessed for the Home Water Savers program. Nonparticipant energy use has been tracked over time to prove the existence of free rider-

ship (for HELP) or disprove it (for the Multifamily program).[R#15]

Second, by using control groups to determine baseline energy use and thus assess savings, free ridership levels have been implicitly subsumed into savings analyses determined through evaluation. For instance, as power rates have increased control groups may well independently install energy efficiency measures. By doing so, they increase the baseline efficiency of the control group, reducing the delta (and thus the savings) between the baseline and the consumption of program participants.[R#15]

MEASURE LIFETIME

SCL's DSM programs have varying average measure lifespans based upon weighted averages of measures installed: the Energy Efficient Water Heater, 12 years; Home Energy Loan, 30 years; Home Water Savers, 15 years; Long Term Super Good Cents, 29 years; Low-Income Electric, 30 years; Multifamily Conservation, 30 years for dwelling area measures and 16 years for common-area lighting; Residential Efficiency Standards, 30 years; Energy Savings Plan, 16 years; Energy Smart Design, from 5 to 35 years; General Service Efficiency Standards, 18 years; and the Industrial Research and Demonstration Project, 15 years.

In order to calculate lifecycle savings SCL has provided accurate weighted lifecycle savings per program on an annual basis. To date, a lifecycle energy savings of over 7,380 GWh has accrued.[R#18]

PROJECTED SAVINGS

In 1993 the Seattle City Council adopted the Conservation Implementation Plan which calls on SCL to meet all electric load growth in the next decade through conservation. As such SCL will seek to acquire 100 aMW in new capacity savings by the year 2003. A City ordinance was passed to increase the 1993 budget for immediate implementation of the plan.

The goal of the Plan for 1993 was to acquire 6.5 aMW from contracted projects. The projects completed in 1993 saved 52.6 GWh and 5 aMW of capacity. Contracts actually signed in all sectors are now projected to bring in approximately 9.5 aMW with the T&D credit, pushing projected savings for the year well above plan and the overall objective somewhat ahead of schedule.[R#18]■

Cost of the Program

COSTS OVERVIEW	RESIDENTIAL PROGRAMS (x1,000)	C/I PROGRAMS (x1,000)	SUPPORT SERVICES (x1,000)	BPA FUNDING (x1,000)	BPA FUNDING AS % OF TOTAL	TOTAL EXPENDITURES (x1,000)
1977	\$0	\$0	\$362	\$0	0.0	\$362
1978	\$660	\$0	\$1,812	\$0	0.0	\$2,472
1979	\$1,174	\$15	\$1,279	\$0	0.0	\$2,467
1980	\$1,252	\$138	\$1,447	\$0	0.0	\$2,837
1981	\$4,510	\$348	\$1,266	\$131	2.1	\$6,123
1982	\$11,689	\$1,469	\$1,282	\$6,519	45.1	\$14,440
1983	\$15,199	\$3,780	\$1,162	\$9,221	45.7	\$20,141
1984	\$10,733	\$1,825	\$1,100	\$0	0.0	\$13,658
1985	\$10,145	\$2,001	\$1,059	\$292	2.2	\$13,205
1986	\$10,552	\$1,991	\$3,369	\$3,361	21.1	\$15,911
1987	\$8,879	\$2,252	\$3,138	\$1,234	8.6	\$14,270
1988	\$8,525	\$3,261	\$3,098	\$2,377	15.9	\$14,884
1989	\$7,414	\$3,932	\$2,100	\$3,071	22.8	\$13,446
1990	\$7,574	\$3,594	\$2,158	\$2,621	19.7	\$13,326
1991	\$6,811	\$4,874	\$857	\$3,714	29.6	\$12,542
1992	\$7,003	\$6,385	\$2,979	\$5,603	34.2	\$16,367
1993	\$8,615	\$10,680	\$2,382	\$11,355	52.4	\$21,678
Total	\$120,735	\$46,544	\$30,851	\$49,500	24.9	\$198,130

Data Alert: Total expenditures represent the gross cost for DSM programs including BPA reimbursements but not customer loan repayments or other sources of revenue. Program expenditures reflect work completed but exclude obligations or encumbrances for work contracted or still in progress. Similarly, specific program expenditures presented include BPA reimbursements but not loan repayments or other revenues.

Just as low electricity rates in Seattle serve as a disincentive for energy efficiency, Bonneville Power Administration's generous buy-back provisions (whereby it buys conservation resources from the utilities to which it sells wholesale power) has been a significant boost for energy efficiency in the region. In fact, Seattle City Light budgeted for a precedent-setting 9.1% of gross revenues on DSM in 1993, up from 7.7% in 1992, and far beyond leading investor-owned utilities which generally spend 1-3% of gross revenues on DSM.

Clearly BPA's support has been important. It has reimbursed SCL for a portion of its conservation expenditures in twelve of the past thirteen years. In fact, through SCL's history with

DSM, BPA has paid \$49.5 million or 25% of total SCL expenditures. Funds from BPA for conservation programs were first received by SCL late in 1981. Due to an inability to negotiate mutually satisfactory terms, BPA funding was discontinued in 1984. Beginning in October of 1985, however, conservation funding from BPA was restored under a long-term contract. Thus SCL's net cost for DSM programs has been \$148.6 million since 1977. [R#18]

In terms of gross expenditures, from 1977 to 1993 Seattle City Light and BPA spent a total of \$198 million on demand-side management. Expenditures steadily increased over these years from \$362,000 in 1977 up to \$21.7 million in 1993. [R#18]

Besides BPA funding, revenues are also received from customer repayments on loan contracts and other sources. Revenues from customer repayments have totaled \$24,291,987 from 1981 to 1993. Thus customer loan repayments have equalled 23% of total residential program costs. Funding for SCL's Lighting Design Lab has come from outside grants from other utilities and environmental groups. From 1989 through 1993 these revenues supporting the LDL have totalled \$707,381 in nominal terms. [R#18]

Cost of the Program (continued)

COST OF SAVED ENERGY AT VARIOUS DISCOUNT RATES (¢/kWh)	3%	4%	5%	6%	7%	8%	9%
1979	2.45	2.66	2.89	3.12	3.37	3.62	3.88
1980	2.34	2.54	2.76	2.99	3.22	3.46	3.71
1981	3.61	3.93	4.27	4.61	4.97	5.34	5.73
1982	2.07	2.26	2.45	2.65	2.85	3.07	3.29
1983	2.76	3.00	3.26	3.52	3.80	4.08	4.37
1984	3.45	3.75	4.07	4.40	4.75	5.10	5.47
1985	4.07	4.43	4.80	5.19	5.60	6.02	6.45
1986	4.90	5.33	5.78	6.26	6.74	7.25	7.77
1987	6.77	7.37	7.99	8.64	9.32	10.01	10.73
1988	5.53	6.02	6.53	7.06	7.61	8.18	8.76
1989	5.84	6.36	6.90	7.46	8.05	8.65	9.27
1990	5.00	5.44	5.90	6.38	6.88	7.39	7.92
1991	3.14	3.41	3.70	4.00	4.32	4.64	4.97
1992	1.66	1.81	1.96	2.12	2.29	2.46	2.63
1993	2.93	3.19	3.46	3.75	4.04	4.34	4.65

As presented in the Costs Overview by Program table, the program with the highest cost for 1993, including BPA expenditures, was the Commercial Energy Smart Design at \$8,780,037. The Multifamily Conservation program was the next most costly at \$5,509,230. The Home Energy Loan program, SCL's third most costly program, had a 1993 expenditure of \$1,218,627.

COST EFFECTIVENESS

Seattle City Light addresses cost effectiveness on a local and regional basis given their relationship with BPA. While the primary screen used by SCL is the Total Resource Cost test, given the likely changes at BPA the utility is moving towards the use of the Utility Cost Test. Based on 1993 annual DSM program

savings and costs, SCL estimates that over the lifetime of the DSM measures installed in 1993, the levelized program cost will be around 29 mills, equivalent to 2.9 ¢/kWh. This cost excludes customer contributions but does include BPA funding. When broken down by sector, SCL estimates cost per kilowatt-hour costs to be 3.8¢/kWh for residential savings, 2.6¢/kWh for commercial programs, and 1.6¢/kWh for industrial programs. [R#17,18]

The Results Center calculations of the annual utility cost of saved energy at various discount rates for various years are shown in the accompanying table. The highest cost of saved energy (at a 5% real discount rate), 7.99 ¢/kWh, was in 1989. The cost of saved energy in 1992 was 1.96 ¢/kWh and in 1993 rose to 3.46 ¢/kWh.

COST PER PARTICIPANT

The Results Center has calculated SCL's cost per participant by program. The programs with the lowest cost per participant are the General Service Efficiency Standards at \$14 per participant due to easy implementation, and the Energy Efficient Water Heater program at \$11 per participant due to its exceedingly high participation rate. The most costly programs per participant in 1993 were the Long Term Super Good Cents at \$44,308 followed by the commercial Energy Savings Plan at \$30,254. The \$23 cost per participant for the Home Water Savers program is calculated from a blend of both 1992 and 1993 costs and participation. This represents a more accurate number due to untimely cost allocation in 1993.

COST COMPONENTS

Most of SCL's DSM expenditures have been for residential conservation, \$120,735,000 or 61% of total DSM expenditures,

while commercial and industrial programs have received \$46,544,000 or 23% of the total. BPA funding comprises 25% of total SCL DSM expenditures over the 16 years. In 1993, expenditures for C/I programs exceeded residential programs for the first time, and by more than \$2 million.

DSM expenditures have totaled \$198 million since 1977. In April of 1993, for the first time, SCL also factored general utility administrative and general overhead (what it calls "Utility Administrative and General" expenses) into these costs. This was done by distributing nonprogrammatic labor and expenses to individual conservation programs in proportion to programmatic labor hours, increasing program expenditures by 26%. (The charge for these expenses in 1993 was slightly under one million dollars.) Support services, including support of energy codes, long-range planning, evaluation, data processing, and general administration over 17 years have accounted for \$31 million or 16% of the total. [R#18] ■

1993 COSTS OVERVIEW BY PROGRAM	START DATE	ADMIN.	MEASURE/ INCENTIVE	SUPPORT SERVICES	BPA FUNDING	TOTAL COST	COST PER PARTIC.
Residential							
<i>Efficient Water Htr.</i>	1992	\$135,081	NA	NA	\$83,896	\$135,081	\$11
<i>Home Energy Loan</i>	1981	\$687,754	\$530,873	NA	\$345,308	\$1,218,627	\$100
<i>Home Water Savers</i>	1992	\$54,730	\$152,340	NA	\$386,455	\$207,070	\$23
<i>Long Term Good Cents</i>	1992	\$127,234	\$803,225	NA	\$601,611	\$930,459	\$44,308
<i>Low-Income Electric</i>	1981	\$320,953	\$268,256	NA	\$262,824	\$589,209	\$56
<i>Multifamily Cons.</i>	1986	\$1,300,408	\$4,208,821	NA	\$655,257	\$5,509,230	\$6,551
<i>Res. Efficiency Stds.</i>	1981	NA	NA	NA	NA	\$25,884	\$19
Commercial							
<i>Energy Savings Plan</i>	1988	\$185,276	\$510,557	NA	\$454,666	\$695,832	\$30,254
<i>Energy Smart Design</i>	1989	\$1,199,110	\$7,580,927	NA	\$7,999,213	\$8,780,037	\$13,223
<i>Gen. Service Eff. Stds.</i>	1983	NA	NA	NA	NA	\$10,726	\$14
<i>Industrial R&D Project</i>	1988	\$50,082	\$53,005	NA	NA	\$103,086	\$6,872
<i>Lighting Design Lab.</i>	1987	NA	NA	NA	NA	\$479	\$0
<i>NW Energy Code</i>	1989	\$479,390	\$0	NA	\$176,789	\$479,390	\$348
Total		\$4,540,018	\$14,108,004	\$2,382,25	\$10,966,019	\$21,030,277	\$114

Environmental Benefit Statement

AVOIDED EMISSIONS: Based on 2,454,256,000 kWh saved 1977 - 1993						
<i>Marginal Power Plant</i>	<i>Heat Rate BTU/kWh</i>	<i>% Sulfur in Fuel</i>	<i>CO2 (lbs)</i>	<i>SO2 (lbs)</i>	<i>NOx (lbs)</i>	<i>TSP* (lbs)</i>
Coal						
Uncontrolled Emissions						
A	9,400	2.50%	5,291,376,000	125,535,000	25,377,000	2,538,000
B	10,000	1.20%	5,642,335,000	48,594,000	16,387,000	12,149,000
Controlled Emissions						
A	9,400	2.50%	5,291,376,000	12,554,000	25,377,000	203,000
B	10,000	1.20%	5,642,335,000	4,859,000	16,387,000	810,000
C	10,000		5,642,335,000	32,396,000	16,198,000	810,000
Atmospheric Fluidized Bed Combustion						
A	10,000	1.10%	5,642,335,000	14,848,000	8,099,000	4,050,000
B	9,400	2.50%	5,291,376,000	12,554,000	10,151,000	761,000
Integrated Gasification Combined Cycle						
A	10,000	0.45%	5,642,335,000	9,989,000	1,620,000	4,050,000
B	9,010		5,075,401,000	3,618,000	1,218,000	243,000
Gas						
Steam						
A	10,400		3,077,637,000	0	7,019,000	0
B	9,224		2,672,685,000	0	16,738,000	791,000
Combined Cycle						
1. Existing	9,000		2,672,685,000	0	10,259,000	0
2. NSPS*	9,000		2,672,685,000	0	4,859,000	0
3. BACT*	9,000		2,672,685,000	0	675,000	0
Oil						
Steam--#6 Oil						
A	9,840	2.00%	4,454,475,000	67,492,000	7,964,000	7,559,000
B	10,400	2.20%	4,724,443,000	66,952,000	10,016,000	4,859,000
C	10,400	1.00%	4,724,443,000	9,557,000	8,045,000	2,538,000
D	10,400	0.50%	4,724,443,000	28,077,000	10,016,000	1,544,000
Combustion Turbine						
#2 Diesel	13,600	0.30%	5,912,303,000	11,771,000	18,277,000	999,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	7,019,172,000	18,088,000	23,811,000	5,291,000

In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

The environmental benefits of energy efficiency programs can include avoided pollution of the air, the land, and the water. Because of immediate concerns about urban air quality, acid deposition, and global warming, the first step in calculating the environmental benefit of a particular DSM program focuses on avoided air pollution. Within this domain we have limited our presentation to the emission of carbon dioxide, sulfur dioxide, nitrous oxides, and particulates. (Dollar values for environmental benefits are not presented given the variety of values currently being used in various states.)

HOW TO USE THE TABLE

1. The purpose of the accompanying page is to allow any user of this profile to apply Seattle City Light's level of avoided emissions saved through its comprehensive municipal DSM to a particular situation. Simply move down the left-hand column to your marginal power plant type, and then read across the page to determine the values for avoided emissions that you will accrue should you implement this DSM program. Note that several generic power plants (labelled A, B, C,...) are presented which reflect differences in heat rate and fuel sulfur content.

2. All of the values for avoided emissions presented in both tables include a 10% credit for DSM savings to reflect the avoided transmission and distribution losses associated with supply-side resources.

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals. We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

4. All the values presented represent approximations and were drawn largely from "The Environmental Costs of Electricity" (Ottinger et al, Oceana Publications, 1990). The coefficients used in the formulas that determine the values in the tables presented are drawn from a variety of government and independent sources. ■

* Acronyms used in the table

TSP = Total Suspended Particulates

NSPS = New Source Performance Standards

BACT = Best Available Control Technology

Lessons Learned / Transferability

LESSONS LEARNED

Energy efficiency has deep roots in Seattle and at Seattle City Light. In fact, integrated resource planning and energy conservation began there in the mid-1970s thanks to an unusual combination of factors which paved the road for SCL's progressive actions and posture with what by the mid-1980s became commonly known as demand-side management.

Not investing in nuclear power helped precipitate SCL's era of conservation:

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. WPPSS experienced the largest municipal bond default in United States history, creating widespread and pronounced rate impacts. In hindsight Seattle's decision proved to be very advantageous.

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. But they were also fully aware of the opportunity to invest in conservation and were cognizant of its risks and costs.

SCL's core DSM staff is experienced: One of the strengths of SCL's conservation staff is their long tenure at the utility. In fact, a few of the core staff have been with the Energy Management Services Division (EMSD) since its inception in the mid-1970s. Many of SCL's conservation staff have become DSM experts because of the pioneering efforts during the late 1970s and early 1980s. This collection of talented and committed individuals in many ways reflects the conscience and di-

versity of Seattle's residents. 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 camaraderie of the EMSD staff has been essential:

In its early years, EMSD staff were generally not welcomed into the utility by its other divisions and were in some ways ostracized from the utility and considered "outsiders." While hard to bear at the time, in retrospect staff believe that this distancing actually helped to create a cohesive, dedicated group of individuals who took it upon themselves to fulfill the citizens' desires for energy efficiency over nuclear power. 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.

Support from local government and voter opinion has been important in shaping SCL policies:

The Seattle City government has also played a key role in SCL's success with DSM and has been fairly supportive of DSM and IRP since the mid-1970s, in large part due to the fact that the local community actively supports conservation. 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 a key driving factor in establishing SCL's conservation capability. Revelle was instrumental in getting Seattle's early conservation work in the Federal register and he travelled to conferences and other utilities to learn about conservation. In retrospect, he was Seattle's "champion" for IRP and DSM within the government.

A healthy dose of pragmatism has also been at work at SCL in regard to demand-side management:

SCL's managers real-

ized that the utility's dependence on low-cost hydroelectric power could not last forever. Thus for many years the utility has been seeking to diversify its energy base to fulfill increased power demands brought on by an increasing population.

The role of the Bonneville Power Administration has also had a major impact on conservation efforts at SCL: BPA provides inexpensive power to 174 wholesale customers (retail utilities) 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 nearly 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 conserve 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. Nevertheless, BPA funded approximately 25% of SCL's total conservation expenditures from 1977-1993.

Just as Bonneville's support has served as a catalyst and major source of funds, depending on this support is problematic as well: Part of the reason for the inconsistencies in BPA's buy-back provision was that 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 clearly has the infrastructure and talent

to continue effective DSM programs but will need the political support to expend the level of resources to which it has become accustomed, in the absence of BPA funds.

SCL has effectively earned and marshalled the support of a good many allies that have been critical to its success: The EMSD has done a very good job of using interest groups and citizen committees when promoting energy efficiency both within the City and the utility. These groups have been effectively leveraged against the supply-side tendencies of SCL. The early motto of the Office of Conservation was, "build a relationship before you need it." Trade allies have taken the conservation ball and run with it and are now a prime marketing force for the DSM programs.

SCL has effectively collaborated with other City departments and utilities, affording means of cost effectively serving communities: In addition to working with the City regarding building codes and standards, SCL staff have a history of forging partnerships to further their initiatives and to make programs cost effective. The Lighting Design Lab is a prime example of this, a collaboration of dozens of regional utilities and interest groups that together have created a precedent-setting and truly exemplary facility that simply could not have been created nor funded independently by Seattle City Light. Similarly, the Home Water Savers program represents a unique and exemplary model for collaboration. The program was carried out with the Seattle Water Department, the Department of Housing and Human Services, and Puget Sound Power & Light, an investor-owned utility at times considered its primary competitor.

An important lesson at SCL is the importance of dedicated employees: SCL's EMSD employees clearly believe in what they are doing and care about their mission. This is apparent when visiting the utility, and has reportedly been a driving factor in the utility's success with DSM. Closely related to staff's customer service orientation is the notion of public service. 🤝

Lessons Learned / Transferability (continued)

Many public power workers, and certainly those at SCL, fundamentally believe in public service and advocate its social ramifications. In our meetings with many publicly owned utilities' personnel, their devotion to public service was evident. Many staff who remain at public utilities do so because they truly believe in it, despite less attractive salaries and benefits. (At SCL qualified staff could easily jump ship and earn higher salaries at Puget Sound Power & Light.) This sensitivity is an important aspect of public power that can be tapped to promote efficiency as it has been done so effectively in Seattle.

Continuity is key to program success: The Seattle residential DSM group believes the key to successful residential DSM is continuity. In order to maintain program interest and customer trust it is essential to avoid stopping and starting programs intermittently. SCL has been successful at offering long-term programs and delivering them on a consistent basis. This has earned SCL a reputation in which utility employees and City residents can be, and genuinely are, proud.

TRANSFERABILITY

Seattle City Light is one of the nation's largest publicly owned utilities, in fact it is the twelfth largest of 2,017 publicly owned electric utilities. In this way it is quite unique. On the other hand, publicly owned utilities share the common feature of having similar customers and owners! They are in place to serve their customer/owners with not only reliable sources of power but a range of energy services. While this is logical, most publicly owned utilities have not embraced demand-side

management the way Seattle has; most have not had the set of circumstances that Seattle has, from its voters' opinions of investments in nuclear power to Bonneville's generous buy-back provisions.

While Seattle has certainly had a unique set of circumstances, perhaps the most impressive aspect of this utility's efforts with demand-side management is that they have been executed in a region characterized by the lowest power rates in the country. This is generally regarded as a primary disincentive to promoting customer energy efficiency.

As such, Seattle has proved that DSM can be successful in areas with low rates, that this need not be a fundamental barrier to energy efficiency. Customers still seek to conserve energy – to stop the waste – and to benefit from a range of new energy-efficient technologies available to lower consumption and ultimately to lower bills. Seattle, in this regard, serves as a powerful model well worthy of examination and replication.

Seattle City Light's portfolio of programs, naturally, will not be ideally tailored to all other regions of the country. Its programs reflect a regional emphasis on electric resistance heating and a lack of insulation, for example. The region also has little air conditioning load, though this picture is changing especially in the commercial sector. Thus, other utilities seeking to emulate Seattle's success will necessarily have to customize Seattle's mix of programs, and its program emphases, to reflect regional weather characteristics and the like, but can learn from and be inspired by what has transpired in Seattle. ■

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