
Southern California Edison Energy Management Hardware Rebates Profile #28, 1992

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Executive Summary

Southern California Edison's Energy Management Hardware Rebate Program (EMHRP) has been providing incentives for energy efficiency improvements to commercial, industrial, and agricultural (CIA) customers since 1978. Measures range from lighting and space conditioning improvements to building envelope enhancements to motor upgrades. As a function of the program all installations are preapproved and cash rebates are issued for up to 30% of the installed cost of the measures with no maximum rebate.

Customers are guided through the simple rebate process by an SCE Energy Services Representative who conducts an energy survey, recommends applicable energy-efficient measures, and issues a coupon authorizing the customer to proceed with installation of selected measures. After installation is completed, the representative returns and performs an inspection, receives copies of the invoices, and validates the coupon. Customers then redeem the coupon, receiving a check within four to five weeks after the coupon is received by SCE.

Although the EMHRP has existed in one form or another since 1978, several program enhancements have been made over the years including adding measures to the list of eligible measures and changing rebate amounts. In 1988 a new customized rebate category was added that allows customers to receive rebates for measures not on the eligible measure list.

Rebate amounts are calculated in a number of ways. In no case will a rebate be paid for more than 30% of the customer's investment. SCE awards rebates based on savings of kW and kWh, based on tonnage of cooling saved, square footage of windows treated, thousands of BTUs saved (water heating improvements), and horsepower saved through motor retrofits.

Between 1987 and 1991, EMHRP generated a total of 596.4 GWh in annual energy savings, and 147.5 MW in annual capacity savings. Lifecycle savings have totalled 8,312 GWh. The program has shown significant progress since the Collaborative stimulated activity in 1990. Annual savings between 1990 and 1991 more than doubled to 192 GWh, with capacity savings in 1991 of 35.8 MW. Most of the 1991 savings were attributed to projects within the commercial sector, where 123.8 GWh in annual savings were realized.

Program expenditures in 1991 far exceeded expenditures in any other year, and were accompanied by unprecedented participation rates and energy savings. In fact, the budgeted incentive funds were depleted by April, 1991, and program managers had to reapportion the budget in order to meet program needs without requesting additional funding. Expenditures on incentives in 1991 were \$20.5 million, with total program cost of \$23.8 million. The Results Center calculates the cost of saved energy for the program, using a 5% discount rate, ranging from 0.26 ¢/kWh in 1987 to 1.23 ¢/kWh in 1991.

Energy Management Hardware Rebate

Utility: Southern California Edison

Sector: Commercial, Agricultural, Industrial.

Measures: Lighting, space conditioning, building envelope enhancements, motors.

Mechanism: Rebates

History: Program began in 1978, modified in 1988, ramped up in 1991.

1991 Program Data

Energy savings: 192.3 GWh

Lifecycle energy savings: 2,741 GWh

Capacity savings: 35.8 MW

Cost: \$23,764,100

Cumulative Data (1987-1991)

Energy savings: 1,795 GWh

Lifecycle energy savings: 8,312 GWh

Capacity savings: 147.5 MW

Cost: \$39,471,800

Conventions

For the entire 1992 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 International Monetary Fund's International Financial Statistics Yearbook: 1991.

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

SCEcorp is the parent holding company of Southern California Edison Company and three non-utility subsidiaries collectively known as The Mission Group. Southern California Edison Company (SCE), the largest subsidiary, provides electric service to central and southern California. Its service territory covers 50,000 square miles and is home to more than 10 million people. SCE has more than 4 million customers and 17,110 employees. [R#1]

In the year ending September 30, 1991, SCE generated 71,146 GWh, 56.3% from utility-owned facilities, and 43.7% was purchased power. Of the utility-owned generation, the majority (22% of 56.3%, or 39%) was nuclear produced, with gas and coal comprising 30% and 25%, respectively. SCE has virtually no oil-based power generation. [R#2]

Most of SCE's electricity sales are to commercial customers. Revenue from electricity sales closely parallels the sales percentages in kWh. Commercial customers purchased 25,236 GWh in the year ending September, 1991, comprising 36% of the total kWh sales and 38% of the operating revenue from electricity sales. Residential customers purchased 30% of electricity sold, for 34.6% of the revenue; and industrial customers purchased 21%, for 16% of the revenue for that period. [R#2]

SCE has focused on retaining its large commercial and industrial customers, as many consider leaving the service territory or installing their own electric generating

SCE 1991 STATISTICS

Number of Customers	4,078,55
Energy Sales	71,146 GWh
Energy Sales Revenue	\$6.904 billion
Summer Peak Demand	16,709 MW
Generating Capacity	20,875 MW
Reserve Margin	24.93%
Average Electric Rates	
Residential	11.00 ¢/kWh
Agricultural	9.46 ¢/kWh
Commercial	10.09 ¢/kWh
Industrial	7.48 ¢/kWh

systems. [R#1] Between September 1990 and September 1991 revenues increased in all except the agricultural sectors. While earnings rose, actual electricity sales (in kWh) decreased in most sectors. Residential sales decreased 3.4%, and overall sales decreased 0.1%. [R#2]

Utility DSM Overview

Southern California Edison has been one of the nation's leading utilities in demand-side management. SCE has offered DSM programs since the mid-seventies and has pioneered in many areas, paying particular attention to data collection and evaluation. After sharing the national leadership for energy-efficiency with Pacific Gas and Electric in the late 1970s, Edison sharply reduced its DSM expenditures in the early and mid-1980s, citing its excess capacity situation. SCE was able to increase DSM spending in 1990 and 1991, thanks to the influence of the California Collaborative.

In 1990 and 1991, SCE's investments in DSM were equal to .9% and 1.4%, respectively, of its gross energy revenues. [R#3,4,5,6] In 1991 SCE's DSM programs yielded energy savings equal to 1.4% of the total energy demand in the absence of any DSM programs. These programs also yielded peak capacity savings equal to 3.0% of the total peak capacity in the absence of any DSM programs.

DSM PROGRAMS FUNDED BY SCE

RESIDENTIAL
INFORMATION PROGRAMS
Action Line
Processing Center
Field Inspections
Conservation Financing and Zero-Interest Program/Greater Eastern Desert Area
Residential Outreach
ENERGY MANAGEMENT SERVICES
Energy Surveys
Appliance Efficiency Incentives
New Construction
Direct Assistance
NONRESIDENTIAL PROGRAMS
INFORMATION PROGRAMS
Major Accounts
Outreach
ENERGY MANAGEMENT SERVICES
Commercial/Industrial/Agricultural Audits
Air Conditioning Inspection & Maintenance Rebates
Energy Management Hardware Rebate Program (EMHRP)
New Construction -- Design For Excellence

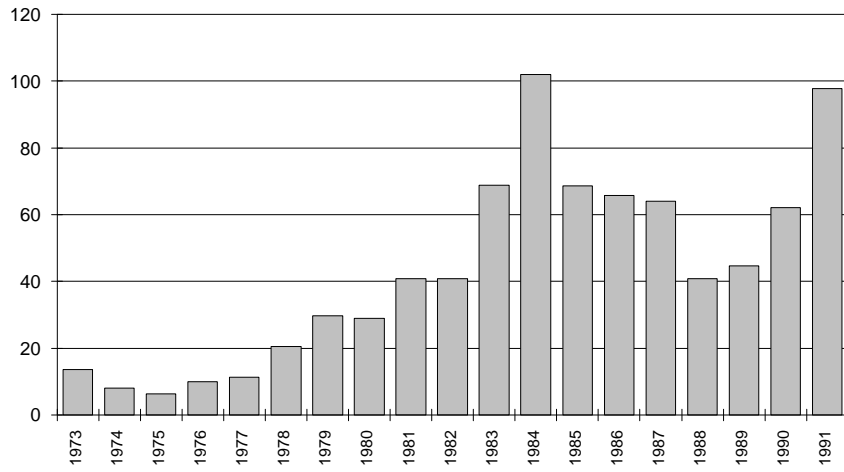
Utility DSM Overview Table	Annual C&LM Expenditure (x1000)	Annual Energy Savings (GWh)	Annual Capacity Savings (MW)
1973	\$13,541	96	10
1974	\$7,953	383	29
1975	\$6,316	609	100
1976	\$9,877	467	80
1977	\$11,215	586	101
1978	\$20,447	720	184
1979	\$29,705	1,121	308
1980	\$28,868	1,267	377
1981	\$40,835	1,352	616
1982	\$40,903	1,565	835
1983	\$68,762	1,568	848
1984	\$102,019	1,610	505
1985	\$68,630	1,518	489
1986	\$65,708	1,131	602
1987	\$63,969	849	445
1988	\$40,768	700	360
1989	\$44,586	683	268
1990	\$62,000	1,129	591
1991	\$97,708	1,039	514
Total	\$823,809	18,393	7,262

[R#3,6]

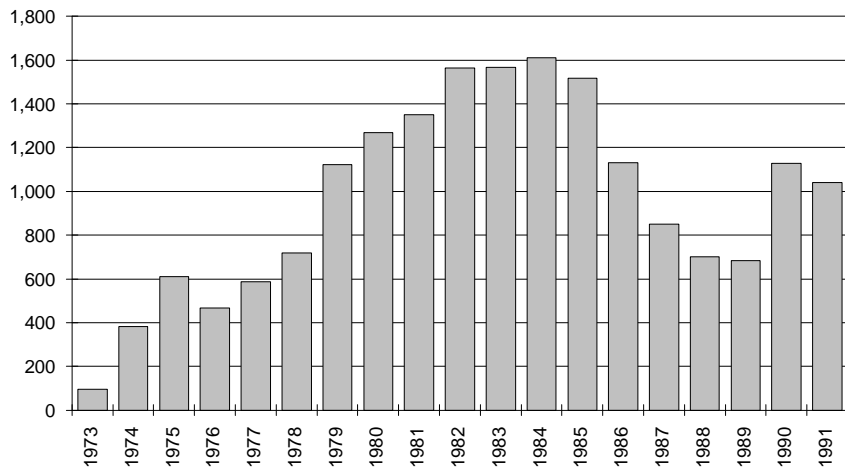
Note: Year March 1 - April 30.

Southern California Edison has two informational programs for its customers in the nonresidential sector. Through the Major Accounts program, corporate decision makers from 212 of SCE's largest commercial and industrial customers are provided assistance and advice with energy planning matters. Through the Outreach Program, customers and trade allies are informed of developments in DSM and related issues. The program uses publications, sponsorship of conferences, seminars, workshops, and trade shows, and periodic direct mailings to disseminate information of interest to commercial, industrial, and agricultural customers.

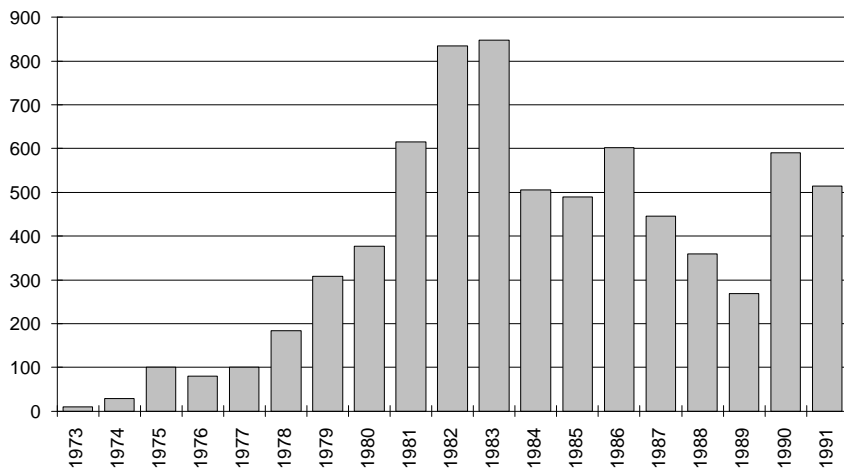
**ANNUAL DSM
EXPENDITURE
(\$1,000,000)**



**ANNUAL ENERGY
SAVINGS (GWH)**



**ANNUAL CAPACITY
SAVINGS (MW)**



Program Overview

Through the Energy Management Hardware Rebate Program (EMHRP), SCE has been providing incentives to commercial, industrial, and agricultural (CIA) customers since 1978. CIA customers can install a variety of energy-efficient measures – from lighting and space conditioning improvements to building envelope enhancements to motors. All installations are preapproved and cash rebates are issued for up to 30% of the installed cost of the measures. There is no maximum rebate.

The program is marketed to all eligible non-residential customers and has proven increasingly popular in the years since its introduction. Customers are guided through the simple rebate process by an Energy Services Representative. This representative conducts an energy survey, recommends applicable energy-efficient measures, and issues a coupon authorizing the customer to proceed with installation of selected measures. After installation is completed, the representative performs an inspection, receives copies of the invoices, and validates the coupon. Customers then redeem the coupon, receiving a check within four to five weeks after the coupon is received by SCE.

Although the EMHRP has existed in one form or another since 1978, the list of eligible measures and the amount of rebates have changed over the years. In 1988, the installation of adjustable speed drives became an eligible measure, with rebates of 5¢ per annualized kWh of savings.

Also added in 1988 was a new customized rebate category, allowing customers to receive rebates for measures which are not included on SCE's list. Another change to the program came in 1991, when the maximum rebate (which had been \$50,000 per customer per year) was dropped as part of SCE's 1990 rate case decision.

Special targeted programs have been occasionally implemented to increase participation rates within certain segments of the eligible customer base. For example, in 1990, SCE introduced a component targeted specifically at smaller CIA customers who want to install timers, lamps, or cooling equipment. Called TLC, this component of EMHRP represented an effort by SCE to encourage participation by those smaller customers who had not historically participated in large numbers in the incentives program. The TLC component was dropped in 1991.

Implementation

MARKETING AND DELIVERY

SCE emphasizes personal contact in marketing EMHRP. All eligible customers are contacted at least once every other year by marketing representatives, who inform the customers of the incentive program, as well as providing other customer service functions. (Large customers with annual demand greater than 200 kW are contacted annually.) EMHRP is also marketed through television and print advertisements, trade publications, tradeshow displays, and seminars. Trade allies, vendors and contractors are also targeted in EMHRP marketing activities.

Contact with most EMHRP participants first occurs through the CIA Audits program, in which customers receive energy surveys to identify energy conservation opportunities in their facilities. Customers often request the survey, or the survey may be initiated by the Energy Services Representative (ESR). Through the survey, a list of energy saving measures is developed. Those measures which are eligible for a rebate are identified and a preliminary rebate amount is calculated based on estimated savings.

The energy survey results are presented to the customer, and the customer can choose which measures to implement. The customer is issued a coupon naming the eligible measures and the estimated rebate amount. After the installation is completed, the customer informs SCE, and the ESR makes a site visit to verify the installation and validate the coupon. The final rebate amount is calculated based on engineering estimates of savings that will result from the actual installation. Rebate checks are usually issued within six weeks of the time the validated coupon is received by SCE. [R#11,12]

MEASURES INSTALLED

The following measures are eligible for rebates under SCE's 1992 EMHRP. In no case will a rebate be paid for more than 30% of the customer's investment. (Rebate amounts reported in this section are in 1992 dollars.) [R#13]

LIGHTING

Existing lighting systems may be replaced by high-efficiency lighting consisting of complete hard-wired fixtures, with rebates of \$140/kW saved.

Modifications of existing lighting systems which improve the system's efficiency, such as installation of electronic ballasts and T-8 lamps, are eligible for rebates of \$100/kW reduced.

Modifications of existing lighting systems which save energy, such as occupancy sensors, twist timers, timeclocks, and photoelectric controls, are eligible for rebates of 3¢ per annualized kWh savings.

Installation of photoelectric daylighting controls are eligible for rebates of \$90/kW controlled.

WATER HEATING

Installation of heat pump water heaters with a COP of at least 2.0 may receive rebates of \$15/thousand btu capacity.

Installation of a low temperature chemical dishwasher is eligible for a rebate of \$50/kW reduced.

HEATING AND COOLING

Installations of air conditioners and heat pumps are eligible for rebates paid per ton of capacity based on the rated electrical cooling output and the SEER or EER of the installation. The following types of equipment qualify for rebates from \$9/ton to \$20/ton: room air conditioners and heat pumps; air cooled split system and air cooled single package air conditioners and heat pumps; evaporative or water cooled

Implementation (continued)

air conditioners; water source heat pumps; and air source air conditioners and heat pumps.

Replacements of electric air conditioning systems with evaporative coolers are eligible for rebates of \$70/ton.

High efficiency chillers that meet or exceed specified efficiency levels may be installed for a rebate of \$15 to \$18/ton.

Permanent installations of window tints or screens with shading coefficients of 0.50 or less are eligible for rebates of 80¢/square foot.

Roof insulation equal to or greater than R-19 and wall insulation equal to or greater than R-11 may be installed in electrically cooled or heated facility for rebates of 16¢/square foot.

HIGH EFFICIENCY ELECTRIC MOTORS

Rebates are paid for single and three phase motors based on rated horsepower and motor efficiencies. Rebates range from \$14 to \$800 per motor installed. Three phase motors greater than 300 horsepower receive rebates of \$2.75/HP.

ELECTRONIC ADJUSTABLE SPEED DRIVES

Installations of electronic adjustable speed drives are eligible for rebates of 5¢/annualized kWh savings.

CUSTOMIZED REBATE

Recommendations by SCE's Energy Services Representative for energy efficiency measures not included in the standard rebate categories are eligible for rebates of \$65/kW or 5¢/kWh.

STAFFING REQUIREMENTS

The EMHRP program is principally administered by three full-time personnel in SCE's central office and seven full-time staff in SCE's regional offices. Approximately 200 ESRs implement EMHRP, performing energy audits, compiling rebate offers, and validating measure installations. The ESRs do not spend 100% of their time on EMHRP, as they also deal with SCE's other energy management services as well as general customer service responsibilities. In addition to these dedicated staff, EMHRP also requires the time of approximately one FTE in SCE's monitoring and evaluation section. [R#12]

Monitoring and Evaluation

MONITORING

Participant and project data for EMHRP are tracked through SCE's Energy Management Reporting System. The system accepts energy audit data regarding revenue class, SIC code, rate, demand range, energy usage, and audit recommendations. EMHRP data regarding installations and rebate amounts are included in the tracking system.

Installations through EMHRP are all site verified. ESRs determine pre-existing equipment as well as inspecting the installation upon completion. In this way, the energy saving estimates may be refined to accurately reflect the actual conditions of the installation. Operational information specific to each installation is incorporated into the savings estimate and rebate calculation. In this way, SCE's engineering estimates accurately reflect actual savings.

SCE has conducted load metering studies to verify and refine the inputs to engineering models used to estimate energy savings. In 1989 and 1990, commercial buildings were monitored and load shapes, energy usage distributions by end-use, load factors for end-uses, and peak day analyses were generated. A special air-conditioning study focusing on commercial buildings is underway.

In 1991, a project was initiated by which site audits of participants and non-participants would generate data to be used in the engineering models. Also, SCE is experimenting with estimating gross impacts through billing analyses, and participation and weather data.[R#11]

EVALUATION

SCE is conducting a process and impact evaluation of EMHRP expected to be completed in 1993. Additionally, many of SCE's evaluation activities generate results applicable to EMHRP. SCE conducts customer "Saturation and Attitude" surveys. Saturation surveys are used to determine what types of equipment customers have in their facilities, and what energy management practices they are currently conducting, as well as demographic data. Attitude surveys are used to examine customers' views toward implementing energy-efficient equipment and other energy conservation activities. This information is used in revising EMHRP to best meet the needs of its customers. As a result of completed and ongoing Saturation and Attitude surveys, SCE is considering revising EMHRP to target specific market segments. In this way, the most energy-efficient and cost-effective measures can be promoted to the appropriate customer types.

SCE's New Technology Assessment activities generate data used in determining which new items should be included in EMHRP and what appropriate rebate amounts should be established.[R#11]

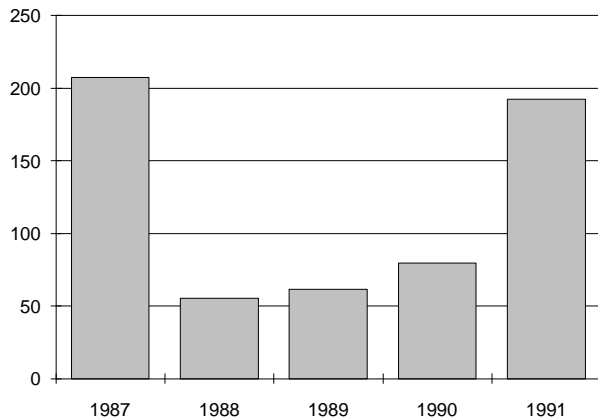
DATA QUALITY

SCE's data regarding energy savings are calculated using engineering estimates based on the actual installations of equipment. As discussed in the Monitoring section, the inputs to these engineering models are frequently revised and updated. Additionally, all installations are site-verified, adding to the reliability of the inputs to the savings estimates.

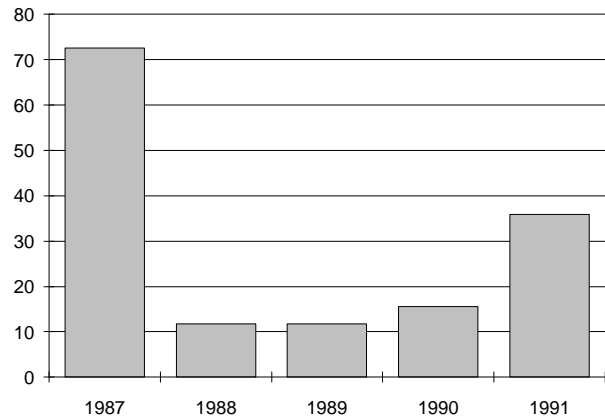
Program Savings

Savings Overview Table	Annual Energy Savings (MWh)	Cumulative Energy Savings (MWh)	Lifecycle Energy Savings (MWh)	Annual Capacity Savings (MW)	Cumulative Capacity Savings (MW)
1987	207,300	207,300	2,954,923	72.6	72.6
1988	55,500	262,800	743,604	11.8	84.4
1989	61,648	324,448	736,958	11.8	96.2
1990	79,644	404,092	1,135,272	15.5	111.7
1991	192,302	596,394	2,741,137	35.8	147.5
Total	596,394	1,795,034	8,311,893	147.5	

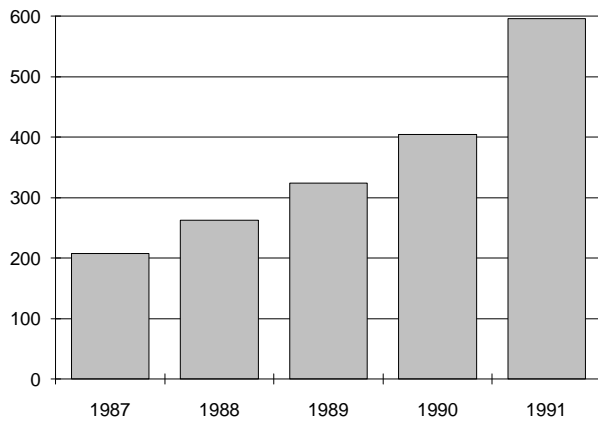
ANNUAL ENERGY SAVINGS (GWH)



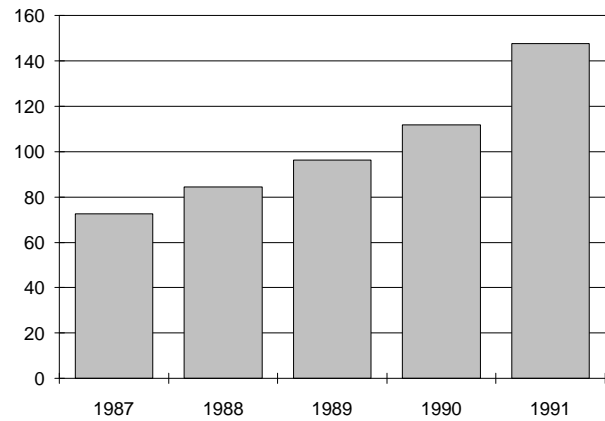
ANNUAL CAPACITY SAVINGS (MW)



CUMULATIVE ENERGY SAVINGS (GWH)



CUMULATIVE CAPACITY SAVINGS (MW)



Between 1987 and 1991, EMHRP generated a total of 596.4 GWh in annual energy savings, and 147.5 MW in annual capacity savings. Lifecycle savings have totalled 8,312 GWh. The program has shown significant progress since the Collaborative stimulated activity in 1990. Annual savings between 1990 and 1991 more than doubled to 192 GWh, with capacity savings in 1991 of 35.8 MW. Most of the 1991 savings were attributed to projects within the commercial sector, where 123.8 GWh in annual savings were realized. Measures installed by industrial customers in 1991 accounted for 55.3 GWh in annual savings, and agricultural customer projects saved 13.1 GWh.[R#11]

Customer Participation Table	Number of Measures Installed	Annual Energy Savings per Measure Installed (kWh)
1987	3,933	52,708
1988	1,385	40,072
1989	1,545	39,902
1990	2,596	30,680
1991	19,049	10,095
Total	28,508	

PARTICIPATION RATES

The majority of program participation occurred in 1991, with 19,049 measures installed, as compared to 1,400 to 4,000 in previous years. Most of the measures were installed by commercial customers, who installed 16,863 measures in 1991. Industrial customers installed 1,718 measures, and agricultural customers installed 468 measures in 1991.[R#11]

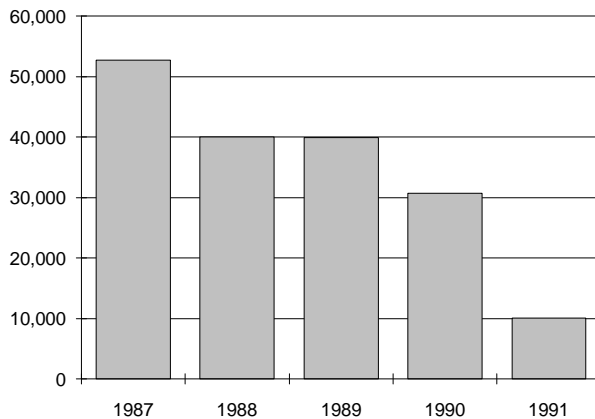
PROJECTED SAVINGS

SCE projects that total annualized savings in 1992 will be 311.6 GWh, nearly double the 1991 savings. SCE expects the program growth will be consistent across the commercial, industrial and agricultural sectors.[R#11,12]

MEASURE LIFETIME

The measure lifetime varies with the number and type of measures installed each year. Between 1987 and 1991, the lifetime of measures installed has ranged from 12 to 14.25 years.

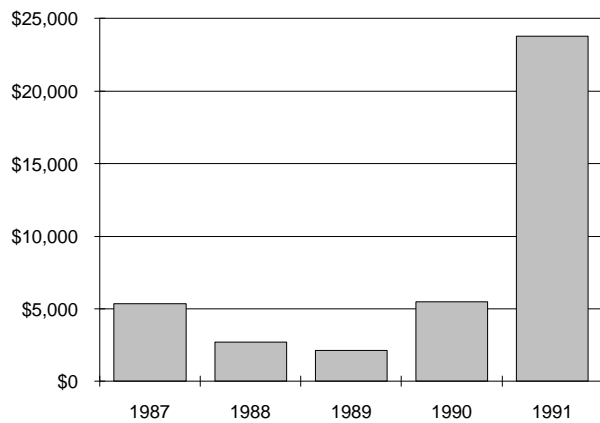
ANNUAL ENERGY SAVINGS PER MEASURE INSTALLED (KWH)



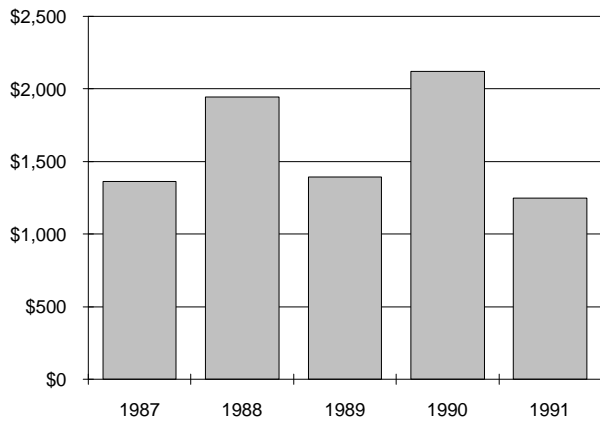
Cost of the Program

Costs Overview Table	Administration (x1000)	Incentives (x1000)	Total Program Cost (x1000)	Cost per Measure Installed
1987	\$500.5	\$4,858.7	\$5,359.2	\$1,363
1988	\$2,316.2	\$377.7	\$2,693.9	\$1,945
1989	\$341.9	\$1,807.9	\$2,149.7	\$1,391
1990	\$7.4	\$5,497.6	\$5,505.0	\$2,121
1991	\$3,264.6	\$20,499.5	\$23,764.1	\$1,248
Total	\$6,430.5	\$33,041.3	\$39,471.8	

TOTAL PROGRAM COST (x1,000)



COST PER MEASURE INSTALLED



Cost of Saved Energy Table (¢/kWh)	Discount Rates						
	3%	4%	5%	6%	7%	8%	9%
1987	0.23	0.24	0.26	0.27	0.29	0.31	0.33
1988	0.42	0.45	0.48	0.52	0.55	0.58	0.62
1989	0.30	0.33	0.35	0.37	0.39	0.42	0.44
1990	0.60	0.65	0.69	0.74	0.78	0.83	0.88
1991	1.08	1.15	1.23	1.31	1.40	1.48	1.57

Program expenditures in 1991 far exceeded expenditures in any other year, and were accompanied by unprecedented participation rates and energy savings. In fact, the budgeted incentive funds were depleted by April, 1991, and program managers had to reapportion the budget in order to meet program needs without requesting additional funding. Expenditures on incentives in 1991 were \$20.5 million, with total program cost of \$23.8 million.[R#11] Total program costs from 1987 to 1991 have been \$39.5 million with \$33.0 million spent on incentives.

COST EFFECTIVENESS

SCE performs cost-effectiveness analyses on all of its DSM programs. Using the Total Resource Cost Test, SCE calculated Benefit to Cost Ratios with the lowest of 5.85 for the large industrial customer projects in EMHRP, and a high of 6.92 for agricultural customers. Net Present Values for EMHRP ranged from a low of \$4.3 million for the small/medium industrial customers, to a high of \$33.9 million for the small/medium commercial customers.[R#11]

The Results Center calculated the cost of saved energy at various discount rates, as shown in the Cost of Saved Energy Table. At 5%, EMHRP costs have been very attractive, ranging from 0.26¢/kWh in 1987 to 1.23 ¢/kWh in 1991.

COST PER PARTICIPANT

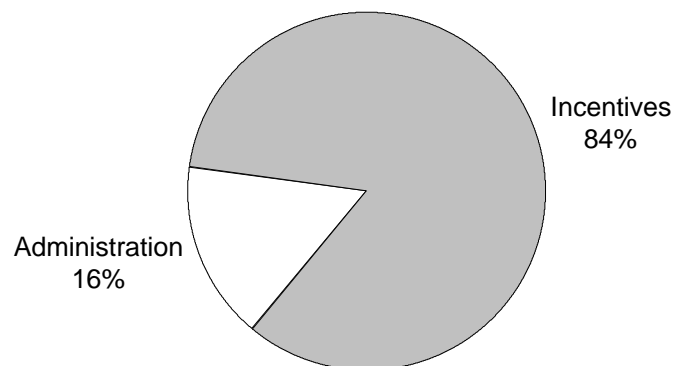
SCE cost per measure installed decreased by nearly one-half between 1990 and 1991, from \$2,121 to \$1,248. Per-measure costs in previous years were \$1,363 in 1987, \$1,945 in 1988, and \$1,391 in 1989.

FREE RIDERSHIP

In the absence of the energy survey and rebates offered through EMHRP, it is possible that some customers would still consider installing some energy conservation measures during a major renovation or routine equipment replacement. However, it is not likely that customers could identify the full range of energy conservation measures, and be inclined to install many of them (especially those with long payback periods) in the absence of the program.

COST COMPONENTS

On average, about 84% of the program budget goes toward incentive payments, with the remaining 16% spent on administration, marketing and program implementation, including the performance of energy surveys. In addition to these costs, the measurement and evaluation section of SCE had a 1991 budget for all activities of \$9.5 million and expenditures for evaluating EMHRP are included in that department's budget.



Environmental Benefit Statement

Marginal Power Plant	Heat Rate BTU/kWh	% Sulfur in Fuel	CO2 (lbs)	SO2 (lbs)	NOx (lbs)	TSP* (lbs)
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Coal Uncontrolled Emissions

A	9,400	2.50%	3,870,000	92,000	19,000	2,000
B	10,000	1.20%	4,127,000	36,000	12,000	9,000

Controlled Emissions

A	9,400	2.50%	3,870,000	9,000	19,000	0
B	10,000	1.20%	4,127,000	4,000	12,000	1,000
C	10,000		4,127,000	24,000	12,000	1,000

Atmospheric Fluidized Bed Combustion

A	10,000	1.10%	4,127,000	11,000	6,000	3,000
B	9,400	2.50%	3,870,000	9,000	7,000	1,000

Integrated Gasification Combined Cycle

A	10,000	0.45%	4,127,000	7,000	1,000	3,000
B	9,010		3,712,000	3,000	1,000	0

Gas Steam

A	10,400		2,251,000	0	5,000	0
B	9,224		1,955,000	0	12,000	1,000

Combined Cycle

1. Existing	9,000		1,955,000	0	8,000	0
2. NSPS*	9,000		1,955,000	0	4,000	0
3. BACT*	9,000		1,955,000	0	0	0

Oil Steam--#6 Oil

A	9,840	2.00%	3,258,000	49,000	6,000	6,000
B	10,400	2.20%	3,455,000	49,000	7,000	4,000
C	10,400	1.00%	3,455,000	7,000	6,000	2,000
D	10,400	0.50%	3,455,000	21,000	7,000	1,000

Combustion Turbine

#2 Diesel	13,600	0.30%	4,324,000	9,000	13,000	1,000
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Refuse Derived Fuel

Conventional	15,000	0.20%	5,134,000	13,000	17,000	4,000
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Avoided Emissions Based on 1,795,034 kWh Saved (1987 - 1991)

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 previous page is to allow any user of this profile to apply Southern California Edison's level of avoided emissions saved through its Energy Management Hardware Rebate Program 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 includes 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

EMHRP has been very successful in evaluating customer needs and responding to them. By offering a range of measures eligible for rebates under the program, participation becomes desirable for the entire eligible customer base.

SCE's marketing approach, which emphasizes personal contact, benefits the program by enhancing participation rates as well as providing a ready method of receiving customer feedback. EMHRP's process of on-site validation of equipment installed is another opportunity for receipt of customer feedback. Additionally, the site inspections insure that installations have been properly completed and give the ESR an opportunity to note any anomalies in customer equipment operations.

SCE has learned a lot about setting appropriate rebate levels, and has some innovative plans for future rebate level establishment. Where appropriate, SCE plans to base rebate amounts on the relative value of the energy saved by the measure to the utility. By looking at different customer use patterns for particular equipment, SCE can adjust savings estimates to specifically apply to each application. Customer differences in use affect the time of day the savings will be realized. With this type of analysis, SCE can determine which applications of which equipment will be most valuable, and establish rebate levels that will be most appealing to those types of customers who can insure the most valuable savings. Additionally, SCE can target marketing for different eligible measures toward the appropriate customer types. In this way, EMHRP will optimize savings for both the customer and SCE.

SCE plans to continue implementing pilot programs that are aimed at enhancing participation rates and increased savings among certain customer classes. The TLC pilot, (Timing, Lights, and Controls), which ran for one year in 1990, was successful in reaching small commercial customers who had limited participation in EMHRP. In 1993, a dealer promotion is being considered on a test basis, aimed at taking advantage of the opportunities that dealers have to promote energy-efficient products to customers.

TRANSFERABILITY

SCE has set up EMHRP in such a way that it can be easily transferred to another region or utility. The ESRs, based at SCE's regional offices, are the program's primary implementers. These highly experienced staff are well equipped to analyze each particular customer's energy needs. Utilities without a base of energy management specialists would need to develop such a staff, or hire contractors, prior to the successful implementation of a program like EMHRP.

As the rebate levels under EMHRP become more focused on the specific value of the energy saved to SCE, the particular rebate amounts will not necessarily be appropriate in other regions or applications. Utilities whose primary goal is to change the market or influence customers to install measures that are new or uncommon would want to evaluate their rebate levels differently.

Regulatory Incentives and Shareholder Returns

California has a long history of compensating its utilities for their demand side management expenditures. The Electricity Revenue Adjustment Mechanism (ERAM) was the first regulatory mechanism to remove the disincentive concerning lost revenue that was preventing most utilities from implementing DSM programs. ERAM allowed utilities to earn a rate of return on projected sales, before energy efficiency programs reduced actual sales. In 1989, the California Collaborative process modified DSM recovery mechanisms to allow utilities to earn a return on their DSM investments. This created an incentive for utilities' participation in DSM – more than simple removal of the disincentive.

For SCE's 1992 general rate case, the California Public Utilities Commission developed an "S-shaped" incentive function for determining the levels of shared savings SCE may earn for the performance of applicable DSM programs. The incentive function is designed to encourage SCE to be both as accurate as possible in projecting its DSM savings goals and as successful as possible in achieving them. The function utilizes a rate which varies with how well program performance matches its goals. The variable rate is designed to provide SCE with its highest rate of return on its DSM investments when SCE exactly meets its projected savings goals. The function employs a penalty for poor performance and a very small rate of return for low achievement and for performance far exceeding the projected goal.

For performance less than 50% of the goal, the value of the incentive is negative; SCE is penalized. At 50% the incentive value is exactly zero; beyond this performance level the utility can accrue rewards. Between 50% and 75% (low achievement) a small, constant incentive rate is available. From 75% to 125%, the greatest rewards are possible. In this region of performance the incentive rate is parabolic, greatly increasing from 75% to its peak at exactly the performance goal and then decreasing to 125% of the goal. The incremental incentive value is large throughout this region, with the greatest value being at 100% of the goal. Beginning at 125% and continuing indefinitely, the same small, constant incentive rate is applied as between 50% and 75%. In this last region the incremental value of the incentive is small and constant.

The incentive value is determined by multiplying the incentive rate (variable as described above) by the incentive basis (IB). The incentive basis is the value of the total resource benefit (TRB) of the program less the utility and customer costs. Utility costs represent the utility's investment in a DSM program and include the utility administrative cost (UAC) and half of the utility incentive cost (UIC). Total costs are defined as the participant cost (PC) and the utility cost. At the target incentive basis (100% of the program performance goal), the incentive available to be earned by SCE is designed to be equal to 10.59% of the utility cost (UAC + UIC). [R#7,12]

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