California Energy Coalition
Energy Cooperatives
Profile #9, 1992

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Executive Summary

The California Energy Coalition (referred to as CEC and "the Coalition") is a unique organization that was established by a third party to coordinate the energy use of large commercial and industrial customers and to broker this service to Southern California Edison and other utilities. The CEC was created by and for large commercial and industrial energy users who want to act responsibly to shed load at times of utility capacity constraints through sophisticated management of their facilities. By coordinating their efforts, these users can respond collectively with a high degree of individual flexibility and reliability. Sometimes one member will compensate for another's inability to meet load reduction targets when called by the utility. At other times the same member may not be able to meet the "firm service level" ascribed in the "load reduction game plan."

The California Energy Coalition has created a process whereby large users can fulfill the dual goals of enhancing their own bottom line through wise energy management while serving as responsible corporate citizens. The CEC's charter was to provide load management services and "outreach" services for its members. The latter has evolved into a major emphasis on energy efficiency; in fact a large fraction of the CEC's revenue comes from energy efficiency initiatives. The CEC has effectively brought major energy users "on board" with profitable load management and then has provided services for members to further enhance their "total energy efficiency management"; a blend of "fuel-neutral" energy efficiency measures and heightened operational awareness and control.

Because all incentive payments are the direct result of measured data, this profile has a high degree of accuracy for savings and costs. The energy efficiency savings that result as members join in the broader energy cooperative process are approximated and thus can only be presented as qualitative information. For 1991, the Coalition provided Southern California Edison with 14 MW of summer peak capacity at a total cost to SCE of $365,000. The CEC has also developed energy cooperatives for PG&E, Long Island Lighting Company, Boston Edison, and now for Commonwealth Edison. Each of these cooperatives has evolved differently, providing fertile ground for comparisons.

The most important lesson learned from energy cooperatives is that a third party broker, such as the CEC, can effectively motivate its members to continually refine their energy management and capture greater and greater efficiency over time. The CEC has provided an effective, low-cost means for major energy users to profit from load management and energy efficiency.

Energy Cooperatives

Utility:	California Energy Coalition
Sector:	Large Commercial and Industrial
Measures:	Load management, efficiency measures, and operational strategies for large users.
Mechanism:	The Coalition collectively manages the power demand for a diverse pool of large users and is paid for the service by the Southern California Edison Company (SCE).
History:	Begun in 1982, contracts until 1997 and 2003.

1991 Program Data:

Average peak capacity contribution:	13,977 kW
Cost:	$364,899

1982-1991 Data:

Average peak capacity contribution:	3,907-15,704 kW
Cumulative cost:	$4,095,301
Participation rate:	1.5%

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.

History of Energy Cooperatives

The California Energy Coalition (referred to as CEC or the Coalition) has developed and refined the energy cooperative concept since the early 1980s. The concept is a basic approach to controlling the electrical demand of large commercial and industrial customers through their cooperation with other large users and the utility. Energy cooperatives' implications, in contrast, can be quite profound.

The CEC is a nonprofit organization that coordinates the energy use of large commercial and industrial properties to collectively manage and ramp down load when the utility reaches its peak demand. In a sense, the CEC is a third party broker for utility load management representing its members in contract negotiations with Southern California Edison and then managing ongoing load management capabilities. CEC has developed a niche for controlling energy use that lies between customers that cannot reduce their load under any circumstances, and those that can tolerate power interruptions. CEC works with those customers that are willing to lower their power demand when called by SCE, but who also maintain another level of flexibility by working within a pool of users who can individually reduce their power demand at different times.

The first energy cooperative was developed in 1975 in response to the oil embargoes when the City of Los Angeles mandated a minimum 10% reduction in energy use. At that time John Phillips was the president of Engineering Supervision Company, a company that was managing the electrical and mechanical systems for 22 million square feet of office space in major cities across the nation. In Los Angeles, after successfully reducing energy use 25%-40%, the cost of energy for facilities there had actually increased by 15% because the utility involved had hiked rates to compensate for reduced electricity sales.

As a result of this experience, the Central City Associates of Los Angeles (a group of influential Los Angeles businesses), the U.S. Department of Energy, and Los Angeles Department of Water and Power formed a task force to address long term solutions for reducing energy use while maintaining utility revenues. Phillips had an idea: a utility and its large commercial and industrial users working together. Large users pooled together could collectively decrease their power requirements with minimal individual disruptions.

In 1979, based on the success of the original energy cooperative, Southern California Edison commissioned the development of the first energy cooperative for an investor-owned utility. The California Energy Coalition was formed with some of the largest and most prestigious businesses in Orange County as its charter members. The CEC was developed to accomplish two major goals: to serve as a management group for the Southern California Edison program, and to raise awareness of the potential of energy efficiency.

> "**We feel this approach makes sense and we encourage others -- companies and utilities -- to form similar Cooperatives. Everyone benefits, ... and that is the name of the game.**" *J. Robert Fluor, former Chairman, Fluor Daniel Corporation*

The CEC was formally established in 1982 and formed three energy cooperatives between 1982 and 1986 that can now collectively reduce load by 18.2 MW as needed by SCE. The cooperatives have proven themselves as low-cost capacity for the utility, and for their members have been avenues for dollar savings and energy efficiency improvements which have resulted from heightened awareness of operations and energy efficiency opportunities.

As the Coalition's influence grew in California it began to play an increasingly important role in the state's energy policy decision-making. The Coalition was asked to represent the state's commercial and industrial users in what became known as the "California Collaborative." The CEC became one of the architects of the collaborative, an innovative policy

instrument jointly signed by 24 individuals from 15 diverse interest groups including environmental activists, consumer advocates, government officials, and the state's utilities.

By the mid-1980s the CEC responded to the request of the senior management at Boston Edison, the Conservation Law Foundation, and Massachusetts' regulators to craft an affirmative approach to promote energy efficiency in the region and in particular to test energy cooperatives in the Northeast. The Northeast Energy Cooperative (NEEC) was formed for Boston Edison and was then successfully incorporated into the company and renamed the Boston Edison Energy Cooperative (BEEC).

At the same time the CEC was involved in developing energy cooperatives for the Long Island Lighting Company. While the cooperatives were ultimately controlled by LILCO they proved once again that large energy users can be effectively pooled together. Today, LILCO's energy cooperatives, although significantly different in structure than the California cooperatives, can provide 60-70 MW of critical peak capacity.

Currently Commonwealth Edison and the City of Chicago are contracting with Phillips to develop a 20 MW energy cooperative in Chicago. The Commonwealth Edison Energy Cooperative, now being developed, will be organized and established by Phillips and his staff and then managed by Demand-Side Resources (a private consulting firm) for Commonwealth Edison.

In addition, the CEC is promoting new kinds of energy cooperatives. In Sweden, the CEC is working with Nacka Energi to develop a cooperative approach to energy planning that takes into account both the needs and plans of users and utility alike. At home in California, the CEC is now involved in a process called "total energy efficiency management," an approach to energy that embodies all the principles of the CEC's first energy cooperatives with an emphasis on energy efficiency. Total energy efficiency management also incorporates residential energy use and transportation planning.

Program Overview

Energy cooperatives are based on computer networks which continuously monitor the individual and collective energy use and reductions of large users. The results are measurable to utility and user alike. Just as utilities bring on line power plants to meet growing demand, energy cooperatives reduce demand as needed by the utility they serve. For utilities, the capacity savings delivered by the cooperative's members can be reliable and cost effective.

For members, energy cooperatives provide revenues from energy savings while maintaining required energy services. Membership provides additional value in the form of recognition by the community. The cooperative management provides its members with expert assistance in achievement of energy efficiency capabilities. Members have found that energy cooperative membership has heightened their awareness of the operating characteristics of their facilities. Thus they make continuous improvements to the control and operations of their facilities, resulting in even greater value.

> "**Building a structure for effective [energy] policy begins with a solid foundation. Rather than looking to government for answers we must create energy and environmental initiatives at the local level that allow communities and businesses to determine their energy future.... Energy cooperatives are a powerful example of a partnership between businesses and their utility, working together for the common good, providing reliable, cost-effective energy efficiency results. Isn't it better for a utility to contract with its customers for energy efficiency rather than buying additional power from outside the community?**" *John Phillips, Executive Director*

For large commercial and industrial customers interruptible rates have been quite successful where applicable, but their scope has been limited to customers that can sustain power reductions. Energy cooperatives allow for cooperation between members to allow maximum flexibility in times of curtailment. By knowing each other's processes and power needs, the Coalition can broker its capacity between members and types of measures and provide reliable curtailment for the utility.

In 1982 the CEC established a contractual 15-year agreement with SCE for load management capabilities. For every kilowatt of peak demand that the CEC can curtail reliably to the firm (or minimum) service level (FSL), the CEC is paid an incentive. Of that fee, the CEC retains a portion (15%) for its management and (5%) to enhance its capabilities. The CEC then writes checks to its members based on their prorated share of the overall capability.

While energy cooperatives were originally designed as a tool for load management, energy cooperatives can work effectively in conjunction with other DSM programs such as energy efficiency standards. Standards, for example, merely lower the "benchmark" for average energy use and thus push the cooperatives to achieve even lower firm service levels. Because it is in the cooperative's interest to maximize the margin between member's coincident peak demand and firm service levels, other programs for energy efficiency delivered by the utility challenge the cooperatives to achieve even greater savings.

The original agreement with SCE did not limit the size of the first cooperative. However, the second two cooperatives that were developed were limited in size to 10 MW each. By 1986, when the second and third energy cooperatives were established, the capacity situation in Southern California had changed. In sharp contrast to the dire capacity constraints that utilities in Southern California were experiencing during the energy crises of the seventies, by 1986 the utility was in an excess capacity situation. "The Coalition was not designed to harm Edison, but to provide capacity as needed. We didn't want to get bigger, and didn't aggressively pursue additional members. We could have doubled or tripled in size -- but it wasn't and isn't in the interest of ratepayers when the utility has plenty of capacity," explained John Phillips.

The current membership is organized into three cooperatives whose representatives meet every other month: The Southern California Energy Coalition, The South Bay Energy Coalition, and The Southern California Energy Coalition II. Members are listed with their date of initial involvement in the Coalition:

Orange County Sanitation District (1982)
Pacific Mutual Life Insurance Company (1982)
Winthrop Management Company (1982)
The Irvine Company (1982/several facilities)
South Coast Plaza (1982)
Steelcase, Inc. (1983)
Hoag Memorial Hospital (1983)
TRW (1986/several facilities)
The Koll Company (1986/several facilities)
Irvine Hyatt Hotel & Resort (1986)
Tooley & Company (1991)

Load Management in Perspective

The purpose of this section is to put load management in general, and energy cooperatives in particular, in perspective. How useful or beneficial is load management to utilities? How do energy cooperatives enhance more traditional load management efforts? And finally, why do utilities contract with third party (or independent) organizations such as the CEC to carry out this sort of effort?

THE VALUE OF LOAD MANAGEMENT

Most energy efficiency advocates insist that load management ranks a "distant second" to programs that actually save energy. Many load management programs simply shift demand from periods of peak demand to off peak periods, a rather attractive situation from a utility perspective as utilities are naturally concerned about losing revenues. But this is an oversimplification of load management. At its worst, load management actually creates a net increase in electricity used. Load management of this kind can be thermodynamically inefficient but practical for utilities with load profiles that vary dramatically. In other cases, part of the curtailed energy use is shifted to another time, while part of the curtailed energy is actually saved. This is the situation in which we find energy cooperatives.

Many of CEC's load curtailment measures simply defer electricity use to a later time. An example of this is the Orange County Sanitation District which holds off on the use of certain pumps in its facilities until the peak period has passed. But other measures, such as cutting hallway lighting levels, do not result in a snapback effect during off-peak periods. While CEC has not defined or even attempted to analyze the percentage of measures that shift use and those that actually result in an absolute load reduction, both situations do occur.

ENVIRONMENTAL IMPLICATIONS

A key consideration that we take up in the section on environmental benefits is whether load management programs actually provide a net environmental benefit. What weight is given to shifting pollution out of the Los Angeles area at times of heightened pollution? Are load management efforts in Los Angeles exporting pollution to Nevada where baseload coal-fired powerplants provide off peak power? These issues are discussed in the section titled, Environmental Benefit Statement.

LOAD MANAGEMENT AT UTILITIES

For many years utilities have used load management techniques to shift on-peak demand to off-peak periods. Load management has been seen as an inexpensive means of maximizing system efficiency and avoiding the need for future and costly power plant capacity. While constructing power plants costs on the order of $1,000/kW to $5,000/kW, many load management programs cost less than $500/kW. It's hard to argue with these comparatively low costs in an era marked by contentious power plant construction. One popular approach to load management has been interruptible rates. For a lower level of service (if you agree to be interrupted up to a prescribed number of times each year for a set period of time) the user pays a lower cost. For large commercial and industrial customers interruptible rates have often been quite successful but limited to customers that can tolerate unreliable electric service. Energy cooperatives provide a middle ground and allow for cooperation between members to allow maximum flexibility for each member in times of curtailment. By knowing each other's processes and power needs, the Coalition, thanks to a central management

which is sensitive to its member's needs, can provide both reliable capacity for utilities and reliable energy services for their members.

USE OF A THIRD PARTY PLAYER

The CEC has proved that cooperation can be assisted by a "third party" player. Utilities are relieved of the administrative burden of managing numerous customer's power demand. What has been unique to the CEC is the trust that has been nurtured and developed over the years between the CEC management -- with its strong understanding of how energy systems in buildings operate -- and its members. Furthermore, key CEC personnel have been running the energy cooperatives since 1982 and this continuity of management has been a unique and powerful element in fostering trust between members and management.

Trust between the CEC and its members has led to successes far beyond the initial expectations of the cooperative effort. As one CEC member put it, "the CEC is borne and bred of facilities engineers." The CEC-run Northeast Energy Cooperative provided critical support services to the Massachusetts Water Resources Authority (MWRA) so that they could effectively integrate their energy use with their electric utilities' demand-side programs. NEEC performed evaluations and energy plans for all MWRA facilities, from pumping facilities to treatment plants and wastewater treatment plants, and helped the huge state agency develop protocols for energy efficiency.

"**It is nice to work with people who understand industrial organizations. NEEC provided an important objective look at our interests and those of the utility.**" *Paul Levy, Executive Director,Massachusetts Water Resources Authority*

HEIGHTENED ENERGY AWARENESS

The CEC has provided a high level of enthusiasm among its members and heightened awareness of energy operations has led to energy savings in addition to capacity credits and payments. While completely undocumented, CEC members typically save 3-10% of their total energy use through better operations of their facilities as a result of membership in the energy cooperative.[R#2] At times this is achieved through investments in energy-efficient technologies, but more often it is the result of increased attention to the operating details of facilities. The CEC has fostered an awareness of operations that has led to increased sophistication coupled with far more frequent adjustments to building systems.

One of the most interesting aspects of the "glue" that the CEC provides is a means of making each member's contribution a part of "the big picture". The need to maintain a high level of interest of the importance of energy efficiency among the members is one area in which the CEC has been highly successful. What the CEC calls "outreach," one of the primary reasons for starting the CEC, is a powerful mechanism for spreading the word of the effectiveness of the CEC approach and for melding the Coalition to be responsive to today's needs: notably the need for total energy efficiency. This not only fertilizes the CEC process with new ideas from outside of California, but also imparts a sense of the importance of the CEC in the global energy arena.

Phillips points out that it was the process of establishing a solid foundation based on regional load management that has allowed the CEC to be effective. CEC stresses a consumer/producer dialogue and supports maximizing energy efficiency of all kinds, in state, national, and even international policy arenas.

Implementation

DELIVERING CURTAILABLE CAPACITY

Just as a utility brings power plants on line to meet increased demand, energy cooperatives dispatch load off line. A real-time interactive computer system links utility, cooperative, and members into a dispatchable capacity system that operates inversely to a utility power dispatch or SCADA system. A central computer located at the cooperative's headquarters links each member of the cooperative to the utility control center. When the utility requests capacity, the central system evaluates the proportionate load for each member to reduce to fulfill the utility's need. The load reduction game plan is then defined, and each member is advised of his respective target. The central system monitors each members load reduction path to assure compliance. If a particular member cannot meet his target the system automatically reallocates that load to other members based on preexisting priority agreements. In this way, the energy cooperative meets its load reduction obligations expediently and with minimal impact on its members.

During a curtailment the utility has no idea of which members are providing what levels of savings; that is left up to the cooperative. It is up to the energy cooperatives to get members to "ramp down" their power consumption to firm service levels, or to cooperatively achieve the overall curtailment level which has been predetermined by the cooperative.

By joining energy cooperatives members agree to curtail load by an average of 10% as many as fifteen times a year for periods up to six hours. If a member exceeds the level that they have committed to compensate for another member that cannot meet the predetermined firm service level, they can get a prorated share of the resulting incentives. The Orange County Sanitation District, for example, can cut far below the ten percent level using backup generators, and deferring some processes if necessary, to compensate for fellow members.

ELIGIBILITY

Energy cooperatives have to date remained a small but highly effective DSM mechanism. At the time that the CEC developed the first energy cooperative for SCE, there was no limit placed on the number of members that the coop could attract, nor any maximum size for the aggregate cooperative. By definition, however, each cooperative member must be a TOU-8 (time of use - 8) customer. This refers to SCE customers whose demand is in excess of 450 kW.

By 1986 when the CEC wanted to add two additional cooperatives for Edison, SCE was far more cautious about the energy cooperative approach and limited the size of the additional cooperatives as well as their geographic distribution. Each of the two newer cooperatives were limited to a maximum of 10 MW of curtailable capacity. In addition, each member had to be located within a ten-mile radius of a central point mutually established by SCE and the CEC.

There is a broad target market for energy cooperatives. Energy cooperatives are made up of large commercial and industrial customers. Optimally, cooperatives should have a diverse set of members. This allows for the greatest cooperation and flexibility for curtailments as necessary. Rather than having homogeneous members which have similar use patterns, part of the CEC's strength is its diversity which allows members to compensate for each other as needed.

In the past several years the CEC management has

targeted and marketed their services only to key customers whom they feel will add benefit to the coalition. (Rather than growing in size, the CEC has grown as a quality organization, providing enhanced services for its membership at home and at large.) If potential members are interested in the energy cooperative, meetings are scheduled to educate them about the requirements of membership and the benefits of joining. A walk-through survey is usually conducted on the spot, and a knowledgeable CEC staffer inquires about key energy use data as well as the level of energy management operating expertise in house.

After the initial visit, if a potential member is still interested and can sell the membership to his or her management, the CEC prepares an analysis which includes information on the cost of joining the coalition (analysis, equipment installation, and training), the commitment that the CEC will require of the prospective facility, and the approximate benefit that the member will accrue on an annual basis.

The CEC has made it continuously easier to join the Coalition. A recent member's initiation costs (which basically included hardware costs, analysis, and training costs) will be repaid to the CEC through their savings. Once the game plan, or strategy, for curtailments has been identified, the equipment installed and facility management trained, a new member is up and running. Members then attend meetings held every other month to share experiences and discuss opportunities for higher levels of energy management.

STAFFING REQUIREMENTS

The CEC is operated by an executive director, a managing director, and three support staff. Approximately one and a half full-time equivalent professional staff are able to manage the three CEC energy cooperatives.[R#2,3]

In addition to the commitment of the CEC management, SCE bears administrative costs in its oversight of the program. According to Ron Frontino of SCE, who is responsible for the CEC energy cooperatives, the amount of time required to oversee the CEC is "cyclic". For day to day management his time with the Coalition is minimal. He and his assistant attend the CEC member meetings which generally last about an hour. At other times however, such as periods when he must prepare for rate cases, the time committed to the CEC increases dramatically as special care must be ascribed to examining the utility costs for this as well as other DSM programs.

Monitoring and Evaluation

MONITORING

The essence of the energy cooperative system is based on the continuous monitoring of member's individual energy use as well as the cooperative's energy use. Data is collected every 5 minutes and is tracked closely by the CEC. Modems relay this data from the CEC to the utility and software records the information to assess the benefit provided by each member. Monthly checks are sent to the Coalition by SCE for the four summer months.

EVALUATION

To date no formal evaluations have been conducted of energy cooperatives either by Southern California Edison or by independent contractors. However, annual tests of the system's capabilities are done routinely. (The last test was in 1990 due to unusually cool summer weather in 1991.) CEC conducts tests to assure that the contracted firm service levels can indeed be met. Tests are conducted on unusually hot days in the summer. During tests the CEC headquarters contacts each member via modem and telephone and informs the member of the curtailment necessary. Then the CEC monitors the reduction and maintains communication with the members throughout the test period. After the test the CEC provides SCE with the documentation of the tests and the firm service levels achieved.

In sharp contrast, Boston Edison routinely uses its energy cooperative to control system peaks. Ironically, since the utility calls the cooperative on a consistent basis, it has been impossible to determine the cooperative's coincident peak.

DATA QUALITY

The data quality for the load management aspect of the CEC program is quite precise. On the other hand, the data for energy efficiency is at best approximate. Significant energy efficiency savings have been accrued that are completely undocumented. This profile presents solid quantification of the energy cooperatives ability to curtail capacity when called upon by the utility, and leaves the issue of resulting energy savings as an unquantified bonus.

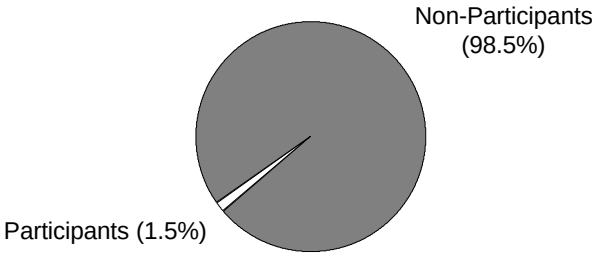
The cooperatives that the CEC has developed for Southern California Edison have been able to provide SCE with between 3,907-18,210 kW of peak capacity. In 1991, an unusually cool summer, the Coalition was able to provide 13,977 kW. Since SCE has been in a situation of excess capacity, it has not called upon the energy cooperatives operated by the CEC since the early 1980s. In fact, SCE has not interrupted any of its interruptible rate customers since 1983.[R#4] Calling neither interruptible customers or the energy cooperatives has been primarily a function of excess capacity, but also marked to a degree by customer-relations oriented sensitivities. SCE notes that its interruptible rates, though unused, have been an effective way of keeping customers on the system in light of the economic crisis in California.[R#4] The tables on the following page and the charts below present average monthly capacity contributions and the four-month cumulatives, or annual monthly kW contributions, for each energy cooperative over time.

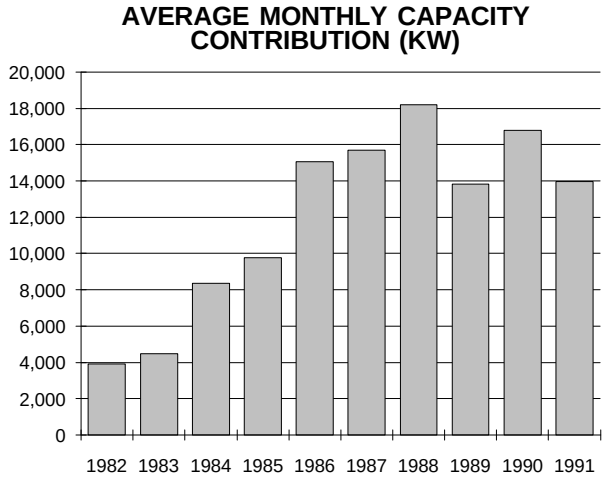
LIFETIME OF ENERGY COOPERATIVE CONTRACTS

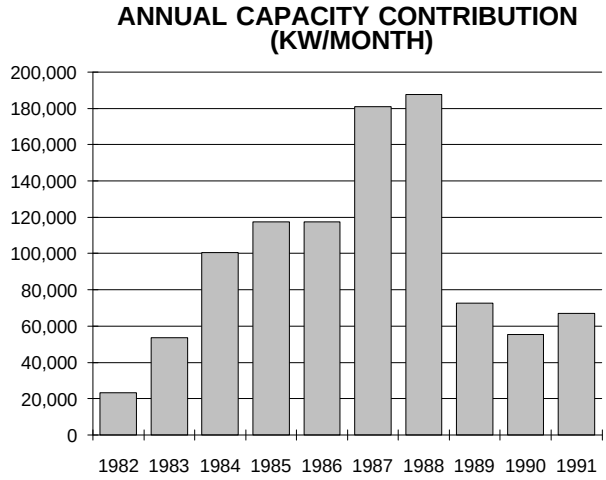
Each of the three energy cooperatives operated by the CEC were established with fifteen year contracts. The first cooperative, Southern California Energy Coalition (SCEC), was established in 1982 and its contract will expire in 1997. The other two energy cooperatives were established in 1986 and will thus expire in 2001. Naturally the attention to energy management within the facilities and the resulting energy savings above and beyond the load management payments will likely have far longer savings and impacts.

PARTICIPATION

The CEC has three energy cooperatives in the SCE service territory made up of 39 facilities operated by 14 companies. Theoretically all of SCE's TOU-8 customers could be involved in energy cooperatives (some 2,492 active accounts). Thus energy cooperatives, on a facility or "meter" basis, today account for a theoretical participation rate of 1.5%. But the practical limitations of effective energy cooperatives have kept CEC membership low. In fact, it is in ways the intimacy established between the limited number of members that provides the atmosphere necessary to achieve the savings discussed above. The second two energy cooperatives were established with the limitation that they had to be within a 10-mile radius of a geographic center. The CEC suggests that it manages the load of approximately 10% of the eligible customers given these criteria.[R#3]







Average Monthly Capacity Contribution (kW)	SCEC	SCEC 11	SCEC	Total
1982	3,907			3,907
1983	4,478			4,478
1984	8,368			8,368
1985	9,786			9,786
1986	9,653	1,310	4,114	15,077
1987	9,461	1,372	4,871	15,704
1988	10,962	1,215	6,033	18,210
1989	8,486	286	5,049	13,821
1990	9,938	1,250	5,599	16,787
1991	8,349	519	5,109	13,977
Total	83,388	5,952	30,775	120,115
Average	8,339	992	5,129	12,012

Annual Capacity Contribution (kW/month)	SCEC	SCEC II	SBEC	Total
1982	23,444			23,444
1983	53,733			53,733
1984	100,421			100,421
1985	117,428			117,428
1986	115,836	15,720	49,368	180,924
1987	113,532	15,720	58,452	187,704
1988	43,849	4,858	24,130	72,837
1989	33,945	1,142	20,196	55,283
1990	39,752	5,001	22,396	67,149
1991	33,395	2,076	20,434	55,905
Total	675,335	44,517	194,976	914,828
Average	67,534	7,420	32,496	91,483

Cost of the Program

The cost of energy cooperatives must be measured in two ways. First, are the startup costs which are undefined in this profile. Second, are the utility payments to the energy cooperative. These are discussed thoroughly in the next two pages along with the breakdown of these revenues for the Coalition.

The cost of starting up an energy cooperative is somewhat elusive. John Phillips, doing business as John B. Phillips Inc., draws a fine line between CEC activities and his personal business interests. All of the energy cooperatives to date have been established by Phillips and his staff. (Note that all projects to establish cooperatives in other locations are approved by the CEC membership.) The price for these services, including licensing custom software owned by John B. Phillips Inc., is negotiable directly with John B. Phillips who can be contacted at the CEC's Laguna Beach offices. Utilities may want to establish their own cooperatives, although David Hanna of LILCO pointed out that the administrative burden of bringing energy users into cooperatives, and then managing these cooperatives, is a burden that he feels is best subcontracted to a group like the CEC.[R#11]

PAYMENTS TO THE COALITION

Each summer month the Coalition reaches a coincident peak level for each energy cooperative. This peak level is measured during Edison's on-peak tariff period, which is currently noon to 6pm every Monday through Friday. (This has changed several times since the cooperatives were established and will likely change again.) The utility pays the margin between each energy cooperative's monthly coincident peak demands, measured every five minutes, and the firm service level established each May 1 prior to the summer. (The CEC has the contractual ability to change its firm service levels but must give SCE 30 days notice. CEC can also increase the capacity that it can provide to SCE by presenting written documentation.)

The utility pays the Coalition $6.90/kW per month for the amount of dispatchable capacity the Coalition had available for the four months of summer. Whether there is a curtailment or not, the utility pays the Coalition $27.60/kW/year ($6.90 x 4 months) for the ability to curtail power to firm service levels. Thus in 1991 SCE paid the CEC $364,899. Since the inception of energy cooperatives SCE has paid a total of $4,095,301 (1990$) for an average annual payment of $409,530.[R#12]

Prior to 1988, the formula for payments was slightly different. Originally, when the Coalition was developed, the utility paid for peaking power capacity for the winter as well. For the eight winter months the CEC's members were paid $2.08/kW/month, for a total of $16.64/kW/year, plus $4.16/kW/summer month for a total of $16.64, and a grand total of $33.28/kW/year.

The Coalition is actually paid by SCE with two checks. One check goes directly into an escrow account. The escrow account can be tapped by SCE in the event that a penalty has to be levied. This also serves to protect members from potential cash outlays. If the Coalition is penalized, the utility dips into the escrow account therefore protecting the Coalition members from direct cash requirements. Every year the

money collected three years earlier is released from this account and paid to the members. The second check is paid directly to CEC. Of the total amount paid to the CEC, the CEC retains 15% for its management and 5% to enhance its capabilities. The CEC then writes checks to its members based on their prorated share of the overall capability.

PENALTIES

If an energy cooperative cannot meet its aggregate firm service level it is penalized four times the payment charge, a penalty of $27.60/kW. Whichever member fails to meet its firm service level is responsible for the shortfall. Note again the resiliency built into the system. Using modem capabilities it is possible for the CEC to send out notice to all members that a particular company cannot curtail its prescribed level for one reason or another. Other companies have the opportunity to make up the shortfall and avoid the penalty. Quarterly meetings between the members, plus careful initial screening of potential members by the CEC, enhance cooperation and understanding of each other's processes and power needs.

OTHER CEC REVENUES

Phillips points out that the CEC actually "subsidizes" the load management efforts, and the shortfall is made up with the range of services that CEC provides. The management fee paid by the CEC members has ranged from $23,702 to $114,687, for an average annual management payment of $81,906. Currently as a percentage of the CEC's gross income from both its gross load management and other projects funded by its members, load management accounts for just over half, and the CEC's energy efficiency services account for fully 44% of the organization's gross income, and over 80% of the CEC management's operating income. The CEC has been very active in 1) providing advisory services for the members, 2) performing outreach functions at the request and with the approval of the members (by majority vote), and 3) establishing energy cooperatives in other locations.[R#2]

COST EFFECTIVENESS

Utilities need to meet peak power demand to avoid brownouts and blackouts. Most utilities have peaking power plants (usually gas turbines) that are cheap to build but expensive to operate. These plants typically cost on the order of $300-700/kW to build versus $1,000-5,000 to build baseload capacity and 10-15 cents per kilowatt hour to operate. In contrast, SCE pays only $24.60/kW each year to the CEC. (Total costs for the capacity to date have been on the order of $225/kW.) While traditional capacity additions such as power plants represent one-time capital payments, unlike energy cooperatives, plant operating costs must be paid each time they are used. This is part of the benefit that SCE gets from the CEC. It is true that the CEC's payments are annual, but their comparatively low-cost render energy cooperatives a least-cost resource strategy for SCE.

The Orange County Sanitation District will save over a million dollars over the term of the contract by participating in the Coalition.

EVALUATION CASE STUDY: PARK PLACE

At the suggestion of the Southern California Gas Company, CEC Managing Director Al Pipkin and Doug Short conducted a scoping study on behalf of CEC member Trammell Crow Company. The "Trammell Crow Report" outlines the potentials for energy efficiency, irrespective of fuel type, what has been described as "fuel-neutral cost effectiveness". The study focuses on Park Place, a two million square foot office complex in Irvine, California.

As part of its ongoing efforts promoting energy efficiency and supporting the California Collaborative process, Southern California Gas Company has initiated a number of energy saving programs and has solicited CEC members regarding creative new ways to expand these programs. The scoping study, for this reason, was designed to examine the potential of one facility that is representative of many others in the area.

"**Park Place has many diverse tenants who insist on consistent levels of lighting and air conditioning, as well as reliable computer operations. CEC has shown us how to create situations that make energy management in our buildings transparent.**" *Regis Duncan, Director of Engineering, Trammell Crow Company*.

The report reveals how the Park Place office complex's energy consumption can be reduced by one-third resulting in savings of nearly 10,000,000 kilowatt-hours plus 4,000,000 mmBTUs which translates into a dollar savings of over a million dollars per year. The key measures for realizing these savings are installing reduced wattage lamps and lighting fixtures which deliver equal or better lighting, switching out HVAC motors with high efficiency replacements, and finally installing an 800 ton gas absorption chiller in place of the existing 1,800 ton electric chiller.

"CEC's consulting services made it possible for us to see clearly the most immediate course of action for capturing huge energy and dollar savings in our facility at Park Place," explains Regis Duncan.

What is most significant about the Trammell Crow Report is that the CEC analysis offers a fresh approach to fuel neutral cost effectiveness with a pragmatic focus on both operating efficiency and mechanical system design flaws such as oversized HVAC systems.

Environmental Benefit Statement

Marginal Power Plant	Heat Rate BTU/kWh	% Sulfur in Fuel	CO2 (lbs)	SO2 (lbs)	NOx (lbs)	TSP* (lbs)
Coal	**Uncontrolled Emissions**					
A	9,400	2.50%	189,451,000	4,495,00	909,000	91,000
B	10,000	1.20%	202,017,000	1,740,00	587,000	435,000
	Controlled Emissions					
A	9,400	2.50%	189,451,000	449,000	909,000	7,000
B	10,000	1.20%	202,017,000	174,000	587,000	29,000
C	10,000		202,017,000	1,160,00	580,000	29,000
	Atmospheric Fluidized Bed Combustion					
A	10,000	1.10%	202,017,000	532,000	290,000	145,000
B	9,400	2.50%	189,451,000	449,000	363,000	27,000
	Integrated Gasification Combined Cycle					
A	10,000	0.45%	202,017,000	358,000	58,000	145,000
B	9,010		181,718,000	130,000	44,000	9,000
Gas	**Steam**					
A	10,400		110,191,000	0	251,000	0
B	9,224		95,692,000	0	599,000	28,000
	Combined Cycle					
1. Existing	9,000		95,692,000	0	367,000	0
2. NSPS*	9,000		95,692,000	0	174,000	0
3. BACT*	9,000		95,692,000	0	24,000	0
Oil	**Steam--#6 Oil**					
A	9,840	2.00%	159,487,000	2,416,00	285,000	271,000
B	10,400	2.20%	169,153,000	2,397,00	359,000	174,000
C	10,400	1.00%	169,153,000	342,000	288,000	91,000
D	10,400	0.50%	169,153,000	1,005,00	359,000	55,000
	Combustion Turbine					
#2 Diesel	13,600	0.30%	211,683,000	421,000	654,000	36,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	235,477,000	648,000	853,000	189,000

Theoretical Avoided Emissions 87,871,590 kWh Saved (1982 - Present)

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 CEC's level of avoided emissions saved through its energy cooperatives 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 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

CEC/SCE AVOIDED EMISSIONS

SCE has been able to defer the construction or purchase of additional generating capacity due in part to its energy efficiency initiatives including load management efforts. Currently, Edison's marginal or "proxy" power plant, filed with the Federal Energy Regulatory Commission and presented before the California Public Utilities Commission to determine avoided costs, is a gas turbine. We present theoretical annual and total avoided emissions based on the assumption that Southern California Edison calls the CEC the maximum times each year (15x for 6 hours each time), and that each time the CEC's load curtailment avoids SCE from using a gas turbine to fulfill the demand for electricity.

One of the most important aspects of the CEC's load management program is that it lessens on-peak power consumption. This is important for a number of reasons but one of particular concern to the South Coast Air Quality Management District. Each kW of capacity used at system peak in the Los Angeles area requires natural gas-fired turbines to be used. Key to this is that the turbines are located in the Los Angeles airshed. At times of system peak -- typically hot summer afternoons -- the CEC's program can breathe life into an already "maxed-out" environmental situation. While exporting pollution does not result in a net decrease in pollution, relieving power use within a particular airshed at times of peak polluting is a critical strategy that energy cooperatives support.

Shifting use from peak to off-peak can have negative effects. Off-peak capacity is usually baseload capacity, either nuclear or the more likely coal. If we assume that peak capacity is gas and that baseload capacity is coal, then shifting to baseload capacity can actually bear a negative environmental impact. Unlike energy efficiency measures which actually result in truly avoided emissions -- load management can cause emissions to be focused on baseload capacity and exported from the Los Angeles basin to Nevada.

Clearly one of the most important lessons learned from energy cooperatives is that the Coalition is supporting its member's transition to a progressive concept of resource efficiency. This includes an emphasis on energy efficiency retrofits (that will also be financed by the energy cooperative in the future) and a focus on cost-effective fuel switching measures (gas and electric).

The most impressive barrier that the Coalition has overcome is responding to the very tight financial requirements of large facilities that make facility managers very reluctant to invest in energy efficiency. Many of the facility operators that we interviewed said their management had bound them to energy efficiency improvements only if they were unnoticeable to building occupants and if they had a payback of less than one year. (The Results Center believes this criteria is unnecessarily restrictive and can often inhibit the financial interests of the building owners.) Through the Coalition process these energy managers have been able to profit immediately with little cash outlay and minimal staff time. The money that each member must invest for initial consultation, to establish curtailment potentials and procedures and to buy the computer equipment necessary to interface with the Coalition, can now be arranged through the CEC via shared savings. In the future the CEC hopes to offer a revolving fund for members' energy efficiency retrofits.

By working collectively, the CEC and its influential large commercial and industrial members have market power and considerable clout in negotiating for advantageous contracts. Ironically, for most members of the Coalition the financial rewards are relatively insignificant but represent a unique opportunity for facility managers who normally require money to run their operations and rarely have a means of making money. The Coalition allows them to actually make a positive contribution to the bottom line through utility incentives! Many of the CEC members have retilled these incentive payments back into further energy efficiency analyses, some of which are conducted by the CEC, and actual energy efficiency measures.

Revenue streams paid to the cooperatives are very weather sensitive. The summer of 1991 was exceptionally cool in southern California. September 18 was the first day over 90° F. This resulted in unusually low payments to the Coalition for the year.[R#3]

The CEC has evolved from effectively fulfilling a narrow niche as a provider of load management services to an organization that advocates a process for energy efficiency. The CEC has moved to working this consumer/producer dialogue on a strategic planning level. CEC's integrated resource plans are complementary to long-range utility plans. They pose and respond to key questions such as, "How much energy is a facility, or a group of facilities, or a city using today? How much will be required in 20 years? What needs will the user have, and how can these best be achieved in their most efficient manner?" Just as utilities plan for future demands, end-users must plan their needs accordingly and then negotiate their needs with their utility. The CEC believes this dialogue is at the heart of effective long-range energy planning.

FROM SCE'S PERSPECTIVE

Ron Frontino, SCE's official representative to the Coalition, notes that whenever you have a third party between a utility and its customers, the arrangement has the potential to be problematic. That said, Frontino can see the distinct advantages of energy cooperatives. They have been highly effective in pooling together a diverse set of customers. That, according to Frontino, opens up possibilities for business opportunities that in "an ideal world" could be provided effectively by the utility without a third party. "It would be best for the utility to deal directly with its customers."[R#4] Frontino notes, however, that "we can work quite well with John Phillips and his staff and lots can be learned from the California experience with energy cooperatives."

One of Edison's concerns revolves around the contractual arrangement that it signed with each of the three energy cooperatives. The fifteen year contracts, established in a very different planning and policy orientation, are now a limitation that SCE must live with. In each rate case, Frontino and his staff must justify the utility's payments to the Coalition. This year, Frontino reports that he will have to reestablish where the CEC payments are going to come from as the contracts were tied to tariff structures that sunset in 1992. Frontino will now have to figure out how to pay the Coalition, a time consuming project that will involve legal and revenue requirement staff time. While the contracts can't be modified, the incentives, which are based on today's tariffs, can be modified. Frontino believes that a better way to set up the contracts would be on a 3-5 year basis with a simple renewal clause. Overall, Frontino reports that the cooperatives are "working well" despite occasional "sticky points." Continuous administration, adding and deleting members and changing firm service levels, is also a burden.

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