
California Energy Commission

Energy Partnership Program

Profile #64

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Executive Summary

The California Energy Commission staff estimates that California local governments spend over a billion dollars annually to purchase electricity, natural gas, and transportation fuels. While energy costs for cities and counties are a small portion of their overall operating budgets (typically 1-5%), it is one of the few costs that can be reduced because it is not fixed. Through its programs the Commission's staff have projected that on selected local government facilities up to 25% can be saved on energy costs.

Thanks in large part to California State Senate Bill 880 (1986), the California Energy Commission has been given and has carried out a broad mandate to improve energy efficiency in the state's cities, counties, and school facilities. The Energy Partnership Program (EPP), a subset of this activity, is the focus of this profile. EPP addresses the energy efficiency of city and county facilities and provides technical assistance for existing facilities, new construction design assistance, fleet management assistance and training, automotive and HVAC training, loans, and awards for participants.

While this profile addresses all components of the EPP program, technical assistance for existing facilities is the largest component in terms of participants, expenditures, and staff time. The Commission contracts with private consultants to provide technical assistance for all types of local government facilities including city halls, administration buildings, libraries, fire departments, police departments, and wastewater treatment plants. One interesting aspect of the program is that the Commission targeted jails and hospitals which have 24-hour, energy-intensive operations.

An important part of the program is to facilitate project financing for energy efficiency upgrades through its own revolving loan fund, federal funds, utility assistance, energy service companies, or other outside funding sources. In order to access its revolving fund which has a highly competitive interest rate, projects must have a simple payback of 6.5 years or less. Large funding requests (over \$250,000) are often referred to private sector sources such as municipal leasing companies and pooled bond mechanisms. Pooled bond programs available include the FARECAL program administered by the California Municipal Utility Association, the CASTLE program administered by the California State Association of Counties, and the ABAG program administered by the Association of Bay Area Governments.

Energy Partnership Program

- Agency:** California Energy Commission
Sector: California cities and counties
Measures: Fluorescent lamps, ballasts, occupancy sensors, thermostat controls, energy management systems, variable frequency drives, HVAC improvements
Mechanism: Technical assistance for existing facilities, new construction design assistance, fleet management, automotive and HVAC training
History: Started in 1989

1992 Program Data Existing Facilities Committed Projects

Energy savings:	15.7 GWh
Lifecycle energy savings:	125.2 GWh
Cost:	\$6,569,200

Cumulative Data Existing Facilities Committed Projects (1989 - 1993)

Energy savings:	165.9 GWh
Lifecycle energy savings:	417.0 GWh
Cost:	\$17,296,900

Conventions

For the entire 1993 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the U.S. Federal Reserve's foreign exchange rates.

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

Agency Overview

The California Energy Commission (Energy Commission or Commission) is California's state energy agency and was formed in 1974 to address the energy challenges facing the state. Created by the Warren-Alquist State Energy Resources Conservation and Development Act passed by the state legislature, the Commission is the State's primary energy policy and planning organization. The Commission's major areas of responsibility are: forecasting future statewide electricity needs; licensing power plants to meet those needs; promoting energy efficiency; developing renewable energy resources and alternative energy technologies; and planning for and directing state response to energy emergencies. Headquartered in Sacramento, the Commission had a 1992 budget of approximately \$74.4 million and employed 507 personnel in several divisions. [R#1,2,3,12]

Assessing energy supply, forecasting demand trends and evaluating technologies and resources are responsibilities of the Energy Forecasting and Planning Division. Data compiled by the division is used to develop balanced state energy policy and various Commission programs. [R#4]

Siting of thermal power plants over 50 MW and transmission system planning is handled through the Commission's Energy Facilities Siting and Environmental Protection Division. In addition to evaluating these proposed power plants the division monitors existing facilities licensed by the Commission to ensure their safe and efficient operation. [R#4]

The mission of the Energy Efficiency Division is to identify, develop, and promote policies and programs for California which maximize cost-effective energy efficiency. Cost effectiveness includes consideration of social, environmental, and economic costs and benefits. The Division maximizes cost-effective energy efficiency through building and appliance standards and through energy efficiency grant, loan, and technical assistance programs. [R#2]

Demonstrating and promoting development of renewable alternative energy resources such as solar, wind, geothermal reservoirs, and abundant biomass residues is directed through the Energy Technology Development Division. This division also examines alternative transportation fuels and technologies such as methanol, ethanol, compressed natural gas, electric vehicles, and flexible fuel ve-

hicles. These resources and alternative technologies are evaluated for cost, reliability, environmental quality, health and safety impacts, and economic development. One of the nation's most progressive methanol demonstration programs is administered by the Commission. [R#4]

Preparing for and responding to energy emergencies is coordinated through the Commission's Fuels Planning Office. The Commission's adopted Contingency Plan, which addresses actions to be taken in the event of an impending serious shortage of energy, is updated on a regular basis and tested in simulated situations. [R#4]

With guidance from the Commission's Public Adviser, the public at-large, businesses, community organizations, and interested groups can participate in Commission programs and proceedings through public hearings, workshops, an outreach program, and other activities. [R#4]

In addition, the Energy Commission's library holds one of the largest centralized collections of energy publications in the western United States and is open to the public. Over 16,000 titles are available on subjects ranging from energy policy, energy efficiency, energy consumption, electric utilities and fossil fuels, to solar, wind, biomass, and nuclear power. [R#4]

The Energy Commission is headed up by five commissioners representing the public and the fields of engineering and physical science, environmental protection, economics, and law. [R#4] ■

Agency DSM Overview

The California Legislature created the Energy Commission to specifically encourage the efficient use of energy. The Energy Commission's DSM programs are principally operated out of the Energy Efficiency Division. For 1992, the Division had a budget of \$19.1 million for energy efficiency programs. This Division achieves its goals through three offices:

The Efficiency Standards Office develops and implements energy standards which ensure that all new buildings constructed in California and major appliances sold in California are energy efficient. Buildings affected by the standards include residential (single family homes, duplexes, and apartments) and nonresidential (offices, stores, restaurants, and hotels) construction. Refrigerators, freezers, water heaters, furnaces, air conditioners, pool heaters, plumbing fittings, and fluorescent lamp ballasts must meet the minimum appliance efficiency standards. The office supports the standards through various methods including a telephone information hotline, training, and a bi-monthly newsletter. [R#2]

The Efficiency Services Office identifies and implements cost-effective energy options for California's energy consumers. The staff is currently implementing the following programs:

- The Energy Partnership Program (the subject of this profile) offers technical assistance, training, and loans for energy-efficient activities involving cities and counties. [R#2]
- The Schools and Hospitals Program provides grants and loans to fund technical analyses and energy saving-projects for public and private (nonprofit) schools and hospitals through the Institutional Conservation Program. This program has had 1,184 participants with total annual energy savings of 363 GWh. [R#2]

- The Small School District Energy Assistance Program makes available technical assistance and loans for small schools to identify and implement energy efficiency options. To date, 184 participants have attained total annual energy savings of 17 GWh. [R#2]

- Through The Higher Education Program participants receive funding for the development and implementation of programs and projects to improve the energy efficiency of equipment and systems on campuses of the University of California (UC), California State University (CSU), and the Community Colleges (CC). To date, 29 UCs, 19 CSUs, and 88 CCs have participated in the program. [R#2]

- The Farm Energy Assistance Program offers technical assistance, demonstration grants, and loans for new initiatives to save energy in the agricultural sector. A total of 250 farms and growers have participated. [R#2]

- The Water Energy Efficiency Program provides technical assistance to cities, counties, and districts for improving the energy efficiency of municipal water and wastewater facilities. [R#2]

The Efficiency Technology Office produces objective analysis and evaluation of the Commission's energy efficiency measures and programs. This office is responsible for evaluating the energy impacts of the Commission's non-regulatory efficiency programs along with the degree of compliance and the energy impacts of the building and appliance standards. The staff also provides technical support in developing the Commission's regulatory and non-regulatory energy efficiency programs. The office is also responsible for developing and maintaining computer programs to model energy consumption of buildings. [R#2] ■

Program Overview

In 1986 the California Legislature passed Senate Bill 880 with the goal of reducing the energy costs in schools, cities, and counties in the state by providing technical and financial assistance and training through energy efficiency programs. This bill was passed to address the increasing percentage of operating expenses for schools and local governments attributable to energy costs. Through 1992, 467 cities, counties, and schools in California have participated in programs developed by the Energy Commission with funding from Senate Bill 880. Funding comes from the oil overcharge funds, the result of fines paid by oil companies for violation of federal oil price control regulations during the oil crisis of the 1970s. [R#1]

Senate Bill 880 required the California Energy Commission to establish a 10-member advisory committee to review and make recommendations on administration of the program. This Local Jurisdiction Advisory Committee (LJAC) met periodically at different locations throughout the state to allow attendance and comments from other elected officials and staff of local governments. Because of fiscal constraints, the 1993 - 1994 Budget Act abolished the LJAC as well as a number of other commission advisory committees. [R#1]

Programs offered through the Commission as a result of Senate Bill 880 include: the Energy Partnership Program (EPP), the Siting and Permit Assistance Program, the Contingency Planning Program, the Small School District Program, and the Higher Education Program. [R#1]

While Senate Bill 880 addresses the needs of cities, counties, and schools, this profile will look specifically at the Energy Partnership Program (EPP), which focuses on cities' and counties' energy-efficiency needs.

The Energy Partnership Program offers technical assistance for existing facilities, new construction design assistance, fleet management, automotive and HVAC training, loans, and awards for participants. The program is administered by the Energy Efficiency Division of the Energy Commission. [R#6]

The program provides technical assistance to cities and counties to identify cost-effective energy efficiency measures to install in existing facilities. The Commission contracts with private consultants to provide energy audits of all types of local government facilities including city halls, administration buildings, libraries, fire and police departments, hospitals, detention facilities, and wastewater treatment

plants. The Energy Commission staff works closely with the consultants and thus provides project management and quality control. The consultants also provide assistance to the local governments such as preparing design specifications for recommended measures and help with preparing requests for proposals (RFPs) to bid out projects. The program also provides technical assistance to cities and counties for operation and design of cogeneration and thermal energy storage systems. [R#6]

The EPP provides design assistance to cities and counties that are planning new local government buildings to identify cost effective energy efficiency improvements that exceed California's building standards. A Commission consultant provides recommendations to the design team throughout the design process. The program can also provide analysis on special energy efficiency areas including thermal energy storage, evaporative cooling potential, and skylight design. [R#6]

To reduce fuel expenditures and other costs of running local government fleets, the EPP targets two aspects of local government fleet operations: fleet maintenance and fleet management. Training is provided for both automotive and diesel maintenance technicians to update vehicle maintenance skills. Fleet maintenance training is offered in the following topics: electronic engine controls and fuel injection; engine performance - hands on diagnostics; automotive air conditioning systems; diesel engine operations and troubleshooting. In terms of fleet management, examples of measures to cut fleet operating costs include the following: eliminating any unnecessary vehicles from the fleet; changing fleet policies and management practices to allow better control of fleet growth; reducing the vehicle sizes; replacing old, inefficient vehicles with newer, more fuel efficient vehicles; incorporating computerized fleet management information systems and automated fuel dispensing systems; and avoiding duplication of effort by centralizing fleet operations within a jurisdiction or among neighboring jurisdictions. [R#6]

HVAC courses are conducted throughout the state using private training consultants. Topics are determined by local need and interest, and include single and/or multizone air conditioning system tune-ups; boiler operations and maintenance; variable air volume systems; economizers; HVAC controls; and pneumatic controls. [R#6]

By providing training for building operations and maintenance technicians and vehicle maintenance mechanics, 

the EPP seeks to impart practical skills, knowledge, and motivation to local government staff to enhance facility and fleet equipment efficiency.[R#6]

EPP has an awards program which is conducted on both a local and statewide level. The goal of this program is to create awareness of city or county energy efficiency efforts. The local recognition award is titled "Outstanding Achievement in Local Government," and these awards are pre-

sent at city council or county board of supervisors meetings. The statewide recognition awards, titled "Energy Excellence in Local Government," are presented at the annual meeting of the League of California Cities and regional meetings of the California State Association of Counties. Local governments are selected based on five objective criteria, and the number of awards is not limited. The number of statewide awards is restricted to three cities and three counties each year. ■

ENERGY ISSUES FACING LOCAL CALIFORNIA GOVERNMENTS

The California Energy Commission staff estimates that California local governments spend over \$1 billion annually to purchase electricity and natural gas. From their experience in working with local governments, Commission staff have concluded that on selected government facilities, average annual energy bills could be reduced by as much as 25% through energy efficiency improvements.[R#1]

In the delivery of services to their communities, local governments suffer from limited resources. In addition, local agencies are increasingly responsible for services previously provided by the state or federal government. Cities and counties must overcome several barriers in order to make cost-effective, environmentally-sound energy decisions: the lack of knowledge about existing opportunities; a lack of information about emerging technologies; the level of the staff's technical expertise (or lack thereof); financial resources for project implementation; and the need for a staff member to push a project through the approval process.[R#1]

By funding state energy programs, the Energy Commission hopes to overcome the barriers to energy efficiency in the following ways:

1. State energy programs are a resource for local governments to learn about emerging energy efficiency technologies and suitable applications. The programs provide information such as engineering studies to help cut facilities' energy costs.[R#1]

2. Government maintenance staffs have experienced severe budget cuts in recent years. The state helps by providing training in energy efficiency and offering the help of technical experts when necessary.[R#1]

3. Energy costs for cities and counties are a small portion of the overall operating budget (1% to 5%). However, because energy is not a fixed cost, it is one of the few costs that can be reduced.[R#1]

The Energy Partnership Program is designed to reduce energy costs incurred by city and county governments through efficiency improvements to their facilities and vehicle fleets. In addition to maximizing cost-effective energy savings, the program seeks participation by as many jurisdictions as possible in order to provide examples of what can be achieved in public institutions and to spread these energy savings and educational benefits statewide.[R#1]

Funding for the EPP is secured through March of 1995. The future of the program is uncertain beyond this date.[R#12]

MARKETING

In general, the Energy Commission tries to market the concept of energy efficiency as opposed to marketing specific programs.[R#12]

The Commission has marketed the Energy Partnership Program through mass mailings, telephone contacts, site visits, utility referrals, the League of California Cities, California State Association of Counties (CSAC), utilities, professional groups, and promotional publications.

The Energy Commission also distributes program information through booths and presentations at League of California Cities, California Municipal Utilities Association, the Northern California Power Agency, and CSAC annual conferences. Information is also distributed at regional meetings of city managers, public works directors, and fleet managers.[R#2,12]

Many cities and counties also learn about the EPP as a result of EPP's awards program and the corresponding publicity that usually results.[R#12]

DELIVERY

While the Energy Partnership Program is made up of several components, the technical assistance for existing facilities component (retrofit projects) dominates the program in terms of expenditures and staff time.

STEP BY STEP PROCEDURES FOR EPP TECHNICAL ASSISTANCE RETROFIT PROJECTS

- After an application is submitted by a local jurisdiction, an EPP staff member is assigned to be the project manager. The project manager reviews the application and schedules an on-site visit with the local government. This meeting is attended by the city manager (or county administrative officer), the city's public works director (or county's general services agency director), the finance director, the facilities manager (or fleet manager, if applicable), the facilities maintenance director, and the local utility's customer service representative. The meeting covers services to be delivered, assesses the local government's commitment to the projects, discusses financing mechanisms, reviews the largest energy-using buildings or facilities, and discusses any special needs of the local government. Any potential

barriers to implementation are discussed at this point.[R#5]

- Following the meeting the project manager meets with the EPP Program Manager to discuss the feasibility of the proposed project. If there is no likely project identified, the project manager notifies the local government that their application has been turned down.[R#5]

- The project manager prepares a written scope of work and schedule of deliverables for a work authorization. The work authorization directs a consultant to conduct an energy audit of specific buildings in order to identify all cost-effective improvements to that building's lighting, HVAC, and hot water systems.[R#5]

- The Energy Commission's Conservation Report and Programs Policy Committee reviews the work authorizations. Approval by this committee is required before work can begin on a project. This committee is made up of two of the five Energy Commissioners.[R#2]

- The project manager notifies the local government when the work authorization is approved and provides a schedule of visits.[R#5]

- The subcontractor conducts a site visit to the local government for the purpose of gathering historical data on existing energy use, meeting with the facilities' staff, touring the facilities, identifying all major equipment and systems, determining occupancy schedules and energy use patterns, and identifying any facility and/or occupancy changes that could affect energy use.[R#3]

- The project report is presented to the local government for review. Subsequently a meeting is held between the project manager and local government to discuss the report along with project financing. (Project financing is discussed below.) A copy of this report is also sent to the utility serving the city or county so the utility can contact the local government regarding eligibility for rebates.[R#5]

- A final report is presented to the local government by the project manager and final financing details are worked out.[R#5]

- Under the direction of the project manager, the subcontractor works with the local government to develop 

Implementation (continued)

and release requests for proposals to solicit a contractor to install the projects. The subcontractor may also assist the local government and the Commission's project manager with the evaluation and selection of the project contractors.

- The project manager monitors progress until the project is complete. [R#5]

From start to finish, projects take between 15 months and 3 years to complete.

NEW CONSTRUCTION TECHNICAL ASSISTANCE

The program provides cities and counties that are planning new local government buildings with design assistance to identify cost-effective energy efficiency measures that exceed California's Energy Efficiency Building Standards. New Construction projects are extremely time sensitive. Maximum energy savings can be captured if facilities receive design recommendations in the early planning stages. Energy efficiency measures are less expensive during construction than when installed as a retrofit. These costs are generally regarded as marginal costs during construction and full costs during a retrofit. As the life of new government buildings may be 30 years or more, a failure to maximize cost-effective energy efficiency will represent a major lost opportunity.

The Commission provides the local government with a consultant specializing in energy-efficient building design. The consultant works as part of the design team and makes recommendations throughout the process on ways to reduce energy costs. The program quantifies the cost and energy savings that are expected to result from the recommended measures. The program also provides the design team with technical analysis on special energy considerations such as thermal energy storage, evaporative cooling potential, and skylight design. Typically participants contact the Commission about joining the program after exposure to the Commission's marketing efforts. [R#2]

FINANCING LOCAL GOVERNMENT ENERGY EFFICIENCY RETROFIT PROJECTS

Local governments have used a variety of sources for financing the energy-efficiency improvements in their facilities. Some have chosen to self-finance energy efficiency

investments while others have used outside sources such as energy service companies. [R#1,2,7]

The Energy Commission administers revolving loan funds which are designated to finance qualifying energy efficiency improvements at local government facilities. Loan program funding comes from two sources: the Energy Conservation Assistance Act (ECAA) which is supported with state funds, and the Local Jurisdiction Account, which is funded by oil overcharge funds stemming from legislation passed in 1986 (Senate Bill 880). Together these funds total nearly \$20 million (unlevelized). Both funds share common interest rates and repayment criteria and are accessed through a single application. Projects must have a simple payback of 6.5 years or less. Most loans are typically repaid in 5 years or less. Interest rates on Commission loans are periodically set at the State Pooled Bond Investment rate, which is usually quite competitive compared to other sources.

Advantages of Commission revolving loans include a simple application process, delay of payments until savings occur, no up-front costs, quick access to funds, and repayment terms that allow payments to be set lower than the savings attributed to the efficiency improvements. The energy efficiency projects can therefore immediately become a positive cash flow to local government participants. [R#12]

Larger funding requests are often referred to the private sector sources including municipal leasing companies, pooled bond programs, and other sources. The municipal leasing market is well developed and is used by some California local governments to finance projects. Pooled bond programs are also available including the CASTLE program sponsored by the California State Association of Counties and League of California Cities; the ABAG program administered by the Association of Bay Area Governments; and the FARECAL program sponsored by the California Municipal Utilities Association. Energy Services Companies can also act as loan brokers or they can provide funding directly. [R#12]

In December 1992, KPMG Peat Marwick prepared "Financing Options for Energy Efficiency Projects in Public Agencies" for the Commission in order to address the challenges facing program participants in securing project financing. This report summarizes factors affecting financing

options and the financing decision process.[R#7]

NEW DETENTION FACILITIES

In 1989, the Commission first worked with the California Board of Corrections to address the issue of energy efficiency in new county detention facilities. This cooperative effort resulted in the production of a handbook titled "Energy Efficiency Design Guide for California Detention Facilities." The handbook provides information needed by architects, engineers, sheriffs, project managers, and local elected officials to consider and specify energy efficiency measures. Detention facilities are prime candidates for energy efficiency because they are 24-hour operations and as a result are one of a county's largest energy users. In addition to the handbook the Commission assists counties throughout the design process, working with the project staff and design team.[R#1]

COUNTY AND CITY HOSPITALS

Hospitals are always energy intensive due to high ventilation requirements and their around-the-clock operations. With most county hospitals, tight maintenance budgets had prevented them from keeping current with energy-efficient technologies. Of the 37 hospitals owned and operated by California counties, 11 have received technical assistance through the Energy Partnership Program.[R#1]

TRAINING

The Energy Partnership Program offers a training program for local government building maintenance technicians and automotive maintenance technicians. The Energy Commission staff works closely with maintenance supervisors, technicians, and professional trainers to determine topics appropriate for each course. Trainers provide classroom instruction using a combination of formal presentations, group discussions, and hands-on sessions. After the course is completed the trainers help local government technicians troubleshoot specific maintenance problems at their facilities.[R#1]

FLEET MANAGEMENT

The fleet management program has focused on four objectives: surveying local government fleets; organizing

statewide conferences for local government fleet managers; disseminating information through professional organizations; and identifying and quantifying cost-effective energy-efficient measures in local government fleets.[R#6]

In November 1991, Energy Partnership staff helped coordinate a statewide fleet management conference attended by more than 250 fleet managers. A similar conference is planned for November 1993.[R#6]

Technical assistance projects have been identified in the cities of Downey, Monterey Park, Oceanside, and Visalia, and the counties of Santa Clara and Monterey. Results from these projects will be shared with other local governments through a fleet manager training program which begins in 1994 and commences with six regional seminars. The seminars will help fleet managers to conduct evaluations of their own operations.[R#6]

AUTOMOTIVE AND HVAC TRAINING

The Energy Partnership Program conducts courses throughout the State of California using private training consultants. Topics covered include HVAC, automotive, and diesel maintenance. When possible courses are conducted at local government facilities to allow hands-on training. Registration is processed by telephone and no fee is charged. The courses target local jurisdictions within a one-hour drive of the training site. Participants receive manuals and course completion certificates.[R#6]

MEASURES INSTALLED

Measures installed through EPP (retrofits and new construction) include various fluorescent lamps, electronic ballasts, occupancy sensors, thermostat controls, energy management systems, and variable frequency drives. Rarely are building envelope measures such as efficient windows and insulation recommended for retrofits, but they are frequently found to be cost effective in new construction projects.[R#12]

The Commission performed an evaluation of the HVAC training course titled "Commercial Package Heating, Ventilation, and Air Conditioning Systems." A questionnaire was sent to 183 participating technicians and 58 responded. When asked what modifications or repairs were

Implementation (continued)

made as a result of this training, the following actions were some of those mentioned: cleaning of condenser and evaporator coils; repair of leaky refrigerant line; adjustment and replacement of damper motors; installation of temperature controllers; installation of new fan motors; repair and replacement of outside air damper motors; thermostat upgrades; replacement of blower motors; and installation of economizers.

Measures installed as a result of automotive training include those components of electronic engine control systems and fuel systems which are not working and need replacing. These components include vehicle oxygen sensors, electronic fuel injectors, and fuel pressure gauges. The

emphasis of the automotive training is not “parts changing” but accurate diagnosis of engine performance problems. Helping local governments avoid the needless replacement of expensive electronic engine controls, particularly the on-board computer, is a key objective of the automotive training program. [R#2]

STAFFING REQUIREMENTS

The Energy Partnership Program is managed by the Energy Commission Energy Efficiency Division. There are 6 staff members (all full-time equivalents) at the Commission working on the EPP. Currently there are 34 subcontractors affiliated with the program. [R#2,12] ■

CASE STUDY: CITY OF RIVERSIDE CITY HALL

Faced with budget shortfalls, the City of Riverside chose to undertake energy retrofits of City Hall that are expected to save \$85,649 on annual utility bills. These utility bill savings translate into a 2.5-year payback. The cost reductions saved three jobs in the building services department which likely would have been lost due to shrinking operating budgets. Having to reduce the staff would have severely affected the level of service in the building. [R#11]

The retrofit was completed in April 1993 at the seven story, 115,000 square foot City Hall building. Installed measures included variable frequency drives, efficient heating and lighting equipment, and modifications to thermal storage tank piping. These measures are projected to account for annual energy savings of 1,071 MWh and demand savings of 27.3 kW. A majority of savings will come from lighting upgrades and variable frequency drives installed on supply fans. [R#11]

The project was financed through a Commission Energy Partnership loan, and the \$25,000 energy audit was also arranged through EPP. [R#11]

CASE STUDY: CITY OF BAKERSFIELD

Building mechanics for the City of Bakersfield participated in an Energy Partnership Program maintenance training course. During the course they discussed problems with the heating and air conditioning unit serving the City's corporation building yard building. They discovered that a roof-top unit was heating and cooling simultaneously, wasting energy and creating comfort problems for building occupants. [R#1]

The course leader incorporated the problem into the class lesson and came up with a cost effective solution. For a cost of \$14,000, the city maintenance superintendent replaced the troublesome unit with a more energy-efficient unit. This retrofit saved the city \$4,870 in energy costs annually, paying for itself in less than three years. This retrofit occurred in January 1991. [R#1]

Monitoring and Evaluation

MONITORING

The energy savings and dollar savings reported in this EPP profile are based strictly on engineering estimates. The Commission is in the process of determining if these engineering estimates are accurately projecting actual energy savings by metering certain energy efficiency projects installed through the program. [R#2]

The Commission has completed monitoring on two variable frequency drive (VFD) installations. One of the installations is at a wastewater treatment plant on raw activated sludge pumps and the other installation is on the supply and return fans for a building air handler. Both of these metering projects show that energy savings equaled or exceeded engineering estimates. [R#2]

The Commission is working on two major end-use metering projects which will be monitoring more than \$1.5 million (participant costs) of energy efficiency projects. The measures that will be monitored include: compact fluorescent lamps, T8 lamps and electronic ballasts, HVAC controls, variable frequency drives, chiller replacements, occupancy sensors, conversion from a constant volume air handling system to a variable air volume system, and an energy management system. [R#2]

In addition to end-use metering, the Commission has done utility bill analyses on several sites that have had energy efficiency measures installed for more than one year. The results of these analyses have shown that in general the actual energy savings are equal to engineering estimates. [R#2]

The Energy Commission has a detailed database which tracks 61 EPP project categories including project type, status, costs, and savings. [R#2] The Commission will perform site visits to monitor installed measures. More often the Commission relies upon participant confirmation of installed measures over the phone. This situation is due in large part to the wide geographic distribution of projects and the excessive cost of visiting every completed project. [R#12]

EVALUATION

The Commission has performed a variety of evaluations concerning the Energy Partnership program: In 1989 the Commission performed an in-house evaluation report of its pilot training program for local government maintenance technicians. A total of \$80,000 was allocated for the pro-

gram and 9 training workshops were completed and studied. The program conducted eight courses in HVAC operations and maintenance and one course in automotive maintenance. The purpose of the pilot was to assess local governments' support for technical training and to learn how to best deliver technical training services in the future. From the pilot the staff learned about local governments' needs and interests. The staff also learned about effective course length, formats, content, training facilities, publicity, registration, and coordination procedures, and the costs of technical training efforts. [R#9]

In August 1990, the Energy Commission completed an overall in-house evaluation of the Energy Partnership Program. This evaluation looked at the facility and fleet maintenance training program, the new detention facility design assistance program, the county hospital technical assistance program, and the general technical assistance component. The evaluation examined program success to date and made recommendations for the future of the program. [R#10]

The "Biennial Report to the Legislature on Senate Bill 880, Energy Efficiency Programs for Cities, Counties, and Schools," (January 1992) summarizes all of the programs administered by the Commission which resulted from Senate Bill 880. This report includes a history of the Commission along with a description of Senate Bill 880. Also included are participation, cost, and dollar savings figures for each individual program, along with participant case studies. [R#1]

In December 1992, the Commission published the "Local Government Fleet Survey Results 1991." The purpose of the survey was to locate fleet managers and create a record of their current fleet management and maintenance practices. The survey gathered responses from 168 city and 56 county fleets (a 39% response rate). According to the survey, fleet budgets represented approximately 5% of city and county expenditures for 1990/1991. For the survey respondents these costs totaled \$885 million (unlevelized). Survey responses reflected a general lack of knowledge of fleet policies, practices, and costs. Very few fleet managers were able to answer all of the survey's questions. [R#8] ■

Program Savings

Existing Facilities Savings	Annual Savings (MWh)	Cumulative Savings (MWh)	Lifecycle Energy Savings (MWh)	Annual Savings (Therms)	Cumulative Savings (Therms)
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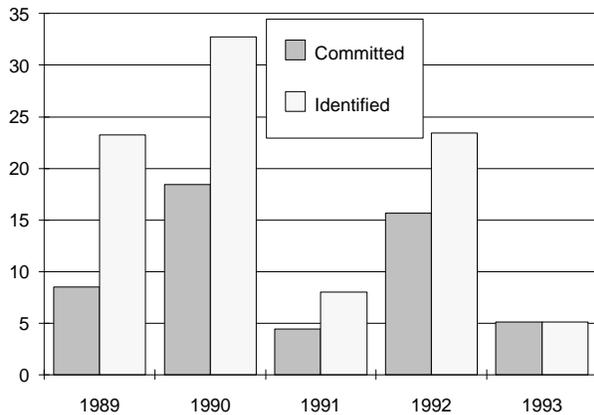
Identified Projects

1989	23,230	23,230	185,840	114,830	114,830
1990	32,758	55,988	262,064	865,621	980,451
1991	7,973	63,961	63,784	159,762	1,140,213
1992	23,414	87,375	187,312	369,171	1,509,384
1993	5,115	92,490	40,920	22,445	1,531,829
Total	92,490	323,044	739,920	1,531,829	5,276,707

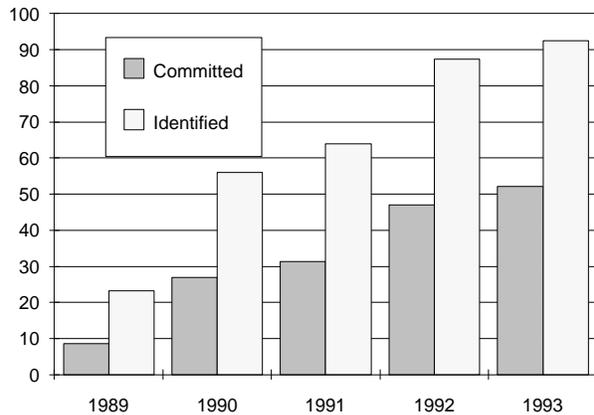
Committed Projects

1989	8,498	8,498	67,984	110,594	110,594
1990	18,417	26,915	147,336	521,328	631,922
1991	4,446	31,361	35,568	12,754	644,676
1992	15,651	47,012	125,208	234,365	879,041
1993	5,115	52,127	40,920	22,445	901,486
Total	52,127	165,913	417,016	901,486	3,167,719

ANNUAL ENERGY SAVINGS (GWH)



CUMULATIVE ENERGY SAVINGS (GWH)



Data Alert: All of the savings figures are based on engineering estimates. Savings for 1993 includes projects from January 1, 1993 to June 30, 1993. Figures have not been derated for free ridership. [R#2]

The Energy Commission tracks both identified projects (energy efficiency projects identified through the Commission's technical assistance) and committed projects (identified projects which local governments have secured financing to install.) Identified project savings represent the maximum potential for savings if all identified projects are implemented, while committed project savings represent savings for projects underway. Savings assigned to committed projects are projections of annual savings once the projects are completed. The Commission does not have savings and participation figures for completed projects. [R#2]

New Construction Savings	<i>Identified Projects (x 1000)</i>	<i>Committed Projects (x 1000)</i>
1989	\$76.09	\$76.09
1990	\$270.26	\$129.17
1991	\$732.17	\$393.47
1992	\$142.99	\$60.07
1993	\$297.43	\$168.80
Total	\$1,518.94	\$827.61

TECHNICAL ASSISTANCE FOR EXISTING FACILITIES

The technical assistance for existing facilities provided by the EPP comprises the vast majority of estimated program savings. Estimated annual savings (identified projects) over the course of the program total 92,490 MWh and 1,531,829 therms. Potential savings for identified projects in 1992 are 23,414 MWh and 369,171 therms. [R#2]

Estimated savings for committed projects total 52,127 MWh and 901,486 therms over the lifetime of the program. In 1992, committed projects had projected annual savings of 15,651 MWh and 234,365 therms. [R#2]

NEW CONSTRUCTION DESIGN ASSISTANCE

Savings figures for the New Construction Design Assistance component are presented in dollar figures because program participants are more interested in their bottom line budget savings than energy savings. In addition, the Commission must move much more quickly with new construction projects, while retrofit projects allow the Commission enough time to perform detailed energy savings estimates. [R#12]

The Commission asserts that savings figures for the New Construction component grossly underestimate program totals. Savings figures are only calculated for projects when the design team needs to be convinced to install energy-efficient measures. Savings are not calculated for projects where recommended energy-efficient measures are readily accepted by the design team. [R#2]

Estimated annual savings for identified new construction projects total \$1,518,940, and projected savings for com-

mitted projects total \$827,610. For 1992, identified projects had potential savings of \$142,990 and committed projects had projected savings of \$60,070. [R#2]

HVAC AND AUTOMOTIVE TRAINING

The Energy Commission does not track energy savings or energy-cost savings resulting from the automotive training or the HVAC training programs because training does not contribute to a local government's decision to purchase new energy efficiency technologies. [R#13]

The influence of the training program can be better measured through changes in behavior linked to increased understanding of energy efficiency issues and the motivation to address these issues. The EPP training programs' success might best be evaluated based on the degree to which trainees have increased their job performance efficiency and effectiveness. [R#13]

No evaluation of the fleet management component has been performed yet as recommendations from the first fleet management study are just being implemented. [R#13]

PARTICIPATION RATES

EXISTING FACILITIES AND NEW CONSTRUCTION COMPONENTS

Program participants are defined as cities or counties that have applied for technical assistance through the EPP.

With the Technical Assistance for Existing Facilities component, 85 cities and 45 counties have participated. In

Program Savings (continued)

Participation	Cities	Counties
Technical Assistance for Existing Facilities		
1989	16	10
1990	41	23
1991	15	4
1992	12	6
1993	1	2
Total	85	45

New Construction		
1989	3	2
1990	1	8
1991	4	6
1992	12	1
1993	4	1
Total	24	18

1992, 12 cities and 6 counties joined the program. Program participation based on identified projects is 18% for cities and 78% for counties. [R#2]

A total of 24 cities and 18 counties have participated in the New Construction component, with 12 cities and 1 county participating in 1992. As there are 468 cities and 58 counties in California, program participation based on identified projects is 5% for cities and 31% for counties. [R#2]

HVAC AND AUTOMOTIVE TRAINING

From 1989 through June 1993, EPP conducted 34 HVAC training courses, with 420 personnel trained. [R#13]

From 1989 through June 1993, the Commission offered 60 courses in light duty automotive training, and trained 784 people. In 1993, the Commission offered 4 courses in heavy duty automotive training, training 42 people. [R#13]

Participation	Courses	Personnel
HVAC Training		
1989	8	107
1990	14	178
1991	11	118
1992	0	0
1993	1	17
Total	34	420

Automotive Training		
1989	3	53
1990	15	222
1991	9	106
1992	31	386
1993	6	59
Total	64	826

These automotive and HVAC training courses were provided to a total of 129 cities and 42 counties.

FREE RIDERSHIP

The Energy Commission has done no formal analysis of free ridership for the EPP and as a result the numbers in this report are not derated for free ridership. [R#2]

MEASURE LIFETIME

The Energy Commission has not assigned an average measure lifetime to the program. Because approximately 80% of the recommended measures for the new construction and existing facilities component are lighting installations, The Results Center has estimated an average measure lifetime of 8 years (See Results Center profiles 13, 17, 19, 23, and 42 for representative measure lifetimes for lighting programs). ■

Cost of the Program

Data Alert: All of the cost figures are based on engineering estimates. Costs for 1993 include projects from January 1, 1993 through June 30, 1993. Costs for 1993 are not levelized.[R#2] The Energy Commission has not tracked costs for completed projects. Costs for the training programs represent actual costs.

The Commission tracks separately the costs for the New Construction Design Assistance component, the technical assistance for existing facilities component, and the costs for training programs.

Costs for the new construction and existing facilities

components are broken out into project identification expenditures, project costs for identified projects, and project costs for committed projects. The sum of project identification expenditures and project costs for identified projects represents the maximum cost to implement all recommended projects. Project identification costs are incurred solely by the Commission and represent technical assistance costs. Project costs for identified projects represent potential customer costs. Costs for committed projects represent estimated customer costs for projects that have secured funding. As with program savings, committed project costs are a subset of identified project costs.[R#2]

Costs	<i>CEC Project Identification Expenditures (x1000)</i>	<i>Estimated Project Cost Identified Projects (x1000)</i>	<i>Committed Projects (x1000)</i>
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Technical Assistance Existing Facilities

1989	\$526.0	\$2,827.1	\$957.6
1990	\$1,298.7	\$8,794.8	\$4,831.4
1991	\$282.6	\$2,693.5	\$1,296.2
1992	\$396.5	\$10,264.4	\$6,172.7
1993	\$78.1	\$1,457.1	\$1,457.1
Total	\$2,581.9	\$26,036.9	\$14,715.0

New Construction

1989	\$54.0	\$110.5	\$110.5
1990	\$145.9	\$1,413.7	\$664.3
1991	\$132.7	\$2,133.6	\$1,289.3
1992	\$117.0	\$489.0	\$197.0
1993	\$57.3	\$786.9	\$308.3
Total	\$506.8	\$4,933.7	\$2,569.3

Cost of the Program (continued)

Through Senate Bill 880 the Energy Partnership program received \$11.1 million (unlevelized). Of this amount \$7.1 million was allocated for technical assistance and \$4 million was allocated for the revolving loan fund. [R#1,12]

TECHNICAL ASSISTANCE FOR EXISTING FACILITIES

For the existing facilities component, project identification costs totaled \$2,581,900, estimated costs to implement identified projects totaled \$26,036,900, and costs for committed projects totaled \$14,715,000. [R#2]

For 1992, project identification expenditures were \$396,500, estimated costs for identified projects were \$10,264,400, and costs for committed projects totaled \$6,172,700. [R#2]

NEW CONSTRUCTION DESIGN ASSISTANCE

For the new construction component, Commission project identification expenditures total \$506,800 and es-

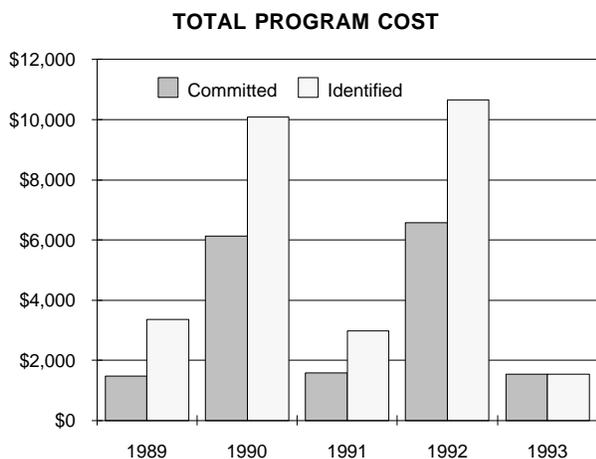
timated project costs for identified projects total \$4,933,700. Costs for committed projects total \$2,569,300. In 1992, project identification expenditures totaled \$117,000, estimated costs for identified projects totaled \$489,000, and estimated costs for committed projects totaled \$197,000. [R#2]

AUTOMOTIVE AND HVAC TRAINING

The Energy Partnership program has spent a total of \$301,060 on automotive training and \$193,846 on HVAC training for total training expenditures of \$494,906. [R#2]

FLEET MANAGEMENT COSTS

The Commission has invested \$189,350 (unlevelized) in local government fleet management to date. A total of \$39,750 was spent on program planning, including preparation of the fleet survey instrument; \$102,350 was used to fund five fleet technical assistance studies; and \$47,250 was spent on technology transfer.



COST EFFECTIVENESS

The Energy Commission has not formally evaluated the cost effectiveness of the EPP program. The Results Center has calculated the cost of saved energy for both identified projects for existing facilities and committed projects for existing facilities. These calculations are based on an 8-year average measure lifetime, along with annual savings and cost figures as presented in the Cost Overview Table, Technical Assistance for Existing Facilities, and the Savings Overview Table, Existing Facilities, both identified and committed projects. At a 5% discount rate, the cost of saved energy has steadily risen for identified projects ranging from 2.23 ¢/kWh in 1989, to

Cost of Saved Energy (¢/kWh) Existing Facilities	Discount Rates						
	3%	4%	5%	6%	7%	8%	9%

Identified Projects

1989	2.06	2.14	2.23	2.32	2.42	2.51	2.61
1990	4.39	4.58	4.77	4.96	5.16	5.36	5.57
1991	5.32	5.54	5.78	6.01	6.25	6.50	6.74
1992	6.49	6.76	7.04	7.33	7.63	7.92	8.23

Committed Projects

1989	2.49	2.59	2.70	2.81	2.92	3.04	3.15
1990	4.74	4.94	5.15	5.36	5.57	5.79	6.01
1991	5.06	5.27	5.49	5.72	5.95	6.18	6.42
1992	5.98	6.23	6.49	6.76	7.03	7.30	7.58

4.77 ¢/kWh in 1990, to 5.78 ¢/kWh in 1991, and 7.04 ¢/kWh in 1992. The cost of saved energy for committed projects at a 5% discount rate has also steadily increased, starting at 2.70 ¢/kWh in 1989, jumping to 5.15 ¢/kWh in 1990, moving to 5.49 ¢/kWh in 1991, and reaching 6.49 ¢/kWh in 1992.

EPP staff believe the increase in the cost of saved energy is due to ongoing program changes that have been made throughout the program's existence. As the program evolved, the technical assistance became more comprehensive, looking deeper, and identifying more

comprehensive retrofits. This in-depth analysis identified more opportunities but these tended to be projects that have a higher cost of energy saved.[R#2]

COST PER PARTICIPANT

Over the life of the program the Energy Commission has spent \$12,066 per city or county with an identified new construction project. The Commission has spent \$19,860 per city or county with an identified existing facilities project. A total of \$397 has been spent on each person receiving automotive or HVAC training. ■

Environmental Benefit Statement

AVOIDED EMISSIONS: Based on 165,913,000 kWh saved 1989 - 1993

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%	357,708,000	8,486,000	1,716,000	172,000
B	10,000	1.20%	381,434,000	3,285,000	1,108,000	821,000

Controlled Emissions

A	9,400	2.50%	357,708,000	849,000	1,716,000	14,000
B	10,000	1.20%	381,434,000	329,000	1,108,000	55,000
C	10,000		381,434,000	2,190,000	1,095,000	55,000

Atmospheric Fluidized Bed Combustion

A	10,000	1.10%	381,434,000	1,004,000	548,000	274,000
B	9,400	2.50%	357,708,000	849,000	686,000	51,000

Integrated Gasification Combined Cycle

A	10,000	0.45%	381,434,000	675,000	110,000	274,000
B	9,010		343,108,000	245,000	82,000	16,000

Gas Steam

A	10,400		208,055,000	0	475,000	0
B	9,224		180,679,000	0	1,132,000	53,000

Combined Cycle

1. Existing	9,000		180,679,000	0	694,000	0
2. NSPS*	9,000		180,679,000	0	329,000	0
3. BACT*	9,000		180,679,000	0	46,000	0

Oil Steam--#6 Oil

A	9,840	2.00%	301,132,000	4,563,000	538,000	511,000
B	10,400	2.20%	319,383,000	4,526,000	677,000	329,000
C	10,400	1.00%	319,383,000	646,000	544,000	172,000
D	10,400	0.50%	319,383,000	1,898,000	677,000	104,000

Combustion Turbine

#2 Diesel	13,600	0.30%	399,684,000	796,000	1,236,000	68,000
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Refuse Derived Fuel

Conventional	15,000	0.20%	474,511,000	1,223,000	1,610,000	358,000
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In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

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

HOW TO USE THE TABLE

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

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

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

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

* Acronyms used in the table

TSP = Total Suspended Particulates

NSPS = New Source Performance Standards

BACT = Best Available Control Technology

Lessons Learned / Transferability

LESSONS LEARNED

Commission staff believes that the most important lesson it has learned is the importance of getting a strong commitment from program participants before beginning any technical assistance. Such commitment is best fostered through personal contact with local government staff and decision makers. [R#2]

TECHNICAL ASSISTANCE FOR EXISTING FACILITIES

Experience has taught the Commission staff the importance of screening applicants before committing to spend technical assistance funds. For example, many of the first program applicants were simply looking for “grants” to conduct programs mandated by other state agencies such as curbside recycling. Other jurisdictions sought funding for pet projects, such as cogeneration and thermal energy storage without first evaluating more cost-effective, energy-efficient strategies. These types of applications rarely led to implemented projects and are not served by the EPP. [R#2]

Instead the EPP staff has learned that it needs full cooperation from local governments’ top management (including the city manager or county administrative officer, the finance director, facilities manager, and maintenance supervisor) from the beginning in order to implement a successful energy retrofit project. It is important to meet with these decision makers so that the EPP staff can be confident that the local government will follow through with project financing and installation. [R#2]

The EPP staff has also found that a great deal of marketing is not necessary to attract local governments to the program. Following successful marketing efforts at the League of California Cities and California State Association of Counties annual meetings, the Commission received an overwhelming number of applicants compared to available staff resources, and many applicants were placed on a waiting list. [R#2]

It is important to provide participants with a “complete” service in order to speed up the implementation process and help guarantee project completion. Initially, the Energy Partnership program only offered audits and financing. The initial projects were very slow in being completed and participants needed guidance through every step of a project. Currently, the program provides more of a “cradle to grave”

service which speeds up the implementation process. In 1994 the Commission hopes to publish a step by step project implementation guide. [R#12]

In addition to providing participants with help through every step of the implementation process, the Commission provides a printed schedule at the beginning of a project. Providing this schedule has greatly reduced the time it takes to complete projects. When the program first began, projects normally took two to three years to complete. Recent projects have been completed in 15 to 18 months. While such a time frame might not seem exceedingly quick, it is important to keep in mind that the program deals only with city and county governments, and EPP projects are certainly not immune from the red tape inherent in dealing with government. [R#12]

NEW CONSTRUCTION DESIGN ASSISTANCE

With new construction projects it is extremely important to get involved early in the design process. It is easier to incorporate energy efficiency into a design from the beginning than to add it later, since building plans are on paper and it is difficult to change the design. [R#2]

One problem that arises from early project involvement is the challenge of calculating energy savings from recommended energy-efficiency improvements. For many new construction projects the design team installs EPP-recommended measures without receiving savings estimates. Savings estimates and project cost estimates are only provided when designers need to be convinced of the value of the energy-efficient measures. [R#2]

Having the Commission and its consultants viewed as part of the design team is very helpful. As with other program elements it is important to get commitment from the owner and the design team. It is equally crucial to be responsive to the owner and design team so that projects can proceed according to the construction schedule. [R#2]

TRAINING

The Commission has found that local governments with very small maintenance staffs (one or two technicians) will not participate in training because there is not sufficient back-up in the event of an equipment emergency. Similarly, some jurisdictions in California are too remote to serve cost

effectively unless the training could be opened up to local school maintenance staffs as well.[R#13]

Conversely, local governments with large maintenance staffs (ten or more) are the easiest to serve because they can fill up an entire class thus eliminating the need to conduct marketing and registration. Being able to conduct training for single jurisdictions also enables the program to address the needs of local governments more specifically.[R#13]

The Commission believes that training is best marketed by first calling the local government maintenance supervisor and then faxing workshop details. Registration is best handled by telephone on a first-come, first-serve basis.[R#13]

The EPP staff believes it is ideal if local governments are not charged a fee for training. Although some cities and counties (including many large jurisdictions) have training budgets which could be used to send technicians to EPP courses, these dollars are usually not used for EPP courses. Originally EPP charged a nominal registration fee of \$25 per day because it believed free training would be undervalued by local governments who would register to attend and then not show up. This was not the case. Governments signing up to attend did so. The Commission has found that local government maintenance departments are anxious to get affordable, high-quality training for their staffs within a reasonable proximity to their jurisdictions.[R#13]

The Commission has found that the best course trainers are former HVAC or automotive technicians who progressed through the apprenticeship, journeyman, and master technician phases to become technical teachers. Engineers are not as effective at training maintenance technicians because they are not technicians themselves and have a more difficult time distinguishing between what technicians “need to know” and what would be “nice to know.”[R#13]

TRANSFERABILITY

For other state energy offices considering implementing a similar program, the staff recommends having different program components or even separate programs designed specifically to serve different sized cities. Smaller California cities have very different needs than larger cities due to smaller projects in terms of savings; the number of

measures installed; size and number of buildings; and program delivery costs and project costs.[R#12]

Smaller states with concentrated population centers would likely have an easier time implementing a similar program simply based on geographic considerations. Due to the sheer size of California, implementing and monitoring the program has been quite a challenge.[R#12] ■

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