

Funding and Energy Savings From Investor-Owned Utility Energy Efficiency Programs In California for Program Years 2000 Through 2004

Formerly Entitled:
Funding and Savings for Energy Efficiency Programs
For Program Years 2000 Through 2004

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In support of the
2005 Integrated Energy Policy Report

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STAFF PAPER

August 2005
CEC-400-2005-042-REV

FUNDING AND ENERGY SAVINGS FROM INVESTOR OWNED UTILITY ENERGY EFFICIENCY PROGRAMS IN CALIFORNIA FOR PROGRAM YEARS 2000 THROUGH 2004

This paper is a brief summary of the energy efficiency programs administered by the major investor-owned utilities (IOUs) in California: Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) over the last five years. The purpose of this paper is to highlight recent trends regarding energy efficiency funding, savings, and the cost-effectiveness of these programs.

The data used in this paper was compiled from the annual reports on energy efficiency filed by each IOU with the California Public Utilities Commission (CPUC). The reported program load impact data for program years 2003 and 2004 has not yet been verified by the CPUC.

This paper tracks energy efficiency efforts for the program years 2000 through 2004. All dollar amounts are reported in nominal dollars.

Annual Spending for Energy Efficiency Programs

Figure 1
Annual Spending for Energy Efficiency Programs
 (\$1.4 billion was spent for PY 2000-2004 with an average of \$286 million per year)

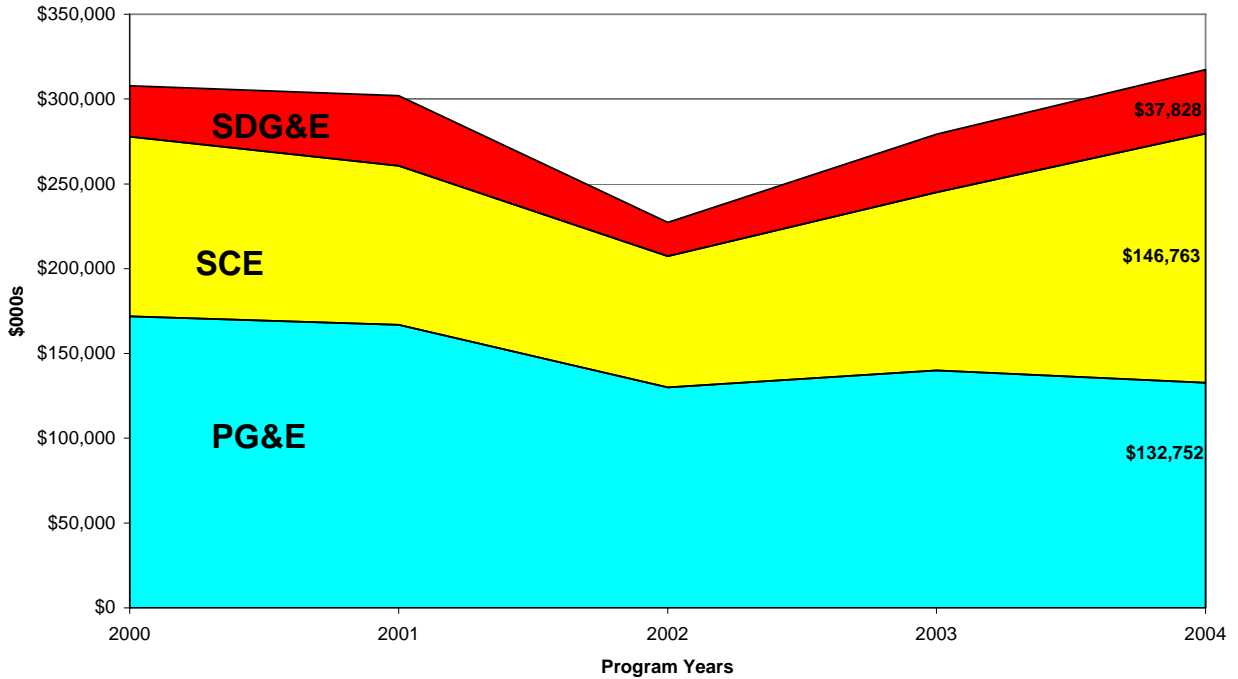


Figure 1 - Collectively, the three IOUs expended \$1.4 billion on energy efficiency programs for the program years 2000 through 2004. For the years 2000 and 2001, the three IOUs expended more than \$300 million each year. In 2002, the spending fell to \$227 million. Spending increased in 2003 to \$279 million and increased again in 2004 to a high of \$317 million.

Although the IOUs spent a record high of \$317 million on energy efficiency programs in 2004, this represents only slightly more than one percent of the 2004 total revenue for the IOUs.

Annual Spending by Sector

Figure 2
Cumulative Spending by Sector for PG&E, SCE and SDG&E for Program Years 2000-2004
(\$1.4 billion was spent for PY 2000-2004 with an average of \$286 million per year)

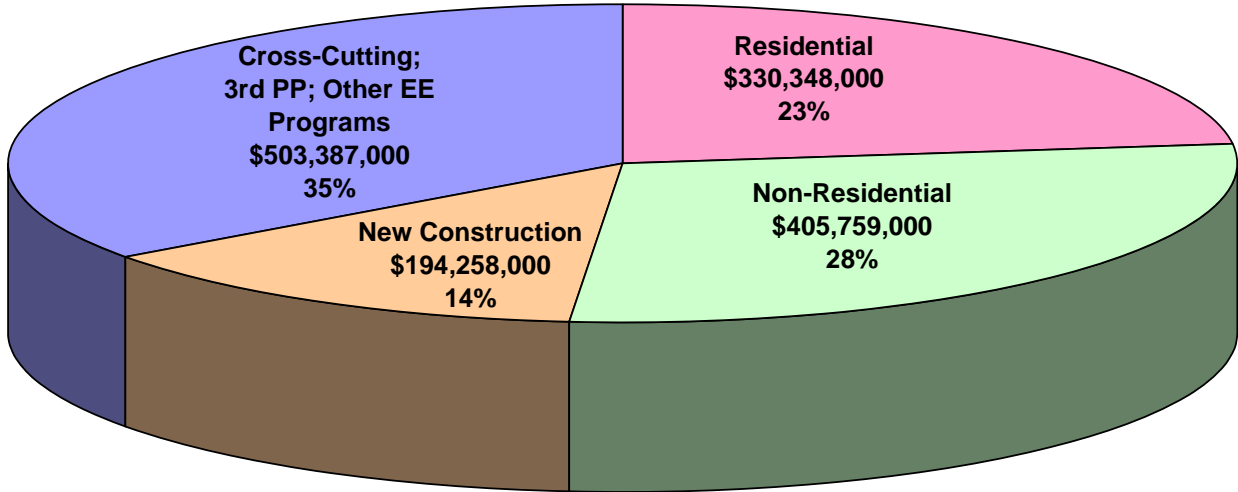


Figure 2 – Of the \$1.4 billion that the three IOUs expended on energy efficiency programs for the program years 2000 through 2004, 14 percent was spent on new construction programs; 23 percent was spent on residential programs; 28 percent was spent on non-residential programs; and 35 percent was spent on cross-cutting, third party programs, and miscellaneous energy efficiency programs.

The term cross-cutting is used for energy efficiency programs that involve any or all of the following: multiple customer types (residential and/or non-residential), and/or multiple building types (retrofit, remodeling, and/or new construction). All of these programs are designed to support and drive energy efficiency and energy savings. Some examples of cross-cutting programs include information and education, marketing and outreach, codes and standards advocacy, and emerging technology.

Figure 3
Spending by Sector for PG&E, SCE and SDG&E for Program Years 2000-2004
 (\$1.4 billion was spent for PY 2000-2004 with an average of \$286 million per year)

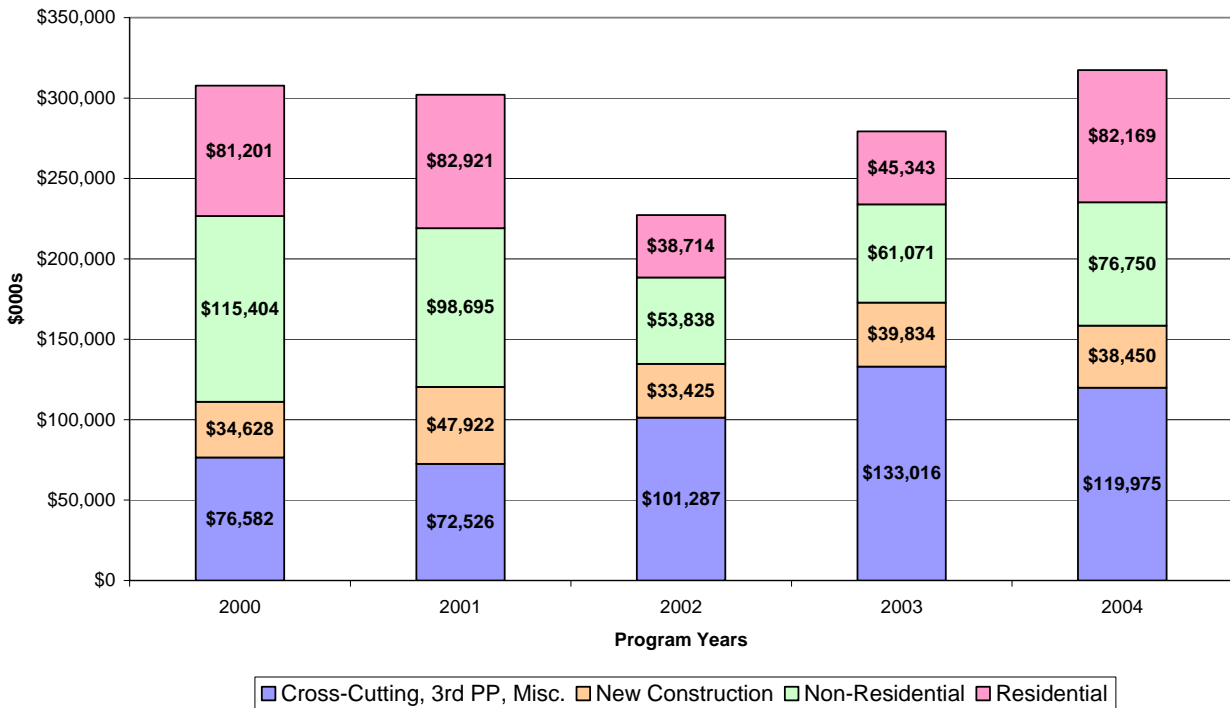


Figure 3 – This graph shows the breakdown by year of the spending for the three different customer sectors and a combination category. This combination category includes cross-cutting utility programs that have multiple customer sectors as well as programs that are administered by third parties. For years 2000 through 2004, these third-party programs accounted for nearly \$50 million dollars of the combination category budget.

Except for years 2000 and 2001, the spending has been highest in the combination category. Spending on non-residential programs energy efficiency programs was highest in 2000 and 2001, and the second highest amount of money for years 2002 and 2003. The non-residential energy efficiency programs include both industrial and commercial customers. Spending for residential programs has been the most volatile; spending in this sector has ranged from nearly \$83 million in 2001 and then dropping dramatically to \$38.7 million in 2002. For all five years, new construction programs have spent the least amount of money.

Spending by Individual Utility

Figure 4
Annual Spending for Energy Efficiency Programs by PG&E, SCE and SDG&E for PY 2000-2004
 (\$1.4 billion was spent for PY 2000-2004 with an average of \$286 million per year)

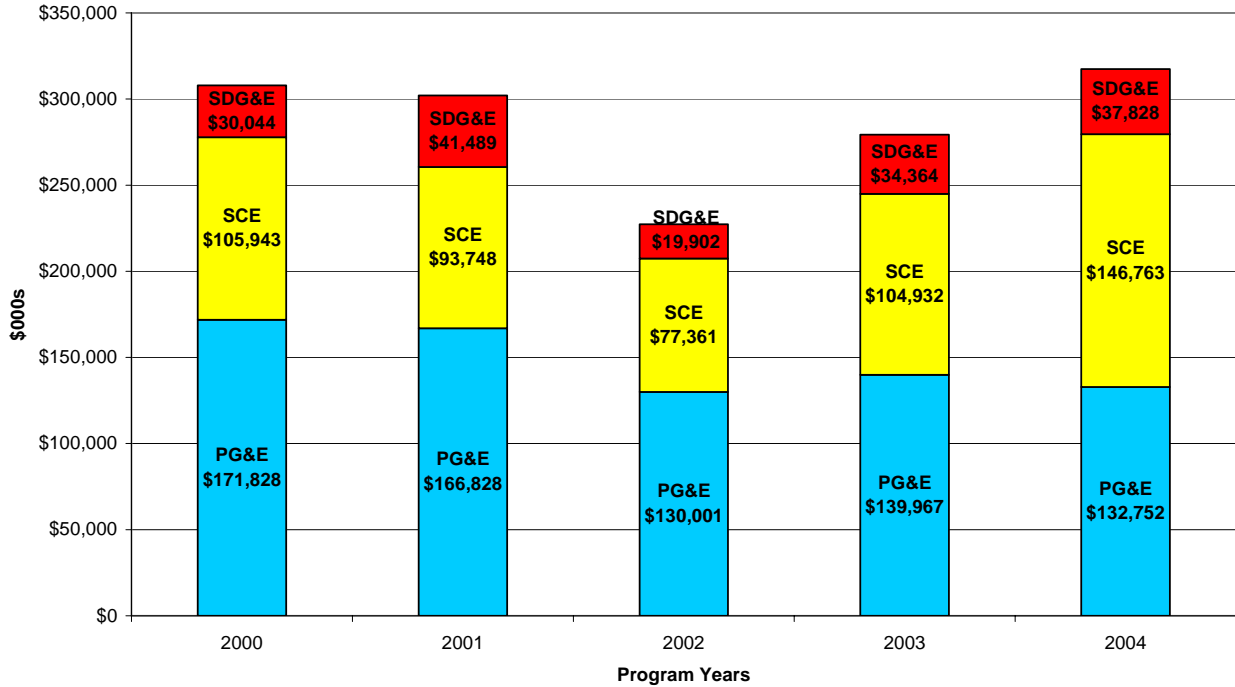


Figure 4 – This graph shows what each IUO spent on energy efficiency programs for each program year. Spending from PG&E was the highest of all the utilities for all years except 2004. For all five years, PG&E spent at least 90 percent of its energy efficiency budget. For years 2000, 2001 and 2004, SCE spent at least 93 percent of its energy efficiency budget. In 2003, SCE spent 87 percent of its budgeted funds. For program year 2002, SCE only spent 64 percent of its budget on energy efficiency programs. For years 2000, 2001 and 2002, SDG&E spent at least 92 percent of its budgeted funds on energy efficiency programs. In 2003, SDG&E spent 84 of its energy efficiency budget. For program year 2004, SDG&E only spent 66 percent of its budget on energy efficiency programs.

First Year Savings in Gigawatt Hours

Figure 5
First Year Savings (GWh/yr) by Utility Energy Efficiency Programs

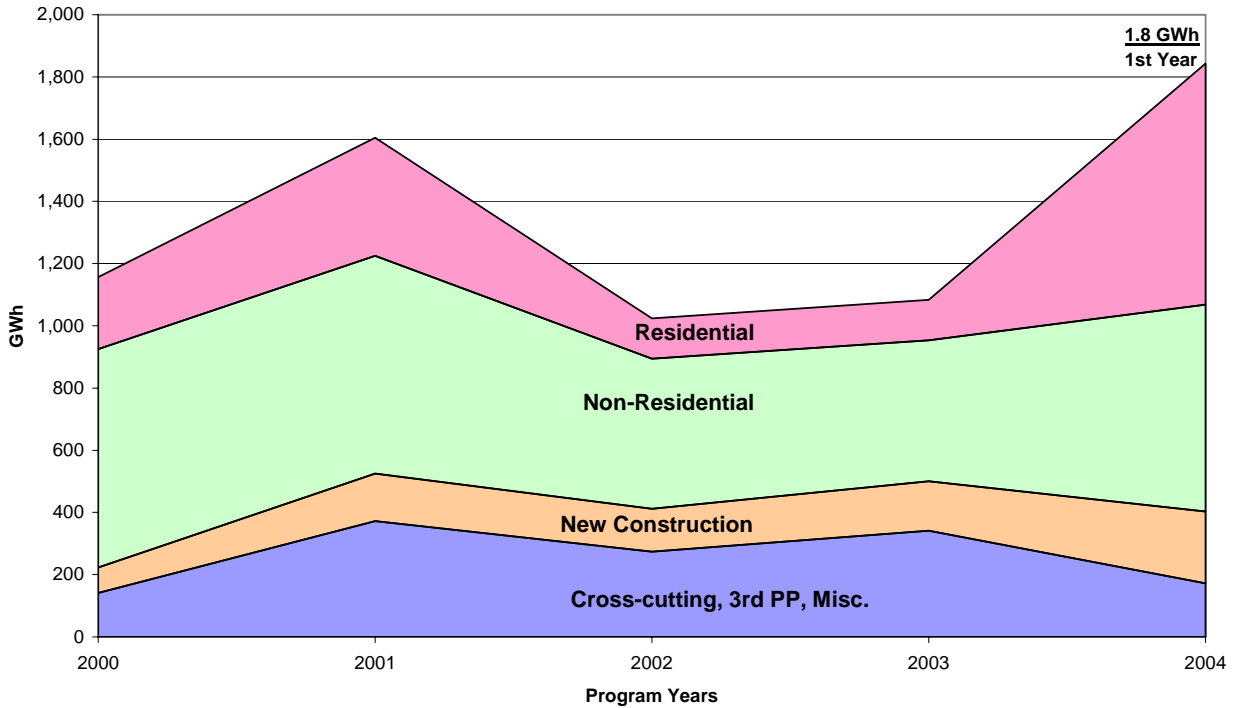


Figure 5 – This graph shows the first year savings in Gigawatt hours from the previously identified sectors. The year 2004 had the greatest first year savings with 1,843 Gigawatt hours saved. Program Year 2002 had the least first year savings with only 1,024 Gigawatt hours saved. For all program years except for the year 2004, non-residential energy efficiency programs had the greatest first year savings in Gigawatt hours. The year 2004 had the greatest first year savings in the residential energy efficiency programs. It appears that this major upswing in savings was caused by a significant increase in lighting savings from the residential sector that has yet to be verified.

The 2004 first year savings of 1,843 Gigawatt hours are roughly one percent of the combined energy sales of the IOUs in 2004.

First Year Peak Savings in Megawatts

Figure 6
First Year Peak Savings of Utility Energy Efficiency Programs

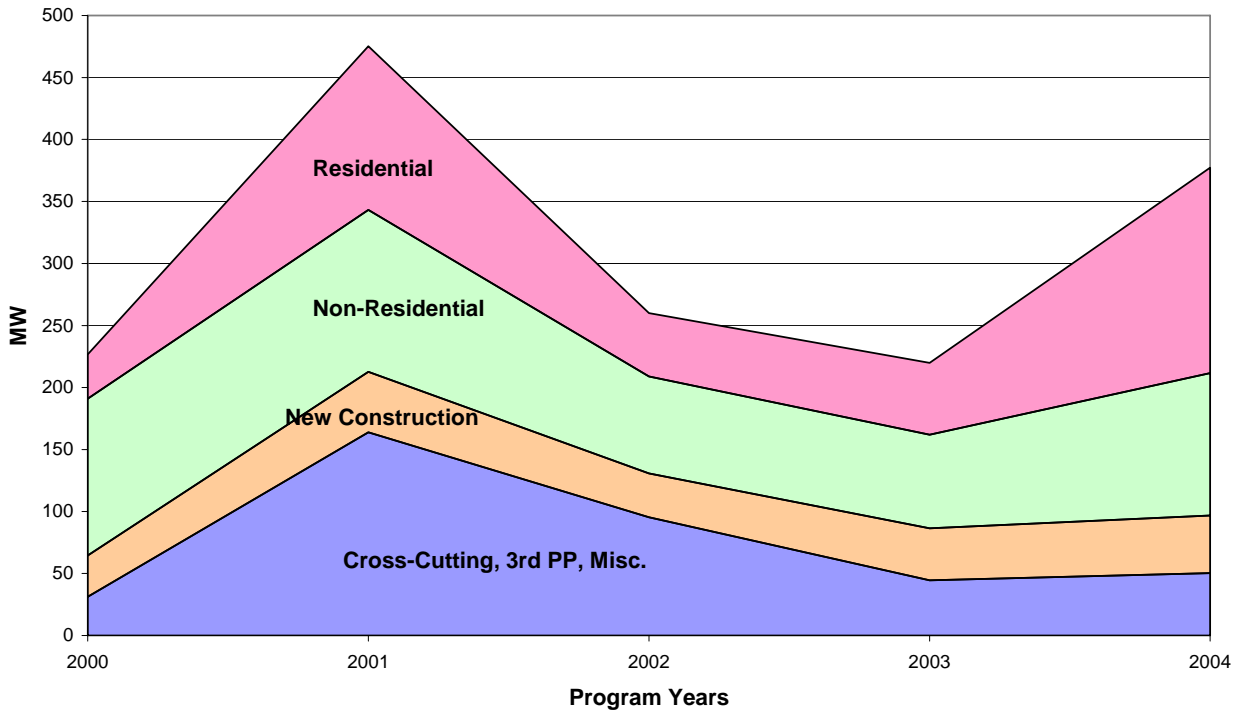


Figure 6 – This graph shows the first year peak savings in megawatts. The year 2001 had the greatest first year peak savings with 475 megawatts saved. The year 2004 was close behind in savings with 377 megawatts saved. For program years 2000 and 2003, non-residential programs had the greatest first year peak savings. The cross-cutting and third party programs had the greatest megawatts savings for years 2001 and 2002. The year 2004 had the greatest first year peak savings in the residential energy efficiency programs with 166 megawatts saved. This first year peak savings of 377 megawatts represents almost one percent of the actual energy generation of the IOUs in 2004.

Table 1
2004 Electricity Funding and Savings for PG&E, SCE and SDG&E

	GWh	% of Total GWh	MW	% of Total MW	Funding (\$000)	% of Total Revenue
PG&E	623	0.8%	141	0.6%	\$132,752	1.3%
SCE	984	1.2%	185	0.9%	\$146,763	1.5%
SDG&E	236	1.4%	51	1.4%	\$37,828	1.5%
Total	1,843	1.0%	377	0.8%	\$317,343	1.4%

Table 1 shows electricity funding and savings for the year 2004 for the individual IOUs and their aggregate total.

- PG&E had a first year savings of 623 Gigawatt hours from energy efficiency programs for all four sectors. This first year savings represents almost one percent of PG&E's total sales for 2004. PG&E had a first year peak savings of 141 megawatts. This represents a little more than half a percent of their peak load in 2004. PG&E spent \$132 million dollars in 2004 on energy efficiency programs. This represents slightly more than one percent of PG&E's total revenue for 2004.
- SCE had a first year savings of 984 Gigawatt hours from energy efficiency programs for all four sectors. This savings represents a little more than one percent of SCE's total sales for 2004. SCE had a first year peak savings of 185 megawatts. This represents almost one percent of SCE's peak load in 2004. SCE spent \$146 million dollars on energy efficiency programs. This represents one and one-half percent of SCE's total revenue for 2004.
- SDG&E had a first year savings of 236 Gigawatt hours from energy efficiency programs for all four sectors. This first year savings represents slightly more than one percent of SDG&E's total sales for 2004. SDG&E had a first year peak savings of 51 megawatts. This represents a little more than one percent of their peak load in 2004. SDG&E spent \$3.7 million dollars in 2004 on energy efficiency programs. This represents one and one-half percent of SCE's total revenue for 2004.
- The combined first year savings for all three IOUs was 1843 Gigawatt hours; this total represents one percent of the combined energy sales for the three IOUs. The first year peak savings of 377 megawatts represents almost one percent of the peak load of the aggregate IOUs in 2004. Together, the three IOUs spent \$317 million dollars on energy efficiency programs. This represents a little over one percent of the IOUs total revenue for the year 2004.

Cost Effectiveness

Figure 7
Summary of Cost Effectiveness by Sector for PG&E, SCE and SDG&E
for Program Years 2000-2004

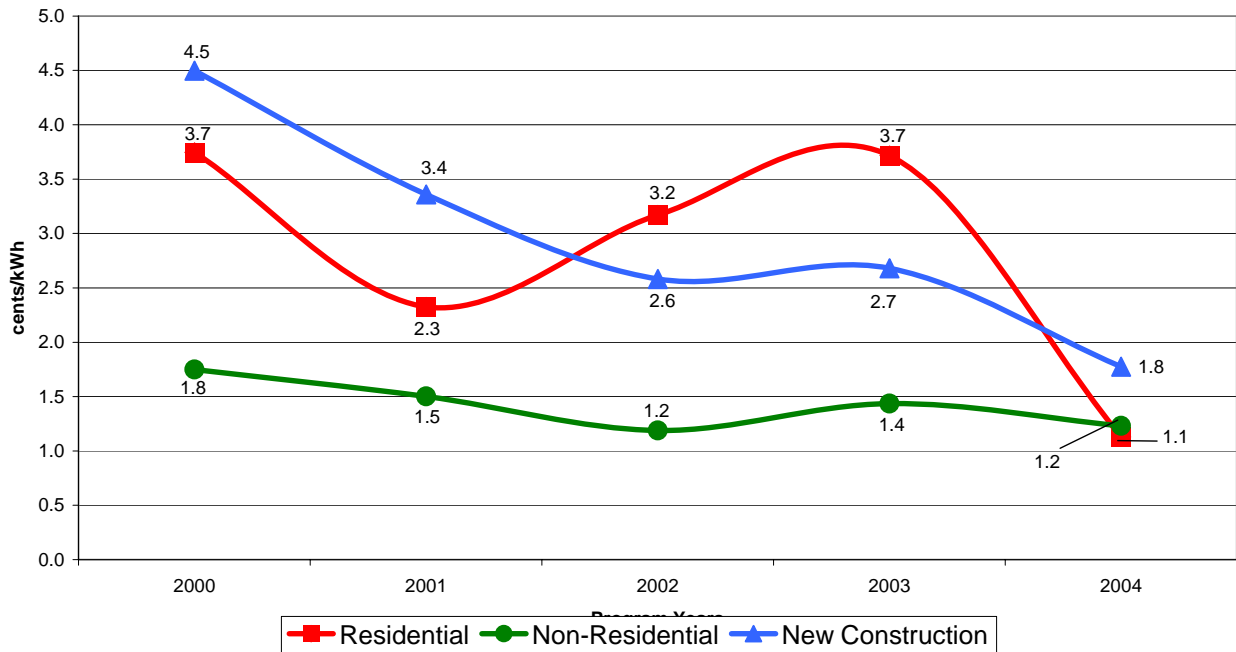


Figure 7 – This graph shows a summary of the reported program cost effectiveness by sector (not including the cross-cutting programs) for the aggregated IOUs for program years 2000 through 2004. We used levelized costs (in ¢/kWh) as the indicator of cost effectiveness, but information on benefit cost ratios is also available. We chose this method because research has shown that policy makers have an easier time comparing levelized costs for demand versus supply sources than comparing benefit cost ratios which are often not provided for supply options.

Over the past five years, program effectiveness has increased in all the sectors. For the year 2004, all sectors were at a levelized cost of a little over 1.1 cents per kWh. New construction had the greatest decrease in levelized cost over the five years. In 2000, the new construction energy efficiency programs were at a levelized cost of 4.5 cents per kWh. By the year 2004, the costs for these programs were now at 1.8 cents per kWh. The non-residential programs were the most stable for the 2000 through 2004 varying only slightly from a high of 1.8 cents per kWh in 2000 to 1.2 cents per kWh in 2004. The residential energy efficiency programs had the most

variance of all three sectors. The years 2000 and 2003 had a high of 3.7 cents per kWh. In 2004, the levelized cost was just 1.1 cents per kWh, the lowest point in five years.

In 2004, the average cost of electricity for the residential sector in California was 11.78 cents per kWh. This cost is ten times greater than the levelized cost of 1.1 cents per kWh for the residential energy efficiency programs for 2004.

These calculations assume an average useful measure life of 12 years and a real discount rate of 4 percent per year. These savings calculations count only utility program costs and incentives and do not include the incremental costs of the measures. Adding these costs would increase the estimates of levelized costs here from 30 to 80 percent, depending on the fraction of the measure cost covered by utility incentives.

To calculate the levelized cost of conserved energy, we used the following formulas:

$$\text{Levelized Cost of Conserved Energy} = \frac{\text{Program Costs} \times \text{CRF}}{\text{First year kWh saved}}$$

$$\text{Capital Recovery Factor (CRF)} = \frac{i(1+i)^n}{(1+i)^n - 1}$$

i = real discount rate

n = useful life period

The CEC has used real discount rates ranging from 3 percent per year to 5 percent per year over the last twenty years. These rates are slightly lower than the discount rates used by utilities in resource planning which have ranged from 5 percent to 9 percent real, or 8 percent to 13 percent nominal for the same time period.

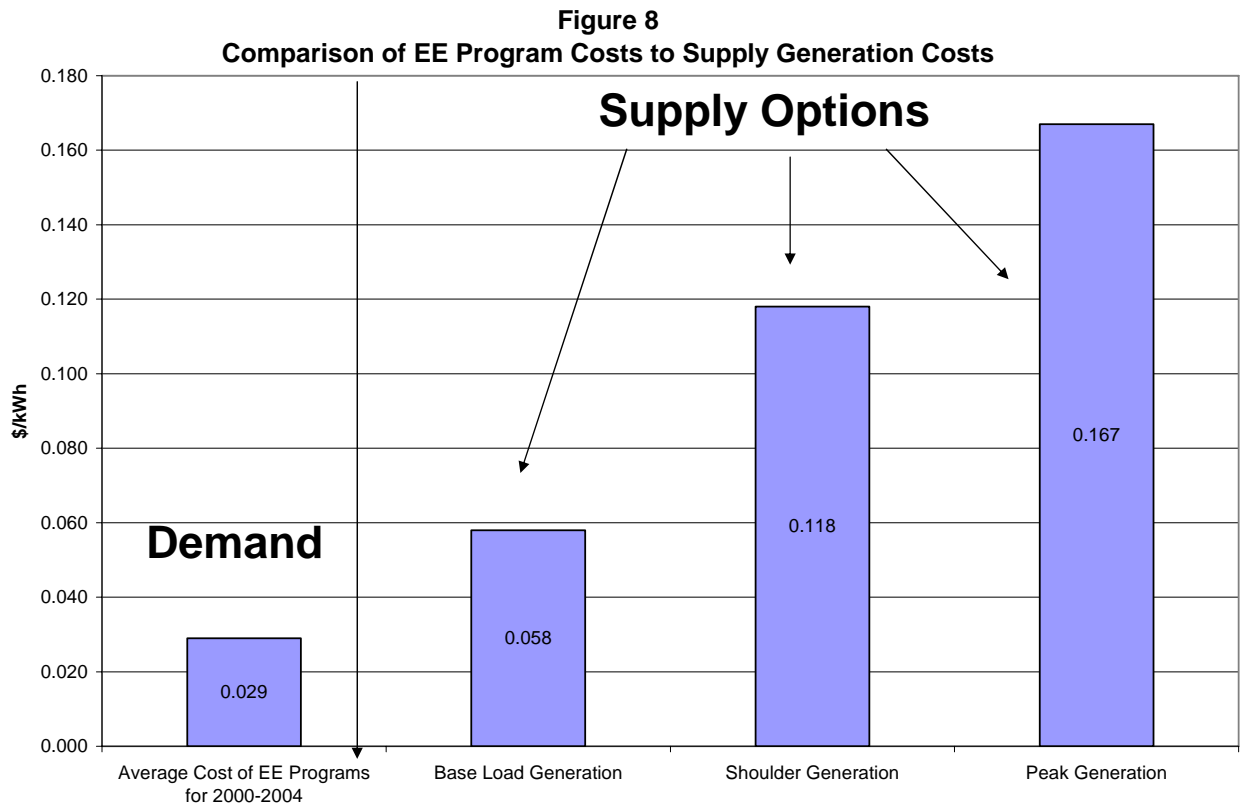


Figure 8 – This graph compares the levelized costs of the of the energy efficiency programs (not including the cross-cutting programs) averaged for program years 2000 through 2004 to the costs of providing energy generation for specific load blocks. The average cost of the energy efficiency programs for program years 2000 through 2004 was 2.9 cents per kWh. As noted in the 2003 electricity goals report (*Proposed Energy Savings Goals for Energy Efficiency Programs in California*, California Energy Commission, October 27, 2003), the levelized cost for electricity generation during the Base Load was estimated at 5.8 cents per kWh, double the cost of the averaged levelized cost for the energy efficiency programs. The levelized cost for electricity generation provided during the Shoulder time period is 11.8 cents per kWh, four times the cost of the averaged levelized cost for the energy efficiency programs. Finally, the levelized cost for the electricity generation for Peak time period is 16.7 cents per kWh, more than five and half times the cost of the averaged levelized cost for the energy efficiency programs for years 2000 through 2004. This graph shows that the average levelized costs for demand are still much less than the levelized costs for supply generation alternatives.

Both Demand and Supply are conservative:

- Demand includes only program costs, not matching investment by building owner, which typically raises societal costs by 50 percent.
- Supply is wholesale cost only: includes transmission and distribution losses, but not transmission and distribution costs, which would add about 3 cents per kWh.

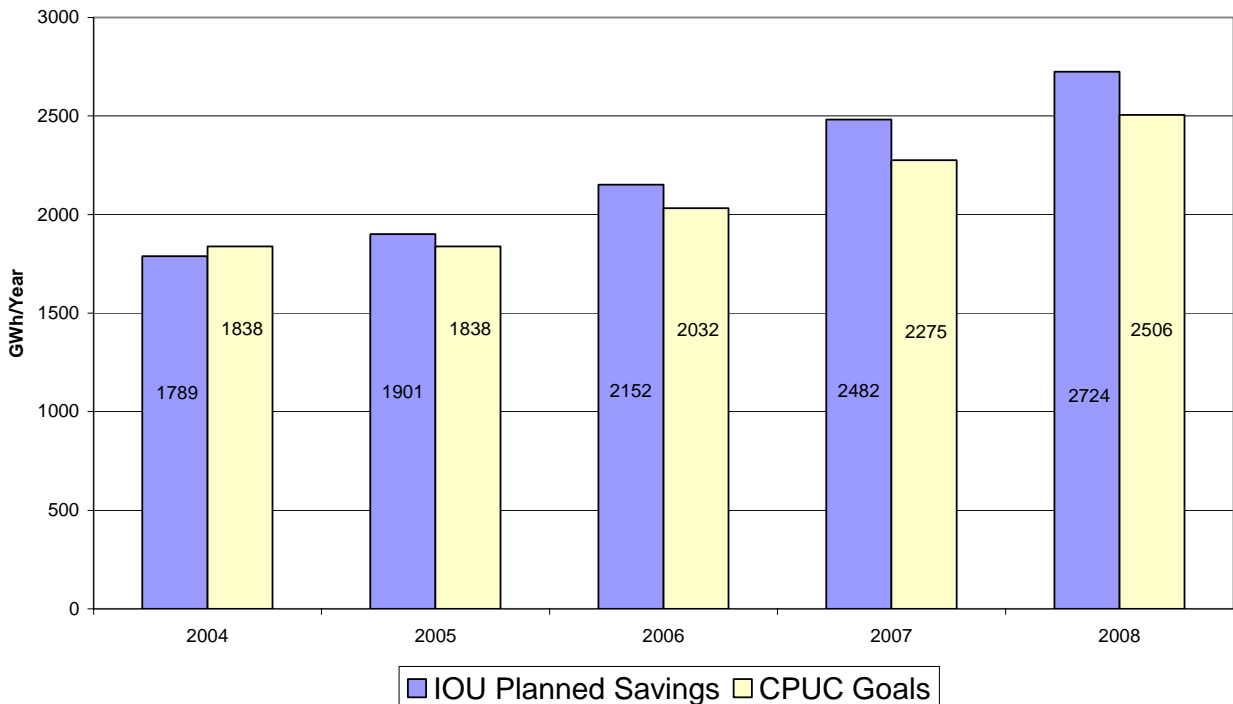
We used the following time periods to define base load, shoulder time period, and peak time period:

- Shoulder time period includes weekdays from 8 a.m. to 1 or 2 p.m. and from 7 p.m. to 9 p.m.
- Peak time period is between 12 p.m. and 7 p.m. on weekdays between the months of May and October.
- Base load is essentially all other time periods.

2006 through 2008 IOU Energy Efficiency Program Portfolios

California’s investor-owned utilities submitted their portfolio plans to the CPUC for review and adoption on June 1, 2005. Initial assessments by the utilities’ Peer Review Groups and the CPUC’s consultants conclude that the total program portfolio has “a good chance” of meeting the near term goals for energy savings, peak demand reduction, and therm savings. Figure 9 shows the comparison of projected savings with goals for the IOUs. In 2005, the IOUs are planning to exceed the CPUC goals by three percent. In 2006, the IOUs are planning to exceed the CPUC goals by six percent and in the years 2007 and 2008, the IOUs plan to exceed the CPUC goals by nine percent each year.

Figure 9
IOU Projected Electricity Savings Compared to Goals 2004-2008



The 2004 through 2013 goals should achieve 90 percent of the remaining cost-effective potential that is reachable through aggressive program activity, as documented in XENERGY Inc.'s *California's Secret Energy Surplus: The Potential for Energy Efficiency*, a study prepared for the Energy Foundation and the Hewlett Foundation in 2002. A nominal discount rate of 8 percent, as required by the CPUC for program filings in 2001, and a normalized measure life of 20 years were used to estimate economic potential.

Through procurement proceedings, ratepayer funds are once again available to fund energy efficiency beyond levels in the PGC. The IOUs have proposed large increases over their 2004-2005 budgets as they prepare to meet the goals. Table 2 shows the preliminary spending proposals and the relative sizes of the annual increases.

Although energy savings declined significantly following the 2000-2001 crisis, the trend today points toward significant increases in both spending and savings, consistent with the policies adopted in the *Energy Action Plan*.

Table 2
Funding for 2006-2008 Programs (\$000)

	2006	% Diff from Previous Year	2007	% Diff from Previous Year	2008	% Diff from Previous Year	Total
PG&E	\$276,000	111%	\$304,000	10%	\$373,000	23%	\$953,000
SCE	\$243,000	43%	\$243,000	0%	\$243,000	0%	\$729,000
SDG&E	\$81,000	30%	\$91,000	12%	\$106,000	16%	\$278,000
SCG	\$48,000	47%	\$61,000	27%	\$73,000	20%	\$182,000
Total	\$648,000		\$699,000		\$795,000		\$2,142,000

The likelihood of meeting the longer-term goals, however, is less certain. Achieving the future goals will require a commitment to innovative programs, including new technologies and program strategies, continuous improvement in program designs, and investments in program approaches expected to yield significant savings in the outer years. Uncertainties that could affect the achievement of these goals include the following:

- The amount of future cost-effective potential could increase or decrease, depending on cost-effectiveness, standards, equipment saturation, and emerging technologies.
- Values for evaluation parameters (net-to-gross ratio, unit energy savings, etc.) may be revised.
- Ramping up funding to these levels may be difficult. Coupling large funding

increases with unproven program ideas carries greater risk for successful program delivery.

- Emphasis on current year savings, as required by the new counting rules, could dampen interest in longer-term investments, such as new construction and standard performance contracting.
- Achieving the long-range goals will depend on the ability of the utilities to expand their reach to customers and increase both the level of savings per customer and the probability that customers will sustain these savings and continue to make efficient decisions.

Summary

This paper describes the latest trends in funding and savings for energy efficiency programs over the last five years. We believe this information provides the necessary background for discussion on how to improve energy efficiency portfolios in the future and the likelihood that future program efforts will meet the Commission's energy and peak goals.

Total expenditures for the different energy efficiency programs ranged from a low of \$227 million in 2002 to a high of \$317 million in 2004. This is still less than the high water mark for efficiency programs of roughly \$400 million in 1994. The total amount spent during these five years, 2000 through 2004, was \$1.4 billion. The majority of the money spent was on cross-cutting and third party programs. The non-residential sector, which includes industrial and commercial customers, spent the second highest amount of money. New construction received the least amount of the funding for energy efficiency programs.

Average energy and peak savings from programs have been steadily increasing over the five-year period, even after the significant drop in savings experienced between 2001 and 2004. The levelized costs for the energy efficiency programs in all sectors reached a low of a little over 1.1 cents per kWh in 2004 and when compared to the supply generation costs, the energy efficiency programs proved to be very cost effective.

The investor-owned utilities are likely to achieve the CPUC adopted goals over the near-term 2004 through 2008 period. This likelihood is less certain looking out to 2013, unless significant changes occur in program investments and approaches.

Links

California Energy Commission Homepage - <http://www.energy.ca.gov/>

California Energy Demand 2006-2016 Staff Energy Demand Forecast - <http://www.energy.ca.gov/2005publications/CEC-400-2005-034/CEC-400-2005-034-SD.PDF>

California Public Utilities Commission - <http://www.cpuc.ca.gov/static/index.htm>

California's Secret Energy Surplus: The Potential For Energy Efficiency - http://www.ef.org/energyseries_secret.cfm

Pacific Gas & Electric 2004 Annual Earnings Assessment Proceeding - https://www.pge.com/regulation/AnnEarnAssessProc2005/Testimony/PGE/2005-01-Fwd/AnnEarnAssessProc2005_Test_PGE_20050502-03-Vol-III.pdf

San Diego Gas & Electric 2004 Energy Efficiency Programs Annual Summary and Technical Appendix - http://www.sdge.com/regulatory/docs/eep_sdge.pdf

Southern California Edison 2000-2004 Energy Efficiency Annual Reports - http://www.sce.com/AboutSCE/Regulatory/eefilings/Annual_Reports/

California's four investor-owned utilities — Pacific Gas and Electric Company, San Diego Gas & Electric, Southern California Edison and Southern California Gas Company — have teamed up to create this energy-efficiency Web site. - <http://www.californiaenergyefficiency.com/resources.html>