FUNDING AND SAVINGS FOR ENERGY EFFICIENCY PROGRAMS FOR PROGRAM YEARS 2000 THROUGH 2004

Cynthia Rogers
Mike Messenger
Sylvia Bender
Energy Efficiency, Demand Analysis and Renewable Energy Division
California Energy Commission

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STAFF PAPER

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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 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). 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)

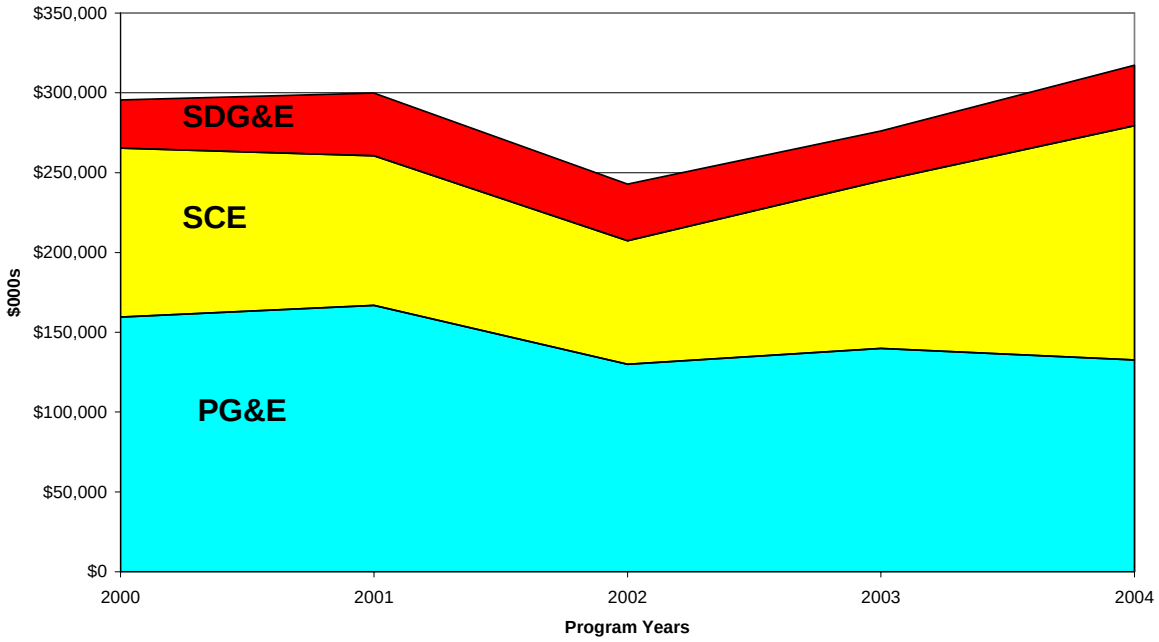


Figure 1 - Collectively, the three IOUs expended $1.4 billion on energy efficiency programs for the program years 2000 through 2004. For the years 2000 and 2001, the three IOUs expended close to $300 million each year. In 2002, the spending fell to $243 million. Spending increased in 2003 to $276 million and increased again in 2004 to a high of $317 million.

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)

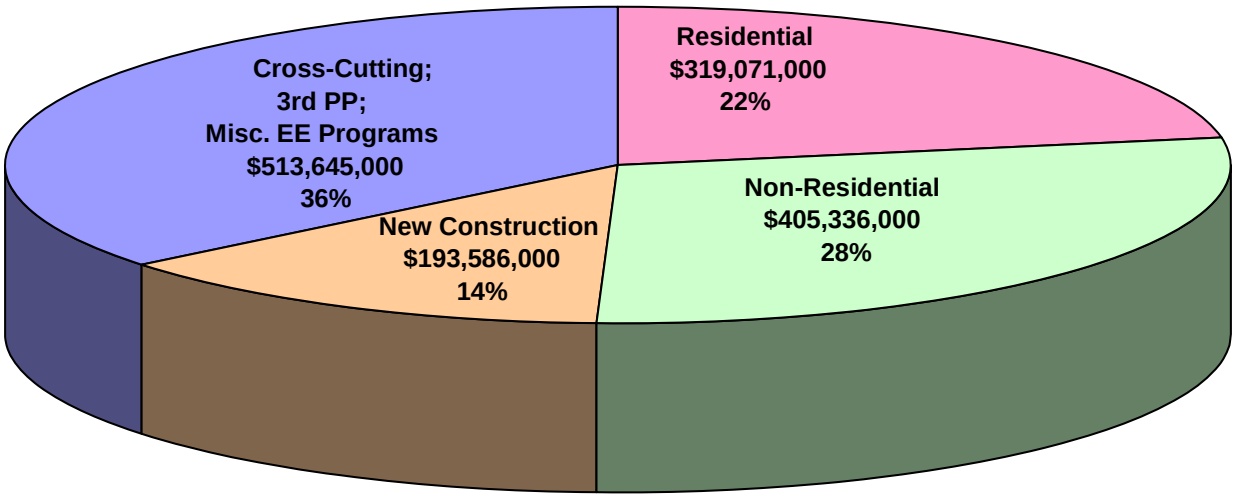


Figure 2 – Of the $1.4 billion that the three IOUs expended on energy efficiency programs for the program years 2000 through 2004, 14 percent was spent on new construction programs; 22 percent was spent on residential programs; 28 percent was spent on non-residential programs; and 36 percent was spent 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)

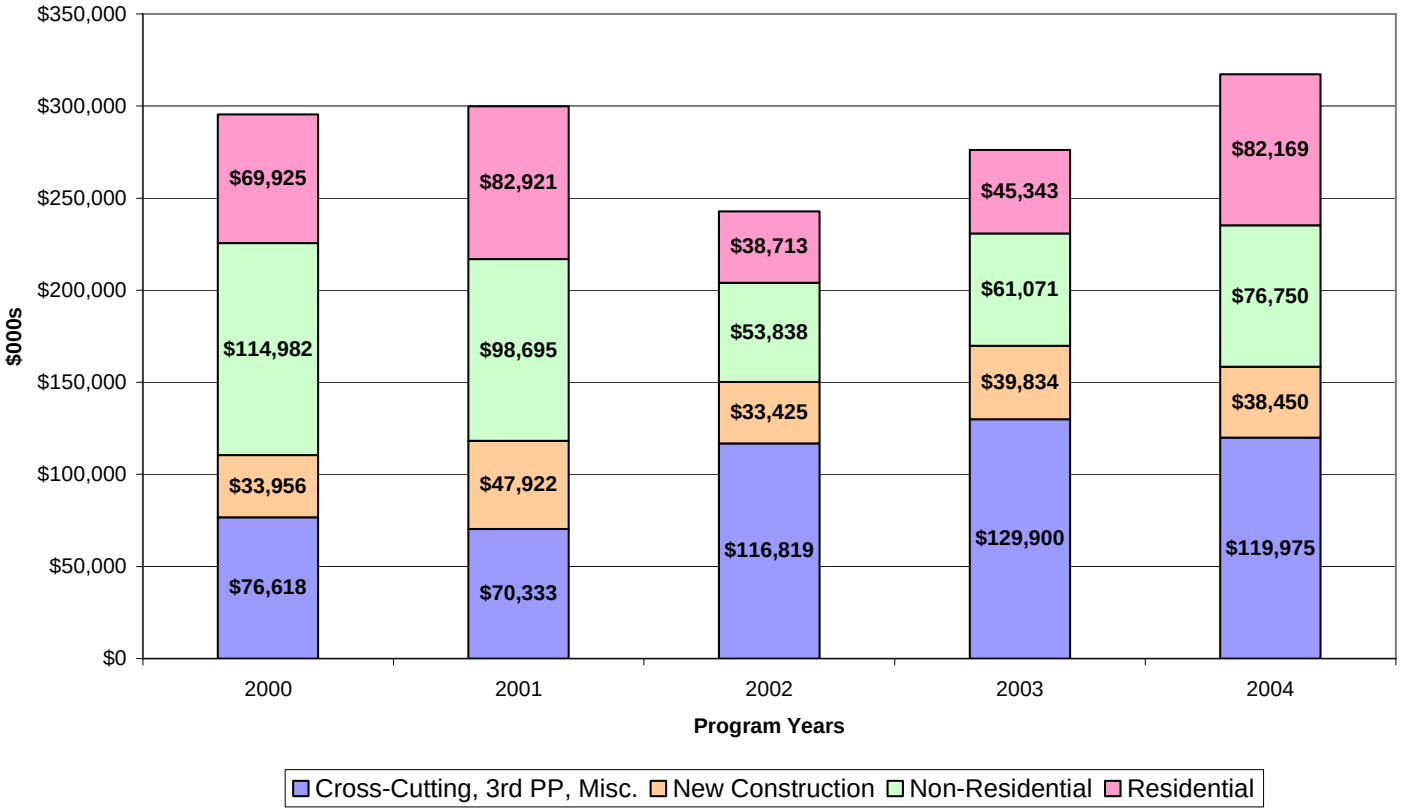


Figure 3 – This graph shows the breakdown by year of the spending for the three different customer sectors and a combination category. This combination category includes cross-cutting utility programs that have multiple customer sectors as well as programs that are administered by third parties. For 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 $38.7 million in 2002 to nearly $83 million in 2003. 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)

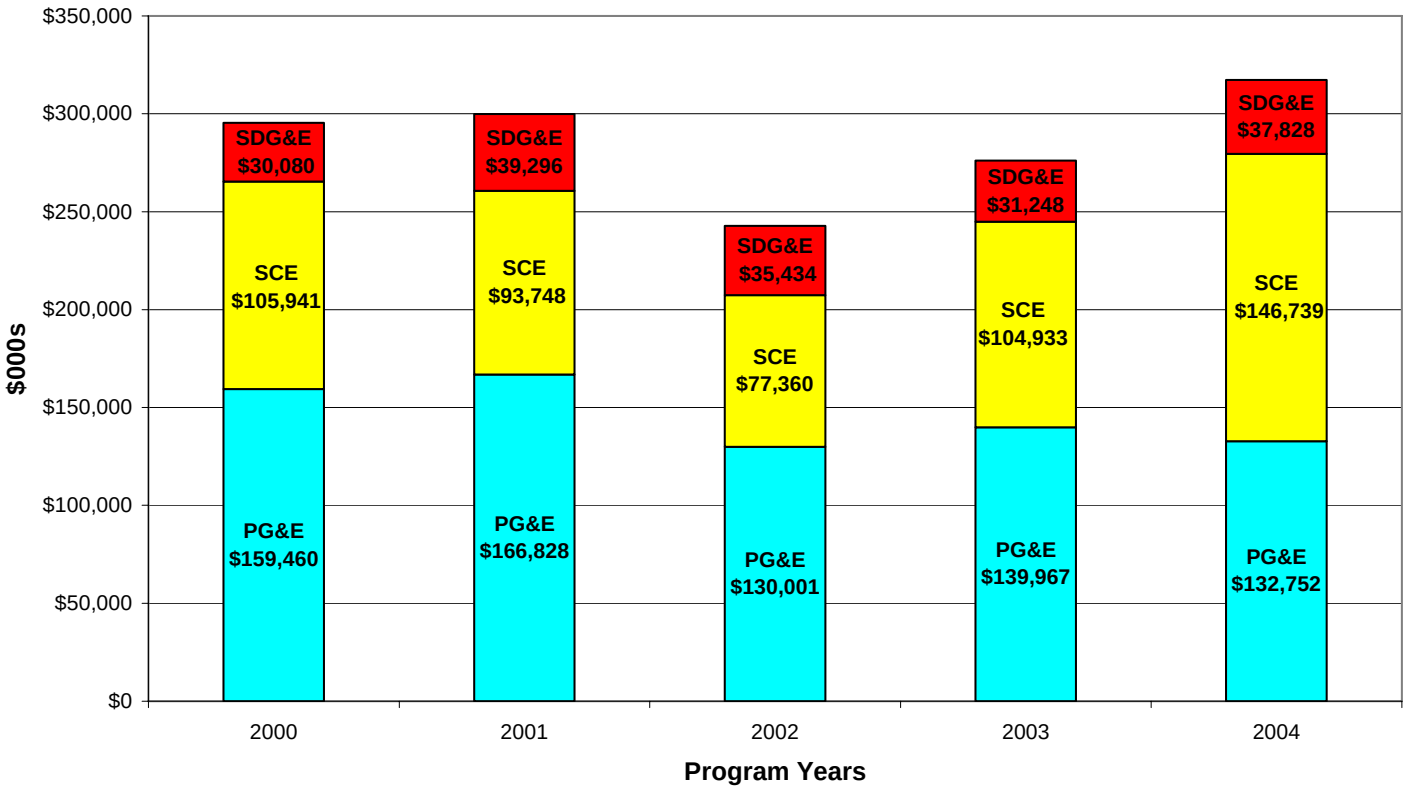


Figure 4 – This graph shows what each IUO spent on energy efficiency programs for each program year. Spending from PG&E was the highest of all the utilities for all years except 2004. In 2000, PG&E spent 88 percent of its energy efficiency budget. In the year 2001, PG&E's actual spending exceeded its budget for energy efficiency programs. In 2002, 2003 and 2004, PG&E spent 91 percent, 92 percent, and 90 percent respectively of its budget for energy efficiency programs. In the years 2000 and 2004, SCE spent 99 percent and 98 percent respectively of its energy efficiency budget. For the years 2001 and 2003, SCE spent 93 percent and 87 percent respectively of its budgeted funds. For program year 2002, SCE only spent 64 percent of its budget on energy efficiency programs. SDG&E spent less than 77 percent of its budgeted funds on energy efficiency programs for program years 2000, 2002, and 2004. In 2001 and 2003, SDG&E spent 90 percent and over 100 percent respectively of its budgeted funds.

First Year Savings in Gigawatt Hours

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

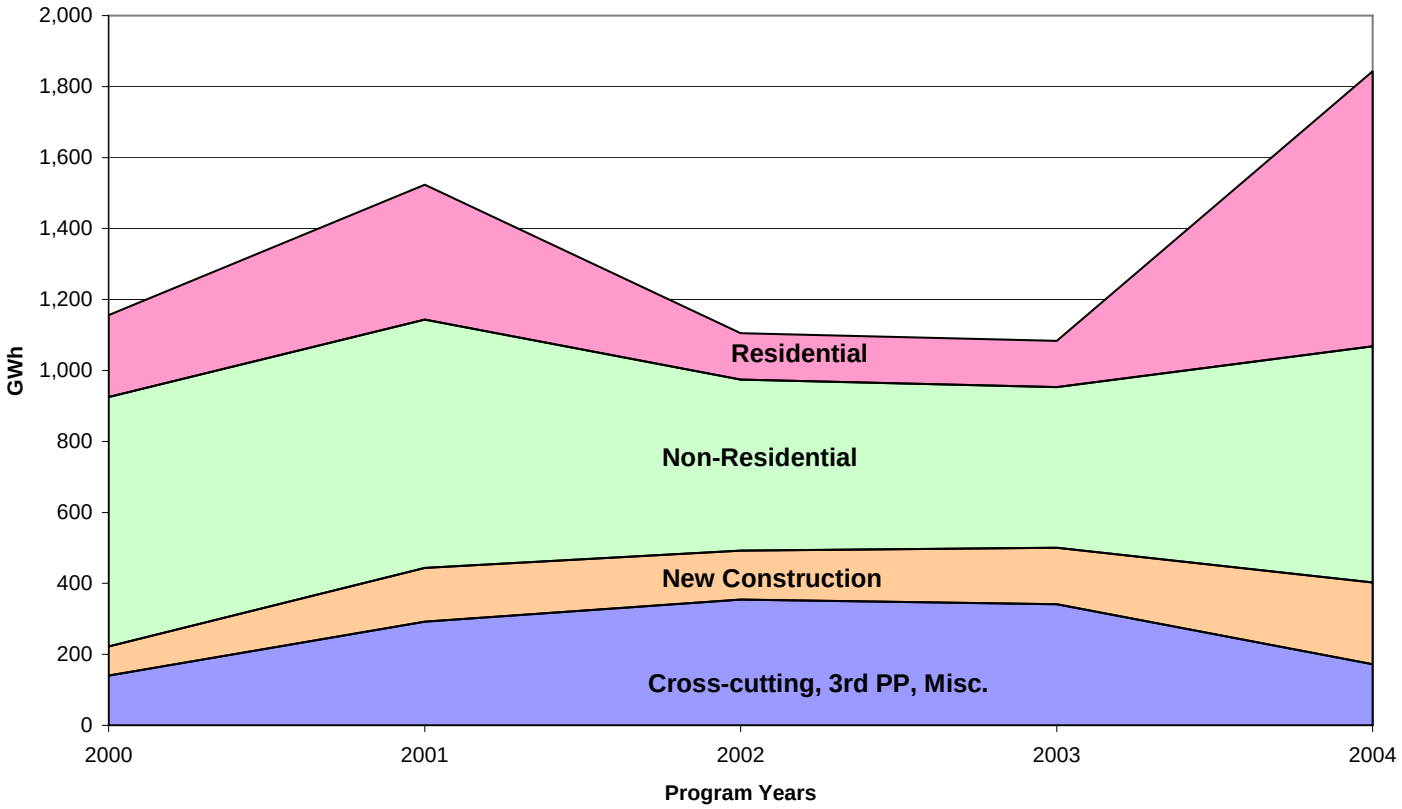


Figure 5 – This graph shows the first year savings in Gigawatt hours from the previously identified sectors. The year 2004 had the greatest first year savings with 1,843 Gigawatt hours saved. Program Year 2003 had the least first year savings with only 1,084 Gigawatt hours saved. For all program years 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.

First Year Peak Savings in Megawatts

Figure 6
First Year Peak Savings of Utility Energy Efficiency Programs

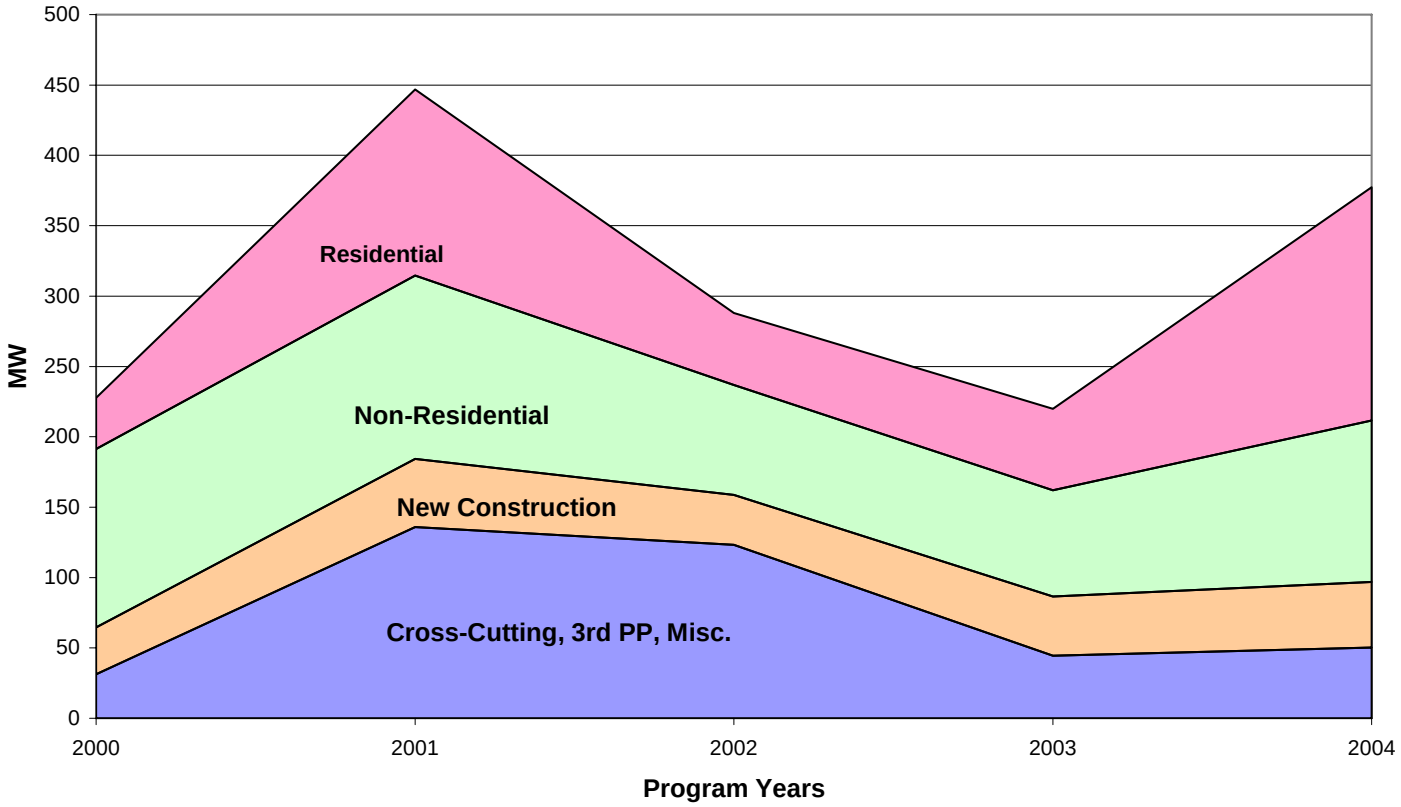


Figure 6 – Shows the first year peak savings in megawatts. The year 2001 had the greatest first year peak savings with 447 megawatts saved. The year 2004 was close behind in savings with 377 megawatts saved. For program years 2000 and 2003, non-residential programs had the greatest first year peak savings. 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.

Cost Effectiveness

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

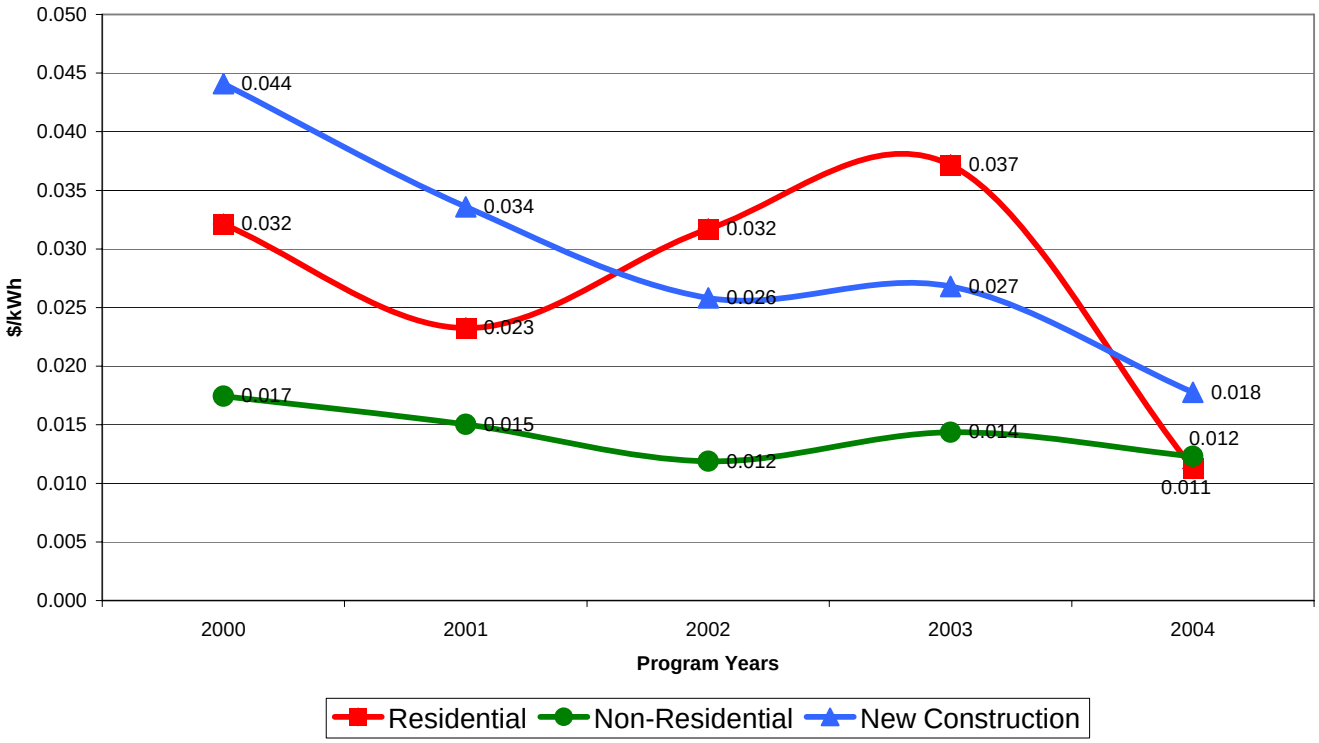


Figure 7 – This graph shows a summary of the reported program cost effectiveness by sector for the aggregated IOUs for program years 2000 through 2004. We used levelized costs (in $/kWh) as the indicator of cost effectiveness, but information on benefit cost ratios is also available. We chose this method 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 4.4 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 1.7 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 year 2003 had a high of 3.7 cents per kWh and then dropped to the lowest point in the five years to 1.1 cents per kWh in 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:

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

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

i = real discount rate
n = useful life period

These calculations assume an average useful measure life of 12 years and a real discount rate of 4 percent per year.

Figure 8
Comparison of EE Program Costs to Supply Generation Costs

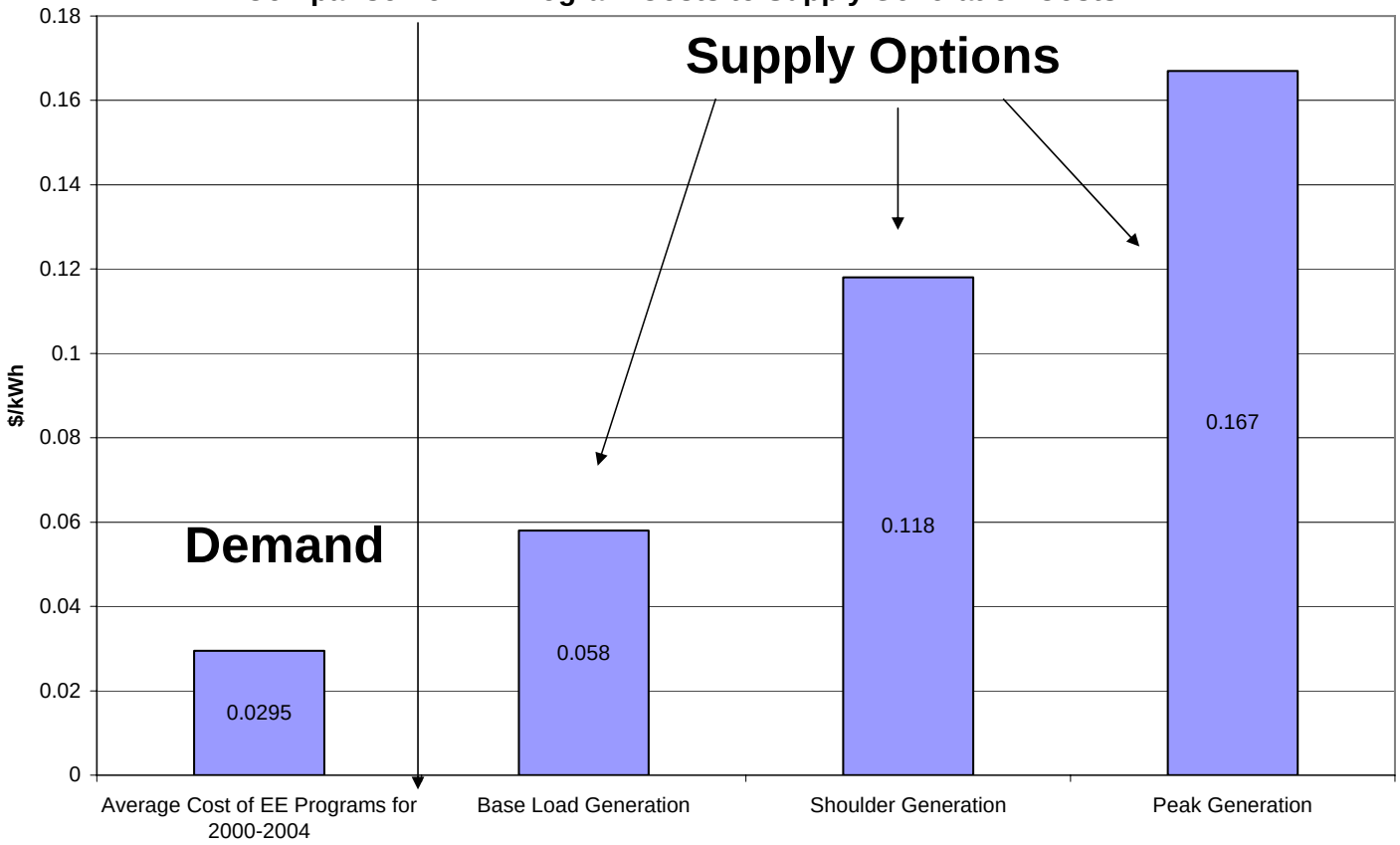


Figure 8 – This graph compares the levelized costs of the of the energy efficiency programs averaged for program years 2000 through 2004 to the costs of providing energy generation for specific load blocks. The average cost of the energy efficiency programs for program years 2000 through 2004 was 2.9 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, nearly 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, 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.

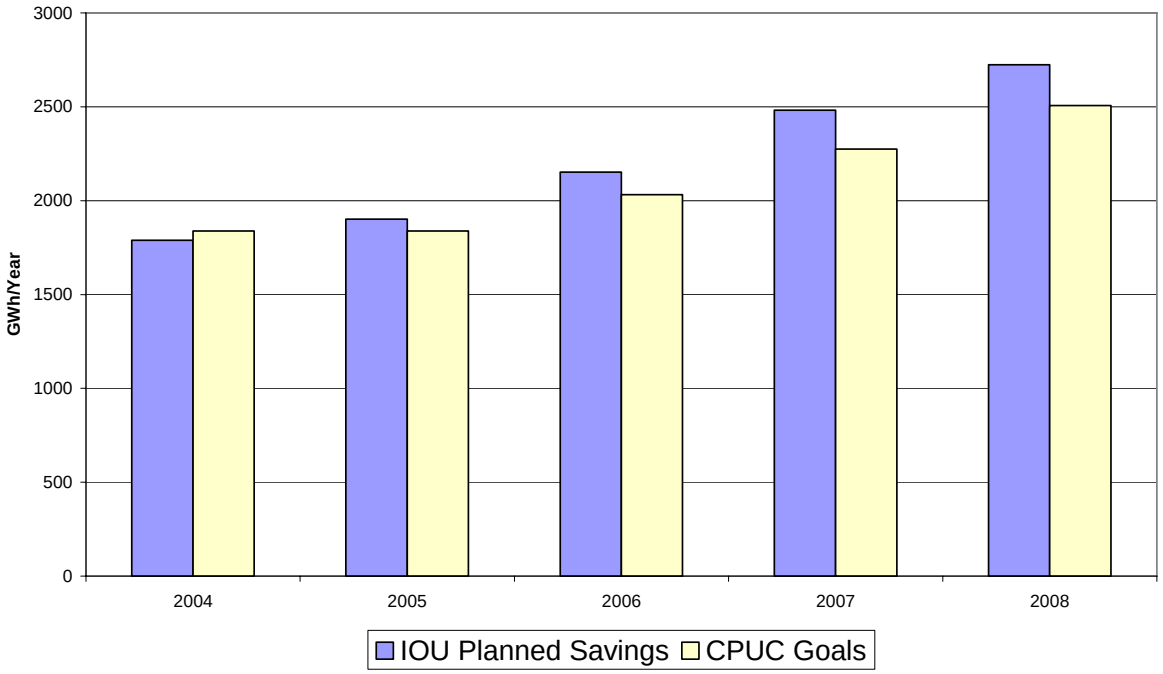
We use the following time periods to define base load, shoulder time period, and peak time period:

- 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 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. The 2004 through 2013 goals should achieve 90 percent of the remaining cost-effective potential that is reachable through aggressive program activity.

Figure 9
IOU Projected Savings Compared to Goals 2004-2008



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 a result. Table 1 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 1
Funding for 2006-2008 Programs ($000)

	2006	% Diff from Previous Year	2007	% Diff from Previous Year	2008	% Diff from Previous Year
PG&E	$240,000	83%	$281,000	17%	$345,000	23%
SCE	$243,000	43%	$243,000	0%	$243,000	0%
SDG&E	$81,000	107%	$91,000	12%	$106,000	16%
SCG	$48,000	47%	$61,000	27%	$73,000	20%

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 $243 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 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

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

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

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