

# CALIFORNIA'S RESIDENTIAL ELECTRICITY CONSUMPTION, PRICES, AND BILLS, 1980-2005

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**STAFF PAPER**

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# ABSTRACT

This white paper compares average residential electricity consumption, prices, and bills over a 25-year period (1980-2005) for customers of five California utilities: Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), Los Angeles Department of Water and Power, (LADWP), and Sacramento Municipal Utility District (SMUD). Historical trends reveal some common patterns among these utilities as well as unique events in each utility's past.

A significant change in the rate structure occurred during this period. Before 2003, the difference between Tier 1 (baseline) and Tier 2 (above baseline rates) was about 2 cents per kWh. Assembly Bill 1X ([Keeley] Chapter 4, Statutes of 2001) established a five-tier rate structure and froze Tier 1 and 2 rates. The difference between baseline and Tier 5 is now up to 25 cents per kWh. Thus, for the period after 2003, average rates and bills need to be calculated using total revenue, consumption, and customers rather than multiplying average consumption by an average rate.

California Energy Commission staff used annual residential electricity revenue and annual average number of customers in calculating the average annual electricity bills throughout the period. Annual residential energy consumption was also used in calculating average annual energy use per customer. Annual values were then converted to monthly units. Staff converted historical, average prices, and average bills to real 2005 dollars to remove the effects of inflation. Although in nominal terms, most electricity prices and bills have increased over the years; an important finding of this analysis reveals that average electricity bills for some utilities are lower today than they were more than 20 years ago, if inflation is taken into account.

**KEYWORDS:** residential; electricity bills; electricity consumption; electricity rates; electricity prices.

# INTRODUCTION

Electricity Analysis Office and Demand Analysis Office staff of the California Energy Commission (Energy Commission) estimated and compared historical consumption, prices and electricity bills of residential customers of Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), Los Angeles Department of Water and Power, (LADWP), and Sacramento Municipal Utility District (SMUD). Staff sought to determine how historical consumption, prices, and bills compare to current consumption, prices, and bills. Staff collected data and analyzed it for a 25-year period (1980-2005).

Annual data for residential consumption, prices, and number of customers were collected from the five major utilities. For the most part, the data staff collected were complete and consistent. In a few instances, however, the data proved inconsistent with data provided by utilities in other forums. In these few instances, staff exercised judgment in determining a specific value.

This paper presents Energy Commission staff findings and solicits comments or corrections from the utilities and other interested parties. It invites energy professionals to share their understanding of the historical events contributing to the observed changes in average consumption, prices, and bills.

## METHOD

The primary focus is on the change in “average” residential bills over the historic period but to get a more complete understanding of residential costs, consumption per customer and prices are also presented. To present a comparative view of how average electricity bills, prices, and consumption have changed in the past 25 years, staff removed the effects of inflation by converting nominal dollars to 2005 constant dollars. Staff used the following definitions in determining average bills, consumption, and prices:

**Average Monthly Bill = Annual Residential Revenue / (Annual Average Residential Customers \* 12)**

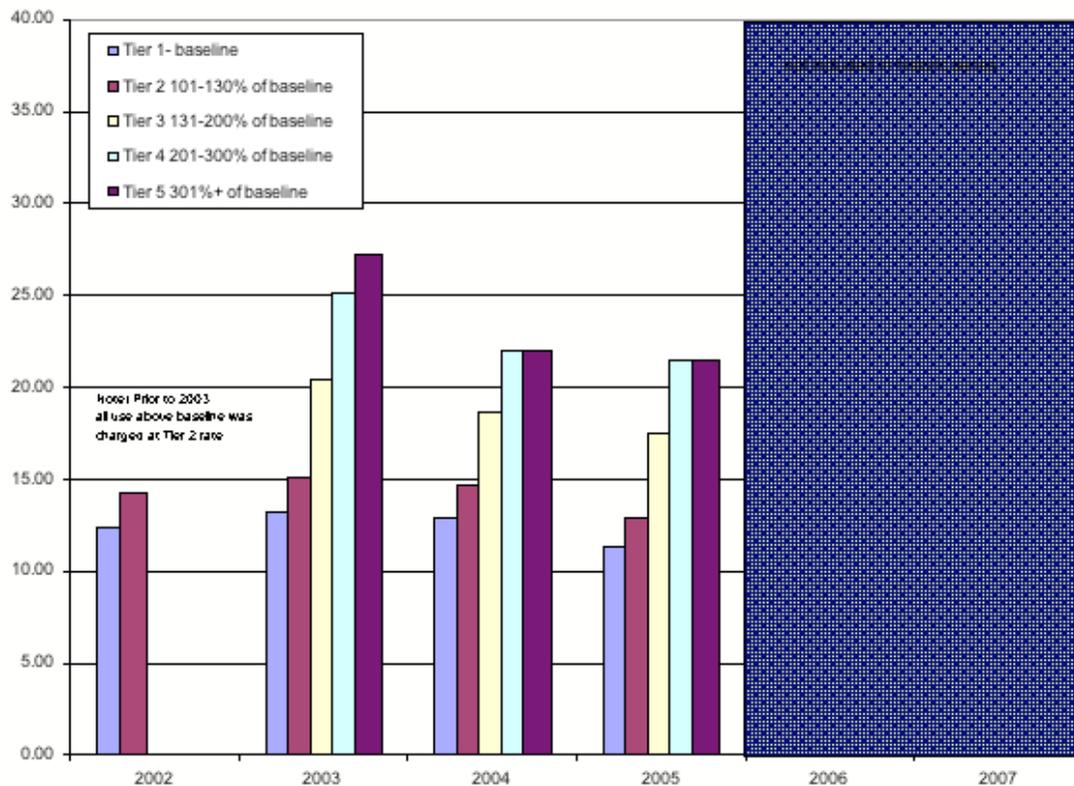
**Average Monthly Consumption = Annual Residential Consumption / (Average Residential Customers \* 12)**

**Average Price = Annual Residential Revenue / Annual Residential Consumption**

Each utility provided annual residential consumption, average number of customers, and annual revenue or average price. In some cases, staff used data previously provided to the Energy Commission during the preparation of the 2005 *Integrated Energy Policy Report* (2005

IEPR) and submissions of data under the *Quarterly Fuel and Energy Report (QFER)* to provide a complete data set (for example, SMUD provided annual average price estimates, while average residential consumption was obtained from QFER filings). Average price includes generation, transmission, distribution, and other charges but does not include state or local taxes or franchise fees. None of the weather data have been “weather-normalized.”

Before 2003, the difference between baseline allowance (in summer defined as 60 percent of average residential use in a geographic region) and Tier 2 (above baseline rates) was about 2 cents per kWh. After the passage of AB 1X ([Keeley] Chapter 4, Statutes of 2001, which established a five tier-rate structure and froze Tier 1 and 2 rates), rates for tiers 3 – 5 are much higher (up to 25 cents per kWh) than the first two tiers. Thus, for the period after 2002, average rates and bills need to be calculated using total revenue, consumption and customers rather than multiplying average consumption by an average rate. Figure 1 provides an example of the differences in real residential rates by Tier before and after the implementation AB 1X for the PG&E service territory. Since only a small percentage of customers are affected by Tier 4 and 5 rates and the rate differential is not as large before 2006 as it currently is, the differences in calculation methods to determine average price do not greatly affect the historic prices in this report but would in years after 2005.



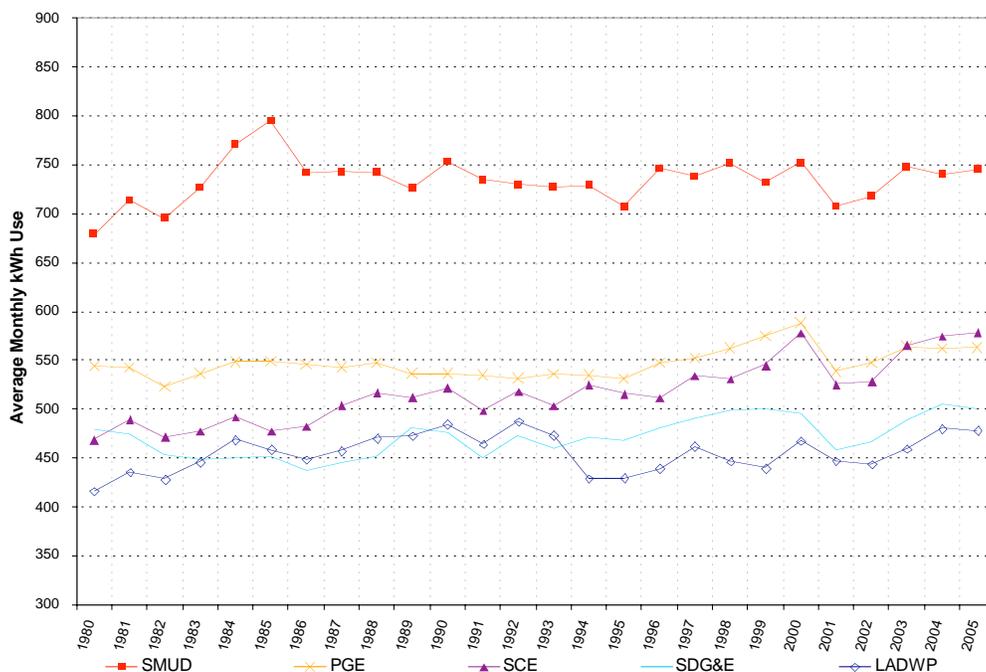
**Figure 1 – PG&E Rates by Tier (2005 cents/kWh)**

Source: PG&E tariff sheets and advice letters to the Public Utilities Commission

## Residential Electricity Consumption

Energy Commission staff found that average residential consumption among utilities ranges between 400 and 800 kWh per month, with minor fluctuations in residential consumption over the 25 year period. All residential customers, however, remained above or below 20 percent of their 1980 consumption level. In 2001, during the peak of the energy crisis, customers of all five utilities experienced significant drops in average consumption. This level of consumption remained low through 2002. By 2003, however, the level of consumption returned back to pre-energy crisis levels.

A significant portion of annual residential consumption differences over time within a utility is temperature dependent. Coastal customers, with relatively mild climates, consume less than inland customers, who face hotter summers and cooler winters. Large utilities such as PG&E and SCE have customers in several climate zones, while smaller utilities, like SMUD, SDG&E, and LADWP, have less diverse climate variation. For this reason, when consumption across all residential customers of a utility is averaged, as shown in Figure 2, SMUD customers have high average consumption because of higher heating and cooling loads, while utilities with relatively mild climates (LADWP and SDG&E) have lower average consumption. SMUD also has a significant number of all-electric homes. PG&E and SCE cover large diverse climate regions, thus their average use falls between the climatic extremes of the smaller utility regions. A PG&E customer, however, might consume the same amount of electricity when located in the same climate zone as a SMUD customer.



**Figure 2- Average Monthly Consumption per Residential Customer**

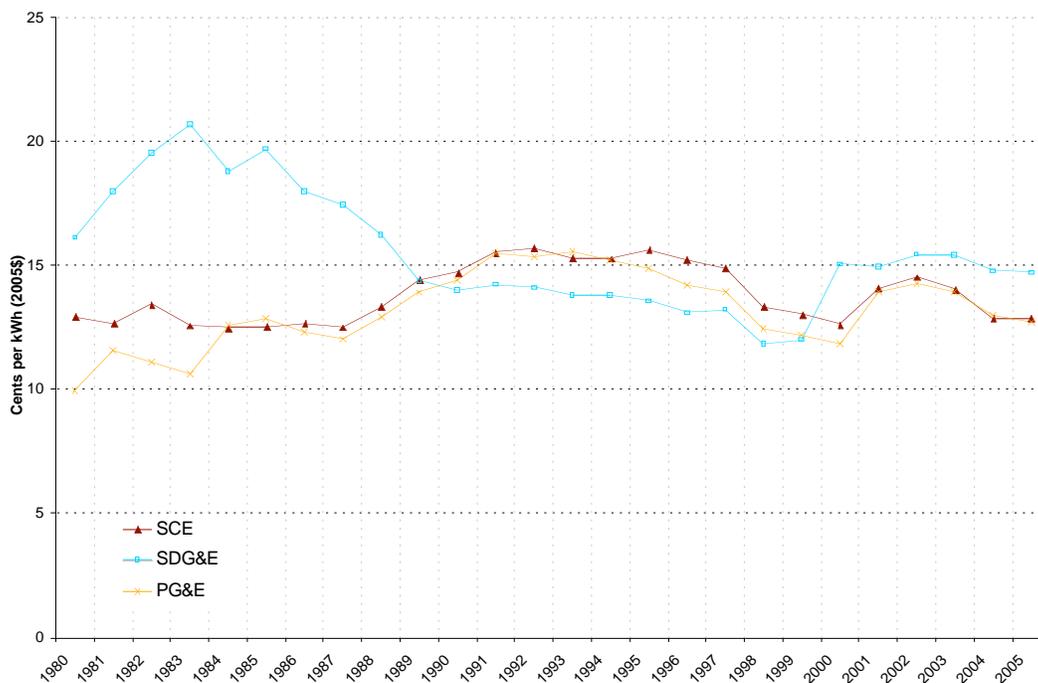
Source: Energy Commission utility submissions

## Residential Electricity Prices

Average residential electricity prices in constant 2005 dollars for the three IOUs are shown in Figure 3, while prices for the two municipal utilities are presented in Figure 4. For the IOUs, the prices follow similar patterns after 1990. Prices for PG&E and SCE in 2005 are slightly lower, in real terms, than they were in the early to mid-1990s. Current prices in SDG&E are only slightly higher than those of the early 1990s and lower than the prices of the 1980s. SMUD prices increased over the 1980-1990 period and have been relatively constant since then. Real prices for LADWP are relatively constant over the entire period.

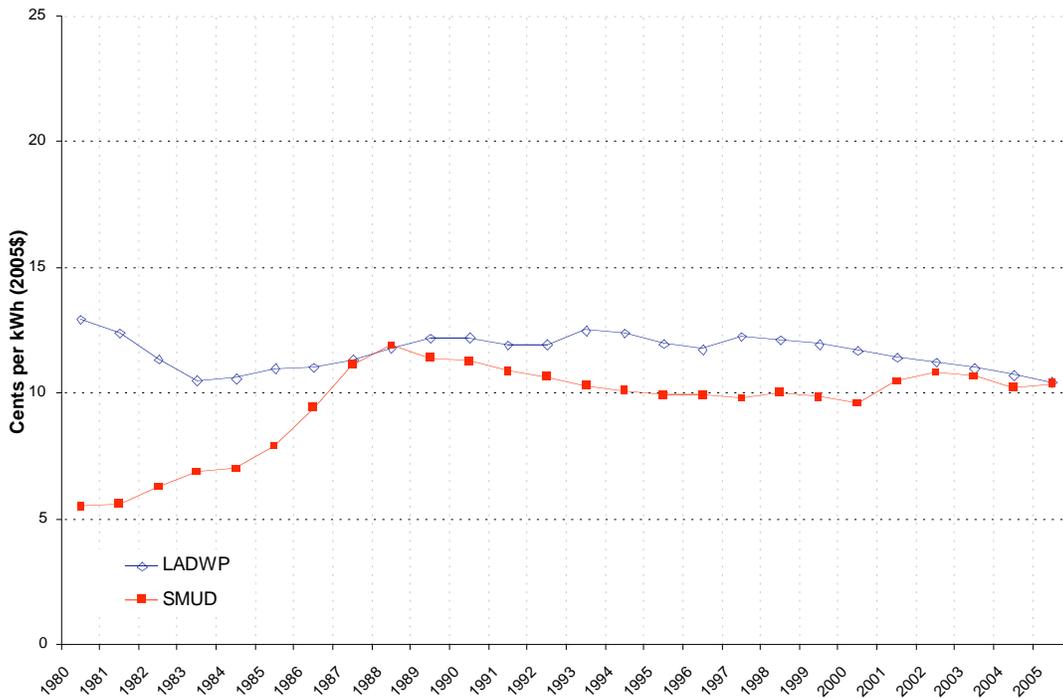
It is worth noticing that residential rates were frozen in 1998 as a result of AB 1890 until the stranded assets of the IOUs were paid off. Completion of the stranded asset payments caused rate increases for customers of SDG&E for a few months during the second half of 2000 as rising market prices were passed through to customers. It also resulted in increases in PG&E and SCE planning areas in 2001. The rising prices led to AB 1X which froze Tier 1 and 2 rates and has stabilized average rates somewhat since 2002.

During the period 2000 to 2005, which is associated with the “energy crisis,” overall average electricity prices for IOU customers increased dramatically, while prices for customers of the two municipal utilities included in this study remained stable, as shown in Figure 4, because the municipal utilities were not subject to the same regulatory environment. Real prices for the IOUs, however, remain at or below prices seen 20 years ago. Since 1990, municipal utility electricity prices have remained relatively stable.



**Figure 3 – Average IOU Residential Electricity Prices (\$2005)**

Source: Energy Commission utility submissions



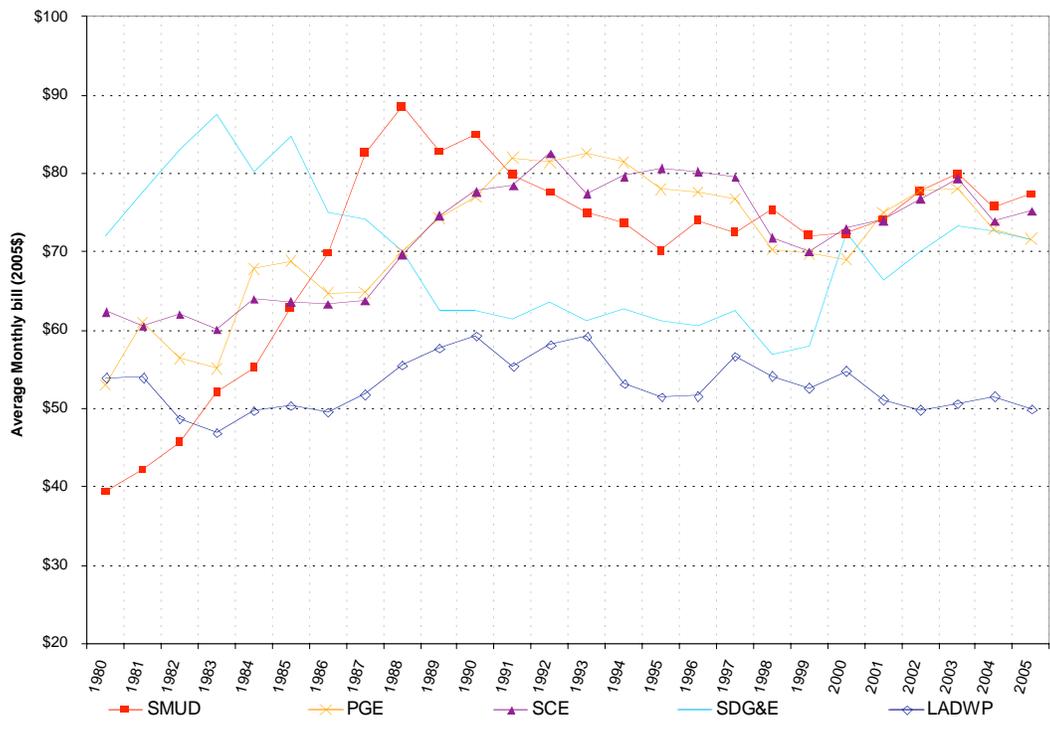
**Figure 4 – Average Municipal Electricity Prices (\$2005)**

Source: Energy Commission utility submissions

## Residential Electricity Bills

Figure 5 presents a comparison of average monthly bills for the five utilities. Up to 1983, SMUD’s residential bills were the lowest of the utilities represented in this study. Since 1983, however, LADWP’s customers have paid lower residential electricity bills than similar IOU and municipal utility customers, because of consistent rates and low use per customer.

At one point or another between 1983 and 2005, each of the remaining four utilities has surpassed the other utilities and had the highest residential bills for at least a few years. SMUD’s gradual increase in electricity prices from 1980 to 1988 affected residential bills more dramatically than bills of the other utilities. SMUD customers’ high level of consumption, when paired with increasing prices, experienced bills more comparable to those of the other IOUs. Through the 1990s, however, SMUD bills declined significantly. SDG&E’s residential electricity bills, on the other hand, have actually declined since 1980 before turning upward in 2000. It is worth noting, however, that after 2000 there is a convergence of electricity bills for PG&E, SCE, SDG&E, and SMUD, in the mid \$70-per-month range, while for LADWP the electricity bills have remained relatively stable at approximately \$50 per month.



**Figure 5 – Average Residential Monthly Bills (\$2005)**

Source: Energy Commission utility submissions

## CONCLUSION

Although in nominal terms, most electricity prices and bills have increased over the years; an important finding of this analysis is that, in constant 2005 dollars, average electricity bills for some utilities are lower today than they were more than 20 years ago. The advent of a five-tier rate structure in 2003 makes understanding the relationships between prices, consumption, and bills more complex.