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ENERGY
COMMISSION

**STAFF FORECAST:
AVERAGE RETAIL ELECTRICITY PRICES
2005 TO 2018**

DRAFT STAFF REPORT

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PREFACE

This draft staff report provides preliminary retail electricity price forecasts for California's 16 largest electric utilities. The forecast period is 2007 to 2018; staff also provided two years of historical prices, 2005 and 2006, for context. Retail price projections are presented for the residential, commercial, industrial, and agricultural customers of each electric utility.

The staff now welcomes public review and comment on these preliminary price forecasts from the utilities, ratepayer-advocate and public-interest organizations, and all other electricity market participants. On July 2, 2007, the staff will present these preliminary price forecasts to the California Energy Commission's Integrated Energy Policy Report Committee at its IEPR Committee Workshop on Staff's Preliminary Retail Electric Price Forecast. Written comments are encouraged. Please send them to the Energy Commission's Docket Unit bearing the following docket number: Docket No. 06-IEP-1H.

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ABSTRACT

The California Energy Commission staff updated its biennial, 10-year forecast of average retail prices for California's 16 largest electric utilities. Statewide, average retail prices are projected to increase at an annual growth rate of 1.8 percent in nominal terms, but to decrease by 0.3 percent in (inflation-adjusted) real terms between 2005 and 2016. The utilities forecasted to have prices higher than California's system-average price in 2018 are the City of Glendale, San Diego Gas & Electric, City of Burbank, Southern California Edison, Pacific Gas and Electric, and Imperial Irrigation District. California publicly owned utilities forecasted to have the lowest system-average price in 2018 include Silicon Valley Power, Roseville, Sacramento Municipal Utility District, Turlock Irrigation District, and Anaheim. Retail prices are also forecasted for individual customer classes within each utility, including residential, commercial, and industrial customers.

Keywords: forecast, retail electricity prices, electric utilities, California

Executive Summary

This draft staff report compiles preliminary forecasts of retail electricity prices for the years 2007 through 2018. It also provides two years of historical prices, 2005 and 2006, for context. The price forecasts are expressed in average dollars per kilowatt-hour (kWh). The price forecasts are not utility *rate* forecasts.

State law, Senate Bill 1389 (Bowen), Chapter 568, Statutes of 2002, requires the California Energy Commission to assess the outlook for retail prices for electricity under current and expected market conditions. The Energy Commission uses these forecasts as an explanatory variable in its electricity demand forecast and as a metric for calculating the cost-effectiveness of proposed changes to the California Title 24 Buildings and Appliance Energy Efficiency Standards.

Energy Commission staff forecasted systemwide average retail prices for each the following electric utilities as well as for their residential, commercial, and industrial customers:

- **Investor-Owned Utilities**
 - Pacific Gas and Electric
 - Southern California Edison
 - San Diego Gas and Electric

- **Publicly Owned Utilities**
 - Sacramento Municipal Utility District
 - Los Angeles Department of Water and Power
 - Imperial Irrigation District
 - Modesto Irrigation District
 - Turlock Irrigation District
 - City of Anaheim
 - City of Burbank
 - City of Glendale
 - City of Pasadena
 - City of Redding
 - City of Riverside
 - City of Roseville
 - City of Santa Clara (doing business as Silicon Valley Power, SVP)

Each electric utility whose peak load in 2005 was 200 megawatts or greater was required to submit a forecast of its financial variables and its electricity sales, according to forms and instructions adopted by the Energy Commission.

From the submitted data, staff calculated future prices by dividing an estimate of annual revenue from each customer class by an estimate of annual electricity sales to that class. Staff calculated system-average prices by dividing each utility's total annual revenue projection by its total annual electricity sales projection for that year. Because the data the IOUs provided was fairly complete, staff's role in preparing the IOU forecasts was limited to checking data for reasonableness and making a simple calculation. If POU-submitted data was incomplete, the staff and technical assistance consultants completed POU forecasts by collecting additional data (for example, capital improvement budgets) for the missing years to determine total annual

revenue requirements for each year. When appropriate, POUs' annual reported revenue was increased to ensure that the POUs' net revenue requirements would be met.

Statewide, average retail prices are projected to increase at an annual growth rate of 1.8 percent in nominal terms, but to decrease by 0.3 percent in inflation-adjusted real dollars between 2005 and 2016. (The statewide price forecast does not extend to 2018, because PG&E did not provide data for 2017 and 2018.) By 2016, the California system-wide average retail electricity price is expected to be approximately 14.7 cents per kWh in nominal terms, or 11.6 cents in real terms. The system average price was 12 cents per kWh in 2005.

California's three largest investor-owned utilities are expected to have system-average retail prices in the range of 15 to 18 cents per kWh (in nominal terms) in 2018. California's 13 publicly owned utilities will likely have a wider range of system-average prices in 2018, between 9.4 cents and 18.6 cents per kWh in nominal terms.

California's statewide-average retail prices for electricity were higher in 2005 than those in any other western state. Factors contributing to California's relatively high retail electricity prices include its use of natural gas as a primary fuel source for electricity generation and its higher costs of serving large metropolitan areas.

The Energy Commission staff estimates for system-average retail electricity prices for investor-owned and publicly owned utilities as follows:

- Los Angeles Department of Water and Power's system average retail electricity prices will increase from \$0.092 to \$0.131 per kWh between 2005 and 2018. This 42.4 percent increase in nominal terms translates into a 7.6 percent increase in real terms. The annual growth rate is 2.8 percent, nominally. In real terms, staff expects system-average retail prices to increase less than 1 percent (0.6 percent) annually.
- In 2005, SMUD's system average retail price was \$0.098 per kWh. The Energy Commission staff is forecasting that this average price will increase by 22.8 percent in 2018, to \$0.123 per kWh in nominal terms.
- Anaheim's system-average retail electricity price may increase from \$0.095 to \$0.128 per kWh between 2005 and 2018, in nominal dollars. This 34.7 percent increase in nominal terms translates into a 2.1 percent increase in real terms.
- Burbank's system-average retail electricity price may increase from \$0.125 to \$0.162 per kWh between 2005 and 2018 in nominal dollars. The annual growth rate is 2 percent, nominally.
- Glendale's system-average retail electricity price may increase from \$0.126 to \$0.186 per kWh between 2005 and 2018 in nominal dollars. This price is higher than the statewide average price.
- Pasadena's system-average retail electricity price may increase from \$0.107 to \$0.145 per kWh between 2005 and 2018 in nominal dollars. This 35.5 percent increase in nominal terms translates into a 1.9 percent increase in real terms.
- Redding's system-average retail electricity price may increase from \$0.093 to \$0.139 per kWh between 2005 and 2018. This 49.5 percent increase in nominal terms translates into an 11.8 percent increase in real terms.

- Riverside's system-average retail electricity price may increase from \$0.105 to \$0.137 per kWh between 2005 and 2018 in nominal terms. This 30.5 percent increase in nominal terms translates into a 1.0 percent decrease in real terms.
- Roseville's system-average retail electricity price may increase from \$0.082 to \$0.100 per kWh between 2005 and 2018. This 22.0 percent increase in nominal terms translates into an 8.5 percent decrease in real terms.
- Silicon Valley Power's system-average retail electricity price may increase from \$0.077 to \$0.094 per kWh between 2005 and 2018, far below the statewide average price.
- Imperial Irrigation District's system-average retail electricity price may increase from \$0.103 to \$0.148 per kWh between 2005 and 2018 in nominal dollars. This 43.7 percent increase in nominal terms translates into an 8.7 percent increase in real terms.
- Modesto Irrigation District's system-average retail electricity price may increase from \$0.090 to \$0.136 per kWh between 2005 and 2018. This 51.1 percent increase in nominal terms translates into a 14.4 percent increase in real terms.
- Turlock Irrigation District's system-average retail electricity price may increase from \$0.085 to \$0.124 per kWh between 2005 and 2018. The annual growth rate is 2.9 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.8 percent) annually.

In the recent past, natural gas prices have been the most volatile contributor to higher retail electric prices in California. An increase in natural gas prices, however, will not cause an equivalent increase in retail electric prices, because natural gas is just one cost component of retail prices. During the forecast period, staff expects natural gas prices to remain an important component of retail electric prices, although hedging can be an effective means of shielding the utility from an increase in natural gas prices. Hedging, however, does not protect a utility against a sustained multi-year increase in natural gas prices, such as that experienced from 1997 to 2006.

CHAPTER 1: INTRODUCTION

This report compiles preliminary forecasts of retail electricity prices for the years 2007 through 2018. These forecasts are based on financial and sales projections requested from California's 16 largest electric utilities. The report presents forecasts of average retail prices for five classes of electric utility customers: residential, commercial, industrial, agricultural, and other. The staff of the California Energy Commission (Energy Commission) Electricity Analysis Office will discuss these preliminary forecasts at the July 2, 2007 workshop of the Integrated Energy Policy Report Committee. After the workshop, the staff may revise this report by incorporating suggested changes received from the utilities, ratepayer groups, the public, and other market participants.

This chapter provides background information about the purpose and scope of the retail price forecasts and the methodology employed to prepare them. It also provides a summary of the key findings regarding these forecasts.

The state law mandating the *Integrated Energy Policy Report (IEPR)*, Senate Bill 1389 (Bowen), Chapter 568, Statutes of 2002, requires the Energy Commission to conduct an "assessment of...the outlook for...retail prices...for electricity...under current market structures and expected market conditions."¹

To perform this forecast, the Energy Commission is authorized to "require submission of demand forecasts, resource plans, market assessments, and related outlooks from electric...utilities...and other market participants."² Furthermore, the Energy Commission's regulations require "each electric...utility to submit, according to forms and instructions adopted by the Commission, a forecast of energy prices which corresponds to the utility's demand forecast and resource plan. Each electric utility shall also submit a *forecast of utility financial variables* consistent with the forecast and plan" (emphasis added).³

The Energy Commission determined which utilities would have to submit their retail electricity price forecasts by identifying those with a peak electrical demand in 2005 of 200 megawatts or greater. The participating utilities were:

- **Investor-Owned Utilities**
 - Pacific Gas and Electric (PG&E)
 - Southern California Edison (SCE)
 - San Diego Gas and Electric (SDG&E)

- **Publicly Owned Utilities (POUs)**
 - Sacramento Municipal Utility District (SMUD)

1 Public Resources Code Section 25303 (a)(1).

2 Public Resources Code Section 25301 (a).

3 California Code of Regulations, Title 20. Public Utilities and Energy, Division 2. State Energy Resources Conservation and Development Commission, Chapter 3. Data Collection, Article 2. Forecast and Assessment of Energy Loads and Resources, Section 1348. Pricing and Financial Information, *Energy Commission's Regulations*, Publication No. CEC-140-2006-001, <http://www.energy.ca.gov/2006publications/CEC-140-2006-001/CEC-140-2006-001.PDF>.

- Los Angeles Department of Water and Power (LADWP)
- Imperial Irrigation District (IID)
- Modesto Irrigation District (MID)
- Turlock Irrigation District (TID)
- City of Anaheim
- City of Burbank
- City of Glendale
- City of Pasadena
- City of Redding
- City of Riverside
- City of Roseville
- City of Santa Clara (doing business as Silicon Valley Power, SVP)

The State of California uses retail electricity price forecasts in the following ways:

- As an explanatory variable in the Energy Commission’s electricity demand forecast.

The demand-forecasting model assumes that consumers will reduce their electricity use when retail electricity prices increase and vice versa. Since the demand forecast is used in part to authorize investor-owned utilities (IOUs) to procure new power supplies, future retail electricity rates are an important consideration when planning for California’s electricity system.

- As a metric for calculating the cost-effectiveness of proposed changes to the California Title 24 Buildings and Appliance Energy Efficiency Standards.

The staff welcomes feedback from the public and market participants about how it has used or intends to use these retail electricity price forecasts.

Table 1, below, shows the 2005 statistics for the California electric utilities whose peak load exceeded 200 MW. The utilities are listed in order by number of customers. The state’s five largest utilities – three IOUs and 2 POUs – serve 92 percent of California’s electricity customers and represent the largest concentration of revenue collections and electricity sales. Although PG&E has the largest number of customers, SCE has the larger revenues, sales, and peak load.

Table 1: California Electric Utility Statistics, 2005

Electric Utility	Class of Ownership	Number of Consumers	Revenue (thousand dollars)	Sales (megawatthours)	Peak Load (megawatts)
Pacific Gas & Electric Co	Investor Owned	4,999,483	9,224,541	72,727,705	18,748
Southern California Edison Co	Investor Owned	4,674,231	9,445,101	75,301,581	21,772
City of Los Angeles	Public	1,438,226	2,257,469	23,400,472	5,667
San Diego Gas & Electric Co	Investor Owned	1,321,623	2,188,227	16,001,482	4,474
Sacramento Municipal Util Dist	Public	572,958	1,027,440	10,483,042	2,959
Imperial Irrigation District	Public	128,101	321,231	3,108,748	898
City of Anaheim	Public	110,773	236,948	2,553,464	554
Modesto Irrigation District	Public	107,056	224,527	2,582,599	629
City of Riverside	Public	102,454	211,226	1,989,207	551
Turlock Irrigation District	Public	93,917	154,062	1,808,573	473
City of Glendale	Public	83,367	136,345	1,104,909	307
City of Pasadena	Public	60,417	124,610	1,175,585	280
City of Burbank	Public	50,633	136,304	1,093,700	286
City of Santa Clara (SVP)	Public	50,092	191,307	2,496,836	415
City of Roseville	Public	48,795	97,054	1,159,937	282
City of Redding	Public	42,011	72,552	769,947	244

Source: U.S. Energy Information Administration (EIA) and California Energy Commission

The forecasts of retail electricity prices are expressed in average dollars per kilowatt-hour (kWh) for each class of retail customer. They were calculated by dividing an estimate of annual revenue from each customer class by an estimate of annual electricity sales to that class. System-average prices were calculated by dividing each utility's total annual revenue projection by its total annual electricity sales projection for that year. The staff used the deflator series to convert the forecasted prices from nominal to real dollars (\$2005). This deflator series reflects an assumption that inflation will increase by 2.2 percent annually between 2005 and 2018.

In addition to this introduction, the draft report is organized into five chapters:

- Statewide Results
- Investor-Owned Utility Results
- Publicly Owned Utilities
- Electricity Price Sensitivity to Natural Gas Prices

Appendix A provides the deflator series that staff used to convert nominal dollars to real dollars (\$2005). Appendix B provides a table for each utility's retail price forecasts. Appendix C provides graphs of the system-average and customer-class forecasts for publicly owned utilities other than LADWP and SMUD.

Background

These retail price forecasts indicate by how much retail electricity prices are likely to change over the next 10 years, but they should not be used for calculating the economic payback of site-specific energy-efficiency and distributed generation projects (for example, lighting or heating,

ventilation, and air conditioning [HVAC] equipment replacements). Analysts should use the utility's current rate schedule to analyze the cost-effectiveness of specific projects.

These forecasts are not utility *rate* forecasts, because there are too many rate schedules and many of these rate schedules are complex. For example:

- Each utility has multiple rate schedules for each customer class. For example, one residential customer may be on a utility's standard rate schedule for residential customers, while another family may be on a residential time-of-use rate schedule.
- Each rate schedule has multiple charges, some of which are based on how much electricity was used during the billing period (the "energy charge") and some of which are based on other factors. For example, SCE's monthly "basic charge" for residential customers is determined by the number of days in the billing period. Medium- and large-sized business customers pay a "demand charge" (in dollars per kilowatt) for the maximum amount of electricity used during any 15-minute period of the billing cycle.
- The "energy charge" within a rate schedule varies by season (summer and winter) and may also vary by time of day. Furthermore, IOUs' and some POU's residential rate schedules are designed to charge higher rates for each tier of electricity consumption above baseline quantities.

While the Energy Commission does not forecast individual tariffs, it does review electric utility tariffs for consistency with the *Energy Action Plan* goals and other objectives expressed in prior *IEPRs*.

Methodology

The staff developed two sets of forms and instructions for collecting the financial and sales data needed to calculate average retail prices: one set for IOUs and one for publicly owned utilities (POUs).^{4,5} The staff learned that the POU's Form 1.a should have also requested information on each utility's other sources of income (for example, sales of surplus power and natural gas, transmission revenue, and interest income) to obtain *net* total annual revenue requirements. The *net* revenue requirements are those that the utility must recover from its customers through rates.

⁴ *Forms and Instructions for Investor-Owned Utilities & Energy Service Providers Submitting Retail Electricity Price Data*, Commission Report, February 2007, CEC-200-2006,003-CMF, <http://www.energy.ca.gov/2006publications/CEC-200-2006-003/CEC-200-2006-003-CMF.PDF>, http://www.energy.ca.gov/2006publications/CEC-200-2006-003/CEC-200-2006-003-CMF_IOU.xls, and http://www.energy.ca.gov/2006publications/CEC-200-2006-003/CEC-200-2006-003-CMF_ESP.xls

⁵ *Forms and Instructions for Publicly-Owned Utilities Submitting Retail Electricity Price Data*, Commission Report, March 2007, CEC-200-2007-002-CMF, <http://www.energy.ca.gov/2007publications/CEC-200-2007-002/CEC-200-2007-002-CMF.PDF> and http://www.energy.ca.gov/2007publications/CEC-200-2007-002/CEC-200-2007-002-CMF_POU_Forms.xls.

The staff intends to solicit additional feedback from the POU's and modify these forms further before issuing them again during the 2009 forecasting cycle.

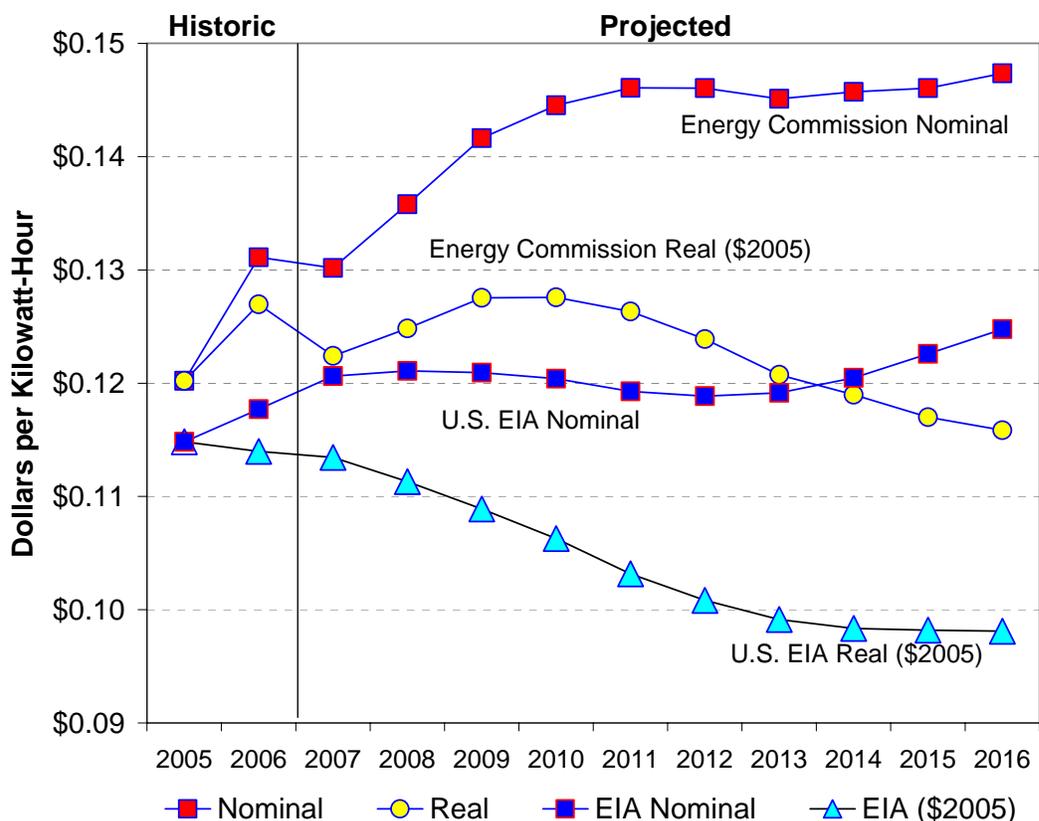
The data provided by the IOU's was fairly complete, so the staff's role in preparing the IOU forecasts was limited to check data for reasonableness.

The data provided by many POU's, however, was incomplete. For example, POU's did not project costs for all years of the 11-year forecast period. In such cases, the staff and technical assistance consultants completed these POU's' forecasts by collecting from them additional data for the years not completed (for example, capital improvement budgets and debt service schedules) to determine total annual revenue requirements for each year. When appropriate, POU's' annual reported revenue was increased to ensure that the POU's' net revenue requirements would be met. Many of these revised forecasts were sent back so that POU staff could conduct its own reasonableness review. For this reason, the POU forecasts are more independent than the IOU forecasts, because the staff did not change any of the IOU-submitted data.

CHAPTER 2: STATEWIDE RESULTS

Statewide results, as shown in Figure 1, are weighted-average prices calculated from the retail electricity price forecasts of three IOUs and 13 POUs. In 2005, for example, total revenues from electricity sales by these utilities were approximately \$26 billion, and total electricity sales were approximately 216 billion kilowatt-hours, for an average price of 12 cents per kWh.

Figure 1: California System-Average Retail Electricity Prices, 2005 to 2016



Sources: California Energy Commission and U.S. Energy Information Administration

California's statewide-average retail prices for electricity⁶ were higher in 2005 than those in any other western state, as shown in Table 2. California's prices were more than 20 percent higher than Nevada's prices for all classes of electricity consumer. Arizona's prices were between 40 and 60 percent lower than California's prices, depending on the customer class. Oregon's prices for industrial customers were nearly half those paid on average by California's industrial sector. California's residential prices were twice as much as prices in Idaho, the western state with the lowest retail electricity prices in all sectors.

⁶ The system-average price of 11.63 cents per kWh for California in Table 2 from the U.S. Energy Information Administration (EIA) differs from the 12.1 cents per kWh calculated for California by the Energy Commission staff and shown in Figure 1. The probable reason is that EIA uses different weights in its calculation.

Table 2: Retail Price Comparisons: California and Other Western States

Average Retail Prices in 2005 (cents per kilowatt-hour)				
	Residential	Commercial	Industrial	All Sectors
Arizona	8.86	7.40	5.85	7.79
California	12.51	11.92	9.55	11.63
Colorado	9.06	7.62	5.74	7.64
Idaho	6.29	5.42	3.91	5.12
Montana	8.10	7.43	4.83	6.72
Nevada	10.20	9.48	7.71	9.02
New Mexico	9.13	7.81	5.61	7.51
Oregon	7.25	6.51	4.83	6.34
Utah	7.52	6.07	4.24	5.92
Washington	6.54	6.33	4.27	5.87
Wyoming	7.48	6.17	3.99	5.16
US Average	9.45	8.67	5.73	8.14

Source: U.S. Energy Information Administration

Only California and Nevada use natural gas as their primary fuel source for electricity generation. The other western states use lower-cost sources, either hydroelectricity or coal.⁷ California's high average retail electricity prices are due in part to the higher costs of serving large metropolitan areas (such as higher labor costs, franchise fees, and property taxes and additional costs for undergrounding electric distribution facilities).⁸

⁷ See each state's profile at *State Electricity Profiles*, http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html.

⁸ "Big City Bias: The Problem with Simple Rate Comparisons," by Johannes P. Pfeifenberger and Mark W. Jenkins, *Public Utilities Fortnightly*, December 2002, <http://www.pur.com/pubs/4057.cfm>

CHAPTER 3: INVESTOR-OWNED UTILITY RESULTS

California's three largest IOUs serve approximately 75 percent of the state's retail electricity loads. In 2005, they collected more than \$20 billion in revenue from both bundled and unbundled (direct access) retail customers.

The IOUs' retail electricity rates are regulated by the California Public Utilities Commission (CPUC).⁹ Every year, IOUs apply to the CPUC to adjust how much revenue they are authorized to collect through multiple "revenue requirement," "cost of capital," "general rate case," "Energy Resource Recovery Account (ERRA)," and other proceedings. General rate cases are conducted in two phases: first, to establish the revenue requirements, then to allocate those revenue requirements among each customer class or between bundled and unbundled customers. The ERRA proceeding provides an annual opportunity to ensure timely recovery of an electric utility's power-purchase expenses. The cost-of-capital proceedings determine the appropriate "rate of return" percentages for the utility's rate base. Other "revenue requirement" proceedings cover single-topic cost-recovery issues, such as spending for energy efficiency programs or nuclear decommissioning. Details of CPUC ratemaking decisions are implemented by the IOUs through advice letters. Once these advice letters are approved by CPUC staff, proposed changes to individual rate tariff sheets become official. Because there can be multiple rate-related proceedings each year, tariff sheets (rate schedules) can change more than once in a year.

Costs associated with electric industry restructuring and with the energy crisis are still included in today's IOU rates, but during this forecast period many of these costs will sunset. For example, the rate reduction bonds, which were financed by residential and small commercial customers (the beneficiaries of those rate reductions) will mature in December 2007. The Fixed Transition Amount (PG&E) or Trust Transfer Account (SCE and SDG&E) line item on residential and small-commercial bills will disappear. PG&E's Energy Recovery Bonds, issued to recover costs associated with its bankruptcy, will mature in December 2012. The last of the Department of Water Resources (DWR) power-supply contracts, which were allocated to PG&E, SCE, and SDG&E, will all expire during the 2007-2018 forecast period. Costs associated with electric industry restructuring or the energy crisis will continue beyond 2018, including the following: payments to the California Independent System Operator for on-going market and transmission-related charges, Public Purpose Program charges, DWR bond charges, and the On-Going Competitive Transition Charge.

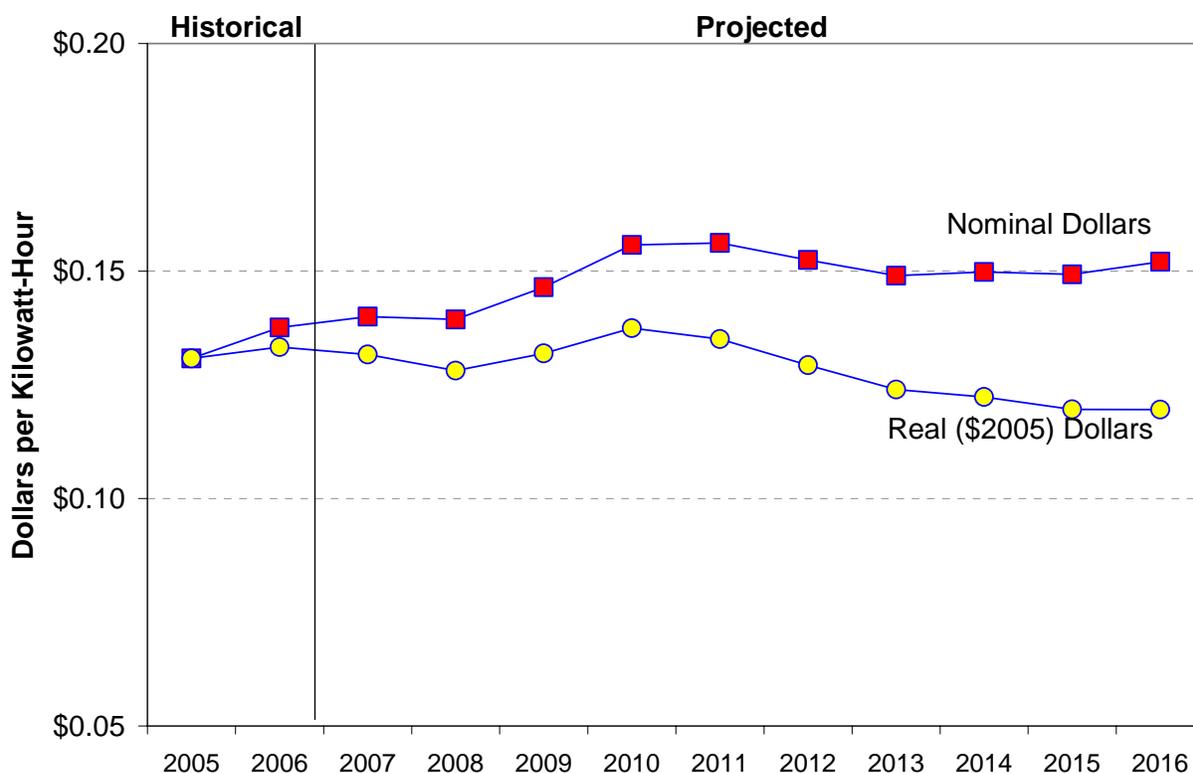
⁹ The transmission component of IOUs' retail rates are regulated by the Federal Energy Regulatory Commission. Revenue requirements to pay for DWR power supply and DWR bond charges are determined by the California DWR and passed through to IOU ratepayers, without modification, by the CPUC.

Pacific Gas and Electric

PG&E submitted four versions of its cost and sales data in response to the Energy Commission’s request for retail price-related data. In this report, the staff provides forecast results only for PG&E’s “Scenario 2: Current World, Low Preferred Resources Availability.” In this scenario, assumptions about future natural gas prices and demand growth are in the “middle” of its other three scenarios.

Portions of PG&E’s data were granted a confidential designation, including its electricity sales projections for 2008 and 2009. To prevent this data from being disclosed, the detailed retail price forecasts provided in Appendix B omit the findings for 2008 and 2009. The values were used, however, in Figure 2.¹⁰

Figure 2: PG&E’s System Average Retail Electricity Prices, 2005 to 2016



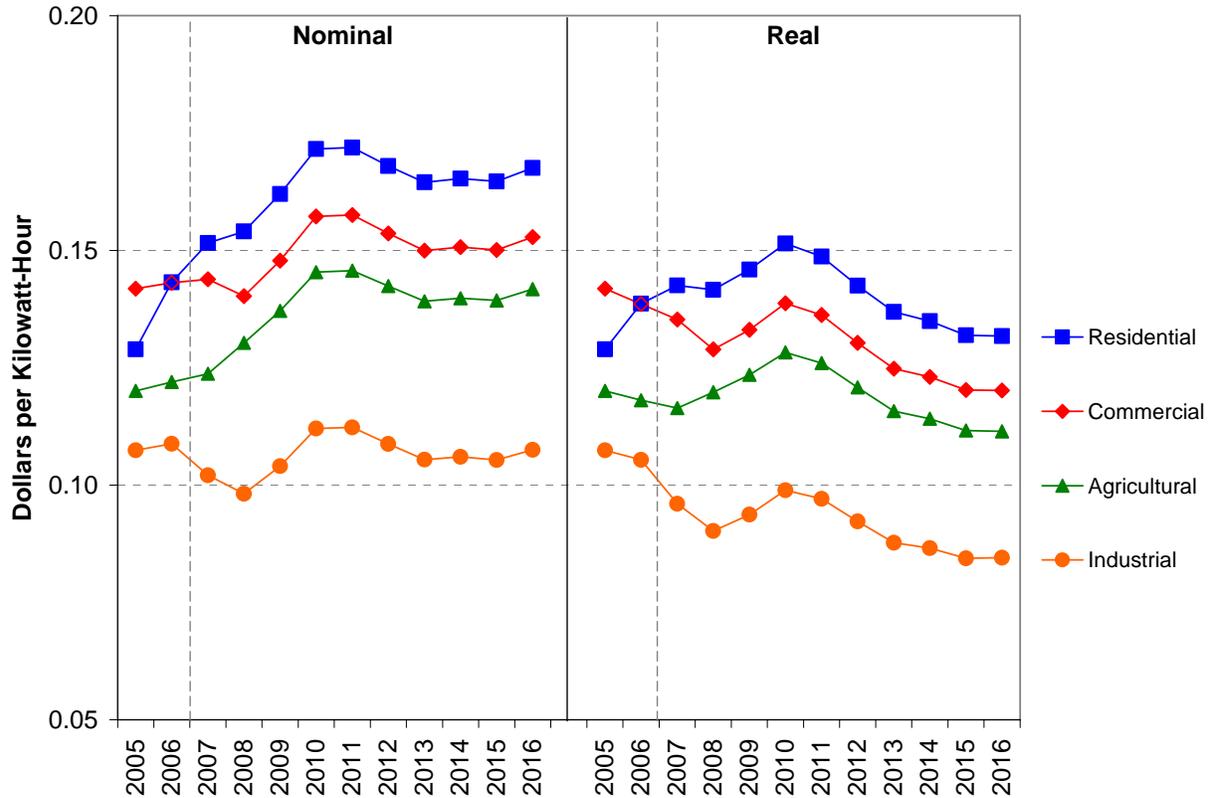
Source: California Energy Commission

PG&E’s system-average retail electricity prices were \$0.121 in 2005 and increase to \$0.148 in 2016. The change in price is a 22 percent increase, nominally. In real terms, however, the system average price will decrease to \$0.116 in 2016.

¹⁰ These prices were included in the graph per an agreement with PG&E.

Figure 3 illustrates the projected prices per kWh for PG&E’s bundled customers by customer class. Note that commercial retail prices were higher than residential prices in 2005, but they are forecasted to be lower than residential retail prices starting in 2007.

Figure 3: PG&E’s Retail Price Forecasts by Customer Class, 2005 to 2018



Source: California Energy Commission

Fixed-Asset Value and Cost Trends

As shown in Table 3, the value of PG&E’s power plants and transmission and distribution system was more than \$29 billion in 2006. PG&E’s distribution system represents more than half of this value and includes its substations, poles, wires, and meters. Since the 2001-2002 energy crisis, the value of PG&E’s infrastructure has increased 10 percent overall, despite a 2 percent drop in value for utility-owned generating facilities. The largest percentage gain in value between 2003 and 2006 was from PG&E’s transmission system, which increased in value by more than 30 percent. The value of PG&E’s distribution system increased more than 14 percent.

**Table 3: Value of PG&E's Electric Facilities in Service
2003 to 2006 (dollars)**

	2003	2004	2005	2006
PRODUCTION PLANT	9,030,898,950	9,141,493,171	9,234,382,343	8,831,393,375
Steam Plant	252,882,618	255,772,409	202,108,078	47,774,777
Nuclear Plant	6,500,497,747	6,569,346,618	6,645,758,608	6,363,872,131
Hydraulic Plant	2,259,219,361	2,297,923,839	2,367,160,310	2,409,706,381
Other Plant	18,299,224	18,450,305	19,355,347	10,040,086
TRANSMISSION PLANT	3,418,693,642	3,713,173,312	3,960,944,547	4,466,026,176
DISTRIBUTION PLANT	13,315,633,401	13,821,458,115	14,438,598,186	15,210,746,603
TOTAL ELECTRIC PLANT IN SERVICE	\$26,453,646,257	\$27,360,812,430	\$28,291,824,462	\$29,149,710,825

Source: Federal Energy Regulatory Commission (FERC)

PG&E's total operation and maintenance (O&M) expenses in 2006 were more than \$5.4 billion, as shown in Table 4, below. These expenses have increased by more than 21 percent since 2003.

**Table 4: PG&E's Total Electric Operations and Maintenance Expenses,
2003 to 2006 (dollars)**

	2003	2004	2005	2006
POWER PRODUCTION EXPENSES	2,769,187,058	3,230,273,753	2,844,720,819	3,358,279,217
Purchased Power	1,924,031,638	2,283,060,866	2,083,796,930	2,599,282,636
TRANSMISSION EXPENSES	100,771,490	110,421,880	127,725,019	170,137,295
DISTRIBUTION EXPENSES	426,735,394	434,234,166	450,099,342	470,509,516
CUSTOMER ACCOUNT EXPENSES	286,273,217	251,136,068	251,079,596	256,018,815
CUSTOMER SERVICE AND INFORMATIONAL	169,246,185	206,234,912	268,276,485	368,142,232
SALES EXPENSES	2,764,272	2,903,924	3,712,269	3,890,933
ADMINISTRATIVE & GENERAL EXPENSES	699,550,338	622,463,648	599,494,134	768,989,471
TOTAL ELECTRIC O&M EXPENSES	4,454,527,954	4,857,668,351	4,545,107,664	5,400,191,977

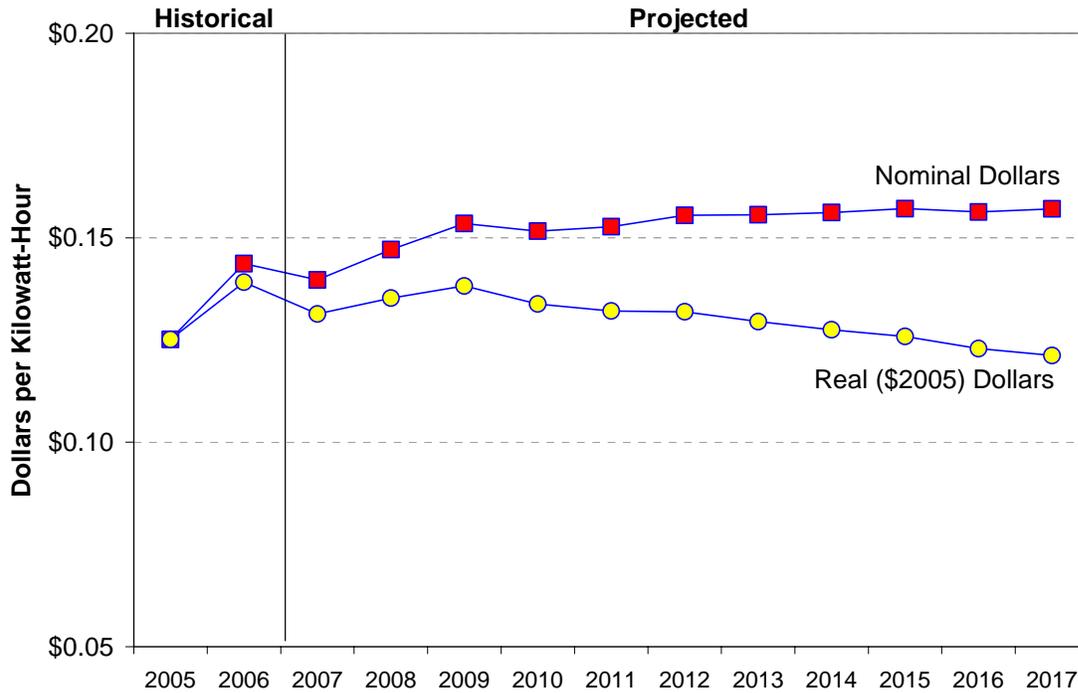
Source: Federal Energy Regulatory Commission

Purchasing and producing electricity (that is, power production expenses) is the largest share of annual expenses, approximately 62 percent in each year. Purchased power expenses, alone, comprised more than 48 percent of total annual O&M expenses in 2006. Since 2003, purchased power expenses have grown at a rate of approximately 3.5 percent per year. Annual power purchases and the prices paid for those purchases differ due to a number of factors, such as higher than expected electricity demand (as occurred during the July 2006 "heat storm"), a decline in the volume of electricity provided through expiring DWR contracts, availability of PG&E's Diablo Canyon nuclear power plant, water supply availability for hydroelectric generation, and migration of direct-access customers back to PG&E service.

Southern California Edison

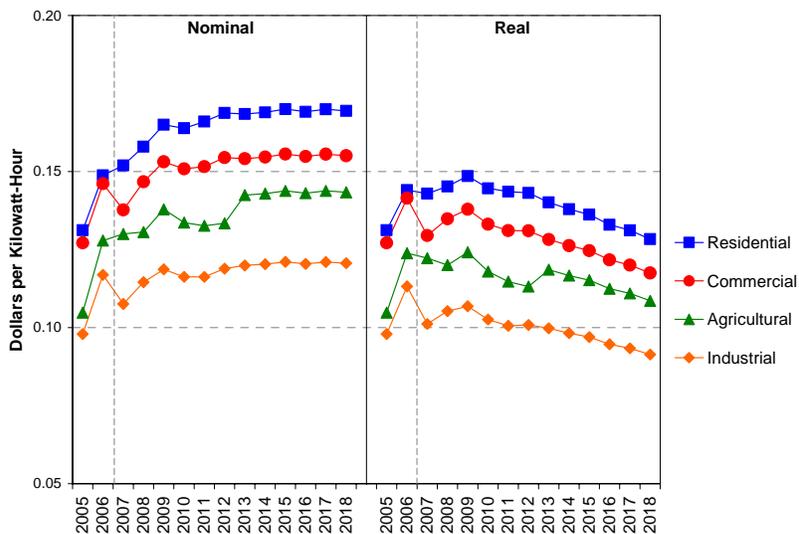
SCE's system-average retail electricity prices are projected to increase nominally by more than 25 percent between 2005 and 2018, from \$0.125 to \$0.157. In real terms, however, prices are projected to drop to \$0.119 in 2018, a 4.8 percent decrease, as illustrated in Figure 4.

Figure 4: SCE's System Average Retail Electricity Prices, 2005 to 2018



Source: California Energy Commission

Figure 5: SCE's Retail Price Forecasts by Customer Class, 2005 to 2018



Source: California Energy Commission

As shown in Figure 5, SCE is expecting the CPUC to approve a shifting in costs from commercial and industrial customers to residential customers in 2007.

Fixed-Asset Value and Cost Expenses

The value of SCE's electric system in 2006 was more than \$25 billion, as shown in Table 5. SCE's distribution system represents 45 percent of this total value. The San Onofre nuclear power plant represents approximately 79 percent of the total value in utility-owned electricity generating facilities. Additions and improvements to SCE's transmission system resulted in the steady, 7 percent annual growth rate in value for this asset between 2003 and 2006.

Table 5: Value of SCE's Electric Facilities in Service, 2003 to 2006 (dollars)

	2003	2004	2005	2006
PRODUCTION PLANT	7,250,134,519	7,398,490,692	7,484,516,775	7,586,176,640
Steam Plant	803,313,741	817,018,552	818,806,197	817,451,201
Nuclear Plant	5,720,593,787	5,837,790,490	5,901,706,326	5,971,947,715
Hydraulic Plant	705,278,111	715,865,910	733,087,577	760,877,220
Other Plant	20,948,880	27,815,740	30,916,675	35,900,504
TRANSMISSION PLANT	3,569,213,690	3,791,060,500	4,056,240,015	4,381,950,467
DISTRIBUTION PLANT	9,362,894,241	9,891,226,441	10,575,122,104	11,337,687,846
TOTAL ELECTRIC PLANT IN SERVICE	\$22,414,674,089	\$23,239,531,075	\$24,329,974,007	\$25,240,793,517

Source: Federal Energy Regulatory Commission

SCE's annual O&M expenses have been increasing since 2003 by a 12.6 percent annual growth rate. Power-related costs represented more than 70 percent of total O&M expenses in 2006, of which purchased power was the largest cost factor, as shown in Table 6, below.

Table 6: SCE's Total Electric Operations and Maintenance Expenses, 2003 to 2006 (dollars)

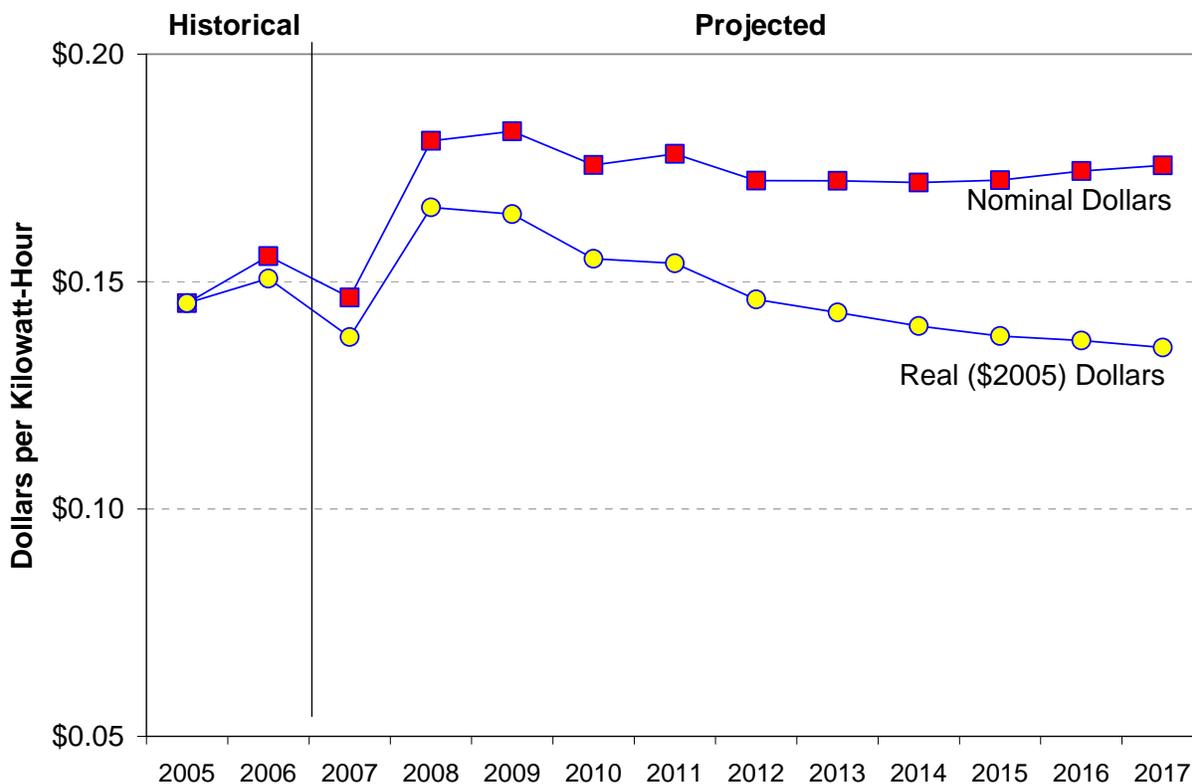
	2003	2004	2005	2006
POWER PRODUCTION EXPENSES	3,503,704,135	3,791,405,720	4,250,432,331	5,152,214,617
Purchased Power	2,783,792,568	2,998,764,007	3,513,789,723	4,486,013,930
TRANSMISSION EXPENSES	140,744,888	228,981,024	320,350,390	299,033,119
DISTRIBUTION EXPENSES	272,761,773	413,760,015	328,470,040	370,328,037
CUSTOMER ACCOUNT EXPENSES	222,508,120	197,611,277	187,950,545	186,494,953
CUSTOMER SERVICE AND INFORMATIONAL	181,446,257	205,342,794	303,741,790	324,455,741
SALES EXPENSES	4,279,872	8,712,596	9,348,352	7,839,467
ADMINISTRATIVE & GENERAL EXPENSES	722,728,384	750,109,188	819,476,855	856,667,749
TOTAL ELECTRIC O&M EXPENSES	\$5,048,173,429	\$5,595,922,614	\$6,219,770,303	\$7,203,165,409

Source: Federal Energy Regulatory Commission

San Diego Gas and Electric

SDG&E has, and is forecasted to have, the highest retail electricity rates among the three largest IOUs in the state. Based on its submitted cost and sales data, SDG&E expects its system-average retail prices to increase from \$0.145 to \$0.178 per kWh between 2005 and 2018, as shown in Figure 5. In real terms, however, system average prices decrease approximately seven percent between 2005 and 2018, to \$0.135 per kWh.

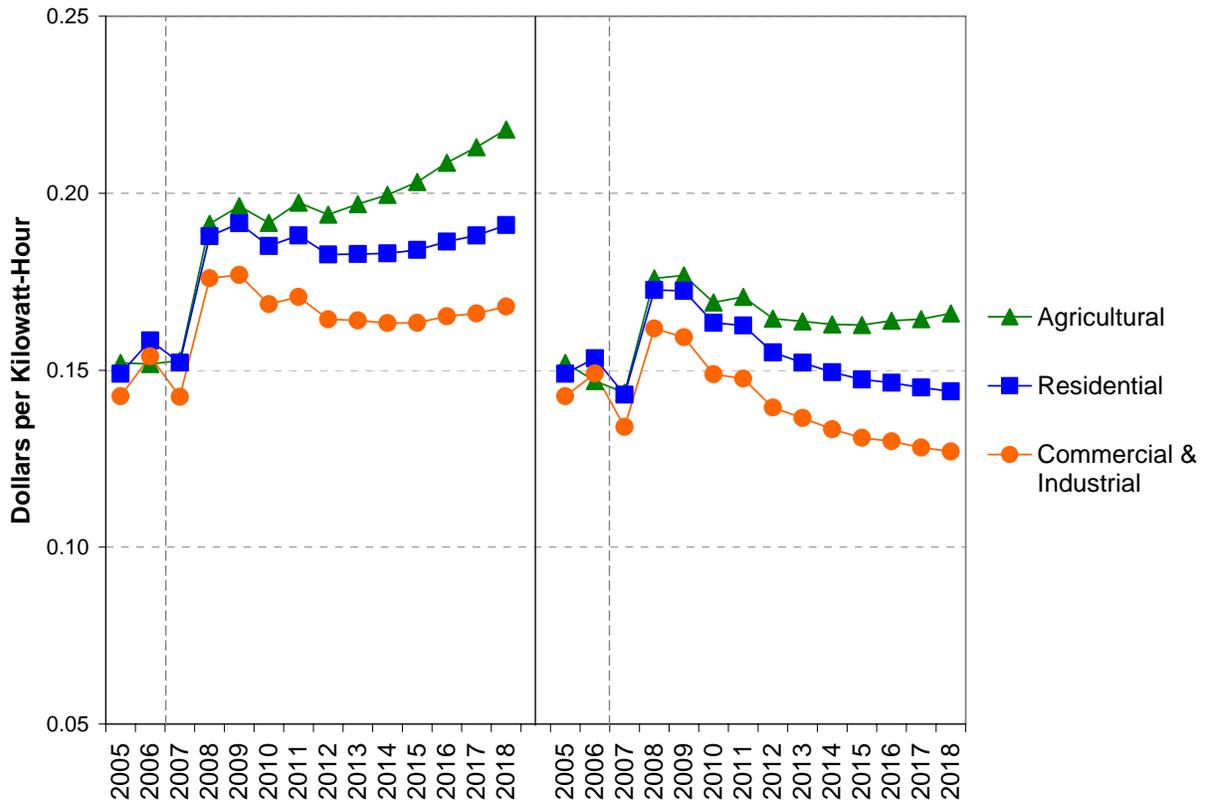
Figure 6: SDG&E's System Average Retail Electricity Prices, 2005 to 2018



Source: California Energy Commission

In Figure 7, forecasts of average retail prices are shown for three customer classes. Note that prices for commercial and industrial customers are reported together, in part because SDG&E has a small number of industrial customers. Note also that SDG&E expects the CPUC to approve a shift in cost allocation from the commercial and industrial class to the residential customer class. Appendix B provides the price details by customer class for the forecast period, except for 2006 through 2009. These prices were not included because SDG&E's electricity sales data was granted a confidential designation for those years.

Figure 7: SDG&E's Retail Price Forecasts by Customer Class, 2005 to 2018



Source: California Energy Commission

Fixed-Asset Value and Cost Expenses

SDG&E's electrical system was worth more than \$6.7 billion in 2006, as shown in Table 7. Its distribution system represented more than half of this value. SDG&E's fixed assets increased by more than 27 percent between 2003 and 2006, primarily due to additions in steam and "other" power plant assets. Specifically, SDG&E's power plant assets include an ownership share in the San Onofre nuclear power plant and the natural gas-fired Palomar power plant (555 megawatts), which began operation in 2006.

Table 7: Value of SDG&E's Electric Facilities in Service, 2003 to 2006 (dollars)

	2003	2004	2005	2006
PRODUCTION PLANT	1,252,509,936	1,271,096,431	1,324,572,197	1,817,463,667
Steam Plant	28,817,498	28,817,498	28,817,498	319,455,963
Nuclear Plant	1,223,546,534	1,241,700,558	1,262,173,178	1,286,766,068
Hydraulic Plant	0	0	0	0
Other Plant	145,904	578,375	33,581,521	211,241,636
TRANSMISSION PLANT	872,625,580	954,702,679	1,061,157,672	1,176,414,256
DISTRIBUTION PLANT	3,059,695,847	3,212,039,493	3,396,605,087	3,586,409,189
TOTAL ELECTRIC PLANT IN SERVICE	\$5,313,457,626	\$5,584,232,353	\$5,942,107,600	\$6,751,863,922

Source: Federal Energy Regulatory Commission

Table 8 shows that SDG&E's O&M costs increased by 35 percent between 2003 and 2006. The largest percentage increases occurred in the customer service and information, transmission, and power production expense cost categories.

Table 8: SDG&E's Total Electric Operations and Maintenance Expenses, 2003 to 2006 (dollars)

	2003	2004	2005	2006
POWER PRODUCTION EXPENSES	525,688,555	503,483,432	498,680,244	700,438,393
Purchased Power	424,121,954	381,375,560	393,714,081	443,113,110
TOTAL POWER PRODUCTION EXPENSES	525,688,555	503,483,432	498,680,244	700,438,393
TRANSMISSION EXPENSES	147,488,504	220,233,036	214,715,777	261,786,335
DISTRIBUTION EXPENSES	103,531,011	101,165,429	105,096,868	118,176,680
CUSTOMER ACCOUNT EXPENSES	47,499,945	52,415,420	50,246,233	51,614,639
CUSTOMER SERVICE AND INFORMATIONAL	41,368,940	44,301,003	86,866,507	86,875,141
SALES EXPENSES	112,459	117,997	74,414	113,226
ADMINISTRATIVE & GENERAL EXPENSES	203,686,721	166,051,846	191,491,490	224,034,763
TOTAL ELECTRIC O&M EXPENSES	\$1,069,376,135	\$1,087,768,163	\$1,147,171,533	\$1,444,200,696

Source: Federal Energy Regulatory Commission

CHAPTER 4: PUBLICLY OWNED UTILITIES

The Los Angeles Department of Water and Power (LADWP) and the Sacramento Municipal Utility District (SMUD) are the state's two largest publicly owned utilities. Together, LADWP and SMUD have 81 percent more customers, 32 percent more sales revenues, and 30 percent more electricity sales than all of the other publicly owned utilities in the state combined.

Los Angeles Department of Water and Power

In 2005, LADWP had 1.4 million customers, annual sales revenues of more than \$2.2 billion, and electricity sales of 23.4 million megawatt-hours (MWh).

In June, 2007, the LADWP's oversight board proposed raising base electricity rates for the first time since 1992.¹¹ Rates would increase by 9 percent overall, but would be phased in over three years. The additional revenues collected through this rate increase would be used to fund distribution infrastructure improvements, energy efficiency programs, renewable energy, Port of Los Angeles electrification, and other projects. LADWP is also a leader among other publicly owned utilities in deploying advanced meters.

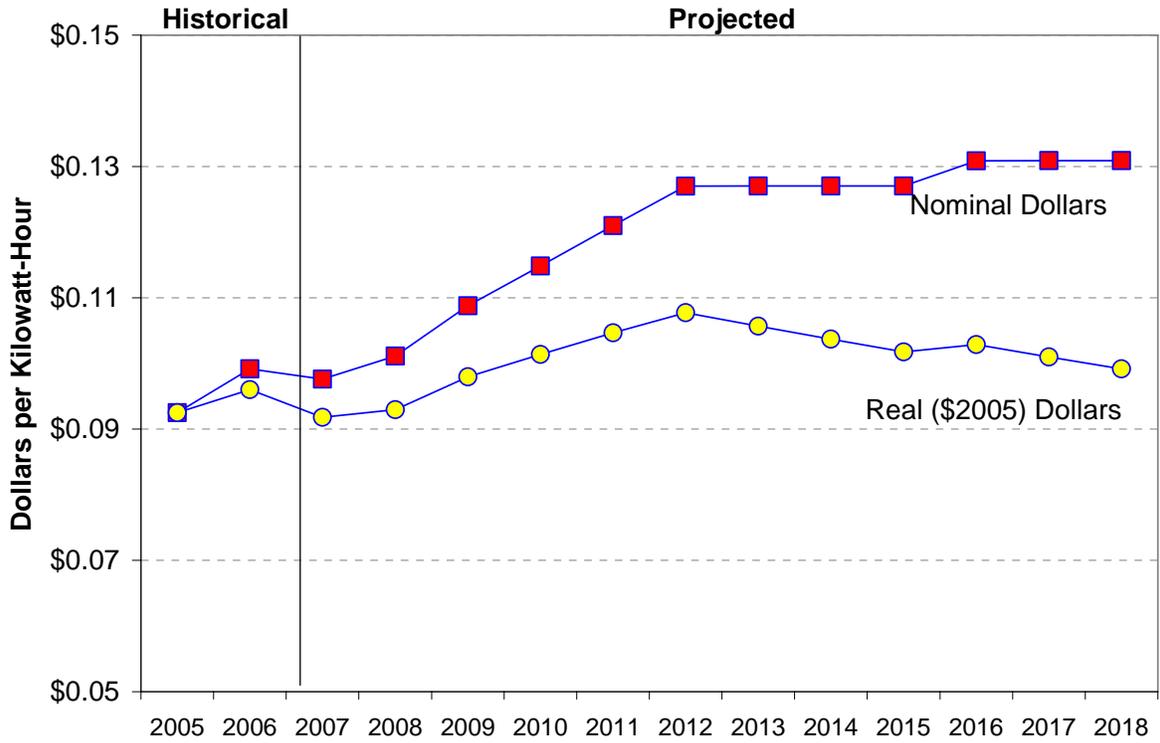
The Energy Commission staff estimates that LADWP's system average retail electricity prices will increase from \$0.092 to \$0.131 per kWh between 2005 and 2018, as illustrated in Figure 8. This 42.4 percent increase in nominal terms translates into a 7.6 percent increase in real terms. The annual growth rate is 2.8 percent, nominally. In real terms, the staff expects system-average retail prices to increase less than 1 percent (0.6 percent) annually.

Figure 9 provides the projections of average retail prices per customer class: residential, commercial, and industrial. The forecast assumes that LADWP will maintain its current revenue allocations per customer class after 2007 (no major shifts in revenue collections from one class to another).

Appendix B provides the dollar values for these customer-class forecasts.

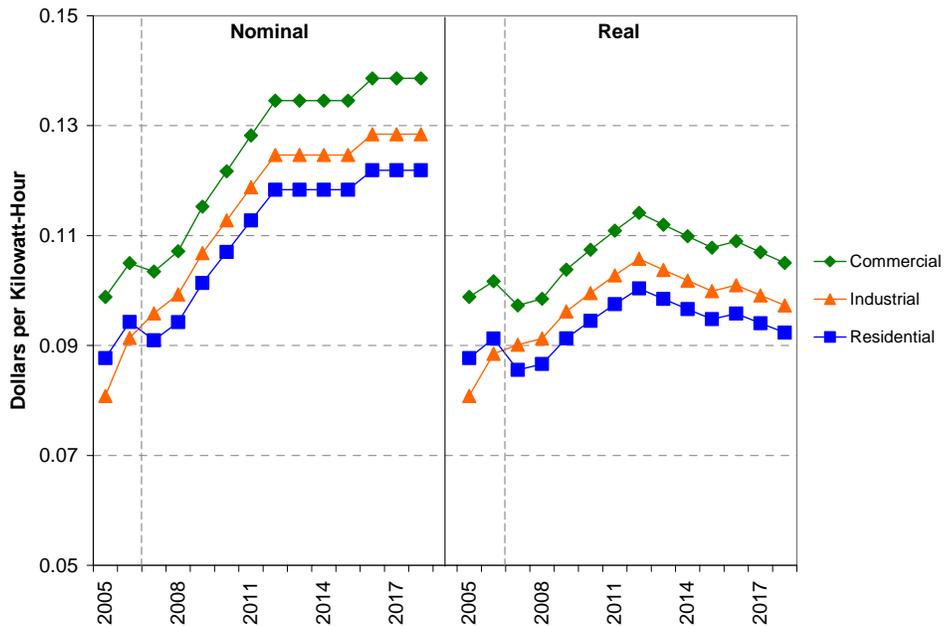
11 "LAWDP Faces First Base Power Rate Hike in 15 Years," *Power Market Today*, June 8, 2007.

Figure 8: LADWP's System Average Retail Electricity Prices, 2005 to 2016



Source: California Energy Commission

Figure 9: LADWP's Retail Price Forecasts by Customer Class, 2005 to 2018



Source: California Energy Commission

Modifications to LADWP's Submitted Data

Staff used the cost data provided by the LADWP on its Form 1.a to determine total annual revenue requirements, with the following exceptions:

- Capital improvement costs were updated to reflect LADWP's new plan through fiscal year 2011-12. Beginning in fiscal year 2012-13, capital improvement costs were escalated at 5 percent per year, based on projected averages.
- Capital improvement costs were assumed to be financed with cash (20 percent) and bonds (80 percent). The additional financing costs for debt service were added to annual revenue requirements.
- The transfer to the General Fund was adjusted so that it equaled 7 percent of revenue.
- Non-retail revenue was provided by LADWP for the forecast period and used to reduce the amount of revenue that must be recovered from retail customers.

Annual sales revenue data provided by LADWP in its Form 1.b had an annual increase of 34 percent from 2006 to 2007. Revenue for 2007 through 2011 was adjusted to reflect the forecasted revenue in LADWP's Power System Financial Projections. Beginning in 2012, revenue was increased by sales growth plus forecasted rate increases to be able to pay for the additional revenue requirements. The rate increases resulted in an annual revenue growth rate of 3.1 percent from 2007 to 2018.

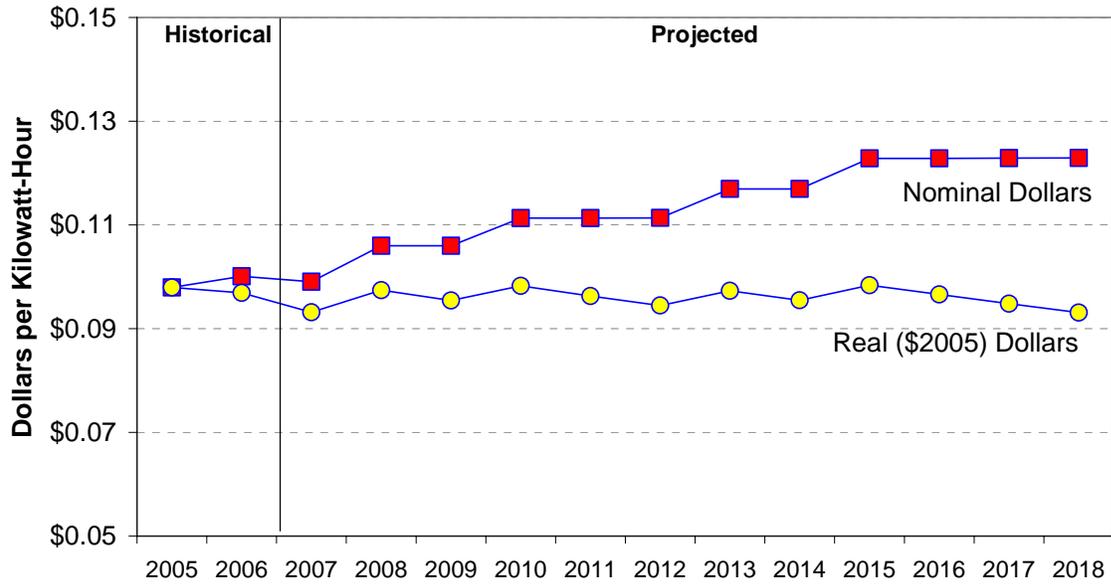
LADWP provided the electricity sales forecast on Form 1.c. The rate of growth of this forecast was 0.7 percent per year from 2007 to 2018. Energy Commission staff used the data provided by LADWP in this form in its retail price calculation.

Sacramento Municipal Utility District

The Sacramento Municipal Utility District, SMUD, has approximately 600,000 retail customers, compared to LADWP's 1.4 million customer count, and its annual sales revenue and electricity sales are approximately half those of LADWP.

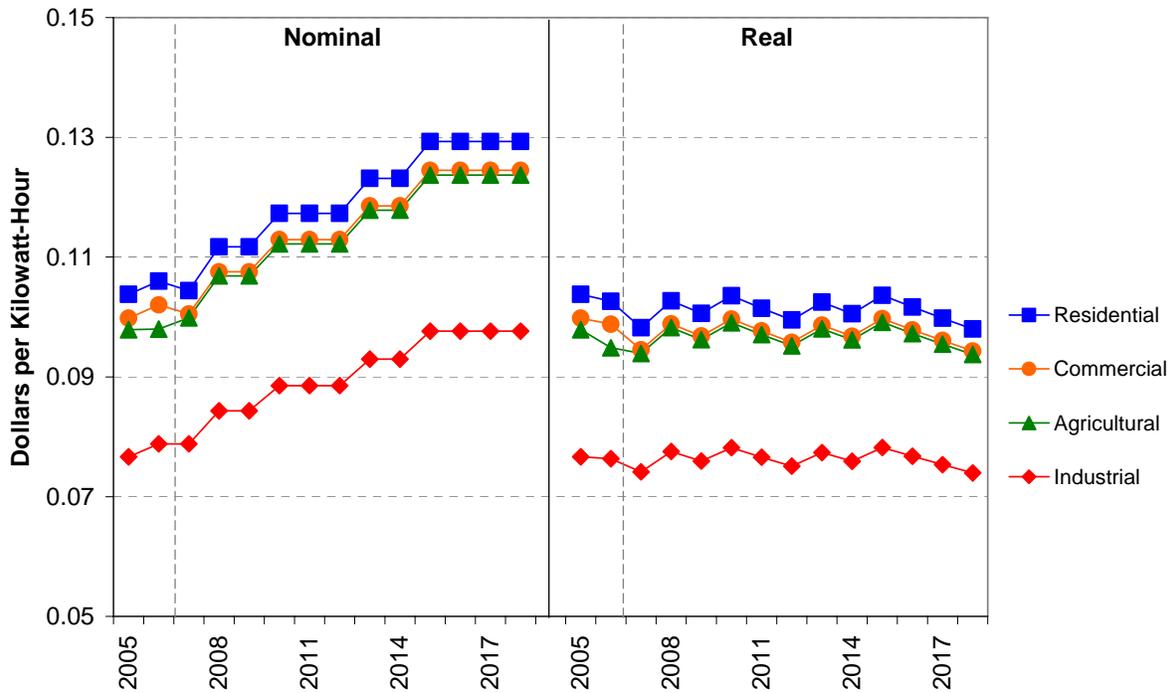
In 2005, SMUD's system average retail price was \$0.098 per kWh. The Energy Commission staff is forecasting that this average price will increase by 22.8 percent in 2018, to \$0.123 per kWh in nominal terms, as shown on Figure 10. Figure 11 shows the customer-class forecasts for SMUD.

Figure 10: SMUD's System Average Retail Electricity Prices, 2005 to 2016



Source: California Energy Commission

Figure 11: SMUD's Retail Price Forecasts by Customer Class, 2005 to 2018



Source: California Energy Commission

Modifications to SMUD's Submitted Data

All historical and projected cost information provided by SMUD (Form 1.a) was used except for the following adjustments:

- Increased amounts for energy efficiency programs by using SMUD-provided updates to its spending plan for these programs.
- Updated the existing debt service schedule to reflect SMUD's two, latest borrowings.
- Assumed capital improvement costs were to be financed with cash (20 percent) and bonds (80 percent). SMUD-reported capital improvement costs include generation, transmission, distribution, and advanced metering investments.
- Projected revenues from other sources of income (such as sales of surplus electricity and natural gas) between 2007 and 2018, based on SMUD-provided historical data regarding its non-retail revenues through 2006.

In Form 1.b, SMUD assumed its sales revenues would increase by only 2.03 percent annually. SMUD's sales revenue income was increased by 7 percent in 2008 to reflect the SMUD Board's recent approval of an across-the-board rate increase. Then, beginning in 2009, annual sales revenues were increased by the same growth rate as SMUD's average annual growth rate for electricity sales (kWh), 2.02 percent. When total net revenue requirements appeared to exceed forecasted revenue, a rate increase was forecasted. The resulting average annual growth rate in sales revenues became 4.04 percent.

Other Publicly Owned Utilities

Similar to Figures 10 and 11 for SMUD, staff provided a system-average and a class-average graph for each utility. These graphs are located in Appendix C. This chapter provides short descriptions of the forecast results for the other publicly owned utilities.

City of Anaheim – Anaheim's system-average retail electricity price may increase from \$0.095 to \$0.128 per kWh between 2005 and 2018. This 34.7 percent increase in nominal terms translates into a 2.1 percent increase in real terms. The annual growth rate is 2.3 percent, nominally. In real terms, the staff expects system average retail prices to increase less than 1 percent (0.2 percent) annually.

City of Burbank – Burbank's system-average retail electricity price may increase from \$0.125 to \$0.162 per kWh between 2005 and 2018. This 29.6 percent increase in nominal terms translates into a 1.6 percent decrease in real terms. The annual growth rate is 2.0 percent, nominally. In real terms, staff expects system average retail prices to decrease less than 1 percent (0.1 percent) annually.

City of Glendale – Glendale's system-average retail electricity price may increase from \$0.126 to \$0.186 per kWh between 2005 and 2018. This 47.6 percent increase in nominal terms translates into an 11.9 percent increase in real terms. The annual growth rate is 3.0 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.9 percent) annually.

City of Pasadena – Pasadena’s system-average retail electricity price may increase from \$0.107 to \$0.145 per kWh between 2005 and 2018. This 35.5 percent increase in nominal terms translates into a 1.9 percent increase in real terms. The annual growth rate is 2.4 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.1 percent) annually.

City of Redding – Redding’s system-average retail electricity price may increase from \$0.093 to \$0.139 per kWh between 2005 and 2018. This 49.5 percent increase in nominal terms translates into an 11.8 percent increase in real terms. The annual growth rate is 3.1 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.9 percent) annually.

City of Riverside – Riverside’s system-average retail electricity price may increase from \$0.105 to \$0.137 per kWh between 2005 and 2018. This 30.5 percent increase in nominal terms translates into a 1.0 percent decrease in real terms. The annual growth rate is 2.1 percent, nominally. In real terms, staff expects system average retail prices to decrease less than 1 percent (0.1 percent) annually.

City of Roseville – Roseville’s system-average retail electricity price may increase from \$0.082 to \$0.100 per kWh between 2005 and 2018. This 22.0 percent increase in nominal terms translates into an 8.5 percent decrease in real terms. The annual growth rate is 1.5 percent, nominally. In real terms, staff expects system average retail prices to decrease less than 1 percent (0.7 percent) annually.

City of Santa Clara (doing business as Silicon Valley Power) – Santa Clara’s system-average retail electricity price may increase from \$0.077 to \$0.094 per kWh between 2005 and 2018. This 22.1 percent increase in nominal terms translates into a 7.8 percent decrease in real terms. The annual growth rate is 1.5 percent, nominally. In real terms, staff expects system average retail prices to decrease less than 1 percent (0.6 percent) annually.

Imperial Irrigation District – Imperial Irrigation District’s system-average retail electricity price may increase from \$0.103 to \$0.148 per kWh between 2005 and 2018. This 43.7 percent increase in nominal terms translates into an 8.7 percent increase in real terms. The annual growth rate is 2.8 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.6 percent) annually.

Modesto Irrigation District – Modesto Irrigation District’s system-average retail electricity price may increase from \$0.090 to \$0.136 per kWh between 2005 and 2018. This 51.1 percent increase in nominal terms translates into a 14.4 percent increase in real terms. The annual growth rate is 3.2 percent, nominally. In real terms, staff expects system average retail prices to increase 1 percent (1.0 percent) annually.

Turlock Irrigation District – Turlock Irrigation District’s system- average retail electricity price may increase from \$0.085 to \$0.124 per kWh between 2005 and 2018. This 45.9 percent increase in nominal terms translates into a 10.6 percent increase in real terms. The annual growth rate is 2.9 percent, nominally. In real terms, staff expects system average retail prices to increase less than 1 percent (0.8 percent) annually.

CHAPTER 5: ELECTRICITY PRICE SENSITIVITY TO NATURAL GAS PRICES

The most volatile component of retail electric rates is the cost of natural gas. Table 9 shows the U.S. Energy Information Administration (EIA) record of average annual natural gas prices sold to electric power consumers in California over the last 10 years. With the exception of 1998 and 1999, the percent change in natural gas prices paid by California utilities has fluctuated in double digits on a percentage basis in each of the last 10 years.

Table 9: Average Natural Gas Prices Paid by Electric Generators in California

Year	Price \$/mcf	Percent Change
1997	3.08	
1998	2.79	-9.4
1999	2.76	-1.1
2000	5.88	113.0
2001	9.38	59.5
2002	3.82	-59.3
2003	5.50	44.0
2004	6.05	10.0
2005	8.08	33.6
2006	6.68	-17.3

The range in changes in natural gas prices paid by California utilities has been from minus 59.3 percent in 2002 to plus 113.0 percent in 2000. The overall trend has been for natural gas prices to increase over the 10-year period, with the price of natural gas in 2006 over twice the level experienced in 1997.

Natural gas prices have been volatile, wide ranging, and a contributor to higher retail electric prices in California. Table 10 shows the U.S. EIA's record of average retail electric prices in California.

Table 10: Average Retail Electric Prices in California

Year	Price \$/kWh	Percent Change
1997	.0954	
1998	.0903	-5.3
1999	.0875	-3.1
2000	.0947	8.2
2001	.1122	18.5
2002	.1219	8.6
2003	.1178	-3.4
2004	.1135	-3.7
2005	.1163	2.5

Source: U.S. Energy Information Administration

A comparison of Table 9 to Table 10 shows that while the price California electric utilities paid for natural gas increased 162 percent between 1997 and 2005, the average retail rate in California increased 21.9 percent during the same time period. The reason for the disparity is that natural gas is just one component of many that make up retail electric rates.

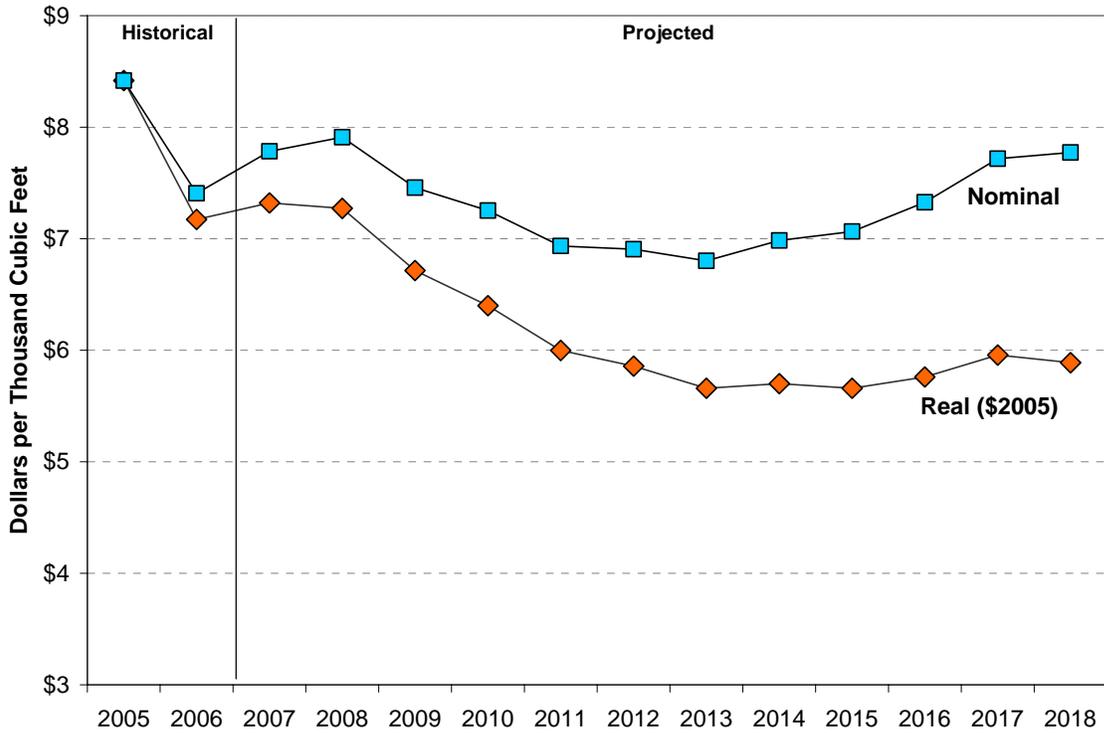
Retail electricity prices are basically total revenues divided by total sales. Total revenues are built from the various cost components such as customer, distribution, transmission, and generation costs. Some of these costs on a per kWh basis may actually decline or not change from a given year to the next due to infill, productivity increases, technological improvements, and demand increases.

During the forecast period, it appears that natural gas prices will still be an important component of retail electric rates. As in the past, however, natural gas prices and retail electric prices will not have a one-to-one correlation.

Natural gas prices are forecast by both the EIA and consulting firms. EIA publishes its forecast annually, while the forecasts of the consulting firms appear sporadically. The forecasts of the consultants are to varying degrees proprietary, but enough details are made public to infer the overall outlook of the consultants.

Figure 12 shows the EIA forecast of average United States prices for natural gas used in power generation. Although natural gas prices in California will differ somewhat from the national average, the purpose of presenting this figure is not for the prices themselves but for the trend that they illustrate.

Figure 12: Average U.S. Prices for Natural Gas as a Power Plant Fuel



Source: U.S. Energy Information Administration

The basic premise behind the EIA natural gas price forecast (and all of the forecasts prepared by consulting firms) is that current natural gas prices are above the cost of production. EIA and all of the consulting firms believe that natural gas costs less to produce than current market prices. They all believe that this is due to temporary market forces and that competition will force natural gas prices to decrease toward the cost of production in a few years.

Every single electric utility that submitted a natural gas price forecast exhibits a similar philosophy. The utilities differ on the degree of the decrease, but they all agree that natural gas prices will decrease for the next few years. Staff is not aware of any international, national, or state government agency that has forecasted differently. Nor does staff know of any consulting firms that forecast differently.

The government consulting forecasting complex appears to be of one mind on this issue. It believes that there are sufficient reserves to satisfy current and future demand at costs much lower than prevailing natural gas prices. It believes that current prices are an aberration that will pass and be replaced by natural gas prices much closer to the cost of production.

What if natural gas prices are not about to decline? What if they are about to increase? To gauge the exposure of the five largest electric utilities to increases in natural gas prices, staff has calculated an estimate for each utility of its maximum exposure to increases in natural gas prices.

Table 11 illustrates the possible relationship between natural gas prices and retail electric rates for the five largest electric utilities in California. The table is derived by combining elements of

each utility’s Power Content Label (annual resource mix) percentages with portions of the data submittals made by the utilities in response to the retail price forecast *Forms and Instructions*.

Table 11: Estimated Maximum Exposure to Natural Gas Costs as a Percentage of Total Annual Revenue Requirements

Year	SCE	PG&E ¹²	LADWP	SDG&E	SMUD
2007	30		15	30	35
2008	30		16	22	34
2009	28	27	16	21	31
2010	27	24	15	21	28
2011	24	23	16	20	26
2012	24	22	16	20	26
2013	25	22	17	19	26
2014	25	20	17	19	27
2015	26	20	17	18	28
2016	26	20	18	18	29
2017	27		18	18	27
2018	28		17	20	28

Source: California Energy Commission

As the table heading states, the table shows the estimated maximum natural gas cost exposure as a percentage of total revenue requirements. Therefore, the “30” in the column headed “SCE” and in the row labeled “2007” indicate that an estimated 30 percent of SCE’s revenue requirements may be attributable to natural gas costs. If natural gas costs were to double in 2007 relative to SCE’s natural gas price forecast, its total revenue requirement in 2007 would increase by another 30 percent.

Several cautions are in order when interpreting the data in Table 11. If rates were increased on this order of magnitude, demand may decrease. Natural gas usage by the electric utility would decrease in response to the decrease in demand. This would lower the exposure to the increase in natural gas prices.

¹² Staff could not estimate percentages for PG&E in 2007, 2008, 2017, or 2018, because data was unavailable.

Also note that a decrease in percentage exposure, such as from 30 percent in 2007 to 24 percent in 2012, may not mean that SCE projects a decrease in physical units of natural gas reliance. It may mean that SCE projects that natural gas prices will be lower in 2012 than in 2007. Or it may mean that they will displace natural gas with another source.

A second caution is warranted when comparing utilities. A lower percentage in the same year by one utility compared to another may reflect a lower reliance on physical natural gas, or it may reflect a lower projection of natural gas prices, or both.

Another caution involves steps taken by utilities, utility boards, and regulators to shield ratepayers from fluctuations in natural gas prices. The CPUC has authorized the investor-owned utilities to hedge natural gas prices. In any given year, SCE, PG&E, and SDG&E may only be minimally affected by increases in natural gas prices due to hedging.

Hedging allows the utility to buy futures or commitments to deliver natural gas at a fixed price months before the utility needs the natural gas. If natural gas prices increase, the value of the futures or commitment increases and offsets the increase in natural gas prices incurred by the utility. Or at least it does in theory. In practice, there may be some differences between the rate of increase in the value of the futures and the increase in natural gas prices delivered to the utility.

In general, hedging is an effective means of shielding the utility from an increase in natural gas prices. Hedging does not protect against a sustained multi-year increase in natural gas prices, such as experienced from 1997 to 2006 as shown on Table 9. Therefore, the investor-owned utility exposure to increase in natural gas prices may be close to zero in any given year, but Table 11 may illustrate the long-term exposure to increases in natural gas prices for the investor-owned utilities.

Publicly owned utilities LADWP and SMUD apparently have purchased or have plans to purchase natural gas reserves, thereby locking in some or all of their natural gas costs for some time into the future. Table 11 may not apply to LADWP and SMUD. They may be protected from any increase in natural gas costs.

At the workshop, and in comments in response to this report and the workshop, the electric utilities could clarify these issues. They could also provide their estimates of their exposure to increases in natural gas prices.

APPENDIX A: DEFLATOR SERIES FOR \$2005

2005	100.00
2006	103.27
2007	106.32
2008	108.79
2009	111.05
2010	113.30
2011	115.62
2012	117.89
2013	120.19
2014	122.49
2015	124.83
2016	127.19
2017	129.58
2018	131.99

APPENDIX B

Utility-Specific Retail Price Forecast Tables

Pacific Gas and Electric

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.129	0.142	0.107	0.120	0.146	0.131
2006	0.143	0.143	0.109	0.122	0.146	0.138
2007	0.152	0.144	0.102	0.124	0.150	0.140
2008	0.15	0.14	0.10	0.13	0.14	0.14
2009	0.16	0.15	0.10	0.14	0.15	0.15
2010	0.172	0.157	0.112	0.145	0.159	0.156
2011	0.172	0.158	0.112	0.146	0.160	0.156
2012	0.168	0.154	0.109	0.142	0.157	0.152
2013	0.165	0.150	0.105	0.139	0.153	0.149
2014	0.165	0.151	0.106	0.140	0.154	0.150
2015	0.165	0.150	0.105	0.139	0.154	0.149
2016	0.168	0.153	0.108	0.142	0.156	0.152

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.129	0.142	0.107	0.120	0.146	0.131
2006	0.139	0.139	0.105	0.118	0.141	0.133
2007	0.143	0.135	0.096	0.116	0.141	0.132
2008	0.14	0.13	0.09	0.12	0.13	0.13
2009	0.15	0.13	0.09	0.12	0.14	0.13
2010	0.151	0.139	0.099	0.128	0.141	0.137
2011	0.149	0.136	0.097	0.126	0.138	0.135
2012	0.142	0.130	0.092	0.121	0.133	0.129
2013	0.137	0.125	0.088	0.116	0.128	0.124
2014	0.135	0.123	0.087	0.114	0.126	0.122
2015	0.132	0.120	0.084	0.112	0.123	0.120
2016	0.132	0.120	0.085	0.111	0.123	0.120

Southern California Edison

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.131	0.127	0.098	0.105	0.115	0.125
2006	0.149	0.146	0.117	0.128	0.138	0.144
2007	0.152	0.138	0.108	0.130	0.131	0.140
2008	0.158	0.147	0.115	0.131	0.138	0.147
2009	0.165	0.153	0.119	0.138	0.142	0.153
2010	0.164	0.151	0.116	0.134	0.140	0.152
2011	0.166	0.152	0.116	0.133	0.140	0.153
2012	0.169	0.154	0.119	0.133	0.143	0.155
2013	0.168	0.154	0.120	0.142	0.146	0.156
2014	0.169	0.155	0.120	0.143	0.146	0.156
2015	0.170	0.156	0.121	0.144	0.147	0.157
2016	0.169	0.155	0.120	0.143	0.147	0.156
2017	0.170	0.156	0.121	0.144	0.147	0.157
2018	0.169	0.155	0.121	0.143	0.147	0.157

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.131	0.127	0.098	0.105	0.115	0.125
2006	0.144	0.141	0.113	0.124	0.134	0.139
2007	0.143	0.130	0.101	0.122	0.124	0.131
2008	0.145	0.135	0.105	0.120	0.127	0.135
2009	0.149	0.138	0.107	0.124	0.128	0.138
2010	0.145	0.133	0.103	0.118	0.123	0.134
2011	0.144	0.131	0.101	0.115	0.121	0.132
2012	0.143	0.131	0.101	0.113	0.121	0.132
2013	0.140	0.128	0.100	0.119	0.121	0.130
2014	0.138	0.126	0.098	0.117	0.120	0.127
2015	0.136	0.125	0.097	0.115	0.118	0.126
2016	0.133	0.122	0.095	0.112	0.115	0.123
2017	0.131	0.120	0.093	0.111	0.114	0.121
2018	0.128	0.117	0.091	0.109	0.111	0.119

San Diego Gas and Electric Company

	Commercial & Residential Industrial Agricultural Other				System Average
	Dollars per kWh (nominal dollars)				
2005	0.149	0.143	0.152	0.102	0.145
2006	0.16	0.15	0.15	0.11	0.16
2007	0.15	0.14	0.15	0.10	0.15
2008	0.19	0.18	0.19	0.13	0.18
2009	0.19	0.18	0.20	0.13	0.18
2010	0.185	0.169	0.192	0.126	0.176
2011	0.188	0.171	0.197	0.129	0.178
2012	0.183	0.164	0.194	0.125	0.172
2013	0.183	0.164	0.197	0.126	0.172
2014	0.183	0.163	0.200	0.127	0.172
2015	0.184	0.163	0.203	0.129	0.172
2016	0.186	0.165	0.209	0.132	0.174
2017	0.188	0.166	0.213	0.134	0.176
2018	0.191	0.168	0.218	0.137	0.178

	Commercial & Residential Industrial Agricultural Other				System Average
	Dollars per kWh (2005 dollars)				
2005	0.149	0.143	0.152	0.102	0.145
2006	0.15	0.15	0.15	0.10	0.15
2007	0.14	0.13	0.14	0.09	0.14
2008	0.17	0.16	0.18	0.12	0.17
2009	0.17	0.16	0.18	0.12	0.16
2010	0.163	0.149	0.169	0.111	0.155
2011	0.163	0.148	0.171	0.111	0.154
2012	0.155	0.139	0.165	0.106	0.146
2013	0.152	0.137	0.164	0.105	0.143
2014	0.149	0.133	0.163	0.104	0.140
2015	0.147	0.131	0.163	0.103	0.138
2016	0.146	0.130	0.164	0.104	0.137
2017	0.145	0.128	0.164	0.103	0.135
2018	0.144	0.127	0.166	0.104	0.135

Los Angeles Department of Water and Power

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (nominal dollars)				
2005	0.088	0.099	0.081	0.070	0.092
2006	0.094	0.105	0.091	0.072	0.099
2007	0.091	0.103	0.096	0.071	0.098
2008	0.094	0.107	0.099	0.073	0.101
2009	0.101	0.115	0.107	0.079	0.109
2010	0.107	0.122	0.113	0.083	0.115
2011	0.113	0.128	0.119	0.088	0.121
2012	0.118	0.135	0.125	0.092	0.127
2013	0.118	0.135	0.125	0.092	0.127
2014	0.118	0.135	0.125	0.092	0.127
2015	0.118	0.135	0.125	0.092	0.127
2016	0.122	0.139	0.128	0.095	0.131
2017	0.122	0.139	0.128	0.095	0.131
2018	0.122	0.139	0.128	0.095	0.131

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (2005 dollars)				
2005	0.088	0.099	0.081	0.070	0.092
2006	0.091	0.102	0.088	0.069	0.096
2007	0.086	0.097	0.090	0.066	0.092
2008	0.087	0.099	0.091	0.067	0.093
2009	0.091	0.104	0.096	0.071	0.098
2010	0.094	0.107	0.100	0.073	0.101
2011	0.098	0.111	0.103	0.076	0.105
2012	0.100	0.114	0.106	0.078	0.108
2013	0.098	0.112	0.104	0.076	0.106
2014	0.097	0.110	0.102	0.075	0.104
2015	0.095	0.108	0.100	0.074	0.102
2016	0.096	0.109	0.101	0.074	0.103
2017	0.094	0.107	0.099	0.073	0.101
2018	0.092	0.105	0.097	0.072	0.099

Sacramento Municipal Utility District

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.104	0.100	0.077	0.098	0.091	0.098
2006	0.106	0.102	0.079	0.098	0.094	0.100
2007	0.104	0.100	0.079	0.100	0.093	0.099
2008	0.112	0.108	0.084	0.107	0.100	0.106
2009	0.112	0.108	0.084	0.107	0.100	0.106
2010	0.117	0.113	0.089	0.112	0.105	0.111
2011	0.117	0.113	0.089	0.112	0.105	0.111
2012	0.117	0.113	0.089	0.112	0.105	0.111
2013	0.123	0.119	0.093	0.118	0.110	0.117
2014	0.123	0.119	0.093	0.118	0.110	0.117
2015	0.129	0.124	0.098	0.124	0.116	0.123
2016	0.129	0.124	0.098	0.124	0.116	0.123
2017	0.129	0.124	0.098	0.124	0.116	0.123
2018	0.129	0.124	0.098	0.124	0.116	0.123

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.104	0.100	0.077	0.098	0.091	0.098
2006	0.103	0.099	0.076	0.095	0.091	0.097
2007	0.098	0.095	0.074	0.094	0.088	0.093
2008	0.103	0.099	0.078	0.098	0.092	0.097
2009	0.101	0.097	0.076	0.096	0.090	0.095
2010	0.104	0.100	0.078	0.099	0.092	0.098
2011	0.101	0.098	0.077	0.097	0.091	0.096
2012	0.099	0.096	0.075	0.095	0.089	0.094
2013	0.102	0.099	0.077	0.098	0.092	0.097
2014	0.101	0.097	0.076	0.096	0.090	0.095
2015	0.104	0.100	0.078	0.099	0.093	0.098
2016	0.102	0.098	0.077	0.097	0.091	0.097
2017	0.100	0.096	0.075	0.095	0.089	0.095
2018	0.098	0.094	0.074	0.094	0.088	0.093

Anaheim Public Utilities

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (nominal dollars)				
2005	0.100	0.108	0.088	0.085	0.095
2006	0.101	0.110	0.090	0.086	0.097
2007	0.105	0.116	0.095	0.096	0.102
2008	0.107	0.121	0.100	0.100	0.107
2009	0.111	0.126	0.105	0.105	0.112
2010	0.115	0.131	0.110	0.110	0.116
2011	0.116	0.133	0.112	0.113	0.119
2012	0.116	0.133	0.112	0.113	0.119
2013	0.118	0.136	0.115	0.115	0.121
2014	0.120	0.138	0.117	0.118	0.123
2015	0.121	0.141	0.120	0.120	0.126
2016	0.123	0.143	0.122	0.123	0.128
2017	0.123	0.143	0.122	0.123	0.128
2018	0.123	0.143	0.122	0.123	0.128

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (2005 dollars)				
2005	0.100	0.108	0.088	0.085	0.095
2006	0.098	0.107	0.087	0.084	0.094
2007	0.099	0.109	0.089	0.090	0.096
2008	0.099	0.111	0.092	0.092	0.098
2009	0.100	0.113	0.094	0.095	0.101
2010	0.101	0.115	0.097	0.097	0.103
2011	0.101	0.115	0.097	0.097	0.103
2012	0.099	0.113	0.095	0.096	0.101
2013	0.098	0.113	0.096	0.096	0.101
2014	0.098	0.113	0.096	0.096	0.101
2015	0.097	0.113	0.096	0.096	0.101
2016	0.097	0.112	0.096	0.096	0.101
2017	0.095	0.110	0.094	0.095	0.099
2018	0.093	0.108	0.093	0.093	0.097

Burbank

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (nominal dollars)				
2005	0.129	0.137	0.122	0.078	0.125
2006	0.129	0.132	0.120	0.157	0.126
2007	0.134	0.135	0.125	0.166	0.130
2008	0.135	0.139	0.123	0.169	0.131
2009	0.138	0.142	0.126	0.174	0.134
2010	0.142	0.146	0.129	0.178	0.137
2011	0.142	0.146	0.129	0.178	0.137
2012	0.142	0.146	0.129	0.178	0.137
2013	0.142	0.146	0.129	0.178	0.137
2014	0.146	0.150	0.133	0.183	0.141
2015	0.153	0.158	0.140	0.192	0.148
2016	0.158	0.162	0.144	0.198	0.153
2017	0.163	0.167	0.148	0.204	0.157
2018	0.168	0.172	0.153	0.210	0.162

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (2005 dollars)				
2005	0.129	0.137	0.122	0.078	0.125
2006	0.125	0.127	0.117	0.152	0.122
2007	0.126	0.127	0.117	0.156	0.123
2008	0.124	0.128	0.113	0.156	0.120
2009	0.125	0.128	0.114	0.156	0.121
2010	0.125	0.129	0.114	0.157	0.121
2011	0.123	0.126	0.112	0.154	0.119
2012	0.120	0.124	0.110	0.151	0.116
2013	0.118	0.121	0.108	0.148	0.114
2014	0.119	0.123	0.109	0.150	0.115
2015	0.123	0.126	0.112	0.154	0.119
2016	0.124	0.128	0.113	0.156	0.120
2017	0.126	0.129	0.114	0.157	0.122
2018	0.127	0.130	0.116	0.159	0.123

Glendale Water and Power

Small Large System
Residential Commercial Commercial Average
 Dollars per kWh (nominal dollars)

2005	0.134	0.138	0.109	0.126
2006	0.135	0.139	0.111	0.126
2007	0.152	0.160	0.135	0.147
2008	0.160	0.168	0.142	0.155
2009	0.160	0.168	0.142	0.155
2010	0.168	0.176	0.149	0.163
2011	0.168	0.176	0.149	0.163
2012	0.177	0.185	0.156	0.171
2013	0.177	0.185	0.156	0.171
2014	0.185	0.194	0.164	0.179
2015	0.185	0.194	0.164	0.179
2016	0.193	0.202	0.171	0.186
2017	0.193	0.202	0.171	0.186
2018	0.193	0.202	0.171	0.186

Small Large System
Residential Commercial Commercial Average
 Dollars per kWh (2005 dollars)

2005	0.134	0.138	0.109	0.126
2006	0.131	0.135	0.107	0.122
2007	0.143	0.150	0.127	0.139
2008	0.147	0.154	0.130	0.142
2009	0.144	0.151	0.128	0.139
2010	0.148	0.155	0.131	0.144
2011	0.145	0.152	0.129	0.141
2012	0.150	0.157	0.133	0.145
2013	0.147	0.154	0.130	0.142
2014	0.151	0.159	0.134	0.146
2015	0.149	0.156	0.131	0.144
2016	0.152	0.159	0.134	0.147
2017	0.149	0.156	0.132	0.144
2018	0.146	0.153	0.129	0.141

Pasadena

	Residential	Small Commercial & Industrial	Medium Commercial & Industrial	Large Commercial & Industrial	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.115	0.109	0.106	0.102	0.093	0.107
2006	0.118	0.113	0.107	0.104	0.101	0.110
2007	0.124	0.124	0.119	0.108	0.122	0.117
2008	0.127	0.127	0.122	0.111	0.125	0.120
2009	0.127	0.127	0.122	0.111	0.125	0.120
2010	0.133	0.133	0.128	0.117	0.131	0.126
2011	0.133	0.133	0.128	0.117	0.131	0.126
2012	0.140	0.140	0.134	0.122	0.137	0.132
2013	0.140	0.140	0.134	0.122	0.137	0.132
2014	0.147	0.147	0.141	0.128	0.144	0.139
2015	0.147	0.147	0.141	0.128	0.144	0.139
2016	0.153	0.152	0.147	0.134	0.150	0.145
2017	0.153	0.152	0.147	0.134	0.150	0.145
2018	0.153	0.152	0.147	0.134	0.150	0.145

	Residential	Small Commercial & Industrial	Medium Commercial & Industrial	Large Commercial & Industrial	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.115	0.109	0.106	0.102	0.093	0.107
2006	0.115	0.109	0.104	0.101	0.098	0.106
2007	0.117	0.116	0.112	0.102	0.115	0.110
2008	0.117	0.116	0.112	0.102	0.115	0.110
2009	0.114	0.114	0.110	0.100	0.112	0.108
2010	0.118	0.117	0.113	0.103	0.116	0.111
2011	0.115	0.115	0.111	0.101	0.113	0.109
2012	0.119	0.118	0.114	0.104	0.117	0.112
2013	0.116	0.116	0.112	0.102	0.114	0.110
2014	0.120	0.120	0.115	0.105	0.118	0.113
2015	0.118	0.117	0.113	0.103	0.116	0.111
2016	0.120	0.120	0.115	0.105	0.118	0.114
2017	0.118	0.118	0.113	0.103	0.116	0.112
2018	0.116	0.115	0.111	0.101	0.114	0.109

Riverside

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.118	0.113	0.084	0.090	0.172	0.105
2006	0.122	0.113	0.088	0.089	0.179	0.107
2007	0.128	0.125	0.090	0.095	0.180	0.112
2008	0.142	0.140	0.092	0.100	0.191	0.121
2009	0.150	0.149	0.093	0.104	0.196	0.126
2010	0.161	0.162	0.096	0.108	0.205	0.134
2011	0.163	0.167	0.098	0.109	0.207	0.137
2012	0.163	0.167	0.098	0.109	0.207	0.137
2013	0.163	0.167	0.098	0.109	0.207	0.137
2014	0.163	0.167	0.098	0.109	0.207	0.137
2015	0.163	0.167	0.098	0.109	0.207	0.137
2016	0.163	0.167	0.098	0.109	0.207	0.137
2017	0.163	0.167	0.098	0.109	0.207	0.137
2018	0.163	0.167	0.098	0.109	0.207	0.137

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.118	0.113	0.084	0.090	0.172	0.105
2006	0.118	0.110	0.085	0.086	0.173	0.103
2007	0.120	0.118	0.085	0.089	0.169	0.105
2008	0.131	0.129	0.085	0.092	0.175	0.111
2009	0.135	0.134	0.084	0.093	0.177	0.114
2010	0.142	0.143	0.085	0.095	0.181	0.118
2011	0.141	0.145	0.084	0.095	0.179	0.118
2012	0.138	0.142	0.083	0.093	0.176	0.116
2013	0.136	0.139	0.081	0.091	0.173	0.114
2014	0.133	0.136	0.080	0.089	0.169	0.112
2015	0.131	0.134	0.078	0.088	0.166	0.110
2016	0.128	0.131	0.077	0.086	0.163	0.107
2017	0.126	0.129	0.075	0.084	0.160	0.106
2018	0.123	0.127	0.074	0.083	0.157	0.104

Imperial Irrigation District

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.101	0.113	0.104	0.108	0.109	0.103
2006	0.119	0.132	0.126	0.127	0.129	0.123
2007	0.119	0.132	0.126	0.127	0.129	0.123
2008	0.120	0.133	0.127	0.128	0.131	0.124
2009	0.121	0.134	0.128	0.129	0.132	0.126
2010	0.123	0.136	0.130	0.130	0.133	0.127
2011	0.125	0.138	0.132	0.133	0.136	0.129
2012	0.127	0.141	0.135	0.135	0.138	0.132
2013	0.130	0.144	0.137	0.138	0.141	0.134
2014	0.132	0.147	0.140	0.141	0.144	0.137
2015	0.135	0.149	0.143	0.144	0.147	0.140
2016	0.138	0.152	0.146	0.146	0.150	0.143
2017	0.141	0.155	0.149	0.149	0.153	0.145
2018	0.143	0.159	0.152	0.152	0.156	0.148

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.101	0.113	0.104	0.108	0.109	0.103
2006	0.115	0.128	0.122	0.123	0.125	0.119
2007	0.112	0.124	0.118	0.119	0.122	0.116
2008	0.111	0.122	0.117	0.117	0.120	0.114
2009	0.109	0.121	0.116	0.116	0.119	0.113
2010	0.108	0.120	0.114	0.115	0.118	0.112
2011	0.108	0.120	0.114	0.115	0.117	0.112
2012	0.108	0.120	0.114	0.115	0.117	0.112
2013	0.108	0.120	0.114	0.115	0.117	0.112
2014	0.108	0.120	0.114	0.115	0.117	0.112
2015	0.108	0.120	0.114	0.115	0.118	0.112
2016	0.108	0.120	0.115	0.115	0.118	0.112
2017	0.108	0.120	0.115	0.115	0.118	0.112
2018	0.109	0.120	0.115	0.115	0.118	0.112

Modesto Irrigation District

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.115	0.089	0.062	0.092	0.092	0.090
2006	0.124	0.094	0.068	0.097	0.097	0.097
2007	0.133	0.101	0.073	0.104	0.104	0.104
2008	0.143	0.108	0.078	0.111	0.111	0.112
2009	0.152	0.115	0.083	0.118	0.118	0.119
2010	0.161	0.122	0.088	0.126	0.126	0.127
2011	0.172	0.130	0.094	0.134	0.134	0.135
2012	0.172	0.130	0.094	0.134	0.134	0.135
2013	0.172	0.130	0.094	0.134	0.134	0.135
2014	0.172	0.130	0.094	0.134	0.134	0.135
2015	0.172	0.130	0.094	0.134	0.134	0.135
2016	0.172	0.130	0.094	0.134	0.134	0.136
2017	0.172	0.130	0.094	0.134	0.134	0.136
2018	0.172	0.130	0.094	0.134	0.134	0.136

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.115	0.089	0.062	0.092	0.092	0.090
2006	0.120	0.091	0.066	0.093	0.094	0.094
2007	0.125	0.095	0.069	0.098	0.098	0.098
2008	0.131	0.099	0.072	0.102	0.102	0.103
2009	0.137	0.104	0.075	0.107	0.107	0.107
2010	0.142	0.108	0.078	0.111	0.111	0.112
2011	0.148	0.112	0.081	0.116	0.116	0.117
2012	0.146	0.110	0.080	0.114	0.114	0.114
2013	0.143	0.108	0.078	0.111	0.111	0.112
2014	0.140	0.106	0.077	0.109	0.109	0.110
2015	0.137	0.104	0.075	0.107	0.107	0.109
2016	0.135	0.102	0.074	0.105	0.105	0.107
2017	0.132	0.100	0.073	0.103	0.103	0.105
2018	0.130	0.098	0.071	0.101	0.101	0.103

Turlock Irrigation District

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.105	0.096	0.066	0.089	0.061	0.085
2006	0.117	0.102	0.079	0.102	0.072	0.097
2007	0.119	0.105	0.080	0.103	0.076	0.099
2008	0.119	0.105	0.080	0.103	0.077	0.099
2009	0.125	0.110	0.084	0.108	0.081	0.104
2010	0.131	0.116	0.085	0.114	0.085	0.107
2011	0.130	0.116	0.086	0.115	0.085	0.107
2012	0.129	0.116	0.087	0.115	0.085	0.108
2013	0.134	0.120	0.090	0.119	0.088	0.112
2014	0.141	0.126	0.095	0.125	0.092	0.118
2015	0.142	0.126	0.096	0.125	0.092	0.118
2016	0.142	0.126	0.096	0.125	0.092	0.118
2017	0.150	0.133	0.101	0.131	0.097	0.124
2018	0.150	0.133	0.101	0.130	0.097	0.124

	Residential	Commercial	Industrial	Agricultural	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.105	0.096	0.066	0.089	0.061	0.085
2006	0.114	0.098	0.076	0.098	0.070	0.094
2007	0.112	0.099	0.075	0.097	0.072	0.093
2008	0.109	0.096	0.073	0.095	0.070	0.091
2009	0.113	0.099	0.075	0.097	0.073	0.093
2010	0.115	0.102	0.075	0.101	0.075	0.095
2011	0.112	0.100	0.074	0.099	0.073	0.093
2012	0.110	0.098	0.073	0.098	0.072	0.091
2013	0.111	0.100	0.075	0.099	0.073	0.093
2014	0.115	0.103	0.078	0.102	0.075	0.096
2015	0.113	0.101	0.077	0.100	0.074	0.094
2016	0.112	0.099	0.075	0.098	0.073	0.093
2017	0.116	0.102	0.078	0.101	0.075	0.096
2018	0.114	0.100	0.076	0.099	0.074	0.094

Redding

	Residential	Small Commercial	Large Commercial	TOU	Other	System Average
	Dollars per kWh (nominal dollars)					
2005	0.092	0.103	0.091	0.086	0.245	0.093
2006	0.099	0.109	0.092	0.081	0.168	0.098
2007	0.099	0.106	0.096	0.092	0.181	0.099
2008	0.103	0.117	0.102	0.095	0.192	0.105
2009	0.107	0.128	0.106	0.099	0.199	0.109
2010	0.110	0.141	0.109	0.103	0.206	0.115
2011	0.110	0.149	0.109	0.103	0.206	0.116
2012	0.114	0.163	0.113	0.107	0.213	0.121
2013	0.114	0.173	0.113	0.107	0.213	0.122
2014	0.114	0.183	0.113	0.108	0.213	0.124
2015	0.117	0.200	0.116	0.111	0.220	0.129
2016	0.117	0.212	0.116	0.111	0.220	0.131
2017	0.117	0.224	0.116	0.111	0.220	0.133
2018	0.121	0.244	0.120	0.115	0.226	0.139

	Residential	Small Commercial	Large Commercial	TOU	Other	System Average
	Dollars per kWh (2005 dollars)					
2005	0.092	0.103	0.091	0.086	0.245	0.093
2006	0.095	0.106	0.089	0.078	0.163	0.094
2007	0.093	0.100	0.090	0.087	0.171	0.093
2008	0.095	0.107	0.094	0.087	0.177	0.096
2009	0.096	0.115	0.095	0.089	0.179	0.099
2010	0.097	0.124	0.097	0.091	0.182	0.101
2011	0.095	0.129	0.095	0.089	0.178	0.100
2012	0.096	0.138	0.096	0.090	0.181	0.102
2013	0.095	0.144	0.094	0.089	0.177	0.102
2014	0.093	0.150	0.092	0.088	0.174	0.101
2015	0.094	0.160	0.093	0.089	0.176	0.104
2016	0.092	0.166	0.091	0.087	0.173	0.103
2017	0.091	0.173	0.090	0.086	0.170	0.102
2018	0.092	0.185	0.091	0.087	0.172	0.105

Roseville

	Residential	Commercial	Industrial	System Average
	Dollars per kWh (nominal dollars)			
2005	0.092	0.085	0.065	0.082
2006	0.096	0.087	0.067	0.085
2007	0.101	0.091	0.070	0.089
2008	0.106	0.097	0.075	0.094
2009	0.112	0.102	0.078	0.099
2010	0.112	0.102	0.079	0.099
2011	0.112	0.102	0.079	0.099
2012	0.112	0.102	0.079	0.099
2013	0.112	0.102	0.079	0.099
2014	0.112	0.102	0.079	0.099
2015	0.112	0.102	0.079	0.099
2016	0.112	0.102	0.079	0.099
2017	0.112	0.102	0.079	0.099
2018	0.112	0.102	0.079	0.100

	Residential	Commercial	Industrial	System Average
	Dollars per kWh (2005 dollars)			
2005	0.092	0.085	0.065	0.082
2006	0.093	0.084	0.065	0.082
2007	0.095	0.086	0.066	0.084
2008	0.098	0.089	0.069	0.086
2009	0.101	0.092	0.071	0.089
2010	0.099	0.090	0.069	0.087
2011	0.097	0.088	0.068	0.085
2012	0.095	0.087	0.067	0.084
2013	0.093	0.085	0.065	0.082
2014	0.091	0.083	0.064	0.081
2015	0.090	0.082	0.063	0.079
2016	0.088	0.080	0.062	0.078
2017	0.087	0.079	0.061	0.077
2018	0.085	0.077	0.060	0.075

Silicon Valley Power (City of Santa Clara)

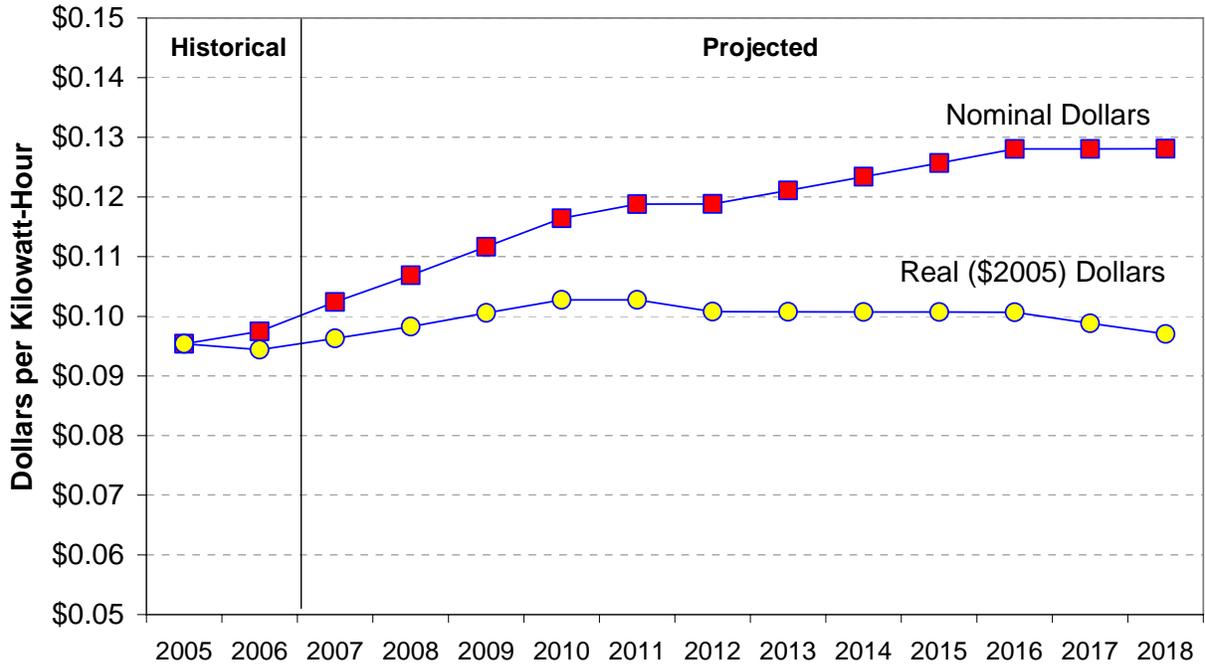
	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (nominal dollars)				
2005	0.078	0.111	0.075	0.089	0.077
2006	0.080	0.114	0.076	0.093	0.078
2007	0.089	0.126	0.084	0.102	0.086
2008	0.090	0.128	0.086	0.104	0.088
2009	0.093	0.132	0.088	0.107	0.090
2010	0.096	0.136	0.091	0.110	0.093
2011	0.097	0.138	0.092	0.112	0.094
2012	0.097	0.138	0.092	0.112	0.094
2013	0.097	0.138	0.092	0.112	0.094
2014	0.097	0.138	0.092	0.112	0.094
2015	0.097	0.138	0.092	0.112	0.094
2016	0.097	0.138	0.092	0.112	0.094
2017	0.097	0.138	0.092	0.112	0.094
2018	0.097	0.138	0.092	0.112	0.094

	Residential	Commercial	Industrial	Other	System Average
	Dollars per kWh (2005 dollars)				
2005	0.078	0.111	0.075	0.089	0.077
2006	0.078	0.110	0.074	0.090	0.075
2007	0.083	0.118	0.079	0.096	0.081
2008	0.083	0.117	0.079	0.096	0.080
2009	0.084	0.119	0.079	0.097	0.081
2010	0.085	0.120	0.080	0.097	0.082
2011	0.084	0.119	0.080	0.097	0.081
2012	0.082	0.117	0.078	0.095	0.080
2013	0.081	0.114	0.077	0.093	0.078
2014	0.079	0.112	0.075	0.091	0.077
2015	0.078	0.110	0.074	0.090	0.075
2016	0.076	0.108	0.073	0.088	0.074
2017	0.075	0.106	0.071	0.086	0.073
2018	0.074	0.104	0.070	0.085	0.071

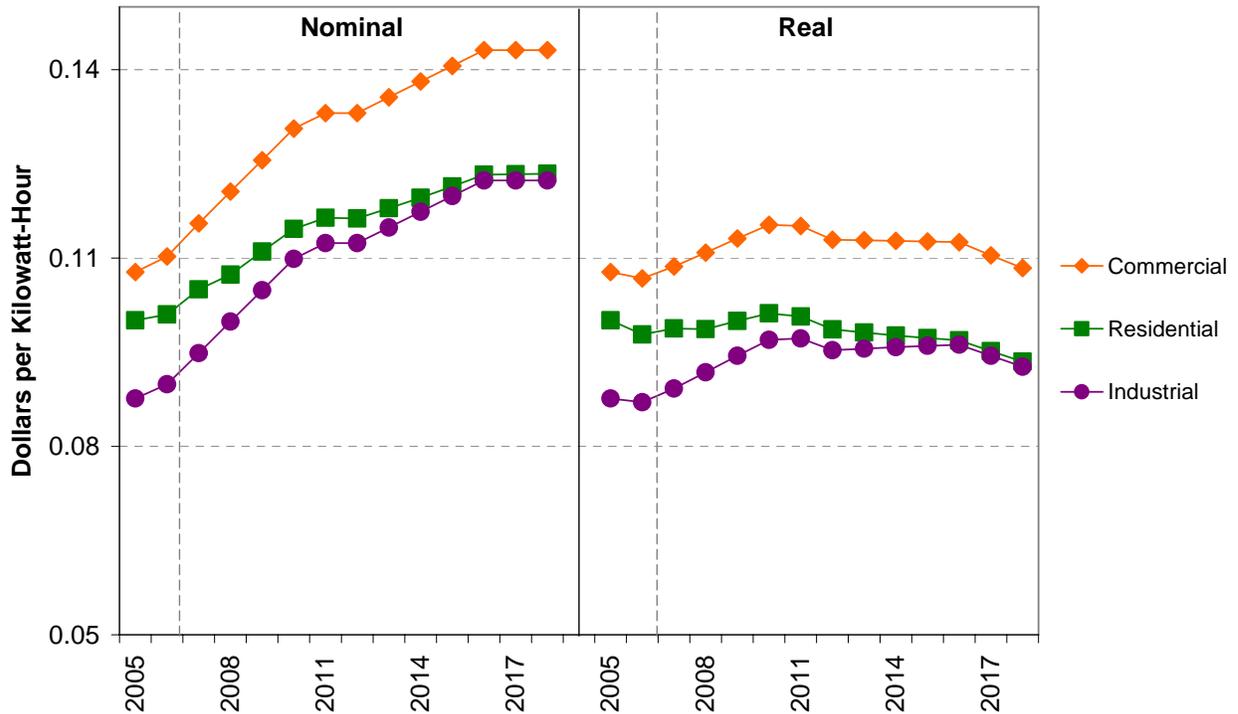
APPENDIX C

OTHER PUBLICLY OWNED UTILITIES' CHARTS

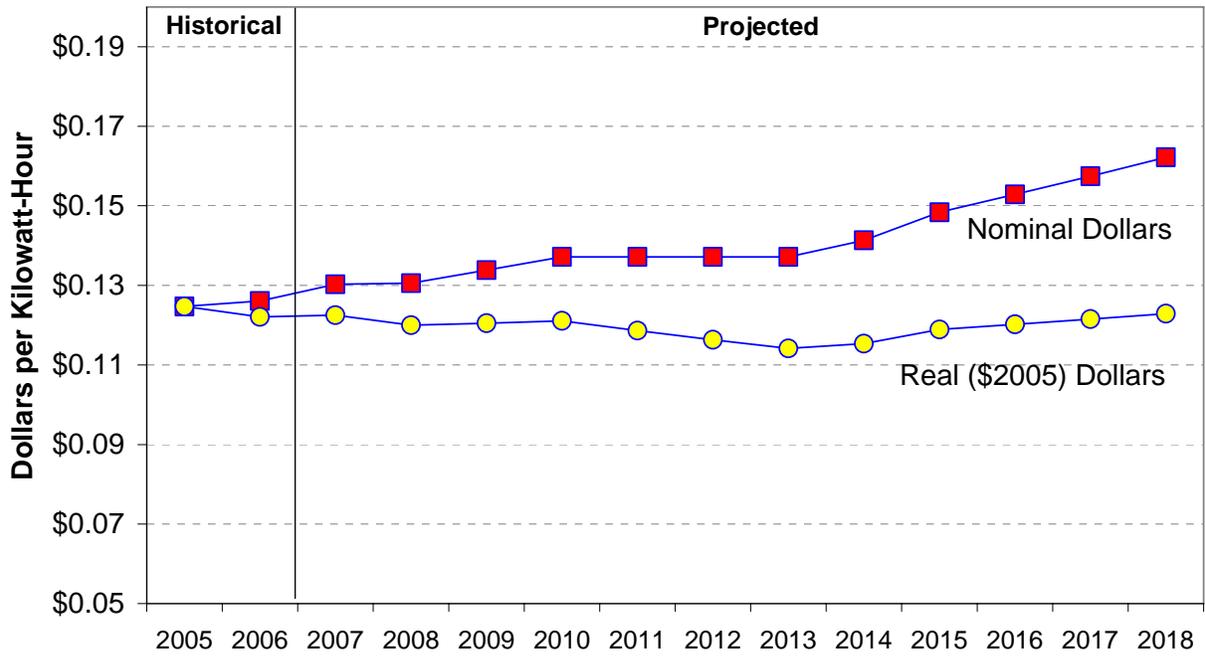
Anaheim Public Utilities System Average Prices, 2005 to 2018



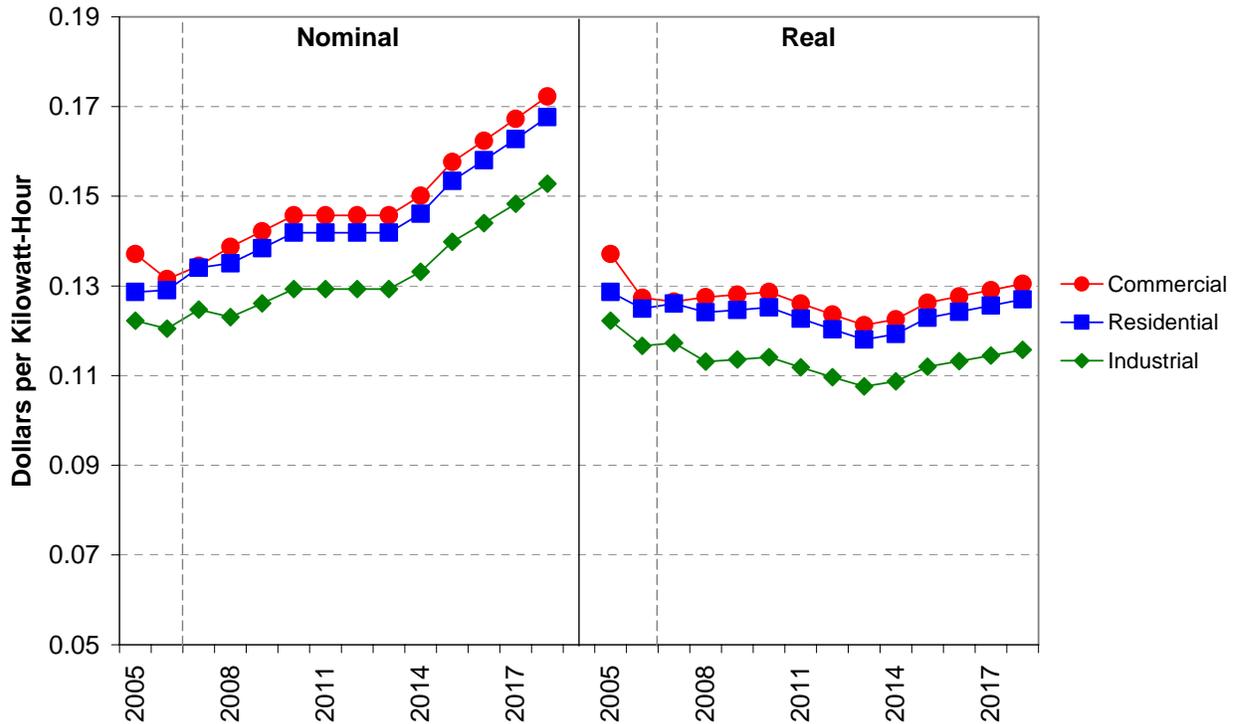
Class Average Prices, 2005 to 2018



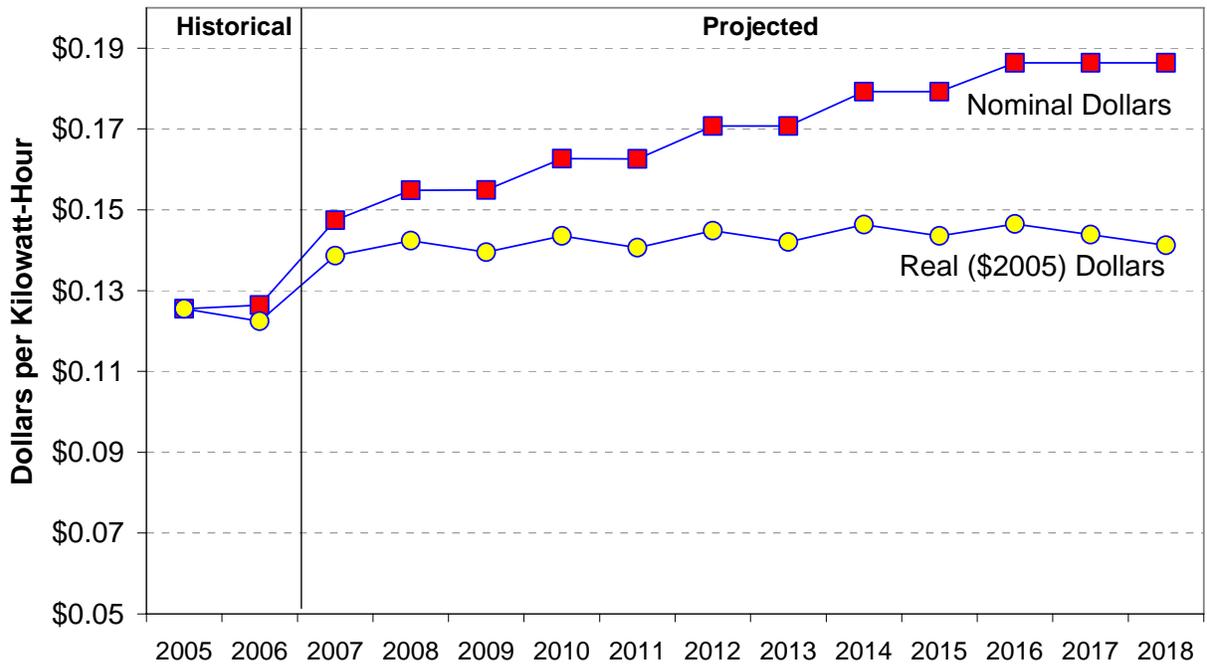
Burbank Water and Power System Average Prices, 2005 to 2018



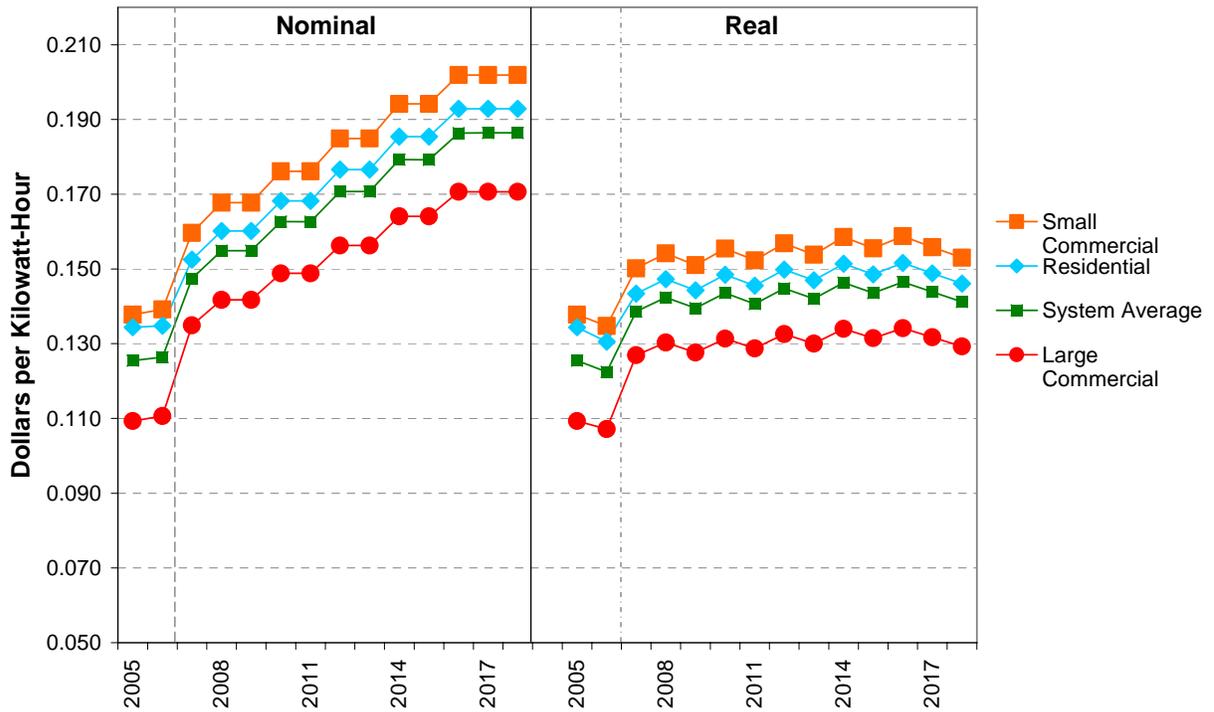
Class Average Prices, 2005 to 2018



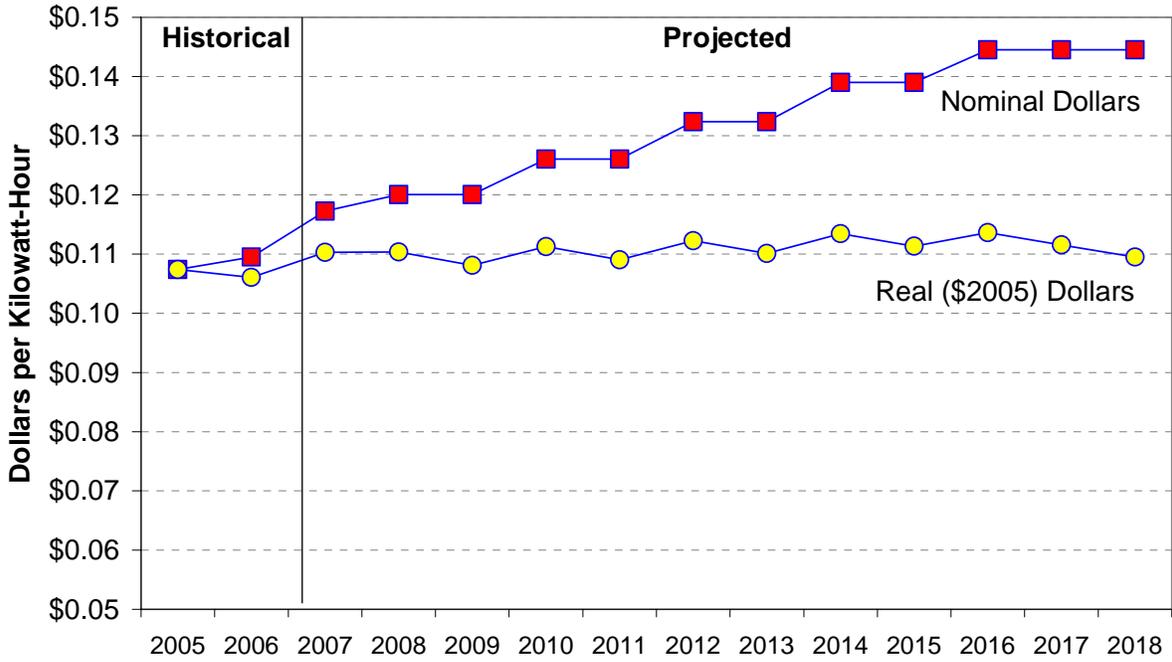
Glendale Water and Power System Average Prices, 2005 to 2018



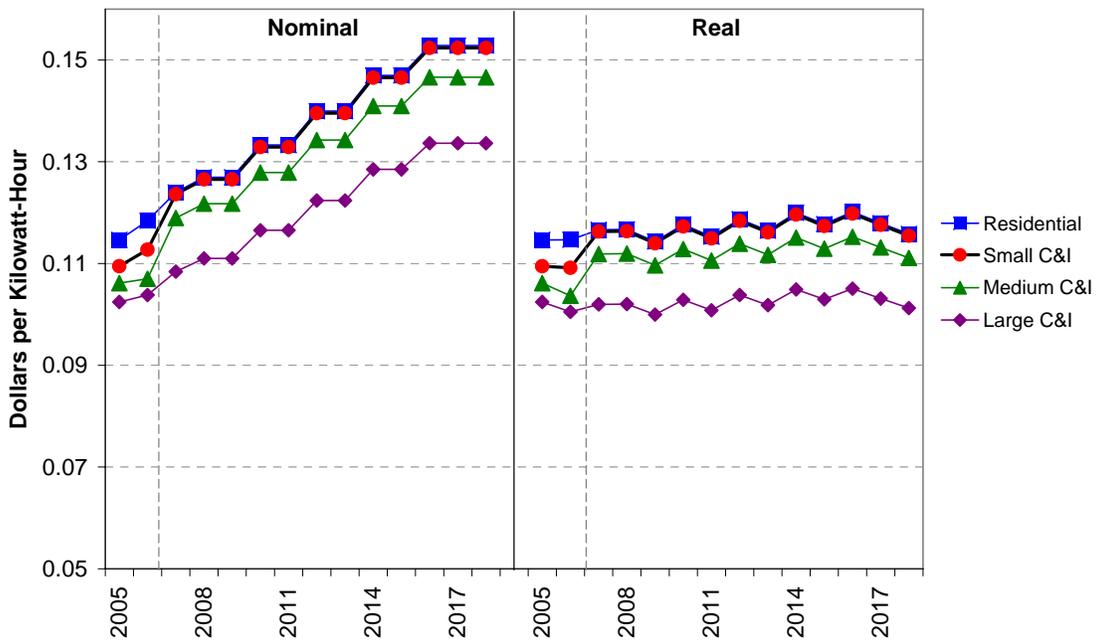
Class Average Prices, 2005 to 2018



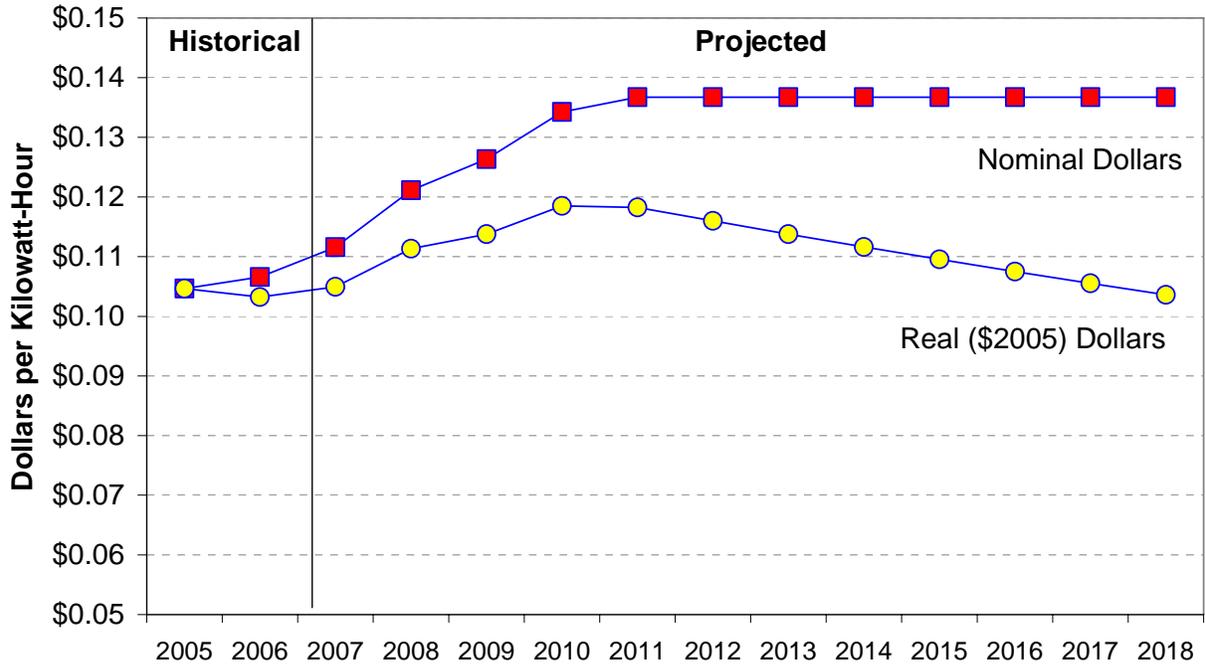
**Pasadena Water and Power
System Average Prices, 2005 to 2018**



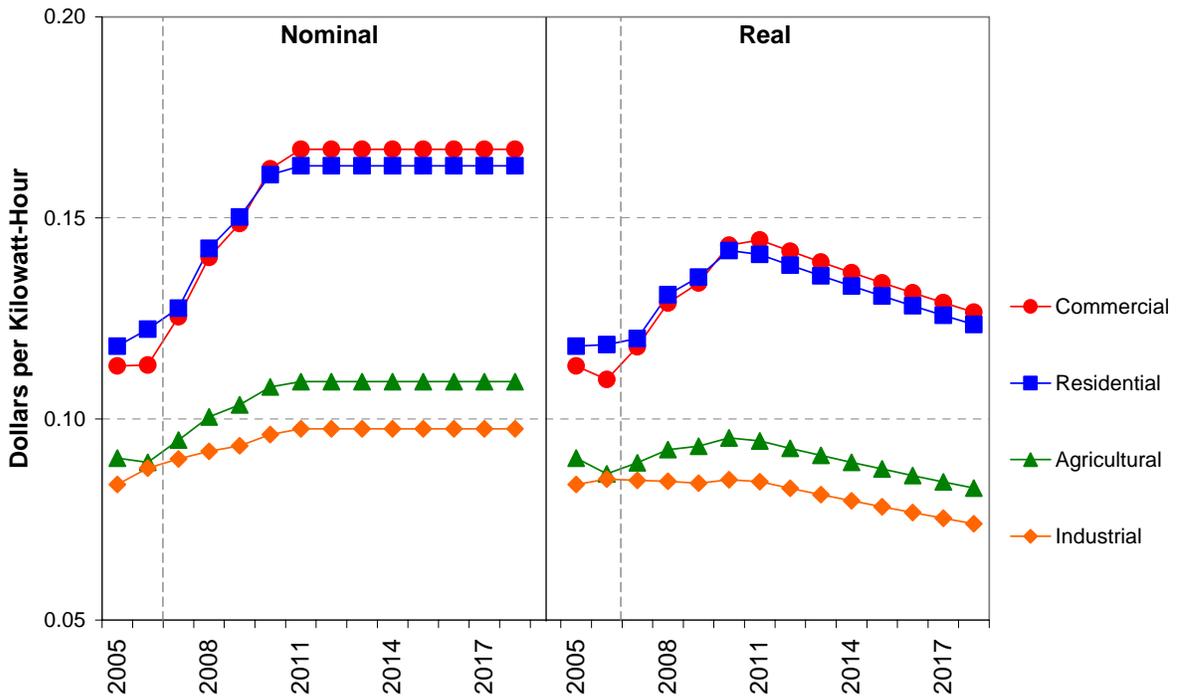
Class Average Prices, 2005 to 2018



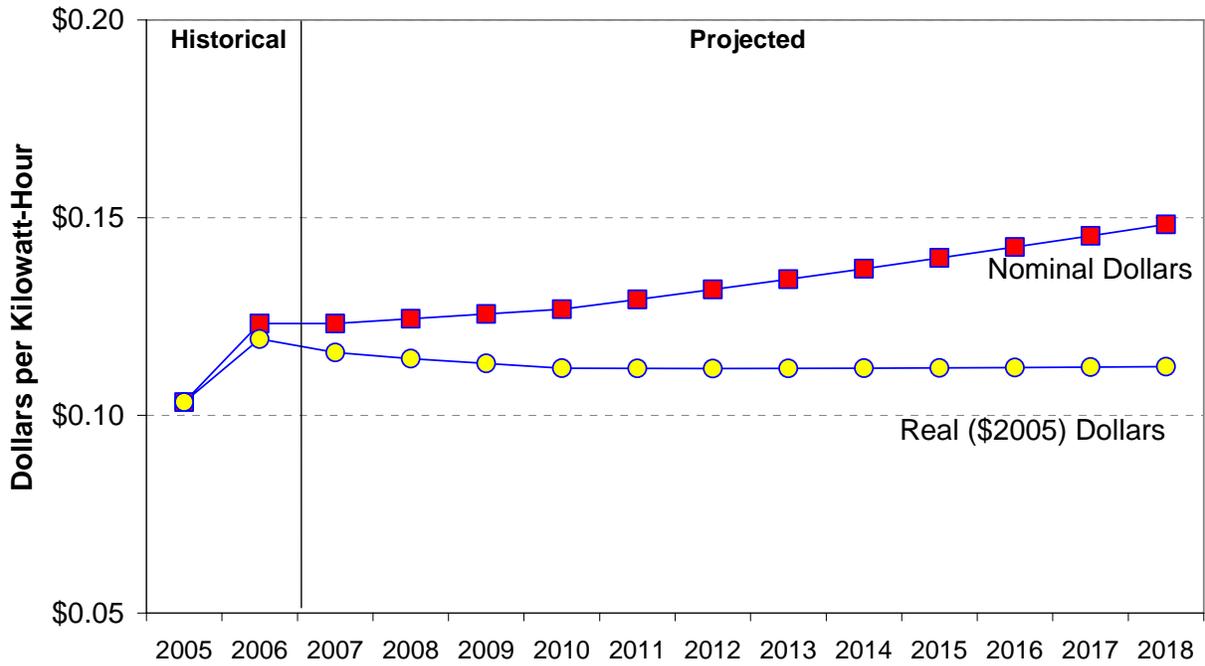
**Riverside Public Utilities
System Average Prices, 2005 to 2018**



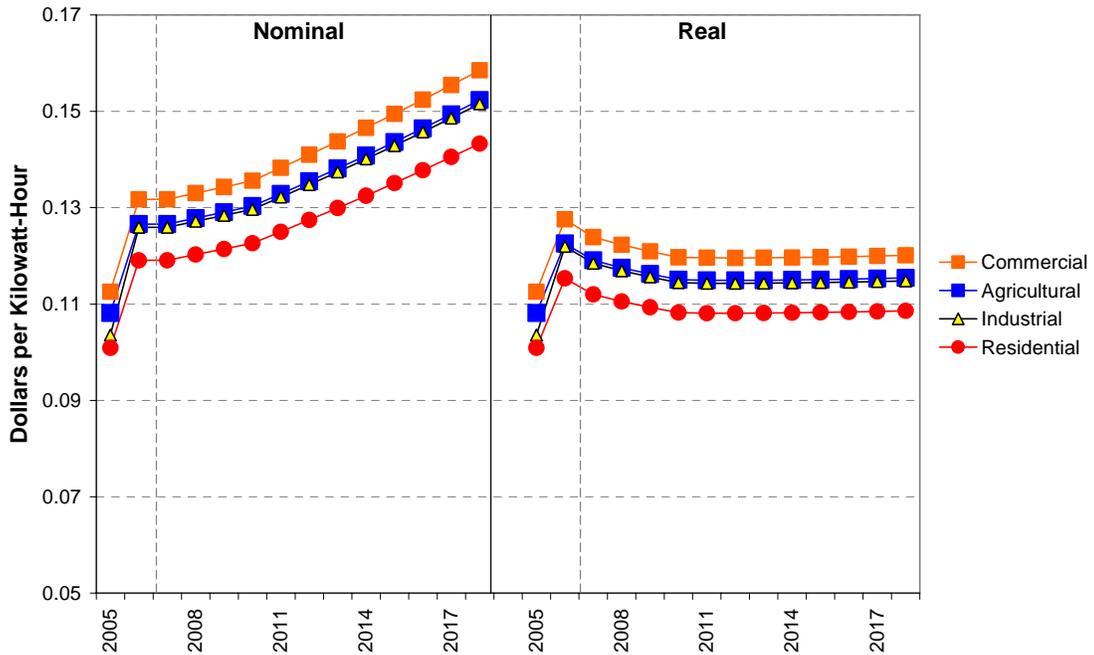
Class Average Prices, 2005 to 2018



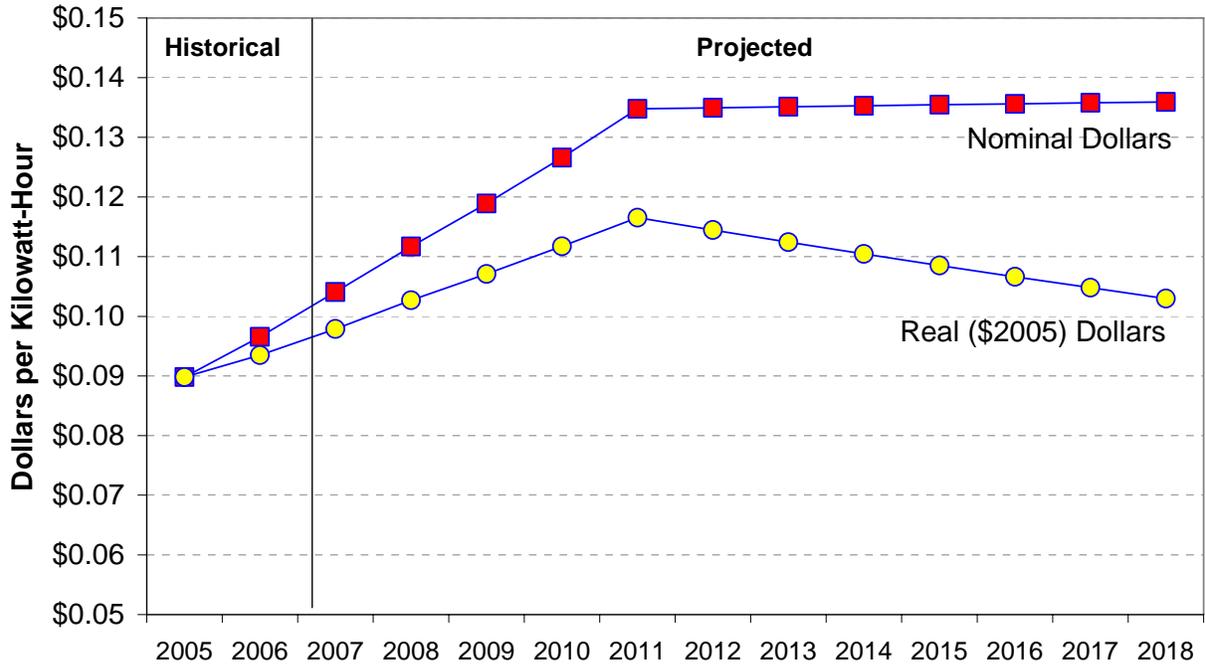
Imperial Irrigation District System Average Prices, 2005 to 2018



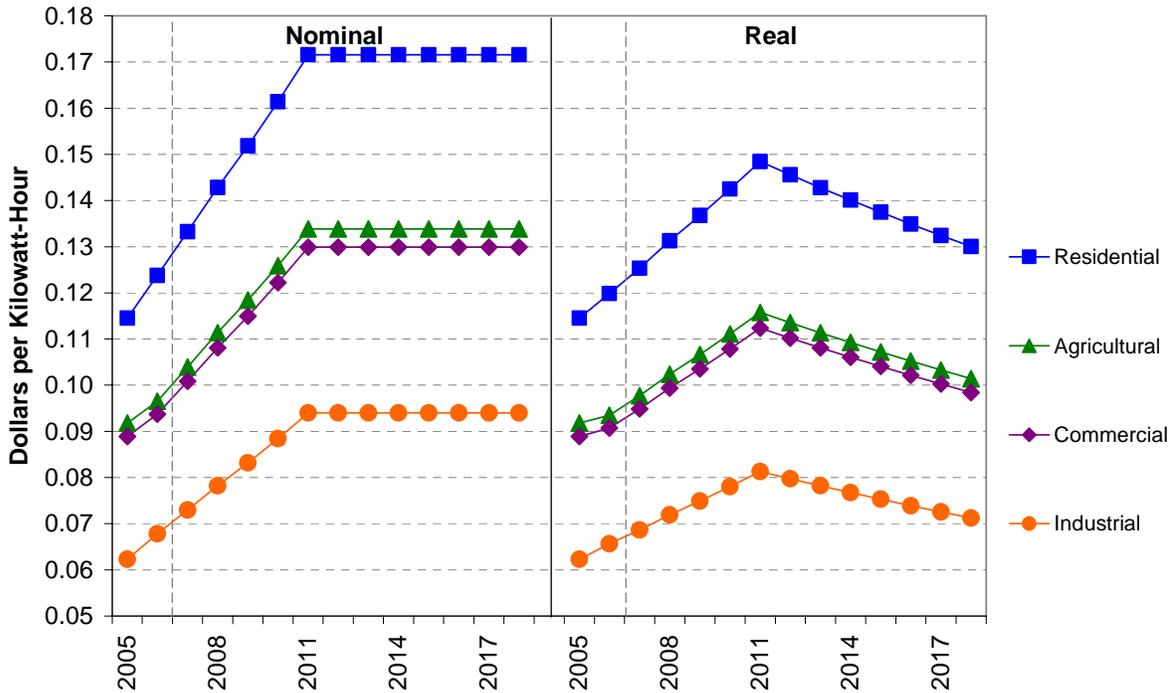
Class Average Prices, 2005 to 2018



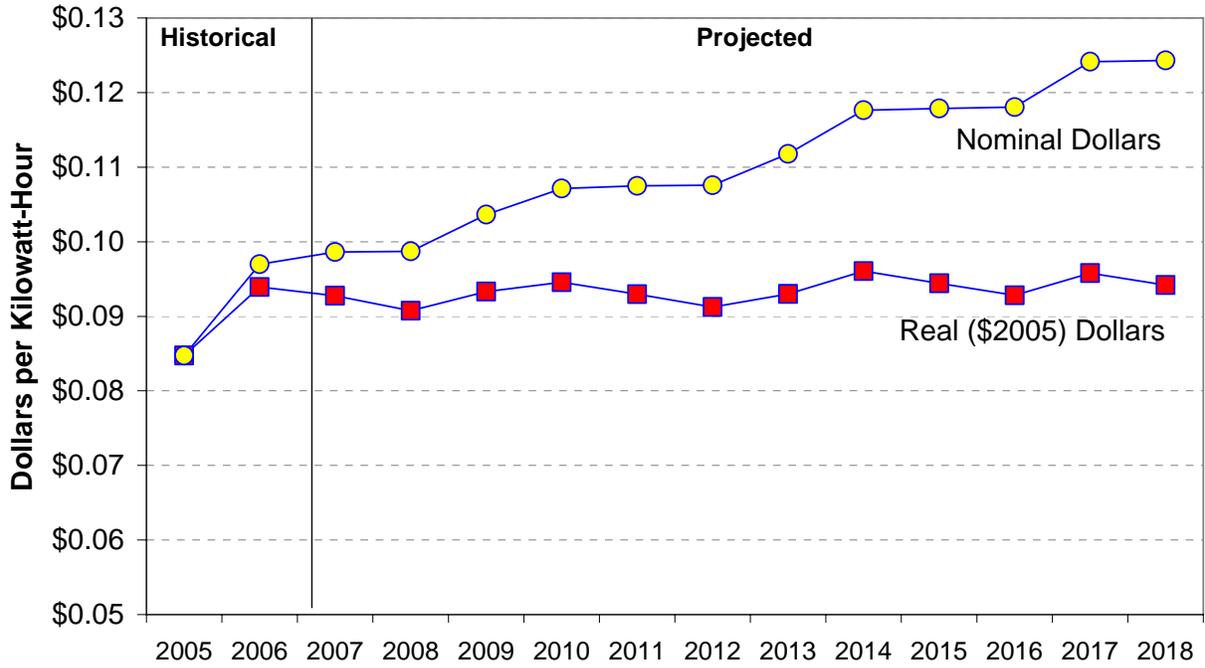
Modesto Irrigation District System Average Prices, 2005 to 2018



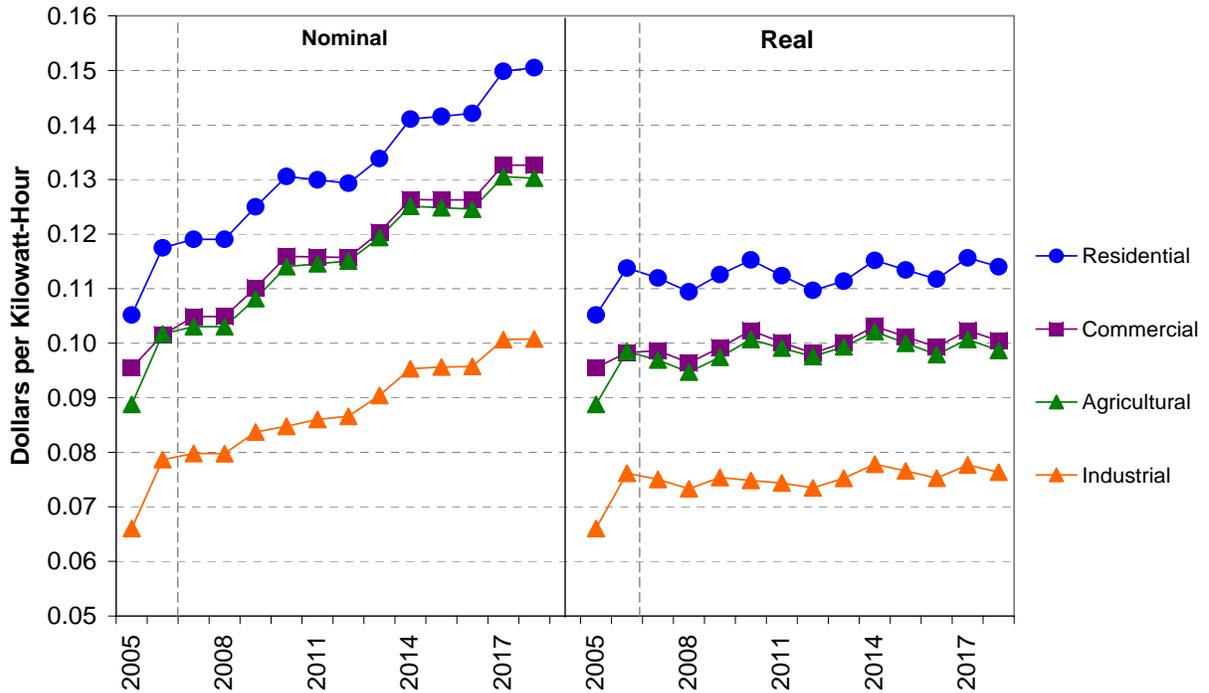
Class Average Prices, 2005 to 2018



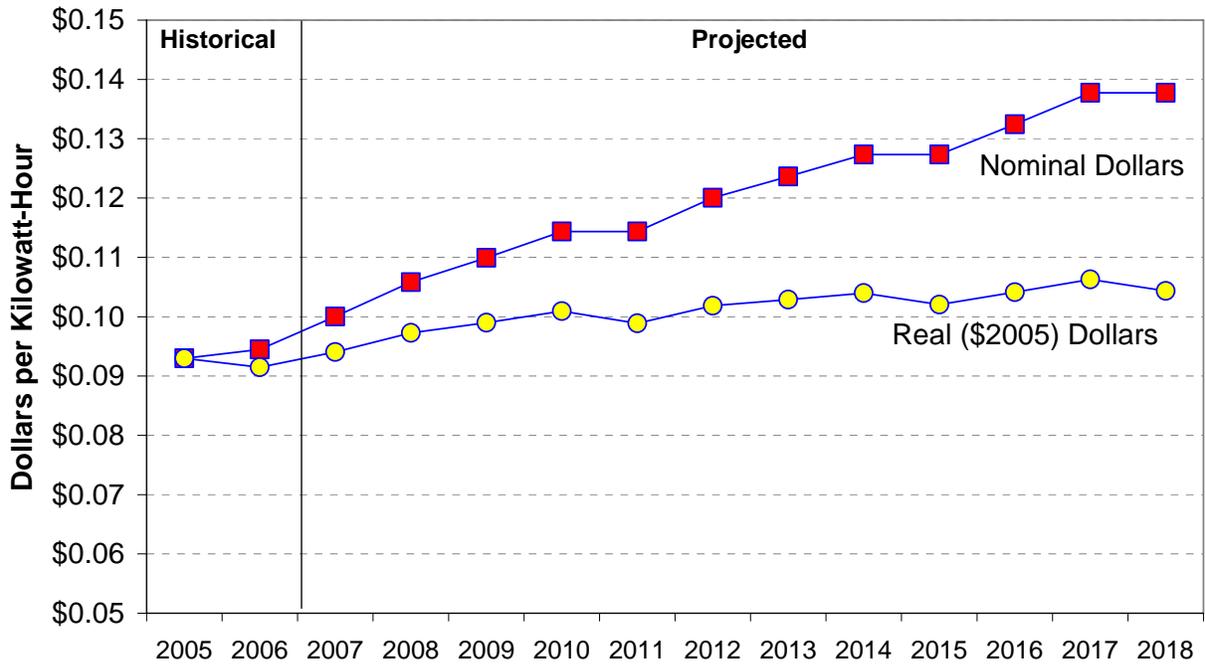
Turlock Irrigation District System Average Prices, 2005 to 2018



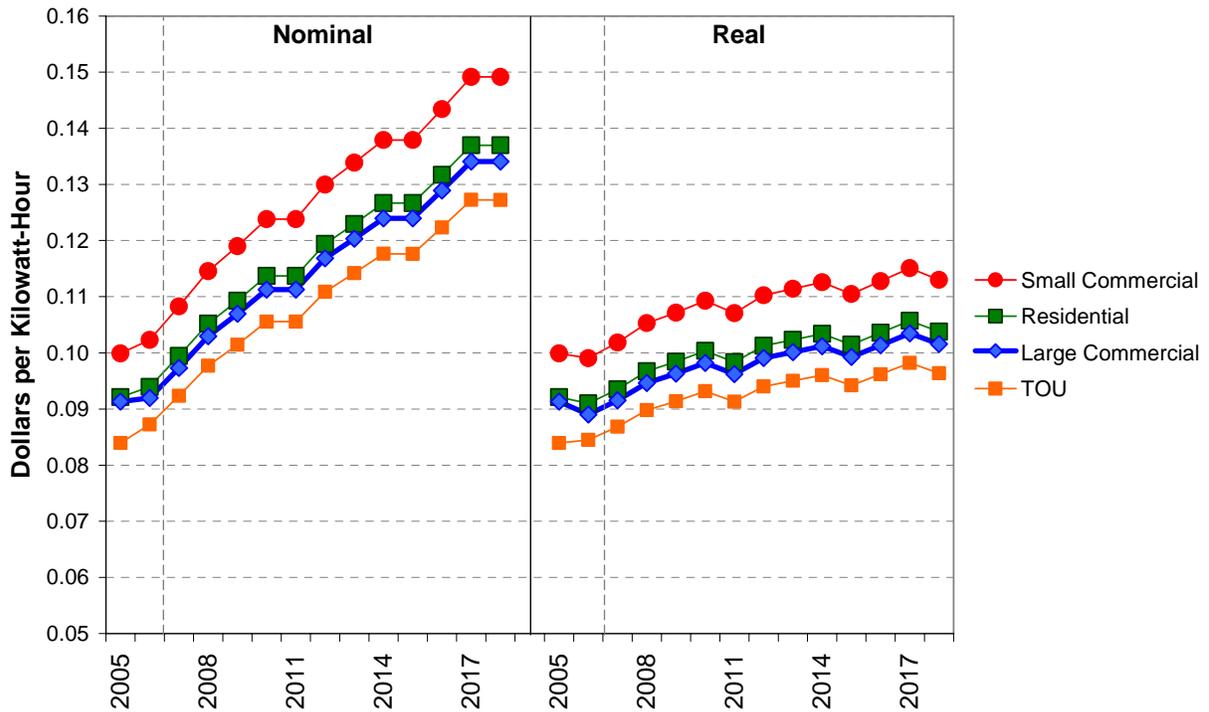
Class Average Prices, 2005 to 2018



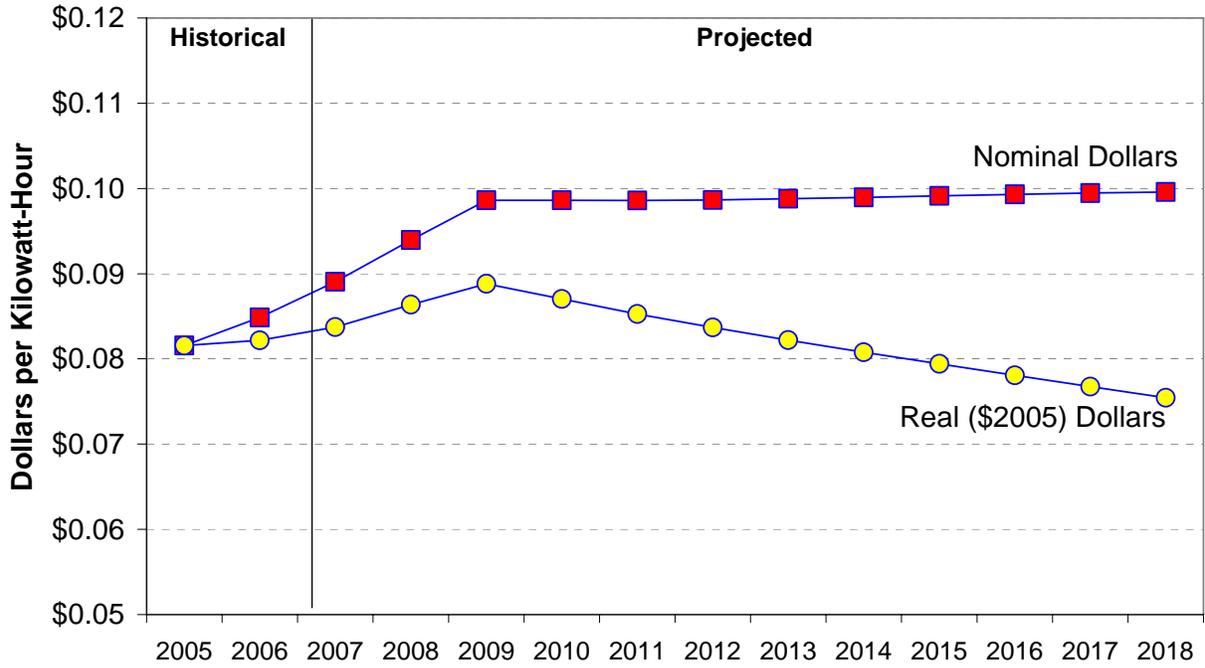
Redding Electric Utility System Average Prices, 2005 to 2018



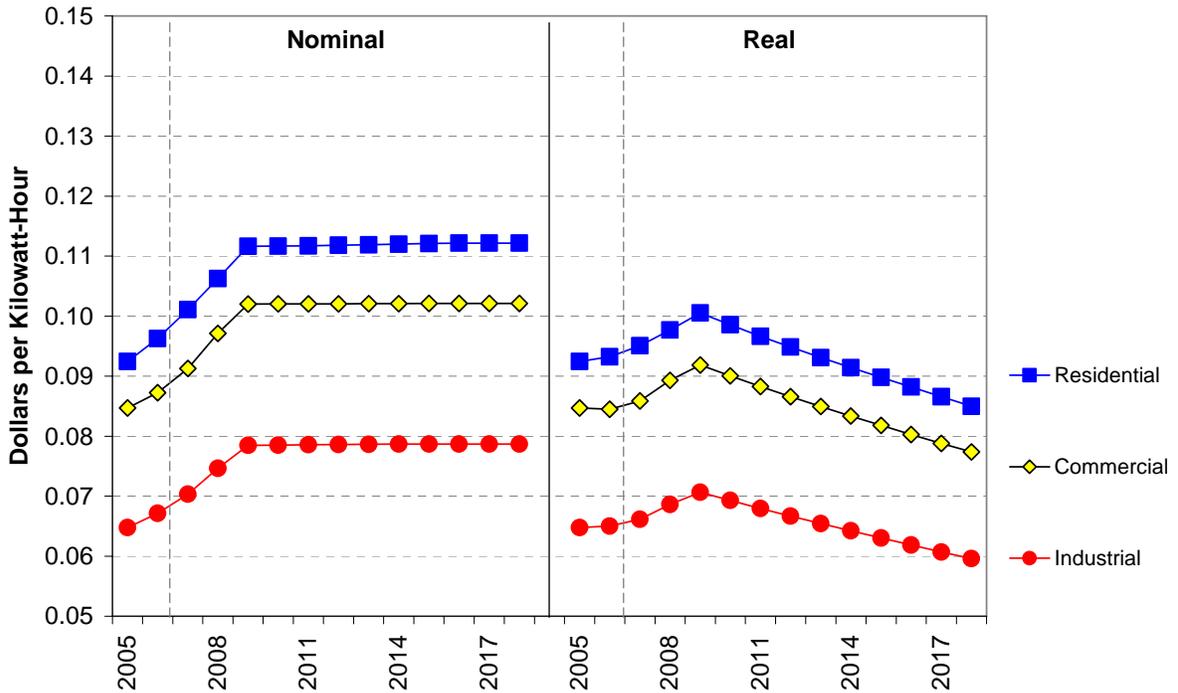
Class Average Prices, 2005 to 2018



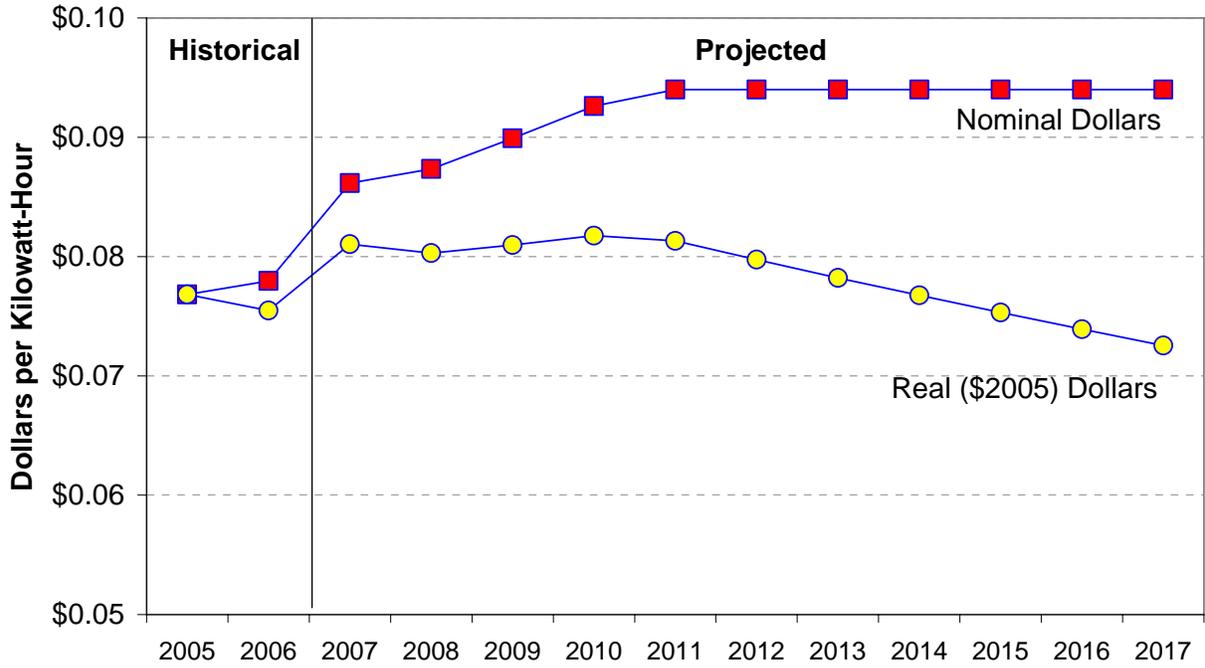
Roseville Electric System Average Prices, 2005 to 2018



Class Average Prices, 2005 to 2018



**Silicon Valley Power
System Average Prices, 2005 to 2018**



Class Average Prices, 2005 to 2018

