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STAFF REVISED FORECAST
Second Edition

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The staff's completed forms are also available on-line at
http://www.energy.ca.gov/2009publications/CEC-200-2009-012/index.html

Abstract

The *California Energy Demand 2010-2020 Staff Revised Forecast* presents 2010-2020 electricity, peak demand, and natural gas demand forecasts for each utility planning area in California and for the state as a whole. The report supports the *2007 Integrated Energy Policy Report* and the *2008 Integrated Energy Policy Report Update* analysis and recommendations. In particular, this document addresses staff progress in the measuring and attributing energy efficiency program impacts within the forecast.

The report's energy consumption and peak forecasts are lower than the 2008-2018 forecasts previously produced for the *2007 Integrated Energy Policy Report*, primarily because of worsening economic conditions. Compared to the previous forecast, projected electricity consumption is down by more than 5 percent, and peak demand is down by almost 4 percent in 2018. However, beyond the short run, electricity consumption and peak demand growth are expected to match rates projected in the *2007 Integrated Energy Policy Report.*

Keywords: Demand, consumption, weather-adjusted, peak, natural gas, self-generation, conservation, energy efficiency, California Solar Initiative, economic scenario

Executive Summary

Introduction

The *California Energy Demand 2010-2020 Staff Revised Forecast* (*CED 2009 Revised*) is an Energy Commission staff report presenting forecasts of electricity and end-user natural gas consumption and peak electricity demand for California as a whole and for each major utility planning area within the state for 2010-2020. *CED 2009 Revised* supports the analysis and recommendations in the *2007 Integrated Energy Policy Report (2007 IEPR)* and *2008 Integrated Energy Policy Report Update (2008 IEPR Update)*, including electricity and natural gas system assessments, and the analysis of progress toward increased energy efficiency. As a result of a major staff effort to improve the measurement and attribution of efficiency impacts within the energy demand forecast, *CED 2009 Revised* provides more detail on the impacts of energy efficiency programs and standards than in the past.

Summary of Changes to Forecast

The long-run forecast used in the 2007 IEPR cycle, the *California Energy Demand 2008-2018 Staff Revised Forecast*[1] (*CED 2007*), was based on 2006 peak demand and energy. For the current electricity and end-user natural gas consumption forecasts, staff added 2007 and 2008 energy consumption data to the historical series used for forecasting, while the peak demand forecast incorporates recent analysis of 2008 temperatures and peak demand at the planning area level.

As in the *California Energy Demand 2010-2020 Staff Draft Forecast*[2] (*CED 2009 Draft* or *Draft Forecast*), residential lighting was broken out as a separate end use in the *CED 2009 Draft* to better capture the impacts of residential lighting efficiency programs. For self-generation, staff refined its methods to track various technologies and individual programs. Unlike *CED 2007* and *CED 2009 Draft*, *CED 2009 Revised* includes a forecast of electricity use by dedicated electric and plug-in hybrid vehicles, provided by the Energy Commission's Fuels Office.

CED 2007 assumed constant electricity rates throughout the forecast period and increasing (by around 30 percent) natural gas rates. *CED 2009 Revised* assumes rates for electricity and natural gas increase by 15 and 10 percent, respectively, between 2010 and 2020. This corresponds to the "mid-rate" scenario forecast in *CED 2009 Draft*.

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[1] California Energy Commission, *California Energy Demand 2008–2018 Staff Revised Forecast,* November 2007, CEC-200-2007-015-SF2.

[2] California Energy Commission, *California Energy Demand 2010–2020 Staff Draft Forecast,* June 2009, CEC-200-2009-012-SD.

The increased effort to capture the effects of energy efficiency programs, along with including the expected effects of 2010-2012 investor-owned utility (IOU) programs, results in reduced forecasted energy demand in California relative to *CED 2007*. *CED 2009 Revised* provides details on staff work related to efficiency program measurement and attribution for this forecast.

Electricity Forecast Results

Table 1 compares *CED 2007* with *CED 2009 Revised* and *CED 2009 Draft* forecasts for select years. For the draft forecast, the table shows results for the mid-rate case scenario, the same set of rates used in *CED 2009 Revised*. *CED 2007* assumed constant rates throughout the forecast period. Both the energy consumption and non-coincident[3] peak forecasts are lower in *CED 2009 Revised* than in *CED 2007* over the entire forecast period, primarily due to worsening short-term economic conditions. Electricity consumption in *CED 2009 Revised* is down by more than 5 percent and peak demand by almost 4 percent by 2018 compared to *CED 2007*. However, consumption and peak demand are projected to be higher in *CED 2009 Revised* than in the draft, since predictions for economic growth are slightly more optimistic compared to a few months ago. Electricity consumption is projected to grow at a rate of 1.2 percent per year from 2010-2018, the same rate as in *CED 2007*, versus 0.7 percent per year in the draft forecast. Peak demand also grows at the same rate for 2010-2018 as in *CED 2007*, 1.3 percent annually, compared to 1.0 percent in the draft forecast.

The revised statewide forecast of electricity consumption is lower than in *CED 2007* over the entire forecast period, beginning with a dip in 2009 (**Figure 1**). This difference reflects current economic conditions, which affect the forecast through lower personal income growth, lower employment, lower industrial output, and fewer additions to commercial floor space. Most of the remaining difference between *CED 2009 Revised* and *CED 2007* comes from increased efficiency program impacts assumed in this forecast. Slightly more optimistic economic projections compared to those used in *CED 2009 Draft* along with the inclusion of an electric vehicle forecast lead to projected consumption by 2018 almost 5 percent higher in *CED 2009 Revised* than in the draft.

Figure 2 compares *CED 2009 Draft* and *CED 2009 Revised* forecasts of statewide non-coincident peak demand with *CED 2007*. As with electricity consumption, current economic conditions have a major effect in the short-term in both the draft and revised forecasts. Both forecasts show a significant reduction in peak relative to the 2007 forecast for 2010. In the longer term, beyond 2010, the growth rate in the *CED 2009 Revised* is close to that in *CED 2007*, but levels remain around 3.7 percent lower by 2018. More optimistic recent economic

[3] Statewide peaks are non-coincident; that is, they are the sum of the individual coincident peak demands for each planning area in California. These individual peaks often occur at different hours of the day. Peak demands provided in this report for individual planning areas are coincident peaks.

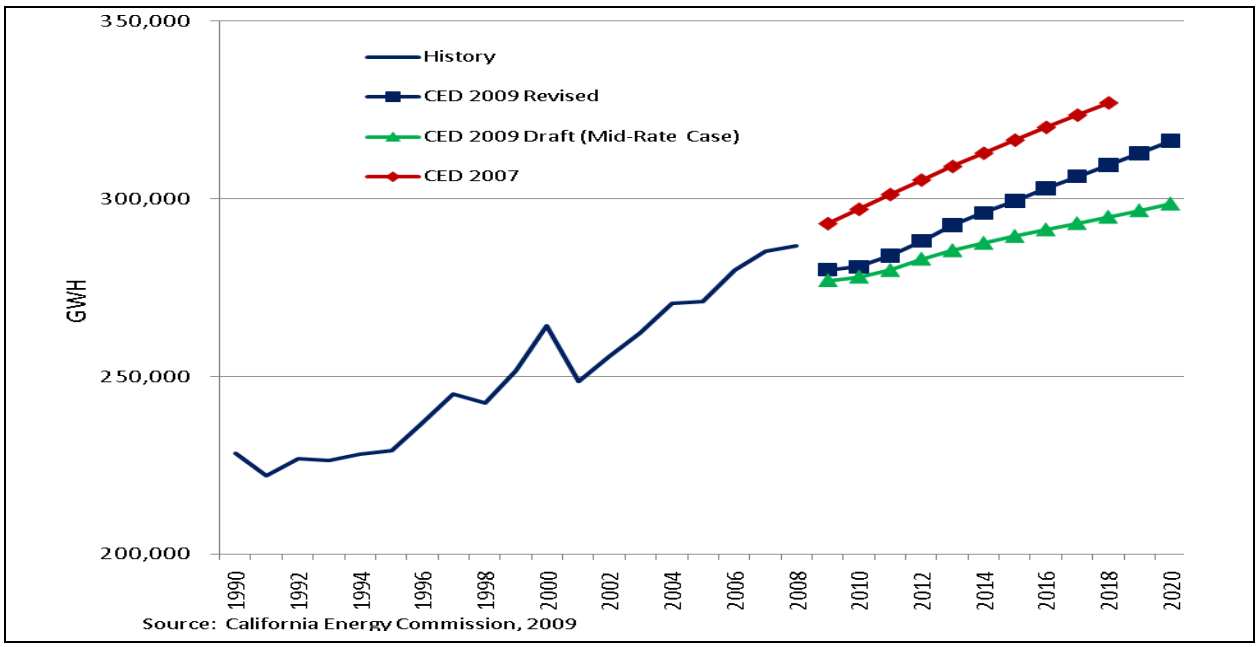
projections push the *CED 2009 Revised* forecast peak 2.5 percent higher than in the draft by the end of the forecast period. **Figure 2** also shows the load factor for the state as a whole.

Table 1: Comparison of *CED 2007*, *CED 2009 Draft*, and *CED 2009 Revised* Statewide Electricity Forecasts

Consumption					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-Rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009 Revised* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	229,868	228,473	228,473	-0.61%	0.00%
2000	265,769	264,233	264,233	-0.58%	0.00%
2008	288,976	280,184	286,771	-0.76%	2.35%
2010	297,062	278,043	280,843	-5.46%	1.01%
2015	316,575	289,493	299,471	-5.40%	3.45%
2018	327,085	294,895	309,561	-5.36%	4.97%
Average Annual Growth Rates					
1990-2000	1.46%	1.46%	1.46%		
2000-2008	1.01%	0.94%	1.03%		
2008-2010	1.39%	-0.38%	-1.04%		
2010-2018	1.21%	0.74%	1.22%		
Non-Coincident Peak					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-Rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	47,308	47,241	47,530	0.47%	0.61%
2000	53,669	53,708	53,709	0.08%	0.00%
2008	62,946	62,948	61,825	-1.78%	-1.78%
2010	64,760	62,520	62,452	-3.55%	-0.10%
2015	69,302	65,968	66,772	-3.62%	1.25%
2018	71,889	67,873	69,240	-3.68%	2.01%
Average Annual Growth Rates					
1990-2000	1.27%	1.29%	1.23%		
2000-2008	2.01%	2.00%	1.78%		
2008-2010	1.43%	-0.34%	0.51%		
2010-2018	1.31%	1.03%	1.30%		
Historical values are shaded					
GWH = gigawatt hour					
MW = megawatt					

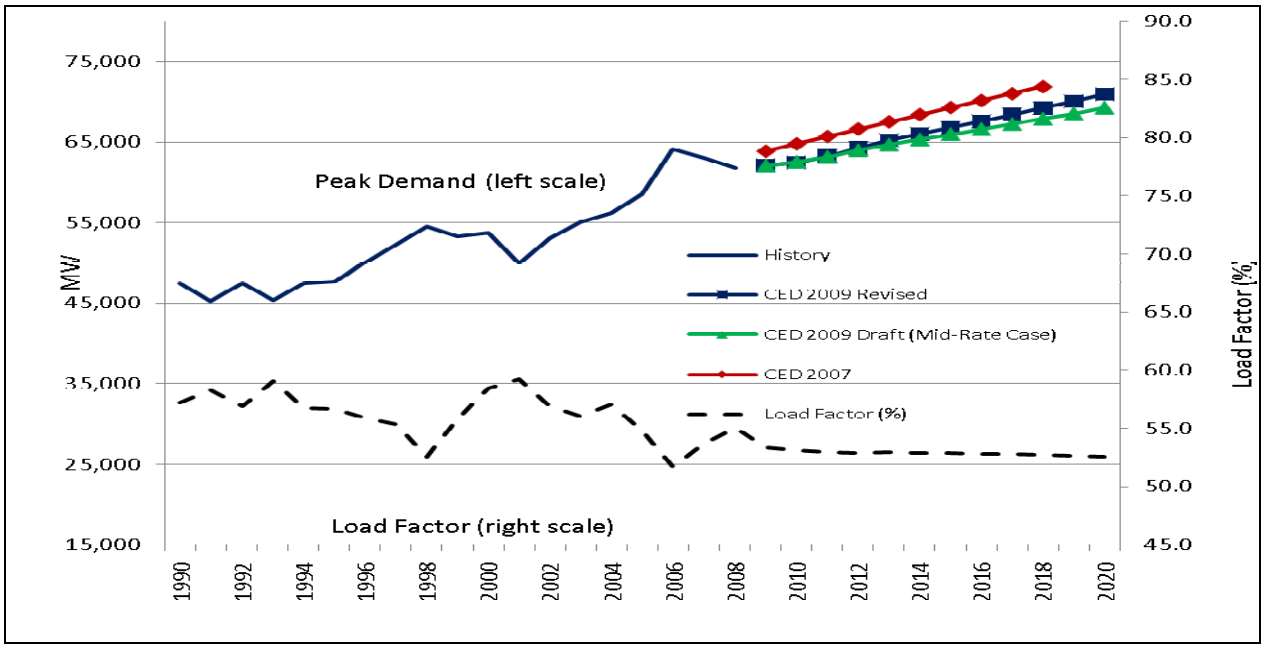
Source: California Energy Commission, 2009

Figure 1: Statewide Electricity Consumption



Source: California Energy Commission, 2009

Figure 2: Statewide Non-Coincident Peak Demand



Source: California Energy Commission, 2009

The load factor represents the relationship between average energy demand and peak: the smaller the load factor, the greater the difference between peak and average hourly demand. The load factor varies with temperature; in extremely hot years (for example, 1998 and 2006) demand is *peakier*. The general decline in the load factor over the last 20 years indicates a greater proportion of homes and businesses with central air conditioning. This trend is projected to continue over the forecast period. Energy efficiency measures, such as more efficient lighting, can also contribute to the declining load factor by reducing overall energy use while having an insignificant effect on peak demand.

End-User Natural Gas Forecast Results

CED 2009 Revised and *CED 2009 Draft* natural gas forecasts are compared with *CED 2007* for selected years (**Table 2**). These forecasts do not include natural gas used for generating electricity. As in the case of electricity, the set of rates used in the *CED 2009 Revised* forecast corresponds to the mid-rate scenario in the draft forecast; thus the comparison is made to the draft mid-rate case. *CED 2007* used slightly higher rates, roughly equivalent to those in the draft high-rate scenario.

Reported 2008 natural gas consumption for the *CED 2009 Revised* forecast is below that predicted in the draft forecast and *CED 2007*. This difference, along with a projected consumption reduction from 2008-2010 in the industrial and mining sectors, leads to a lower forecast through 2020. However, as the economy recovers beyond 2010, the growth rate exceeds those of the two previous forecasts.

Table 2: Statewide End-User Natural Gas Consumption

End-User Consumption (MM Therms)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-Rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009 Revised* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	12,893	12,893	12,893	0.00%	0.00%
2000	13,913	13,913	13,913	0.00%	0.00%
2008	13,445	12,941	12,494	-7.07%	-3.46%
2010	13,616	12,992	12,162	-10.68%	-6.48%
2015	13,932	13,218	12,751	-8.48%	-3.54%
2018	14,058	13,319	12,894	-8.28%	-3.20%
Average Annual Growth Rates					
1990-2000	0.76%	0.76%	0.76%		
2000-2008	-0.55%	-0.73%	-1.11%		
2008-2010	0.63%	0.19%	-1.34%		
2010-2018	0.40%	0.31%	0.73%		
Historical values are shaded					
End-user consumption excludes natural gas used to generate electricity					

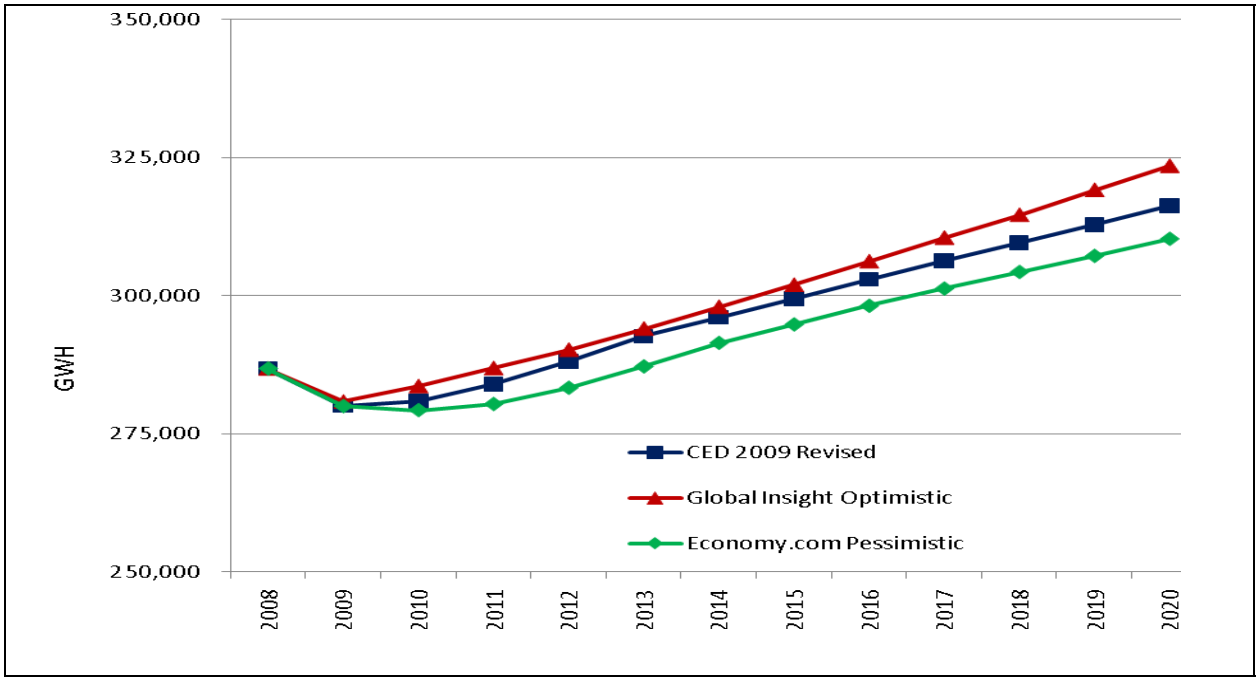
Source: California Energy Commission, 2009

Economic Scenarios

The results presented above rely on economic inputs from a *base case* economic scenario provided by Moody's Economy.com (Economy.com). Staff also examined the effects of two alternative economic scenarios for California electricity demand: an *optimistic* case provided by IHS Global Insight and an Economy.com *pessimistic* case. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. **Figure 3** shows the projected impacts of the optimistic and pessimistic scenarios on statewide consumption. Peak demand was developed by applying projected load factors from the *CED 2009 Revised* forecast at the planning area and sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 4**.

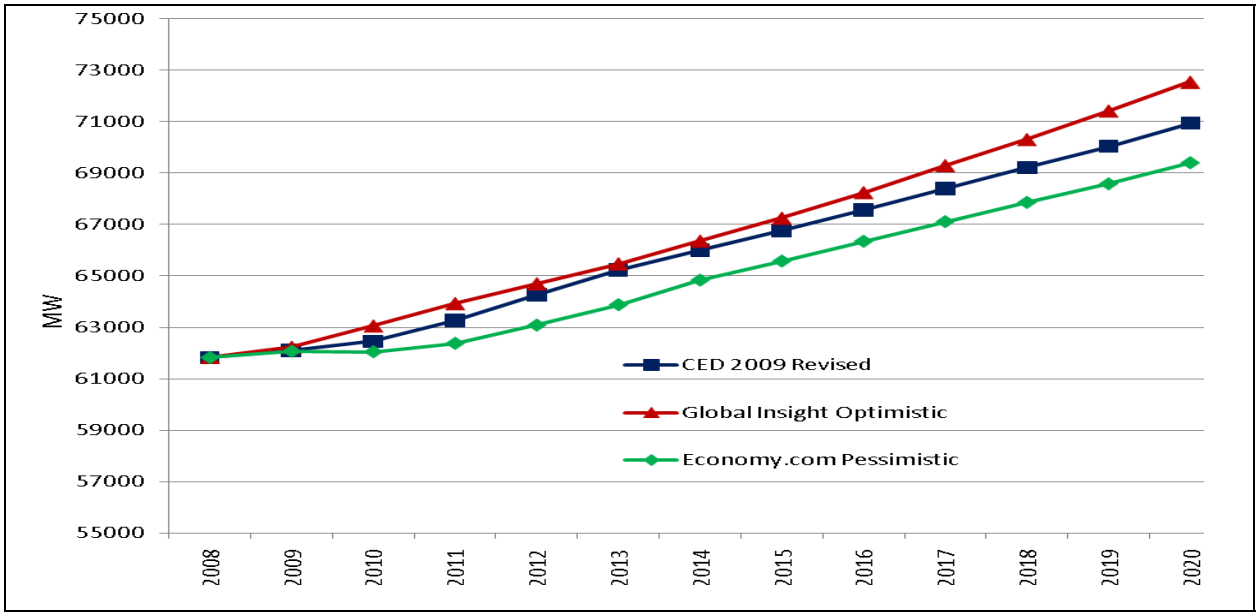
Electricity consumption is projected to be 2.3 percent higher in the optimistic economic case than in the *CED 2009 Revised* forecast by 2020 and 1.9 percent lower in the pessimistic scenario. The peak demand forecast increases by 2.3 percent under the optimistic scenario by 2020 and falls by 2.2 percent in the pessimistic case. The percentage of peak reduction is more than consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.2 percent and 1.3 percent, respectively, to 1.3 percent and 1.4 percent in the optimistic case, and fall to 1.1 percent each under the pessimistic scenario.

Figure 3: Projected Statewide Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 4: Projected Statewide Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



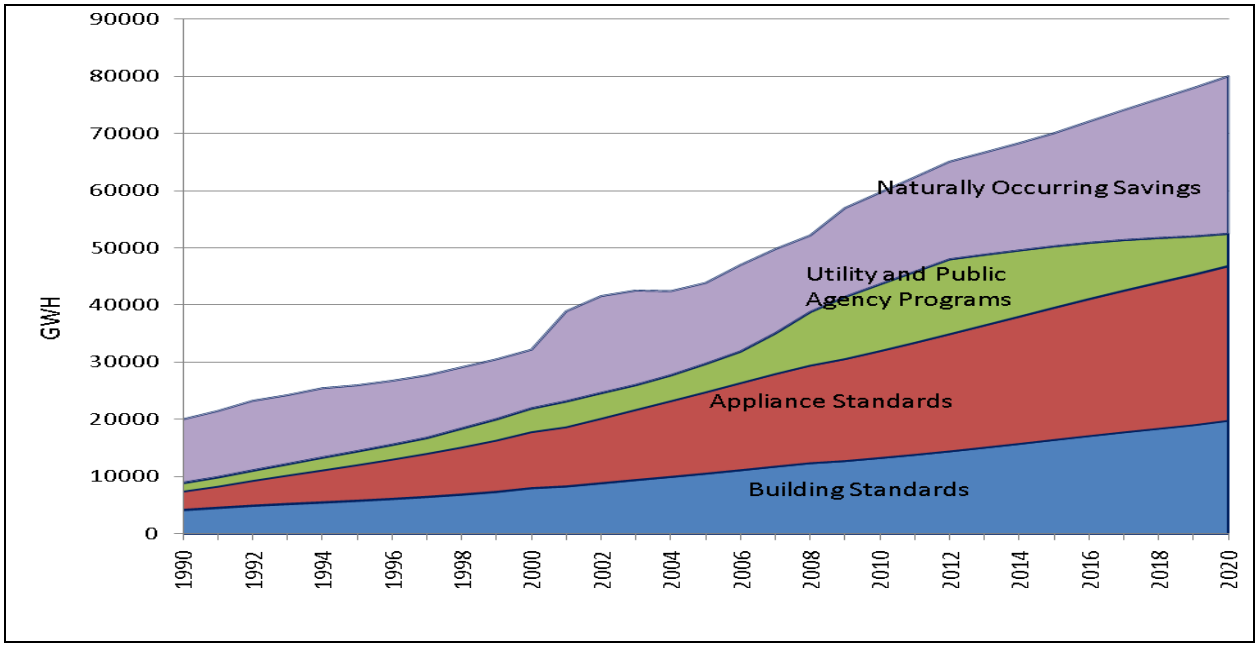
Source: California Energy Commission, 2009

Conservation/Efficiency

With the state's adoption of the first *Energy Action Plan (EAP)* in 2003, energy efficiency became the resource of first choice for meeting the state's future energy needs. Assembly Bill 2021 (Levine, Chapter 734, Statutes of 2006) set a statewide goal of reducing total forecasted electricity consumption by 10 percent over the next 10 years. Under AB 2021, the Energy Commission, in consultation with the California Public Utilities Commission (CPUC), is responsible for setting annual statewide efficiency targets in a public process using the most recent investor-owned and publicly owned utility targets. These targets, combined with California's greenhouse gas emission reduction goals, make it essential for the Energy Commission to properly account for energy efficiency impacts when forecasting future electricity and natural gas demand.

Much time and effort was put into refining the staff's forecasting methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Figure 5** shows electricity consumption savings estimates incorporated in *CED 2009 Revised* for building and appliance standards, utility and public agency programs, and *naturally occurring* savings, or savings associated with rate changes and market trends not directly related to programs or standards.

Figure 5: Efficiency/Conservation Consumption Savings by Source



Source: California Energy Commission, 2009

CHAPTER 1: Statewide Forecast Results and Methods

Introduction

The *California Energy Demand 2010-2020 Staff Revised Forecast* (*CED 2009 Revised*), an Energy Commission staff report, presents forecasts of electricity and end-user natural gas consumption and peak electricity demand for California as a whole and for each major utility planning area within the state for 2010-2020. *CED 2009 Revised* supports the analysis and recommendations in the *2007 Integrated Energy Policy Report (2007 IEPR)* and *2008 Integrated Energy Policy Report Update (2008 IEPR Update)*, including electricity and natural gas system assessments as well as analysis of progress towards increased energy efficiency. As a result of a major staff effort to improve the measurement and attribution of efficiency impacts within the energy demand forecast, this report provides more detail on the effects of energy efficiency programs and standards than in the past.

Energy Commission staff conducted a workshop on June 26, 2009, to receive public comments on the staff draft forecast[4] (*CED 2009 Draft*, or *draft forecast)*. Staff revised the draft forecast to address many of the comments received, as well as direction from the IEPR Committee. Further comments received during an IEPR workshop on September 21, 2009 were incorporated for this final version of the forecast.

CED 2009 Revised will be used in a number of applications, including the California Public Utilities Commission (CPUC) 2010 procurement process. The CPUC has identified the IEPR process as "the appropriate venue for considering issues of load forecasting, resource assessment, and scenario analyses, to determine the appropriate level and ranges of resource needs for load serving entities in California."[5] *CED 2009 Revised* will also be an input to California Independent System Operator (California ISO) controlled grid studies and other transmission planning studies and in the *California Gas Report*[6] and electricity supply-demand assessments.

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[4] California Energy Commission, *California Energy Demand 2010-2020 Staff Draft Forecast*, June 2009, CEC-200-2009-012SD.

[5] California Public Utilities Commission, Assigned Commissioner's Ruling On Interaction Between The CPUC Long-Term Planning Process And The California Energy Commission Integrated Energy Policy Report Process, September 9, 2004 Rulemaking 04-04-003.

[6] The *California Gas Report,* prepared by California electric and gas utilities in compliance with California Public Utilities Commission Decision D.95-01-039.

Summary of Changes to Forecast

The long-run forecast used in the 2007 IEPR cycle, *California Energy Demand 2008-2018 Staff Revised Forecast*[7] (*CED 2007*), was based on 2006 peak demand and energy. For the current electricity and end-user natural gas consumption forecasts, staff added 2007 and 2008 energy consumption data to the historical series used for forecasting. The peak demand forecast incorporates recent analysis of 2008 temperatures and peak demand at the planning area level.

As in *CED 2009 Draft*, residential lighting was broken out as a separate end use in *CED 2009 Revised* to better capture the effects of residential lighting efficiency programs. For self-generation, staff refined its methods to track various technologies and individual programs. Unlike *CED 2007* and *CED 2009 Draft*, *CED 2009 Revised* includes a forecast of electricity use by dedicated electric and plug-in hybrid vehicles, provided by the Energy Commission's Fuels Office.

CED 2007 assumed constant electricity rates throughout the forecast period and increasing (by around 30 percent) natural gas rates. *CED 2009 Revised* assumes rates for electricity and natural gas increase by 15 and 10 percent, respectively, between 2010 and 2020. This corresponds to the *mid-rate* scenario forecast in *CED 2009 Draft*.

The increased effort to capture the impacts of energy efficiency programs, along with including the expected effects of 2010-2012 (formerly 2009-2011) utility programs, helps reduce forecasted energy demand in the investor-owned utility (IOU) service territories relative to *CED 2007*. Chapter 8 provides details on staff work related to efficiency program measurement and attribution for this forecast.

Changes From CED 2009 Draft to CED 2009 Revised

For *CED 2009 Revised*, staff updated the economic projections used in *CED 2009 Draft*. In addition, staff developed alternative economic scenarios for *CED 2009 Revised*. *CED 2009 Revised* incorporates one rather than three sets of electricity and natural gas rates, the mid-rate scenario used in *CED 2009 Draft*.[8]

Commercial floor space, a key input for the Commercial Model, was projected using the method developed for *CED 2007*[9], rather than a more recent model developed for *CED 2009*

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[7] California Energy Commission, *California Energy Demand 2008–2018 Staff Revised Forecast*, November 2007, CEC-200-2007-015-SF2.

[8] In *CED 2009 Draft*, three price scenarios were developed for electricity and natural gas rates: high rates, low (constant) rates, and a rate scenario in between the two, the "mid-rate" case.

[9] California Energy Commission, *California Energy Demand 2008–2018 Staff Revised Forecast*, November 2007, CEC-200-2007-015-SF2, pp. 21-23.

Draft. Staff was concerned that application of the newer method may have led to unrealistically low commercial energy output. The newer model does have potential as an effective projection tool and staff will attempt to correct the current problems and use the model in the future.

Measured utility efficiency program energy savings in *CED 2009 Revised* include updated estimates for both the publicly owned and investor-owned utilities (IOUs). In *CED 2009 Draft*, staff relied on publicly owned utility estimates made for *CED 2007*. In addition, staff has incorporated in *CED 2009 Revised* the recent decision by the CPUC to shift the 2009-2011 IOU program cycle to 2010-2012.[10] The forecast for self-generation energy production was updated to incorporate 2009 installations and pending installations.

Statewide Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* forecasts of statewide electricity consumption and peak demand are lower than *CED 2007* levels because of the economic downturn and increased efficiency impacts but higher than in *CED 2009 Draft*.
- Per capita electricity consumption and peak demand in California are projected to be lower than in *CED 2007* but higher than in *CED 2009 Draft*.
- The largest percentage reductions in electricity consumption and peak demand relative to *CED 2007* occur in the residential and commercial sectors.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by around 2 percent in 2020.
- Self-generation impacts are projected to be higher than in *CED 2007* and *CED 2009 Draft*, mainly because of increased adoption of photovoltaic systems.
- Statewide electricity consumption from dedicated electric vehicles and plug-in hybrids is projected to reach around 4,400 GWH by 2020.

Table 3 compares the revised and draft forecasts for select years with *CED 2007*. For *CED 2009 Draft*, the table shows results for the mid-rate case scenario, the same set of rates used in *CED 2009 Revised*. The 2007 forecast assumed constant rates throughout the forecast period. Both the energy consumption and peak forecasts are lower in *CED 2009 Revised* than in *CED 2007* over the entire forecast period, primarily due to worsening short-term economic conditions. Electricity consumption in *CED 2009 Revised* is down by more than 5 percent and peak demand by almost 4 percent by 2018 compared to *CED 2007*. However, consumption and peak demand are projected to be higher in *CED 2009 Revised* than in the

[10] Decision D.09-09-047, September 24, 2009.

draft, since predictions for economic growth are slightly more optimistic compared to a few months ago. Electricity consumption is projected to grow at a rate of 1.2 percent per year from 2010-2018, the same rate as in *CED 2007*, versus 0.7 percent per year in the draft forecast. Peak demand also grows at the same rate for 2010-2018 as in *CED 2007*, 1.3 percent annually, compared to 1.0 percent in the draft forecast.

Table 3: Comparison of *CED 2007*, *CED 2009 Draft*, and *CED 2009 Revised* Statewide Electricity Forecasts

Consumption					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-Rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009 Revised* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	229,868	228,473	228,473	-0.61%	0.00%
2000	265,769	264,233	264,233	-0.58%	0.00%
2008	288,976	280,184	286,771	-0.76%	2.35%
2010	297,062	278,043	280,843	-5.46%	1.01%
2015	316,575	289,493	299,471	-5.40%	3.45%
2018	327,085	294,895	309,561	-5.36%	4.97%
Average Annual Growth Rates					
1990-2000	1.46%	1.46%	1.46%		
2000-2008	1.01%	0.94%	1.03%		
2008-2010	1.39%	-0.38%	-1.04%		
2010-2018	1.21%	0.74%	1.22%		
Non-Coincident Peak					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-Rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	47,308	47,241	47,530	0.47%	0.61%
2000	53,669	53,708	53,709	0.08%	0.00%
2008	62,946	62,948	61,825	-1.78%	-1.78%
2010	64,760	62,520	62,452	-3.55%	-0.10%
2015	69,302	65,968	66,772	-3.62%	1.25%
2018	71,889	67,873	69,240	-3.68%	2.01%
Average Annual Growth Rates					
1990-2000	1.27%	1.29%	1.23%		
2000-2008	2.01%	2.00%	1.78%		
2008-2010	1.43%	-0.34%	0.51%		
2010-2018	1.31%	1.03%	1.30%		
Historical values are shaded					
GWH = gigawatt hour					
MW = megawatt					

Source: California Energy Commission, 2009

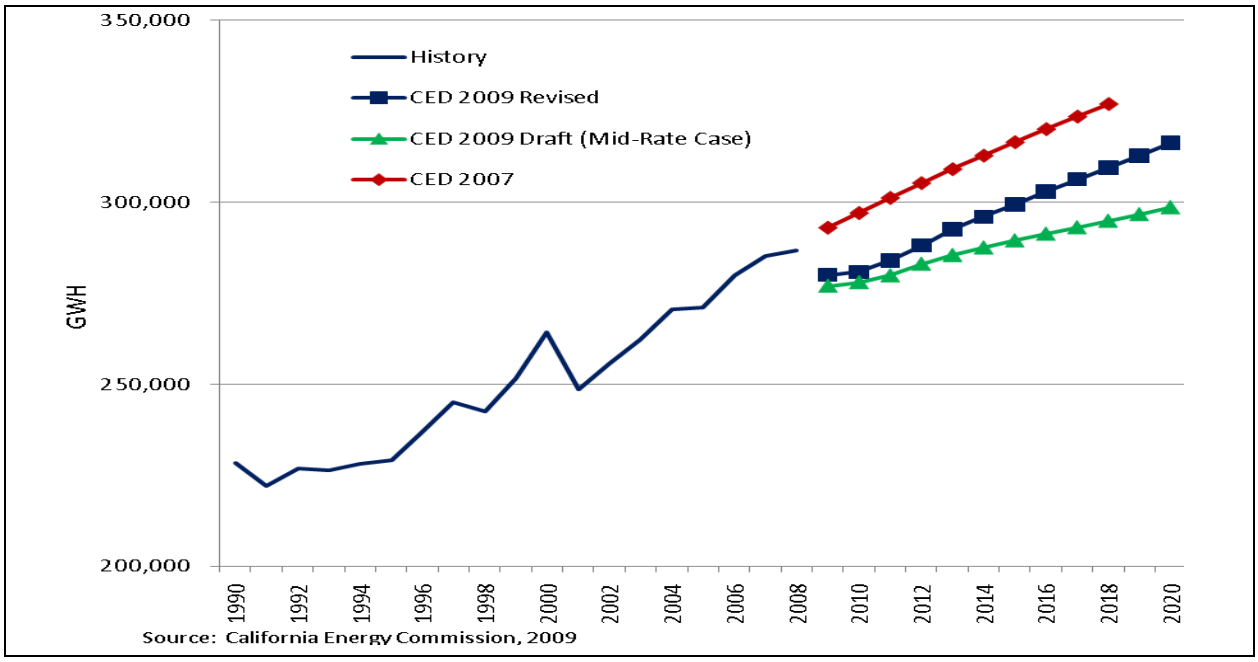
The historical data used for this forecast differs slightly from *CED 2007* and *CED 2009 Draft* because of revised data submitted by utilities and because a detailed review of self-generation data found some additional consumption from small systems before 2008.

Annual Electricity Consumption

The revised statewide forecast of electricity consumption, shown in **Figure 6**, is lower than in *CED 2007* over the entire forecast period, beginning with a dip in 2009. This difference reflects current economic conditions, which affect the forecast through lower personal income growth, lower employment, lower industrial output, and fewer additions to commercial floor space. Most of the remaining difference between *CED 2009 Revised* and *CED 2007* comes from increased efficiency program impacts assumed in this forecast. Slightly more optimistic economic projections compared to those used in *CED 2009 Draft* along with the inclusion of an electric vehicle forecast lead to projected consumption by 2018 almost 5 percent higher in *CED 2009 Revised* than in the draft.

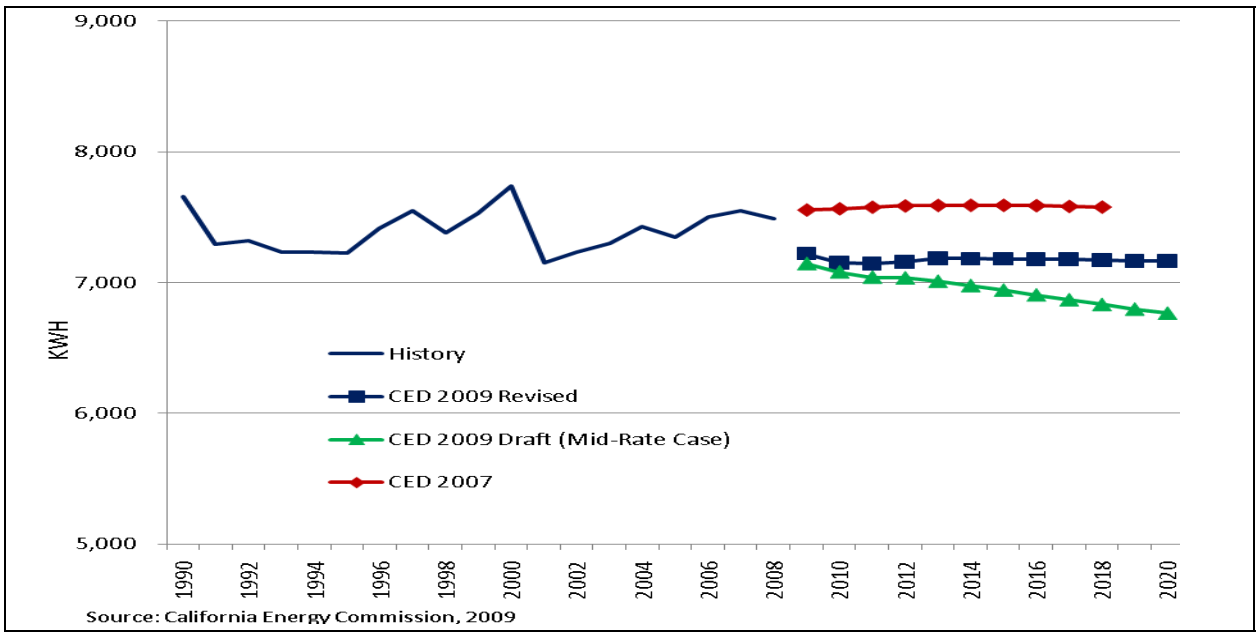
Consistent with lower total consumption compared to *CED 2007*, per capita electricity use is lower in *CED 2009 Revised* throughout the forecast period, as shown in **Figure 7**. Projected per capita consumption is reduced by more than 400 kWh by 2018 compared to the 2007 forecast, but higher by around 350 kWh in 2020 compared to *CED 2009 Draft*.

Figure 6: Statewide Annual Electricity Consumption



Source: California Energy Commission, 2009

Figure 7: Statewide Annual Electricity Use per Capita

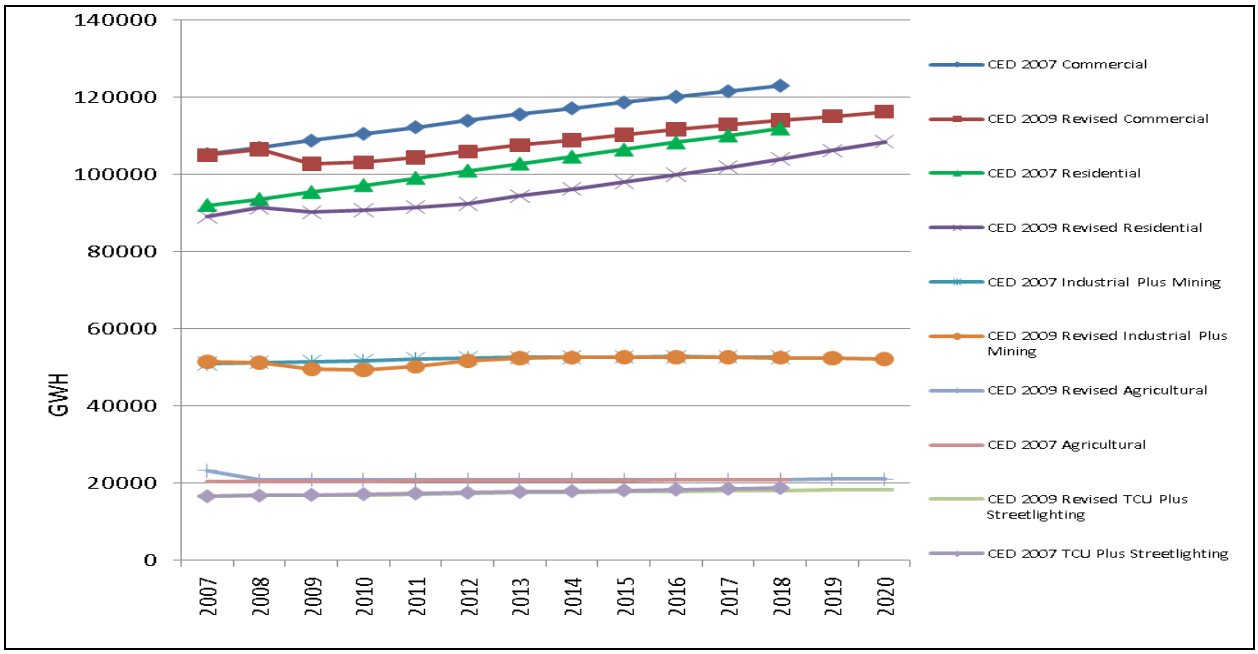


Source: California Energy Commission, 2009

Figure 8 shows projected annual consumption by major economic sector, comparing *CED 2009 Revised* with *CED 2007*. The largest percentage reductions relative to *CED 2007* occur in the residential sector and the commercial sector (both -7.1 percent by 2018). In the residential case, the main driver for these reductions compared to *CED 2007* is lower personal income per capita. Commercial reductions result from lower projections of floor space based on decreases in projected employment and commercial sector output. Industrial consumption compared to *CED 2007* decreases by a much lower percentage (around 0.1 percent by 2018), reflecting declines in industrial output projected in both forecasts. The only sector with increased consumption compared to *CED 2007* is agricultural/water pumping (up 1 percent in 2018), a result of higher actual consumption in 2008 than projected in *CED 2007*.

Annual electricity consumption is projected to be higher in *CED 2009 Revised* than in the draft throughout the forecast period for every sector except agricultural. By 2020, commercial consumption is forecast to be 4.1 percent higher, residential consumption 8.6 percent higher, industrial consumption 4.0 percent higher, and the transportation, communications, and utility (TCU) and street lighting sectors 1.3 percent higher. Lower agricultural consumption projections result from reduced actual demand in 2008 compared to *CED 2009 Draft* predictions, which used 2007 as the last historical year.

Figure 8: Statewide Electricity Consumption by Sector



Source: California Energy Commission, 2009

To support sub-regional electricity system analysis, staff disaggregates the planning area forecasts to correspond to control areas and congestion zones. **Table 4** shows the forecast of energy required to meet demand by control area and congestion zone. Compared with 2008, demand is projected to be down in all areas in 2010 with the exception of the Imperial Irrigation District (IID) control area. After 2010, demand is expected to grow the fastest in the SMUD and IID control areas, reflecting strong population growth for SMUD and relatively high expected economic growth for IID. The slowest growth occurs in the Los Angeles Department of Water and Power (LADWP) control area because of relatively low projected economic growth in that area. In the California ISO control area, demand is projected to grow slightly faster in Southern California beyond 2010.

Table 4: Control Area Net Energy for Load

	North of Path 26	South of Path 26	California ISO Total	SMUD	LADWP	Imperial Irrigation	Turlock Irrigation
2008	108,725	132,703	241,428	18,712	30,604	3,712	2,694
2010	106,832	129,818	236,649	18,100	29,523	3,763	2,631
2015	113,372	138,011	251,383	19,600	31,214	4,265	2,841
2020	119,592	146,278	265,870	20,816	32,437	4,828	3,041
	Annual Growth Rates						
2008-2010	-0.87%	-1.09%	-0.99%	-1.65%	-1.78%	0.68%	-1.18%
2010-2015	1.20%	1.23%	1.22%	1.61%	1.12%	2.54%	1.54%
2010-2020	1.13%	1.20%	1.17%	1.41%	0.95%	2.52%	1.46%

Source: California Energy Commission, 2009

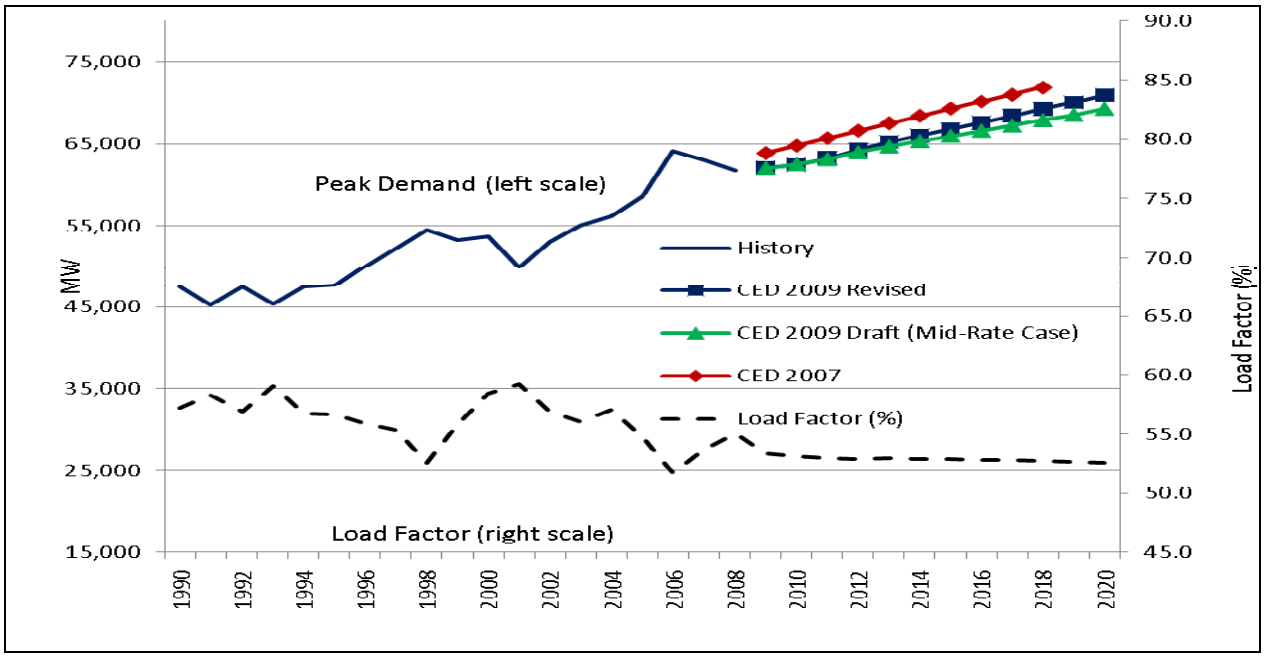
Statewide Peak Demand

Figure 9 compares *CED 2009 Draft* and *CED 2009 Revised* forecasts of statewide non-coincident[11] peak demand with *CED 2007*. As with electricity consumption, current economic conditions have a major effect in the short-term in both the draft and revised forecasts. Both of these forecasts show a significant reduction in peak relative to the 2007 forecast for 2010. In the longer term, beyond 2010, the growth rate in the *CED 2009 Revised* is close to that in *CED 2007*, but levels remain around 3.7 percent lower by 2018. More optimistic recent economic projections push the *CED 2009 Revised* forecast peak 2.5 percent higher than in the draft by the end of the forecast period.

Figure 9 also shows the load factor for the state as a whole. The load factor represents the relationship between average energy demand and peak: the smaller the load factor, the greater the difference between peak and average hourly demand. The load factor varies with temperature; in extremely hot years (for example, 1998 and 2006) demand is *peakier*. The general decline in the load factor over the last 20 years indicates a greater proportion of homes and businesses with central air conditioning. This trend is projected to continue over the forecast period. Energy efficiency measures, such as more efficient lighting, can also contribute to the declining load factor by reducing overall energy use while having an insignificant effect on peak demand.

[11] Statewide peaks are non-coincident; that is, they are the sum of the individual coincident peak demands for each planning area in California. These individual peaks often occur at different hours of the day. Peak demands provided in this report for individual planning areas are coincident peaks.

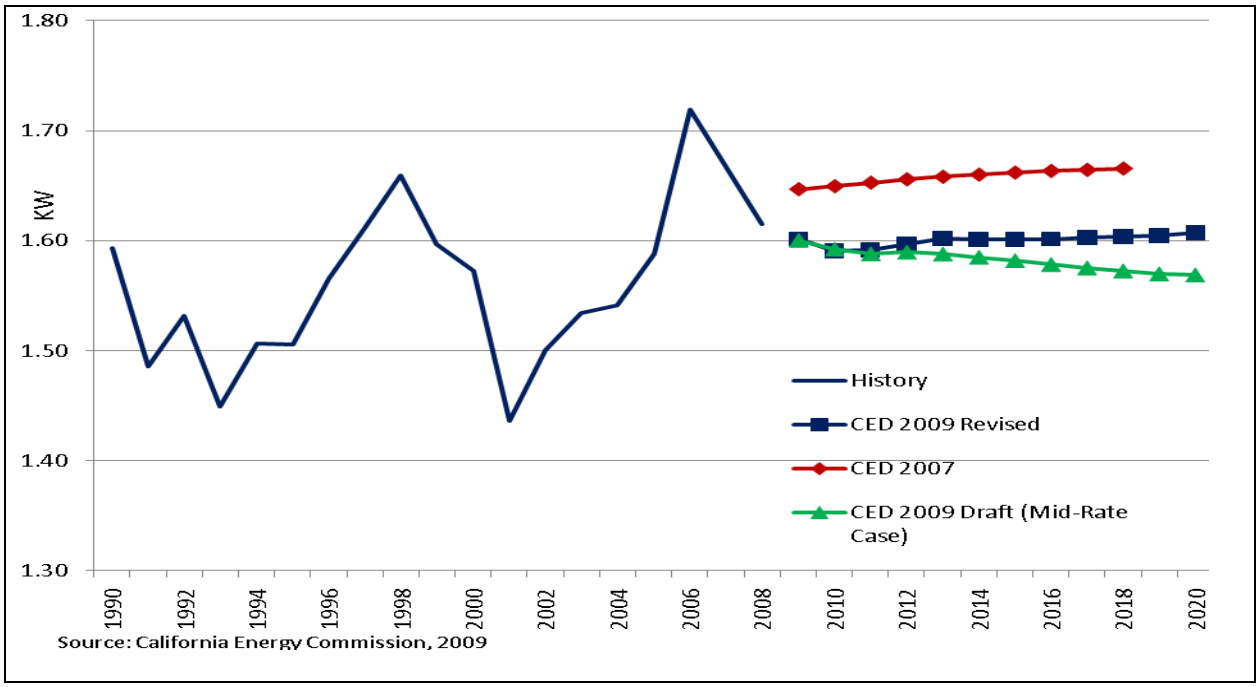
Figure 9: Statewide Non-Coincident Peak Demand



Source: California Energy Commission, 2009

Per capita non-coincident peak, shown in **Figure 10**, is projected to rise slightly over the forecast period in *CED 2009 Revised*, unlike the marked decline projected in *CED 2009 Draft*, although it remains well below that projected in *CED 2007*. As in the forecast for per capita consumption, economic conditions and energy efficiency impacts result in a marked reduction in projected per capita use relative to *CED 2007* at the beginning of the forecast period. In 2018, the per capita peak is 3.7 percent lower in *CED 2009 Revised* than in *CED 2007*, declining from 1.67 kW to 1.61 kW.

Figure 10: Statewide Non-Coincident Peak Demand per Capita

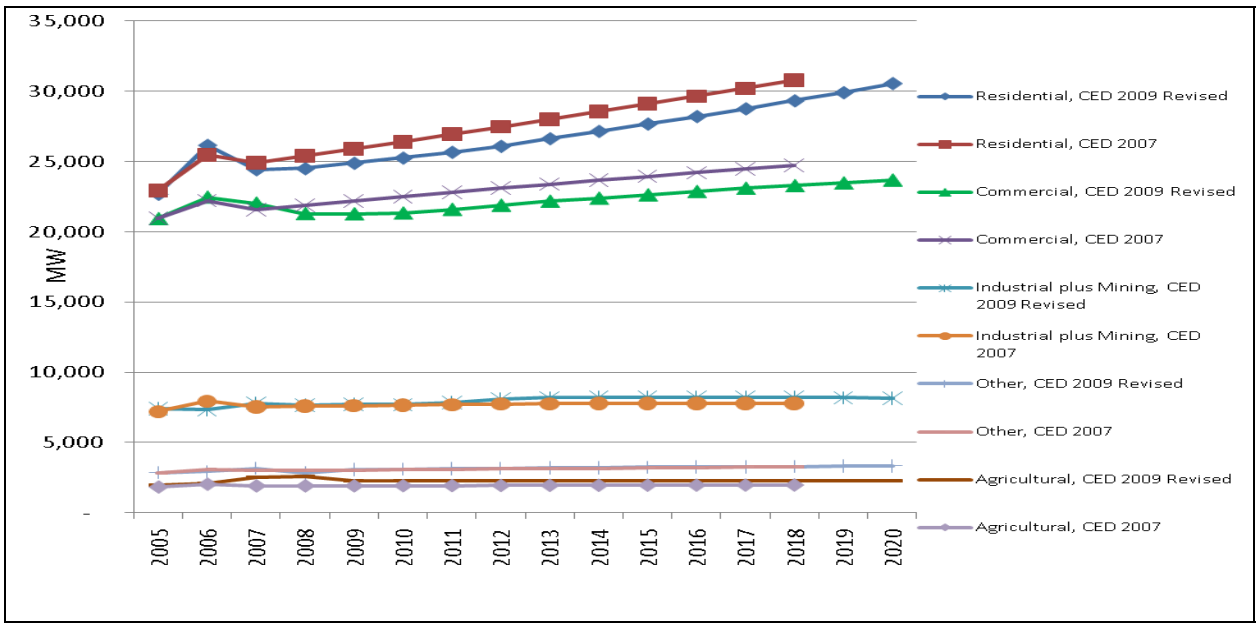


Source: California Energy Commission, 2009

Figure 11 shows projected annual peak demand by the major economic sectors for *CED 2009 Revised* and for *CED 2007*. As in the consumption forecast, the largest percentage reductions compared to *CED 2007* occur in the residential and commercial sectors (-4.7 percent and -5.9 percent by 2018, respectively). In both cases, the decrease in peak is less than the decrease in consumption, a reflection of smaller reductions in cooling relative to other end uses. Projected industrial and agricultural/water pumping peaks are higher (by 5.7 and 14.7 percent by 2018, respectively) because of significantly higher reported actual peaks in the final historical years (2007 and 2008) compared to peaks predicted in the 2007 forecast.

Annual peak demand is projected to be higher in *CED 2009 Revised* than in *CED 2009 Draft* throughout most of the forecast period for every sector except "other" (TCU and street lighting). By 2020, peaks are forecast to be 4.9 percent higher in the commercial sector, 1.3 percent in the residential, 3.1 percent in the industrial, and 5.4 percent in the agricultural. Lower TCU and street lighting peak projections reflect lower recorded consumption in 2008 compared to *CED 2009 Draft* predictions.

Figure 11: Statewide Peak Demand by Sector



Source: California Energy Commission, 2009

Table 5 shows peak demand by control area. Demand is down in 2010 compared to 2008 in all areas except the Southern California portion of California ISO, which experienced lower than average temperatures in 2008, IID, and Turlock. As with net energy, demand in the IID control area grows the fastest and LADWP the slowest beyond 2010, for the same reasons. Growth in peak demand is higher than growth for energy beyond 2010 because the trend toward increased air conditioning use is expected to continue.

Table 5: Annual Peak Demand by Control Area and Congestion Zone

	North of Path 26	South of Path 26	California ISO Coincident* Peak	SMUD	LADWP	Imperial Irrigation	Turlock Irrigation
2008	21,959	26,929	47,714	4,552	6,608	977	647
2010	21,694	27,995	48,497	4,541	6,428	985	648
2015	23,185	30,004	51,913	4,892	6,718	1,114	711
2020	24,626	32,032	55,298	5,196	6,912	1,256	776
	Annual Growth Rates						
2008-2010	-0.60%	1.96%	0.82%	-0.13%	-1.37%	0.42%	0.06%
2010-2015	1.34%	1.40%	1.37%	1.50%	0.88%	2.49%	1.86%
2010-2020	1.28%	1.36%	1.32%	1.36%	0.73%	2.46%	1.82%

Source: California Energy Commission, 2009
*Staff estimates coincident peak by applying an estimated factor (0. 9761) to non-coincident peak.

End-User Natural Gas Demand Forecast

Table 6 compares *CED 2009 Revised* and *CED 2009 Draft* natural gas forecasts with *CED 2007* for selected years. These forecasts do not include natural gas used for generating electricity. As in the case of electricity, the set of rates used in *CED 2009 Revised* correspond to the mid-rate scenario in *CED 2009 Draft*; thus the comparison is made to the draft mid-rate case. *CED 2007* used slightly higher rates, roughly equivalent to those in the draft forecast high-rate scenario.

Reported 2008 natural gas consumption for *CED 2009 Revised* is well below that predicted in *CED 2009 Draft* and in *CED 2007*. This difference, along with a projected consumption reduction from 2008-2010 in the industrial and mining sectors, leads to a lower forecast through 2020. However, as the economy recovers beyond 2010, the growth rate exceeds that of the two previous forecasts.

Table 6: Statewide End-User Natural Gas Consumption

End-User Consumption (MM Therms)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-rate Case (June 2009)	*CED 2009 Revised* (Sept. 2009)	Difference, *CED 2009 Revised* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	12,893	12,893	12,893	0.00%	0.00%
2000	13,913	13,913	13,913	0.00%	0.00%
2008	13,445	12,941	12,494	-7.07%	-3.46%
2010	13,616	12,992	12,162	-10.68%	-6.48%
2015	13,932	13,218	12,751	-8.48%	-3.54%
2018	14,058	13,319	12,894	-8.28%	-3.20%
Average Annual Growth Rates					
1990-2000	0.76%	0.76%	0.76%		
2000-2008	-0.55%	-0.73%	-1.11%		
2008-2010	0.63%	0.19%	-1.34%		
2010-2018	0.40%	0.31%	0.73%		
Historical values are shaded					
End-user consumption excludes natural gas used to generate electricity					

Source: California Energy Commission, 2009

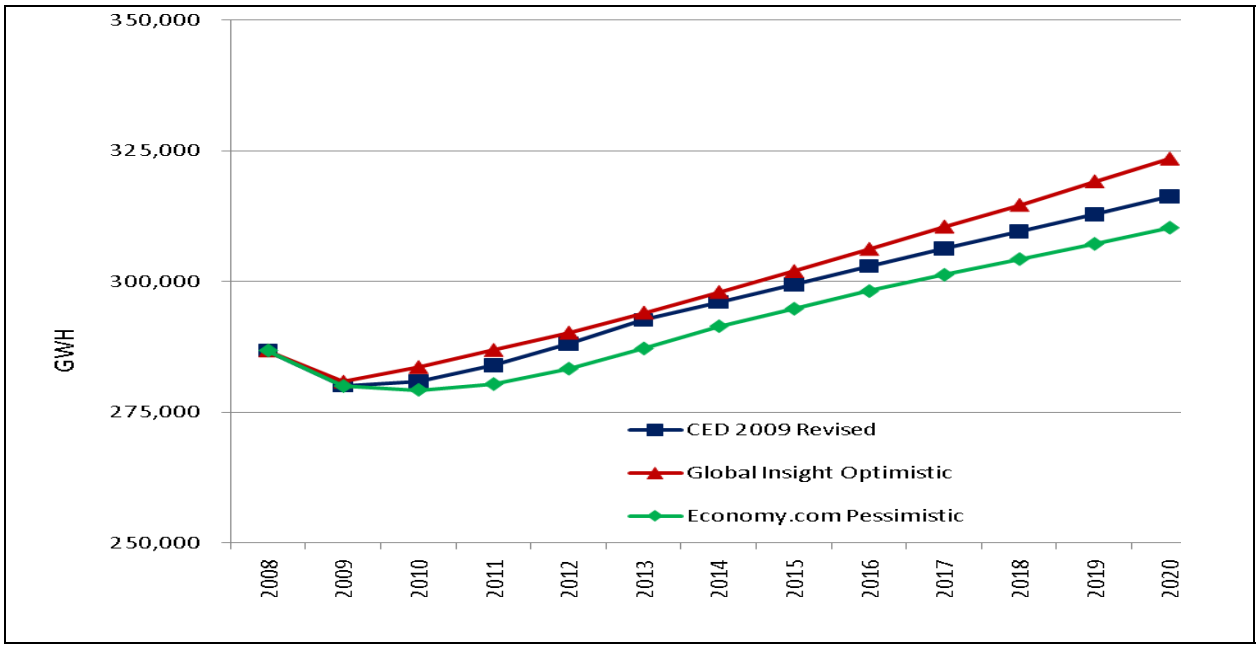
Economic Scenarios

The results in this chapter thus far rely on economic inputs from a *base case* economic scenario provided by Moody's Economy.com (Economy.com). Because of the importance of economic factors to the energy forecast and the uncertainty involved in economic forecasting, staff also examined the impacts of two alternative economic scenarios for California electricity demand: an *optimistic* case provided by IHS Global Insight and an

Economy.com *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth of the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models. Note that the scenarios are not meant to serve as alternative forecasts but rather to provide a plausible range around the base case forecast to account for economic uncertainty.

The estimated models were run for the two economic scenarios as well as the Economy.com base case.[12] The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2007 Revised* consumption projections. **Figure 12** shows the projected impacts of the optimistic and pessimistic scenarios on statewide consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the planning area and sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 13**.

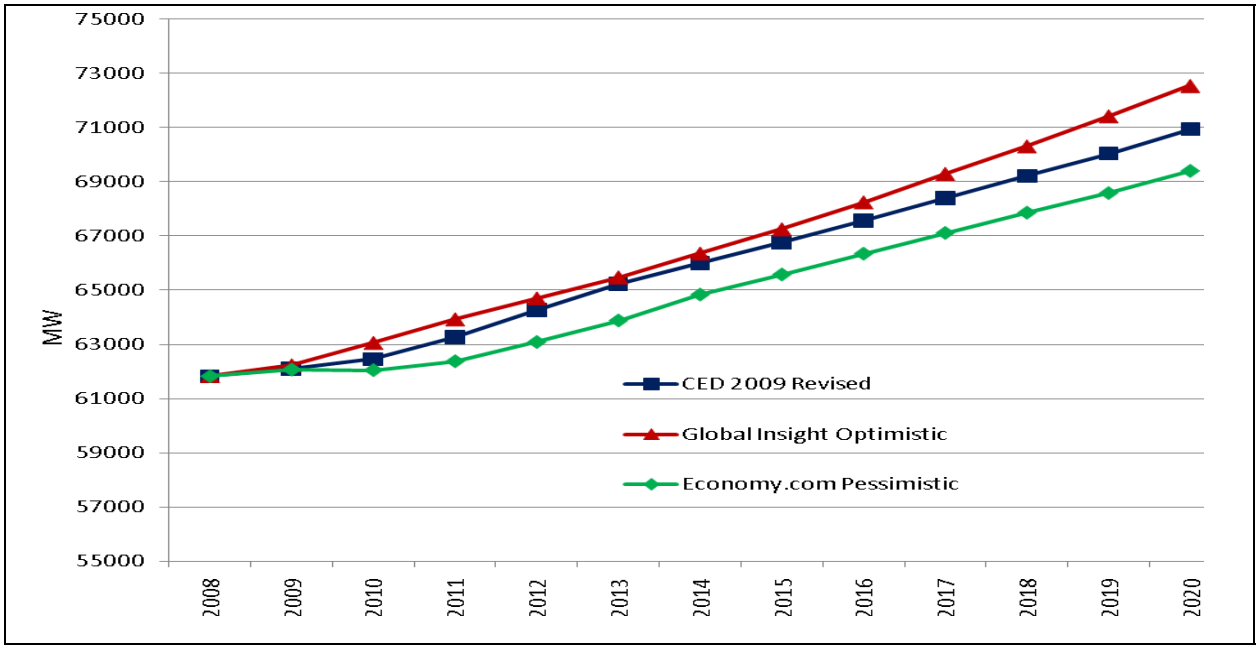
Figure 12: Projected Statewide Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

[12] As shown in the Appendix, the results from the econometric models together using Economy.com base case inputs matched *CED 2009 Revised* forecast very closely. In 2020, the difference in projected statewide consumption was less than 0.5 percent.

Figure 13: Projected Statewide Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Electricity consumption is projected to be 2.3 percent higher (around 7,000 GWH) in the optimistic economic case than in *CED 2009 Revised* by 2020, and 1.9 percent lower (6,000 GWH) in the pessimistic scenario. The peak demand forecast increases by 2.3 percent (1,600 MW) under the optimistic scenario by 2020 and falls by 2.2 percent (1,600 MW) in the pessimistic case. The percentage peak reduction is higher than that of consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.2 percent and 1.3 percent, respectively, to 1.3 percent and 1.4 percent in the optimistic case, and fall to 1.1 percent each under the pessimistic scenario.

Changes in consumption and peak demand are small compared to *CED 2009 Revised* totals in percentage terms because of a relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020. This spread reflects a convergence in views of the economic future: neither Global Insight nor Economy.com currently projects a scenario with a complete long-term economic collapse or with a new "bubble" that rapidly increases economic growth.

Overview of Methods and Assumptions

Although the methods to estimate energy efficiency impacts, self-generation, and commercial floor space have been refined and residential lighting is now explicitly modeled, *CED 2009 Draft* uses essentially the same methods as earlier long-term staff demand forecasts. The specific data sources and assumptions used for this forecast and any changes to the methods since *CED 2007* are described here. A more detailed discussion of forecast methods and data sources is available in the *Energy Demand Forecast Methods Report*. [13] The Appendix discusses model performance relative to historical consumption and provides other additional documentation for *CED 2009 Revised*.

Models for the major economic sectors produce forecasts of annual energy consumption in each utility planning area. After adjusting for historical weather and usage, the annual consumption forecast is used to forecast annual peak demand.

The commercial, residential, and industrial sector energy models are structural models that attempt to explain how energy is used by process and end use. Structural models are critical to enable forecasts to account for the impacts of mandatory energy efficiency standards and other energy efficiency programs that seek to force or encourage adoption of more efficient technologies by end users. The forecasts of agricultural and water pumping energy consumption are made using econometric methods, while projections for the street lighting and the transportation, communications, and utility sectors rely on trend analyses.

Economic and Demographic Assumptions

Population growth is a key driver for residential and commercial energy demand and for water pumping and other services. As in past forecasts, staff used the California Department of Finance's (DOF) most recent long-term population forecast, which has not been updated since *CED 2007*.[14] **Figure 14** shows the historical (through 2008) and forecasted population growth used in *CED 2009 Revised*. Population is projected to grow at about 1.2 percent annually during the forecast period. For comparison, statewide population grew an average of 1.4 percent annually from 1990 to 2008. The declining growth rates over the forecast horizon reflect lower rates of fertility and immigration as the population of California and other regions age. Older age cohorts have a lower tendency to migrate.[15]

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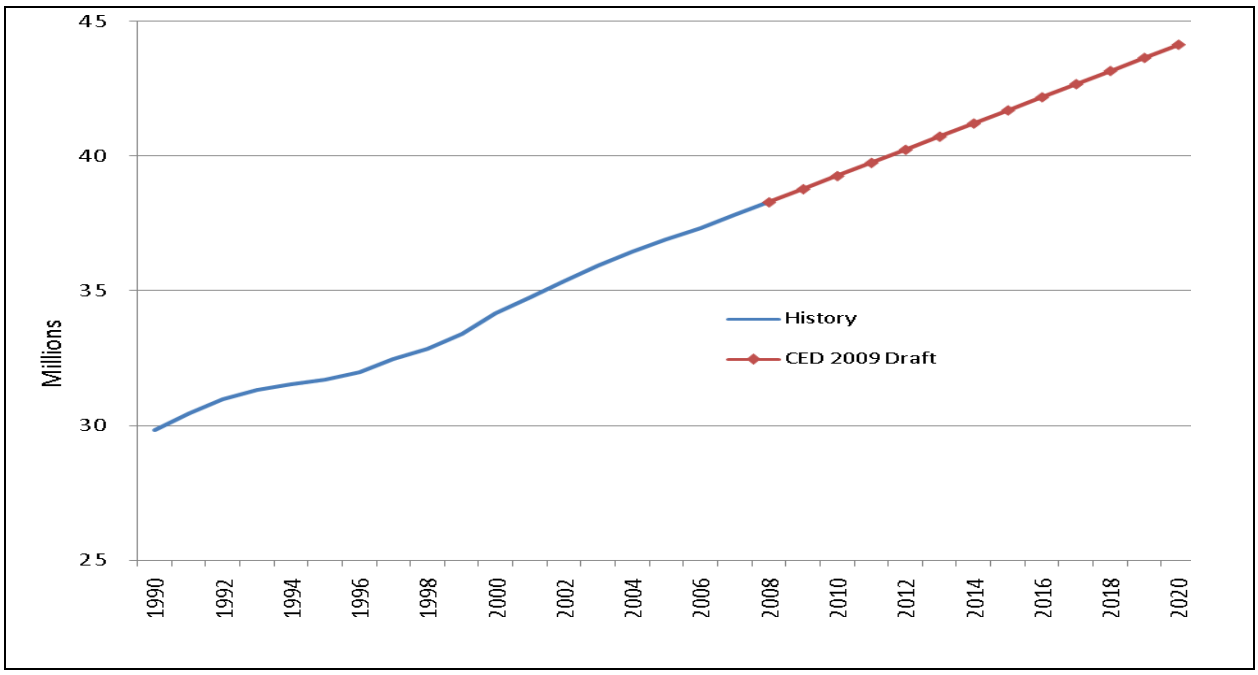
[13] California Energy Commission, *Energy Demand Forecast Methods Report*, CEC-400-2005-036, June, 2005.

[14] Economy.com also provides a population forecast, based on projections from the U.S. Department of Census. Population estimates are lower for recent historical years in the Economy.com forecast, but projected rates of growth (more relevant to Energy Commission energy demand forecasts) for 2010- 2020 are almost identical: 1.16 percent per year for Economy.com and 1.18 percent per year in the DOF forecast.

[15] A "cohort" is a generational group as defined in demographics or statistics.

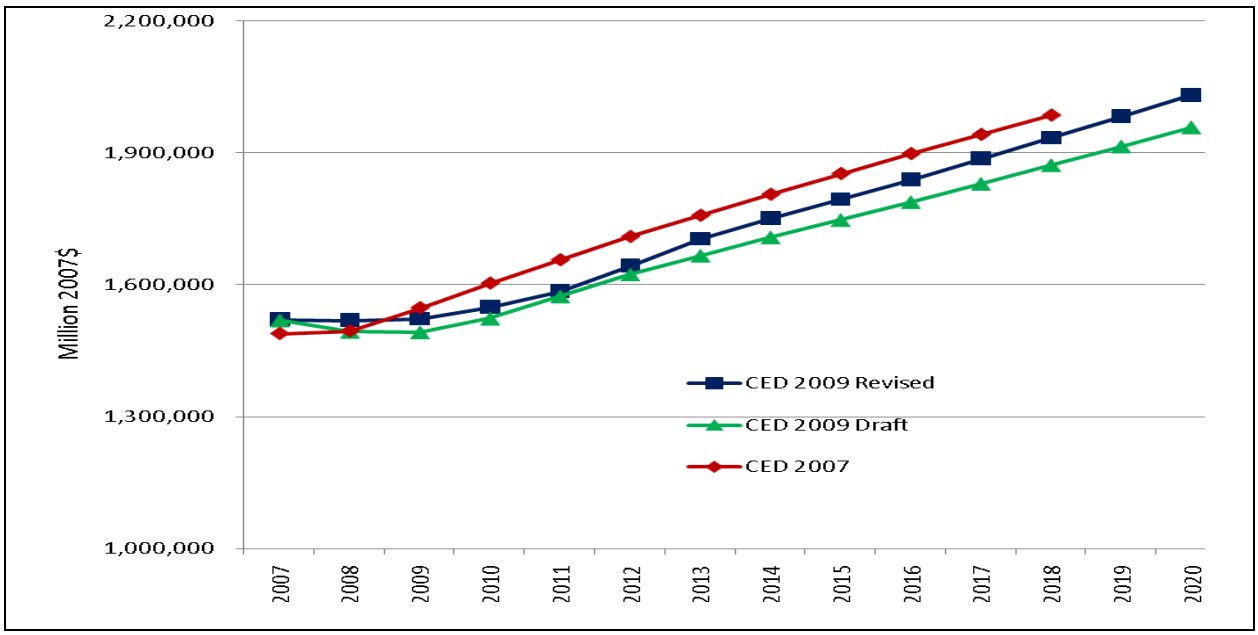
Figure 14: Historical and Projected Total Statewide Population



Source: California Department of Finance, 2009

Most of the difference in energy peak demand and consumption projections compared to *CED 2007* comes from the *base* economic outlook provided by Economy.com. The economic forecast particularly reflects short-term impacts from the current recession. These effects are indicated in **Figure 15**, which compares projected statewide real personal income incorporated in the draft and revised forecasts with that used in *CED 2007*. In the longer term, as the economy is projected to recover, the *CED 2009 Revised* growth rate for personal income return to levels similar to those projected for *CED 2007*. Economic projections were updated in *CED 2009 Revised* using a June 2009 release, compared to December 2008 for *CED 2009 Draft*. The more recent projections show a more optimistic outlook in the longer term, and growth rates are higher in *CED 2009 Revised* than in the draft for personal income and other important economic drivers. Projections for key economic variables are listed in the forms at the end of this chapter and posted in spreadsheet form on the Energy Commission's website.

Figure 15: Statewide Personal Income ($2007)



Source: Moody's Economy.com, 2009

Electricity and Natural Gas Rate Projections

CED 2009 Revised assumes a slight increase in rates for electricity (15 percent) and natural gas (10 percent) between 2010 and 2020 for each planning area.[16] These projections correspond to the mid-rate scenario used in *CED 2009 Draft*. **Table 7** shows the increase in rates assumed over the first five and last five years of the forecast. Electricity rate projections assumed that most of the increase would occur in the last five years.

Table 7: Percentage Growth in Rates by Scenario and Fuel Type

Time Period	Electricity	Natural Gas
2010-2015	5. 0%	4. 9%
2015-2020	9. 5%	4. 9%

Source: California Energy Commission, 2009

Residential Lighting

Residential lighting was broken out as a separate end use to better capture the effects of residential lighting efficiency programs. Functionally, this meant separating lighting from

[16] If utilities provided a rate forecast for 2009 and 2010 in the *Forms and Instructions* filed with the Energy Commission in March 2009, these were used; otherwise rates were kept constant from 2008-2010.

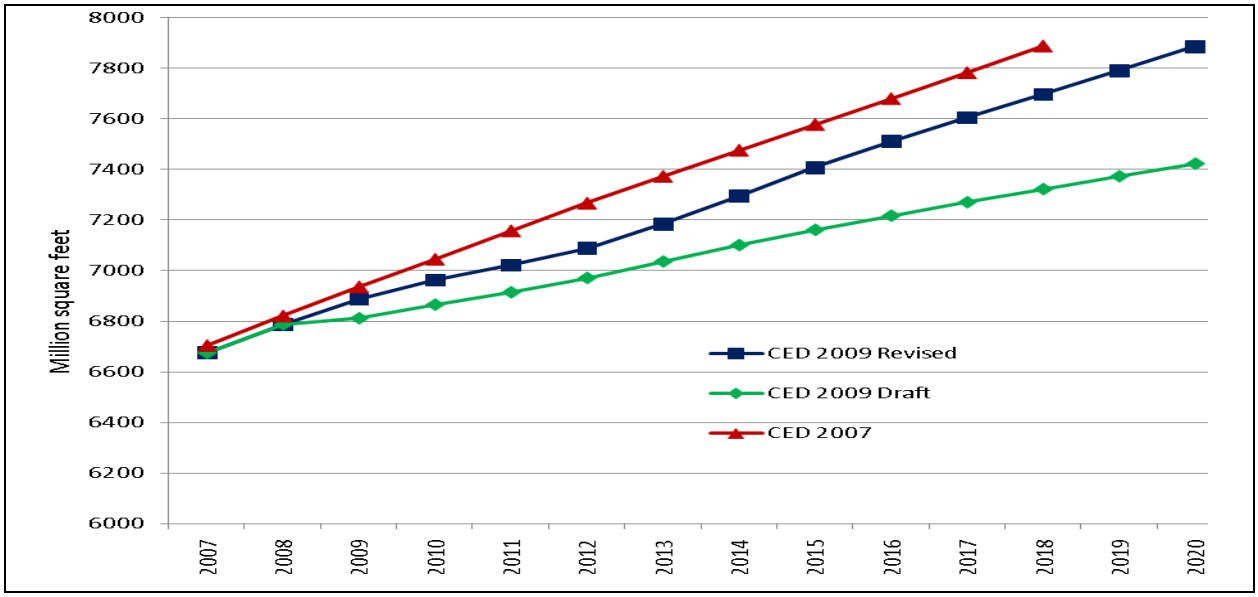
the *miscellaneous* end use in the Residential Model, estimating historical use of lighting per household and projecting the use through 2020.

Historical estimates of lighting use per household through 2004 are based on values supplied by the consulting firm Itron along with various lighting studies. For the investor-owned utility (IOU) planning areas, reported energy savings and efficiency program plans were used to provide reductions to average lighting use relative to the 2004 estimates for 2005 – 2011. Details about average lighting input assumptions and the impact of residential lighting programs are provided in the Appendix.

Floor Space Forecast

Energy use in the commercial sector is modeled in terms of energy use per square foot for each of twelve different building types. A forecast of floor space in each county serves as the economic driver of demand trends. For *CED 2009 Revised*, staff applied the econometric model for forecasting growth in floor space developed for *CED 2007*. A new model was estimated for *CED 2009 Draft*, but staff was concerned that the newer methods may have been producing unrealistically low commercial energy output. The difference in models, along with a more optimistic economic outlook, gives a higher projected growth rate for floor space in *CED 2009 Revised* than in the draft forecast, although projections remain below *CED 2007* levels through 2018. **Figure 16** shows projected floor space for the three forecasts.

Figure 16: Comparison of *CED 2007*, *CED 2009 Draft*, and *CED 2009 Revised* Statewide Commercial Floor Space Projections



Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Energy Commission demand forecasts seek to account for all conservation that is *reasonably expected to occur*. Since the 1985 *Electricity Report*, reasonably expected to occur conservation programs have been split into two types: committed and uncommitted. *CED 2009 Revised* continues that distinction. Committed programs are defined as programs that have been implemented or for which funding has been approved and include some form of program plan. While conservation reasonably expected to occur includes both committed and uncommitted programs, only the effects of committed programs are included in the demand forecast. However, the Energy Commission models include naturally occurring or market-driven energy efficiency. Therefore, the forecasts include some impacts associated with the historical and ongoing levels of programs to the extent they represent impacts associated with replacement of aging building stock and equipment, or installation of new stock and equipment at efficiency levels that comply with current building and appliance standards. Uncommitted effects are thus defined as the incremental impacts of the level of future programs (for example, savings associated with new equipment that exceeds current standards or early replacement of existing stock), impacts of new programs, and impacts from expansion of current programs.

Chapter 8 gives details regarding the committed energy efficiency impacts projected for *CED 2009 Revised*. Staff will also provide a forecast of the impacts of uncommitted programs on energy demand later this year.

Demand Response

The term *demand response* encompasses a variety of programs, including traditional direct control (interruptible) programs and new price-responsive demand programs. A key distinction is whether the program is dispatchable. Dispatchable programs, such as direct control, interruptible tariffs, or demand bidding programs, have triggering conditions that are not under the control of, and cannot be anticipated by, the customer. Energy or peak load saved from dispatchable programs is treated as a resource and is therefore not accounted for in the demand forecast. Non-dispatchable programs are not activated using a predetermined threshold condition but allow the customer to make the economic choice whether to modify usage in response to ongoing price signals. Impacts from committed non-dispatchable programs should be included in the demand forecast.

At this time, all of the existing demand response programs have some form of triggering condition. Although the utility or California ISO may not have direct control, only the customer has the opportunity to participate in the program when the program operator has called an event, either because of high market prices or resource scarcity. Therefore, in this forecast, no demand response impacts are counted on the demand side.

Self-Generation

CED 2009 Revised accounts for all the major programs designed to promote self-generation, building up from sales of individual systems. Incentive programs include:

- Emerging Renewables Program (ERP)—managed by the Energy Commission
- California Solar Initiative (CSI)–managed by the CPUC
- Self-Generation Incentive Program (SGIP)–managed by the CPUC
- New Solar Homes Partnership (NSHP)—managed by the Energy Commission
- Incentives administered by public utilities such as SMUD, LADWP, Burbank Water and Power, City of Glendale, City of Pasadena, and IID

The forecast also accounts for power plants that report information to the Energy Commission. The principal source of that information is Form CEC-1304, which must be submitted to the Energy Commission by owners of electric power plants located in California or within a control area serving end users inside California. Staff included only power plants that were explicitly listed as operating under cogeneration or self-generation mode in the forecast.

The general strategy of the ERP, CSI, SGIP, and NSHP programs is to encourage demand for self-generation technologies with financial incentives until the size of the market increases to the point where economies of scale are achieved and capital costs decline. The extent to which consumers see real price declines will depend on the interplay of supplier expectations, the future level of incentives, and resulting overall demand.

The ERP and SGIP programs currently fund small wind turbines and fuel cells. Based on the availability of historical data, either a simple trend or the average rate of installations reflected in the historical data was used to project future capacity additions. For the CSI and NSHP programs, added future photovoltaic (PV) capacity was projected by taking the average annual capacity installed and pending[17] for 2008 and 2009 for the IOUs, and the capacity installed in 2008 for the publicly owned utilities, where 2009 data was not yet available. These values are carried forward until 2016, when both the CSI and NSHP programs are scheduled to end. Capacity additions between 2017 and 2020 are derived by allowing the cumulative installed capacity to grow at the historical rate of electricity consumption for each sector. The difference in cumulative capacity between successive years is assumed to reflect new additions once the programs have ended.

Capacity additions for programs administered by the public utilities were assumed to increase at the same rate as electricity growth by sector. For the large generators reporting under CEC-1304, cumulative capacity was assumed to remain constant at 2008 levels throughout the forecast period. Inspection of historical data revealed no trend upward or downward in installations. Since many of these plants sell electricity back to the grid, the

[17] Pending adoptions were reduced by 8 percent, an estimate of recent historical drop-out rates.

effective plant generating capacity for projecting future onsite generation was derived by weighting overall plant capacity by the ratio of historical total electricity consumed by the plant to the overall electricity generated.

To translate self-generation capacity into effects on system peak demand requires assumptions about load shape, the coincidence of self-generation peak with system peak, and the extent to which self-generation units are operating during peak hours. Staff used four annual evaluation studies of the SGIP program for these assumptions.[18] For example, the 2004 study found that the load impact at the time of the 2004 California ISO peak was 58 MW out of 103 MW of installed capacity. Staff averaged the results of these studies to develop peak factors for *CED 2009 Revised*.[19] *CED 2009 Draft* relied on the 2004 study only.

Figure 17 shows the cumulative impacts of self-generation of all types on peak demand for the three forecasts. In *CED 2009 Revised*, self-generation is projected to reduce peak load by more than 2,700 MW, significantly more than in the two previous forecasts. This difference comes mainly from higher projections for PV system adoption, shown in **Figure 18**, a result of incorporating 2009 adoptions and pending adoptions. By 2018, PV is projected to reduce peak demand by around 800 MW, 100 MW higher than in *CED 2009 Draft* and more than 300 MW higher than in *CED 2007*.[20] *CED 2009 Revised* PV numbers are slightly lower than in *CED 2009 Draft* at the beginning of the forecast period, reflecting a lower average peak factor. Both figures show a reduced rate of increase for self-generation impacts in the draft and revised forecasts beyond 2016, reflecting the end of the solar programs. Self-generation is projected to reduce electricity sales by around 15,000 GWH in 2018, around 1,500 GWH higher than *CED 2007* and 2,500 GWH higher than in *CED 2009 Draft*.

These projections are consistent with current demand but may prove to be conservative. Staff is developing predictive models for some of the self-generation technologies based on estimated payback periods and cost-effectiveness, determined by upfront costs, energy rates, and incentive levels. The first model, near completion, is designed to project residential demand for PV systems. This model is based on one used by the Energy Information Administration as part of its National Energy Modeling System. Details of the model are provided in the Appendix.

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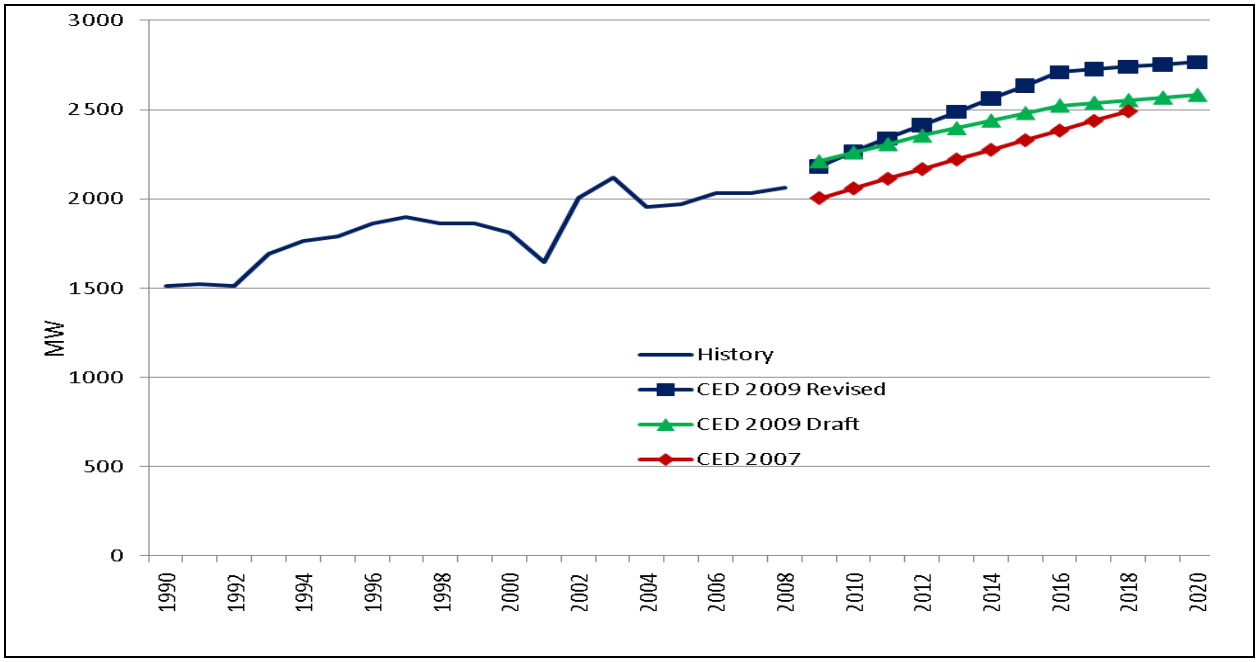
[18] *CPUC Self-Generation Incentive Program Impact Report*, 2004-2007.

[19] Based on these studies, peak factors were assumed to be 0.5 for San Diego Gas and Electric, 0.3 for Pacific Gas and Electric, and 0.4 for all other planning areas.

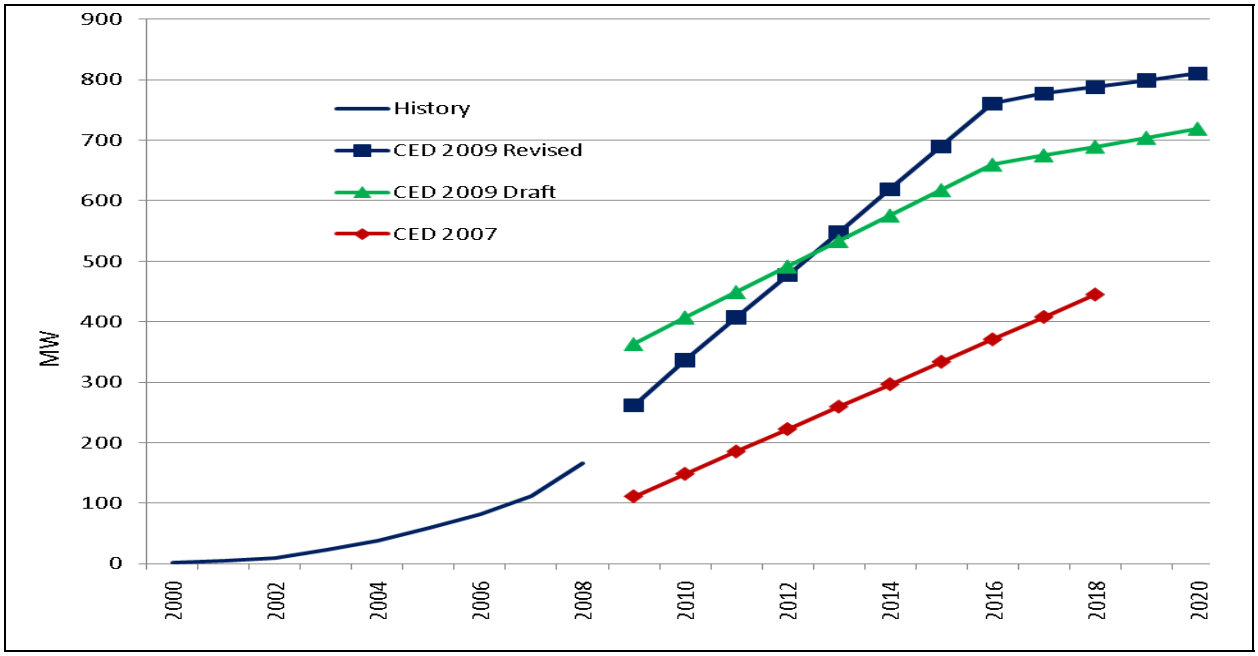
[20] *CED 2009 Revised* PV peak impacts correspond to installed capacity of 2,100 MW in 2016 and 2,300 MW in 2020.

Figure 17: Statewide Cumulative Peak Impacts of Total Self-Generation



Source: California Energy Commission, 2009

Figure 18: Statewide Cumulative Peak Impacts of PV Self-Generation



Source: California Energy Commission, 2009

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids, provided by the Energy Commission's Fuels Office.[21] The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

In order to develop a plausible range for alternative fuel vehicle demand, the Fuels Office ran two scenarios: a "high gasoline price, low alternative fuel price" case and a "low gasoline price, high alternative fuel price" case. *CED 2009 Revised* uses the average of these two scenarios for electric vehicles.

The Fuels Office forecast provides statewide totals only, so staff needed to distribute the results among the eight planning areas. For personal vehicles, projections were allocated based on the number of light-duty vehicles registered in each planning area in 2008,[22] indexed to projected changes in population distribution in the forecast period. For commercial vehicles, current and forecast Economy.com total employment by planning area was used.

Table 8 shows the resulting projections for number of light-duty electric vehicles on the road by planning area for selected years. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter.

Table 8: Forecast of Electric Vehicles by Planning Area

Year	Burbank/ Glendale	Imperial	LADWP	Pasa-dena	PG&E	SCE	SDG&E	SMUD	Total
2009	18	16	230	8	807	807	215	89	2,191
2012	812	972	10,327	381	39,511	38,954	9,941	3,993	104,892
2015	4,744	6,073	60,322	2,224	236,084	232,464	58,777	23,596	624,284
2018	8,572	11,681	108,992	4,018	435,981	428,821	107,430	43,145	1,148,641
2020	11,061	15,701	140,634	5,184	570,891	561,096	139,674	56,111	1,500,352

Source: California Energy Commission, 2009

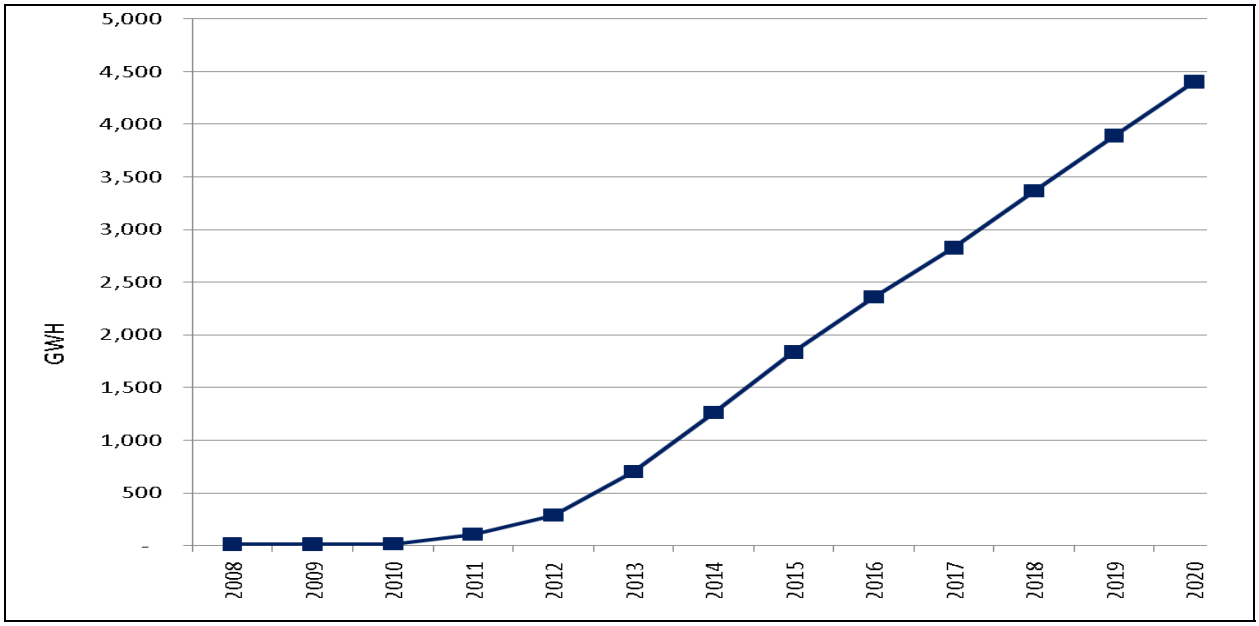
[21] Details of the electric vehicle forecast are provided in the forthcoming *Transportation Energy Forecasts and Analyses for the 2009 Integrated Energy Policy Report, Final Staff Report*, to be available at http://www.energy.ca.gov/2009publications/CEC-600-2009-012/

[22] Using the Department of Motor Vehicle database maintained by the Fuels Office.

Figure 19 shows projected statewide electricity consumption for EVs, which reaches around 4,400 GWH by 2020. Results for the five major planning areas are provided in Chapters 2-6 of this report. A critical assumption made in the EV forecast is that plug-in hybrids operate half of the time (during city driving) using the electric motor, with the gasoline motor engaged for higher speed travel.

To translate consumption to peak demand, staff assumed that 75 percent of recharging would take place during off-peak hours (10 p.m. – 6 a.m.), with the rest evenly distributed over the remaining hours.[23] This recharging profile assumes some form of favored off-peak pricing for electric vehicle owners by utilities. **Figure 20** shows the projected EV contribution to statewide non-coincident peak. Peak impacts are relatively small compared to consumption because of recharging assumptions, and EVs provide a slight increase to the statewide load factor.

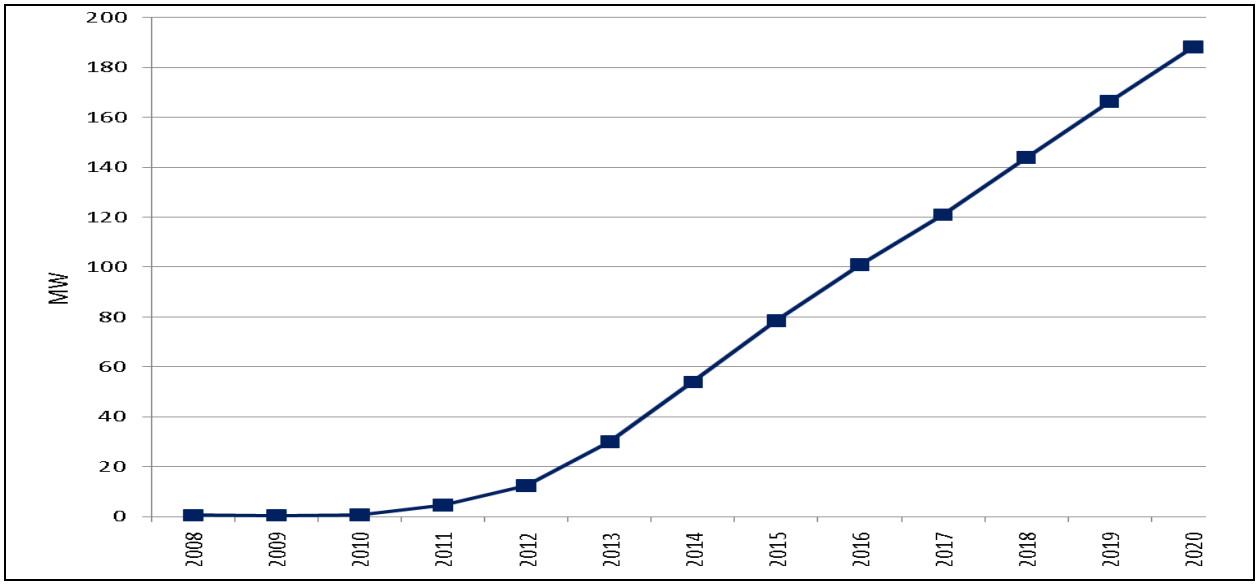
Figure 19: Projected Statewide Electricity Consumption by Light-Duty Electric Vehicles



Source: California Energy Commission, 2009

[23]This is consistent with "reference case" assumptions made in a recent Electric Power Research Institute study, *Environmental Assessment of Plug-in Hybrid Electric Vehicles, Volume 1: Nationwide Greenhouse Gas Emissions*, Electric Power Research Institute, July 2007.

Figure 20: Projected Statewide Electricity Peak Demand by Light-Duty Electric Vehicles



Source: California Energy Commission, 2009

Historical Electricity Consumption Estimates

Energy Commission forecasting models are organized by sector according to economic activity: commercial, industrial, agricultural, and so on. Each of these models develops a forecast based on sub-activities within the sector (for example, commercial building type or industrial activity). Under the Energy Commission's Quarterly Fuel and Reporting (QFER) regulations, each load-serving entity (LSE) is required to file monthly and annual reports that document energy consumption by activity group.

The quality of the QFER data continues to be undermined by LSE data coding errors, lack of adherence to regulations by some LSEs, and failure to provide economic classification for some of the data. However, unclassified consumption has declined significantly in recent years. From a high of almost 20,000 GWh in 2003, unclassified energy use dropped to less than 8,000 GWh in 2008 as economic classification is now provided for direct access customers, per current reporting requirements. Staff allocated unclassified consumption to economic sectors using professional judgment, relying on such factors as apparently unrealistic changes in historical consumption in a given sector.

Demand Forecast Disaggregation

Many uses for demand forecasts require more disaggregation than the planning area forecasts presented in the following chapters. For example, electricity system analysis requires identification of load by congestion zone or load pocket; evaluation of progress

toward renewable energy goals requires sales data by individual LSEs; development of energy efficiency goals requires projections of per capita sales by LSEs; and controlled grid studies require forecasts for each LSE, sometimes with geographic subdivisions. The statewide tables following this chapter include forecast disaggregations developed by staff to support some of these applications.

Structure of Report

Chapters 2-6 provide *CED 2009* electricity forecasts for the following planning areas: Pacific Gas and Electric, Southern California Edison, San Diego Gas & Electric, SMUD, and LADWP, in that order. All of the planning areas included in this forecast are described in **Table 9**. Chapter 7 provides statewide results from the end-user natural gas forecast, along with results for the Pacific Gas and Electric, Southern California Gas, and San Diego Gas & Electric distribution areas. Chapter 8 describes staff work focused on refining and improving methods to incorporate energy efficiency and conservation savings within the forecast and presents staff estimates of the impacts resulting from utility efficiency programs, building and appliance standards, and other conservation-related factors. The Appendix provides information about the economic scenarios, the impact of climate change on peak demand, model performance, residential lighting, self-generation, utility efficiency program impacts, and ongoing evaluation of staff modeling methodologies and alternative forecasting approaches.

Table 9: Utilities within Forecasting Areas

Planning Area	Utilities Included	
Electric Areas		
Pacific Gas and Electric (PG&E)	PG&E Alameda Biggs Calaveras Gridley Healdsburg Lassen MUD Lodi Lompoc Merced Modesto Palo Alto	Plumas – Sierra Port of Stockton PWRPA Redding Roseville San Francisco Shasta Silicon Valley Tuolumne Turlock Irrigation District Ukiah USBR-CVP
Sacramento Municipal Utility District (SMUD)	SMUD	
Southern California Edison (SCE)	Anaheim Anza Azusa Banning Bear Valley Colton MWD	Ranch Cucamonga Riverside Southern California Edison USBR-Parker Davis Valley Electric Vernon Victorville
Los Angeles Department of Water and Power (LADWP)	LADWP	
San Diego Gas & Electric (SDG&E)	SDG&E	
Cities of Burbank and Glendale (BUGL)	Burbank,Glendale	
Pasadena (PASD)	Pasadena	
Imperial (IID)	Imperial Irrigation District	
Department of Water Resources (DWR)	DWR	
Natural Gas Distribution Areas		
PG&E	PG&E Electric Planning Area, SMUD	
SDG&E	SDG&E	
Southern California Gas Company (SCG)	SCG, Long Beach	
OTHER	Avista Energy, Southwest Gas Corporation	

Source: California Energy Commission, 2009

Form 1.1 - Statewide
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	67,020	0	72,365	0	47,282	7,269	20,580	12,381	1,576	228,473
1991	66,465	0	72,145	0	45,909	7,260	16,118	12,591	1,610	222,098
1992	68,546	0	75,612	0	45,846	6,940	15,308	12,921	1,647	226,819
1993	67,711	0	76,180	0	45,441	6,646	15,769	13,011	1,645	226,403
1994	69,042	0	76,232	0	45,300	6,239	16,829	12,797	1,646	228,084
1995	69,032	0	77,956	0	46,748	6,454	14,162	13,187	1,620	229,159
1996	71,331	0	80,285	0	47,118	6,592	16,723	13,237	1,658	236,945
1997	72,776	0	83,994	0	48,760	6,537	17,374	13,854	1,701	244,996
1998	74,621	0	85,840	0	47,215	6,212	13,373	13,546	1,757	242,564
1999	75,676	0	88,973	0	48,622	5,842	16,951	13,860	1,658	251,582
2000	79,843	0	94,636	0	49,857	6,300	17,389	14,477	1,729	264,230
2001	75,143	0	89,657	0	44,704	5,708	18,746	12,858	1,724	248,539
2002	76,942	0	92,095	0	45,337	5,643	20,822	13,205	1,710	255,754
2003	81,424	0	96,613	0	43,317	5,881	20,092	13,182	1,748	262,255
2004	84,027	0	98,934	0	44,039	6,633	21,824	13,357	1,772	270,585
2005	85,319	0	99,641	0	44,484	6,756	19,112	14,099	1,781	271,192
2006	89,617	0	102,976	0	44,124	6,753	20,337	14,423	1,780	280,010
2007	89,065	3	105,040	10	44,515	6,883	23,239	14,795	1,837	285,373
2008	91,473	4	106,569	9	44,142	7,088	20,705	14,967	1,828	286,771
2009	90,172	4	102,729	8	42,724	6,812	20,858	14,907	1,848	280,049
2010	90,712	9	103,143	7	42,666	6,649	20,831	14,986	1,856	280,843
2011	91,542	93	104,478	13	43,279	6,881	20,794	15,162	1,865	284,001
2012	92,467	268	105,969	22	44,549	7,136	20,759	15,369	1,873	288,123
2013	94,422	658	107,607	43	45,104	7,307	20,792	15,534	1,882	292,649
2014	96,255	1,199	108,915	63	45,172	7,336	20,826	15,654	1,891	296,047
2015	98,074	1,755	110,313	80	45,224	7,322	20,860	15,778	1,899	299,471
2016	99,955	2,266	111,675	94	45,295	7,309	20,883	15,905	1,908	302,929
2017	101,933	2,726	112,959	104	45,284	7,287	20,907	16,027	1,916	306,314
2018	104,041	3,257	114,025	111	45,232	7,258	20,931	16,148	1,925	309,561
2019	106,222	3,776	115,120	116	45,122	7,233	20,955	16,269	1,934	312,854
2020	108,529	4,285	116,278	118	44,956	7,205	20,981	16,389	1,942	316,280

* Residential and commercial electric vehicle consumption included in residential and commercial totals.
Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)										
1990-2000	1.77%	0.00%	2.72%	0.00%	0.53%	-1.42%	-1.67%	1.58%	0.93%	1.46%
2000-2008	1.71%	0.00%	1.50%	0.00%	-1.51%	1.48%	2.21%	0.42%	0.70%	1.03%
2008-2010	-0.42%	46.63%	-1.62%	-9.55%	-1.69%	-3.15%	0.30%	0.07%	0.76%	-1.04%
2010-2020	1.81%	84.60%	1.21%	32.29%	0.52%	0.81%	0.07%	0.90%	0.45%	1.20%

Form 1.1b - Statewide
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street Lighting	Total Sales
1990	67,013	71,243	41,414	5,840	20,562	11,810	1,576	219,456
1991	66,457	70,968	40,126	5,751	16,100	12,010	1,610	213,022
1992	68,540	74,410	40,099	5,449	15,288	12,368	1,647	217,801
1993	67,704	74,928	38,708	5,224	15,754	12,373	1,645	216,335
1994	69,041	74,760	38,310	4,820	16,814	12,178	1,646	217,570
1995	69,031	76,425	39,681	5,037	14,147	12,540	1,620	218,482
1996	71,330	78,809	39,473	5,140	16,708	12,723	1,658	225,841
1997	72,775	82,475	41,035	5,014	17,358	13,329	1,701	233,687
1998	74,620	84,302	39,689	4,658	13,359	13,076	1,757	231,461
1999	75,674	87,451	40,993	4,369	16,951	13,397	1,658	240,494
2000	79,840	93,110	42,570	4,835	17,389	13,983	1,729	253,456
2001	75,134	88,927	37,943	3,685	18,746	12,576	1,724	238,734
2002	76,921	90,931	37,322	3,382	20,821	12,738	1,710	243,826
2003	81,385	95,411	34,850	3,490	20,091	12,702	1,748	249,677
2004	83,961	97,692	36,654	4,203	21,821	12,911	1,772	259,013
2005	85,229	98,223	37,125	4,402	19,102	13,663	1,781	259,525
2006	89,497	101,275	36,748	4,446	20,322	13,941	1,780	268,009
2007	88,901	103,130	37,140	4,901	23,219	14,303	1,837	273,431
2008	91,238	104,457	36,832	5,144	20,679	14,568	1,828	274,746
2009	89,816	100,334	35,354	4,863	20,811	14,460	1,848	267,486
2010	90,258	100,570	35,266	4,697	20,769	14,516	1,856	267,932
2011	90,989	101,762	35,854	4,927	20,720	14,674	1,865	270,791
2012	91,816	103,111	37,099	5,180	20,672	14,864	1,873	274,616
2013	93,673	104,608	37,629	5,349	20,693	15,017	1,882	278,850
2014	95,407	105,774	37,672	5,375	20,714	15,124	1,891	281,957
2015	97,128	107,031	37,699	5,359	20,736	15,236	1,899	285,089
2016	98,911	108,252	37,745	5,343	20,747	15,350	1,908	288,255
2017	100,857	109,507	37,730	5,320	20,769	15,471	1,916	291,571
2018	102,948	110,549	37,675	5,290	20,790	15,591	1,925	294,768
2019	105,110	111,620	37,561	5,264	20,811	15,710	1,934	298,010
2020	107,398	112,754	37,393	5,235	20,833	15,829	1,942	301,385

Last historical Year = 2008; sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	1.77%	2.71%	0.28%	-1.87%	-1.66%	1.70%	0.93%	1.45%
2000-2008	1.68%	1.45%	-1.79%	0.78%	2.19%	0.51%	0.70%	1.01%
2008-2010	-0.54%	-1.88%	-2.15%	-4.45%	0.22%	-0.18%	0.76%	-1.25%
2010-2020	1.75%	1.15%	0.59%	1.09%	0.03%	0.87%	0.45%	1.18%

Form 1.1c
California Energy Demand 2009-2020 Staff Revised Forecast
Electricity Delivieries to End Users by Agency* (GWH)

Planning Area	Agency	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth, 2010-2020
PGE	Calaveras Public Power Agency	30	28	28	28	28	29	29	29	29	30	30	30	30	0.8%
	Central Valley Project	3,251	3,042	3,054	3,088	3,125	3,161	3,184	3,208	3,231	3,257	3,278	3,298	3,320	0.8%
	City of Alameda	435	425	426	431	437	444	449	454	460	466	471	477	483	1.3%
	City of Biggs	17	17	17	18	18	18	19	19	19	20	20	20	20	1.7%
	City of Gridley	35	34	35	35	36	37	37	38	39	39	40	41	42	1.9%
	City of Healdsburg	68	66	66	67	68	69	70	71	72	73	74	75	76	1.3%
	City of Lodi	455	448	451	458	467	477	484	490	497	505	512	519	527	1.6%
	City of Lompoc	134	131	132	133	135	137	139	141	143	145	147	149	151	1.4%
	City of Palo Alto	981	953	958	971	987	1,002	1,012	1,022	1,032	1,043	1,053	1,062	1,072	1.1%
	City of Redding	816	814	823	837	851	871	889	908	927	947	968	989	1,012	2.1%
	City of Roseville	1,247	1,237	1,247	1,268	1,294	1,321	1,343	1,365	1,388	1,413	1,437	1,462	1,487	1.8%
	City of San Francisco	928	872	876	883	892	900	905	911	917	924	929	935	941	0.7%
	City of Shasta Lake	182	176	176	178	183	186	187	188	189	190	191	192	193	0.9%
	City of Ukiah	117	114	115	117	118	120	122	124	126	128	129	131	133	1.4%
	Lassen Municipal Utility District	132	130	130	132	133	136	138	140	143	145	148	150	153	1.6%
	Merced Irrigation District	433	420	422	429	439	447	450	454	458	462	466	469	473	1.1%
	Modesto Irrigation District	2,604	2,528	2,538	2,573	2,621	2,668	2,699	2,730	2,763	2,797	2,830	2,863	2,897	1.3%
	Pacific Gas and Electric Company (Bundled)	81,983	79,976	80,192	81,079	82,279	83,665	84,662	85,650	86,674	87,787	88,843	89,898	91,010	1.3%
	Pacific Gas and Electric Company (Direct Access)	6,376	5,483	5,513	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603	0.2%
	Plumas-Sierra Rural Electric Cooperation	155	151	151	153	154	157	159	161	163	165	168	170	172	1.3%
	Port of Oakland	51	50	50	50	51	52	52	52	53	53	53	54	54	0.8%
	Port of Stockton	13	12	12	12	13	13	13	13	13	13	13	13	14	1.0%
	Power and Water Resource Purchasing Authority	436	369	369	368	368	368	369	369	369	369	370	370	370	0.0%
	Silicon Valley Power	2,864	2,770	2,780	2,822	2,887	2,932	2,954	2,976	3,000	3,025	3,045	3,064	3,082	1.0%
	Tuolumne County Public Power Agency	26	26	26	26	27	27	27	28	28	28	28	29	29	1.1%
	Turlock Irrigation District	2,026	1,966	1,979	2,006	2,041	2,078	2,108	2,138	2,168	2,201	2,234	2,267	2,302	1.5%
PGE Total		105,795	102,236	102,567	103,768	105,255	106,918	108,104	109,282	110,503	111,829	113,080	114,329	115,643	1.2%
SMUD	Sacramento Municipal Utility District	10,935	10,620	10,629	10,762	10,964	11,164	11,322	11,461	11,586	11,705	11,825	11,949	12,079	1.3%
SCE	Anza Electric Cooperative, Inc.	47	47	48	48	49	51	52	53	55	57	58	60	62	2.7%
	Bear Valley Electric Service	139	138	139	142	144	148	151	155	159	163	167	171	176	2.4%
	Boulder City/Parker Davis	121	120	121	123	125	127	128	130	131	133	134	136	137	1.3%
	City of Anaheim	2,603	2,504	2,505	2,531	2,567	2,606	2,635	2,667	2,698	2,730	2,759	2,789	2,819	1.2%
	City of Azusa	250	240	240	242	246	250	252	255	257	260	262	265	267	1.1%
	City of Banning	153	151	152	154	157	160	163	166	169	173	176	180	184	1.9%
	City of Cerritos	46	44	44	44	44	45	45	46	46	47	47	47	48	0.9%
	City of Colton	368	356	357	361	366	373	378	384	389	395	401	407	413	1.5%
	City of Rancho Cucamonga	63	59	59	60	60	61	62	63	64	64	65	66	67	1.2%
	City of Riverside	2,160	2,119	2,130	2,157	2,190	2,234	2,272	2,313	2,354	2,398	2,441	2,485	2,531	1.7%
	City of Vernon	1,230	1,180	1,178	1,194	1,228	1,244	1,248	1,251	1,254	1,255	1,255	1,252	1,249	0.6%
	Metropolitan Water Department	1,789	1,560	1,541	1,522	1,504	1,504	1,503	1,503	1,502	1,503	1,504	1,506	1,507	-0.2%
	Moreno Valley Utilities	53	52	53	53	54	55	57	58	59	60	62	63	65	2.1%
	Southern California Edison Company (Bundled)	81,454	78,677	78,666	79,450	80,616	82,043	83,123	84,251	85,405	86,598	87,747	88,914	90,126	1.4%
	Southern California Edison Company (Direct Access)	8,555	7,699	7,776	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869	0.1%
	Valley Electric Association, Inc.	8	7	7	7	7	7	7	7	7	7	7	7	7	-0.2%
	Victorville Municipal	31	30	30	31	31	32	32	32	32	32	32	32	32	0.6%
SCE Total		99,069	94,985	95,045	95,990	97,258	98,808	99,978	101,202	102,452	103,745	104,987	106,249	107,558	1.2%
LADWP	Los Angeles Department of Water and Power	24,820	24,029	23,927	24,167	24,574	24,901	25,121	25,330	25,539	25,738	25,944	26,153	26,365	1.0%
BUGL	City of Burbank	1,124	1,095	1,093	1,101	1,116	1,127	1,131	1,135	1,138	1,141	1,143	1,146	1,149	0.5%
	City of Glendale	1,163	1,133	1,131	1,140	1,156	1,170	1,176	1,182	1,188	1,194	1,200	1,206	1,213	0.7%
BUGL Total		2,287	2,228	2,223	2,241	2,273	2,297	2,308	2,317	2,326	2,335	2,343	2,352	2,361	0.6%
PASD	City of Pasadena	1,252	1,217	1,218	1,226	1,235	1,240	1,242	1,246	1,250	1,254	1,257	1,261	1,266	0.4%
DWR	Department of Water Resources	6,675	8,729	8,729	8,729	8,729	8,729	8,729	8,729	8,729	8,729	8,729	8,729	8,729	0.0%
SDGE	San Diego Gas and Electric Company (Bundled)	17,481	16,993	17,083	17,313	17,633	18,003	18,282	18,566	18,821	19,091	19,357	19,641	19,927	1.6%
	San Diego Gas and Electric Company (Direct Access)	3,142	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	0.0%
SDGE Total		20,623	20,169	20,258	20,488	20,809	21,179	21,457	21,742	21,997	22,266	22,532	22,816	23,102	1.3%
IID	Imperial Irrigation District	3,291	3,273	3,336	3,419	3,519	3,614	3,696	3,781	3,874	3,971	4,069	4,171	4,280	2.5%
OTHER	City of Needles	58	58	58	58	58	58	58	58	58	58	58	58	58	0.0%
	Mountain Utilities	4	4	4	4	4	4	4	4	4	4	4	4	4	0.0%
	Pacificorp	841	841	847	854	861	867	874	881	888	895	902	909	916	0.8%
	Sierra Pacific Power Company	535	536	536	536	536	536	536	536	536	536	536	536	536	0.0%
	Surprise Valley Electrical Corporation	88	88	88	88	89	89	89	90	90	91	91	91	92	0.4%
	Trinity Public Utility District	89	89	90	91	92	93	94	95	96	97	97	98	99	1.0%
	Truckee-Donner Public Utility District	148	147	149	150	152	153	154	156	157	159	160	162	163	0.9%
OTHER Total		1,763	1,763	1,773	1,782	1,791	1,800	1,810	1,819	1,829	1,839	1,849	1,859	1,869	0.5%
Statewide Total		276,509	269,250	269,705	272,572	276,407	280,650	283,767	286,908	290,084	293,410	296,617	299,869	303,253	1.2%
Total Pumping Load		11,715	13,331	13,324	13,339	13,358	13,394	13,417	13,440	13,462	13,490	13,511	13,533	13,556	0.2%
Total Statewide Retail Deliveries excluding pumping		264,794	255,919	256,381	259,233	263,049	267,256	270,350	273,468	276,622	279,920	283,105	286,336	289,697	1.2%

This table includes retail sales and other deliveries only measured at the customer level; losses and consumption served by self-generation are excluded.
* Includes sales from entities outside of California. Thus, total sales in row 70 are higher than state totals given in Form 1.1b.

Form 1.2 - Statewide
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)*

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	228,473	18,590	247,063	9,016	0	9,016	238,046
1991	222,098	18,212	240,310	9,076	0	9,076	231,234
1992	226,819	18,641	245,459	9,018	0	9,018	236,441
1993	226,403	18,487	244,890	10,068	0	10,068	234,822
1994	228,084	18,481	246,565	10,513	1	10,514	236,051
1995	229,159	18,659	247,818	10,676	2	10,677	237,141
1996	236,945	19,187	256,132	11,101	2	11,104	245,029
1997	244,996	19,837	264,834	11,306	3	11,309	253,525
1998	242,564	19,719	262,283	11,100	3	11,103	251,180
1999	251,582	20,382	271,964	11,084	5	11,088	260,875
2000	264,230	21,423	285,653	10,767	7	10,774	274,879
2001	248,539	20,202	268,741	9,788	16	9,804	258,937
2002	255,754	20,567	276,321	11,889	38	11,928	264,393
2003	262,255	21,051	283,306	12,493	85	12,578	270,728
2004	270,585	21,808	292,393	11,422	150	11,572	280,821
2005	271,192	21,875	293,067	11,440	227	11,667	281,400
2006	280,010	22,566	302,575	11,680	321	12,001	290,575
2007	285,373	23,035	308,408	11,501	440	11,941	296,467
2008	286,771	23,307	310,078	11,373	652	12,025	298,053
2009	280,049	22,598	302,648	11,522	1,040	12,563	290,085
2010	280,843	22,635	303,478	11,574	1,338	12,911	290,567
2011	284,001	22,884	306,885	11,590	1,620	13,210	293,675
2012	288,123	23,219	311,343	11,607	1,901	13,507	297,836
2013	292,649	23,581	316,230	11,615	2,184	13,799	302,431
2014	296,047	23,846	319,893	11,624	2,467	14,091	305,802
2015	299,471	24,111	323,582	11,632	2,750	14,382	309,200
2016	302,929	24,380	327,309	11,641	3,033	14,674	312,635
2017	306,314	24,662	330,977	11,650	3,094	14,744	316,233
2018	309,561	24,935	334,496	11,659	3,134	14,793	319,702
2019	312,854	25,211	338,065	11,668	3,176	14,844	323,221
2020	316,280	25,498	341,778	11,677	3,218	14,896	326,882

Last historical year is 2008

Annual Growth Rates (%)

1990-2000	1.46%	1.43%	1.46%	1.79%	-	1.80%	1.45%
2000-2008	1.03%	1.06%	1.03%	0.69%	76.45%	1.38%	1.02%
2008-2010	-1.04%	-1.45%	-1.07%	0.88%	43.28%	3.62%	-1.26%
2010-2020	1.20%	1.20%	1.20%	0.09%	9.18%	1.44%	1.18%

*Excludes load located in non-California based control areas; this is included in Table 1.1c.

Form 1.3 - Statewide
California Energy Demand 2010-2020 Staff Revised Forecast
Sum of Planning Area Sector Coincident Peak Demands (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	16,855	0	15,843	0	7,836	2,215	2,446	45,196
1991	16,093	0	14,840	0	7,669	2,204	2,307	43,113
1992	17,169	0	15,762	0	7,807	2,124	2,278	45,140
1993	16,138	0	15,138	0	7,729	2,049	2,327	43,380
1994	17,572	0	15,638	0	7,633	2,210	2,356	45,410
1995	17,947	0	16,110	0	7,507	1,902	2,201	45,668
1996	18,648	0	16,624	0	8,035	2,091	2,445	47,843
1997	20,019	0	17,316	0	8,024	2,108	2,500	49,967
1998	20,613	0	18,918	0	8,253	1,783	2,402	51,970
1999	19,995	0	18,453	0	7,818	2,042	2,580	50,888
2000	20,396	0	19,074	0	7,391	1,780	2,526	51,166
2001	18,759	0	17,427	0	6,788	2,134	2,409	47,517
2002	19,529	0	18,742	0	7,453	2,276	2,753	50,753
2003	20,552	0	20,446	0	7,209	1,758	2,829	52,796
2004	19,834	0	20,783	0	7,997	2,008	2,975	53,597
2005	22,699	0	20,924	0	7,396	1,967	2,855	55,841
2006	26,177	0	22,460	0	7,348	2,102	2,935	61,021
2007	24,443	0	22,031	0	7,803	2,512	3,174	59,962
2008	24,517	0	21,288	0	7,672	2,584	2,821	58,882
2009	24,898	0	21,266	0	7,732	2,284	3,098	59,278
2010	25,268	0	21,327	0	7,698	2,277	3,111	59,681
2011	25,680	4	21,589	1	7,835	2,267	3,139	60,510
2012	26,102	11	21,883	1	8,080	2,258	3,171	61,494
2013	26,646	28	22,168	2	8,195	2,260	3,197	62,466
2014	27,166	51	22,382	3	8,208	2,263	3,217	63,235
2015	27,689	75	22,621	3	8,214	2,265	3,236	64,025
2016	28,220	97	22,862	4	8,223	2,265	3,257	64,826
2017	28,771	117	23,092	4	8,219	2,264	3,276	65,622
2018	29,339	139	23,277	5	8,206	2,263	3,296	66,381
2019	29,920	161	23,470	5	8,184	2,263	3,315	67,152
2020	30,567	183	23,676	5	8,154	2,262	3,334	67,993

Last historical year is 2008
* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)

1990-2000	1.92%	0.00%	1.87%	0.00%	-0.58%	-2.16%	0.32%	1.25%
2000-2008	2.33%	0.00%	1.38%	0.00%	0.47%	4.77%	1.39%	1.77%
2008-2010	1.52%	46.63%	0.09%	-9.55%	0.17%	-6.13%	5.01%	0.68%
2010-2020	1.92%	84.60%	1.05%	32.29%	0.58%	-0.07%	0.70%	1.31%

Form 1.4 - Statewide
California Energy Demand 2010-2020 Staff Revised Forecast
Non-Coincident Peak Demand (MW)*

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV Self Generation	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	45,196	3,839	49,035	1,514	0	1,514	47,521	57
1991	43,113	3,667	46,780	1,524	0	1,524	45,256	58
1992	45,140	3,832	48,972	1,514	0	1,514	47,458	57
1993	43,380	3,677	47,057	1,690	0	1,690	45,367	59
1994	45,410	3,835	49,244	1,765	0	1,765	47,479	57
1995	45,668	3,868	49,535	1,792	0	1,793	47,743	57
1996	47,843	4,051	51,894	1,864	1	1,864	50,030	56
1997	49,967	4,238	54,205	1,898	1	1,899	52,306	55
1998	51,970	4,420	56,389	1,863	1	1,864	54,525	53
1999	50,888	4,319	55,207	1,861	1	1,862	53,346	56
2000	51,166	4,346	55,512	1,807	2	1,809	53,703	58
2001	47,517	4,036	51,554	1,643	4	1,647	49,906	59
2002	50,753	4,289	55,042	1,996	10	2,006	53,037	57
2003	52,796	4,446	57,241	2,096	22	2,118	55,123	56
2004	53,597	4,526	58,123	1,914	39	1,952	56,171	57
2005	55,841	4,716	60,557	1,914	58	1,972	58,585	55
2006	61,021	5,190	66,211	1,951	82	2,033	64,178	52
2007	59,962	5,078	65,040	1,919	112	2,031	63,009	54
2008	58,882	5,005	63,886	1,894	166	2,060	61,826	55
2009	59,278	5,008	64,286	1,916	262	2,178	62,108	53
2010	59,681	5,036	64,716	1,921	336	2,257	62,459	53
2011	60,510	5,102	65,611	1,923	407	2,330	63,282	53
2012	61,494	5,182	66,676	1,925	477	2,402	64,274	53
2013	62,466	5,261	67,727	1,926	548	2,474	65,253	53
2014	63,235	5,321	68,557	1,927	619	2,546	66,011	53
2015	64,025	5,383	69,408	1,928	690	2,618	66,790	53
2016	64,826	5,446	70,272	1,929	761	2,690	67,582	53
2017	65,622	5,514	71,136	1,931	777	2,708	68,428	53
2018	66,381	5,578	71,960	1,932	788	2,720	69,240	53
2019	67,152	5,644	72,796	1,933	799	2,732	70,064	53
2020	67,993	5,716	73,709	1,935	810	2,745	70,964	53

Last historical year is 2008

Annual Growth Rates (%)							
1990-2000	1.25%	1.25%	1.25%	1.79%	-	1.80%	1.23%
2000-2008	1.77%	1.78%	1.77%	0.59%	75.15%	1.64%	1.78%
2008-2010	0.68%	0.31%	0.65%	0.70%	42.46%	4.68%	0.51%
2010-2020	1.31%	1.28%	1.31%	0.07%	9.20%	1.97%	1.28%

*Excludes load located in non-California based control areas.

Form 1.5a
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load by Agency and Balancing Authority (GWH)*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth 2010-2020
PG&E Service Area - Greater Bay Area	41,448	39,439	39,435	39,766	40,200	40,711	41,037	41,355	41,685	42,050	42,385	42,715	43,064	0.9%
Silicon Valley Power	3,139	3,035	3,047	3,093	3,164	3,214	3,238	3,261	3,288	3,315	3,337	3,358	3,378	1.0%
NCPA - Greater Bay Area	1,607	1,564	1,572	1,592	1,616	1,641	1,658	1,675	1,693	1,712	1,729	1,746	1,763	1.2%
Other NP15 LSEs - Greater Bay Area	33	30	31	31	31	31	32	32	32	32	33	33	33	0.8%
CCSF	1,017	956	960	968	977	986	992	999	1,005	1,012	1,019	1,025	1,031	0.7%
Greater Bay Area Subtotal	47,244	45,025	45,044	45,450	45,989	46,583	46,956	47,322	47,703	48,122	48,503	48,876	49,269	0.9%
PG&E Service Area - Non Bay	44,160	43,227	43,446	44,035	44,738	45,542	46,153	46,762	47,394	48,075	48,731	49,390	50,083	1.4%
NCPA - Non Bay	1,076	1,054	1,060	1,075	1,093	1,113	1,128	1,144	1,160	1,177	1,194	1,211	1,229	1.5%
WAPA	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	0.0%
Other NP15 LSEs - Non Bay	764	685	688	690	693	698	702	707	711	715	719	724	729	0.6%
CDWR-N	848	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	0.0%
Total North of Path 15	95,891	93,088	93,333	94,346	95,608	97,031	98,035	99,030	100,062	101,185	102,242	103,296	104,405	1.1%
PG&E Service Area (ZP26)	11,234	10,996	11,052	11,202	11,381	11,585	11,741	11,896	12,056	12,230	12,396	12,564	12,740	1.4%
CDWR-ZP26	1,601	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446	0.0%
Total Zone Path 26	12,834	13,443	13,499	13,648	13,827	14,032	14,187	14,342	14,503	14,676	14,843	15,011	15,187	1.2%
Total Valley	61,482	61,506	61,788	62,545	63,446	64,479	65,266	66,050	66,863	67,739	68,583	69,431	70,322	1.3%
Total North of Path 26	108,725	106,531	106,832	107,995	109,435	111,062	112,222	113,372	114,565	115,862	117,085	118,307	119,592	1.1%
Merced	474	461	463	470	482	490	494	498	502	507	511	514	518	1.1%
Turlock Irrigation District	2,220	2,155	2,169	2,198	2,236	2,278	2,310	2,343	2,377	2,413	2,449	2,485	2,523	1.5%
Total Turlock Irrigation District Control Area	2,694	2,615	2,631	2,668	2,718	2,768	2,804	2,841	2,879	2,919	2,959	2,999	3,041	1.5%
SMUD	11,635	11,299	11,309	11,451	11,666	11,878	12,046	12,195	12,327	12,454	12,582	12,714	12,852	1.3%
WAPA (SMUD)	1,763	1,534	1,547	1,584	1,625	1,664	1,690	1,716	1,741	1,770	1,792	1,815	1,839	1.7%
Redding	894	893	902	917	933	955	975	995	1,016	1,038	1,061	1,084	1,109	2.1%
Roseville	1,367	1,355	1,367	1,390	1,418	1,448	1,472	1,496	1,522	1,549	1,575	1,602	1,630	1.8%
City of Shasta Lake	199	193	193	196	201	204	205	206	208	209	210	211	211	0.9%
Modesto Irrigation District	2,854	2,770	2,782	2,820	2,873	2,924	2,959	2,992	3,028	3,066	3,102	3,138	3,175	1.3%
Total SMUD/WAPA Control Area	18,712	18,044	18,100	18,359	18,715	19,073	19,347	19,600	19,841	20,085	20,322	20,563	20,816	1.4%
SCE Service Area - LA Basin	74,914	71,891	71,946	72,676	73,646	74,834	75,733	76,672	77,632	78,625	79,581	80,552	81,561	1.3%
Anaheim	2,780	2,674	2,675	2,703	2,741	2,783	2,815	2,848	2,882	2,916	2,947	2,978	3,011	1.2%
Riverside	2,307	2,263	2,275	2,304	2,339	2,386	2,427	2,470	2,515	2,561	2,607	2,654	2,703	1.7%
Vernon	1,314	1,261	1,258	1,276	1,312	1,329	1,332	1,336	1,340	1,341	1,340	1,338	1,333	0.6%
MWD	172	150	148	146	145	145	144	144	144	144	145	145	145	-0.2%
Other SP15 LSEs - LA Basin	980	950	952	963	977	995	1,009	1,025	1,040	1,057	1,073	1,089	1,106	1.5%
Pasadena	1,332	1,295	1,296	1,305	1,314	1,320	1,322	1,325	1,330	1,335	1,338	1,342	1,347	0.4%
LA Basin Subtotal	83,799	80,483	80,550	81,373	82,474	83,791	84,782	85,820	86,883	87,978	89,030	90,097	91,206	1.3%
SCE Service Area - Big Creek Ventura	17,619	16,908	16,921	17,093	17,321	17,601	17,812	18,033	18,259	18,492	18,717	18,945	19,183	1.3%
CDWR-S	3,480	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	5,319	0.0%
Big Creek/Ventura Subtotal	21,099	22,227	22,240	22,412	22,640	22,919	23,131	23,352	23,577	23,811	24,036	24,264	24,502	1.0%
SCE Service Area - Out of Basin	3,596	3,451	3,453	3,488	3,535	3,592	3,635	3,680	3,726	3,774	3,820	3,866	3,915	1.3%
MWD	1,739	1,516	1,497	1,479	1,462	1,461	1,461	1,461	1,460	1,461	1,462	1,463	1,465	-0.2%
Other SP15 LSEs - Out of Basin	384	380	383	388	394	402	408	415	421	428	436	443	451	1.7%
Total SCE TAC Area	110,618	108,057	108,123	109,141	110,505	112,165	113,417	114,727	116,068	117,453	118,783	120,134	121,538	1.2%
SDG&E Service Area	22,085	21,599	21,695	21,941	22,284	22,680	22,978	23,283	23,556	23,845	24,130	24,434	24,740	1.3%
Total South of Path 26	132,703	129,656	129,818	131,081	132,789	134,846	136,395	138,011	139,624	141,297	142,913	144,568	146,278	1.2%
LADWP	28,170	27,273	27,157	27,430	27,891	28,263	28,513	28,749	28,986	29,213	29,446	29,684	29,925	1.0%
Burbank	1,196	1,165	1,163	1,171	1,188	1,199	1,204	1,207	1,211	1,214	1,217	1,219	1,222	0.5%
Glendale	1,237	1,206	1,203	1,213	1,230	1,245	1,252	1,258	1,264	1,270	1,277	1,283	1,290	0.7%
Total LADWP Control Area	30,604	29,644	29,523	29,814	30,309	30,707	30,968	31,214	31,461	31,697	31,939	32,186	32,437	0.9%
Imperial Irrigation District Control Area	3,712	3,692	3,763	3,857	3,969	4,077	4,169	4,265	4,369	4,479	4,590	4,705	4,828	2.5%
Total CAISO	241,428	236,187	236,649	239,076	242,224	245,908	248,617	251,383	254,189	257,159	259,998	262,875	265,870	1.2%
Total Statewide	297,151	290,183	290,666	293,774	297,936	302,533	305,905	309,303	312,740	316,339	319,809	323,329	326,991	1.2%

*Balancing Authority Tables exclude LSEs located in non-California based control areas.

Form 1.5b
California Energy Demand 2010-2020 Staff Revised Forecast
1-in-2 Net Electricity Peak Demand by Agency and Balancing Authority (MW)*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth 2010-2020
PG&E Service Area - Greater Bay Area	8,082	7,761	7,792	7,873	7,970	8,066	8,131	8,196	8,263	8,339	8,409	8,477	8,558	0.9%
Silicon Valley Power	495	489	492	499	508	515	519	524	529	535	540	544	549	1.1%
NCPA - Greater Bay Area	278	274	276	280	285	289	292	295	298	301	304	307	311	1.2%
Other NP15 LSEs - Greater Bay Area	6	6	6	6	6	6	6	6	6	6	6	6	6	0.4%
CCSF	120	110	110	110	111	112	112	112	113	113	113	113	113	0.3%
Greater Bay Area Subtotal	8,981	8,639	8,675	8,768	8,880	8,988	9,060	9,133	9,209	9,294	9,372	9,448	9,537	1.0%
PG&E Service Area - Non Bay	9,726	9,637	9,729	9,884	10,061	10,239	10,382	10,527	10,677	10,840	10,998	11,156	11,332	1.5%
NCPA - Non Bay	212	212	214	218	222	227	230	234	237	241	245	249	253	1.7%
WAPA	210	181	183	186	190	193	196	198	200	203	206	208	210	1.4%
Other NP15 LSEs - Non Bay	172	154	154	155	156	157	157	157	158	158	158	159	159	0.3%
CDWR-N	90	118	118	118	118	118	118	118	118	118	118	118	118	0.0%
Total North of Path 15	19,391	18,941	19,074	19,330	19,626	19,922	20,143	20,368	20,600	20,855	21,097	21,338	21,610	1.3%
PG&E Service Area (ZP26)	2,397	2,375	2,398	2,436	2,480	2,524	2,559	2,595	2,632	2,672	2,711	2,749	2,793	1.5%
CDWR-ZP26	170	223	223	223	223	223	223	223	223	223	223	223	223	0.0%
Total Zone Path 26	2,567	2,598	2,621	2,659	2,702	2,746	2,782	2,817	2,854	2,895	2,933	2,972	3,016	1.4%
Total Valley	12,978	12,900	13,019	13,220	13,449	13,680	13,864	14,052	14,245	14,456	14,658	14,862	15,088	1.5%
Total North of Path 26	21,959	21,539	21,694	21,988	22,329	22,668	22,924	23,185	23,454	23,750	24,030	24,310	24,626	1.3%
Merced	88	88	89	90	92	94	95	96	97	99	100	102	103	1.5%
Turlock Irrigation District	560	553	560	570	582	594	604	614	625	637	648	660	673	1.9%
Total Turlock Irrigation District Control Area	647	640	648	660	674	687	699	711	723	736	749	762	776	1.8%
SMUD	3,080	3,039	3,050	3,088	3,140	3,190	3,232	3,270	3,302	3,334	3,367	3,401	3,438	1.2%
WAPA (SMUD)	200	200	200	200	200	200	200	200	200	200	200	200	200	0.0%
Redding	251	255	260	266	272	279	285	291	297	304	310	317	325	2.3%
Roseville	334	340	345	353	362	371	378	385	393	402	410	419	428	2.2%
City of Shasta Lake	32	32	32	32	33	33	34	34	35	36	36	37	37	1.6%
Modesto Irrigation District	655	646	653	665	677	690	701	711	722	734	745	756	769	1.6%
Total SMUD/WAPA Control Area	4,552	4,512	4,541	4,604	4,684	4,764	4,830	4,892	4,950	5,009	5,068	5,130	5,196	1.4%
SCE Service Area - LA Basin	15,886	16,385	16,482	16,703	16,961	17,233	17,454	17,688	17,928	18,180	18,422	18,667	18,930	1.4%
Anaheim	541	559	561	568	576	584	591	598	605	613	620	627	634	1.2%
Riverside	554	588	595	606	619	632	644	656	669	682	695	708	722	2.0%
Vernon	187	191	191	192	194	196	198	200	201	203	204	206	207	0.8%
MWD	24	23	22	22	22	22	22	22	22	22	22	22	22	-0.3%
Other SP15 LSEs - LA Basin	200	210	212	215	219	224	227	231	235	239	243	248	252	1.7%
Pasadena	303	301	302	303	305	306	305	306	307	307	308	308	308	0.2%
LA Basin Subtotal	17,695	18,257	18,364	18,610	18,897	19,197	19,441	19,700	19,967	20,246	20,514	20,784	21,076	1.4%
SCE Service Area - Big Creek Ventura	3,850	3,971	3,994	4,048	4,111	4,176	4,230	4,287	4,345	4,406	4,464	4,524	4,588	1.4%
CDWR-S	200	200	300	300	300	300	300	300	300	300	300	300	300	0.0%
Big Creek/Ventura Subtotal	4,050	4,171	4,294	4,348	4,411	4,476	4,530	4,587	4,645	4,706	4,764	4,824	4,888	1.3%
SCE Service Area - Out of Basin	527	543	547	554	562	572	579	587	595	603	611	619	628	1.4%
MWD	229	215	212	209	207	206	206	206	205	206	206	206	206	-0.3%
Other SP15 LSEs - Out of Basin	57	61	62	63	65	66	68	69	71	73	74	76	78	2.4%
Total SCE TAC Area	22,558	23,248	23,479	23,785	24,142	24,518	24,823	25,149	25,482	25,833	26,169	26,509	26,875	1.4%
SDG&E Service Area	4,371	4,487	4,516	4,578	4,658	4,738	4,797	4,856	4,911	4,973	5,032	5,094	5,157	1.3%
Total South of Path 26	26,929	27,734	27,995	28,363	28,800	29,256	29,620	30,004	30,393	30,806	31,201	31,603	32,032	1.4%
LADWP	6,015	5,812	5,791	5,846	5,929	5,989	6,025	6,060	6,096	6,132	6,168	6,206	6,247	0.8%
Burbank	282	304	304	306	309	312	313	313	314	315	315	316	317	0.4%
Glendale	312	335	333	336	340	343	344	344	345	345	346	347	348	0.4%
Total LADWP Control Area	6,608	6,450	6,428	6,488	6,579	6,644	6,681	6,718	6,755	6,792	6,829	6,869	6,912	0.7%
Imperial Irrigation District Control Area	977	965	985	1,012	1,042	1,067	1,090	1,114	1,141	1,169	1,197	1,226	1,256	2.5%
Total CAISO Noncoincident Peak	48,888	49,273	49,689	50,351	51,129	51,924	52,545	53,190	53,847	54,556	55,231	55,913	56,658	1.3%
Total CAISO Coincident Peak	47,714	48,091	48,497	49,143	49,902	50,678	51,283	51,913	52,555	53,246	53,905	54,571	55,298	1.3%
Total Statewide Noncoincident Peak	61,672	61,841	62,292	63,115	64,107	65,086	65,844	66,624	67,416	68,262	69,074	69,898	70,799	1.3%
Total Statewide Coincident Peak	60,192	60,356	60,797	61,600	62,568	63,524	64,264	65,025	65,798	66,624	67,416	68,221	69,099	1.3%

*Balancing Authority Tables exclude LSEs located in non-California-based control areas. LSE peaks are coincident with control area peak.

Form 1.5c
California Energy Demand 2010-2020 Staff Revised Forecast
1-in-5 Net Electricity Peak Demand by Agency and Balancing Authority

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth 2010-2020
PG&E Service Area - Greater Bay Area	8,002	8,034	8,117	8,218	8,316	8,383	8,450	8,520	8,598	8,670	8,741	8,824	0.9%
Silicon Valley Power	504	507	515	524	531	536	540	546	551	556	561	566	1.1%
NCPA - Greater Bay Area	283	285	289	294	298	301	304	307	311	314	317	320	1.2%
Other NP15 LSEs - Greater Bay Area	6	6	6	6	6	6	6	6	6	6	6	6	0.4%
CCSF	113	113	114	115	115	116	116	116	117	117	117	117	0.3%
Greater Bay Area Local Area	8,907	8,944	9,040	9,156	9,267	9,341	9,417	9,495	9,583	9,663	9,741	9,833	1.0%
North of Path 26	22,767	22,931	23,242	23,602	23,960	24,231	24,507	24,791	25,104	25,400	25,695	26,029	1.3%
Turlock Irrigation District Control Area	671	679	692	706	720	732	745	757	771	785	798	813	1.8%
SMUD/WAPA Control Area	4,839	4,870	4,937	5,024	5,109	5,180	5,247	5,308	5,372	5,436	5,502	5,573	1.4%
SCE Service Area - LA Basin	17,329	17,432	17,665	17,939	18,226	18,459	18,707	18,961	19,227	19,483	19,742	20,021	
Anaheim	591	593	601	609	618	625	633	640	648	656	663	671	1.2%
Riverside	622	629	641	655	669	681	694	707	721	735	749	763	2.0%
Vernon	191	191	192	194	196	198	200	201	203	204	206	207	0.8%
MWD	23	22	22	22	22	22	22	22	22	22	22	22	-0.3%
Other SP15 LSEs - LA Basin	222	224	228	232	237	240	245	249	253	257	262	266	1.7%
Pasadena	318.000	318.981	320.979	322.797	323.335	323.079	323.597	324.241	324.779	325.296	325.675	326.149	0.2%
LA Basin Local Area	19,297	19,410	19,670	19,974	20,291	20,548	20,823	21,104	21,399	21,682	21,968	22,276	1.4%
SCE Service Area - Big Creek Ventura	4,123	4,147	4,203	4,268	4,336	4,391	4,450	4,511	4,574	4,635	4,696	4,762	1.4%
CDWR-S	200	300	300	300	300	300	300	300	300	300	300	300	0.0%
Big Creek/Ventura Local Area	4,321	4,449	4,504	4,569	4,638	4,693	4,752	4,812	4,875	4,936	4,997	5,064	1.3%
Total SCE TAC Area	24,828	25,076	25,402	25,783	26,185	26,511	26,859	27,215	27,590	27,948	28,312	28,703	1.4%
SDG&E Service Area	4,836	4,868	4,935	5,021	5,108	5,171	5,234	5,294	5,361	5,424	5,491	5,559	1.3%
Total South of Path 26	29,758	30,038	30,432	30,902	31,391	31,782	32,194	32,611	33,054	33,478	33,910	34,370	1.4%
LADWP Control Area	6,878	6,855	6,918	7,015	7,084	7,124	7,163	7,203	7,243	7,282	7,324	7,371	0.7%
Imperial Irrigation District Control Area	1,030	1,052	1,080	1,112	1,140	1,163	1,189	1,218	1,248	1,278	1,308	1,341	2.5%
Total CAISO Noncoincident Peak	52,525	52,969	53,674	54,503	55,351	56,013	56,701	57,402	58,158	58,878	59,605	60,399	1.3%
Total CAISO Coincident Peak	51,265	51,698	52,386	53,195	54,023	54,669	55,340	56,024	56,762	57,464	58,175	58,950	1.3%
Total Statewide Noncoincident Peak	65,943	66,425	67,302	68,360	69,405	70,213	71,044	71,889	72,792	73,658	74,537	75,497	1.3%
Total Statewide Coincident Peak	64,360	64,830	65,687	66,719	67,739	68,528	69,339	70,164	71,045	71,890	72,748	73,685	1.3%

*Balancing Authority Tables exclude LSEs located in non-California-based control areas.

Form 1.5d
California Energy Demand 2010-2020 Staff Revised Forecast
1-in-10 Net Electricity Peak Demand by Agency and Balancing Authority

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth 2010-2020
PG&E Service Area - Greater Bay Area	8,082	8,114	8,199	8,300	8,400	8,467	8,535	8,605	8,684	8,757	8,828	8,912	0.9%
Silicon Valley Power	509	512	520	529	536	541	546	551	557	562	567	572	1.1%
NCPA - Greater Bay Area	286	288	292	297	301	304	307	310	314	317	320	324	1.2%
Other NP15 LSEs - Greater Bay Area	6	6	6	6	6	6	6	6	6	6	6	6	0.4%
CCSF	114	114	115	116	117	117	117	117	118	118	118	118	0.3%
Greater Bay Area Local Area	8,997	9,034	9,131	9,247	9,360	9,435	9,511	9,590	9,679	9,760	9,839	9,932	1.0%
North of Path 26	23,112	23,278	23,594	23,959	24,323	24,598	24,878	25,166	25,484	25,784	26,084	26,423	1.3%
Turlock Irrigation District Control Area	684	692	705	719	734	746	759	772	786	800	813	829	1.8%
SMUD/WAPA Control Area	4,932	4,963	5,032	5,120	5,207	5,279	5,347	5,410	5,475	5,540	5,607	5,679	1.4%
SCE Service Area - LA Basin	17,770	17,874	18,114	18,394	18,689	18,928	19,182	19,442	19,716	19,978	20,243	20,529	
Anaheim	606	608	616	625	634	641	649	657	665	672	680	688	1.2%
Riverside	638	645	657	671	686	698	712	725	739	753	768	783	2.0%
Vernon	191	191	192	194	196	198	200	201	203	204	206	207	0.8%
MWD	23	22	22	22	22	22	22	22	22	22	22	22	-0.3%
Other SP15 LSEs - LA Basin	228	230	234	238	243	247	251	255	260	264	268	273	1.7%
Pasadena	326.078	327.084	329.131	330.995	331.546	331.283	331.813	332.473	333.024	333.554	333.942	334.428	0.2%
LA Basin Local Area	19,782	19,898	20,164	20,475	20,800	21,064	21,346	21,634	21,937	22,227	22,520	22,836	1.4%
SCE Service Area - Big Creek Ventura	4,229	4,254	4,311	4,377	4,447	4,504	4,564	4,626	4,690	4,753	4,816	4,883	1.4%
CDWR-S	200	300	300	300	300	300	300	300	300	300	300	300	0.0%
Big Creek/Ventura Local Area	4,425	4,556	4,613	4,680	4,749	4,806	4,866	4,928	4,993	5,055	5,118	5,186	1.3%
Total SCE TAC Area	25,293	25,545	25,878	26,266	26,675	27,008	27,362	27,725	28,106	28,472	28,842	29,240	1.4%
SDG&E Service Area	4,935	4,967	5,036	5,124	5,212	5,277	5,341	5,402	5,470	5,535	5,603	5,673	1.3%
Total South of Path 26	30,331	30,617	31,019	31,497	31,996	32,394	32,814	33,239	33,691	34,123	34,563	35,032	1.4%
LADWP Control Area	6,999	6,975	7,040	7,139	7,209	7,250	7,289	7,330	7,370	7,410	7,453	7,501	0.7%
Imperial Irrigation District Control Area	1,040	1,062	1,091	1,123	1,151	1,175	1,201	1,230	1,260	1,290	1,321	1,354	2.5%
Total CAISO Noncoincident Peak	53,443	53,895	54,612	55,456	56,319	56,992	57,692	58,405	59,175	59,907	60,647	61,455	1.3%
Total CAISO Coincident Peak	52,160	52,601	53,302	54,125	54,967	55,624	56,307	57,004	57,754	58,469	59,192	59,981	1.3%
Total Statewide Noncoincident Peak	67,098	67,588	68,480	69,557	70,619	71,442	72,288	73,148	74,066	74,947	75,842	76,818	1.3%
Total Statewide Coincident Peak	65,487	65,965	66,836	67,887	68,925	69,727	70,553	71,392	72,288	73,148	74,022	74,975	1.3%

*Balancing Authority Tables exclude LSEs located in non-California-based control areas.

Form 1.5e
California Energy Demand 2010-2020 Staff Revised Forecast
1-in-20 Net Electricity Peak Demand by Agency and Balancing Authority

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual Growth 2010-2020
PG&E Service Area - Greater Bay Area	8,162	8,195	8,280	8,383	8,483	8,551	8,620	8,691	8,770	8,844	8,916	9,001	0.9%
Silicon Valley Power	514	517	525	534	542	546	551	557	563	567	572	578	1.1%
NCPA - Greater Bay Area	289	291	295	300	304	307	310	313	317	320	323	327	1.2%
Other NP15 LSEs - Greater Bay Area	6	6	6	6	6	6	6	6	6	6	6	6	0.4%
CCSF	115	115	116	117	118	118	118	119	119	119	119	119	0.3%
Greater Bay Area Local Area	9,086	9,124	9,222	9,339	9,453	9,529	9,606	9,685	9,775	9,857	9,937	10,031	1.0%
North of Path 26	23,413	23,582	23,901	24,271	24,640	24,919	25,202	25,494	25,816	26,121	26,425	26,768	1.3%
Turlock Irrigation District Control Area	693	702	715	729	744	757	769	782	797	811	825	840	1.8%
SMUD/WAPA Control Area	5,012	5,044	5,114	5,203	5,292	5,365	5,434	5,498	5,564	5,630	5,698	5,772	1.4%
SCE Service Area - LA Basin	18,194	18,302	18,547	18,834	19,135	19,380	19,640	19,906	20,186	20,455	20,726	21,019	
Anaheim	621	623	631	640	649	656	664	672	681	688	696	704	1.2%
Riverside	653	661	673	687	702	715	729	742	757	771	786	802	2.0%
Vernon	191	191	192	194	196	198	200	201	203	204	206	207	0.8%
MWD	23	22	22	22	22	22	22	22	22	22	22	22	-0.3%
Other SP15 LSEs - LA Basin	233	235	239	244	248	252	257	261	266	270	275	280	1.7%
Pasadena	333.871	334.900	336.996	338.903	339.467	339.198	339.740	340.415	340.979	341.520	341.917	342.414	0.2%
LA Basin Local Area	20,250	20,368	20,641	20,960	21,292	21,562	21,850	22,145	22,455	22,752	23,052	23,376	1.4%
SCE Service Area - Big Creek Ventura	4,267	4,292	4,349	4,416	4,487	4,544	4,605	4,667	4,732	4,795	4,859	4,927	1.4%
CDWR-S	200	300	300	300	300	300	300	300	300	300	300	300	0.0%
Big Creek/Ventura Local Area	4,463	4,595	4,652	4,719	4,790	4,847	4,908	4,970	5,035	5,098	5,162	5,230	1.3%
Total SCE TAC Area	25,665	25,921	26,258	26,652	27,068	27,405	27,764	28,133	28,520	28,890	29,266	29,670	1.4%
SDG&E Service Area	5,020	5,053	5,123	5,212	5,302	5,368	5,433	5,495	5,565	5,631	5,700	5,771	1.3%
Total South of Path 26	30,829	31,119	31,527	32,013	32,521	32,925	33,352	33,784	34,243	34,682	35,129	35,606	1.4%
LADWP Control Area	7,104	7,080	7,146	7,246	7,317	7,359	7,399	7,440	7,481	7,522	7,565	7,613	0.7%
Imperial Irrigation District Control Area	1,077	1,100	1,130	1,164	1,192	1,217	1,244	1,275	1,306	1,337	1,369	1,403	2.5%
Total CAISO Noncoincident Peak	54,242	54,700	55,429	56,285	57,161	57,844	58,555	59,279	60,059	60,803	61,554	62,375	1.3%
Total CAISO Coincident Peak	52,940	53,388	54,098	54,934	55,789	56,456	57,149	57,856	58,618	59,344	60,077	60,878	1.3%
Total Statewide Noncoincident Peak	68,129	68,627	69,533	70,627	71,706	72,541	73,401	74,274	75,207	76,102	77,011	78,003	1.3%
Total Statewide Coincident Peak	66,494	66,980	67,864	68,932	69,985	70,800	71,640	72,492	73,402	74,276	75,163	76,131	1.3%

*Balancing Authority Tables exclude LSEs located in non-California-based control areas.

Form 2.2 - Statewide
California Energy Demand 2009-2020 Staff Revised Forecast
Economic and Demographic Assumptions

	Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2007$)	Commercial Floorspace (MM Sqft.)
1990	29,828,685	10,370,753	2.79	947,562	138,684	4,879
1991	30,458,225	10,543,350	2.80	934,780	135,692	5,041
1992	30,986,940	10,666,773	2.82	955,075	131,876	5,177
1993	31,313,835	10,769,374	2.82	948,606	126,566	5,275
1994	31,523,270	10,864,237	2.81	958,716	125,542	5,350
1995	31,711,155	10,956,461	2.81	983,941	129,647	5,419
1996	31,961,985	11,045,475	2.81	1,019,330	135,273	5,487
1997	32,451,640	11,139,125	2.83	1,064,402	162,265	5,557
1998	32,861,690	11,244,536	2.83	1,147,435	186,762	5,640
1999	33,416,925	11,365,123	2.85	1,204,844	216,628	5,750
2000	34,152,028	11,463,373	2.88	1,298,741	269,942	5,879
2001	34,747,465	11,588,888	2.91	1,308,464	241,615	6,006
2002	35,358,330	11,724,250	2.93	1,304,260	226,459	6,149
2003	35,926,021	11,867,587	2.94	1,322,633	233,927	6,279
2004	36,437,344	12,025,981	2.94	1,374,146	249,012	6,384
2005	36,894,972	12,202,745	2.94	1,415,798	284,020	6,491
2006	37,337,019	12,372,264	2.93	1,483,203	308,617	6,576
2007	37,804,451	12,513,296	2.94	1,520,755	301,062	6,676
2008	38,291,487	12,617,018	2.95	1,518,642	298,902	6,788
2009	38,778,524	12,749,518	2.95	1,521,956	294,136	6,890
2010	39,265,560	12,885,706	2.96	1,548,566	300,152	6,963
2011	39,752,596	13,022,822	2.96	1,584,880	310,593	7,023
2012	40,239,633	13,162,069	2.96	1,643,022	324,728	7,090
2013	40,726,669	13,303,449	2.97	1,704,025	333,451	7,186
2014	41,213,705	13,447,033	2.97	1,750,675	337,922	7,296
2015	41,700,741	13,592,844	2.98	1,793,585	342,310	7,408
2016	42,187,778	13,740,946	2.98	1,838,368	347,015	7,512
2017	42,674,814	13,891,372	2.98	1,886,487	351,407	7,605
2018	43,161,850	14,044,170	2.99	1,934,279	355,508	7,698
2019	43,648,887	14,199,394	2.99	1,982,339	359,070	7,792
2020	44,135,923	14,357,080	3.00	2,031,266	362,014	7,886
Annual Growth Rates (%)						
1990-2000	1.36%	1.01%	0.33%	3.20%	6.89%	1.88%
2000-2008	1.44%	1.21%	0.29%	1.97%	1.28%	1.81%
2008-2010	1.26%	1.06%	0.13%	0.98%	0.21%	1.28%
2010-2020	1.18%	1.09%	0.14%	2.75%	1.89%	1.25%

Form 2.2b Statewide
California Energy Demand 2009-2020 Staff Revised Forecast
Economic and Demographic Assumptions by Economic Scenario

	Number of Households, Base Case	Number of Households, Optimistic Scenario	Number of Households, Pessimistic Scenario	Persons per Household, Base Case	Persons per Household, Optimistic Scenario	Persons per Household, Pessimistic Scenario	Real Personal Income (Millions 2007$), Base Case	Real Personal Income (Millions 2007$), Optimistic Scenario	Real Personal Income (Millions 2007$), Pessimistic Scenario
2008	12,617,017	12,617,017	12,617,017	2.95	2.95	2.95	1,518,642	1,518,642	1,518,642
2009	12,749,517	12,749,517	12,749,517	2.95	2.95	2.95	1,521,956	1,495,530	1,510,766
2010	12,885,707	12,918,430	12,882,144	2.96	2.95	2.96	1,548,566	1,527,573	1,504,918
2011	13,022,820	13,073,636	13,001,352	2.96	2.95	2.97	1,584,880	1,590,559	1,519,732
2012	13,162,069	13,164,921	13,125,513	2.96	2.96	2.97	1,643,022	1,663,513	1,566,859
2013	13,303,448	13,278,437	13,247,918	2.97	2.97	2.98	1,704,025	1,731,055	1,618,415
2014	13,447,034	13,420,479	13,381,614	2.97	2.98	2.99	1,750,675	1,792,218	1,662,321
2015	13,592,844	13,573,545	13,517,042	2.98	2.98	2.99	1,793,585	1,848,508	1,694,546
2016	13,740,946	13,739,942	13,653,086	2.98	2.98	3.00	1,838,368	1,900,975	1,725,679
2017	13,891,372	13,920,477	13,790,249	2.98	2.98	3.01	1,886,487	1,953,783	1,759,060
2018	14,044,170	14,108,831	13,929,290	2.99	2.98	3.01	1,934,279	2,008,428	1,792,108
2019	14,199,393	14,305,812	14,070,300	2.99	2.97	3.02	1,982,339	2,069,180	1,825,295
2020	14,357,078	14,513,622	14,213,301	3.00	2.96	3.03	2,031,266	2,142,956	1,858,799
Annual Growth Rates (%)									
2010-2020	1.09%	1.17%	0.99%	0.14%	0.05%	0.24%	2.75%	3.44%	2.13%

	Total Employment (Thousands), Base Case	Total Employment (Thousands), Optimistic Scenario	Total Employment (Thousands), Pessimistic Scenario	Unemployment Rate, Base Case	Unemployment Rate, Optimistic Scenario	Unemployment Rate, Pessimistic Scenario	Industrial Output (Millions 2007$), Base Case	Industrial Output (Millions 2007$), Optimistic Scenario	Industrial Output (Millions 2007$), Pessimistic Scenario
2008	14,642	14,642	14,642	7.24	7.24	7.24	298,902	298,902	298,902
2009	14,008	14,062	14,008	11.91	11.44	11.91	294,136	297,316	294,136
2010	13,831	14,131	13,697	13.06	10.96	13.82	300,152	309,190	296,633
2011	14,200	14,521	13,845	11.61	9.78	13.82	310,593	320,847	302,660
2012	14,762	14,943	14,273	9.01	8.71	11.90	324,728	336,010	313,739
2013	15,189	15,204	14,609	7.47	8.19	10.78	333,451	345,815	322,533
2014	15,306	15,336	14,803	6.96	7.72	9.70	337,922	352,190	328,212
2015	15,360	15,469	14,880	6.82	7.28	9.30	342,310	357,796	333,856
2016	15,433	15,636	14,940	6.81	6.76	9.27	347,015	363,563	340,032
2017	15,509	15,797	14,995	6.83	6.26	9.34	351,407	369,078	346,140
2018	15,578	15,959	15,042	6.85	5.81	9.40	355,508	374,621	352,350
2019	15,647	16,129	15,090	6.87	5.38	9.48	359,070	380,075	358,548
2020	15,724	16,339	15,143	6.88	5.16	9.54	362,014	385,047	364,585
Annual Growth Rates (%)									
2010-2020	1.29%	1.46%	1.01%	-6.20%	-7.25%	-3.64%	1.89%	2.22%	2.08%

Loss Factors - Losses are included in the net peak and net energy for load tables		
	Peak	Energy
PG&E	1.097	1.096
SMUD	1.077	1.064
SCE	1.076	1.068
LADWP	1.112	1.135
SDG&E	1.096	1.0709
Burbank, Glendale, Pasadena	1.051	1.064
IID	1.060	1.128
DWR	1.060	1.038

Investor-Owned-Utility Bundled and Direct Access Forecasts*

Direct Access Assumptions

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sales (GWH)													
PGE	6,376	5,483	5,513	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603	5,603
SCE	8,555	7,699	7,776	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869	7,869
SDGE	3,142	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175	3,175
Net Energy for Load (GWH)													
PGE	6,924	5,955	5,987	6,084	6,084	6,084	6,084	6,084	6,084	6,084	6,084	6,084	6,084
SCE	9,077	8,169	8,251	8,349	8,349	8,349	8,349	8,349	8,349	8,349	8,349	8,349	8,349
SDGE	3,343	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379
Coincident Peak (MW)													
PGE	1,080	904	909	924	924	924	924	924	924	924	924	924	924
SCE	1,386	1,247	1,260	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275
SDGE	552	558	558	558	558	558	558	558	558	558	558	558	558
Noncoincident Peak (MW)													
PGE	1,107	952	957	973	973	973	973	973	973	973	973	973	973
SCE	1,459	1,313	1,326	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342
SDGE	581	587	587	587	587	587	587	587	587	587	587	587	587
Load Factors													
PGE	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714	0.714
SCE	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710	0.710
SDGE	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657	0.657

Bundled Customer Forecast

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sales (GWH)													
PGE	81,983	79,976	80,192	81,079	82,279	83,665	84,662	85,650	86,674	87,787	88,843	89,898	91,010
SCE	81,454	78,677	78,666	79,450	80,616	82,043	83,123	84,251	85,405	86,598	87,747	88,914	90,126
SDGE	17,481	16,993	17,083	17,313	17,633	18,003	18,282	18,566	18,821	19,091	19,357	19,641	19,927
Net Energy for Load (GWH)													
PGE	89,917	87,708	87,946	88,919	90,234	91,753	92,846	93,928	95,051	96,271	97,428	98,584	99,803
SCE	87,053	84,081	84,069	84,908	86,153	87,677	88,831	90,035	91,267	92,542	93,769	95,015	96,310
SDGE	18,742	18,220	18,316	18,562	18,905	19,302	19,600	19,904	20,178	20,466	20,751	21,055	21,362
Coincident Peak (MW)													
PGE	19,124	18,868	19,010	19,269	19,586	19,905	20,147	20,394	20,648	20,927	21,193	21,459	21,759
SCE	18,876	19,652	19,763	20,030	20,359	20,706	20,987	21,286	21,592	21,914	22,222	22,535	22,871
SDGE	3,819	3,929	3,958	4,020	4,101	4,181	4,239	4,298	4,353	4,415	4,474	4,536	4,599

Total Service Area Forecast (Bundled + Direct Access)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sales (GWH)													
PGE	88,359	85,459	85,705	86,682	87,882	89,268	90,265	91,253	92,277	93,390	94,446	95,501	96,612
SCE	90,009	86,377	86,442	87,320	88,485	89,912	90,992	92,121	93,274	94,468	95,616	96,783	97,995
SDGE	20,623	20,169	20,258	20,488	20,809	21,179	21,457	21,742	21,997	22,266	22,532	22,816	23,102
Net Energy for Load (GWH)													
PGE	96,841	93,663	93,933	95,004	96,318	97,838	98,930	100,013	101,135	102,355	103,512	104,669	105,887
SCE	96,129	92,251	92,320	93,257	94,502	96,027	97,180	98,385	99,617	100,891	102,118	103,364	104,659
SDGE	22,085	21,599	21,695	21,941	22,284	22,680	22,978	23,283	23,556	23,845	24,130	24,434	24,740
Coincident Peak (MW)													
PGE	20,204	19,773	19,919	20,193	20,510	20,829	21,071	21,318	21,572	21,851	22,117	22,383	22,683
SCE	20,262	20,899	21,023	21,305	21,634	21,981	22,262	22,561	22,867	23,189	23,497	23,810	24,146
SDGE	4,371	4,487	4,516	4,578	4,658	4,738	4,797	4,856	4,911	4,973	5,032	5,094	5,157

* Does not account for recent passage of SB 695 reopening direct access; further analysis incorporating the legislation will follow.

CHAPTER 2: Pacific Gas and Electric Planning Area

The Pacific Gas and Electric (PG&E) planning area includes:

- PG&E bundled retail customers.
- Customers served by energy service providers (ESPs) using the PG&E distribution system to deliver electricity to end users.
- Customers of publicly owned utilities and irrigation districts in PG&E's transmission system, with the exception of the Sacramento Municipal Utility District (SMUD). SMUD is treated as its own planning area and is discussed in a later chapter.

For purposes of this chapter, the PG&E planning area forecast includes the members of the SMUD control area, Roseville, Redding, and the Western Area Power Administration (WAPA). To support electricity and transmission system analysis, staff uses historical consumption and load data to develop individual forecasts for all medium and large utilities in the planning area. Those results are presented in Forms 1.5a through 1.5c following Chapter 1. The results in this chapter are for the entire PG&E transmission planning area.

This chapter is organized as follows. First, forecasted consumption and peak loads for the PG&E planning area are discussed; both total and per capita values are presented. *CED 2009 Draft* values are compared to adopted *CED 2007* values, with differences between the two forecasts explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Second, the chapter presents sector consumption and peak load forecasts. The residential, commercial, industrial, and "other" sector forecasts are compared to those in *CED 2007*, and differences between the two are discussed. Third, the chapter discusses the forecasts self generation, electric vehicles and effects of conservation and efficiency programs.

For *CED 2009 Draft*, three price scenarios were developed for electricity rates: high rates, low (constant) rates, and a mid-rate scenario in between the two. The high rate case assumed approximately 30 percent higher rates by 2020 relative to 2010, while the mid-rate case assumed 15 percent higher rates over the same period. In the low rate case, rates remained at 2010 levels through 2020 as was done in *CED 2007*. In *CED 2009 Revised,* the mid rate price forecast is used, and all comparisons to *CED 2009 Draft* are made to the mid rate scenario. Chapter 1 provides more details on price assumptions.

Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* forecasts of PG&E planning area electricity consumption and peak demand are lower than *CED 2007* levels because of the economic downturn and increased efficiency impacts, but higher than *CED 2009 Draft*.
- Per capita electricity consumption and peak demand are also projected to be lower than *CED 2007* but higher than *CED 2009 Draft*.
- The largest percentage reduction in electricity consumption and peak demand relative to *CED 2007* occurs in the residential sector.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by around 2.3 percent in 2020.
- Self-generation impacts are projected to be higher than in *CED 2007* because of increased adoption of photovoltaic systems but lower than *CED 2009 Draft* because of a reduced peak factor assumption. .
- Electric vehicles are projected to increase electricity consumption by almost 1,700 GWH in 2020.

Table 10 presents a comparison of the planning area electricity consumption and peak demand forecasts for selected years. *CED 2009 Revised* compares both *CED 2009 Draft* mid rate and *CED 2007*. The revised electricity consumption forecast is higher than *CED 2009 Draft* by more than 6 percent at the end of the forecast period. This is caused mainly by higher economic forecast values provided in June Moody's Economy.com forecast and inclusion of consumption from electric vehicles included in *CED 2009 Revised*.

The revised consumption forecast is still about 1.7 percent lower than *CED 2007* at the end of the period. The revised peak forecast is now 3 percent higher than *CED 2009 Draft* by the end of the forecast period. This is still more than 2 percent lower than *CED 2007*. The smaller increase in the revised peak forecast relative to changes in the consumption forecast is caused by increased self-generation assumptions, which reduce net system peak but do not reduce total electricity consumption, and inclusion of consumption from electric vehicles, which are assumed to be primarily charged off peak. Long-term growth rates of both *CED 2009 Revised* consumption and peak forecasts are similar to the growth rates of *CED 2007*.

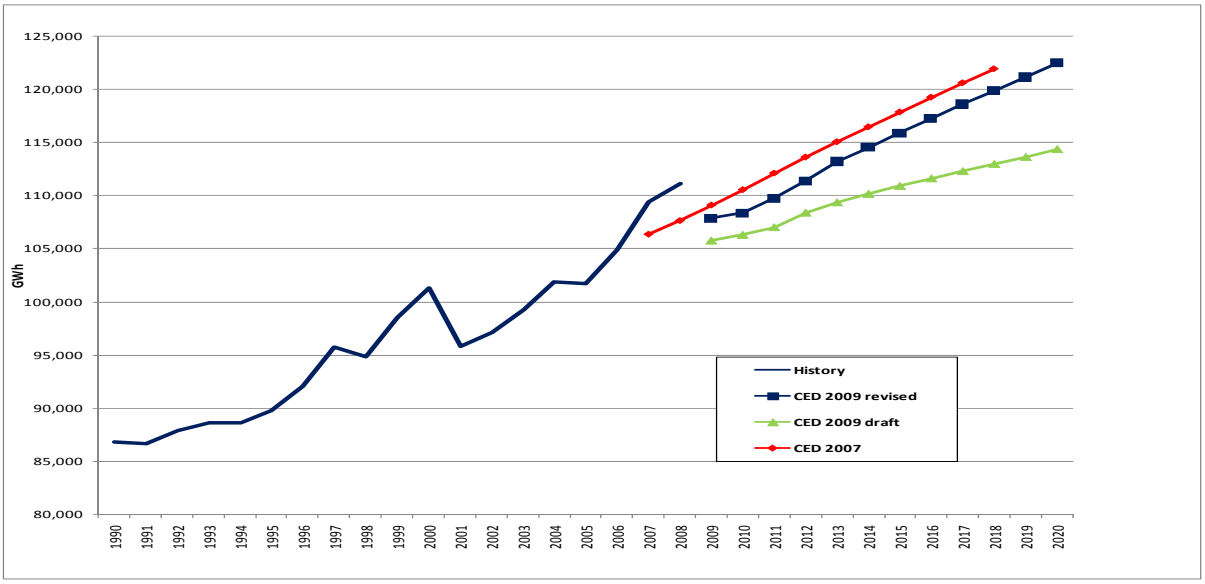
Table 10: PG&E Planning Area Forecast Comparison

Consumption (GWH)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	86,803	86,803	86,803	0.00%	0.00%
2000	101,331	101,331	101,333	0.00%	0.00%
2008	107,591	106,753	111,128	3.29%	4.10%
2010	110,503	106,240	108,344	-1.95%	1.98%
2015	117,806	110,878	115,828	-1.68%	4.46%
2018	121,873	112,959	119,814	-1.69%	6.07%
Average Annual Growth Rates					
1990-2000	1.56%	1.56%	1.56%		
2000-2008	0.75%	0.65%	1.16%		
2008-2010	1.34%	-0.24%	-1.26%		
2010-2018	1.23%	0.77%	1.27%		
Peak (MW)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	17,055	17,013	17,250	1.14%	1.39%
2000	20,716	20,665	20,628	-0.42%	-0.18%
2008	23,413	23,405	23,805	1.67%	1.71%
2010	24,050	23,240	23,479	-2.37%	1.03%
2015	25,760	24,606	25,163	-2.32%	2.26%
2018	26,754	25,341	26,125	-2.35%	3.09%
Average Annual Growth Rates					
1990-2000	1.96%	1.96%	1.80%		
2000-2008	1.54%	1.57%	1.81%		
2008-2010	1.35%	-0.35%	-0.69%		
2010-2018	1.34%	1.09%	1.34%		

Source: California Energy Commission, 2009

As shown in **Figure 21**, the *CED 2009 Revised* consumption forecast is about 6 percent higher than *CED 2009 Draft* values by the end of the forecast period but is still below the *CED 2007* projection throughout the forecast period. The dip in the early years of *CED 2009 Revised* is caused by both the revised economic projections and by elevated assumptions about increased energy efficiency program savings.

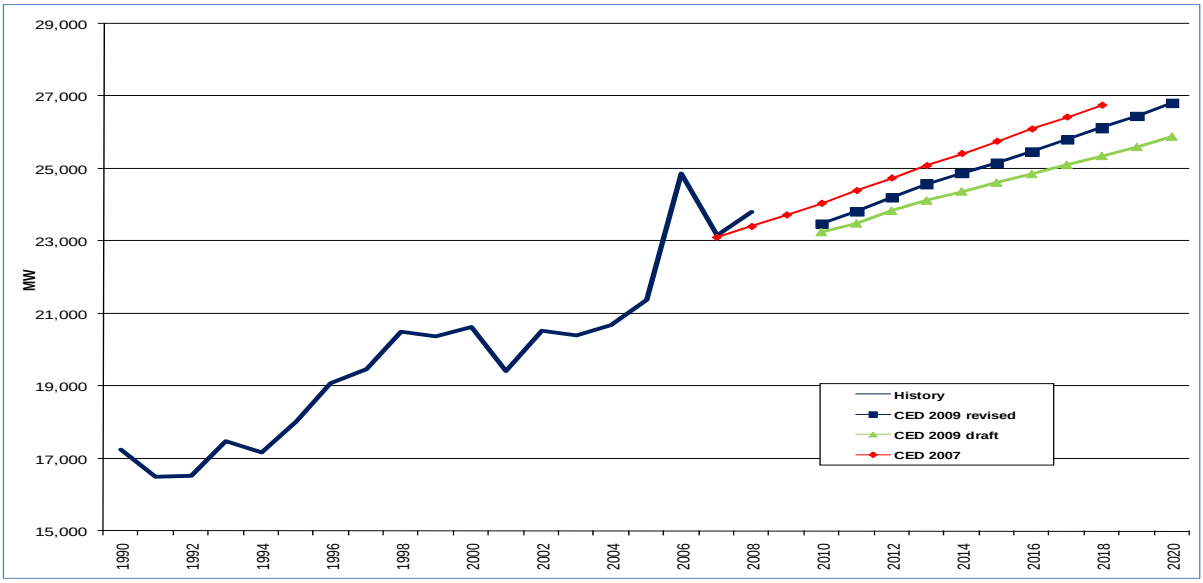
Figure 21: PG&E Planning Area Electricity Forecast



Source: California Energy Commission, 2009

CED 2009 Revised PG&E planning area peak demand (**Figure 22**) is higher than *CED 2009 Draft* by the end of the forecast period. The reason for the smaller difference in peak demand between the forecasts, compared to that in consumption, is an increase in photovoltaic self-generation (which has a much larger relative impact on peak than on consumption).

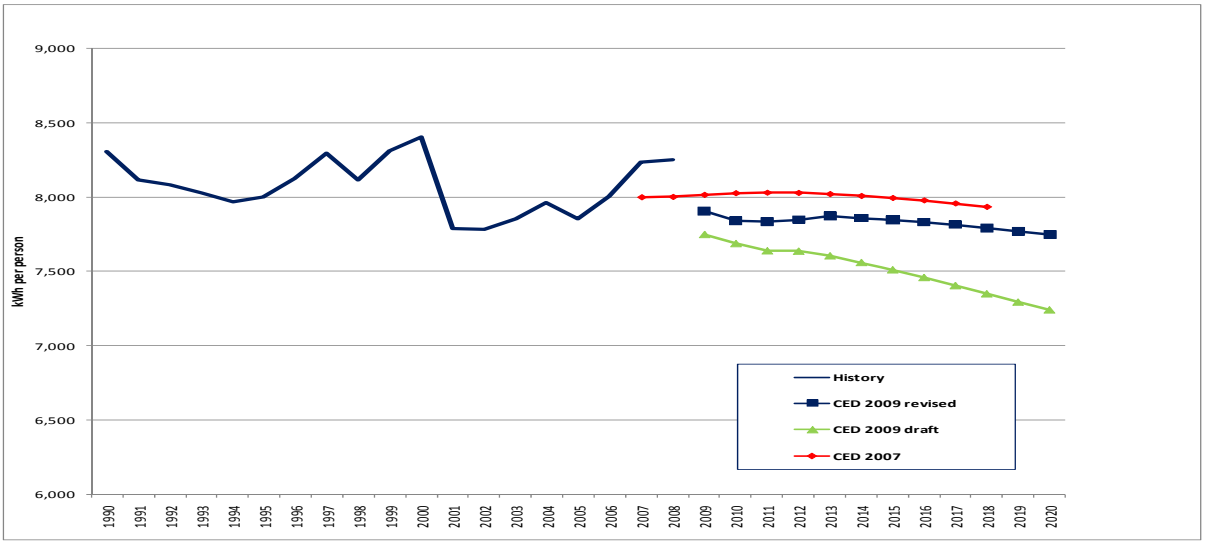
Figure 22: PG&E Planning Area Peak



Source: California Energy Commission, 2009

Figure 23 compares forecasted per capita residential electricity consumption. Per capita consumption in *CED 2009 Revised* is higher than in *CED 2009 Draft*. It is still below the projection of *CED 2007*. The revised projection declines slightly over the forecast period and is lower than recent recorded history. The dip in per capita consumption in the near term is caused by a combination of the aforementioned economic/demographic forecast assumptions and increased savings from energy efficiency programs.

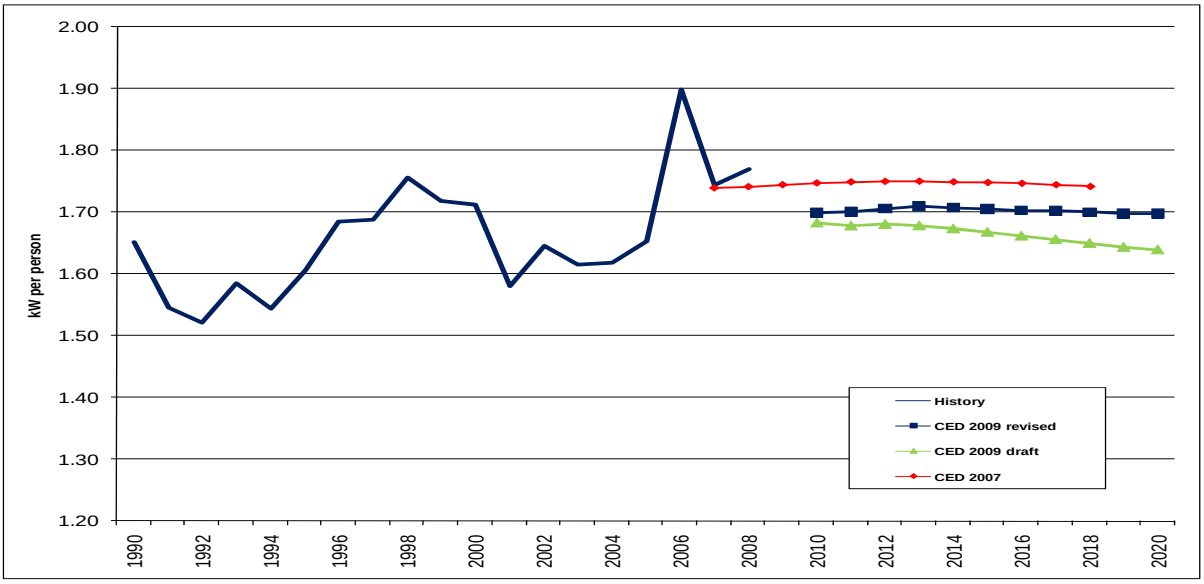
Figure 23: PG&E Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2009

CED 2009 Revised per capita peak demand, shown in **Figure 24**, is now higher than *CED 2009 Draft* by the end of the forecast period. *CED 2009 Revised* per capita peak demand is lower than recent history because of recent economic events and increases in savings from efficiency programs. The small decline in long-term per capita consumption is a result of continued savings from efficiency programs (both standards and utility programs).

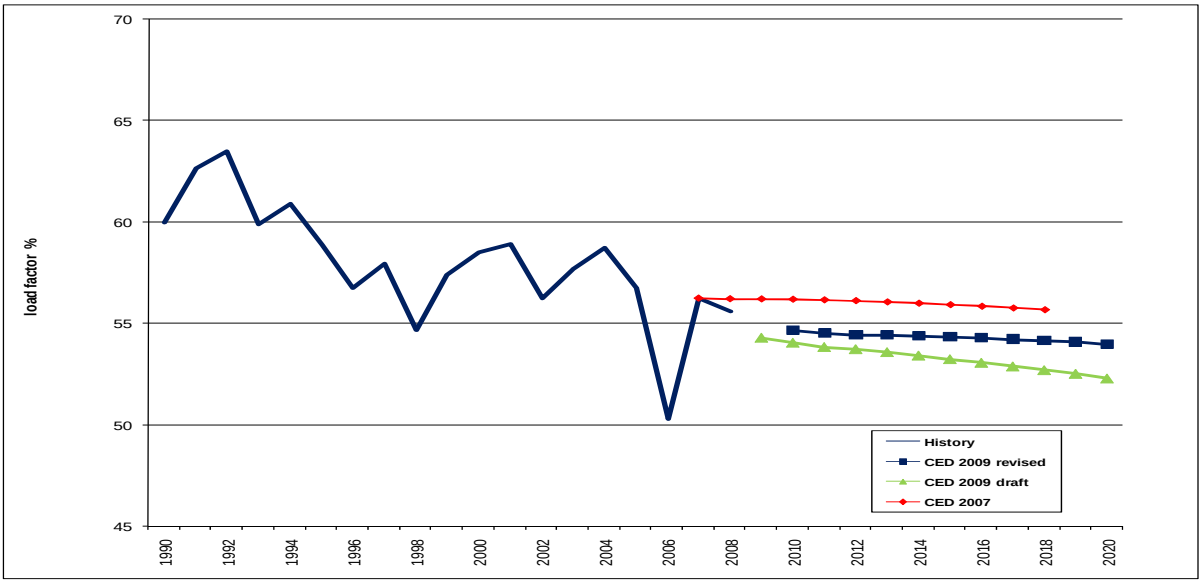
Figure 24: PG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2009

Figure 25 compares respective forecast load factors. The high load factor observed from 1998-2005 is a product of lower-than-average peak temperatures and reaction to the energy crisis. The projected load factor, based on higher 1-in-2 peak temperatures and a return to normal air conditioning use patterns, should be lower than this recent value. The *CED 2009 Revised* load factor is higher than *CED 2009 Draft* because of the revised self-generation estimate, which lowers peak relative to consumption peak. As in *CED 2009 Draft*, the *CED 2009 Revised* load factor is projected to decline over the forecast period.

Figure 25: PG&E Planning Area Peak Load Factor



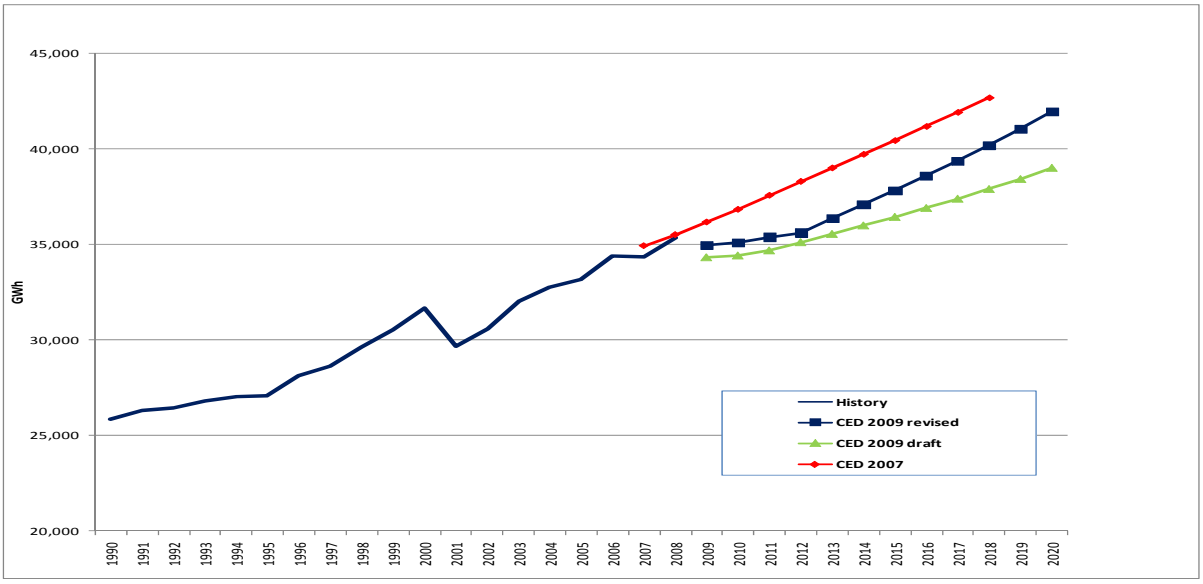
Source: California Energy Commission, 2009

Sector Level Results and Input Assumptions

Residential

Figure 26 compares residential forecasts. *CED 2009 Revised* is higher over the entire forecast period than *CED 2009 Draft* but is still well below the level of *CED 2007*. The increase over *CED 2009 Draft* is caused by increased projections of household income, inclusion of private electric vehicle consumption and an increase in the starting value brought about by inclusion of 2008 sales. *CED 2009 Revised* household income projections are still below those projected in *CED 2007*.

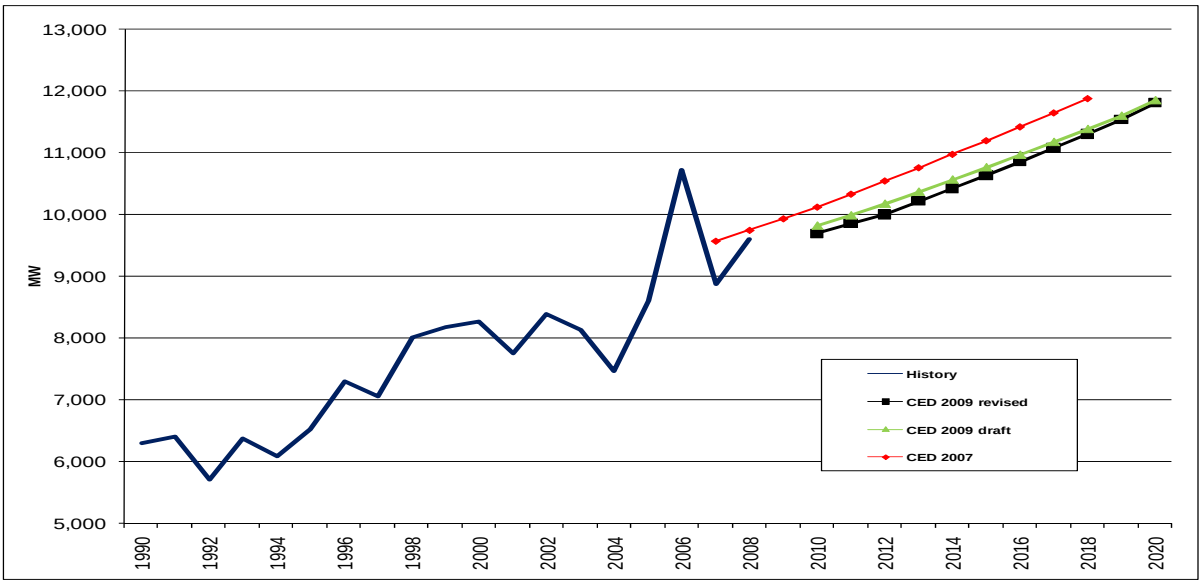
Figure 26: PG&E Planning Area Residential Consumption



Source: California Energy Commission, 2009

Figure 27 compares residential peak demand forecasts. Unlike the consumption forecast, there is only a slight difference in *CED 2009 Revised* over *CED 2009 Draft* residential peak.

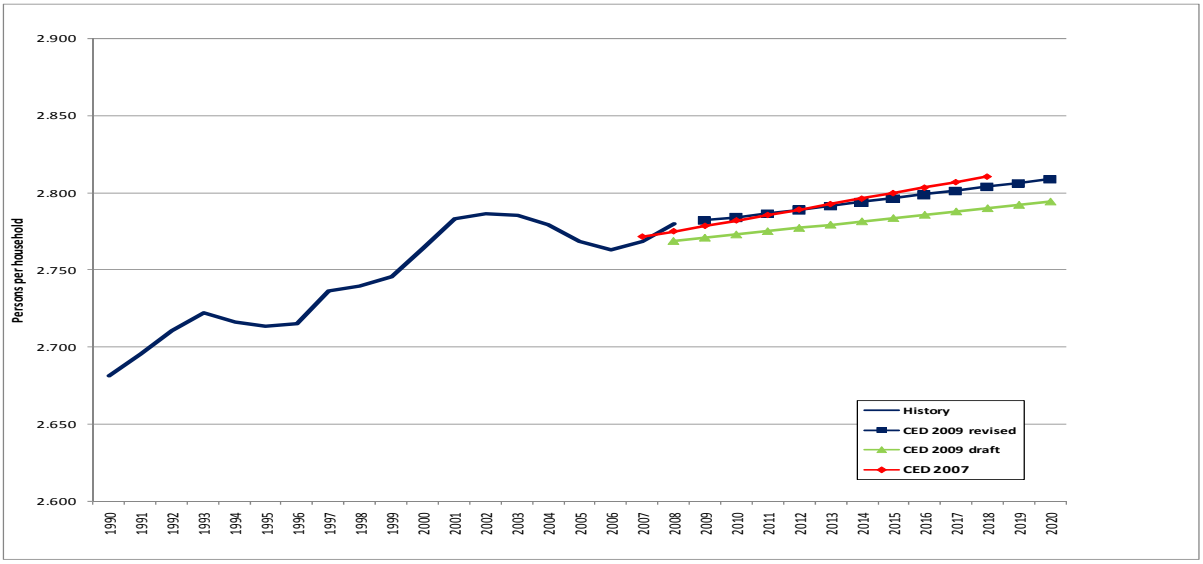
Figure 27: PG&E Planning Area Residential Peak



Source: California Energy Commission, 2009

Figures 28 and **29** compare residential drivers used in the forecasts. **Figure 28** compares persons per household projections. There is slight increase in the forecast of persons per household in *CED 2009 Revised* compared *CED 2009 Draft*. This is primarily caused by inclusion of 2008 person per household estimates in *CED 2009 Revised*. The change in *CED 2009 Revised* projections reduces the household forecast by about 28,000 households by the end of the forecast period compared to *CED 2009 Draft* (about 0.5 percent). The new projections are similar to *CED 2007* estimates through the middle of the forecast period.

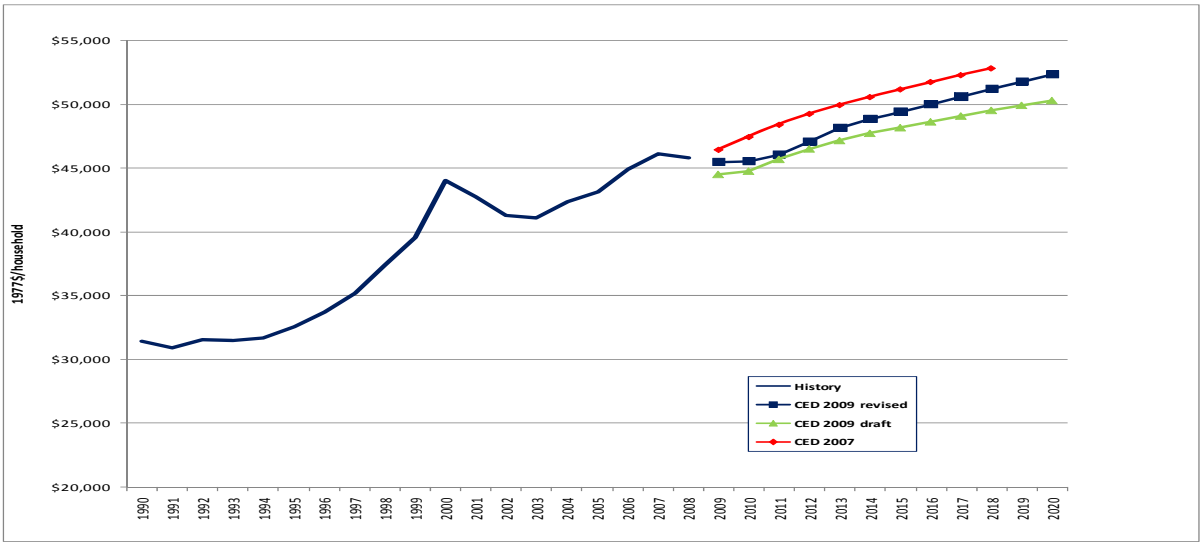
Figure 28: PG&E Planning Area Persons-per-Household Projections



Source: California Energy Commission, 2009

Figure 29 compares household income used in the respective forecasts. *CED 2009 Revised* projections are higher than those used in *CED 2009 Draft* but are still below what was used in *CED 2007*. *CED 2009 Revised* uses the June 2009 projections from Economy.com, while the previous forecasts used earlier vintages of Economy.com projections. The new projections produce long-term growth similar to that used in *CED 2007* coming out of the current economic slump.

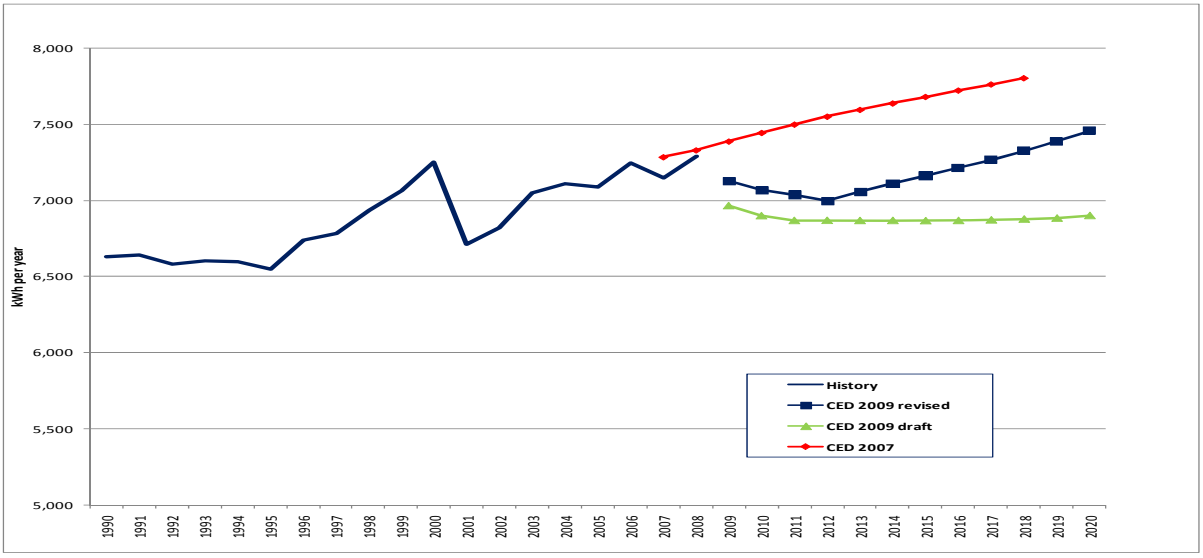
Figure 29: PG&E Planning Area Household Income Projections



Source: California Energy Commission, 2009

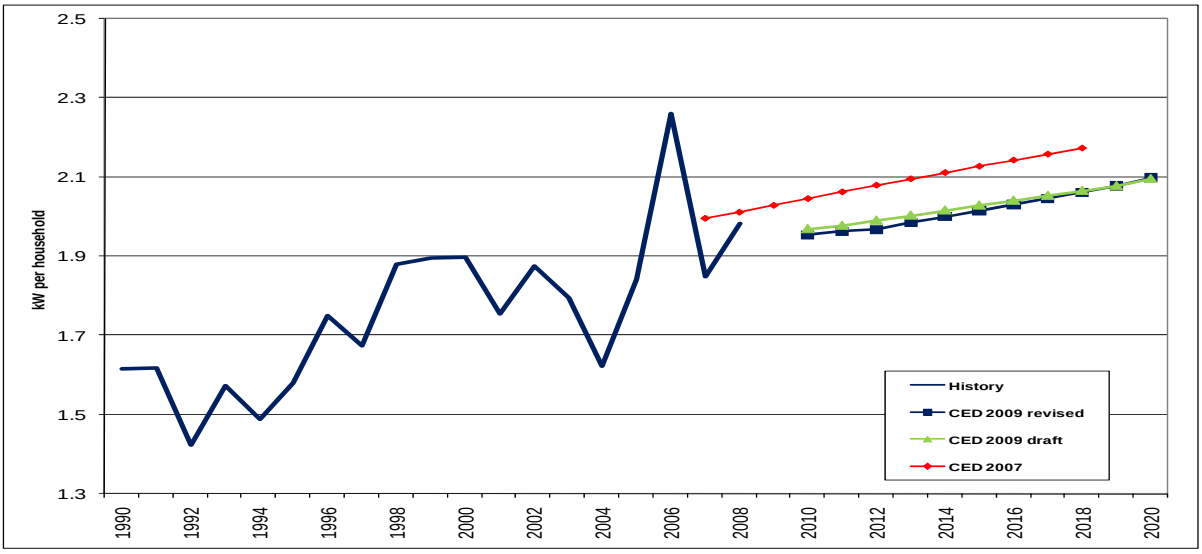
Figures 30 and **31** present comparisons of residential use per household and residential peak use per household, respectively. *CED 2009 Revised* use per household (**Figure 30**) is higher than *CED 2009 Draft*. This is partly caused by inclusion of 2008 sales data which adjusts the starting point upward, as well as the use of increased household income projections and inclusion of private electric vehicle use in the residential sector. About 60% of the increase in use per household from 2012 to 2020 is attributed to household electric vehicle charging. *CED 2009 Revised* use per household is still well below the level of *CED 2007* projections. In contrast, differences in peak use per household (**Figure 31**) are virtually unchanged in *CED 2009 Revised* compared to *CED 2009 Draft* because most of the consumption increases do not directly translate into peak impacts. Household electric vehicle charging is assumed to occur mainly at off-peak times.

Figure 30: PG&E Planning Area Use per Household



Source: California Energy Commission, 2009

Figure 31: PG&E Planning Area Peak Use per Household

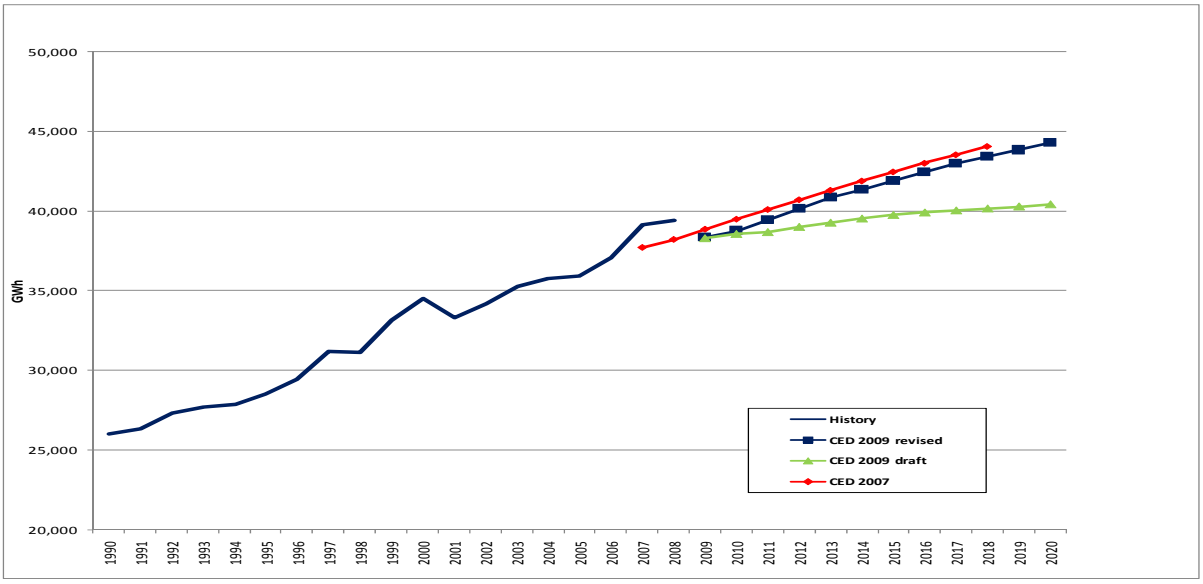


Source: California Energy Commission, 2009

Commercial Building Sector

Figures 32 and **33** compare commercial building sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of increased economic growth assumptions, as well as revisions to commercial floor space projections. *CED 2009 Revised* projections are still below those of *CED 2007*.

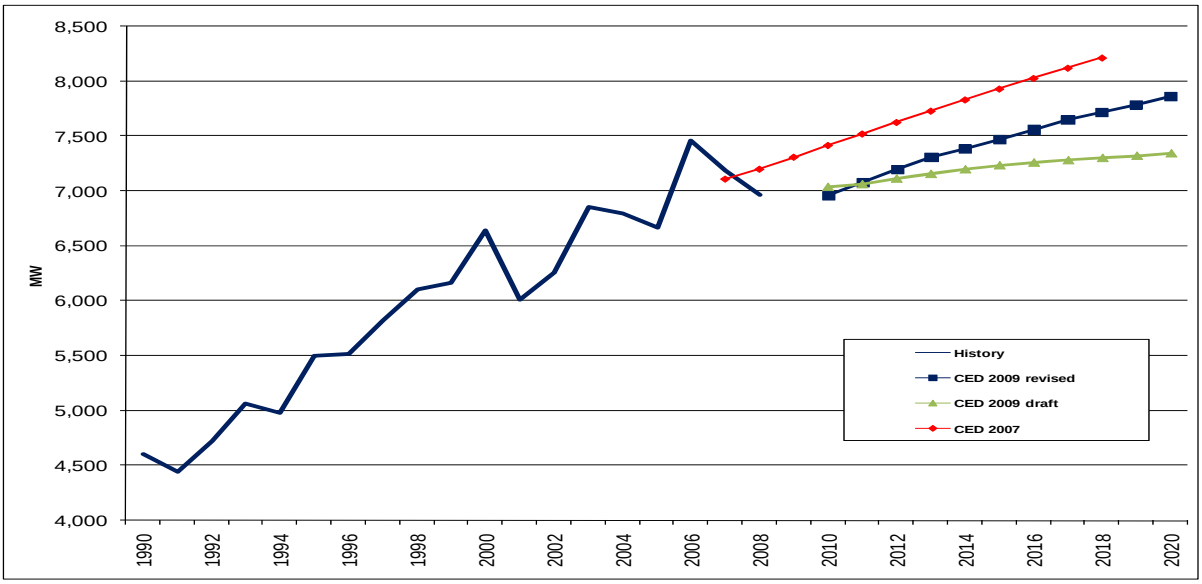
Figure 32: PG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2009

Figure 33 compares commercial building sector peak demand forecasts. Differences in the peak forecasts are smaller than those in the consumption forecast because of revised self-generation estimates and because increases to end-use consumption have little peak impact.

Figure 33: PG&E Planning Area Commercial Sector Peak

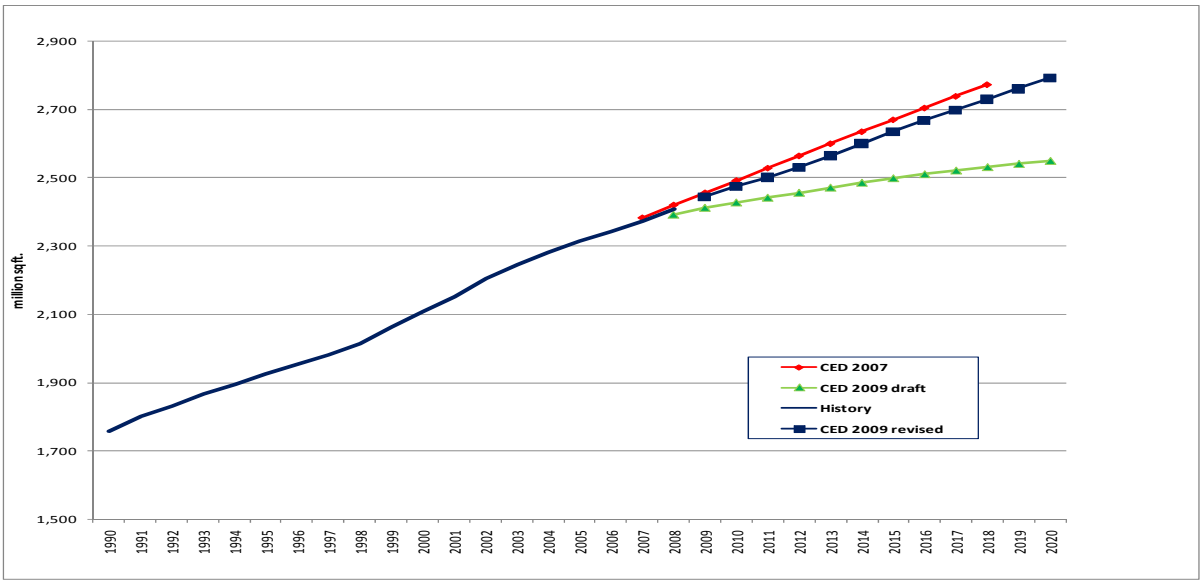


Source: California Energy Commission, 2009

In staff's commercial building sector forecasting model, floor space by building type (that is, retail, schools, offices, and so forth) is the key driver of energy use for each specific building type. **Figure 34** compares total commercial floor space projections. The difference between forecasts is caused by differences in economic and demographic drivers, as well as changes to the econometric estimates in the floor space model. *CED 2009 Revised* floor space estimates are higher in total than *CED 2009 Draft* forecast projections, but still below the level projected in *CED 2007*. The new estimate also has a higher value of additions than *CED 2009 Draft*.

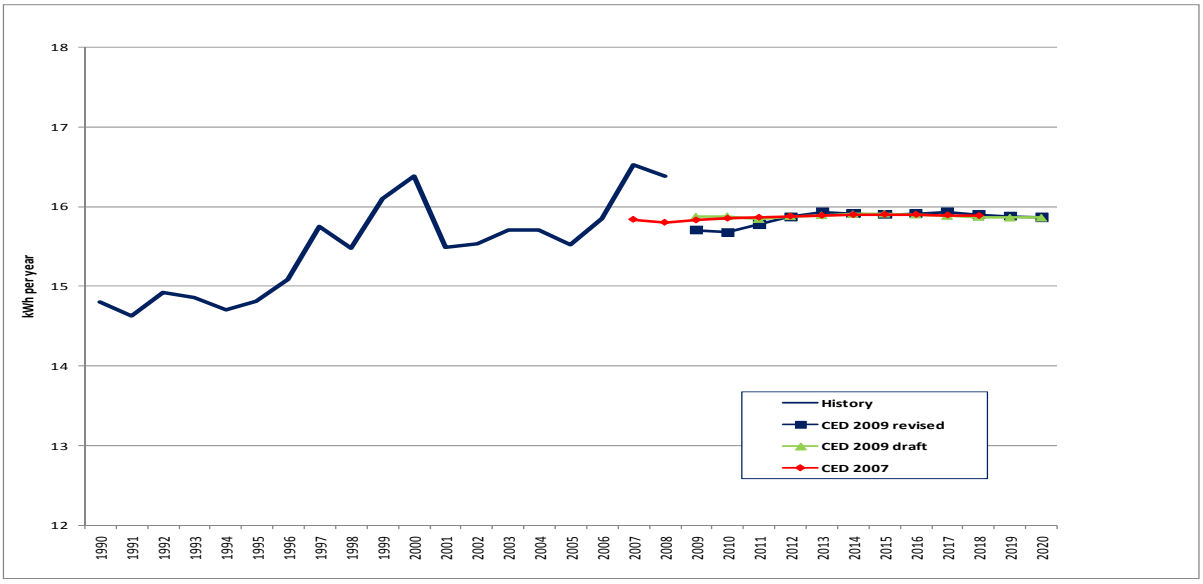
Historical and projected commercial sector annual and peak use per square foot are shown in **Figures 35** and **36**, respectively. Changes in annual use per square foot are based on the historical floor space estimates presented in **Figure 35**. Use per square foot (**Figure 36**) in *CED 2009 Revised* now returns to levels projected in *CED 2007* after recovery from the current economic downturn. Revised peak use per square foot (**Figure 37**) is projected to be lower than both *CED 2009 Draft* and *CED 2007* values. Both the energy and peak forecasts decline slightly over the long term forecast period because of projected commercial building and appliance standards impacts, as well as increased efficiency program savings.

Figure 34: PG&E Planning Area Commercial Floor Space



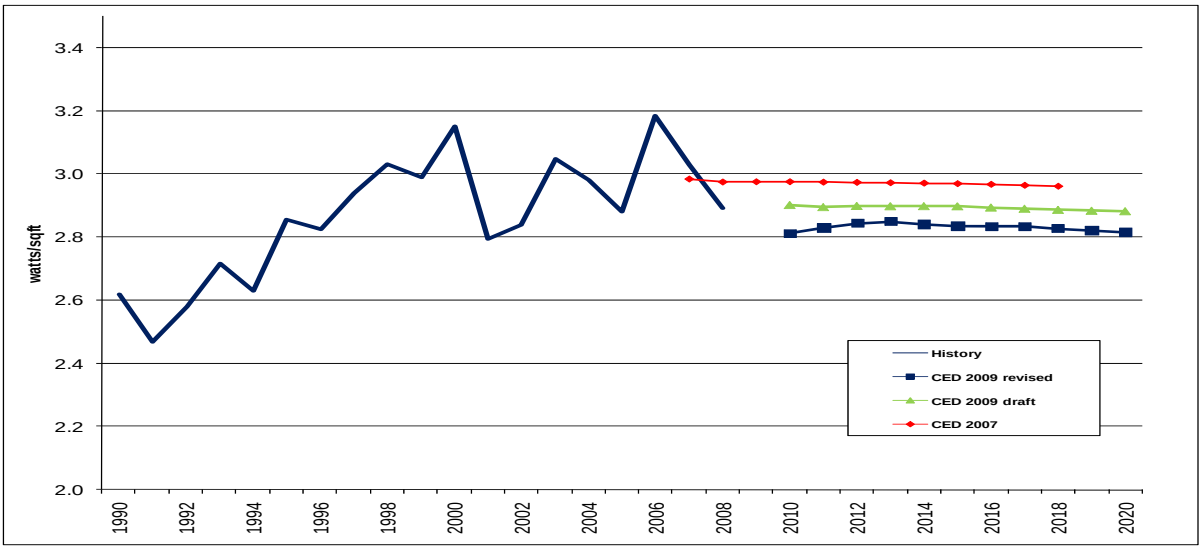
Source: California Energy Commission, 2009

Figure 35: PG&E Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2009

Figure 36: PG&E Planning Area Commercial Watts per Square Foot



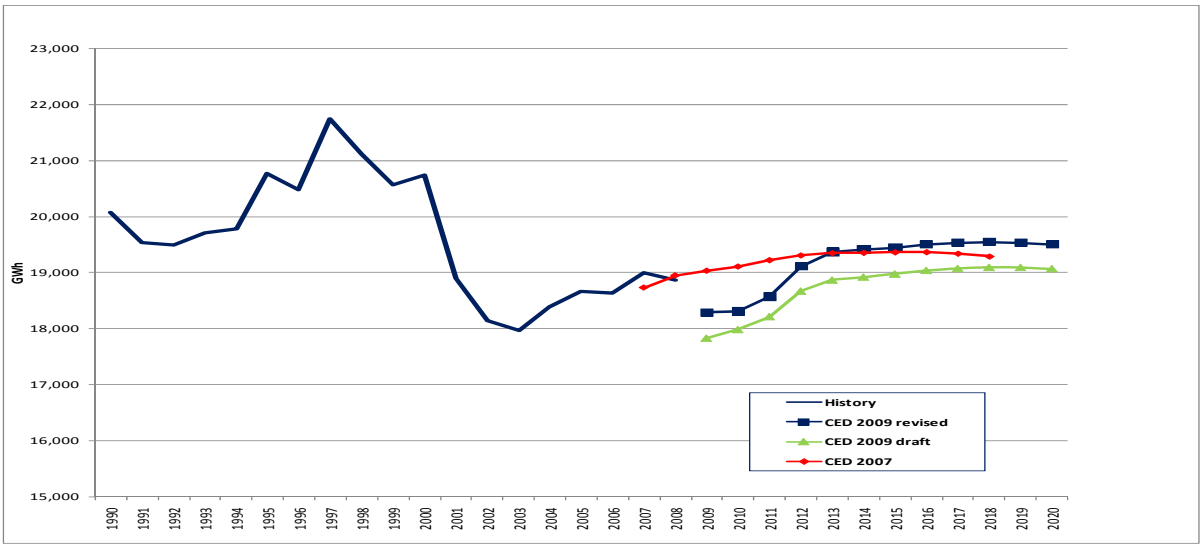
Source: California Energy Commission, 2009

Industrial Sector

Figure 37 provides a comparison of the industrial sector electricity consumption forecasts for the PG&E planning area. *CED 2009 Revised* is higher throughout the entire forecast period than *CED 2009 Draft,* based on a higher assumed starting point related to the

inclusion of 2008 consumption estimates as well as revised economic drivers. The long term *CED 2009 Revised* projection rises above the level of *CED 2007*.

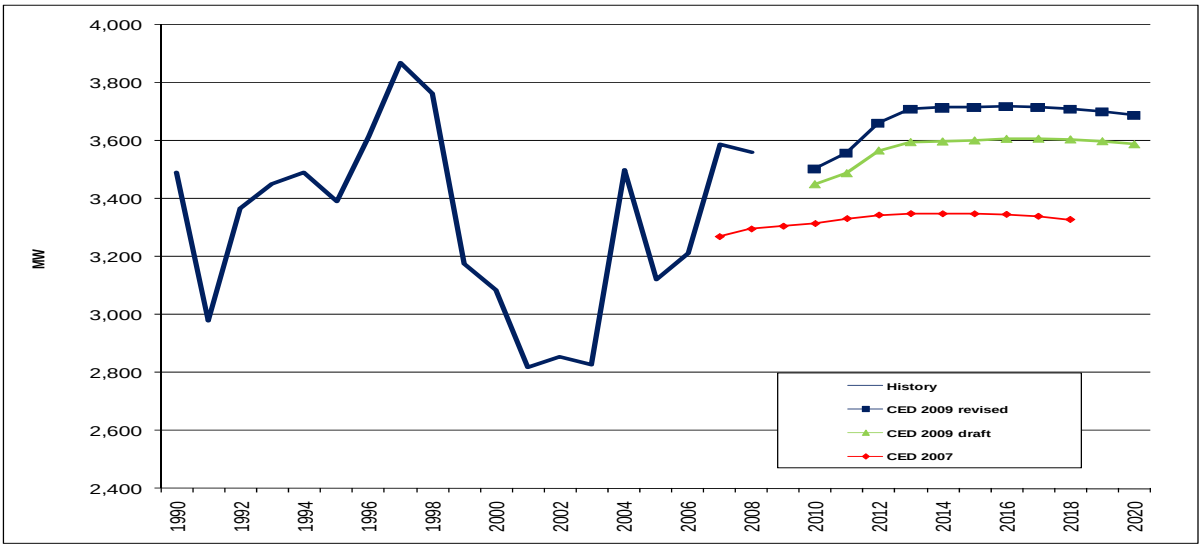
Figure 37: PG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2009

Figure 38 compares industrial sector peak forecasts. The revised peak forecast is higher than *CED 2009 Draft,* mirroring consumption differences.

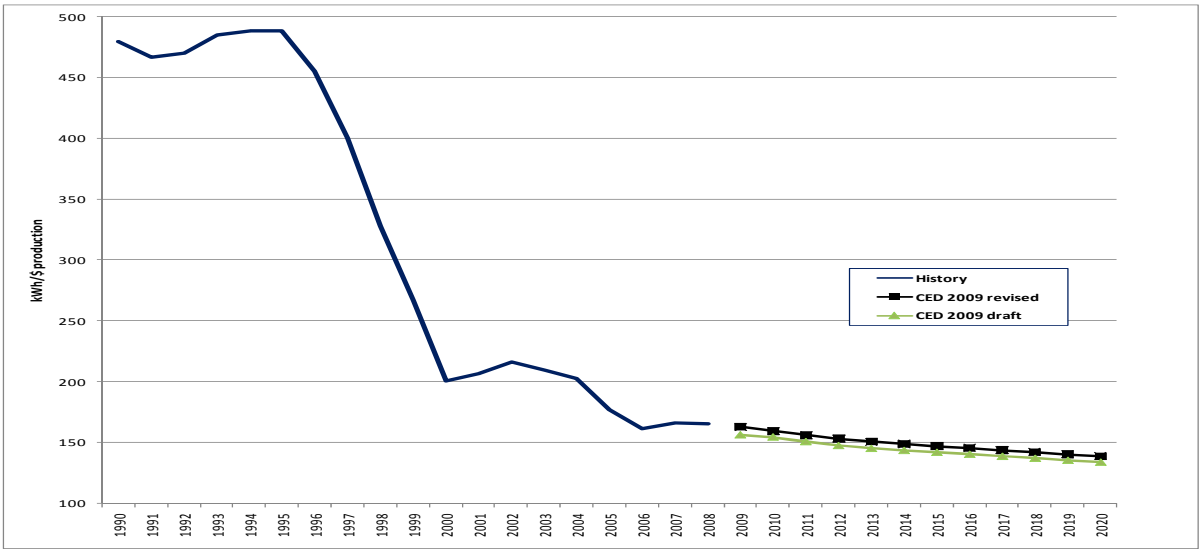
Figure 38: PG&E Planning Area Industrial Sector Peak



Source: California Energy Commission, 2009

Figure 39 compares use per dollar value of industrial production in the revised and draft forecasts. *CED 2009 Revised* has a slightly higher level of electricity use per dollar of value added than *CED 2009 Draft*. The forecasted growth rates are similar.

Figure 39: PG&E Planning Area Industrial Use per Production Unit

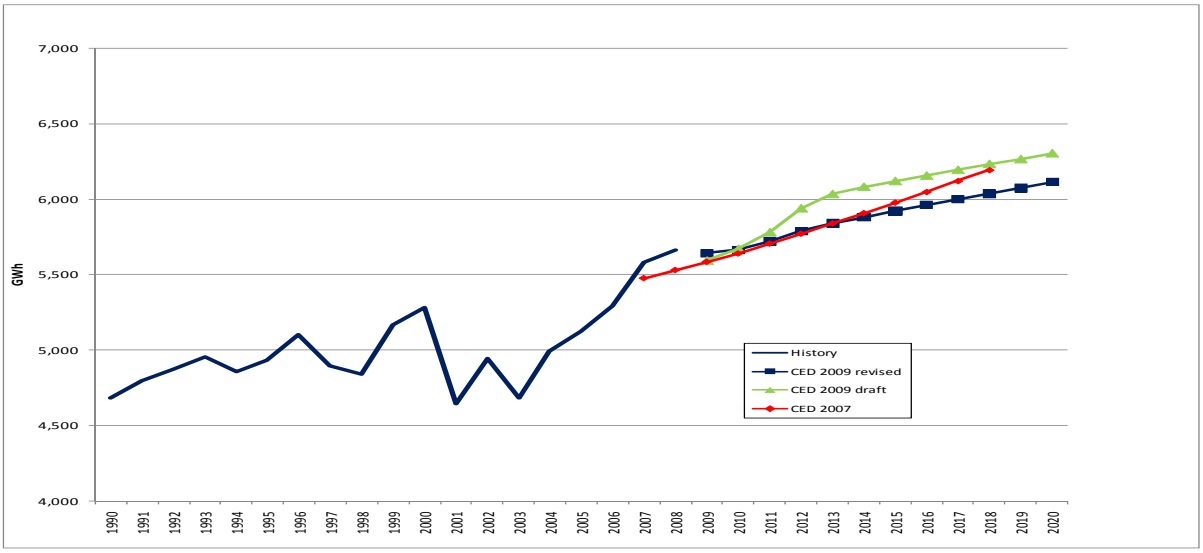


Source: California Energy Commission, 2009

Other Sectors

Figures 40 and **41** compare electricity consumption forecasts for the remaining sectors. **Figure 40** compares transportation, communication, and utilities (TCU) sector forecasts. *CED 2009 Revised* is lower than *CED 2009 Draft*, caused by inclusion of 2008 consumption history for calibration purposes and revised drivers for some of the industries.

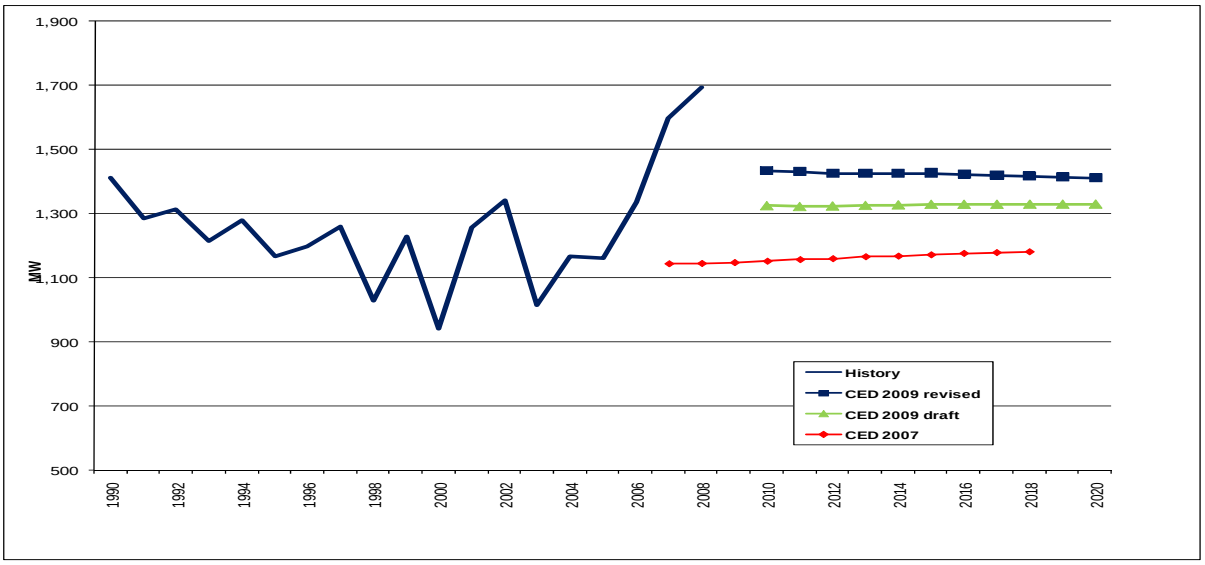
Figure 40: PG&E Planning Area Transportation, Communication and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2009

Figure 41 compares agriculture and water pumping sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* due to higher estimated historical consumption, but the increase is tempered by an assumed return to normal rainfall conditions in the forecast period.

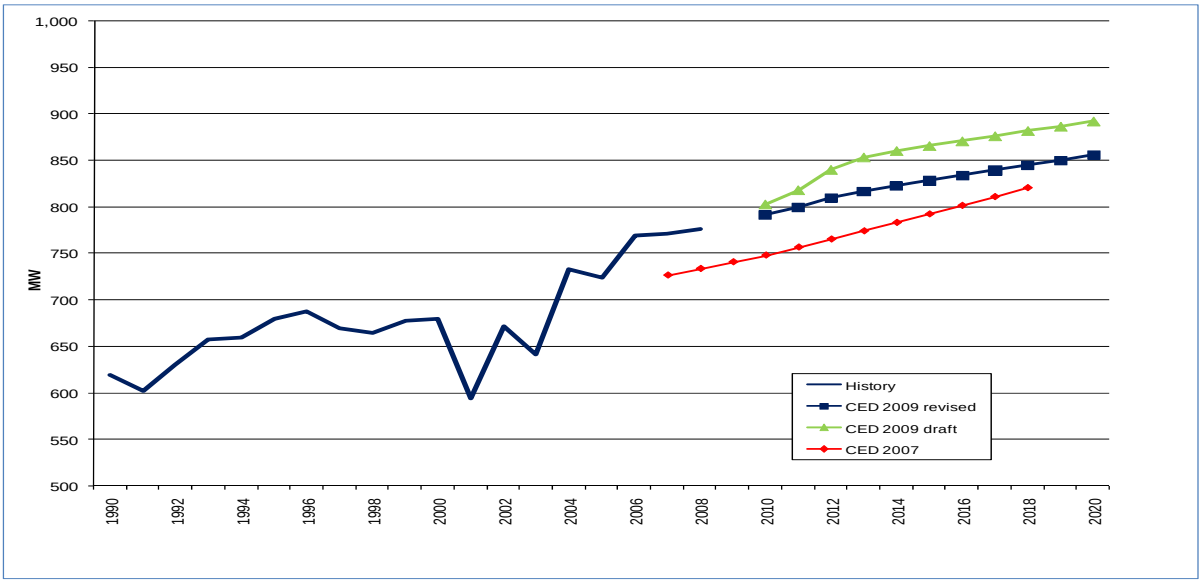
Figure 41: PG&E Planning Area Agriculture and Water Pumping Forecasts



Source: California Energy Commission, 2009

Figure 42 compares combined other sector peaks (TCU and street lighting). *CED 2009 Revised* is now higher than the previous two forecasts and very similar to *CED 2007* in the long term.

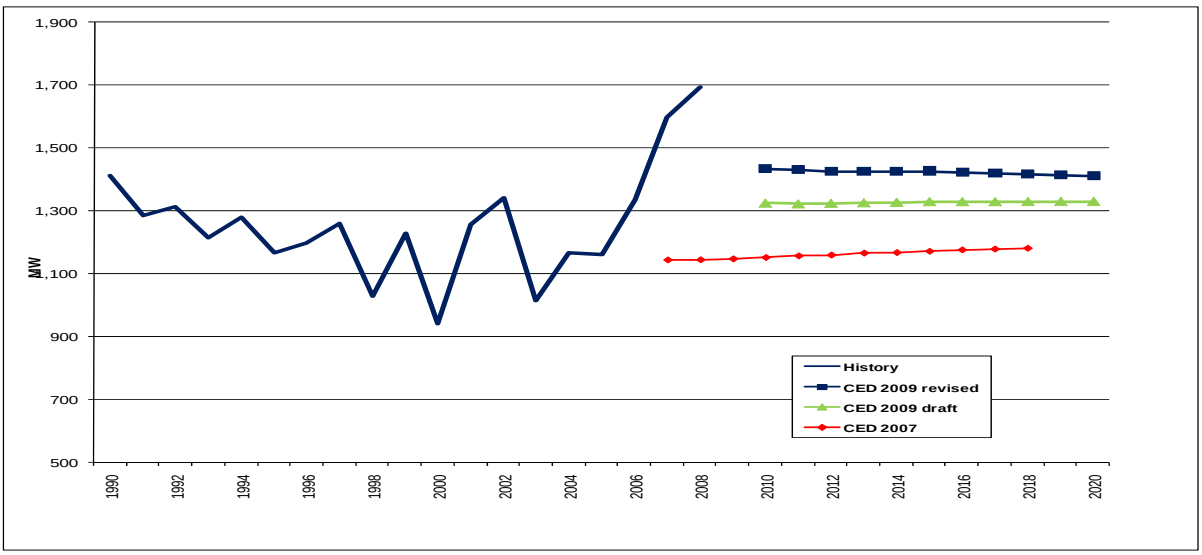
Figure 42: PG&E Planning Area Other Sector Peak



Source: California Energy Commission, 2009

Figure 43 compares agriculture and water pumping sector peaks. *CED 2009 Revised* is higher than *CED 2009 Draft*. Both forecasts are higher than *CED 2007*, which is based on a lower assumed starting point.

Figure 43: PG&E Planning Area Agriculture and Water Pumping Peak

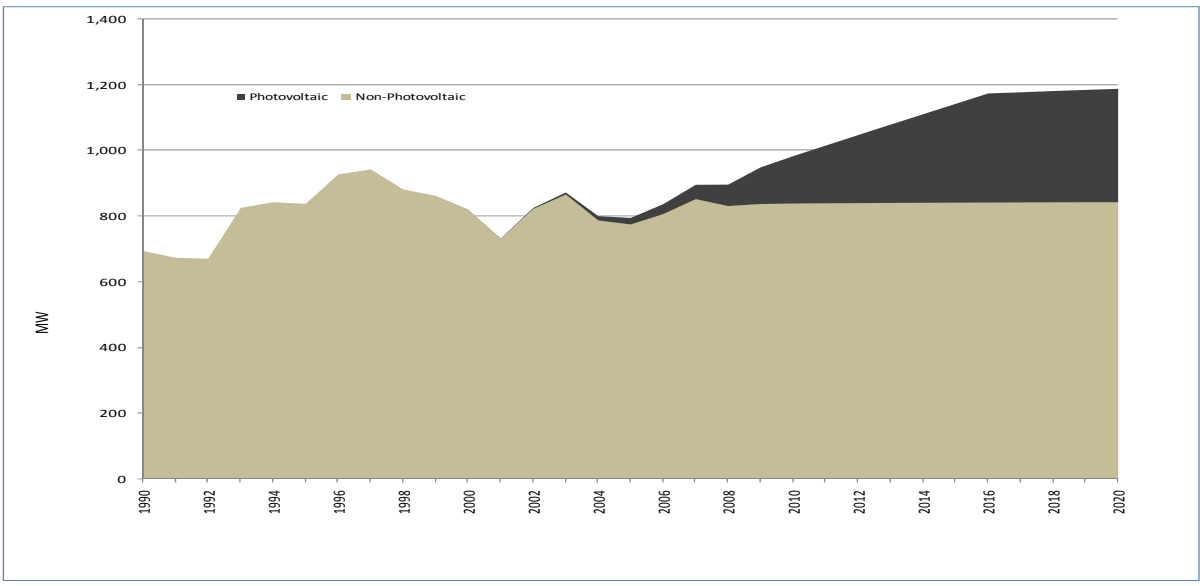


Source: California Energy Commission, 2009

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Chapter 1. The effects of these programs are forecast based on recent trends in installations. **Figure 44** shows *CED 2009 Draft* peak impacts from photovoltaic and non-photovoltaic self-generation. Based on these trends, staff projects about 350 MW of peak reduction from photovoltaic systems by 2020.

Figure 44: PG&E Planning Area Self-Generation Peak Forecasts



Source: California Energy Commission, 2009

Economic Scenarios

The results presented above rely on economic inputs from the Moody's Economy.com *base case* scenario. Staff also examined the impacts of two alternative economic scenarios for electricity demand: an *optimistic* case provided by HIS Global Insight and an Economy.com *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth of the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models.

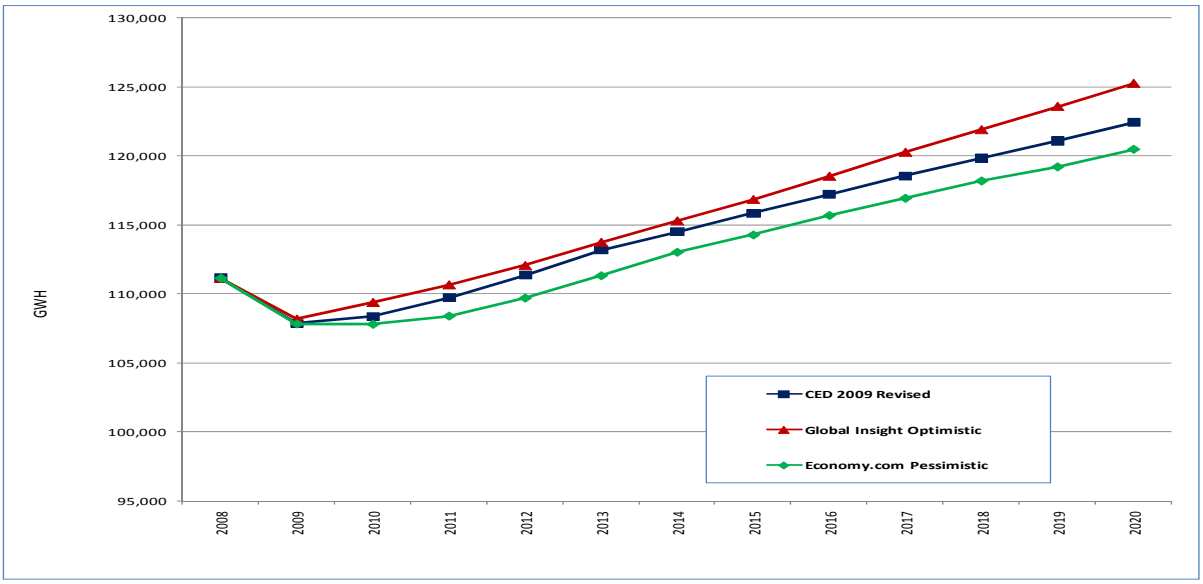
The estimated models were run for PG&E for the two economic scenarios as well as the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2007* consumption projections. **Figure 45** shows the projected impacts of the optimistic and pessimistic scenarios on PG&E consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 46**.

Electricity consumption is projected to be 2.4 percent higher than in *CED 2009 Revised* by 2020 in the optimistic economic case and 1.6 percent lower in the pessimistic scenario. The

peak demand forecast increases by 2.3 percent under the optimistic scenario by 2020 and falls by 1.9 percent in the pessimistic case. The percentage peak reduction is higher than that of consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial sector, which has a higher load factor. Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.1 percent and 1.25 percent, respectively, to 1.25 percent and 1.4 percent in the optimistic case, and fall to 1.0 percent and 1.1 percent under the pessimistic scenario.

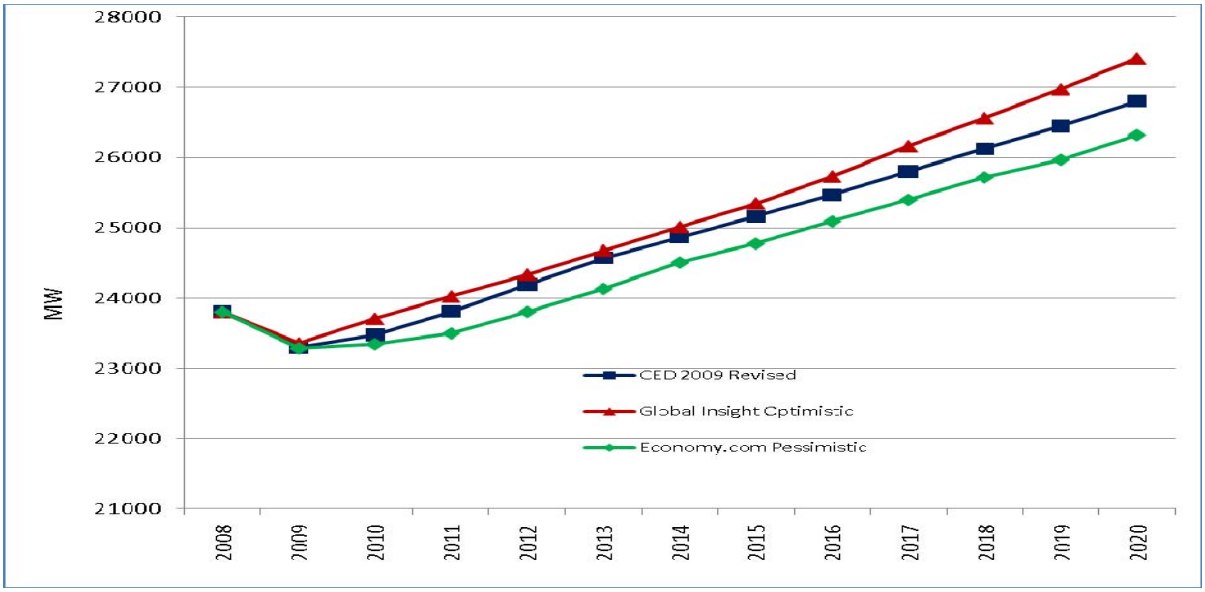
Variation in consumption and peak demand is small compared to *CED 2009 Revised* totals in percentage terms, and this is a reflection of the relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020.

Figure 45: Projected PG&E Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 46: Projected PG&E Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Staff spent a great deal of effort refining methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Tables 11** and **12** show electricity consumption and peak savings estimates for selected years, for building and appliance standards, utility and public agency programs, and "naturally occurring" savings, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts from rate changes and standards. Chapter 8 provides much more detail on staff work related to energy efficiency and conservation.

Table 11: PG&E Planning Area Electricity Consumption Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	858	1,555	1,992	2,385	2,676	3,092	3,616
Appliance Standards	993	2,605	3,798	5,210	6,067	7,160	8,406
Utility and Public Agency Programs	646	984	997	2,298	3,302	3,078	1,328
Naturally Occurring Savings	83	111	139	188	200	660	2,294
Total Residential Savings	2,580	5,255	6,926	10,080	12,244	13,990	15,643
Commercial Energy Savings							
Building Standards	432	815	1,370	1,971	2,292	2,836	3,476
Appliance Standards	238	580	902	1,250	1,410	1,676	1,975
Utility and Public Agency Programs*	167	759	1,021	1,835	2,077	1,476	888
Naturally Occurring Savings	5,806	6,145	9,339	7,182	8,094	8,980	10,669
Total Commercial Savings	6,643	8,299	12,632	12,238	13,873	14,968	17,008
Total Energy Savings	9,223	13,554	19,558	22,319	26,117	28,957	32,651

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Table 12: PG&E Planning Area Electricity Peak Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	209	421	507	648	747	883	1,053
Appliance Standards	242	706	966	1,416	1,693	2,046	2,448
Utility and Public Agency Programs	157	267	254	625	921	879	387
Naturally Occurring Savings	20	30	35	51	56	188	668
Total Residential Savings	629	1,423	1,762	2,740	3,416	3,997	4,556
Commercial Energy Savings							
Building Standards	76	160	266	348	411	506	617
Appliance Standards	42	114	175	221	253	299	351
Utility and Public Agency Programs*	30	149	198	324	372	263	158
Naturally Occurring Savings	1,027	1,204	1,814	1,269	1,451	1,601	1,895
Total Commercial Savings	1,175	1,626	2,454	2,162	2,487	2,669	3,021
Total Energy Savings	1,803	3,049	4,215	4,902	5,904	6,666	7,576

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption and peak demand from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids. More details for this forecast are provided in Chapter 1. The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

Table 13 shows the resulting projections for electricity consumption and peak demand, by sector, for the PG&E planning area. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter. The survey also indicated that commercial establishments were much less willing to purchase electric vehicles than private households, so consumption is heavily weighted to the residential sector.

Table 13: PG&E Electric Vehicle Forecast

	Residential		Commercial	
Year	GWH	MW	GWH	MW
2008	2	0	3	0
2009	2	0	3	0
2010	4	0	3	0
2011	35	2	5	0
2012	101	4	8	0
2013	249	11	16	1
2014	454	19	23	1
2015	665	28	29	1
2016	860	37	34	1
2017	1,035	44	38	2
2018	1,238	53	40	2
2019	1,437	61	42	2
2020	1,633	70	43	2

Source: California Energy Commission, 2009

Form 1.1 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Street lighting	Total Consumption
1990	25,844	0	26,022	0	20,071	3,188	6,512	4,685	481	86,803
1991	26,308	0	26,325	0	19,545	3,255	5,887	4,799	508	86,627
1992	26,412	0	27,333	0	19,500	3,190	6,078	4,871	499	87,883
1993	26,781	0	27,714	0	19,706	3,115	5,850	4,955	507	88,627
1994	27,013	0	27,850	0	19,784	2,838	5,772	4,854	509	88,621
1995	27,080	0	28,516	0	20,770	2,574	5,380	4,934	527	89,781
1996	28,120	0	29,466	0	20,486	2,629	5,723	5,104	542	92,069
1997	28,599	0	31,203	0	21,750	2,716	5,975	4,897	559	95,699
1998	29,596	0	31,156	0	21,117	2,563	5,000	4,841	572	94,845
1999	30,521	0	33,176	0	20,572	2,585	6,005	5,165	509	98,535
2000	31,647	0	34,504	0	20,748	2,599	6,004	5,279	552	101,333
2001	29,660	0	33,330	0	18,893	2,397	6,350	4,645	509	95,785
2002	30,544	0	34,228	0	18,144	2,283	6,439	4,945	503	97,086
2003	31,989	0	35,270	0	17,966	2,477	6,325	4,685	516	99,228
2004	32,731	0	35,807	0	18,384	2,655	6,780	4,992	532	101,880
2005	33,137	0	35,923	0	18,671	2,878	5,407	5,122	537	101,675
2006	34,387	0	37,107	0	18,638	2,928	6,017	5,291	542	104,911
2007	34,324	1	39,179	4	19,003	3,420	7,352	5,579	556	109,413
2008	35,321	2	39,437	3	18,873	3,492	7,793	5,661	552	111,128
2009	34,937	2	38,383	3	18,289	3,444	6,592	5,642	559	107,847
2010	35,074	4	38,789	3	18,306	3,351	6,599	5,663	561	108,344
2011	35,358	35	39,462	5	18,570	3,435	6,595	5,720	563	109,703
2012	35,594	101	40,170	8	19,106	3,532	6,591	5,787	565	111,346
2013	36,336	249	40,864	16	19,362	3,588	6,604	5,838	568	113,161
2014	37,075	454	41,373	23	19,405	3,578	6,617	5,879	570	114,499
2015	37,808	665	41,904	29	19,446	3,547	6,631	5,920	572	115,828
2016	38,566	860	42,453	34	19,503	3,510	6,635	5,960	574	117,201
2017	39,342	1,035	42,992	38	19,530	3,469	6,638	5,998	576	118,545
2018	40,171	1,238	43,420	40	19,542	3,426	6,642	6,035	579	119,814
2019	41,022	1,437	43,844	42	19,532	3,384	6,646	6,073	581	121,082
2020	41,932	1,633	44,296	43	19,502	3,340	6,650	6,112	583	122,414

* Residential and commercial electric vehicle consumption included in residential and commercial totals.

Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)

1990-2000	2.05%	0.00%	2.86%	0.00%	0.33%	-2.02%	-0.81%	1.20%	1.40%	1.56%
2000-2008	1.38%	0.00%	1.68%	0.00%	-1.18%	3.76%	3.31%	0.88%	-0.01%	1.16%
2008-2010	-0.35%	46.77%	-0.82%	-9.59%	-1.51%	-2.04%	-7.98%	0.02%	0.85%	-1.26%
2010-2020	1.80%	84.79%	1.34%	32.24%	0.63%	-0.03%	0.08%	0.77%	0.38%	1.23%

Form 1.1b - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street lighting	Total Sales
1990	25,837	25,638	17,638	2,015	6,504	4,559	481	82,673
1991	26,302	25,915	17,320	2,024	5,878	4,671	508	82,619
1992	26,406	26,919	17,276	1,978	6,069	4,744	499	83,890
1993	26,774	27,277	16,592	1,900	5,847	4,815	507	83,712
1994	27,013	27,408	16,536	1,634	5,770	4,733	509	83,604
1995	27,080	28,073	17,531	1,391	5,378	4,813	527	84,792
1996	28,120	29,020	16,752	1,412	5,720	4,982	542	86,548
1997	28,599	30,765	17,960	1,444	5,972	4,787	559	90,087
1998	29,596	30,721	17,699	1,278	4,997	4,731	572	89,594
1999	30,521	32,736	17,157	1,407	6,005	5,067	509	93,402
2000	31,646	34,065	17,594	1,408	6,004	5,182	552	96,451
2001	29,657	33,101	15,802	1,364	6,350	4,644	509	91,428
2002	30,537	33,810	14,778	1,197	6,439	4,909	503	92,174
2003	31,976	34,921	14,288	1,356	6,324	4,650	516	94,032
2004	32,708	35,439	15,204	1,483	6,778	4,962	532	97,106
2005	33,106	35,445	15,570	1,780	5,402	5,088	537	96,929
2006	34,345	36,462	15,442	1,853	6,010	5,253	542	99,907
2007	34,263	38,415	15,659	2,308	7,341	5,529	556	104,071
2008	35,224	38,609	15,588	2,429	7,779	5,613	552	105,795
2009	34,777	37,410	14,975	2,377	6,570	5,569	559	102,236
2010	34,863	37,737	14,974	2,282	6,571	5,579	561	102,567
2011	35,094	38,339	15,219	2,364	6,562	5,627	563	103,768
2012	35,279	38,976	15,736	2,460	6,554	5,684	565	105,255
2013	35,970	39,602	15,974	2,514	6,562	5,729	568	106,917
2014	36,658	40,043	15,998	2,502	6,570	5,763	570	108,104
2015	37,339	40,505	16,021	2,469	6,579	5,796	572	109,282
2016	38,046	40,986	16,059	2,430	6,578	5,830	574	110,503
2017	38,815	41,516	16,085	2,388	6,581	5,867	576	111,829
2018	39,637	41,935	16,096	2,345	6,585	5,904	579	113,080
2019	40,482	42,349	16,086	2,302	6,589	5,942	581	114,329
2020	41,385	42,790	16,055	2,257	6,593	5,980	583	115,643

Last historic year is 2008. Sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	2.05%	2.88%	-0.02%	-3.52%	-0.80%	1.29%	1.40%	1.55%
2000-2008	1.35%	1.58%	-1.50%	7.05%	3.29%	1.00%	-0.01%	1.16%
2008-2010	-0.51%	-1.14%	-1.99%	-3.07%	-8.09%	-0.30%	0.85%	-1.54%
2010-2020	1.73%	1.26%	0.70%	-0.11%	0.03%	0.70%	0.38%	1.21%

Form 1.2 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	86,803	7,937	94,739	4,130	0	4,130	90,609
1991	86,627	7,931	94,558	4,008	0	4,008	90,550
1992	87,883	8,053	95,937	3,993	0	3,993	91,944
1993	88,627	8,036	96,663	4,915	0	4,915	91,748
1994	88,621	8,026	96,647	5,017	0	5,017	91,630
1995	89,781	8,140	97,921	4,989	0	4,989	92,932
1996	92,069	8,309	100,378	5,522	0	5,522	94,856
1997	95,699	8,648	104,347	5,612	0	5,612	98,735
1998	94,845	8,601	103,446	5,250	0	5,250	98,196
1999	98,535	8,967	107,501	5,133	1	5,133	102,368
2000	101,333	9,259	110,592	4,880	1	4,882	105,710
2001	95,785	8,777	104,562	4,353	4	4,357	100,205
2002	97,086	8,849	105,934	4,898	14	4,911	101,023
2003	99,228	9,027	108,255	5,165	31	5,196	103,059
2004	101,880	9,322	111,203	4,711	63	4,774	106,429
2005	101,675	9,305	110,980	4,650	96	4,746	106,234
2006	104,911	9,591	114,502	4,860	144	5,003	109,498
2007	109,413	9,991	119,404	5,134	208	5,342	114,062
2008	111,128	10,156	121,285	5,025	309	5,334	115,951
2009	107,847	9,815	117,661	5,082	529	5,610	112,051
2010	108,344	9,846	118,190	5,092	685	5,777	112,413
2011	109,703	9,962	119,664	5,101	834	5,935	113,729
2012	111,346	10,104	121,451	5,110	981	6,091	115,360
2013	113,161	10,264	123,425	5,113	1,130	6,243	117,182
2014	114,499	10,378	124,877	5,116	1,278	6,395	118,482
2015	115,828	10,491	126,319	5,119	1,427	6,546	119,773
2016	117,201	10,608	127,809	5,122	1,576	6,698	121,111
2017	118,545	10,736	129,280	5,125	1,591	6,716	122,564
2018	119,814	10,856	130,670	5,128	1,606	6,734	123,936
2019	121,082	10,976	132,058	5,131	1,622	6,753	125,305
2020	122,414	11,102	133,516	5,134	1,637	6,771	126,745

Annual Growth Rates (%)

1990-2000	1.56%	1.55%	1.56%	1.68%		1.69%	1.55%
2000-2008	1.16%	1.16%	1.16%	0.37%	97.91%	1.11%	1.16%
2008-2010	-1.26%	-1.54%	-1.28%	0.67%	48.94%	4.07%	-1.54%
2010-2020	1.23%	1.21%	1.23%	0.08%	9.11%	1.60%	1.21%

Form 1.3 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	6,297	0	4,602	0	3,490	1,409	620	16,418
1991	6,405	0	4,442	0	2,979	1,282	602	15,711
1992	5,706	0	4,725	0	3,368	1,312	630	15,741
1993	6,376	0	5,068	0	3,454	1,212	658	16,768
1994	6,088	0	4,981	0	3,492	1,276	659	16,497
1995	6,526	0	5,498	0	3,393	1,164	680	17,260
1996	7,301	0	5,517	0	3,616	1,196	688	18,317
1997	7,056	0	5,826	0	3,870	1,258	670	18,681
1998	8,017	0	6,103	0	3,765	1,027	665	19,577
1999	8,183	0	6,165	0	3,177	1,228	678	19,430
2000	8,275	0	6,643	0	3,086	940	680	19,624
2001	7,747	0	6,013	0	2,819	1,254	594	18,429
2002	8,397	0	6,259	0	2,856	1,340	672	19,524
2003	8,136	0	6,851	0	2,828	1,012	642	19,469
2004	7,460	0	6,799	0	3,502	1,165	733	19,659
2005	8,607	0	6,672	0	3,123	1,158	724	20,283
2006	10,726	0	7,461	0	3,214	1,334	769	23,503
2007	8,870	0	7,185	0	3,590	1,595	771	22,011
2008	9,602	0	6,967	0	3,560	1,692	776	22,596
2009	9,560	0	6,890	0	3,516	1,433	788	22,188
2010	9,698	0	6,959	0	3,504	1,433	791	22,386
2011	9,858	2	7,075	0	3,558	1,429	800	22,720
2012	10,007	4	7,196	0	3,662	1,426	809	23,100
2013	10,220	11	7,307	1	3,711	1,426	817	23,480
2014	10,430	19	7,385	1	3,714	1,426	822	23,778
2015	10,641	28	7,470	1	3,715	1,426	828	24,081
2016	10,856	37	7,559	1	3,719	1,423	834	24,391
2017	11,077	44	7,649	2	3,716	1,420	839	24,701
2018	11,305	53	7,718	2	3,711	1,417	845	24,996
2018	11,538	61	7,788	2	3,702	1,414	850	25,291
2020	11,806	70	7,862	2	3,689	1,410	856	25,623

* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)

1990-2000	2.77%	0.00%	3.74%	0.00%	-1.22%	-3.97%	0.93%	1.80%
2000-2008	1.88%	0.00%	0.60%	0.00%	1.80%	7.63%	1.67%	1.78%
2008-2010	0.50%	46.77%	-0.06%	-9.59%	-0.80%	-7.96%	0.99%	-0.47%
2010-2020	1.99%	84.79%	1.23%	32.24%	0.52%	-0.16%	0.78%	1.36%

Form 1.4 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	16,418	1,525	17,943	693	0	693	17,250	60.0
1991	15,711	1,459	17,170	673	0	673	16,497	62.7
1992	15,741	1,462	17,203	670	0	670	16,533	63.5
1993	16,768	1,546	18,314	825	0	825	17,489	59.9
1994	16,497	1,518	18,015	842	0	842	17,173	60.9
1995	17,260	1,593	18,853	837	0	837	18,016	58.9
1996	18,317	1,687	20,004	927	0	927	19,077	56.8
1997	18,681	1,721	20,401	942	0	942	19,459	57.9
1998	19,577	1,813	21,390	881	0	881	20,509	54.7
1999	19,430	1,801	21,231	862	0	862	20,369	57.4
2000	19,624	1,824	21,448	819	0	820	20,628	58.5
2001	18,429	1,717	20,145	731	1	732	19,414	58.9
2002	19,524	1,814	21,338	822	3	825	20,513	56.2
2003	19,469	1,804	21,273	866	6	872	20,401	57.7
2004	19,659	1,829	21,489	787	13	800	20,688	58.7
2005	20,283	1,890	22,174	775	20	795	21,379	56.7
2006	23,503	2,199	25,702	807	30	837	24,865	50.3
2007	22,011	2,048	24,059	852	44	895	23,163	56.2
2008	22,596	2,105	24,701	831	65	896	23,805	55.6
2009	22,188	2,060	24,248	837	111	949	23,299	54.9
2010	22,386	2,076	24,462	838	144	983	23,479	54.7
2011	22,720	2,105	24,825	839	176	1,015	23,810	54.5
2012	23,100	2,139	25,239	840	207	1,047	24,192	54.4
2013	23,480	2,173	25,653	840	238	1,079	24,574	54.4
2014	23,778	2,199	25,977	841	270	1,110	24,866	54.4
2015	24,081	2,225	26,306	841	301	1,142	25,163	54.3
2016	24,391	2,252	26,643	841	332	1,174	25,469	54.3
2017	24,701	2,282	26,983	842	335	1,177	25,805	54.2
2018	24,996	2,310	27,306	842	339	1,181	26,125	54.2
2019	25,291	2,338	27,629	842	342	1,184	26,445	54.1
2020	25,623	2,370	27,993	843	345	1,188	26,805	54.0

Annual Growth Rates (%)

1990-2000	1.80%	1.80%	1.80%	1.68%	0.00%	1.69%	1.80%	-0.25%
2000-2008	1.78%	1.81%	1.78%	0.18%	97.91%	1.12%	1.81%	-0.63%
2008-2010	-0.47%	-0.69%	-0.49%	0.44%	48.94%	4.73%	-0.69%	-0.86%
2010-2020	1.36%	1.33%	1.36%	0.05%	9.11%	1.92%	1.33%	-0.12%

Form 1.5 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Extreme Temperature Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2009	23,299	24,627	25,000	25,326	1.057	1.073	1.087
2010	23,479	24,817	25,193	25,522	1.057	1.073	1.087
2011	23,810	25,167	25,548	25,882	1.057	1.073	1.087
2012	24,192	25,571	25,958	26,297	1.057	1.073	1.087
2013	24,574	25,975	26,368	26,712	1.057	1.073	1.087
2014	24,866	26,284	26,682	27,030	1.057	1.073	1.087
2015	25,163	26,598	27,000	27,353	1.057	1.073	1.087
2016	25,469	26,921	27,328	27,685	1.057	1.073	1.087
2017	25,805	27,276	27,689	28,050	1.057	1.073	1.087
2018	26,125	27,614	28,032	28,398	1.057	1.073	1.087
2019	26,445	27,952	28,375	28,746	1.057	1.073	1.087
2020	26,805	28,333	28,762	29,137	1.057	1.073	1.087

Form 1.7a - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	7	383	2,433	1,173	8	126	0	4,130
1991	7	410	2,225	1,231	9	127	0	4,008
1992	6	414	2,225	1,212	10	127	0	3,993
1993	7	437	3,113	1,215	3	140	0	4,915
1994	0	442	3,248	1,203	3	121	0	5,017
1995	0	443	3,239	1,183	3	121	0	4,989
1996	0	446	3,734	1,217	3	122	0	5,522
1997	0	438	3,790	1,272	3	109	0	5,612
1998	0	435	3,418	1,285	3	110	0	5,250
1999	0	441	3,416	1,178	0	98	0	5,133
2000	1	439	3,154	1,191	0	97	0	4,882
2001	3	229	3,092	1,032	0	1	0	4,357
2002	7	418	3,366	1,086	0	35	0	4,911
2003	13	349	3,679	1,120	0	35	0	5,196
2004	23	368	3,180	1,171	2	30	0	4,774
2005	31	478	3,100	1,098	5	34	0	4,746
2006	42	645	3,196	1,075	7	37	0	5,003
2007	62	764	3,344	1,112	11	50	0	5,342
2008	96	828	3,284	1,063	14	48	0	5,334
2009	160	973	3,314	1,067	22	73	0	5,610
2010	211	1,053	3,333	1,069	28	84	0	5,777
2011	264	1,123	3,351	1,071	32	93	0	5,935
2012	315	1,194	3,370	1,072	37	103	0	6,091
2013	366	1,262	3,388	1,074	42	110	0	6,243
2014	418	1,330	3,407	1,076	47	117	0	6,395
2015	469	1,398	3,425	1,078	52	123	0	6,546
2016	520	1,466	3,444	1,080	57	130	0	6,698
2017	527	1,476	3,445	1,081	57	131	0	6,716
2018	534	1,485	3,446	1,082	57	131	0	6,734
2019	540	1,495	3,446	1,082	57	132	0	6,753
2020	547	1,505	3,447	1,083	57	132	0	6,771

Annual Growth Rates (%)

1990-2000	-20.01%	1.38%	2.63%	0.15%	0.00%	-2.60%	0.00%	1.69%
2000-2008	84.75%	8.24%	0.51%	-1.41%	0.00%	-8.49%	0.00%	1.11%
2008-2010	48.04%	12.78%	0.74%	0.26%	39.32%	32.78%	0.00%	4.07%
2010-2020	9.98%	3.64%	0.34%	0.13%	7.49%	4.66%	0.00%	1.60%

Form 2.2 - PG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Household Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2000$)	Commercial Floorspace (MM Sqft.)
1990	10,450,128	3,897,421	2.68	352,572	41,818	1,758
1991	10,678,197	3,961,902	2.70	351,034	41,838	1,800
1992	10,874,483	4,011,740	2.71	362,430	41,479	1,832
1993	11,037,375	4,055,134	2.72	364,533	40,641	1,866
1994	11,125,194	4,095,706	2.72	370,458	40,499	1,894
1995	11,221,517	4,135,477	2.71	384,839	42,528	1,925
1996	11,331,199	4,173,736	2.71	403,080	44,978	1,953
1997	11,538,191	4,216,615	2.74	424,313	54,285	1,981
1998	11,684,836	4,265,384	2.74	457,470	64,314	2,014
1999	11,859,729	4,319,650	2.75	489,081	76,991	2,062
2000	12,058,945	4,363,044	2.76	547,532	103,369	2,107
2001	12,296,435	4,419,002	2.78	535,209	91,177	2,152
2002	12,473,890	4,477,097	2.79	519,562	83,917	2,204
2003	12,634,773	4,536,605	2.79	520,797	85,650	2,246
2004	12,790,570	4,602,671	2.78	541,270	90,569	2,280
2005	12,942,336	4,675,276	2.77	557,496	105,435	2,315
2006	13,105,896	4,743,642	2.76	586,705	115,365	2,342
2007	13,289,560	4,801,043	2.77	607,914	114,093	2,372
2008	13,464,871	4,844,177	2.78	610,277	113,756	2,408
2009	13,641,175	4,902,717	2.78	612,700	112,270	2,445
2010	13,820,023	4,963,789	2.78	621,890	114,873	2,475
2011	14,002,083	5,024,762	2.79	636,633	119,051	2,501
2012	14,187,416	5,086,797	2.79	659,641	124,743	2,531
2013	14,376,096	5,149,913	2.79	683,170	128,452	2,565
2014	14,568,193	5,214,132	2.79	701,917	130,366	2,600
2015	14,763,782	5,279,477	2.80	718,519	132,139	2,635
2016	14,962,938	5,345,976	2.80	735,717	134,088	2,668
2017	15,165,735	5,413,653	2.80	753,699	135,921	2,699
2018	15,372,256	5,482,523	2.80	771,968	137,645	2,730
2019	15,582,566	5,552,617	2.81	790,445	139,181	2,761
2020	15,796,769	5,623,962	2.81	809,045	140,442	2,792

Annual Growth Rates (%)

1990-2000	1.44%	1.13%	0.30%	4.50%	9.47%	1.83%
2000-2008	1.39%	1.32%	0.07%	1.37%	1.20%	1.68%
2008-2010	1.31%	1.23%	0.08%	0.95%	0.49%	1.37%
2010-2020	1.35%	1.26%	0.09%	2.67%	2.03%	1.21%

Form 2.3: Electricity Prices (2007 cents/kWh) - PG&E			
YEAR	**Residential**	**Commercial**	**Industrial**
1980	9.42	11.86	9.08
1981	10.94	13.92	10.48
1982	10.54	13.13	10.60
1983	10.07	12.80	11.25
1984	11.92	15.04	13.43
1985	12.67	16.31	14.51
1986	12.62	16.18	13.42
1987	11.33	13.98	9.90
1988	12.14	13.63	9.26
1989	13.40	14.27	9.73
1990	13.78	14.42	9.62
1991	14.33	14.66	9.85
1992	14.72	15.17	9.65
1993	14.74	14.87	9.25
1994	14.69	14.74	8.87
1995	13.34	13.33	8.51
1996	13.69	12.83	7.75
1997	13.46	12.61	7.30
1998	12.11	8.83	6.83
1999	11.93	8.93	7.45
2000	11.68	8.69	7.39
2001	12.44	8.87	13.64
2002	12.53	12.27	12.30
2003	12.89	13.87	12.51
2004	13.00	13.49	11.58
2005	13.29	13.06	10.85
2006	14.63	13.69	10.67
2007	14.77	13.63	10.02
2008	13.90	12.75	8.96
2009	14.18	13.14	9.42
2010	14.18	13.14	9.42
2011	14.31	13.27	9.51
2012	14.45	13.40	9.60
2013	14.60	13.53	9.70
2014	14.74	13.67	9.79
2015	14.88	13.80	9.89
2016	15.16	14.05	10.07
2017	15.44	14.31	10.25
2018	15.72	14.57	10.44
2019	16.01	14.84	10.63
2020	16.30	15.11	10.83

CHAPTER 3: Southern California Edison Planning Area

The Southern California Edison (SCE) planning area includes

- SCE bundled retail customers.
- Customers served by energy service providers (ESPs) using the SCE distribution system to deliver electricity to end users.
- Customers of the various Southern California municipal and irrigation district utilities with the exception of the cities of Los Angeles, Pasadena, Glendale, and Burbank and the Imperial Irrigation District. Also excluded from the SCE planning area is San Diego County and the southern portion of Orange County served by San Diego Gas & Electric. (SDG&E)

This chapter presents forecasted consumption and peak loads for the SCE planning area, including both total and per capita values. For perspective, *CED 2009 Revised* values are compared to both *CED 2009 Draft* and *CED 2007* values. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Next, sector consumption and peak load forecasts are presented and compared to the sector level forecast values of the two previous forecasts mentioned above.

For *CED 2009 Draft*, three price scenarios were developed for electricity rates: high rates, low (constant) rates, and a *mid-rate* scenario in between the two. The high-rate case assumed approximately 30 percent higher rates by 2020 relative to 2010, while the mid-rate case assumed 15 percent higher rates over the same period. In the low-rate case, rates remained at 2010 levels through 2020 as was done in *CED 2007*. In *CED 2009 Revised*, the mid-rate price forecast was used, and all comparisons to *CED 2009 Draft* are made to the mid-rate scenario. Chapter 1 provides more details on price assumptions.

Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* forecasts of SCE planning area electricity consumption and peak demand are lower than *CED 2007* levels because of the economic downturn and increased efficiency impacts, but higher than *CED 2009 Draft*.
- Per capita electricity consumption and peak demand are also projected to be lower than *CED 2007* but slightly higher than *CED 2009 Draft*.
- The largest percentage reduction in electricity consumption and peak demand relative to *CED 2007* occurs in the residential and commercial sectors.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by around 2.5 percent in 2020.

- Self-generation impacts are projected to be higher than in *CED 2007* and *CED 2009 Draft* because of increased adoption of photovoltaic systems.
- Electric vehicles are projected to increase electricity consumption by more than 1,600 GWH in 2020.

Table 14 presents a comparison of the planning area electricity consumption and peak demand forecasts for selected years. *CED 2009 Revised* is compared to both *CED 2009 Draft* mid rate and *CED 2007*. The revised electricity consumption forecast is higher than *CED 2009 Draft* by 5 percent at the end of the forecast period. This is caused mainly by higher economic forecast values provided in the June Moody's Economy.com forecast. The revised consumption forecast is still about 9 percent lower than the *CED 2007* forecast at the end of the period. The revised peak forecast is now 1.8 percent higher than *CED 2009 Draft* values by the end of the forecast period. This is still more than 5 percent lower than *CED 2007* projections. The smaller increase in the revised peak forecast relative to the changes in the consumption forecast is caused by increased assumptions regarding self generation. This has the impact of reducing net system peak but does not reduce total electricity consumption. Also contributing to the difference is the impact of efficiency programs that have a greater impact on overall consumption than peak. Long-term growth rates of both the revised consumption and peak forecasts are now just slightly below the growth rates of the *CED 2007* forecast.

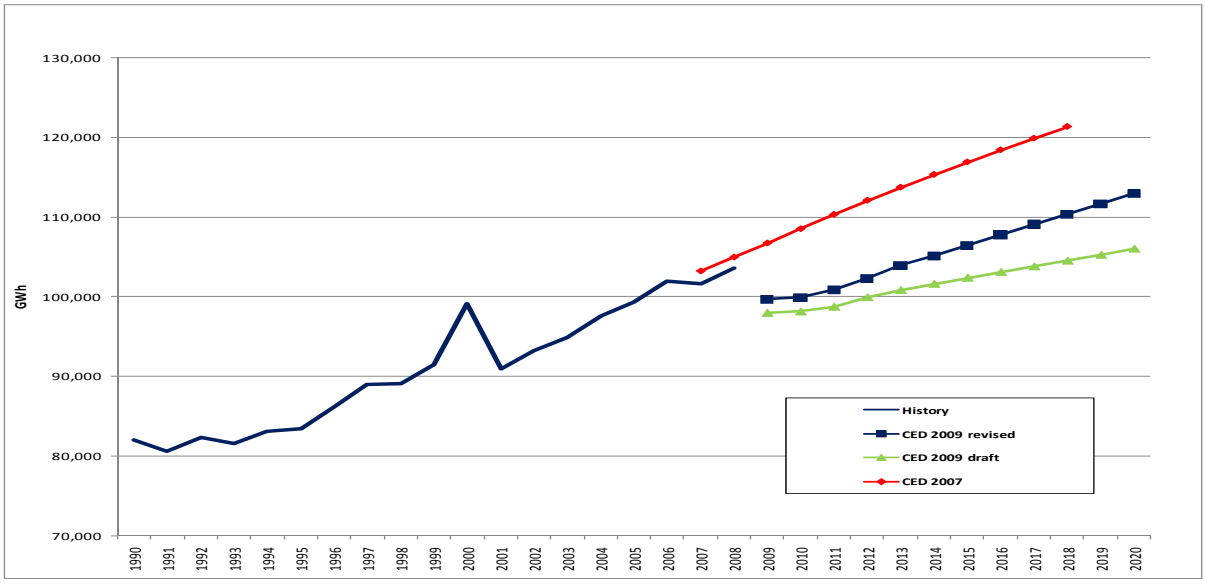
Table 14: SCE Planning Area Forecast Comparison

Consumption (GWH)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	82,069	82,069	82,069	0.00%	0.00%
2000	99,146	99,146	99,148	0.00%	0.00%
2008	104,957	99,780	103,600	-1.29%	3.83%
2010	108,503	98,190	99,875	-7.95%	1.72%
2015	116,872	102,394	106,460	-8.91%	3.97%
2018	121,298	104,528	110,362	-9.02%	5.58%
Average Annual Growth Rates					
1990-2000	1.91%	1.91%	1.91%		
2000-2008	0.71%	0.13%	0.88%		
2008-2010	1.68%	-0.53%	-1.21%		
2010-2018	1.40%	0.78%	1.26%		
Peak (MW)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	17,635	17,647	17,647	0.07%	0.00%
2000	19,408	19,506	19,506	0.50%	0.00%
2008	23,272	22,859	22,055	-5.23%	-3.52%
2010	24,082	22,898	22,877	-5.00%	-0.09%
2015	26,013	24,299	24,543	-5.65%	1.00%
2018	27,112	25,108	25,561	-5.72%	1.80%
Average Annual Growth Rates					
1990-2000	0.96%	1.01%	1.01%		
2000-2008	2.30%	2.00%	1.55%		
2008-2010	1.73%	0.09%	1.85%		
2010-2018	1.49%	1.16%	1.40%		
Historic values are shaded					

Source: California Energy Commission, 2009

As shown in **Figure 47**, *CED 2009 Revised* consumption is about 4 percent higher than *CED 2009 Draft* but still below *CED 2007* throughout the forecast period. The dip in the early years of *CED 2009 Revised* is caused by both the revised economic projections and increased expected savings from energy efficiency programs.

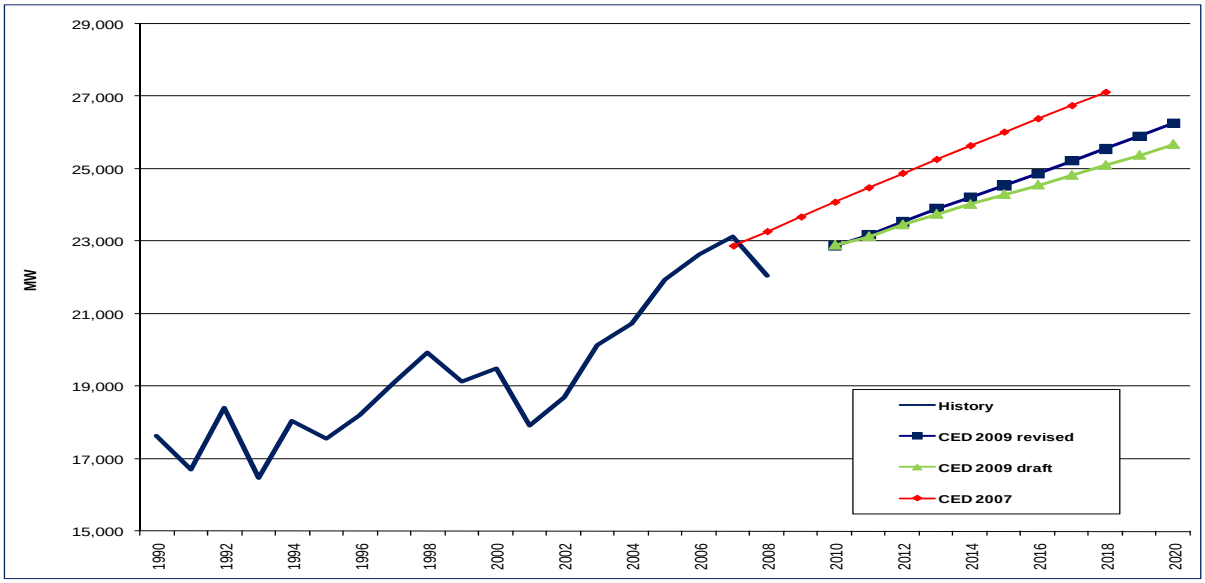
Figure 47: SCE Planning Area Electricity Forecast



Source: California Energy Commission, 2009

CED 2009 Revised SCE planning area peak demand (**Figure 48**) is slightly higher than *CED 2009 Draft* by the end of the forecast period. The difference in relation to the consumption forecast is caused by an increase in peak impacts of self-generation programs assumed in *CED 2009 Revised* as well as increases in consumption that have little impact on peak.

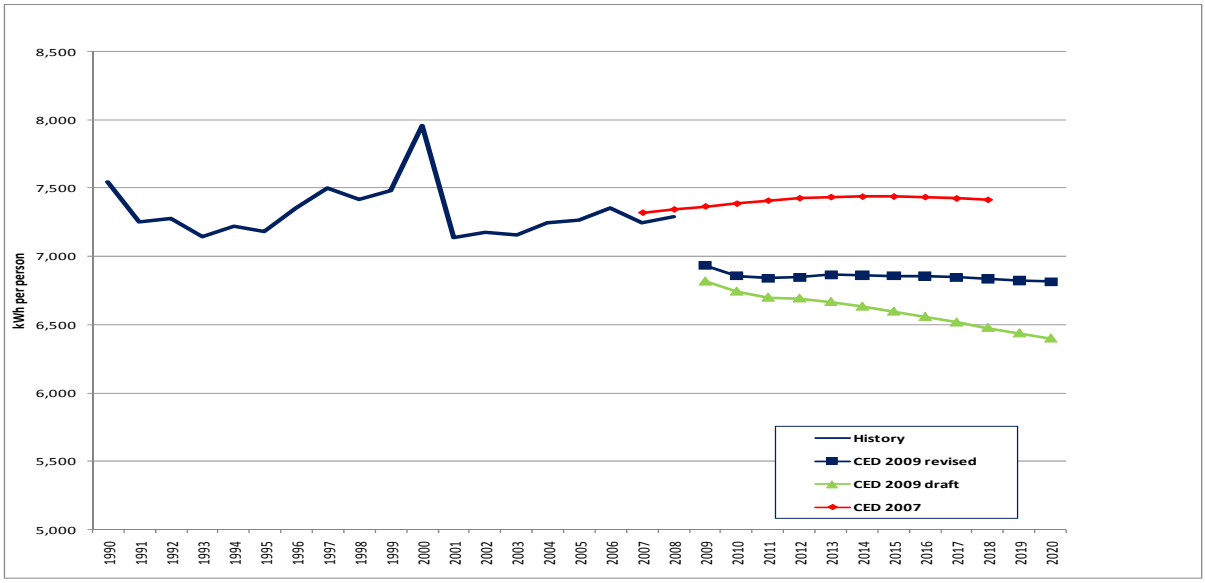
Figure 48: SCE Planning Area Peak



Source: California Energy Commission, 2009

Figure 49 compares forecasted per capita residential electricity consumption. Per capita consumption in *CED 2009 Revised* is higher than *CED 2009 Draft*. It is still below the projection of *CED 2007* forecast. The revised projection declines slightly over the forecast period and is lower than recent recorded history. The short-term dip in per capita consumption is caused by a combination of economic/demographic forecast assumptions and increased savings from energy efficiency programs.

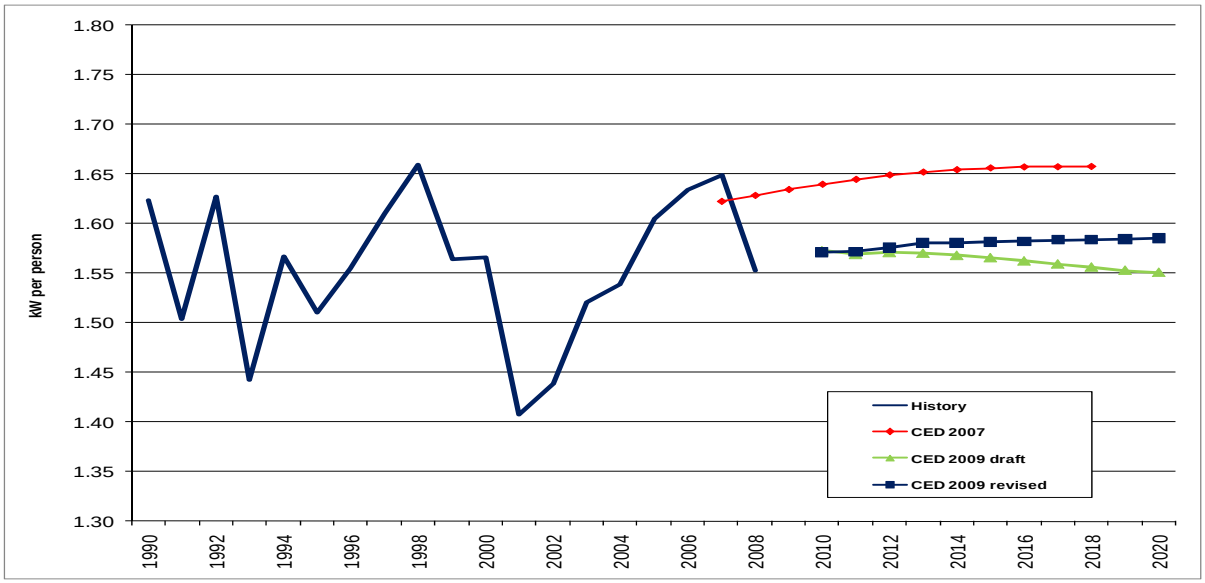
Figure 49: SCE Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2009

Per capita peak demand for *CED 2009 Revised*, shown in **Figure 50**, is now slightly higher than *CED 2009 Draft* by the end of the forecast period. *CED 2009 Revised* per capita peak demand increases slightly in the short term, after which it is relatively constant over the remainder of the forecast period as opposed to the increase projected in *CED 2007* forecast. This is caused by increases in estimates of self-generation and efficiency program impacts as well as reduced economic growth relative to *CED 2007* projections.

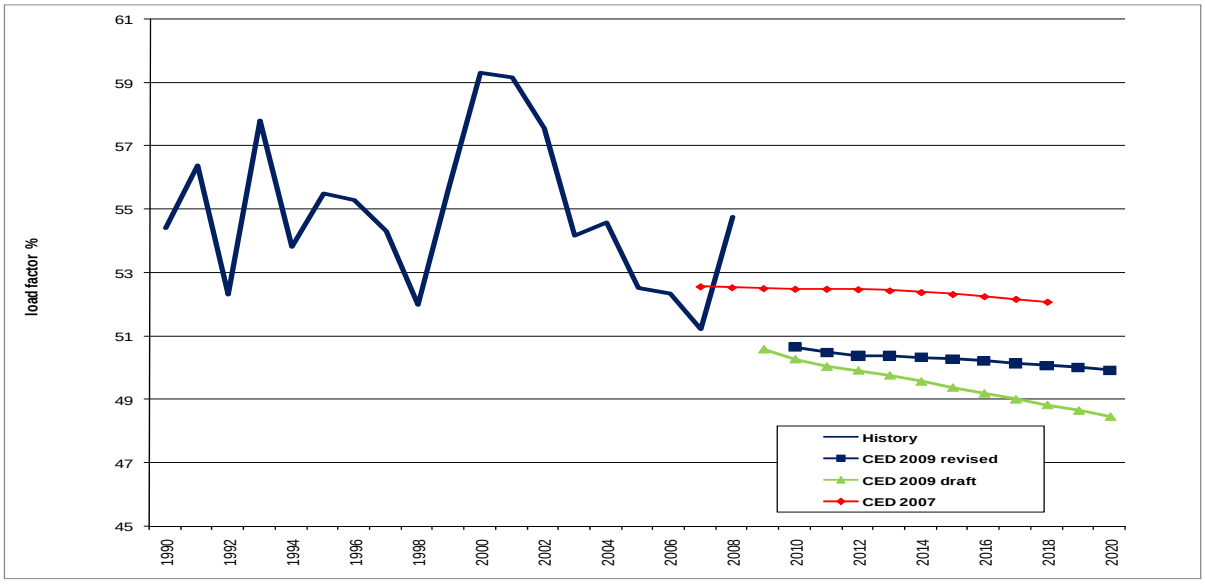
Figure 50: SCE Planning Area per Capita Peak Demand



Source: California Energy Commission, 2009

Figure 51 provides a comparison of the respective forecast load factors. The high load factors observed from 1998-2005 is a product of lower-than-average peak temperatures and reaction to the energy crisis. The projected load factor, based on higher 1-in-2 peak temperatures and a return to normal air conditioning use patterns, should be lower than this recent value. The *CED 2009 Revised* load factor is higher than *CED 2009 Draft* because of the revised self-generation estimates, which lower peak relative to consumption. As in *CED 2009 Draft,* the revised load factor is projected to decline over the forecast period.

Figure 51: SCE Planning Area Peak Load Factor



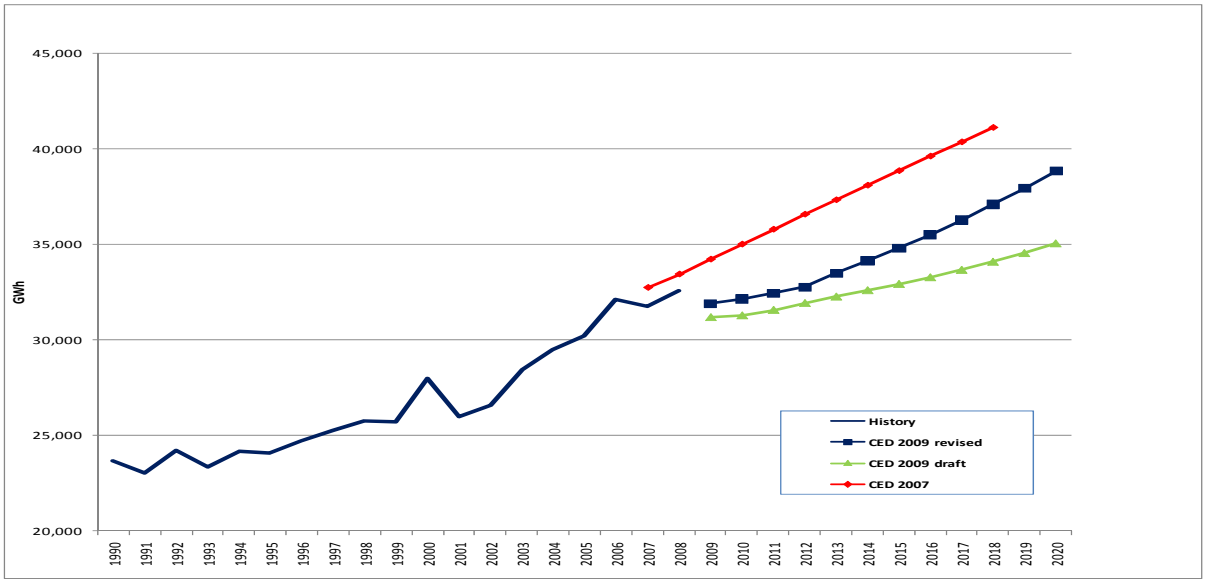
Source: California Energy Commission, 2009

Sector Level Results and Input Assumptions

Residential

Figure 52 provides a comparison of the residential forecasts. *CED 2009 Revised* is higher over the entire forecast period than *CED 2009 Draft* but still well below the level of *CED 2007*. The increase over *CED 2009 Draft* is caused by increased projections of household income, inclusion of private electric vehicle consumption and slightly higher persons per household projections as well as an increase in the starting value brought about by inclusion of 2008 sales. The revised household income projections are still below those projected in *CED 2007* forecast.

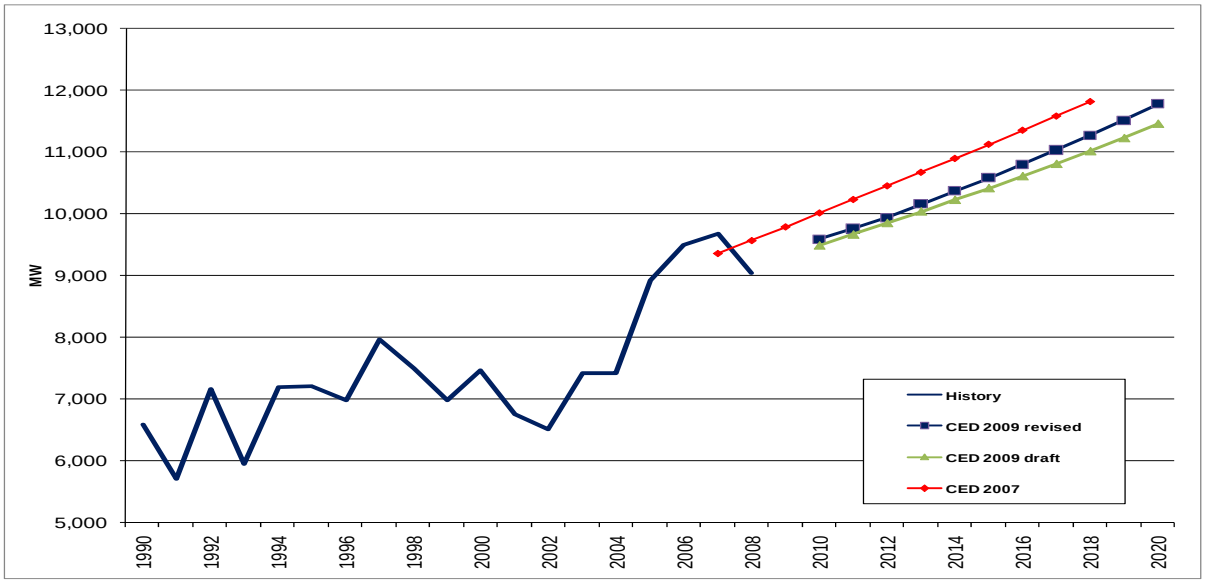
Figure 52: SCE Planning Area Residential Consumption



Source: California Energy Commission, 2009

Figure 53 provides a comparison of the residential peak demand forecasts. Unlike the consumption forecast, there is only a slight increase in *CED 2009 Revised* residential peak over *CED 2009 Draft*. Almost all of the residential consumption increase is caused by end-use consumption that has little impact on peak.

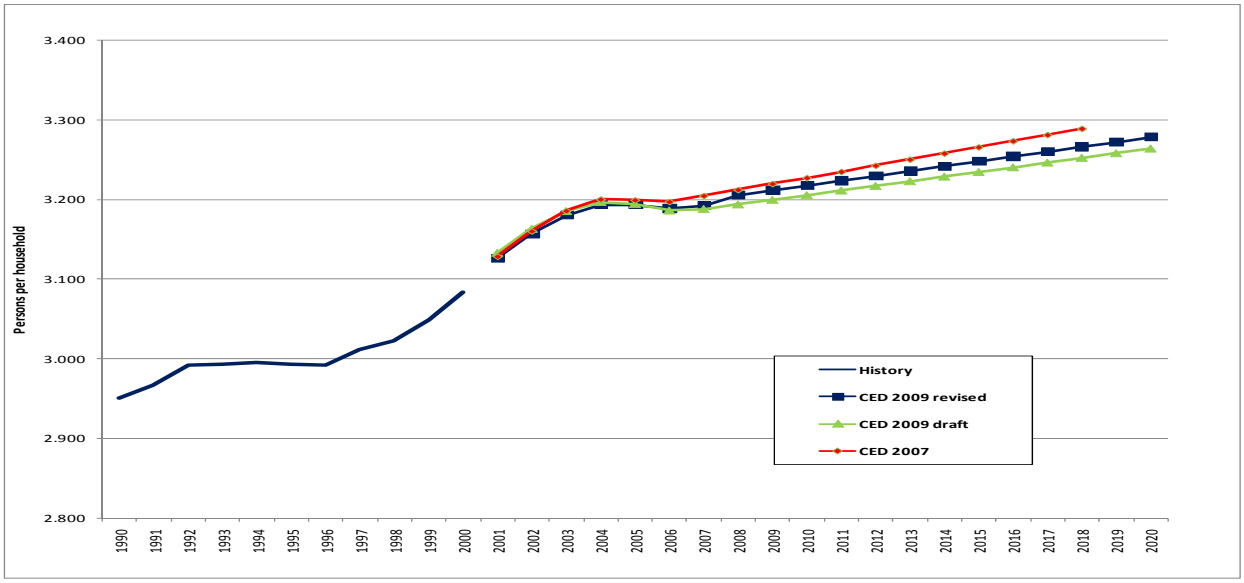
Figure 53: SCE Planning Area Residential Peak



Source: California Energy Commission, 2009

Figures 54 and **55** provide comparisons of the residential drivers used in the forecasts. **Figure 54** provides comparisons of persons per household projections used in the forecasts. There is slight increase in the forecast of persons per household in *CED 2009 Revised* compared *CED 2009 Draft*. The change in *CED 2009 Revised* reduces the household forecast by about 2,000 households by the end of the forecast period compared to *CED 2009 Draft* (less than 0.04 percent).

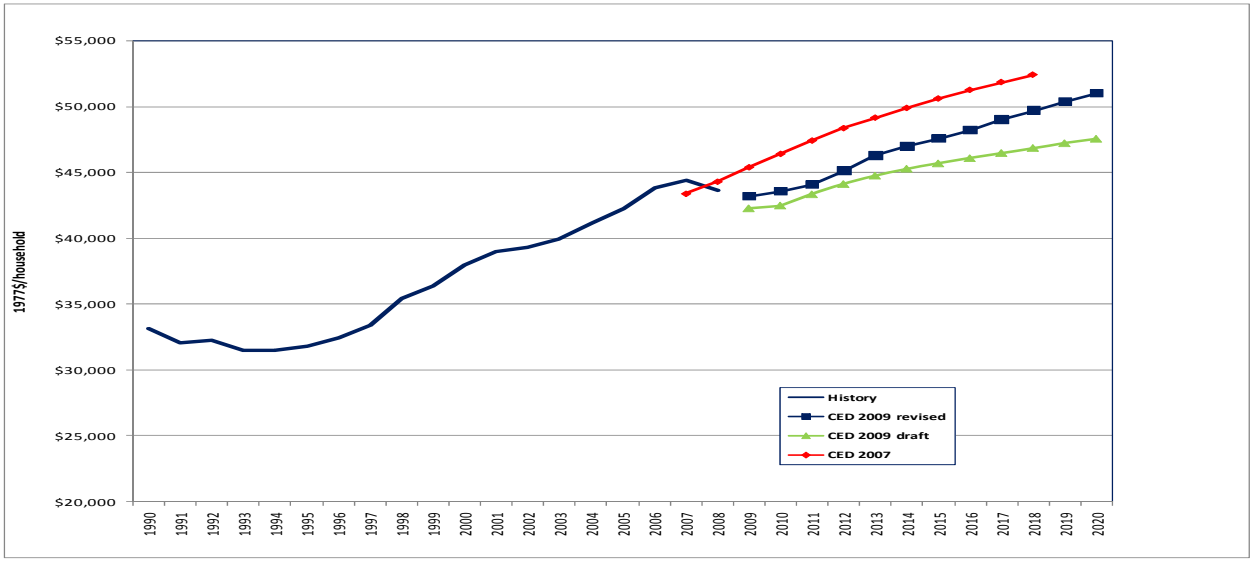
Figure 54: SCE Planning Area Persons-per-Household Projections



Source: California Energy Commission, 2009

Figure 55 provides a comparison of household income used in the respective forecasts. *CED 2009 Revised* projections are higher than those used in *CED 2009 Draft* but still below what was used in *CED 2007*. *CED 2009 Revised* uses the June 2009 projections from Moody's Economy.com while the previous forecasts used earlier vintages. The new projections produce a long-term growth coming out of the current economic slump growth similar to that used in *CED 2007.*

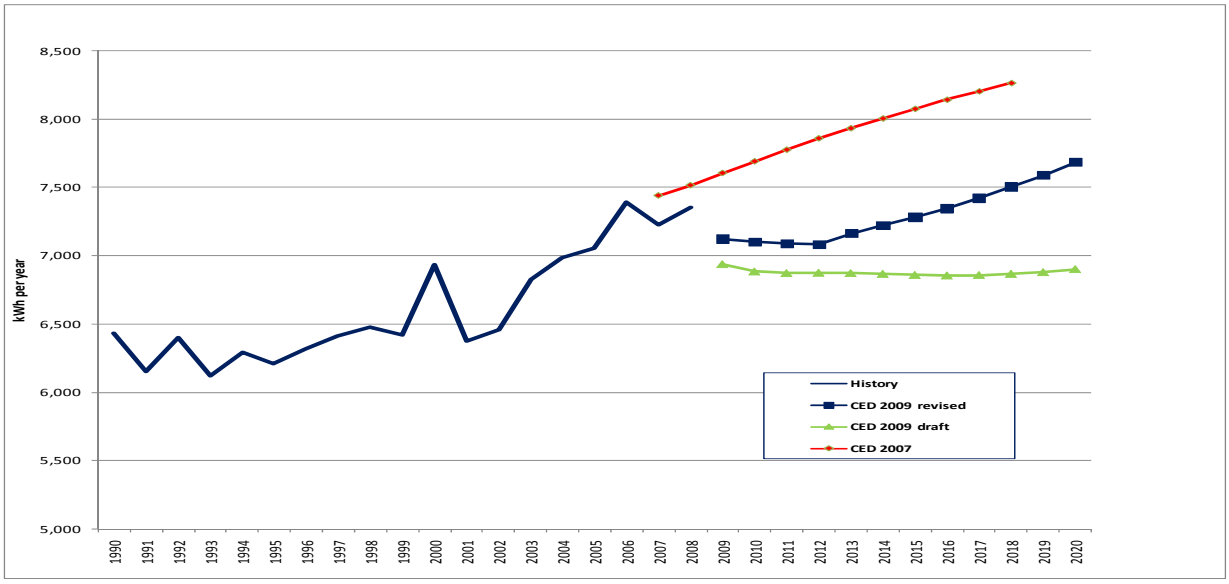
Figure 55: SCE Planning Area Household Income Projections



Source: California Energy Commission, 2009

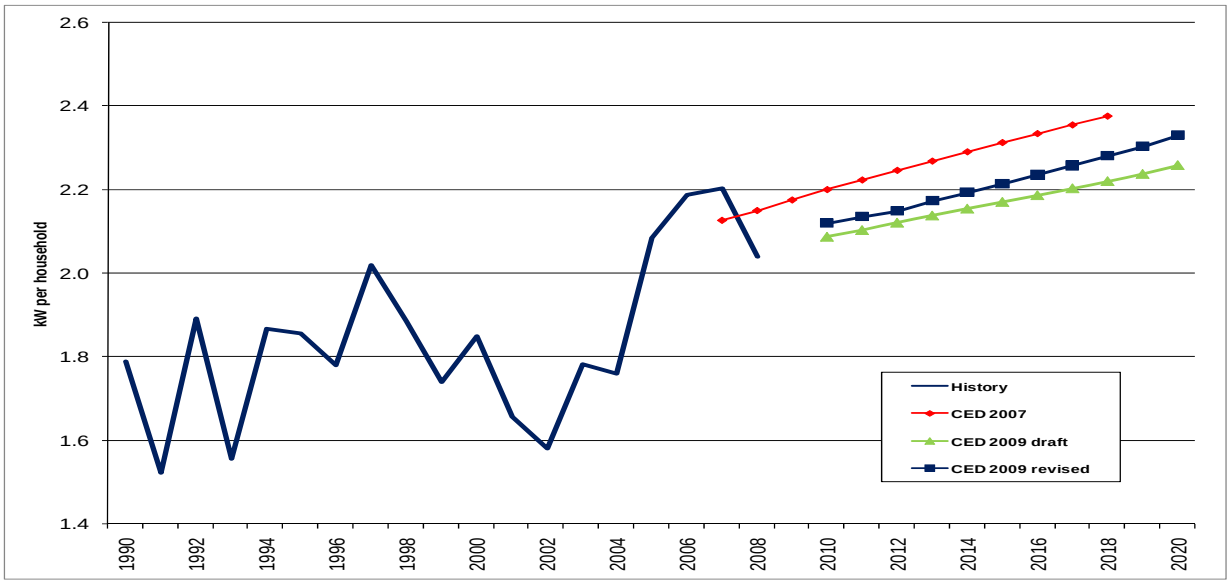
Figures 56 and **57** present comparisons of residential use per household and residential peak use per household, respectively. *CED 2009 Revised* use per household (**Figure 56**) is higher than *CED 2009 Draft*. This is partly caused by inclusion of 2008 sales data, which adjusts the starting point upward, as well as the use of increased household income projections. Also included in *CED 2009 Revised* is private electric vehicle use in the residential sector. About 50% of the increase in use per household from 2012 to 2020 is caused by household electric vehicle charging. *CED 2009 Revised* use per household is still below *CED 2007* levels. In contrast, differences in peak use per household (**Figure 57**) are only slightly higher in *CED 2009 Revised* compared to *CED 2009 Draft* because most of the consumption increases do not directly translate into peak impacts.

Figure 56: SCE Planning Area Use per Household



Source: California Energy Commission, 2009

Figure 57: SCE Planning Area Peak Use per Household

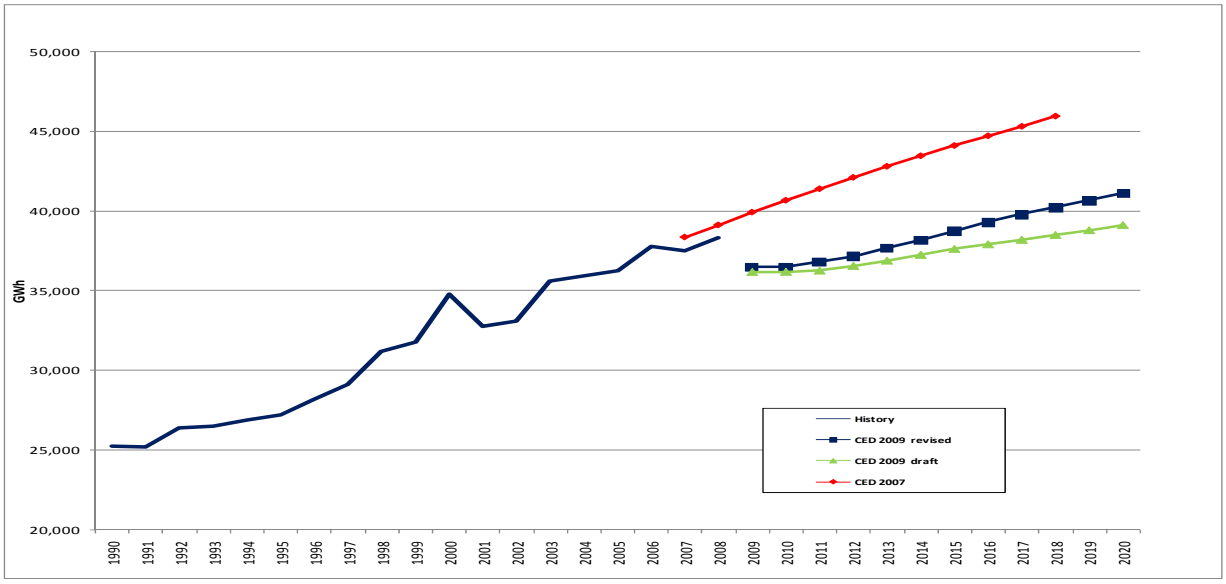


Source: California Energy Commission, 2009

Commercial Building Sector

Figures 58 and **59** provide a comparison of the commercial building sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of increased floor space projections. *CED 2009 Revised* is still below the forecast levels of *CED 2007*.

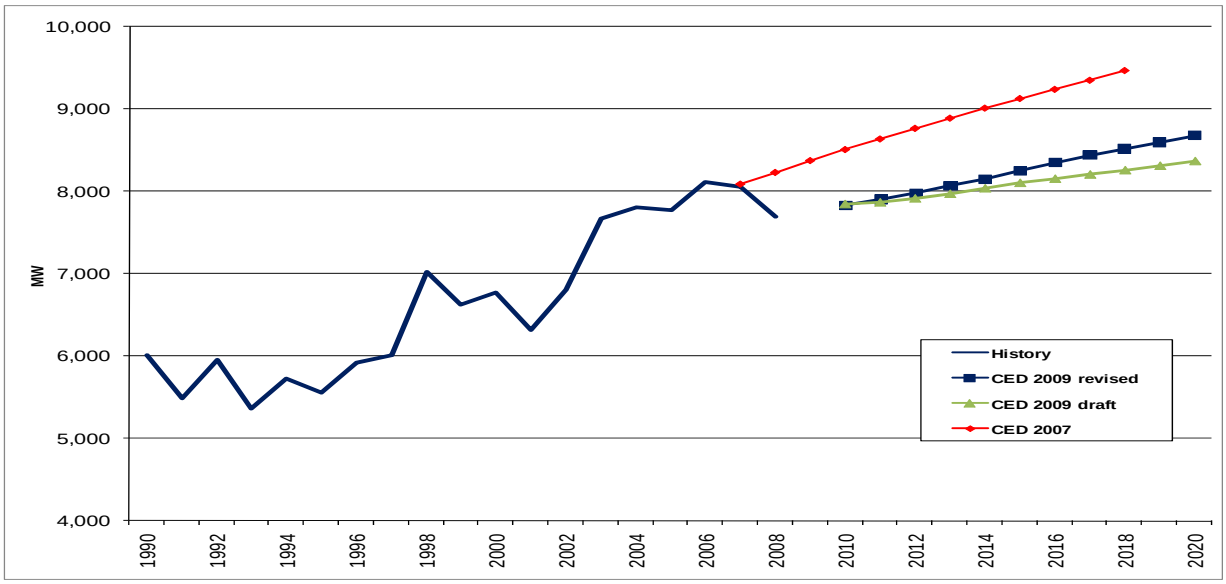
Figure 58: SCE Planning Area Commercial Consumption



Source: California Energy Commission, 2009

Figure 59 provides a comparison of the commercial building sector peak demand forecasts. Differences in the peak forecasts are similar to those in the consumption forecast.

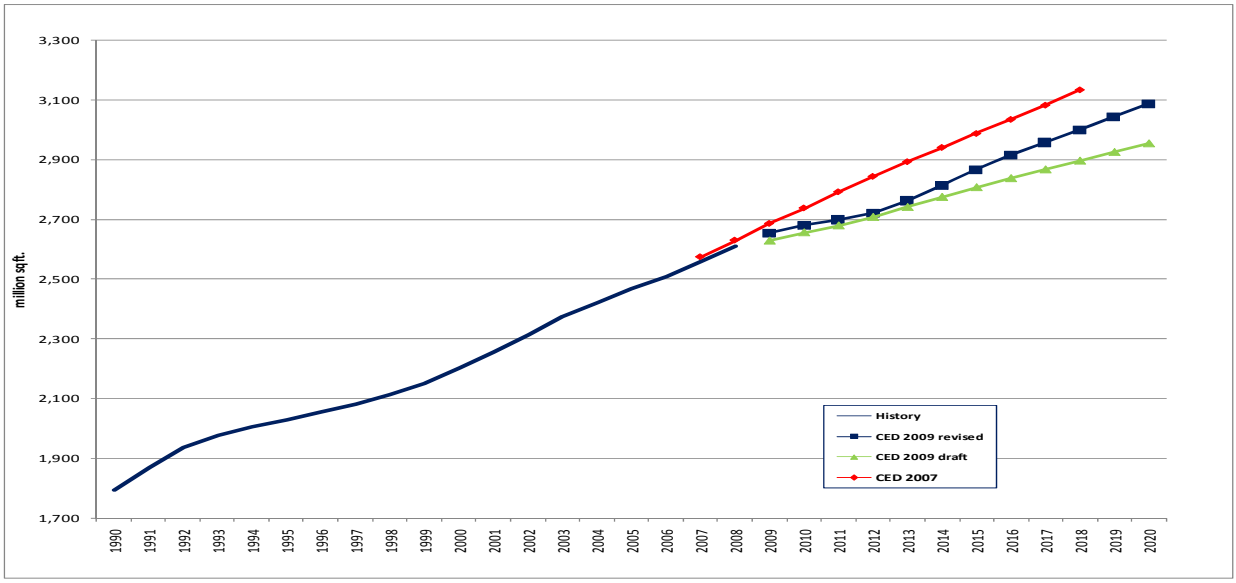
Figure 59: SCE Planning Area Commercial Sector Peak



Source: California Energy Commission, 2009

In staff's commercial building sector forecasting model, floor space by building type (that is, retail, schools, offices, and so forth) is the key driver of energy use for each specific building type. **Figure 60** provides a comparison of total commercial floor space projections. *CED 2009 Revised* is now higher than the draft forecast in the long run because of revisions to economic and demographic drivers as well as changes in the econometric estimates in the floor space model.

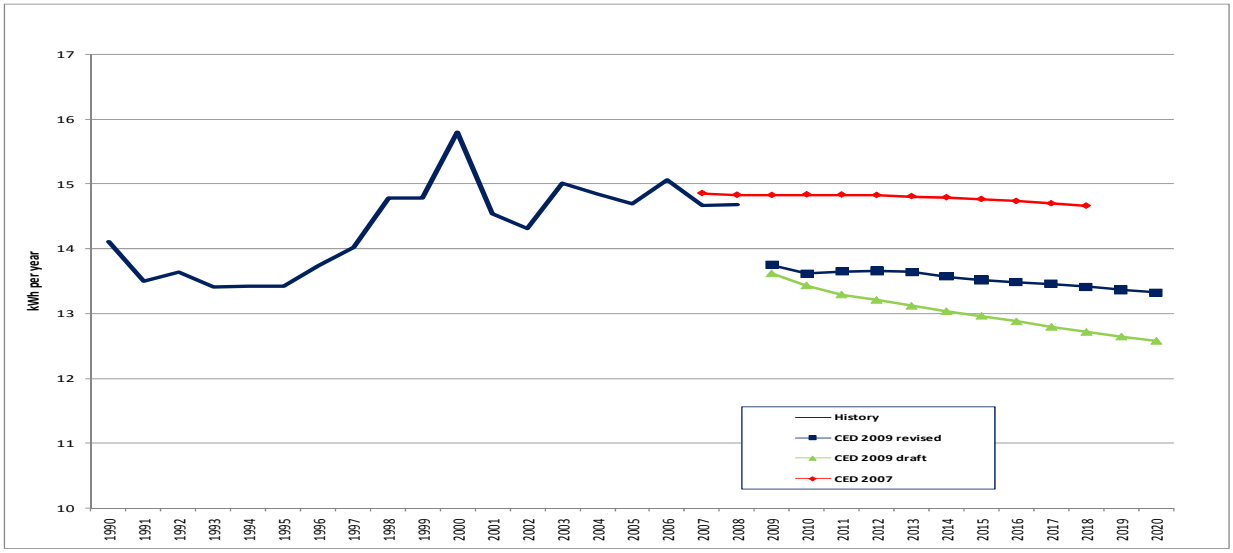
Figure 60: SCE Planning Area Commercial Floor Space



Source: California Energy Commission, 2009

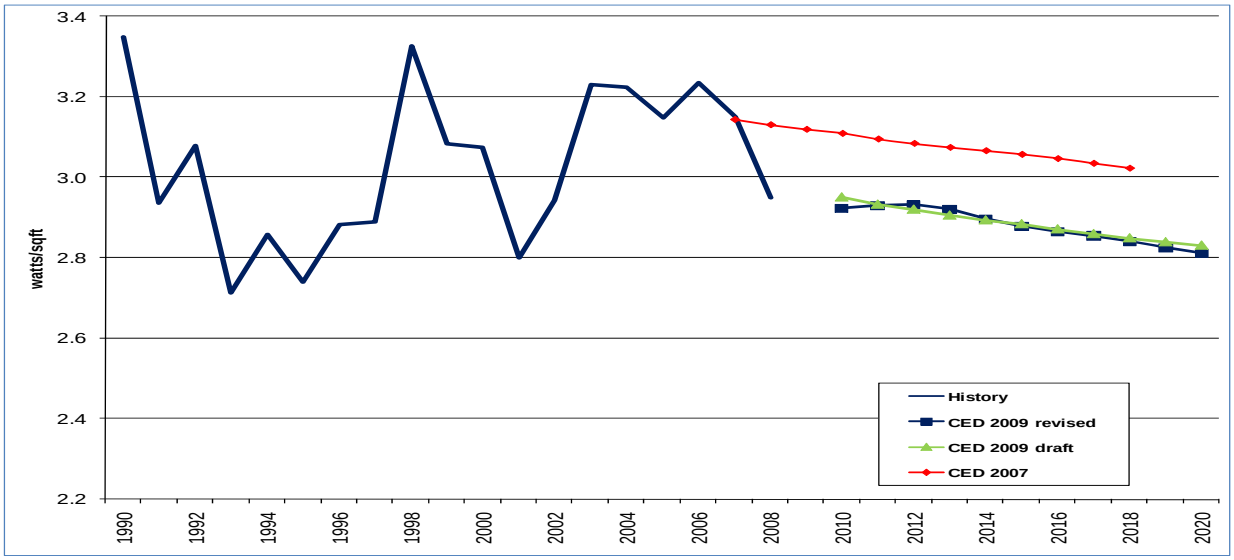
Historical and projected commercial sector annual and peak use per square foot are shown in **Figures 61** and **62,** respectively. Changes in annual use per square foot are based on the historical floor space estimates presented in **Figure 60**. Use per square foot (**Figure 61**) in *CED 2009 Revised* is somewhat higher than *CED 2009 Draft*. These values are still below those projected in *CED 2007*. Revised peak use per square foot (**Figure 62**) is little changed from *CED 2009 Draft* values. Both the energy and peak forecasts decline over the long-term forecast period because of projected commercial building and appliance standards impacts as well as increased efficiency program savings.

Figure 61: SCE Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2009

Figure 62: SCE Planning Area Commercial Watts per Square Foot

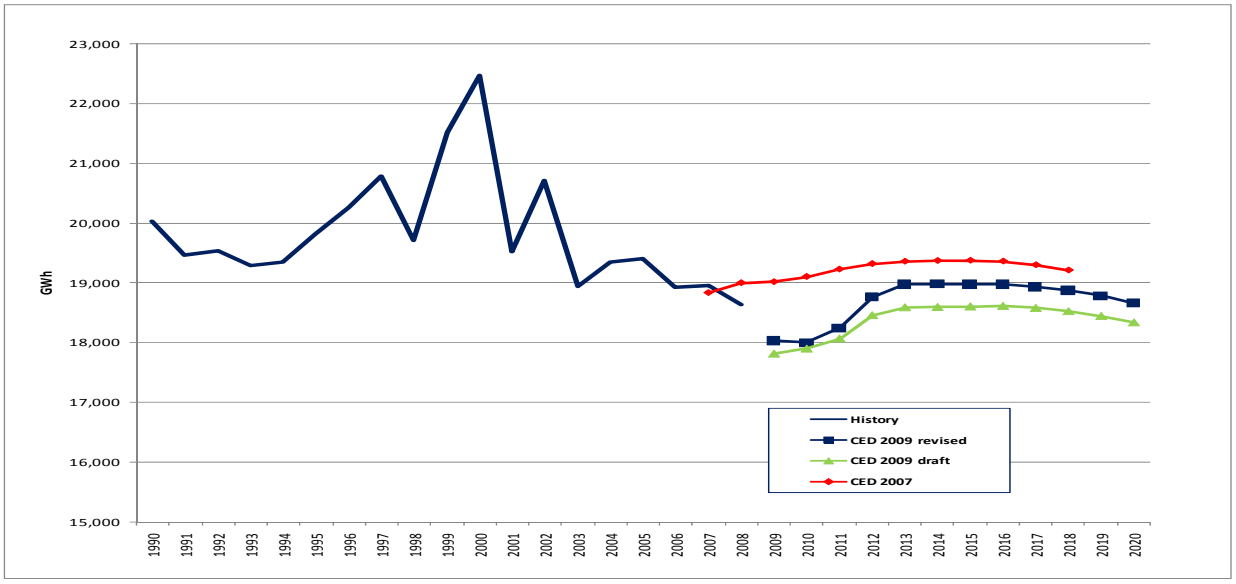


Source: California Energy Commission, 2009

Industrial Sector

Figure 63 compares the industrial sector electricity consumption forecasts for the SCE planning area. *CED 2009 Revised* is slightly higher throughout the entire forecast period than *CED 2009 Draft* based on more optimistic economic projections. The long-term growth of *CED 2009 Revised* is also higher than *CED 2007*.

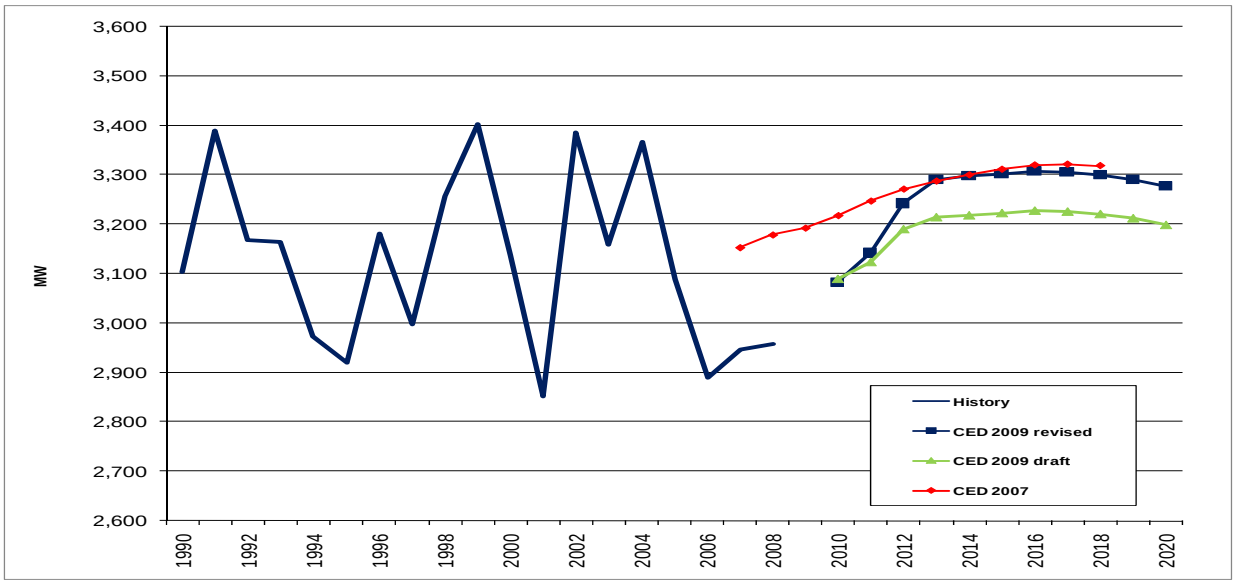
Figure 63: SCE Planning Area Industrial Consumption



Source: California Energy Commission, 2009

Figure 64 compares the industrial sector peak forecasts. The industrial peak for *CED 2009 Revised* now returns to the level of *CED 2007* in the latter part of the forecast period.

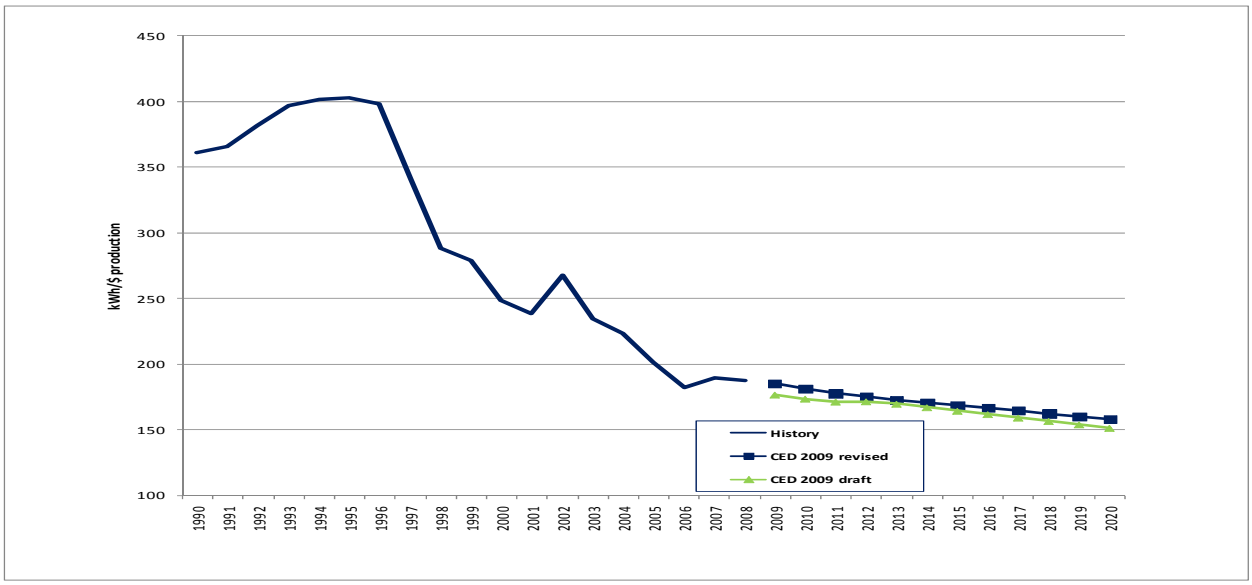
Figure 64: SCE Planning Area Industrial Sector Peak



Source: California Energy Commission, 2009

Figure 65 compares electricity use per dollar value of production between the revised and draft *CED 2009* forecasts. The *CED 2009 Revised* has a slightly higher level of electricity use per dollar of industrial value added than *CED 2009 Draft*. This is primarily caused by a higher historical starting point due to inclusion of 2008 consumption history. The forecasted growth rates are similar in both forecasts.

Figure 65: SCE Planning Area Industrial Use per Production Unit



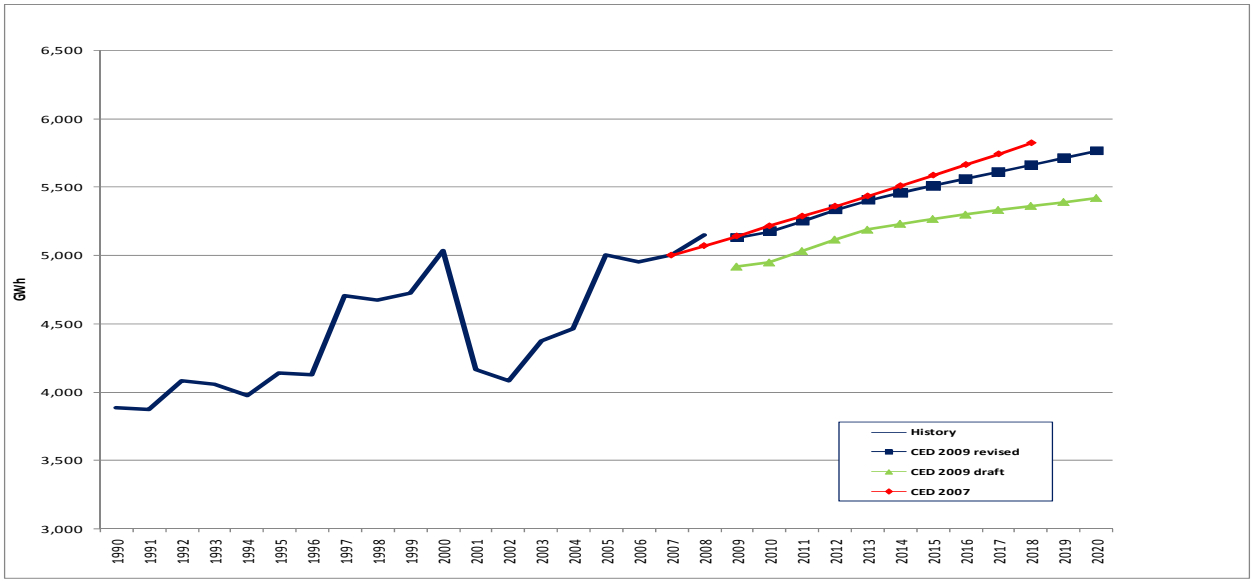
Source: California Energy Commission, 2009

Other Sectors

Figures 66 and **67** provide comparisons of the remaining sector electricity consumption forecasts. **Figure 66** compares the transportation, communication, and utilities (TCU) sector forecasts. *CED 2009 Revised* is slightly higher than *CED 2009 Draft*, caused by inclusion of 2008 consumption history.

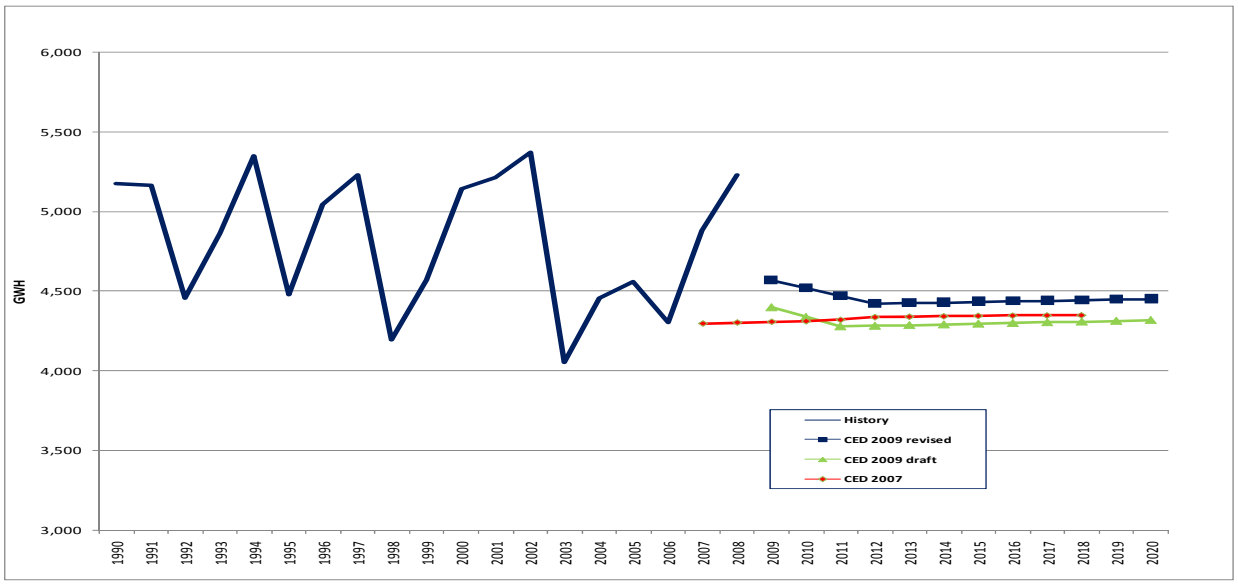
Figure 67 compares the agriculture and water pumping sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of higher estimated historical consumption, but the increase is tempered by limitations on water that is available to pump.

Figure 66: SCE Planning Area Transportation, Communication and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2009

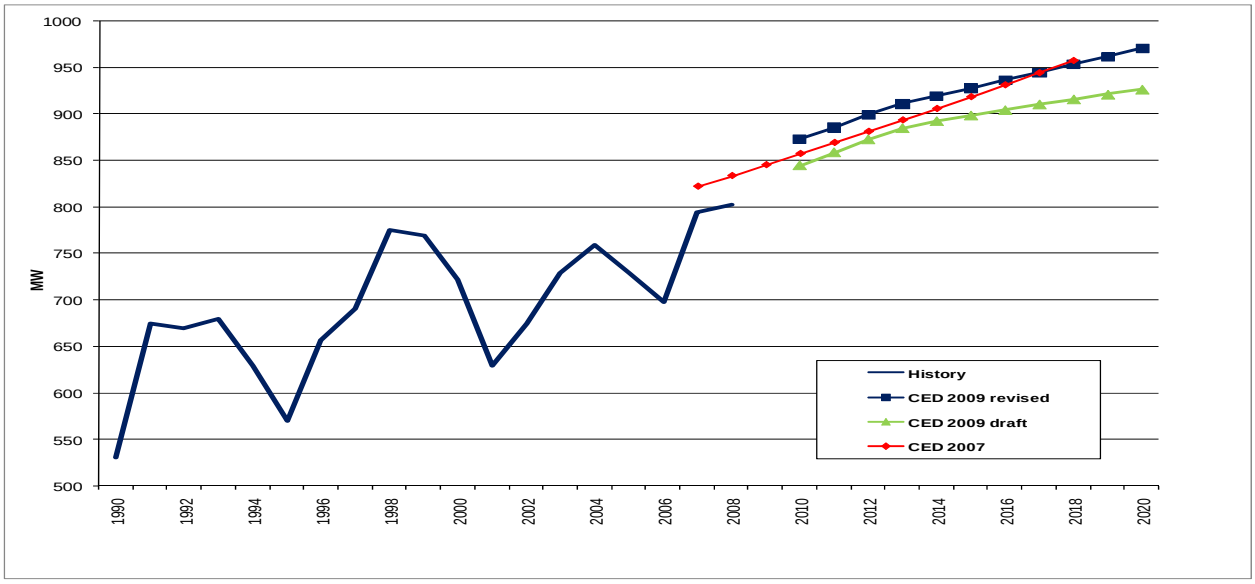
Figure 67: SCE Planning Area Agriculture and Water Pumping Forecasts



Source: California Energy Commission, 2009

Figure 68 compares the other sector peaks (TCU and street lighting). *CED 2009 Revised* is now higher than the previous two forecasts and very similar to *CED 2007* in the long term.

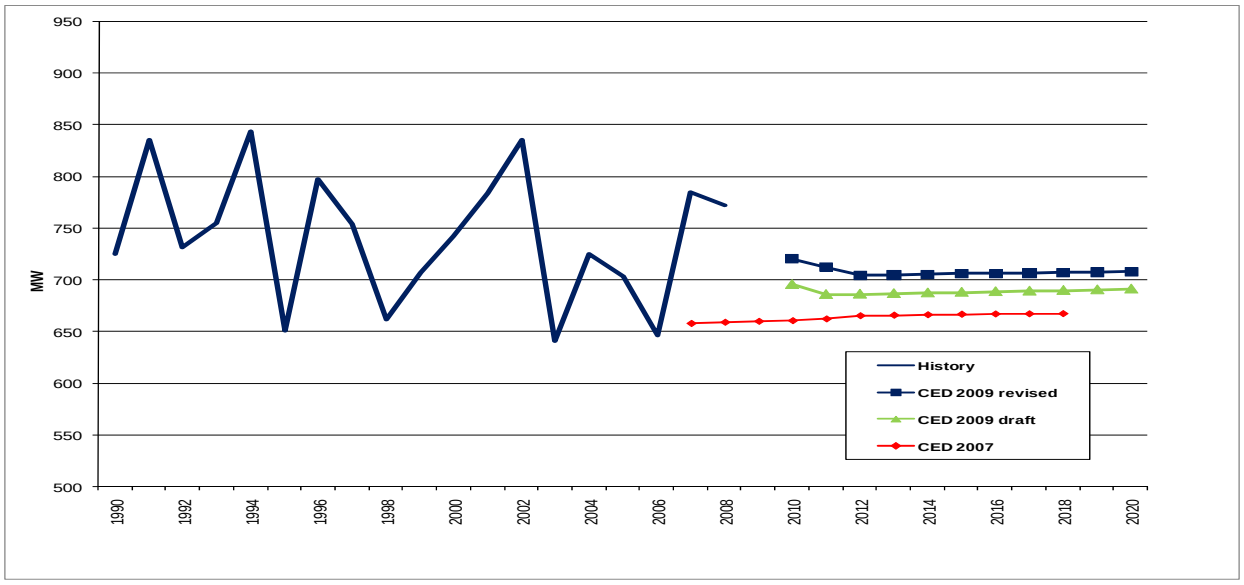
Figure 68: SCE Planning Area Other Sector Peak



Source: California Energy Commission, 2009

Figure 69 compares the agriculture and water pumping sector peaks. *CED 2009 Revised* is higher than *CED 2009 Draft*. Both *CED 2009* forecasts are higher than *CED 2007,* which is based on a lower assumed starting point.

Figure 69: SCE Planning Area Agriculture and Water Pumping Peak

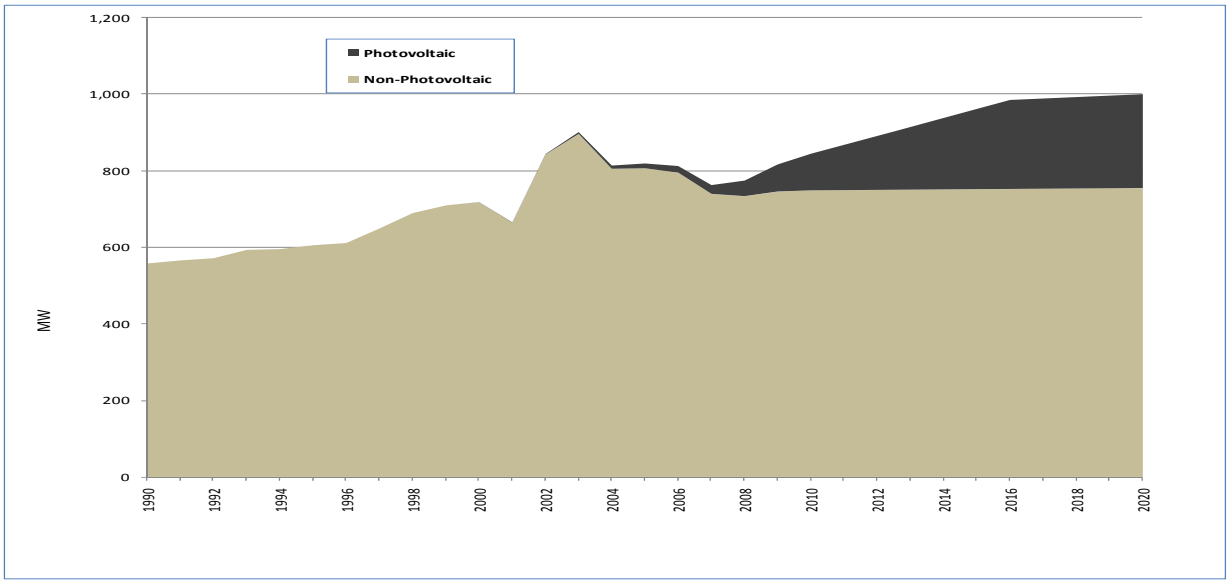


Source: California Energy Commission, 2009

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Chapter 1. The effects of these programs are forecast based on recent trends in installations. **Figure 70** shows the staff draft forecast of peak impacts from photovoltaic and non-photovoltaic self-generation. Based on these trends, staff projects about 250 MW of peak reduction from photovoltaic systems by 2020.

Figure 70: SCE Planning Area Self-Generation Peak Forecasts



Source: California Energy Commission, 2009

Economic Scenarios

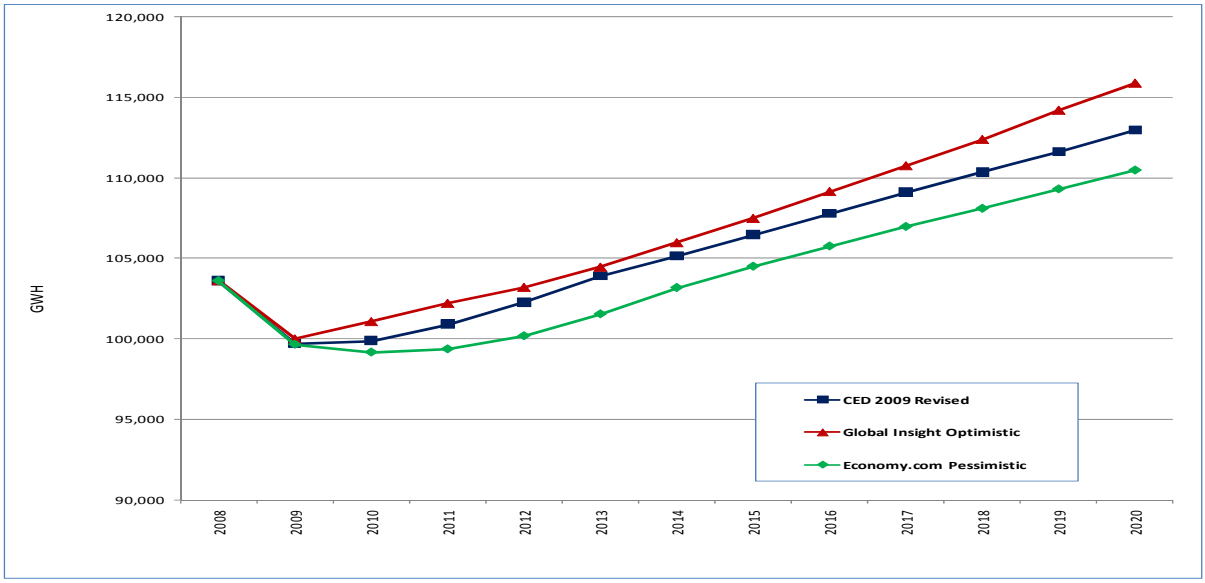
The results presented above rely on economic inputs from the *base case* Moody's Economy.com scenario. Staff also examined the impacts of two alternative economic scenarios for electricity demand: an *optimistic* case provided by Global Insight and an Economy.com *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth of the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models.

The estimated models were run for SCE for the two economic scenarios as well as the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2007 Revised* consumption projections. **Figure 71** shows the projected impacts of the optimistic and pessimistic scenarios on SCE consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 72**.

Electricity consumption is projected to be 2.6 percent higher in the optimistic economic case than in *CED 2009 Revised* by 2020 and 2.2 percent lower in the pessimistic scenario. The peak demand forecast increases by 2.6 percent under the optimistic scenario by 2020 and falls by 2.6 percent in the pessimistic case. The percentage peak reduction is higher than that of consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.1 percent and 1.35 percent, respectively, to 1.25 percent and 1.5 percent in the optimistic case, and fall to 0.95 percent and 1.15 percent under the pessimistic scenario.

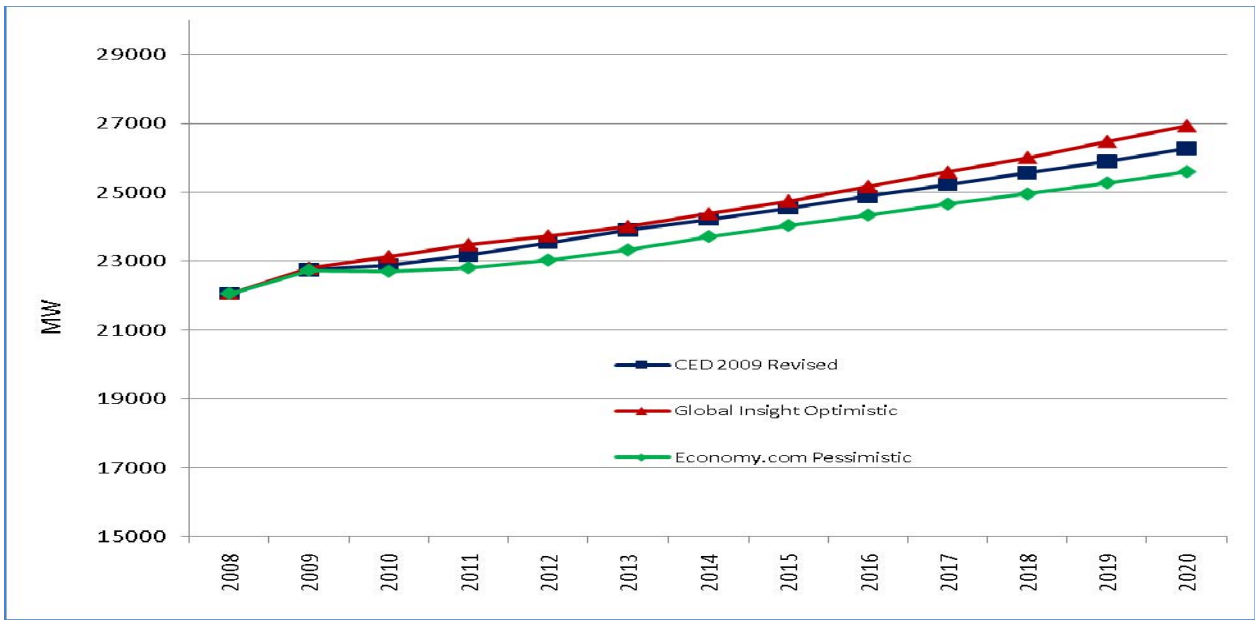
Changes in consumption and peak demand are small compared to *CED 2009 Revised* totals in percentage terms, and this is a reflection of the relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020.

Figure 71: Projected SCE Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 72: Projected SCE Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Staff spent a great deal of effort refining methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Tables 15** and **16** show electricity consumption and peak savings estimates for selected years, for building and appliance standards, utility and public agency programs, and *naturally occurring* savings, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts from rate changes and standards. Chapter 8 provides much more detail on staff work related to energy efficiency and conservation.

Table 15: SCE Planning Area Electricity Consumption Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	966	1,138	1,239	1,487	1,669	1,926	2,238
Appliance Standards	990	2,305	3,310	4,656	5,429	6,411	7,500
Utility and Public Agency Programs	176	207	577	2,558	3,445	3,049	1,255
Naturally Occurring Savings	75	85	122	132	194	785	2,485
Total Residential Savings	2,208	3,736	5,249	8,834	10,738	12,171	13,478
Commercial Energy Savings							
Building Standards	508	1,192	1,942	2,851	3,144	3,847	4,734
Appliance Standards	342	833	1,306	1,830	1,966	2,311	2,729
Utility and Public Agency Programs*	89	582	888	1,076	1,594	1,469	1,101
Naturally Occurring Savings	2,597	1,681	4,050	3,268	4,820	5,480	6,884
Total Commercial Savings	3,536	4,288	8,186	9,025	11,524	13,107	15,448
Total Energy Savings	5,744	8,024	13,435	17,859	22,262	25,278	28,926

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Table 16: SCE Planning Area Electricity Peak Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	269	331	324	413	503	596	704
Appliance Standards	276	671	864	1,292	1,636	1,982	2,359
Utility and Public Agency Programs	49	60	151	710	1,038	943	395
Naturally Occurring Savings	21	25	32	37	59	243	782
Total Residential Savings	615	1,088	1,371	2,452	3,236	3,763	4,240
Commercial Energy Savings							
Building Standards	121	268	418	573	675	820	1,000
Appliance Standards	81	187	281	368	422	492	576
Utility and Public Agency Programs*	21	131	191	216	342	313	233
Naturally Occurring Savings	616	378	872	657	1,035	1,168	1,454
Total Commercial Savings	839	965	1,762	1,813	2,474	2,793	3,263
Total Energy Savings	1,454	2,053	3,133	4,265	5,710	6,556	7,503

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption and peak demand from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids. More details for this forecast are provided in Chapter 1. The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

Table 17 shows the resulting projections for electricity consumption and peak demand, by sector, for the SCE planning area. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter. The survey also indicated that commercial establishments were much less willing to purchase electric vehicles than private households, so consumption is heavily weighted to the residential sector.

Table 17: SCE Electric Vehicle Forecast

	Residential		Commercial	
Year	GWH	MW	GWH	MW
2008	2	0	3	0
2009	2	0	3	0
2010	3	0	3	0
2011	35	1	5	0
2012	100	4	8	0
2013	245	10	16	1
2014	446	19	23	1
2015	654	28	30	1
2016	845	36	35	1
2017	1,017	43	39	2
2018	1,216	52	41	2
2019	1,411	60	43	2
2020	1,603	69	44	2

Source: California Energy Commission, 2009

Form 1.1 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Street lighting	Total Consumption
1990	23,684	0	25,308	0	20,028	3,361	5,173	3,884	632	82,069
1991	23,039	0	25,227	0	19,464	3,251	5,160	3,871	632	80,642
1992	24,210	0	26,398	0	19,539	3,031	4,456	4,080	678	82,392
1993	23,362	0	26,504	0	19,294	2,883	4,864	4,056	666	81,629
1994	24,190	0	26,916	0	19,347	2,765	5,348	3,969	659	83,195
1995	24,097	0	27,225	0	19,818	3,118	4,475	4,138	616	83,487
1996	24,738	0	28,219	0	20,257	3,183	5,042	4,125	633	86,197
1997	25,270	0	29,160	0	20,793	3,232	5,225	4,702	647	89,029
1998	25,749	0	31,220	0	19,705	2,910	4,191	4,669	677	89,120
1999	25,726	0	31,781	0	21,512	2,536	4,570	4,720	650	91,493
2000	27,980	0	34,798	0	22,475	3,047	5,140	5,035	674	99,148
2001	25,972	0	32,785	0	19,528	2,595	5,212	4,166	700	90,959
2002	26,580	0	33,121	0	20,715	2,663	5,369	4,078	706	93,232
2003	28,432	0	35,610	0	18,940	2,751	4,051	4,371	700	94,854
2004	29,472	0	35,916	0	19,354	3,284	4,455	4,461	704	97,645
2005	30,210	0	36,234	0	19,409	3,286	4,559	5,003	705	99,405
2006	32,108	0	37,765	0	18,925	3,216	4,301	4,948	706	101,970
2007	31,736	1	37,509	4	18,950	2,855	4,878	5,002	738	101,666
2008	32,572	2	38,320	3	18,636	2,977	5,226	5,147	723	103,600
2009	31,891	2	36,490	3	18,035	2,851	4,568	5,129	733	99,698
2010	32,130	3	36,496	3	18,002	2,817	4,518	5,175	736	99,875
2011	32,431	35	36,826	5	18,244	2,946	4,470	5,250	740	100,907
2012	32,752	100	37,164	8	18,760	3,085	4,423	5,335	744	102,261
2013	33,484	245	37,678	16	18,968	3,188	4,426	5,404	747	103,896
2014	34,139	446	38,171	23	18,974	3,231	4,430	5,455	751	105,151
2015	34,792	654	38,746	30	18,971	3,256	4,435	5,506	754	106,460
2016	35,495	845	39,294	35	18,971	3,284	4,438	5,557	758	107,796
2017	36,264	1,017	39,792	39	18,929	3,308	4,441	5,608	761	109,104
2018	37,081	1,216	40,218	41	18,867	3,328	4,444	5,659	765	110,362
2019	37,928	1,411	40,656	43	18,779	3,351	4,448	5,710	768	111,639
2020	38,830	1,603	41,115	44	18,662	3,373	4,452	5,762	771	112,964

* Residential and commercial electric vehicle consumption included in residential and commercial totals.

Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)

1990-2000	1.68%	0.00%	3.24%	0.00%	1.16%	-0.98%	-0.06%	2.63%	0.65%	1.91%
2000-2008	1.92%	0.00%	1.21%	0.00%	-2.31%	-0.29%	0.21%	0.28%	0.88%	0.55%
2008-2010	-0.68%	46.73%	-2.41%	-9.53%	-1.72%	-2.72%	-7.02%	0.27%	0.92%	-1.81%
2010-2020	1.91%	84.75%	1.20%	32.36%	0.36%	1.81%	-0.15%	1.08%	0.47%	1.24%

Form 1.1b - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street lighting	Total Sales
1990	23,684	24,848	17,597	3,104	5,163	3,717	632	78,745
1991	23,039	24,753	17,026	2,972	5,150	3,699	632	77,272
1992	24,210	25,893	17,091	2,752	4,446	3,916	678	78,985
1993	23,362	25,965	16,770	2,676	4,851	3,802	666	78,093
1994	24,190	26,374	16,810	2,549	5,336	3,729	659	79,648
1995	24,097	26,675	17,251	2,884	4,463	3,893	616	79,879
1996	24,738	27,668	17,655	2,947	5,029	3,883	633	82,554
1997	25,270	28,586	18,022	2,981	5,213	4,440	647	85,159
1998	25,749	30,603	16,768	2,641	4,179	4,393	677	85,010
1999	25,726	31,141	18,505	2,241	4,570	4,433	650	87,265
2000	27,980	34,149	19,421	2,772	5,140	4,736	674	94,872
2001	25,970	32,674	16,868	1,605	5,212	3,968	700	86,998
2002	26,577	32,934	17,347	1,487	5,369	3,788	706	88,208
2003	28,426	35,394	15,426	1,481	4,050	4,019	700	89,496
2004	29,463	35,701	16,332	2,025	4,454	4,136	704	92,814
2005	30,199	36,005	16,355	2,030	4,555	4,699	705	94,549
2006	32,093	37,407	16,006	1,985	4,296	4,669	706	97,162
2007	31,715	37,116	16,014	1,985	4,872	4,728	738	97,167
2008	32,537	37,858	15,738	2,098	5,218	4,896	723	99,069
2009	31,830	35,927	15,114	1,971	4,550	4,858	733	94,985
2010	32,049	35,864	15,072	1,936	4,493	4,895	736	95,045
2011	32,329	36,144	15,310	2,065	4,439	4,963	740	95,990
2012	32,629	36,433	15,823	2,203	4,387	5,040	744	97,258
2013	33,341	36,896	16,027	2,306	4,385	5,105	747	98,808
2014	33,976	37,339	16,029	2,349	4,384	5,151	751	99,978
2015	34,609	37,863	16,023	2,373	4,383	5,197	754	101,202
2016	35,291	38,361	16,018	2,401	4,381	5,243	758	102,452
2017	36,056	38,850	15,975	2,425	4,384	5,293	761	103,745
2018	36,868	39,267	15,912	2,445	4,387	5,344	765	104,987
2019	37,710	39,696	15,822	2,467	4,391	5,395	768	106,249
2020	38,608	40,145	15,703	2,489	4,395	5,446	771	107,558

Last historic year is 2008. Sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	1.68%	3.23%	0.99%	-1.12%	-0.05%	2.45%	0.65%	1.88%
2000-2008	1.90%	1.30%	-2.59%	-3.42%	0.19%	0.42%	0.88%	0.54%
2008-2010	-0.75%	-2.67%	-2.14%	-3.93%	-7.21%	-0.02%	0.92%	-2.05%
2010-2020	1.88%	1.13%	0.41%	2.54%	-0.22%	1.07%	0.47%	1.24%

Form 1.2 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	82,069	5,355	87,423	3,324	0	3,324	84,100
1991	80,642	5,255	85,897	3,370	0	3,370	82,527
1992	82,392	5,371	87,763	3,407	0	3,407	84,355
1993	81,629	5,310	86,939	3,536	0	3,536	83,403
1994	83,195	5,416	88,611	3,547	0	3,547	85,064
1995	83,487	5,432	88,919	3,609	0	3,609	85,310
1996	86,197	5,614	91,810	3,643	0	3,643	88,168
1997	89,029	5,791	94,820	3,871	0	3,871	90,949
1998	89,120	5,781	94,901	4,110	0	4,110	90,791
1999	91,493	5,934	97,427	4,228	1	4,228	93,199
2000	99,148	6,451	105,599	4,276	1	4,277	101,323
2001	90,959	5,916	96,875	3,959	2	3,961	92,914
2002	93,232	5,998	99,231	5,019	5	5,024	94,207
2003	94,854	6,086	100,940	5,341	17	5,358	95,582
2004	97,645	6,311	103,956	4,802	28	4,830	99,126
2005	99,405	6,429	105,834	4,812	44	4,856	100,978
2006	101,970	6,607	108,577	4,747	61	4,808	103,769
2007	101,666	6,607	108,274	4,417	82	4,499	103,774
2008	103,600	6,737	110,337	4,386	145	4,531	105,806
2009	99,698	6,459	106,157	4,461	252	4,713	101,444
2010	99,875	6,463	106,338	4,491	340	4,830	101,508
2011	100,907	6,527	107,434	4,496	421	4,917	102,517
2012	102,261	6,614	108,874	4,502	501	5,003	103,872
2013	103,896	6,719	110,615	4,506	582	5,088	105,527
2014	105,151	6,798	111,949	4,510	664	5,173	106,776
2015	106,460	6,882	113,342	4,514	745	5,259	108,083
2016	107,796	6,967	114,763	4,518	826	5,344	109,419
2017	109,104	7,055	116,158	4,522	837	5,359	110,799
2018	110,362	7,139	117,501	4,526	848	5,374	112,127
2019	111,639	7,225	118,864	4,530	860	5,390	113,474
2020	112,964	7,314	120,278	4,535	871	5,406	114,872

Annual Growth Rates (%)

1990-2000	1.91%	1.88%	1.91%	2.55%	0.00%	2.55%	1.88%
2000-2008	0.55%	0.54%	0.55%	0.32%	96.04%	0.73%	0.54%
2008-2010	-1.81%	-2.05%	-1.83%	1.18%	53.02%	3.25%	-2.05%
2010-2020	1.24%	1.24%	1.24%	0.10%	9.88%	1.13%	1.24%

Form 1.3 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	6,592	0	6,007	0	3,103	725	531	16,959
1991	5,704	0	5,491	0	3,390	835	675	16,095
1992	7,159	0	5,958	0	3,167	731	669	17,684
1993	5,943	0	5,364	0	3,164	755	679	15,905
1994	7,187	0	5,732	0	2,974	843	630	17,365
1995	7,211	0	5,563	0	2,920	650	571	16,914
1996	6,973	0	5,925	0	3,181	797	656	17,533
1997	7,963	0	6,012	0	2,998	754	691	18,417
1998	7,497	0	7,027	0	3,257	661	775	19,217
1999	6,974	0	6,630	0	3,403	706	769	18,481
2000	7,471	0	6,774	0	3,138	742	722	18,846
2001	6,748	0	6,314	0	2,852	784	629	17,327
2002	6,504	0	6,813	0	3,386	835	674	18,213
2003	7,425	0	7,666	0	3,159	641	728	19,619
2004	7,427	0	7,804	0	3,367	725	759	20,082
2005	8,927	0	7,768	0	3,089	703	729	21,216
2006	9,503	0	8,114	0	2,890	646	698	21,850
2007	9,682	0	8,054	0	2,947	784	793	22,261
2008	9,041	0	7,699	0	2,958	772	802	21,272
2009	9,433	0	7,838	0	3,093	728	866	21,957
2010	9,594	0	7,835	0	3,084	720	873	22,106
2011	9,765	1	7,907	0	3,142	712	885	22,412
2012	9,939	4	7,980	0	3,243	704	899	22,765
2013	10,163	10	8,069	1	3,291	705	911	23,138
2014	10,372	19	8,149	1	3,299	705	919	23,445
2015	10,584	28	8,251	1	3,303	706	928	23,771
2016	10,803	36	8,351	1	3,308	706	936	24,104
2017	11,033	43	8,443	2	3,305	706	945	24,433
2018	11,271	52	8,518	2	3,300	707	953	24,748
2018	11,513	60	8,595	2	3,291	707	962	25,068
2020	11,779	69	8,678	2	3,277	708	970	25,412

* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)								
1990-2000	1.26%	0.00%	1.21%	0.00%	0.11%	0.24%	3.12%	1.06%
2000-2008	2.41%	0.00%	1.61%	0.00%	-0.73%	0.49%	1.32%	1.52%
2008-2010	3.01%	46.73%	0.88%	-9.53%	2.10%	-3.40%	4.35%	1.94%
2010-2020	2.07%	84.75%	1.03%	32.36%	0.61%	-0.17%	1.06%	1.40%

Form 1.4 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	16,959	1,246	18,205	558	0	558	17,647	54.4
1991	16,095	1,180	17,275	566	0	566	16,709	56.4
1992	17,684	1,301	18,985	572	0	572	18,413	52.3
1993	15,905	1,164	17,069	594	0	594	16,475	57.8
1994	17,365	1,274	18,639	595	0	595	18,044	53.8
1995	16,914	1,239	18,154	606	0	606	17,548	55.5
1996	17,533	1,286	18,819	612	0	612	18,207	55.3
1997	18,417	1,350	19,768	650	0	650	19,118	54.3
1998	19,217	1,408	20,625	690	0	690	19,935	52.0
1999	18,481	1,351	19,832	710	0	710	19,122	55.6
2000	18,846	1,378	20,224	718	0	718	19,506	59.3
2001	17,327	1,266	18,593	665	1	665	17,928	59.2
2002	18,213	1,320	19,533	842	2	844	18,689	57.5
2003	19,619	1,423	21,041	896	5	901	20,140	54.2
2004	20,082	1,464	21,546	806	8	813	20,733	54.6
2005	21,216	1,550	22,766	807	12	819	21,947	52.5
2006	21,850	1,599	23,449	795	17	812	22,637	52.3
2007	22,261	1,634	23,895	740	23	763	23,132	51.2
2008	21,272	1,558	22,829	734	41	775	22,055	54.8
2009	21,957	1,607	23,564	746	71	817	22,747	50.9
2010	22,106	1,616	23,722	749	95	844	22,877	50.7
2011	22,412	1,637	24,049	750	118	868	23,181	50.5
2012	22,765	1,662	24,428	750	141	891	23,537	50.4
2013	23,138	1,689	24,827	751	164	915	23,912	50.4
2014	23,445	1,711	25,156	751	187	938	24,218	50.3
2015	23,771	1,734	25,504	752	209	961	24,543	50.3
2016	24,104	1,757	25,861	753	232	985	24,876	50.2
2017	24,433	1,782	26,215	753	235	989	25,226	50.1
2018	24,748	1,805	26,554	754	239	992	25,561	50.1
2019	25,068	1,829	26,897	754	242	996	25,901	50.0
2020	25,412	1,855	27,267	755	245	1,000	26,267	49.9

Annual Growth Rates (%)

1990-2000	1.06%	1.01%	1.06%	2.55%	#DIV/0!	2.55%	1.01%	0.87%
2000-2008	1.52%	1.55%	1.53%	0.28%	96.04%	0.95%	1.55%	-0.99%
2008-2010	1.94%	1.85%	1.94%	1.03%	53.02%	4.41%	1.85%	-3.83%
2010-2020	1.40%	1.39%	1.40%	0.08%	9.88%	1.71%	1.39%	-0.14%

Form 1.5 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Extreme Temperature Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2009	22,747	24,294	24,749	25,113	1.068	1.088	1.104
2010	22,877	24,433	24,891	25,257	1.068	1.088	1.104
2011	23,181	24,758	25,221	25,592	1.068	1.088	1.104
2012	23,537	25,137	25,608	25,984	1.068	1.088	1.104
2013	23,912	25,538	26,016	26,399	1.068	1.088	1.104
2014	24,218	25,864	26,349	26,736	1.068	1.088	1.104
2015	24,543	26,212	26,703	27,095	1.068	1.088	1.104
2016	24,876	26,567	27,065	27,463	1.068	1.088	1.104
2017	25,226	26,941	27,446	27,850	1.068	1.088	1.104
2018	25,561	27,300	27,811	28,220	1.068	1.088	1.104
2019	25,901	27,663	28,181	28,595	1.068	1.088	1.104
2020	26,267	28,053	28,578	28,999	1.068	1.088	1.104

Form 1.7a - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	0	460	2,431	257	10	166	0	3,324
1991	0	474	2,437	278	10	171	0	3,370
1992	0	505	2,448	279	10	164	0	3,407
1993	0	539	2,524	207	13	254	0	3,536
1994	0	542	2,537	216	13	240	0	3,547
1995	0	550	2,567	234	13	245	0	3,609
1996	0	550	2,602	236	13	242	0	3,643
1997	0	574	2,771	250	13	263	0	3,871
1998	0	617	2,936	269	12	275	0	4,110
1999	0	640	3,006	295	0	287	0	4,228
2000	0	649	3,054	274	0	299	0	4,277
2001	1	111	2,660	991	0	198	0	3,961
2002	3	187	3,367	1,176	0	291	0	5,024
2003	5	216	3,513	1,270	0	352	0	5,358
2004	9	215	3,022	1,259	0	325	0	4,830
2005	12	228	3,053	1,256	4	303	0	4,856
2006	15	359	2,919	1,231	5	279	0	4,808
2007	21	393	2,936	869	6	274	0	4,499
2008	34	462	2,897	879	7	251	0	4,531
2009	61	563	2,921	880	18	270	0	4,713
2010	81	632	2,930	881	25	280	0	4,830
2011	102	681	2,934	881	31	287	0	4,917
2012	122	731	2,937	882	36	294	0	5,003
2013	143	782	2,941	882	41	299	0	5,088
2014	163	832	2,945	882	47	304	0	5,173
2015	184	883	2,949	883	52	309	0	5,259
2016	204	933	2,953	883	57	314	0	5,344
2017	208	942	2,954	883	57	314	0	5,359
2018	213	951	2,955	883	57	315	0	5,374
2019	217	960	2,957	883	57	316	0	5,390
2020	222	969	2,958	883	57	316	0	5,406

Annual Growth Rates (%)

1990-2000	0.00%	3.51%	2.31%	0.67%	0.00%	6.02%	0.00%	2.55%
2000-2008	86.37%	-4.15%	-0.66%	15.66%	0.00%	-2.16%	0.00%	0.73%
2008-2010	53.88%	16.92%	0.56%	0.13%	85.66%	5.75%	0.00%	3.25%
2010-2020	10.54%	4.37%	0.10%	0.02%	8.41%	1.21%	0.00%	1.13%

Form 2.2 - SCE Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Household Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2000$)	Commercial Floorspace (MM Sqft.)
1990	10,871,277	3,684,795	2.95	347,782	55,486	1,794
1991	11,115,545	3,746,160	2.97	340,647	53,248	1,870
1992	11,318,875	3,782,987	2.99	345,643	51,234	1,936
1993	11,426,195	3,818,354	2.99	340,789	48,607	1,977
1994	11,518,360	3,846,110	3.00	343,540	48,197	2,006
1995	11,618,825	3,882,777	2.99	350,541	49,203	2,030
1996	11,714,175	3,915,466	2.99	360,634	50,916	2,055
1997	11,870,277	3,941,462	3.01	374,447	60,917	2,081
1998	12,014,585	3,975,263	3.02	401,901	68,335	2,113
1999	12,223,586	4,008,944	3.05	415,521	77,208	2,151
2000	12,453,540	4,038,518	3.08	435,591	90,451	2,203
2001	12,738,257	4,074,765	3.13	447,486	81,756	2,255
2002	12,991,652	4,116,172	3.16	453,280	77,390	2,315
2003	13,245,519	4,165,072	3.18	464,395	80,826	2,374
2004	13,475,629	4,219,883	3.19	482,436	86,739	2,421
2005	13,678,325	4,283,568	3.19	499,047	96,280	2,468
2006	13,856,297	4,345,657	3.19	522,739	103,940	2,508
2007	14,028,699	4,394,620	3.19	531,726	100,228	2,557
2008	14,202,828	4,431,239	3.21	525,201	99,313	2,610
2009	14,377,963	4,477,149	3.21	524,582	97,580	2,654
2010	14,560,384	4,525,489	3.22	535,248	99,424	2,681
2011	14,745,933	4,574,595	3.22	548,074	102,848	2,698
2012	14,934,676	4,624,500	3.23	568,723	107,381	2,721
2013	15,126,675	4,675,197	3.24	590,876	109,987	2,762
2014	15,322,001	4,726,723	3.24	606,982	111,271	2,813
2015	15,520,724	4,779,079	3.25	621,895	112,592	2,866
2016	15,722,919	4,832,291	3.25	638,272	113,977	2,915
2017	15,928,657	4,886,374	3.26	656,422	115,252	2,957
2018	16,138,016	4,941,346	3.27	673,849	116,437	2,999
2019	16,351,072	4,997,235	3.27	691,153	117,431	3,042
2020	16,567,904	5,054,040	3.28	708,937	118,252	3,086

Annual Growth Rates (%)						
1990-2000	1.37%	0.92%	0.43%	2.28%	5.01%	2.08%
2000-2008	1.66%	1.17%	0.52%	2.37%	1.18%	2.14%
2008-2010	1.25%	1.06%	0.16%	0.95%	0.06%	1.33%
2010-2020	1.30%	1.11%	0.18%	2.85%	1.75%	1.42%

Form 2.3: Electricity Prices (2007 cents/kWh) - SCE					
YEAR	**Residential**		**Commercial**		**Industrial**
1990	13.95		14.41		11.03
1991	14.64		14.80		10.99
1992	14.90		14.67		10.50
1993	14.55		13.67		9.54
1994	14.52		13.54		9.58
1995	14.85		13.26		9.43
1996	14.43		12.24		8.69
1997	14.20		11.74		8.43
1998	12.77		11.30		7.93
1999	12.58		11.07		7.08
2000	12.31		10.84		6.53
2001	13.78		14.33		11.09
2002	13.39		16.10		11.06
2003	13.49		14.92		10.63
2004	12.10		12.85		8.94
2005	11.73		12.33		8.84
2006	13.41		14.57		10.49
2007	12.77		13.53		9.73
2008	11.85		12.56		9.03
2009	13.76		14.62		10.51
2010	14.16		15.03		10.81
2011	14.30		15.18		10.92
2012	14.44		15.33		11.02
2013	14.58		15.48		11.13
2014	14.73		15.63		11.24
2015	14.87		15.78		11.35
2016	15.14		16.07		11.56
2017	15.42		16.37		11.77
2018	15.71		16.67		11.99
2019	15.99		16.97		12.21
2020	16.29		17.28		12.43

CHAPTER 4: San Diego Gas & Electric Planning Area

The San Diego Gas & Electric (SDG&E) planning area includes SDG&E bundled retail customers and customers served by various energy service providers (ESPs) using the SDG&E distribution system to deliver electricity to end users.

This chapter is organized in a fashion similar to those for the other planning areas. First, forecasts of total and per capita consumption and peak loads for the planning area are presented. For perspective, *CED 2009 Revised* values are compared to both *CED 2009 Draft* and *CED 2007* values. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Then, sector consumption and peak load forecasts are presented and compared to the sector level values of the two previous forecasts.

For the *CED 2009 Draft*, three price scenarios were developed for electricity rates: high rates, low (constant) rates, and a mid-rate scenario in between the two. The high-rate case assumed approximately 30 percent higher rates by 2020 relative to 2010, while the mid-rate case assumed 15 percent higher rates over the same period. In the low-rate case, rates remained at 2010 levels through 2020 as was done in *CED 2007*. In *CED 2009 Revised*, the mid-rate price forecast was used and all comparisons to *CED 2009 Draft* are made to the mid-rate scenario. Chapter 1 provides more details on price assumptions.

Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* electricity consumption forecasts for the SDG&E planning area are lower than *CED 2007* levels because of the economic downturn and increased efficiency impacts, but higher than in *CED 2009 Draft*.
- *CED 2009 Revised* peak demand is lower than both previous forecasts because of increased estimates of self-generation.
- Per capita electricity consumption and peak demand are projected to be lower than in *CED 2007*.
- The largest percentage reduction in electricity consumption relative to *CED 2007* occurs in the residential and commercial sectors.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by around 2 percent in 2020.
- Peak self-generation impacts are projected to be higher than in *CED 2007* and *CED 2009 Draft*, mainly because of increased adoption of photovoltaic systems.

- Electric vehicles are projected to increase electricity consumption by more than 400 GWH in 2020.

Table 18 compares planning area electricity consumption and peak demand forecasts for selected years. *CED 2009 Revised* is compared to both *CED 2009 Draft* mid rate and *CED 2007*. *CED 2009 Revised* electricity consumption is higher than *CED 2009 Draft* by over 6 percent at the end of the forecast period. This is caused mainly by higher economic forecast values provided in the June Moody's Economy.com forecast as well as inclusion of an electric vehicle consumption forecast. *CED 2009 Revised* consumption is still over 4 percent lower than *CED 2007* at the end of the period. *CED 2009 Revised* peak is about 1.6 percent lower than *CED 2009 Draft* peak and a little over 4 percent lower than *CED 2007*. The reduction in *CED 2009 Revised* peak, relative to the changes in the consumption, is caused by increased assumptions regarding self-generation. This has the impact of reducing net system peak but does not reduce total electricity consumption. In addition, electric vehicle consumption is largely assumed to be met by off-peak charging. Long-term growth rates of both *CED 2009 Revised* consumption and peak are now similar to *CED 2007* growth rates.

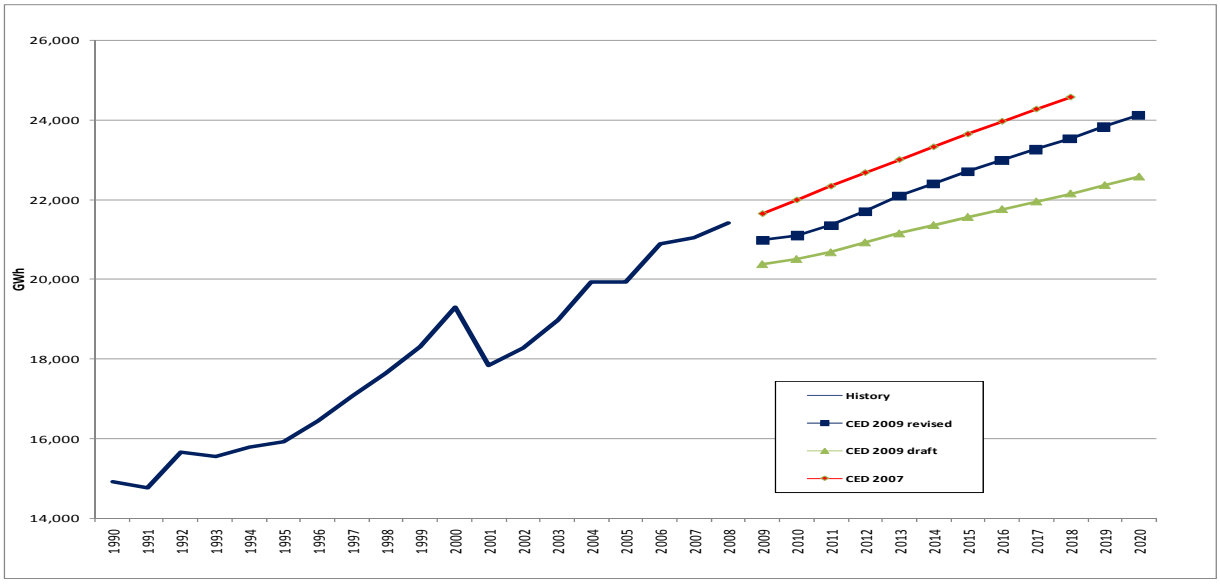
Table 18: SDG&E Planning Area Forecast Comparison

Consumption					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	14,926	14,926	14,926	0.00%	0.00%
2000	19,294	19,294	19,294	0.00%	0.00%
2008	21,304	20,361	21,407	0.49%	5.14%
2010	21,991	20,502	21,100	-4.05%	2.92%
2015	23,643	21,568	22,707	-3.96%	5.28%
2018	24,567	22,160	23,535	-4.20%	6.20%
Average Annual Growth Rates					
1990-2000	2.60%	2.60%	2.60%		
2000-2008	1.25%	0.67%	1.31%		
2008-2010	1.60%	0.35%	-0.72%		
2010-2018	1.39%	0.98%	1.37%		
Peak					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	2,961	2,961	2,978	0.57%	0.57%
2000	3,471	3,471	3,485	0.40%	0.40%
2008	4,568	4,596	4,371	-4.31%	-4.90%
2010	4,714	4,621	4,516	-4.20%	-2.27%
2015	5,023	4,923	4,856	-3.32%	-1.36%
2018	5,247	5,115	5,032	-4.10%	-1.62%
Average Annual Growth Rates					
1990-2000	1.60%	1.60%	1.58%		
2000-2008	3.49%	3.57%	2.87%		
2008-2010	1.59%	0.27%	1.65%		
2010-2018	1.35%	1.28%	1.36%		

Source: California Energy Commission, 2009

As shown in **Figure 73**, *CED 2009 Revised* consumption is about 5 percent higher than *CED 2009 Draft* consumption, but still below *CED 2007* throughout the forecast period. The dip in the early years of *CED 2009 Revised* is caused by both the current recession and increased savings from energy efficiency programs.

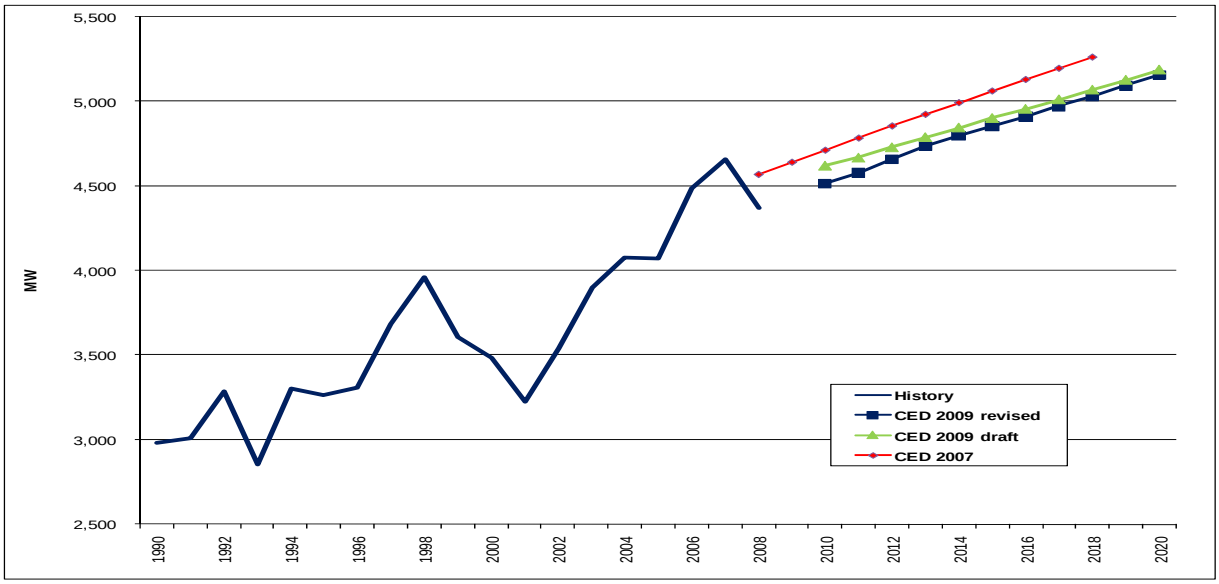
Figure 73: SDG&E Planning Area Electricity Forecast



Source: California Energy Commission, 2009

CED 2009 Revised SDG&E planning area peak demand **(Figure 74)** is slightly lower than *CED 2009 Draft* throughout the forecast period. This is caused by an increase in the peak impact of self-generation programs projected in *CED 2009 Revised*.

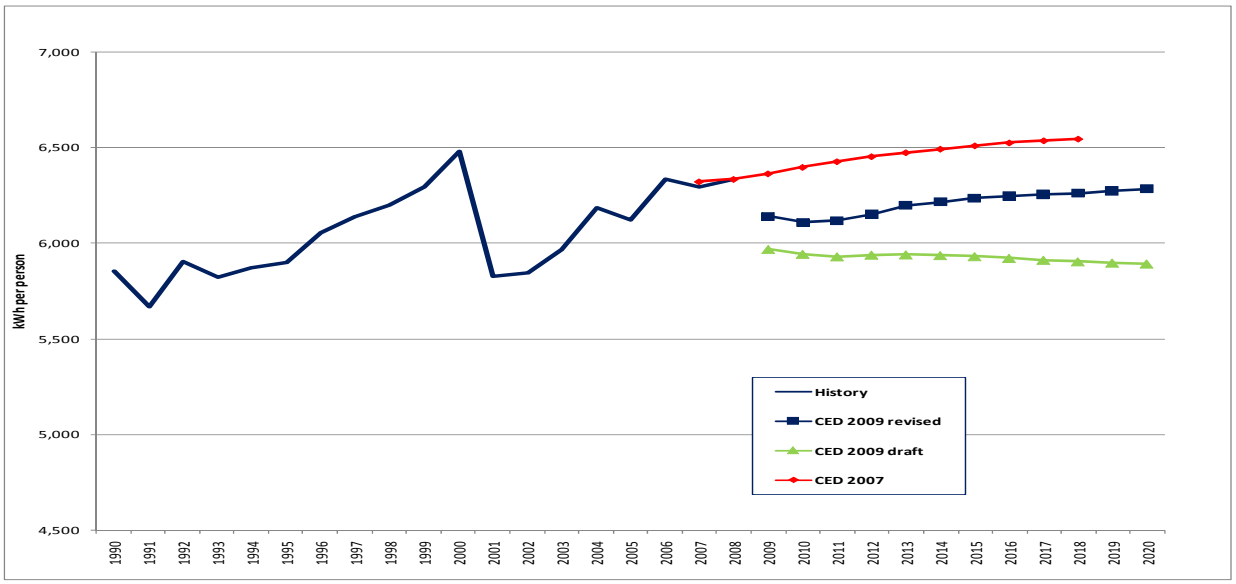
Figure 74: SDG&E Planning Area Peak



Source: California Energy Commission, 2009

Figure 75 compares forecasted per capita residential electricity consumption. *CED 2009 Revised* per capita consumption is higher than *CED 2009 Draft*, but still well below *CED 2007* projections. Projections increase slightly after 2012 as a result of consumption from electric vehicles. The current recession and increased savings from energy efficiency programs combine to cause the short-term dip in per capita consumption.

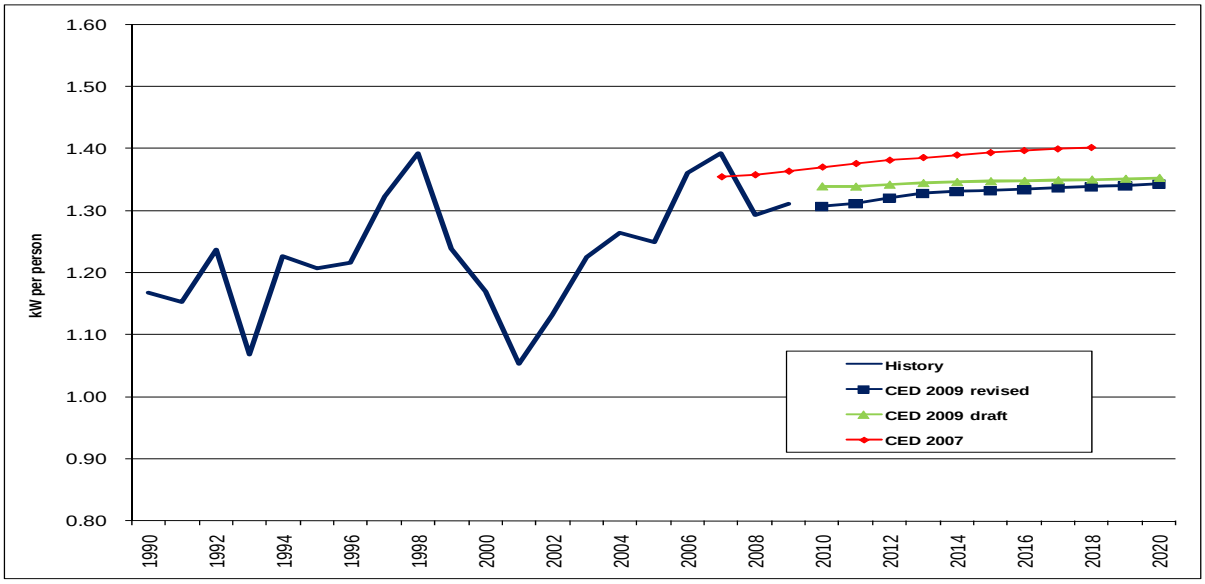
Figure 75: SDG&E Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2009

CED 2009 Revised per capita peak demand, shown in **Figure 76**, is lower over the entire forecast period because of higher self-generation peak estimates.

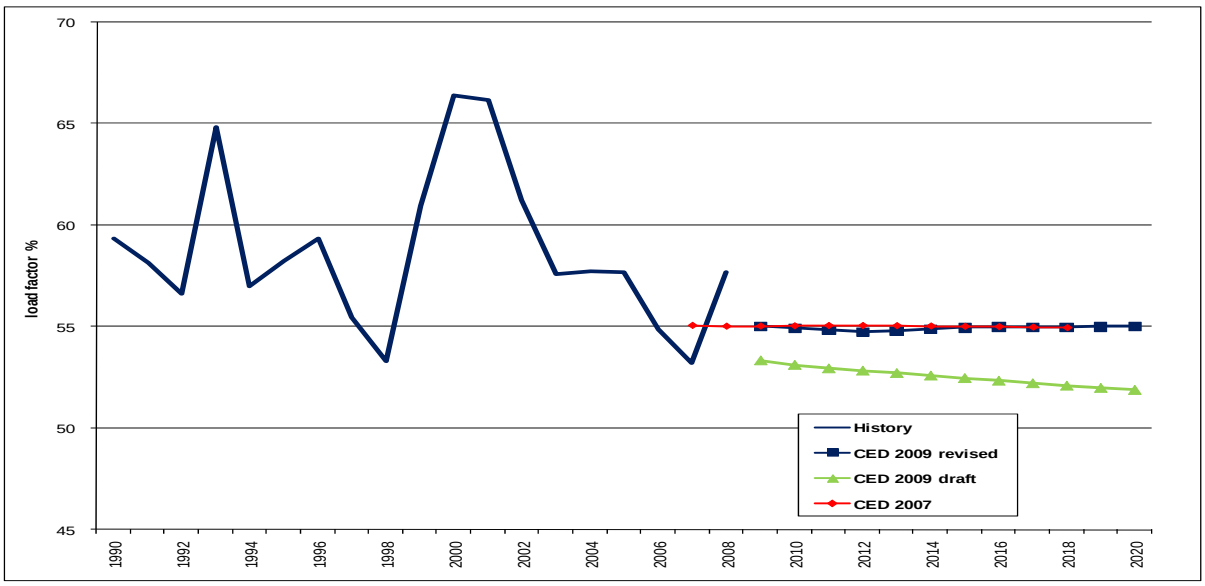
Figure 76: SDG&E Planning Area per Capita Peak Demand



Source: California Energy Commission, 2009

Figure 77 compares respective forecast load factors. The high load factor observed from 1998-2005 is a product of lower-than-average peak temperatures and of reaction to the energy crisis. The projected load factor, based on higher 1-in-2 peak temperatures and a return to normal air conditioning use patterns, is expected to be lower than this recent value. The *CED 2009 Revised* load factor is higher than *CED 2009 Draft* because of revised self-generation projections, which lower peak relative to consumption, and assumptions for electric vehicle recharging. The *CED 2009 Revised* load factor is now the same as projected in *CED 2007.*

Figure 77: SDG&E Planning Area Peak Load Factor



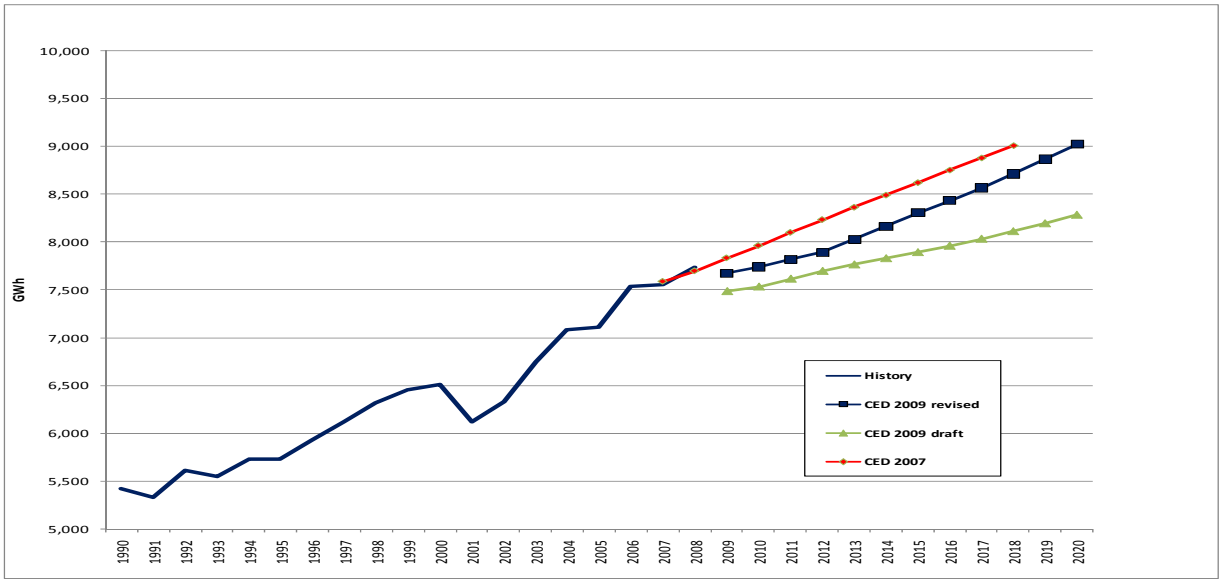
Source: California Energy Commission, 2009

Sector Level Results and Input Assumptions

Residential

Figure 78 compares residential forecasts. *CED 2009 Revised* is higher over the entire forecast period than *CED 2009 Draft* but is still below the level of *CED 2007*. The increase over *CED 2009 Draft* is caused by increased projections of household income and slightly higher persons-per-household projections, as well as an increase in the starting value brought about by inclusion of 2008 sales. Also contributing to the increase is electric vehicle consumption in the residential sector, which was not included in either *CED 2007* or *CED 2009 Draft.* The revised household income projections are still below those in *CED 2007*.

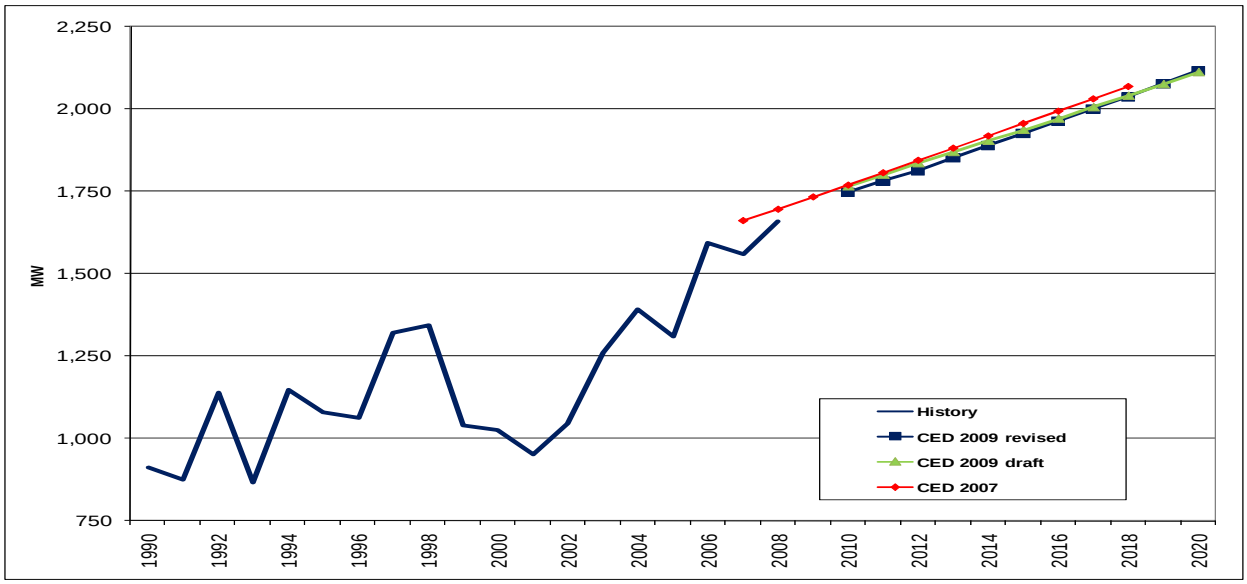
Figure 78: SDG&E Planning Area Residential Consumption



Source: California Energy Commission, 2009

Figure 79 compares residential peak demand forecasts. Unlike the consumption forecast, there is very little difference in the revised and draft residential peak forecasts.

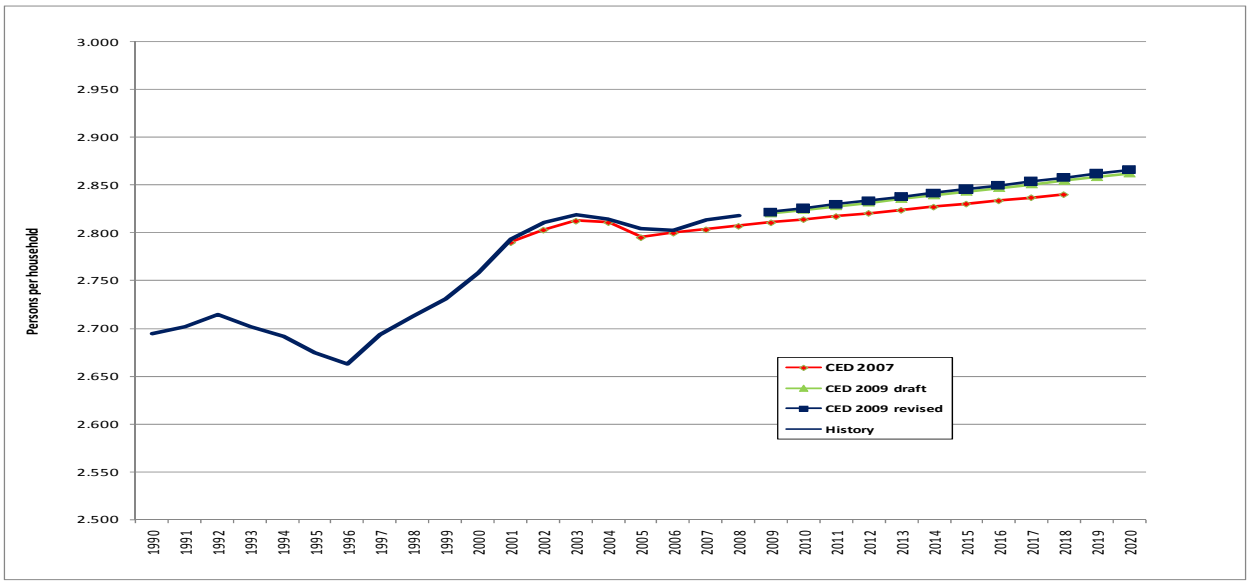
Figure 79: SDG&E Planning Area Residential Peak



Source: California Energy Commission, 2009

Figures 80 and **81** provide comparisons of the residential drivers used in the forecasts. **Figure 80** shows projections of persons per household. There is slight increase in forecast persons per household in *CED 2009 Revised* compared to both *CED 2009 Draft* and to *CED 2007*. The change in *CED 2009 Revised* projections reduces the household forecast by 340 households by the end of the forecast period compared to *CED 2009 Draft* (less than 0.05 percent).

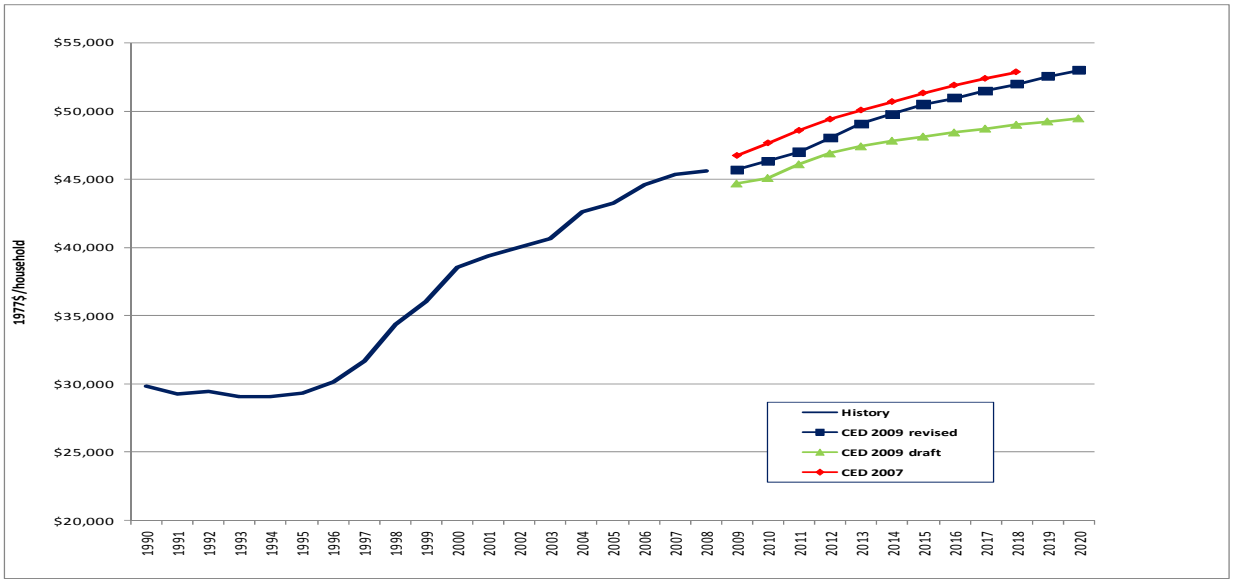
Figure 80: SDG&E Planning Area Persons-per-Household Projections



Source: California Energy Commission, 2009

Figure 81 compares household income used in the respective forecasts. *CED 2009 Revised* projections are higher than in *CED 2009 Draft* but still below what was used in *CED 2007*. *CED 2009 Revised* uses the June 2009 projections from Economy.com while the previous forecasts used earlier vintages of Economy.com projections.

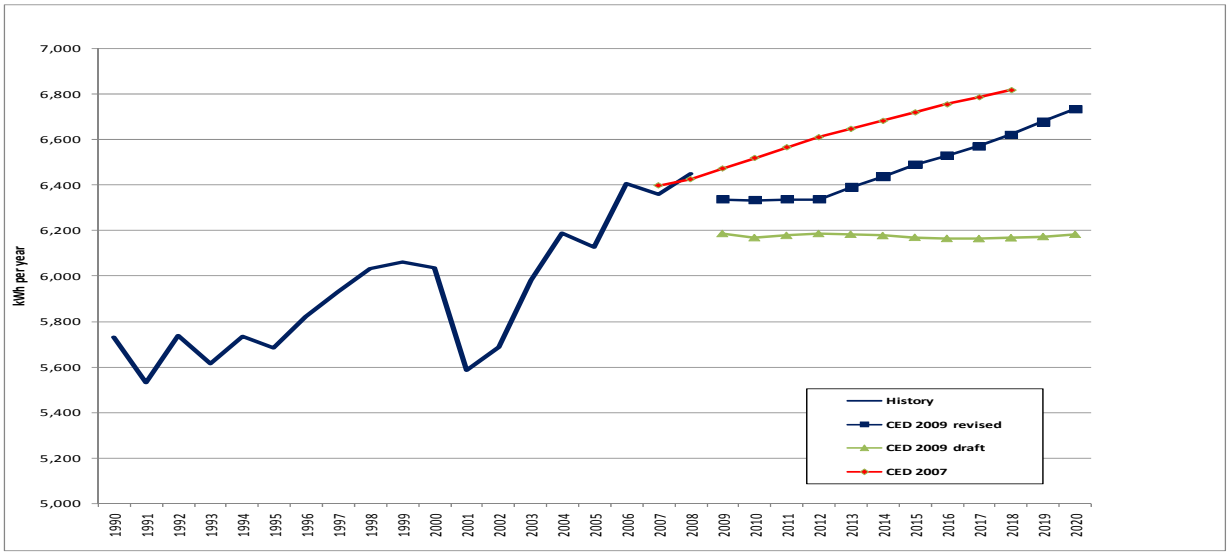
Figure 81: SDG&E Planning Area Household Income Projections



Source: California Energy Commission, 2009

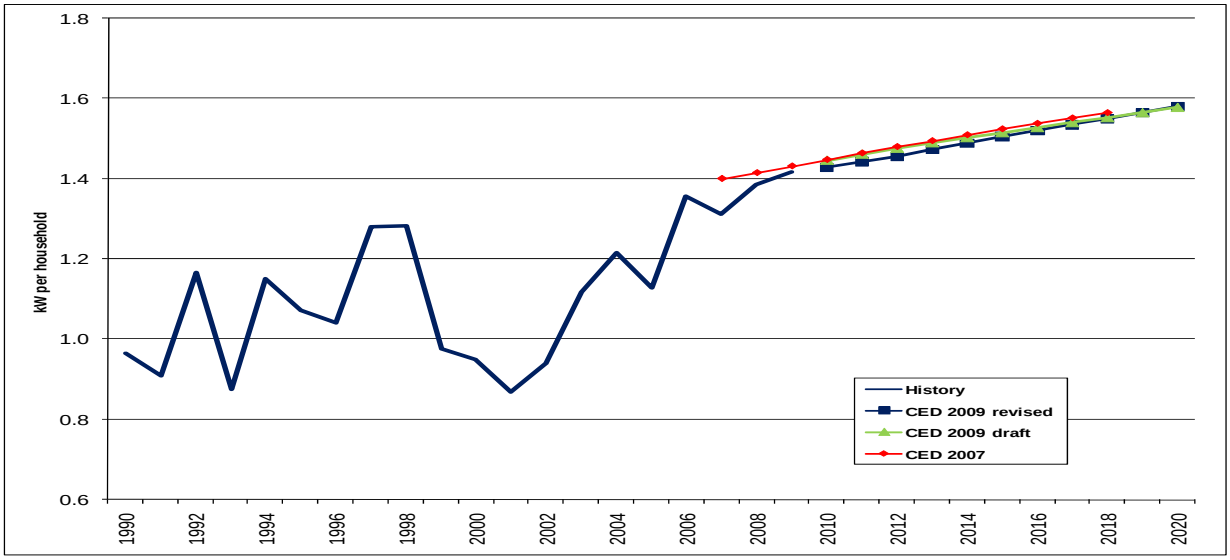
Figures 82 and **83** compare residential use per household and residential peak use per household, respectively. *CED 2009 Revised* use per household (**Figure 82**) is higher than *CED 2009 Draft*, caused by inclusion of 2008 sales data which adjusts the starting point. *CED 2009 Revised* increases slightly over the forecast period as a result of increased household income projections. Also included in *CED 2009 Revised* is electric vehicle consumption in the residential sector. About 70% of the increase in use per household from 2012 to 2020 is caused by household electric vehicle recharging. *CED 2009 Revised* use per household is still below *CED 2007.* In contrast, differences in peak use per household (**Figure 83**) are very slight because most of the consumption savings do not directly translate into peak savings and electric vehicles are assumed to be recharged mainly in off-peak periods.

Figure 82: SDG&E Planning Area Use per Household



Source: California Energy Commission, 2009

Figure 83: SDG&E Planning Area Peak Use per Household

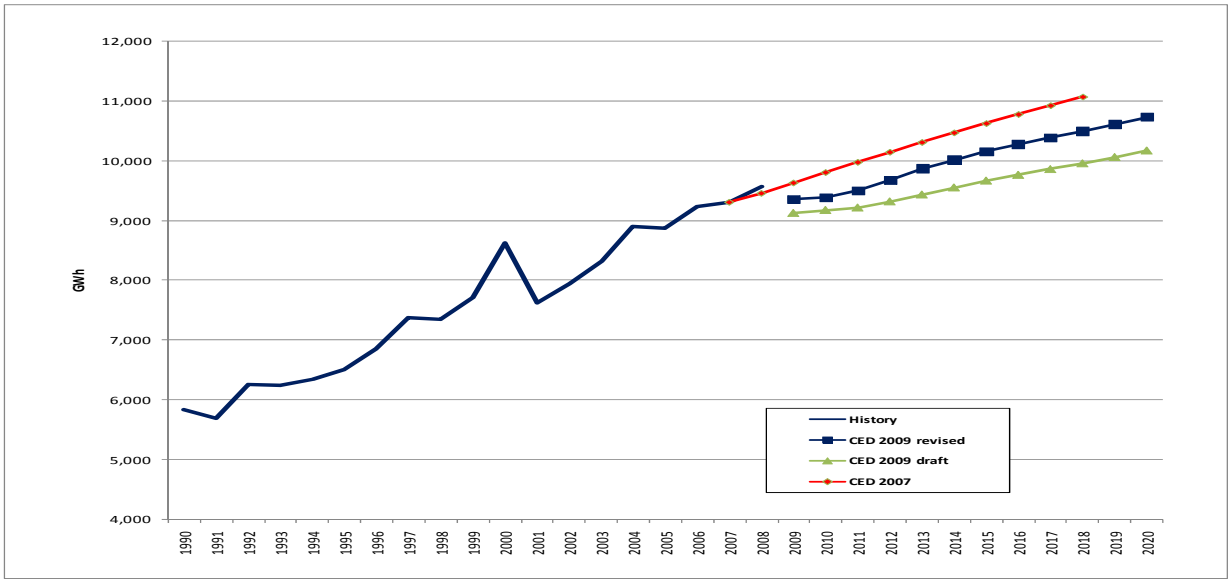


Source: California Energy Commission, 2009

Commercial Building Sector

Figures 84 and **85** compare the commercial building sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of increased economic growth as well as inclusion of 2008 consumption data as a revised starting point. *CED 2009 Revised* projections are still below those of *CED 2007*.

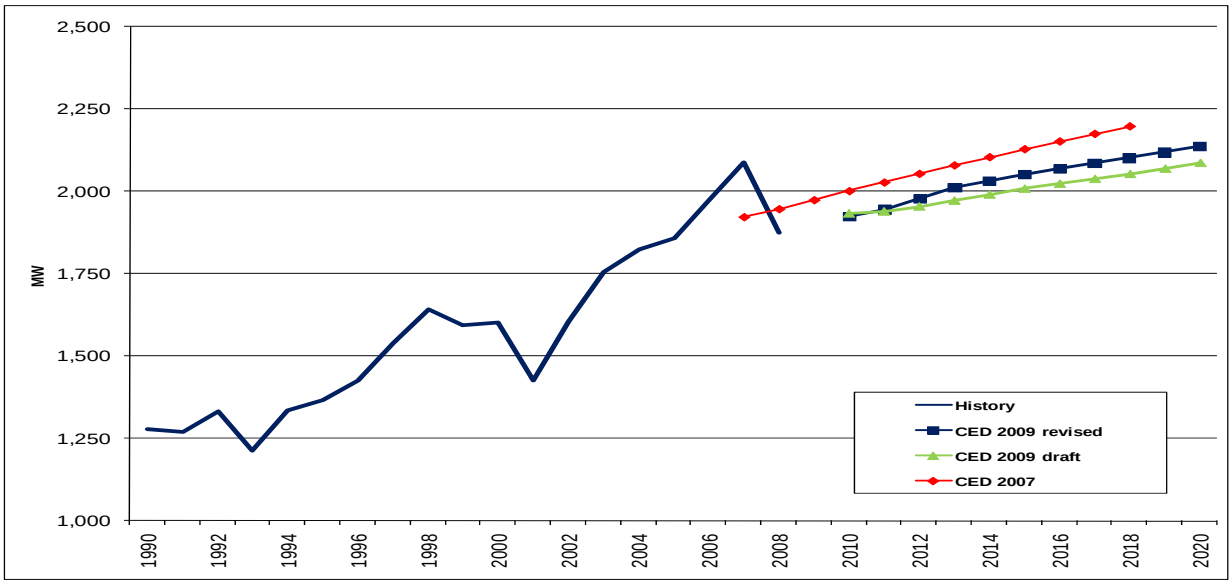
Figure 84: SDG&E Planning Area Commercial Consumption



Source: California Energy Commission, 2009

Figure 85 compares commercial building sector peak demand forecasts. Differences in the peak forecasts are similar to those in the consumption forecasts.

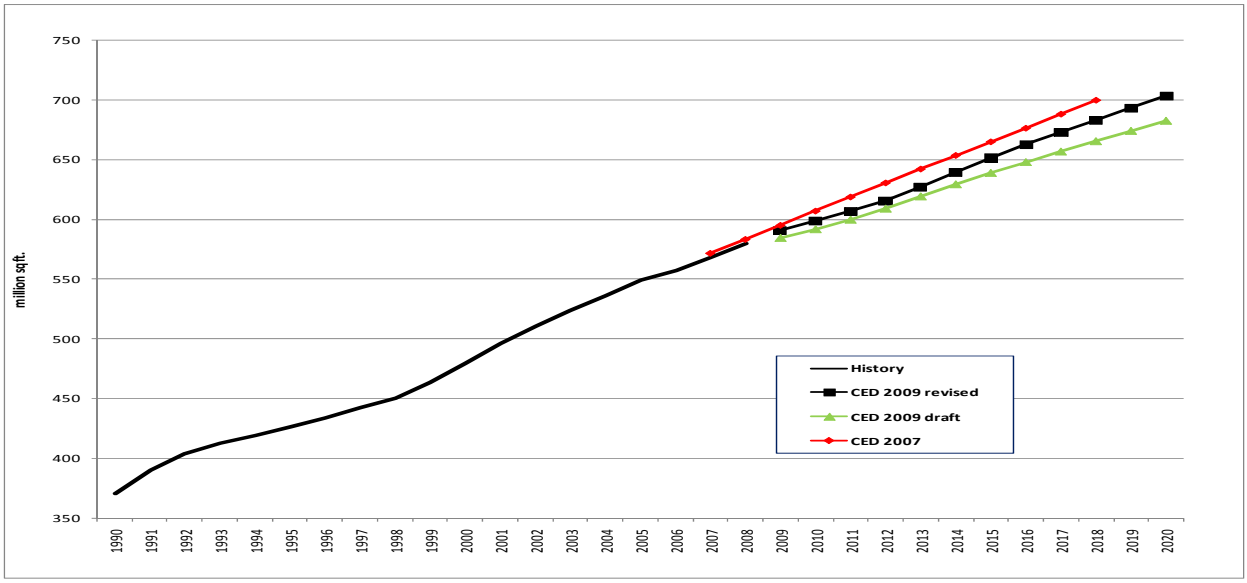
Figure 85: SDG&E Planning Area Commercial Sector Peak



Source: California Energy Commission, 2009

In staff's commercial building sector forecasting model, floor space by building type (that is, retail, schools, offices, and so forth) is the key driver of energy use for each specific building type. **Figure 86** compares total commercial floor space projections. *CED 2009 Revised* is higher than *CED 2009 Draft* because of revisions to economic and demographic drivers as well as changes in the econometric estimates used in the floor space model. The revised floor space projections are still below those used in *CED 2007*.

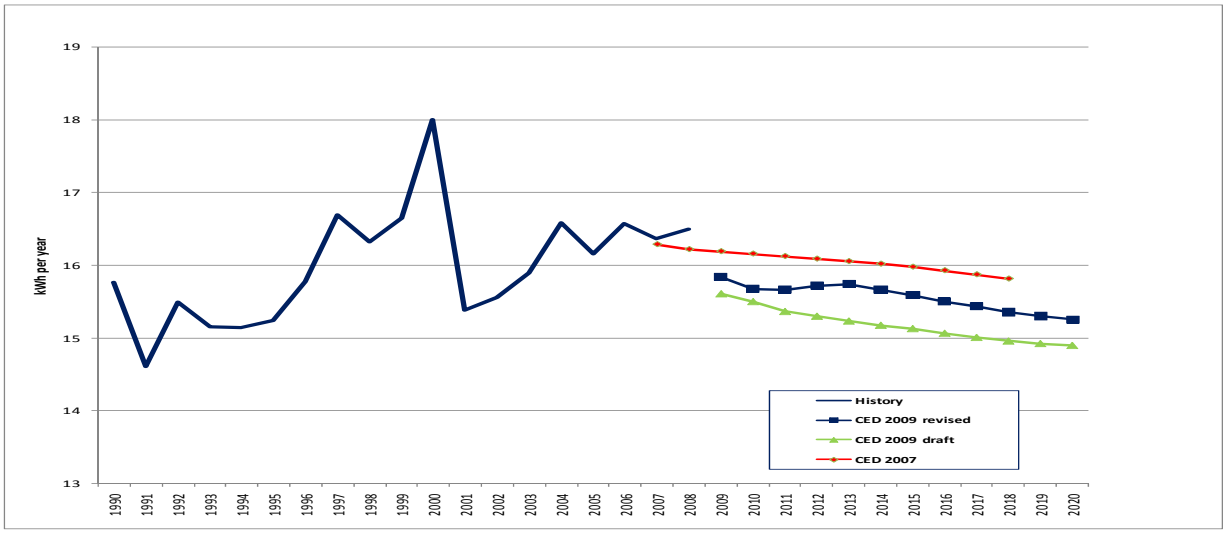
Figure 86: SDG&E Planning Area Commercial Floor Space



Source: California Energy Commission, 2009

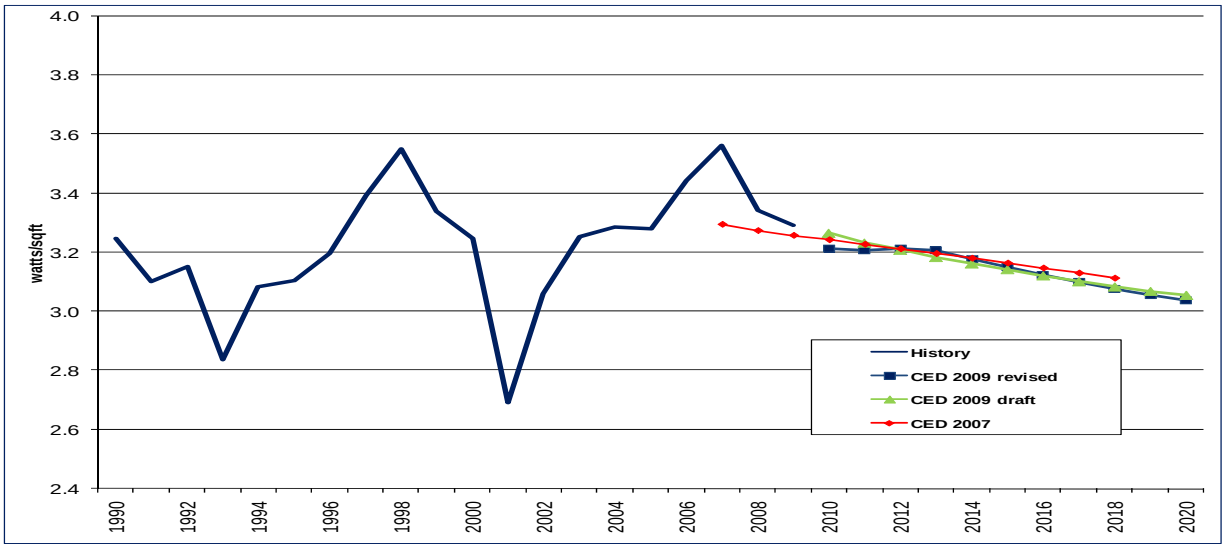
Historical and projected commercial sector annual and peak use per square foot are shown in **Figures 87** and **88**, respectively. Changes in annual use per square foot are based on the historical floor space estimates presented in **Figure 86**. Use per square foot (**Figure 87**) in *CED 2009 Revised* is somewhat higher than *CED 2009 Draft* because of an assumed higher starting value caused by inclusion of 2008 consumption values, as well as revisions to the economic drivers used in the forecast. This value is still below that projected in *CED 2007*. Revised peak use per square foot (**Figure 88**) is virtually unchanged from *CED 2009 Draft* and *CED 2007* projections. Both the energy and peak forecasts decline over the forecast period because of projected commercial building and appliance standards effects as well as increased efficiency program savings.

Figure 87: SDG&E Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2009

Figure 88: SDG&E Planning Area Commercial Watts per Square Foot

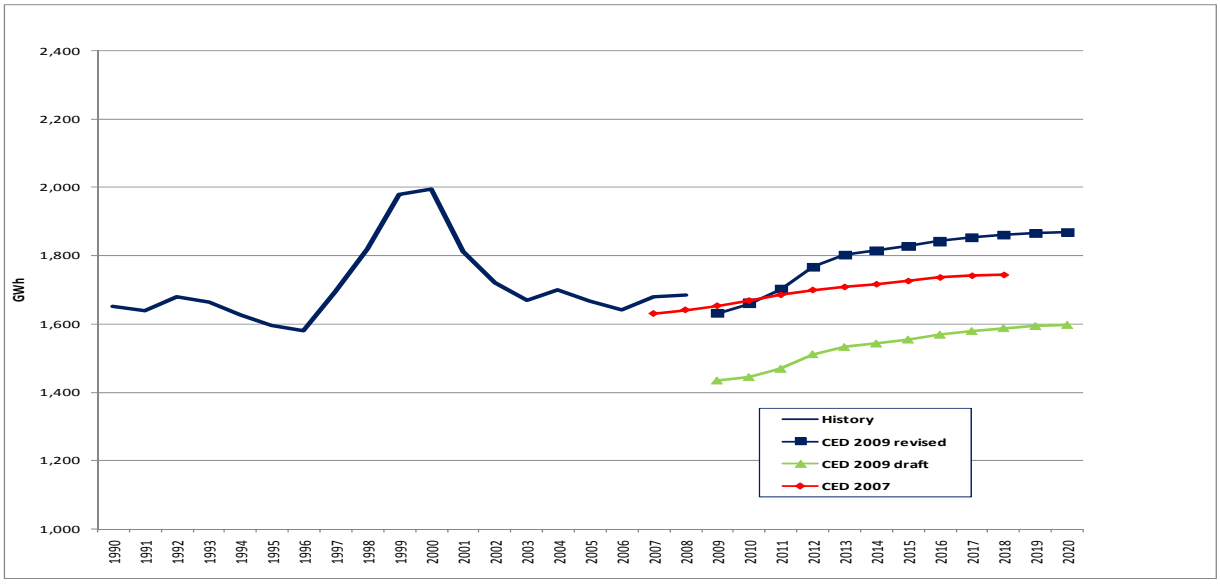


Source: California Energy Commission, 2009

Industrial Sector

Figure 89 compares industrial sector electricity consumption forecasts for the SDG&E planning area. *CED 2009 Revised* is above *CED 2009 Draft* throughout the entire forecast period because of a higher assumed starting point as a result of the inclusion of 2008 consumption estimates. The long-term growth rate in *CED 2009 Revised* is also higher than *CED 2007.*

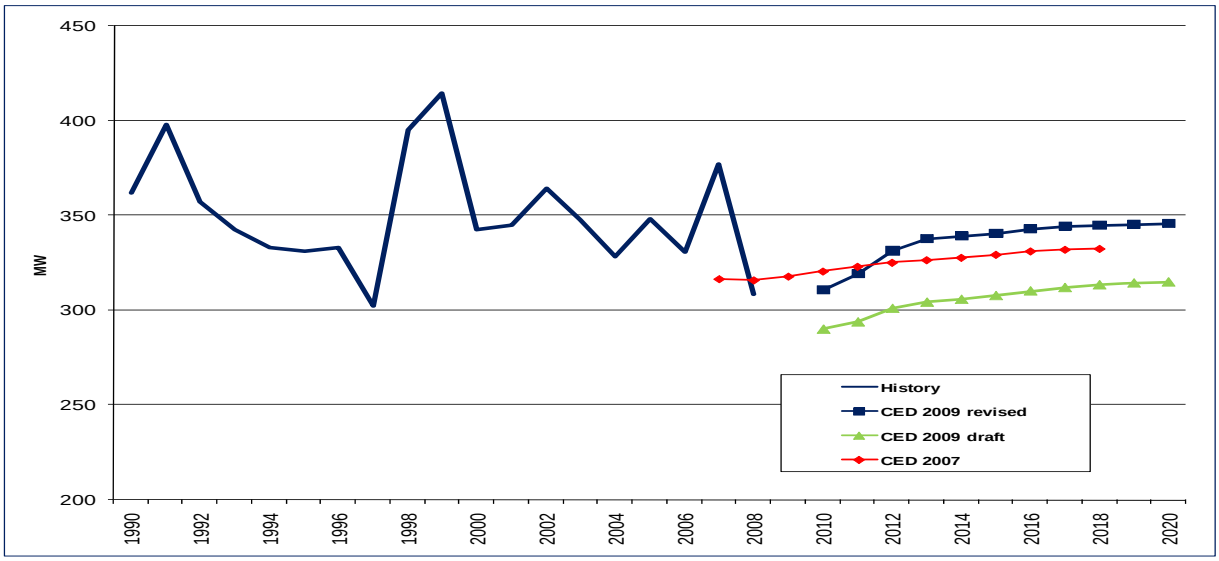
Figure 89: SDG&E Planning Area Industrial Consumption



Source: California Energy Commission, 2009

Figure 90 compares industrial sector peak forecasts. The differences mirror those in the consumption forecasts.

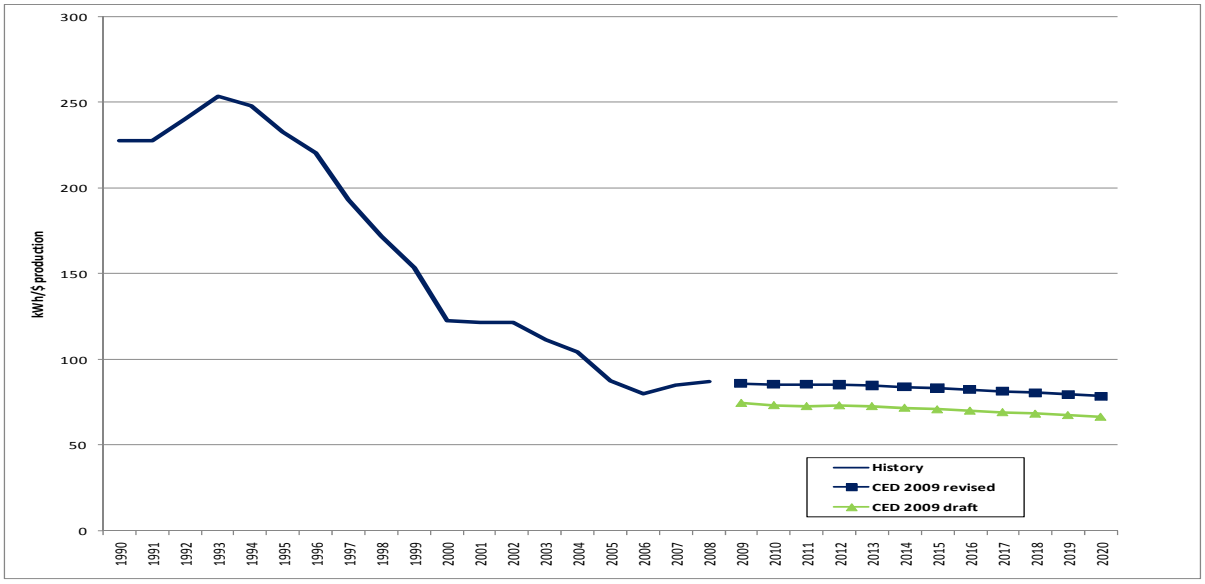
Figure 90: SDG&E Planning Area Industrial Sector Peak



Source: California Energy Commission, 2009

Figure 91 compares electricity use per dollar value of production between the revised and draft forecasts. *CED 2009 Revised* has a higher level of electricity use per dollar of value added than *CED 2009 Draft*. This is primarily caused by a higher historical starting point as a result of inclusion of 2008 consumption history. The forecasted growth rates are similar.

Figure 91: SDG&E Planning Area Industrial Use per Production Unit



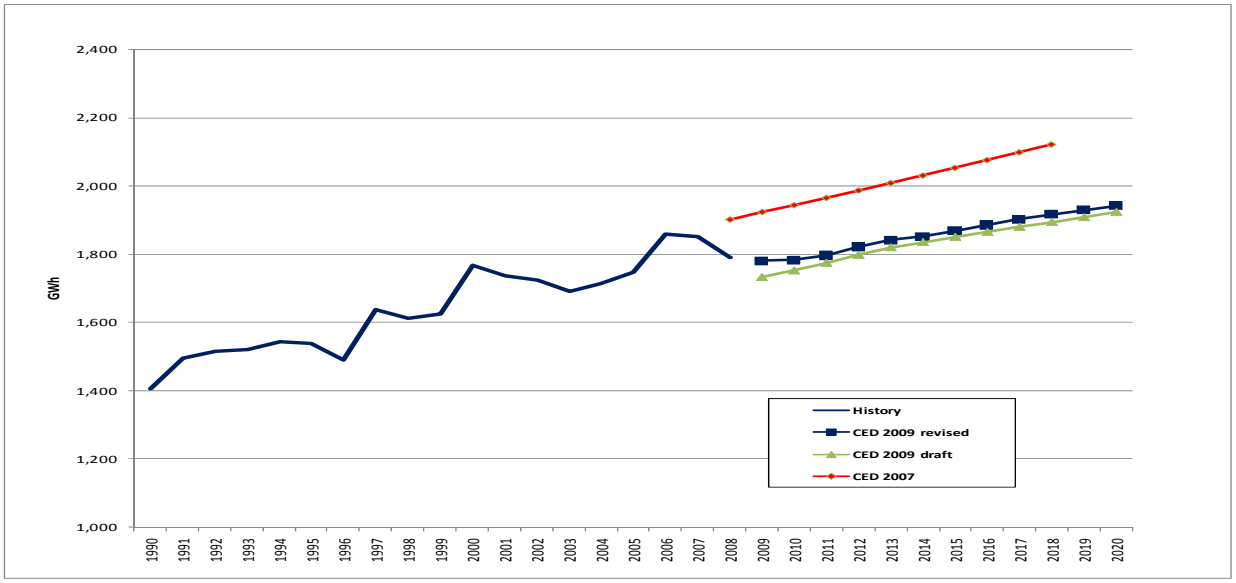
Source: California Energy Commission, 2009

Other Sectors

Figures 92 and **93** compare electricity consumption forecasts for the remaining sectors. **Figure 92** compares transportation, communication, and utilities (TCU) sector forecasts. *CED 2009 Revised* is slightly higher than *CED 2009 Draft*, caused by inclusion of 2008 consumption history.

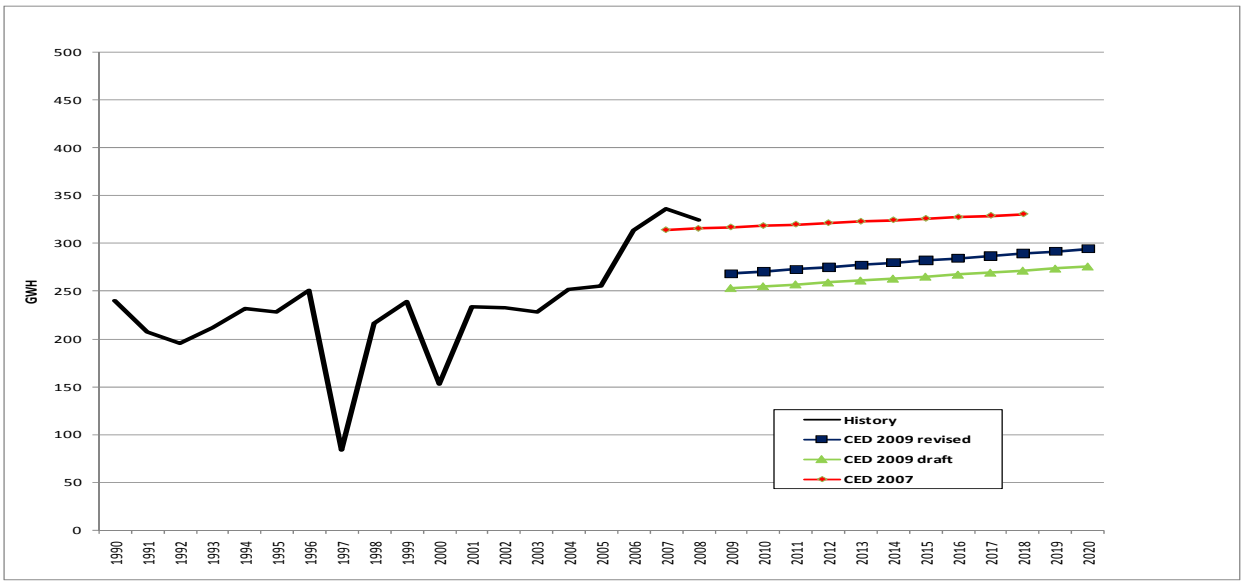
Figure 93 compares the agriculture and water pumping sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of higher estimated historical consumption, but the increase is tempered by limitations on water that is available to pump.

Figure 92: SDG&E Planning Area Transportation, Communication and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2009

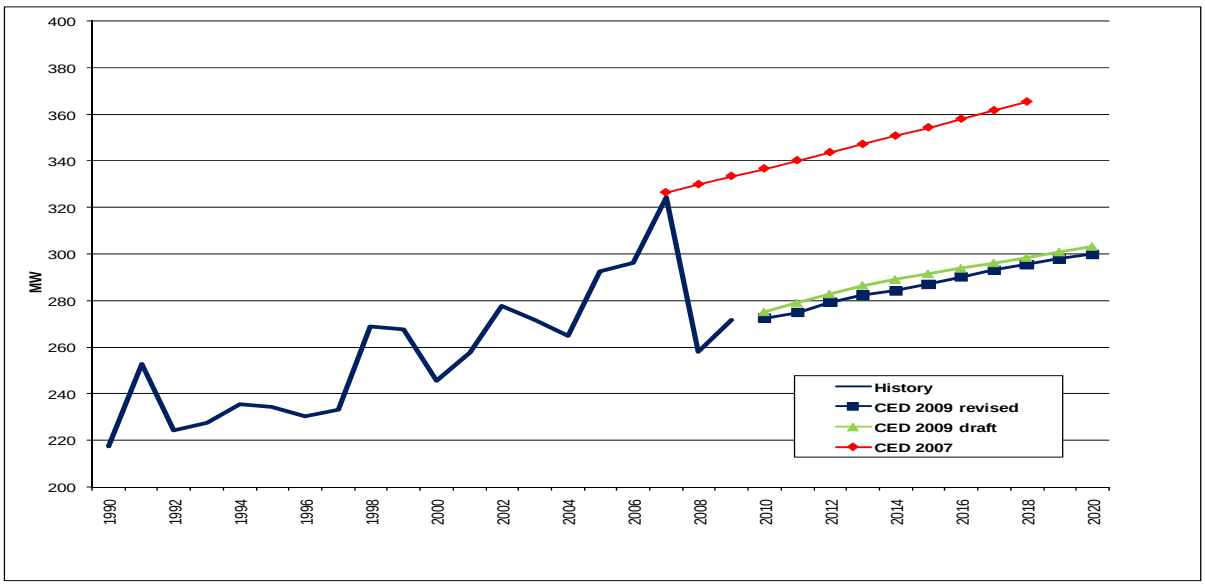
Figure 93: SDG&E Planning Area Agriculture and Water Pumping Forecasts



Source: California Energy Commission, 2009

Figure 94 compares other sector (TCU and street lighting) peaks. *CED 2009 Revised* is very similar to *CED 2009 Draft*. Both *CED 2009* forecasts are lower than the *CED 2007* forecast, which is based on a higher assumed starting point.

Figure 94: SDG&E Planning Area Other Sector Peak

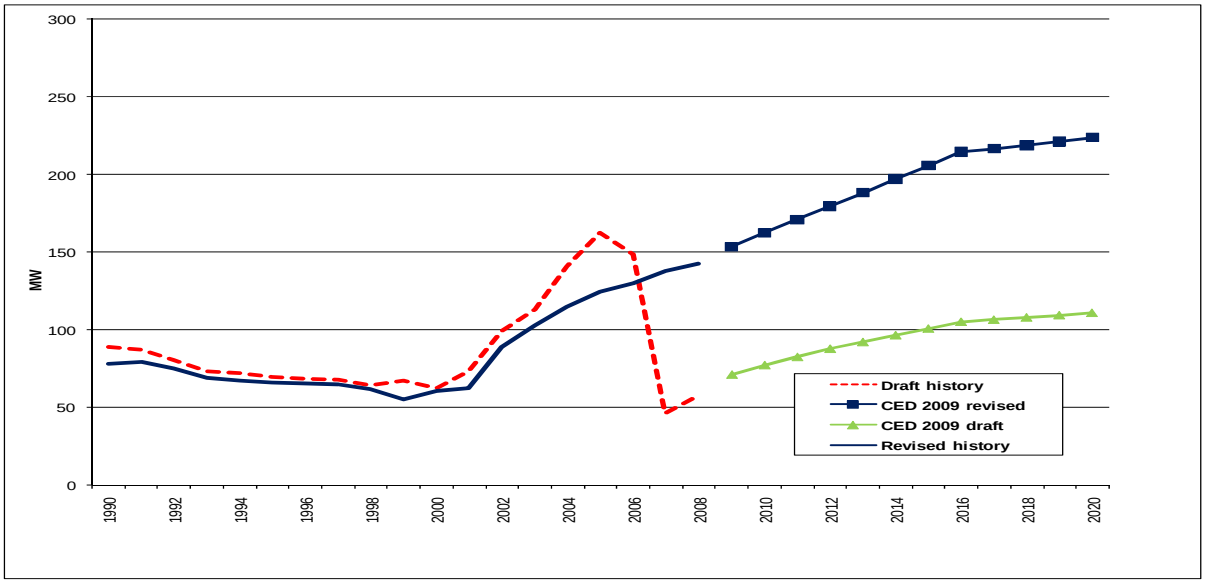


Source: California Energy Commission, 2009

Self-Generation

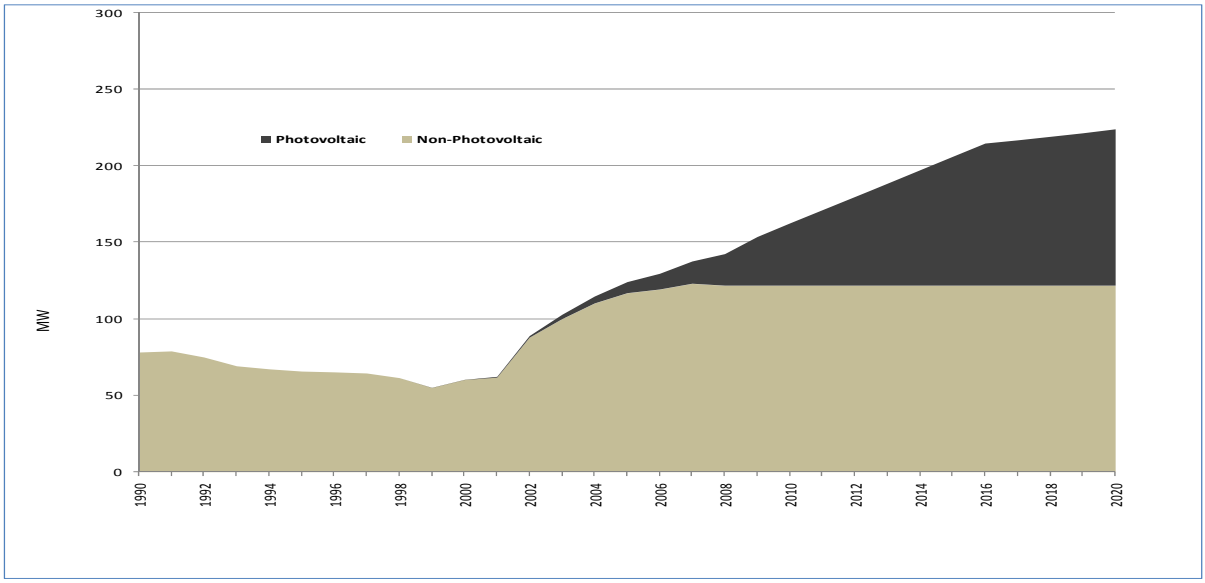
The peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Chapter 1. The effects of these programs are forecast based on recent trends in installations and associated generation now including 2009. During the *CED 2009 Draft* workshop, SDG&E noted that staff estimates of historical self-generation differed from data that SDG&E had. Since the workshop, staff has worked with SDG&E to reconcile differences in historical self-generation values. **Figure 95** shows staff revised historical and forecast peak impacts of total self-generation as well as those used in the preliminary forecast. **Figure 96** provides a breakdown of peak impacts in the *CED 2009 Revised* forecast from photovoltaic and non-photovoltaic self-generation. Based on current trends, staff now projects about 100 MW of peak reduction from photovoltaic systems by 2020.

Figure 95: SDG&E Planning Area Self-Generation Estimates



Source: California Energy Commission, 2009

Figure 96: SDG&E Planning Area Self-Generation Peak Forecasts



Source: California Energy Commission, 2009

Economic Scenarios

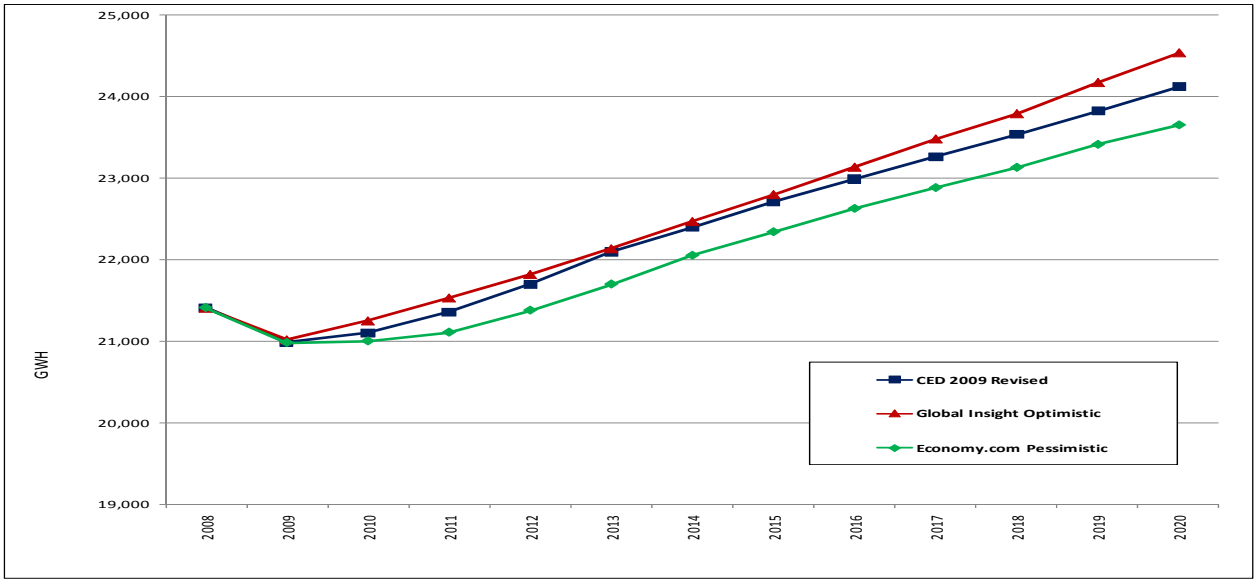
The results presented above rely on economic inputs from the *base case* Economy.com scenario. Staff also examined the effects of two alternative economic scenarios for electricity demand: an *optimistic* case provided by Global Insight and an Economy.com *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth among the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models.

The estimated models were run for SDG&E for the two economic scenarios as well as the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2007* consumption projections. **Figure 97** shows the projected impacts of the optimistic and pessimistic scenarios on SDG&E consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 98**.

Electricity consumption is projected to be 1.7 percent higher in the optimistic economic case than in *CED 2009 Revised* by 2020, and 2.0 percent lower in the pessimistic scenario. The peak demand forecast increases by 1.8 percent under the optimistic scenario by 2020 and falls by 2.2 percent in the pessimistic case. The percentage peak reduction is higher than consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.2 percent and 1.3 percent, respectively, to 1.3 percent and 1.4 percent in the optimistic case, and fall to 1.05 percent and 1.1 percent under the pessimistic scenario.

Changes in consumption and peak demand are small compared to *CED 2009 Revised* totals in percentage terms, and this is a reflection of the relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Moody's Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020.

Figure 97: Projected SDG&E Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 98: Projected SDG&E Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios

Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Staff spent a great deal of effort refining methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Tables 19** and **20** show electricity consumption and peak savings estimates for selected years, for building and appliance standards, utility and public agency programs, and *naturally occurring* savings, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts from rate changes and standards. Chapter 8 provides much more detail on staff work related to energy efficiency and conservation.

Table 19: SDG&E Planning Area Electricity Consumption Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	328	312	297	314	329	349	375
Appliance Standards	207	559	847	1,149	1,318	1,524	1,747
Utility and Public Agency Programs	27	61	180	570	675	550	234
Naturally Occurring Savings	14	18	35	54	57	199	503
Total Residential Savings	576	951	1,359	2,087	2,379	2,622	2,859
Commercial Energy Savings							
Building Standards	144	334	578	844	969	1,210	1,464
Appliance Standards	90	212	338	480	540	660	768
Utility and Public Agency Programs*	67	268	307	326	407	387	274
Naturally Occurring Savings	599	560	707	702	719	858	1,152
Total Commercial Savings	900	1,374	1,930	2,352	2,635	3,115	3,658
Total Energy Savings	1,477	2,324	3,289	4,439	5,014	5,737	6,517

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Table 20: SDG&E Planning Area Electricity Peak Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	55	66	56	67	75	82	91
Appliance Standards	35	119	158	246	301	360	425
Utility and Public Agency Programs	4	13	34	122	154	130	57
Naturally Occurring Savings	2	4	7	12	13	47	122
Total Residential Savings	97	202	254	448	543	618	696
Commercial Energy Savings							
Building Standards	31	74	122	165	198	245	292
Appliance Standards	20	47	71	94	111	133	153
Utility and Public Agency Programs*	15	60	65	64	83	78	55
Naturally Occurring Savings	131	125	149	138	147	174	230
Total Commercial Savings	197	306	407	461	539	630	729
Total Energy Savings	294	508	661	909	1,082	1,248	1,426

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption and peak demand from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids. More details for this forecast are provided in Chapter 1. The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

Table 21 shows the resulting projections for electricity consumption and peak demand, by sector, for the SDG&E planning area. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter. The survey also indicated that commercial establishments were much less willing to purchase electric vehicles than private households, so consumption is heavily weighted to the residential sector.

Table 21: SDG&E Electric Vehicle Forecast

	Residential		Commercial	
Year	GWH	MW	GWH	MW
2008	0	0	1	0
2009	0	0	1	0
2010	1	0	1	0
2011	9	0	1	0
2012	25	1	2	0
2013	62	3	4	0
2014	113	5	6	0
2015	165	7	8	0
2016	212	9	9	0
2017	255	11	10	0
2018	304	13	11	0
2019	352	15	12	1
2020	398	17	12	1

Source: California Energy Commission, 2009

Form 1.1 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Street lighting	Total Consumption
1990	5,421	0	5,841	0	1,653	292	240	1,405	73	14,926
1991	5,333	0	5,698	0	1,640	316	207	1,495	76	14,764
1992	5,609	0	6,257	0	1,680	332	195	1,515	76	15,665
1993	5,549	0	6,253	0	1,665	272	212	1,521	77	15,549
1994	5,729	0	6,352	0	1,628	229	232	1,542	79	15,791
1995	5,734	0	6,503	0	1,595	246	228	1,537	81	15,923
1996	5,935	0	6,850	0	1,581	248	251	1,491	82	16,437
1997	6,123	0	7,384	0	1,694	77	84	1,637	83	17,082
1998	6,319	0	7,355	0	1,819	217	216	1,611	93	17,630
1999	6,453	0	7,716	0	1,979	207	239	1,624	93	18,312
2000	6,513	0	8,628	0	1,995	143	153	1,767	96	19,294
2001	6,117	0	7,629	0	1,813	200	233	1,736	98	17,826
2002	6,328	0	7,943	0	1,721	225	232	1,725	96	18,270
2003	6,748	0	8,325	0	1,671	207	228	1,692	105	18,977
2004	7,079	0	8,898	0	1,700	176	252	1,714	102	19,921
2005	7,111	0	8,874	0	1,667	171	255	1,747	105	19,930
2006	7,530	0	9,238	0	1,642	189	313	1,859	108	20,880
2007	7,551	0	9,305	1	1,683	201	336	1,851	114	21,041
2008	7,732	0	9,565	1	1,688	196	324	1,790	113	21,407
2009	7,674	0	9,357	1	1,633	159	268	1,781	112	20,985
2010	7,742	1	9,384	1	1,662	145	270	1,783	113	21,100
2011	7,816	9	9,499	1	1,704	151	273	1,797	114	21,354
2012	7,890	25	9,671	2	1,769	157	275	1,823	115	21,699
2013	8,027	62	9,870	4	1,805	159	277	1,841	116	22,094
2014	8,161	113	10,015	6	1,817	156	280	1,852	116	22,397
2015	8,304	165	10,152	8	1,829	153	282	1,869	117	22,707
2016	8,430	212	10,271	9	1,844	153	284	1,886	118	22,987
2017	8,562	255	10,385	10	1,855	151	287	1,903	119	23,262
2018	8,708	304	10,489	11	1,863	148	289	1,918	120	23,535
2019	8,863	352	10,605	12	1,868	147	292	1,931	121	23,825
2020	9,018	398	10,726	12	1,870	146	294	1,942	121	24,119

* Residential and commercial electric vehicle consumption included in residential and commercial totals.

Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)

1990-2000	1.85%	0.00%	3.98%	0.00%	1.90%	-6.88%	-4.42%	2.32%	2.71%	2.60%
2000-2008	2.17%	0.00%	1.30%	0.00%	-2.07%	4.03%	9.88%	0.16%	2.02%	1.31%
2008-2010	0.07%	46.48%	-0.95%	-9.10%	-0.76%	-13.95%	-8.65%	-0.20%	0.26%	-0.72%
2010-2020	1.54%	84.24%	1.34%	32.34%	1.19%	0.06%	0.84%	0.86%	0.71%	1.35%

Form 1.1b - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street lighting	Total Sales
1990	5,420	5,599	1,521	292	239	1,314	73	14,460
1991	5,333	5,460	1,503	316	207	1,400	76	14,294
1992	5,609	6,038	1,538	332	195	1,429	76	15,218
1993	5,549	6,044	1,525	272	212	1,457	77	15,136
1994	5,729	6,149	1,494	229	232	1,478	79	15,390
1995	5,734	6,301	1,457	246	228	1,485	81	15,531
1996	5,935	6,643	1,455	248	251	1,434	82	16,048
1997	6,123	7,178	1,570	77	84	1,583	83	16,698
1998	6,319	7,171	1,689	217	216	1,558	93	17,264
1999	6,453	7,579	1,855	207	239	1,557	93	17,984
2000	6,513	8,487	1,869	143	153	1,675	96	18,935
2001	6,116	7,473	1,682	200	233	1,653	98	17,456
2002	6,326	7,657	1,571	225	232	1,636	96	17,743
2003	6,745	7,997	1,490	207	227	1,600	105	18,372
2004	7,074	8,521	1,501	176	252	1,625	102	19,251
2005	7,105	8,461	1,464	170	254	1,653	105	19,213
2006	7,522	8,802	1,453	189	312	1,753	108	20,139
2007	7,539	8,831	1,512	201	335	1,734	114	20,267
2008	7,716	9,053	1,528	196	321	1,697	113	20,623
2009	7,647	8,829	1,472	159	263	1,687	112	20,169
2010	7,707	8,843	1,499	145	263	1,689	113	20,258
2011	7,773	8,944	1,540	150	264	1,703	114	20,488
2012	7,839	9,103	1,605	156	264	1,728	115	20,809
2013	7,969	9,289	1,639	157	264	1,746	116	21,179
2014	8,094	9,421	1,651	154	264	1,756	116	21,457
2015	8,230	9,545	1,661	152	265	1,772	117	21,742
2016	8,348	9,650	1,675	151	265	1,789	118	21,997
2017	8,479	9,763	1,685	149	265	1,805	119	22,266
2018	8,623	9,865	1,694	146	265	1,820	120	22,532
2019	8,775	9,980	1,699	145	264	1,833	121	22,816
2020	8,929	10,099	1,700	144	263	1,845	121	23,102

Last historic year is 2008. Sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	1.85%	4.25%	2.08%	-6.88%	-4.40%	2.45%	2.71%	2.73%
2000-2008	2.14%	0.81%	-2.49%	4.02%	9.76%	0.16%	2.02%	1.07%
2008-2010	-0.06%	-1.17%	-0.92%	-14.13%	-9.50%	-0.23%	0.26%	-0.89%
2010-2020	1.48%	1.34%	1.27%	-0.06%	-0.01%	0.89%	0.71%	1.32%

Form 1.2 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	14,926	1,025	15,952	466	0	466	15,485
1991	14,764	1,013	15,778	470	0	470	15,308
1992	15,665	1,079	16,744	447	0	447	16,297
1993	15,549	1,073	16,622	412	0	412	16,210
1994	15,791	1,091	16,882	401	0	401	16,481
1995	15,923	1,101	17,025	392	0	392	16,632
1996	16,437	1,138	17,575	389	0	389	17,185
1997	17,082	1,184	18,266	384	0	384	17,882
1998	17,630	1,224	18,854	366	0	366	18,488
1999	18,312	1,275	19,587	328	0	329	19,259
2000	19,294	1,342	20,637	359	0	360	20,277
2001	17,826	1,238	19,064	369	1	370	18,694
2002	18,270	1,258	19,528	524	3	527	19,001
2003	18,977	1,303	20,279	596	8	604	19,675
2004	19,921	1,365	21,286	657	13	670	20,616
2005	19,930	1,362	21,292	697	20	718	20,575
2006	20,880	1,428	22,307	711	29	740	21,567
2007	21,041	1,437	22,478	734	41	775	21,703
2008	21,407	1,462	22,869	726	63	789	22,085
2009	20,985	1,430	22,415	726	103	829	21,599
2010	21,100	1,436	22,536	726	134	860	21,695
2011	21,354	1,453	22,807	726	164	890	21,941
2012	21,699	1,475	23,175	726	194	921	22,284
2013	22,094	1,502	23,596	726	225	951	22,680
2014	22,397	1,521	23,919	726	256	982	22,978
2015	22,707	1,541	24,248	726	287	1,013	23,283
2016	22,987	1,560	24,546	726	317	1,044	23,556
2017	23,262	1,579	24,841	726	325	1,051	23,845
2018	23,535	1,598	25,132	726	332	1,059	24,130
2019	23,825	1,618	25,443	726	341	1,067	24,434
2020	24,119	1,638	25,757	726	349	1,076	24,740

Annual Growth Rates (%)

1990-2000	2.60%	2.73%	2.61%	-2.57%	#DIV/0!	-2.56%	2.73%
2000-2008	1.31%	1.07%	1.29%	9.19%	107.78%	10.32%	1.07%
2008-2010	-0.72%	-0.89%	-0.73%	0.00%	46.18%	4.41%	-0.89%
2010-2020	1.35%	1.32%	1.34%	0.00%	10.09%	2.26%	1.32%

Form 1.3 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	913	0	1,277	0	362	27	217	2,795
1991	876	0	1,269	0	398	26	253	2,822
1992	1,139	0	1,332	0	357	20	224	3,072
1993	867	0	1,213	0	342	23	227	2,672
1994	1,149	0	1,335	0	333	27	236	3,079
1995	1,081	0	1,367	0	331	27	234	3,040
1996	1,061	0	1,426	0	333	30	230	3,081
1997	1,321	0	1,539	0	302	28	233	3,423
1998	1,344	0	1,640	0	395	27	269	3,675
1999	1,039	0	1,595	0	414	29	268	3,345
2000	1,025	0	1,602	0	342	26	245	3,240
2001	952	0	1,425	0	345	25	258	3,005
2002	1,045	0	1,605	0	364	27	278	3,320
2003	1,260	0	1,756	0	348	26	272	3,661
2004	1,391	0	1,823	0	328	27	265	3,834
2005	1,310	0	1,858	0	348	29	293	3,838
2006	1,593	0	1,970	0	331	34	296	4,224
2007	1,559	0	2,088	0	377	39	325	4,386
2008	1,659	0	1,874	0	309	31	258	4,131
2009	1,716	0	1,922	0	309	28	272	4,247
2010	1,748	0	1,923	0	311	28	272	4,283
2011	1,781	0	1,944	0	319	29	275	4,348
2012	1,814	1	1,977	0	331	29	279	4,430
2013	1,852	3	2,011	0	338	29	282	4,512
2014	1,889	5	2,032	0	339	29	284	4,574
2015	1,927	7	2,052	0	341	29	287	4,636
2016	1,963	9	2,069	0	343	29	290	4,695
2017	2,001	11	2,086	0	344	30	293	4,754
2018	2,039	13	2,101	0	345	30	296	4,810
2018	2,078	15	2,118	1	346	30	298	4,869
2020	2,117	17	2,136	1	346	30	300	4,929

* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)

1990-2000	1.17%	0.00%	2.29%	0.00%	-0.55%	-0.36%	1.22%	1.49%
2000-2008	6.20%	0.00%	1.98%	0.00%	-1.29%	2.29%	0.62%	3.08%
2008-2010	2.64%	46.48%	1.31%	-9.10%	0.34%	-4.34%	2.79%	1.82%
2010-2020	1.93%	84.24%	1.06%	32.34%	1.08%	0.62%	0.97%	1.42%

Form 1.4 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	2,795	261	3,056	78	0	78	2,978	59.4
1991	2,822	263	3,085	79	0	79	3,006	58.1
1992	3,072	288	3,360	75	0	75	3,285	56.6
1993	2,672	250	2,922	69	0	69	2,853	64.9
1994	3,079	289	3,368	67	0	67	3,301	57.0
1995	3,040	286	3,326	66	0	66	3,260	58.2
1996	3,081	289	3,370	65	0	65	3,305	59.4
1997	3,423	322	3,745	64	0	64	3,681	55.5
1998	3,675	347	4,022	62	0	62	3,960	53.3
1999	3,345	316	3,661	55	0	55	3,606	61.0
2000	3,240	305	3,545	60	0	60	3,485	66.4
2001	3,005	282	3,287	62	1	62	3,225	66.2
2002	3,320	310	3,630	88	1	89	3,541	61.2
2003	3,661	342	4,003	100	3	103	3,900	57.6
2004	3,834	357	4,191	110	5	115	4,077	57.7
2005	3,838	357	4,195	117	7	124	4,070	57.7
2006	4,224	393	4,617	119	10	130	4,487	54.9
2007	4,386	408	4,794	123	14	138	4,657	53.2
2008	4,131	383	4,514	122	20	142	4,371	57.7
2009	4,247	393	4,640	122	32	154	4,487	55.0
2010	4,283	396	4,678	122	41	162	4,516	54.8
2011	4,348	401	4,749	122	49	171	4,578	54.7
2012	4,430	408	4,838	122	58	180	4,658	54.6
2013	4,512	415	4,927	122	66	188	4,738	54.6
2014	4,574	420	4,994	122	75	197	4,797	54.7
2015	4,636	425	5,061	122	84	206	4,856	54.7
2016	4,695	430	5,125	122	93	215	4,911	54.8
2017	4,754	436	5,190	122	95	217	4,973	54.7
2018	4,810	441	5,251	122	97	219	5,032	54.7
2019	4,869	446	5,315	122	99	221	5,094	54.8
2020	4,929	452	5,381	122	102	224	5,157	54.8

Annual Growth Rates (%)

1990-2000	1.49%	1.58%	1.50%	-2.57%		-2.56%	1.58%	1.13%
2000-2008	3.08%	2.87%	3.06%	9.19%	105.50%	11.32%	2.87%	-1.75%
2008-2010	1.82%	1.64%	1.81%	0.00%	40.68%	6.81%	1.64%	-2.49%
2010-2020	1.42%	1.34%	1.41%	0.00%	9.65%	3.26%	1.34%	-0.01%

Form 1.5 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Extreme Temperature Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2009	4,487	4,836	4,935	5,020	1.078	1.100	1.119
2010	4,516	4,868	4,967	5,053	1.078	1.100	1.119
2011	4,578	4,935	5,036	5,123	1.078	1.100	1.119
2012	4,658	5,021	5,124	5,212	1.078	1.100	1.119
2013	4,738	5,108	5,212	5,302	1.078	1.100	1.119
2014	4,797	5,171	5,277	5,368	1.078	1.100	1.119
2015	4,856	5,234	5,341	5,433	1.078	1.100	1.119
2016	4,911	5,294	5,402	5,495	1.078	1.100	1.119
2017	4,973	5,361	5,470	5,565	1.078	1.100	1.119
2018	5,032	5,424	5,535	5,631	1.078	1.100	1.119
2019	5,094	5,491	5,603	5,700	1.078	1.100	1.119
2020	5,157	5,559	5,673	5,771	1.078	1.100	1.119

Form 1.7a - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	1	242	132	0	0	92	0	466
1991	0	238	137	0	0	95	0	470
1992	0	218	142	0	0	86	0	447
1993	0	209	139	0	0	64	0	412
1994	0	203	134	0	0	64	0	401
1995	0	202	138	0	0	52	0	392
1996	0	206	126	0	0	57	0	389
1997	0	206	124	0	0	54	0	384
1998	0	183	130	0	0	53	0	366
1999	0	137	124	0	0	68	0	329
2000	0	141	126	0	0	92	0	360
2001	1	156	130	0	0	83	0	370
2002	2	286	150	0	1	88	0	527
2003	3	328	180	0	1	92	0	604
2004	5	376	199	0	0	89	0	670
2005	6	414	203	0	1	94	0	718
2006	8	437	189	0	1	105	0	740
2007	12	473	171	0	1	117	0	775
2008	16	512	160	0	3	94	0	785
2009	27	529	162	1	5	94	0	817
2010	35	542	163	1	7	94	0	842
2011	43	555	164	1	9	95	0	866
2012	51	568	165	1	11	95	0	891
2013	59	581	166	1	13	96	0	915
2014	66	594	167	2	15	96	0	940
2015	74	607	168	2	17	97	0	965
2016	82	621	169	2	19	97	0	990
2017	84	622	169	2	22	97	0	996
2018	85	623	169	2	25	97	0	1,002
2019	87	625	170	2	28	97	0	1,009
2020	89	626	170	2	31	97	0	1,016

Annual Growth Rates (%)

1990-2000	-14.14%	-5.26%	-0.45%	0.00%	0.00%	0.10%	0.00%	-2.56%
2000-2008	81.64%	17.50%	3.03%	0.00%	0.00%	0.15%	0.00%	10.24%
2008-2010	48.27%	2.86%	0.80%	118.98%	63.39%	0.33%	0.00%	3.58%
2010-2020	9.74%	1.46%	0.44%	13.11%	15.78%	0.33%	0.00%	1.90%

Form 2.2 - SDG&E Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Household Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2000$)	Commercial Floorspace (MM Sqft.)
1990	2,549,874	946,084	2.70	82,398	7,265	371
1991	2,604,754	964,042	2.70	82,071	7,205	390
1992	2,653,616	977,591	2.71	83,705	6,981	404
1993	2,670,770	988,476	2.70	83,354	6,564	412
1994	2,688,861	998,758	2.69	84,224	6,557	419
1995	2,699,011	1,008,967	2.68	86,001	6,845	427
1996	2,714,332	1,019,262	2.66	89,976	7,172	434
1997	2,780,840	1,032,431	2.69	95,158	8,774	442
1998	2,842,514	1,047,694	2.71	104,463	10,588	451
1999	2,908,550	1,064,929	2.73	111,398	12,848	464
2000	2,976,657	1,079,125	2.76	119,864	16,259	479
2001	3,059,985	1,095,209	2.79	123,177	14,873	496
2002	3,126,138	1,112,304	2.81	126,323	14,125	511
2003	3,180,451	1,128,221	2.82	129,137	14,929	524
2004	3,221,191	1,144,411	2.82	135,963	16,222	536
2005	3,255,701	1,160,937	2.80	139,021	18,988	549
2006	3,294,785	1,175,410	2.80	143,787	20,420	557
2007	3,341,753	1,187,621	2.81	146,907	19,643	568
2008	3,378,398	1,199,008	2.82	149,810	19,221	580
2009	3,418,190	1,211,412	2.82	151,168	18,931	591
2010	3,454,458	1,222,531	2.83	154,752	19,330	599
2011	3,491,098	1,233,750	2.83	158,579	19,889	606
2012	3,528,115	1,245,069	2.83	164,204	20,676	615
2013	3,565,513	1,256,485	2.84	170,341	21,212	627
2014	3,603,294	1,268,002	2.84	175,417	21,550	639
2015	3,641,465	1,279,619	2.85	180,744	21,909	651
2016	3,680,028	1,291,339	2.85	185,240	22,310	663
2017	3,718,988	1,303,159	2.85	189,997	22,709	673
2018	3,758,347	1,315,085	2.86	194,668	23,089	683
2019	3,798,111	1,327,113	2.86	199,323	23,439	693
2020	3,838,284	1,339,248	2.87	204,056	23,742	703

Annual Growth Rates (%)						
1990-2000	1.56%	1.32%	0.22%	3.82%	8.39%	2.61%
2000-2008	1.60%	1.33%	0.27%	2.83%	2.11%	2.41%
2008-2010	1.12%	0.98%	0.18%	1.64%	0.28%	1.60%
2010-2020	1.06%	0.92%	0.14%	2.80%	2.08%	1.62%

Form 2.3 Electricity Prices - SDGE					
YEAR	**Residential**		**Commercial**		**Industrial**
1990	13.59		16.07		10.45
1991	13.22		15.56		10.27
1992	13.17		15.71		9.73
1993	13.32		16.27		9.29
1994	12.58		16.77		9.40
1995	12.26		16.27		9.27
1996	13.71		15.82		8.89
1997	13.49		12.77		8.91
1998	12.13		13.67		8.98
1999	11.61		13.48		9.00
2000	14.95		13.19		13.87
2001	14.34		15.96		18.18
2002	13.52		15.03		19.23
2003	14.02		14.28		14.09
2004	16.44		13.53		13.41
2005	16.37		13.25		9.82
2006	18.19		12.96		11.43
2007	16.96		13.85		12.44
2008	15.95		13.85		13.51
2009	15.95		13.85		13.51
2010	15.95		13.85		13.51
2011	16.11		13.99		13.64
2012	16.26		14.13		13.77
2013	16.42		14.27		13.91
2014	16.59		14.41		14.05
2015	16.75		14.55		14.18
2016	17.06		14.81		14.44
2017	17.37		15.09		14.71
2018	17.69		15.36		14.98
2019	18.01		15.65		15.25
2020	18.34		15.93		15.53

CHAPTER 5: Sacramento Municipal Utility District Planning Area

The Sacramento Municipal Utility District (SMUD) planning area includes SMUD retail customers but does not include the new members of the SMUD control area, Roseville, Redding, and the Western Area Power Administration (WAPA). To support electricity system analysis, staff derives forecasts by control area and California ISO congestion zone from the planning area forecasts. Using historical consumption data and regional population projections, the estimated share of the PG&E forecast for WAPA, Roseville, and Redding forecasts are subtracted from the PG&E planning area and added to the SMUD control area. The results in this chapter are for the SMUD planning area only.

This chapter first discusses forecasted consumption and peak loads for the SMUD planning area; both total and per capita values are presented. *CED 2009 Revised* values are compared to both *CED 2009 Draft* and *CED 2007* and differences between forecasts are explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Next, sector consumption and peak load forecasts are presented. Residential, commercial, industrial, and other sector forecasts are compared and differences are discussed.

For *CED 2009 Draft*, three price scenarios were developed for electricity rates: high rates, low (constant) rates, and a *mid-rate* scenario in between the two. The high-rate case assumed approximately 30 percent higher rates by 2020 relative to 2010, while the mid-rate case assumed 15 percent higher rates over the same period. In the low-rate case, rates remained at 2010 levels through 2020 as was done in *CED 2007*. In *CED 2009 Revised*, the mid-rate price forecast is used and all comparisons to *CED 2009 Draft* are made to the mid-rate scenario. Chapter 1 provides more details on price assumptions.

Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* forecasts of SMUD planning area electricity consumption and peak demand are lower than both *CED 2009 Draft* and *CED 2007* levels throughout the forecast period.
- Reductions in consumption and peak compared to previous forecasts result from a more pessimistic economic outlook and higher expected efficiency impacts.
- Residential and commercial consumption and commercial peak demand is lower than in the draft forecast; residential peak is slightly higher.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by between 1.8 and 2.2 percent in 2020.

- Electric vehicles are projected to increase electricity consumption by around 165 GWH in 2020.

Table 22 presents a comparison of the planning area electricity consumption and peak demand forecasts for selected years. *CED 2009 Revised* is compared to both the *CED 2009 Draft* mid-rate case and *CED 2007*. The revised electricity consumption forecast is lower than *CED 2009 Draft* by almost 1.6 percent at the end of the forecast period. This is caused mainly by lower economic forecast values provided in the June 2009 Economy.com forecast. *CED 2009 Revised* consumption is 7.6 percent lower than *CED 2007* in 2020. Revised peak demand is virtually identical to *CED 2009 Draft* by the end of the forecast period. The smaller change in the peak forecast relative to changes in consumption comes from efficiency programs, which have a greater impact on overall consumption than peak. Short-term growth rates of both the revised consumption and peak forecasts are lower than previous forecasts due to more negative economic projections, but the long-term growth rates are just slightly below the growth rates of *CED 2007*.

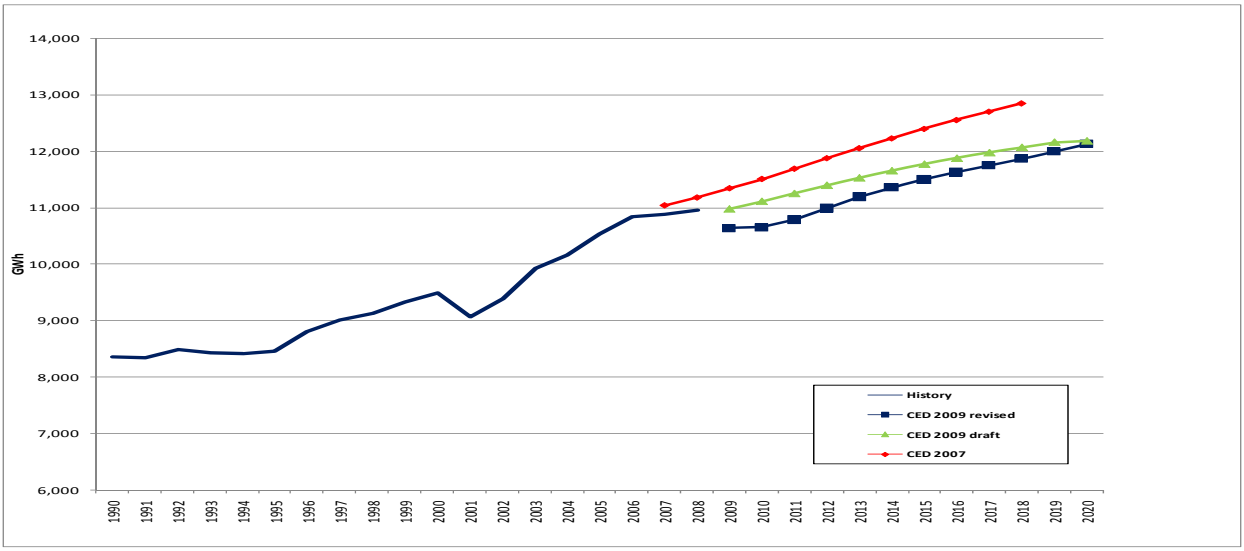
Table 22: SMUD Planning Area Forecast Comparison

Consumption (GWH)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	8,358	8,358	8,358	0.00%	0.00%
2000	9,491	9,491	9,494	0.04%	0.04%
2008	11,174	10,936	10,956	-1.95%	0.18%
2010	11,506	11,114	10,656	-7.39%	-4.12%
2015	12,397	11,771	11,504	-7.20%	-2.27%
2018	12,851	12,068	11,875	-7.59%	-1.60%
Average Annual Growth Rates					
1990-2000	1.28%	1.28%	1.28%		
2000-2008	2.06%	1.79%	1.81%		
2008-2010	1.47%	0.81%	-1.38%		
2010-2018	1.39%	1.04%	1.36%		
Peak (MW)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	2,198	2,167	2,167	-1.41%	0.00%
2000	2,693	2,688	2,687	-0.22%	-0.04%
2008	3,174	3,077	3,080	-2.96%	0.10%
2010	3,261	3,077	3,050	-6.47%	-0.88%
2015	3,515	3,276	3,270	-6.97%	-0.18%
2018	3,645	3,363	3,367	-7.63%	0.12%
Average Annual Growth Rates					
1990-2000	2.05%	2.18%	2.17%		
2000-2008	2.08%	1.70%	1.72%		
2008-2010	1.36%	0.00%	-0.49%		
2010-2018	1.40%	1.12%	1.24%		
Historic values are shaded					

Source: California Energy Commission, 2009

As shown in **Figure 99**, *CED 2009 Revised* consumption is lower than *CED 2009 Draft* until 2020 and below *CED 2007* throughout the forecast period. The dip in the early years of *CED 2009 Revised* is caused by both the revised economic projections and increased savings from energy efficiency programs.

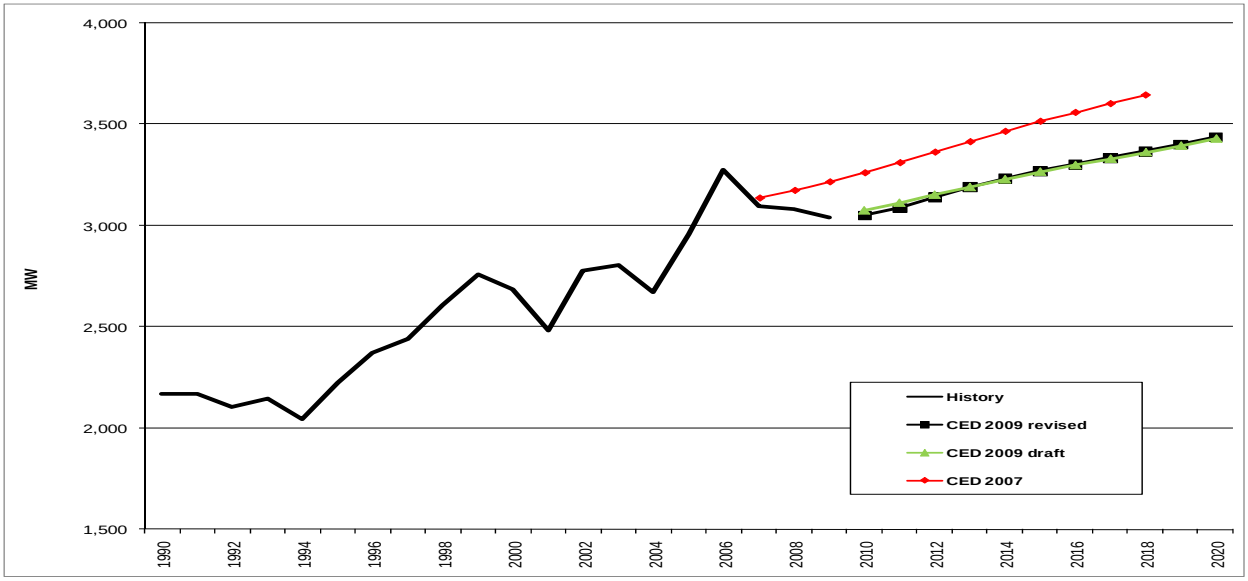
Figure 99: SMUD Planning Area Electricity Forecast



Source: California Energy Commission, 2009

The *CED 2009 Revised* SMUD planning area peak demand forecast, shown in **Figure 100**, is essentially the same as *CED 2009 Draft* throughout the forecast period. The percentage difference is less than that of consumption because energy efficiency programs have a greater impact on consumption than on peak.

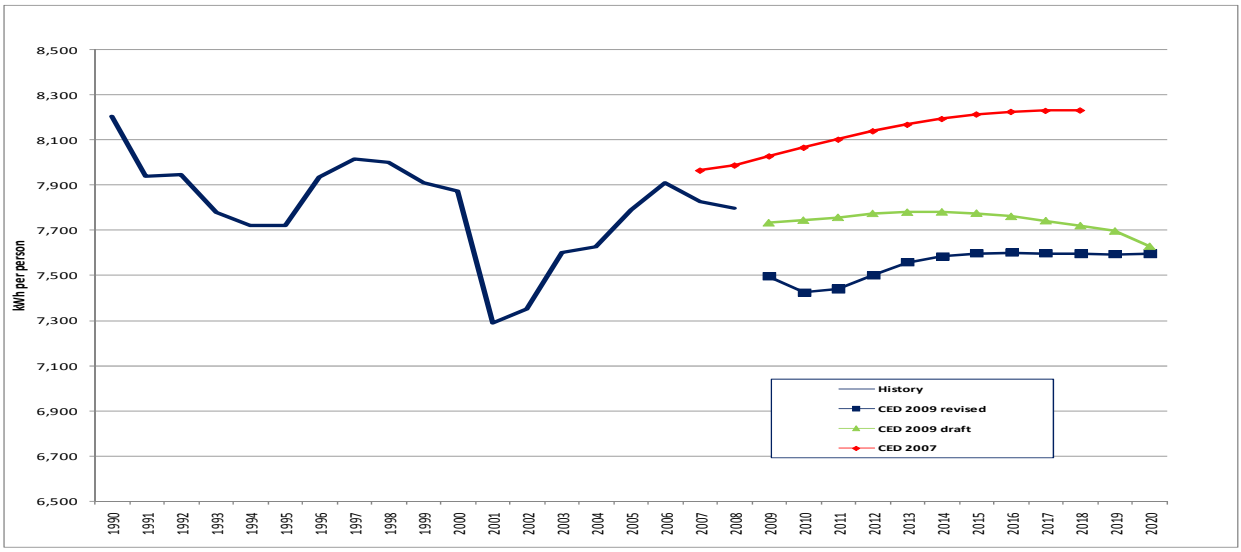
Figure 100: SMUD Planning Area Peak



Source: California Energy Commission, 2009

Figure 101 compares forecasted per capita residential electricity consumption. Per capita consumption in *CED 2009 Revised* is lower than *CED 2009 Draft* and is well below the projection of *CED 2007*. The revised projection begins at a lower level than recently recorded history because of more pessimistic economic projections than were used in previous forecasts. The increase in the mid-term is the result of an improving economy.

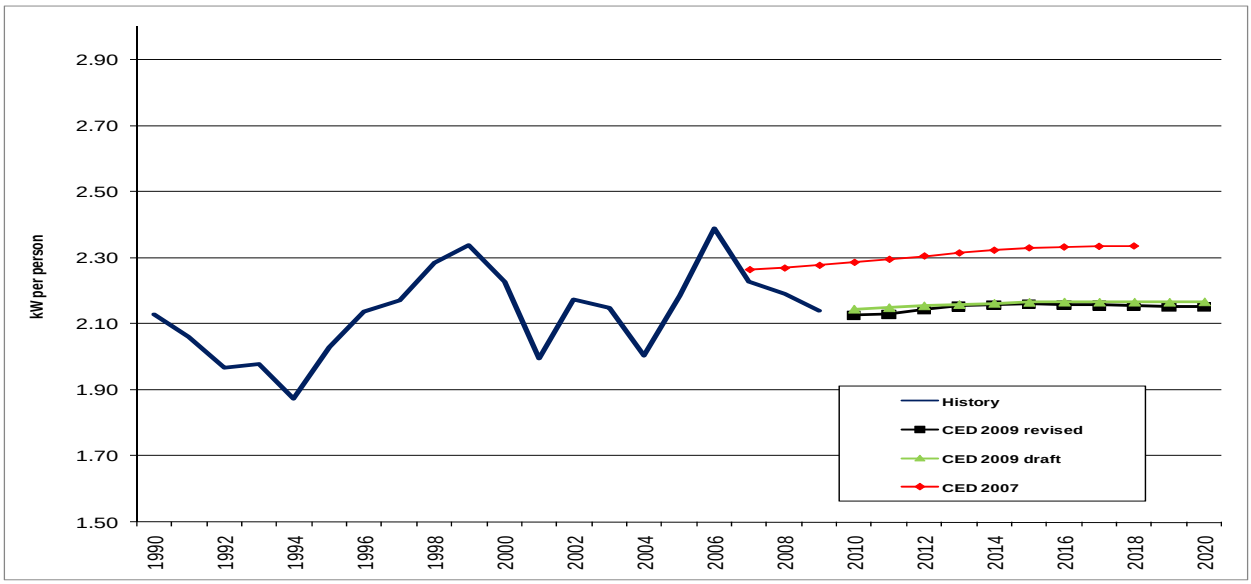
Figure 101: SMUD Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2009

Per capita peak demand for *CED 2009 Revised*, shown in **Figure 102**, is lower over the entire forecast period than *CED 2007* because of a lower starting point—the result of a poor economic climate— as well as higher self-generation peak impacts. *CED 2009 Revised* per capita peak demand increases slightly in the mid-term, and is relatively constant over the remainder of the forecast period, in contrast to the increase projected in *CED 2007*.

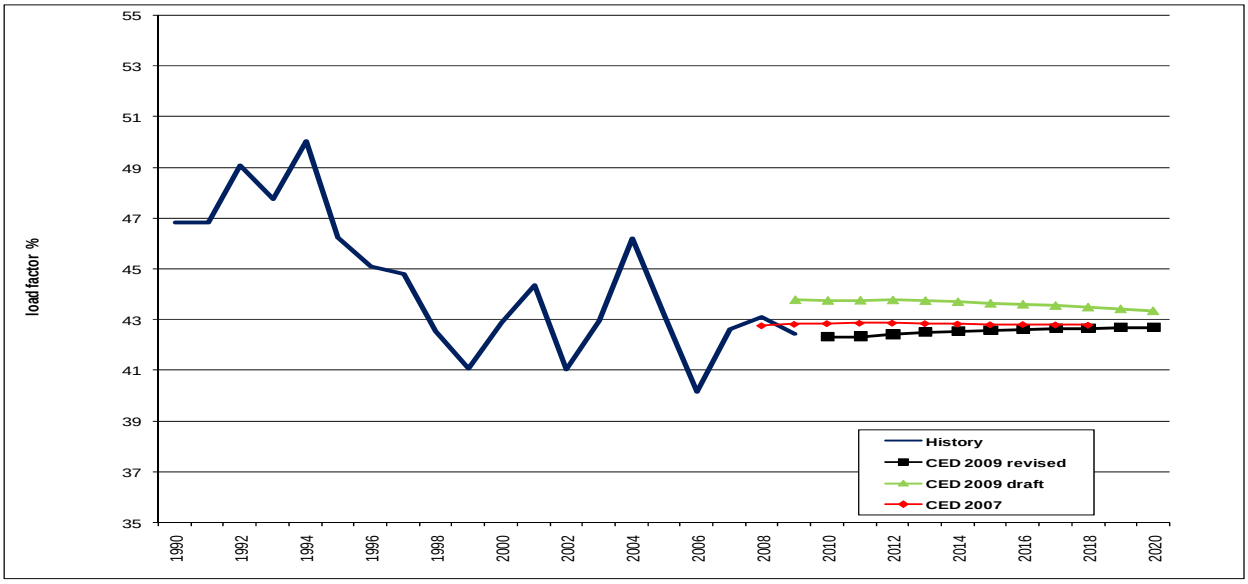
Figure 102: SMUD Planning Area per Capita Peak Demand



Source: California Energy Commission, 2009

Figure 103 compares the load factors of the three forecasts. The load factor represents the relationship between average energy demand and peak: the smaller the load factor, the greater the difference between peak and average hourly demand. The load factor varies with temperature; in extremely hot years (for example, 1998 and 2006) demand is *peakier*. The SMUD load factor has been declining since the mid-1990s as the residential sector—with a continually increasing presence of air conditioning—grew faster than other sectors. The forecasted load factor levels out as air conditioning in the SMUD planning area is projected to reach near complete saturation levels.

Figure 103: SMUD Planning Area Peak Load Factor



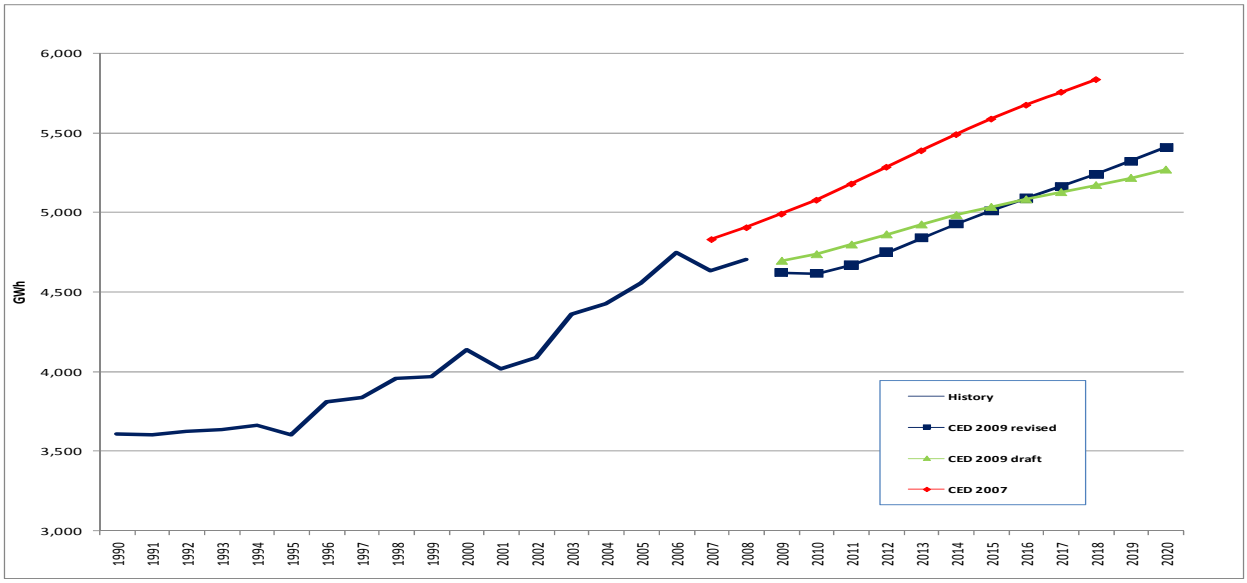
Source: California Energy Commission, 2009

Sector Level Results and Input Assumptions

Residential

Figure 104 compares the residential forecasts. *CED 2009 Revised* is lower over in the short-term than *CED 2009 Draft* and well below the level of *CED 2007*. The decrease relative to *CED 2009 Draft* is caused by decreased projections of household income and slightly higher persons-per-household projections. The higher *CED 2009 Revised* long-term forecast is caused by inclusion of electric vehicle consumption in the residential sector.

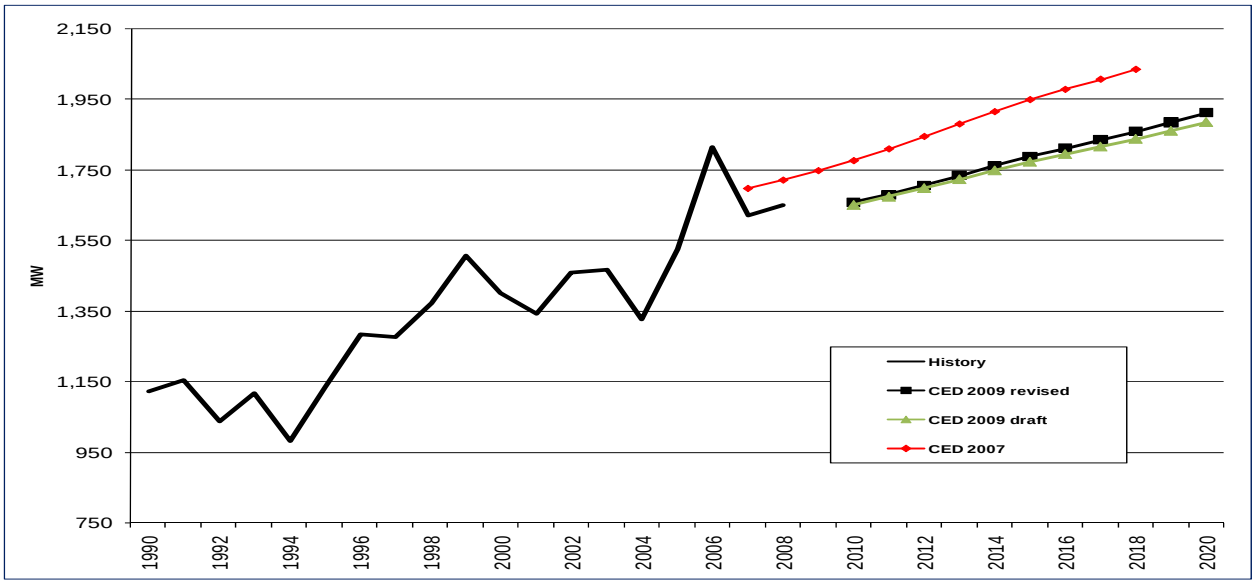
Figure 104: SMUD Planning Area Residential Consumption



Source: California Energy Commission, 2009

Figure 105 compares the residential peak demand forecasts. Unlike the consumption forecast, there is very little difference in *CED 2009 Revised* and draft residential peak forecasts, with *CED 2009 Revised* being slightly higher by the end of the forecast period.

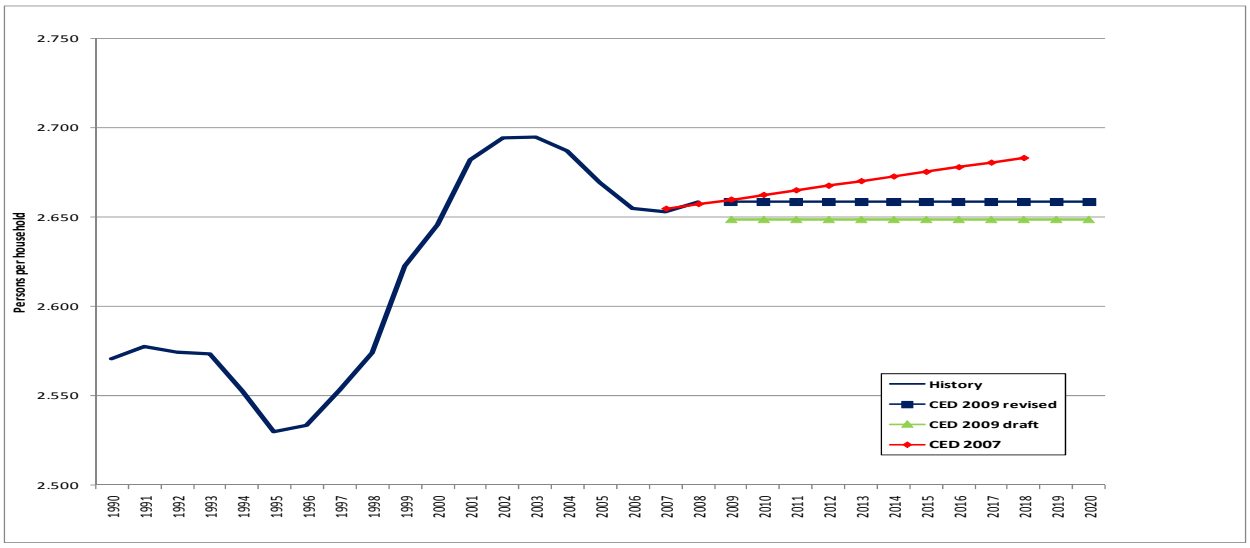
Figure 105: SMUD Planning Area Residential Peak



Source: California Energy Commission, 2009

Figures 106 and **107** provide comparisons of the residential drivers used in the forecasts. **Figure 106** shows persons-per-household projections. There is a slight increase in persons per household in *CED 2009 Revised* compared to *CED 2009 Draft*. This change reduces the household projection by about 2,000 households by the end of the forecast period (less than 0.04 percent).

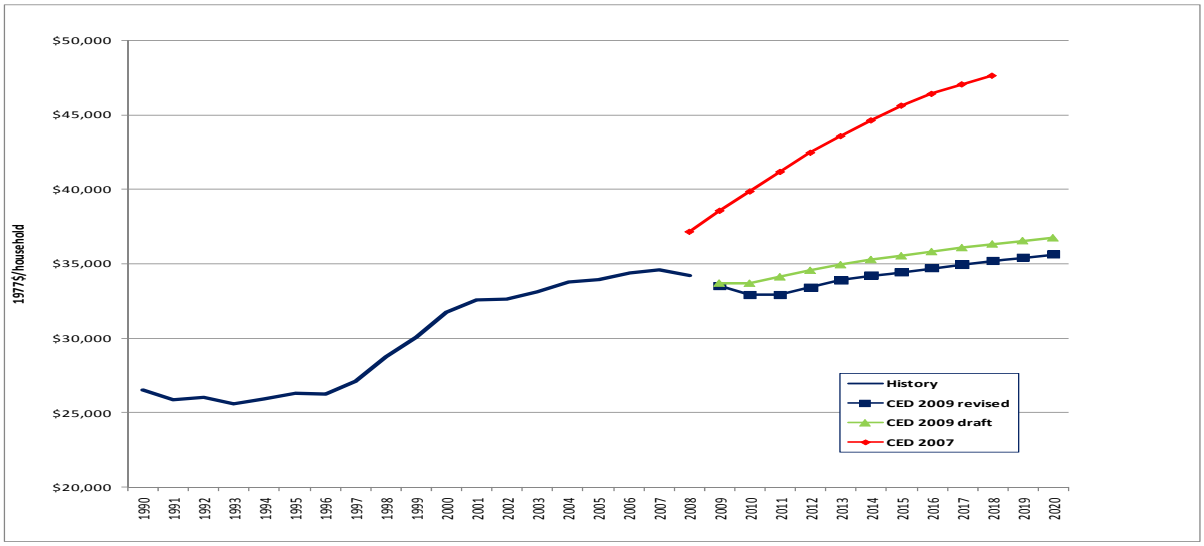
Figure 106: SMUD Planning Area Persons-per-Household Projections



Source: California Energy Commission, 2009

Figure 107 compares household income used in the respective forecasts. *CED 2009 Revised* projections are lower than those used in *CED 2009 Draft*. Both are far below the income projections used in *CED 2007*. Long-term growth is similar to *CED 2009 Draft* as the economy recovers from the current slump.

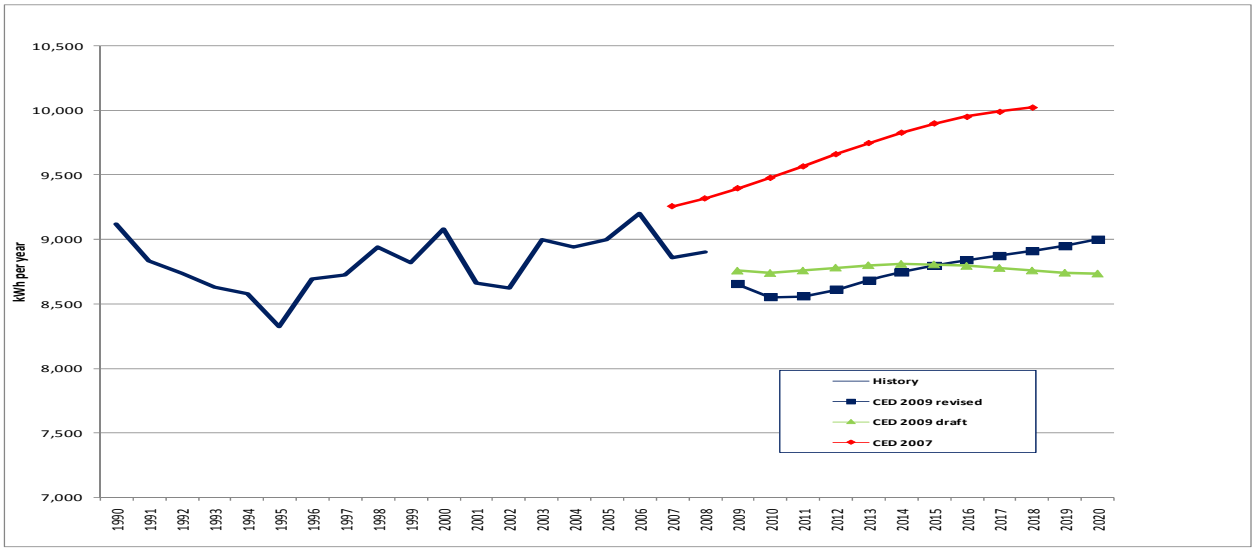
Figure 107: SMUD Planning Area Household Income Projections



Source: California Energy Commission, 2009

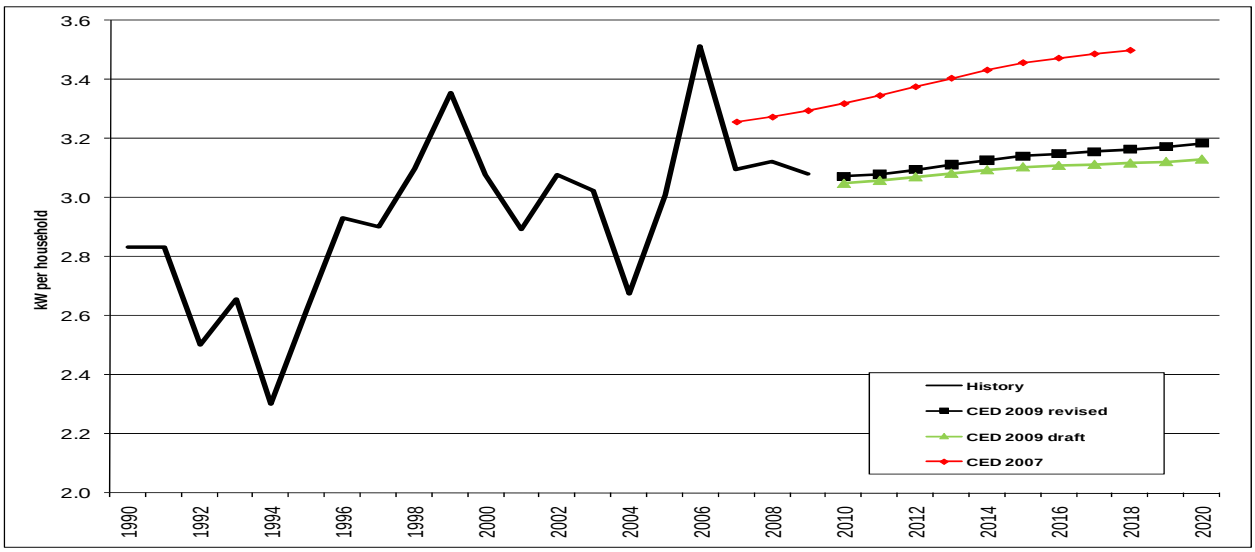
Figures 108 and **109** compare residential use per household and residential peak use per household, respectively. *CED 2009 Revised* use per household (**Figure 108**) is lower than *CED 2009 Draft* in the short-term because of the current economic downturn and decreased household income projections. Approximately 60 percent of the post 2012 increase in use per household is driven by personal electric vehicle consumption. *CED 2009 Revised* use per household is well below the level of *CED 2007*. There is less of a difference in peak use per household (**Figure 109**) because income-induced reductions in *miscellaneous* consumption have much less impact on peak and electric vehicles are assumed to be charged mainly in off-peak periods.

Figure 108: SMUD Planning Area Use per Household



Source: California Energy Commission, 2009

Figure 109: SMUD Planning Area Peak Use per Household

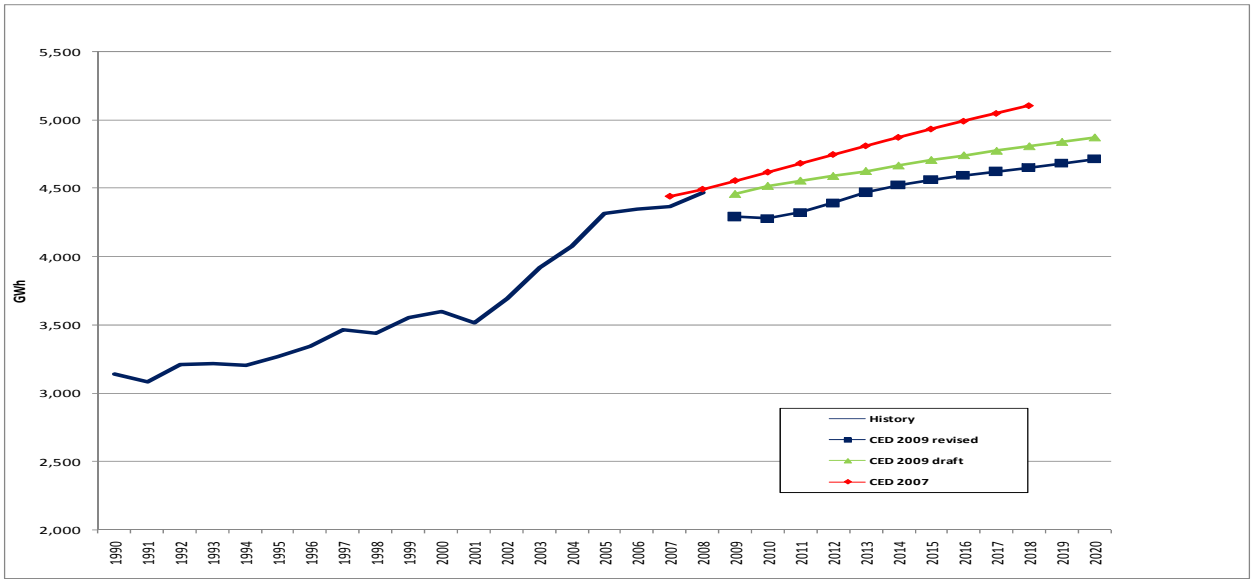


Source: California Energy Commission, 2009

Commercial Building Sector

Figures 110 and **111** compare the commercial building sector forecasts. *CED 2009 Revised* is lower than *CED 2009 Draft* because of lower economic growth. The growth rate in consumption after the economic recovery is very similar to that of *CED 2009 Draft*. Both *CED* 2009 forecasts are lower than *CED 2007*.

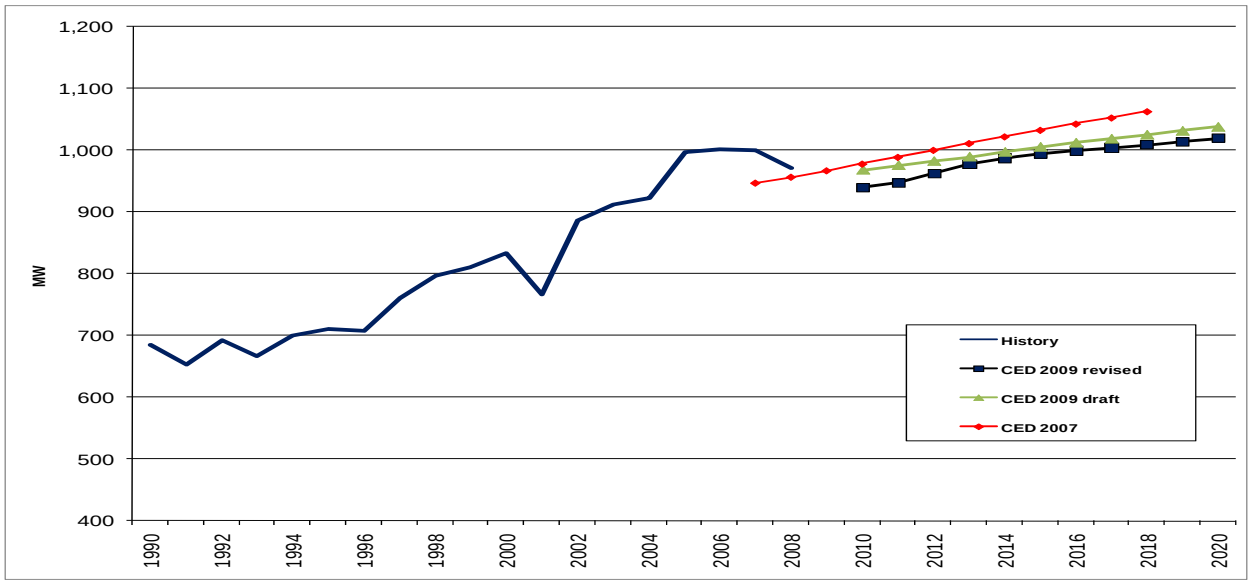
Figure 110: SMUD Planning Area Commercial Consumption



Source: California Energy Commission, 2009

Figure 111 compares the commercial building sector peak demand forecasts. Differences in the peak forecasts are similar to those in the consumption forecasts.

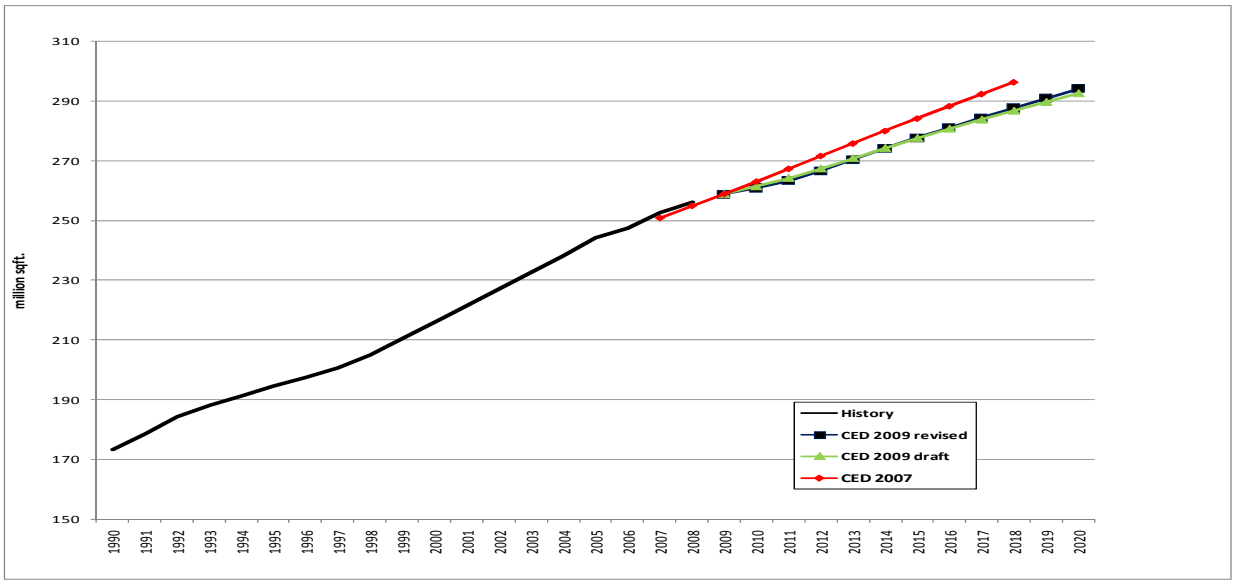
Figure 111: SMUD Planning Area Commercial Sector Peak



Source: California Energy Commission, 2009

In staff's commercial building sector forecasting model, floor space by building type (that is, retail, schools, offices, and so forth) is the key driver of energy use for each specific building type. **Figure 112** compares total commercial floor space projections. The revised floor space forecast is little changed from *CED 2009 Draft*.

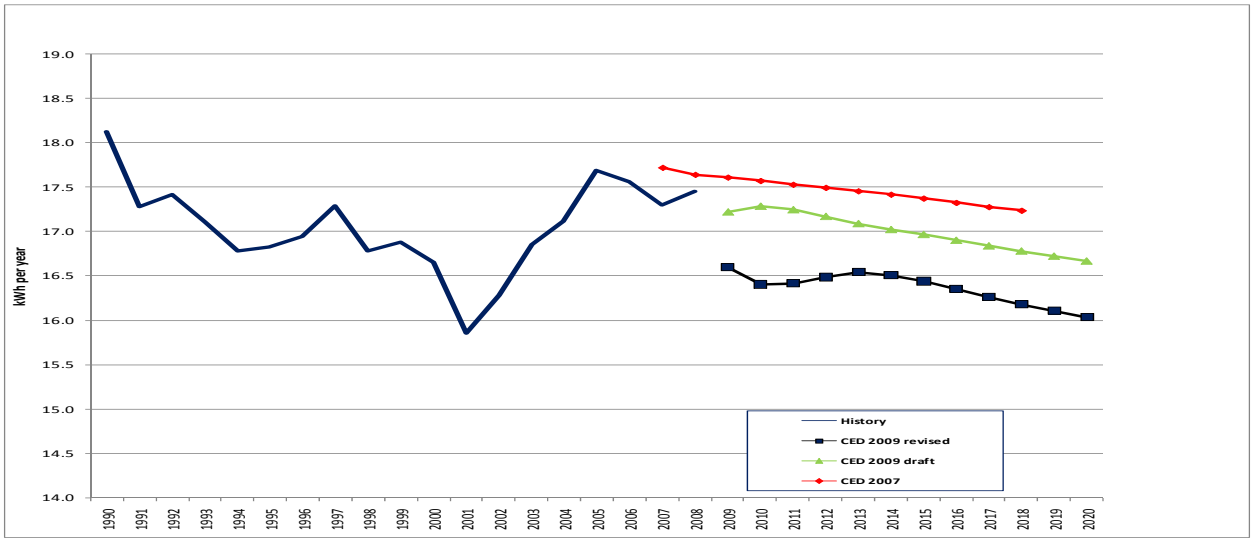
Figure 112: SMUD Planning Area Commercial Floor Space



Source: California Energy Commission, 2009

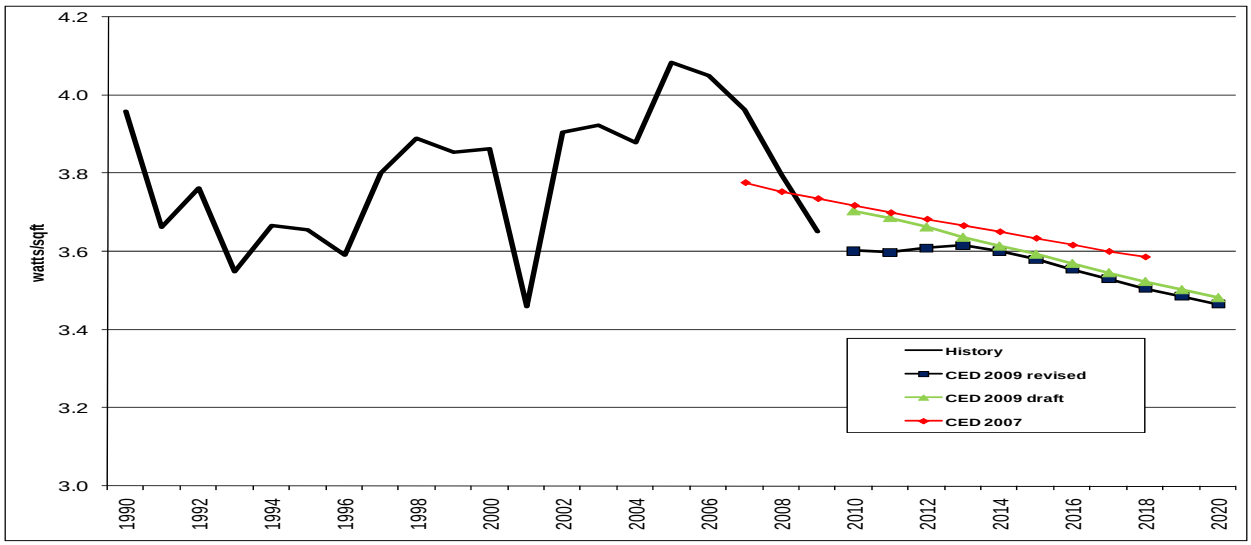
Historical and projected commercial sector annual and peak use per square foot are shown in **Figures 113** and **114**, respectively. Use per square foot (**Figure 113**) in *CED 2009 Revised* is lower than *CED 2009 Draft* because of more pessimistic economic projections for Sacramento County. This value is also below that projected in *CED 2007*. Revised peak use per square foot (**Figure 114**) follows a similar pattern, especially in the short-term. However, peak use per square foot returns to the draft level after recovery from the current economic downturn.

Figure 113: SMUD Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2009

Figure 114: SMUD Planning Area Commercial Watts per Square Foot

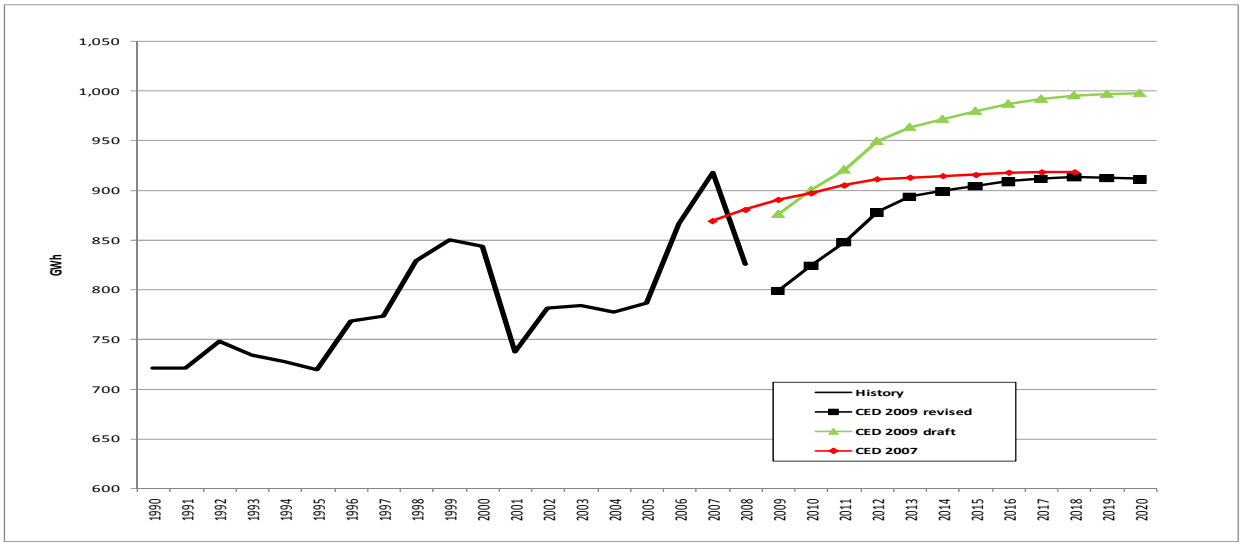


Source: California Energy Commission, 2009

Industrial Sector

Figure 115 compares industrial sector electricity consumption forecasts for the SMUD planning area. *CED 2009 Revised* is lower throughout the entire forecast period relative to *CED 2009 Draft,* especially in the early forecast years. This comes from a lower starting point—the 2008 consumption estimate—and also more pessimistic economic projections. The long-term growth of *CED 2009 Revised* is similar to *CED 2009 Draft*.

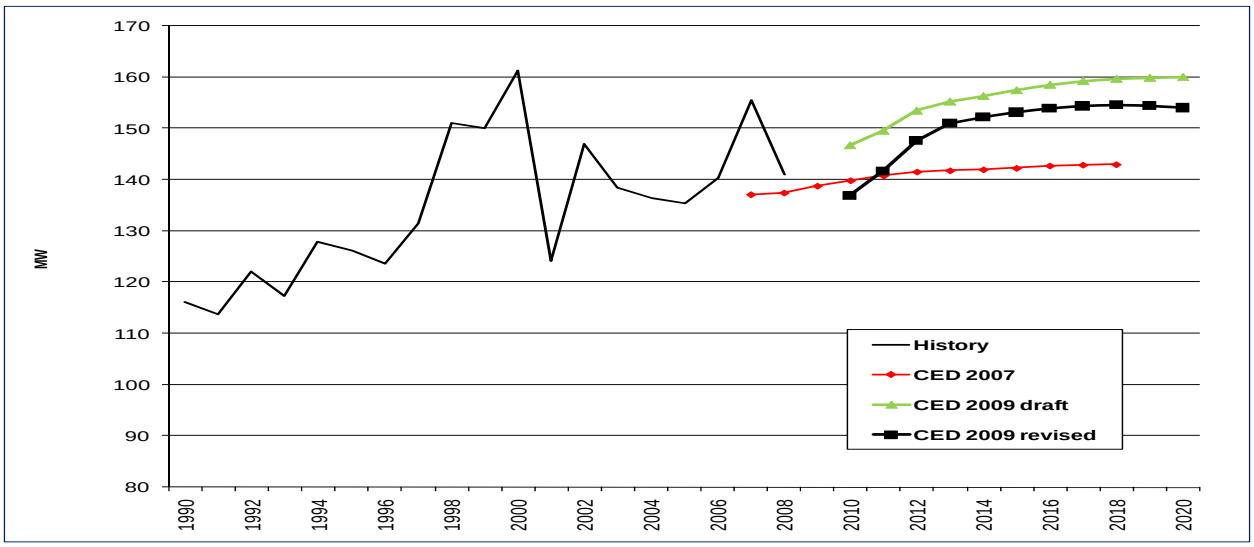
Figure 115: SMUD Planning Area Industrial Consumption



Source: California Energy Commission, 2009

Figure 116 compares the industrial sector peak forecasts. The differences are similar to those in the consumption forecast, meaning a higher growth rate than in *CED 2007* once economic recovery has occurred.

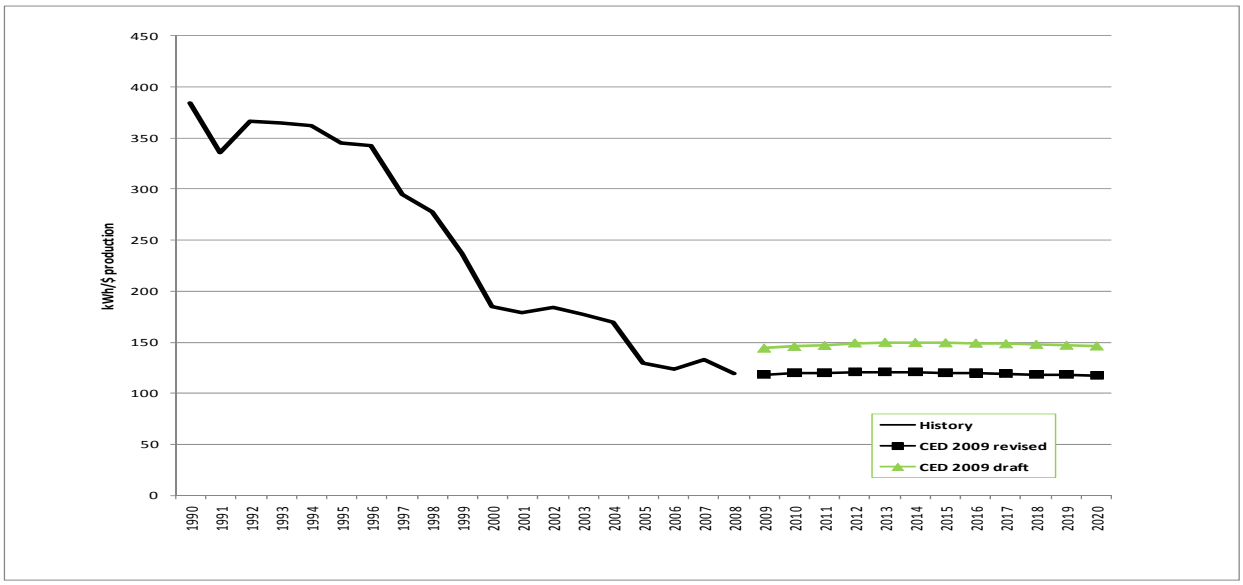
Figure 116: SMUD Planning Area Industrial Sector Peak



Source: California Energy Commission, 2009

Figure 117 compares use per dollar value of production between the revised and draft *CED 2009* forecasts. *CED 2009 Revised* has a lower level of electricity use per dollar of industrial value added than *CED 2009 Draft*. This is primarily caused by a lower historical starting point due to inclusion of 2008 consumption history, which reflects the current economic climate. The forecasted growth rates are similar in both forecasts.

Figure 117: SMUD Planning Area Industrial Use per Production Unit



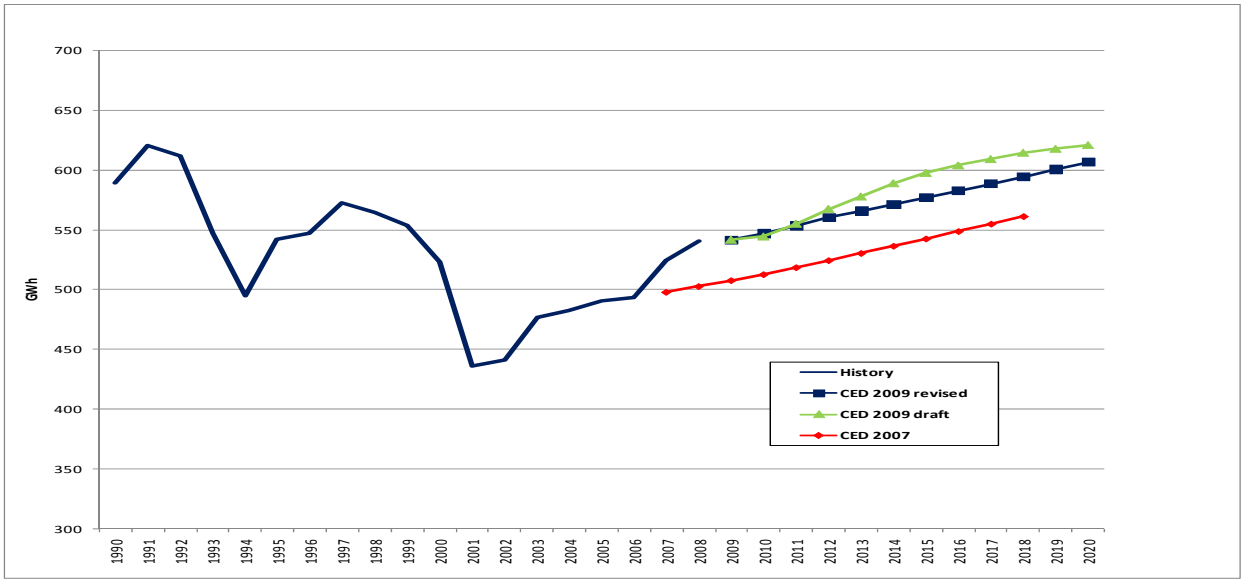
Source: California Energy Commission, 2009

Other Sectors

Figures 118 and **119** compare the remaining sector electricity consumption forecasts. **Figure 118** shows the transportation, communication, and utilities (TCU) sector forecasts. *CED 2009 Revised* is the same as *CED 2009 Draft* in the early years, with the inclusion of 2008 consumption history, but lower economic projections reduce the long-term growth rate.

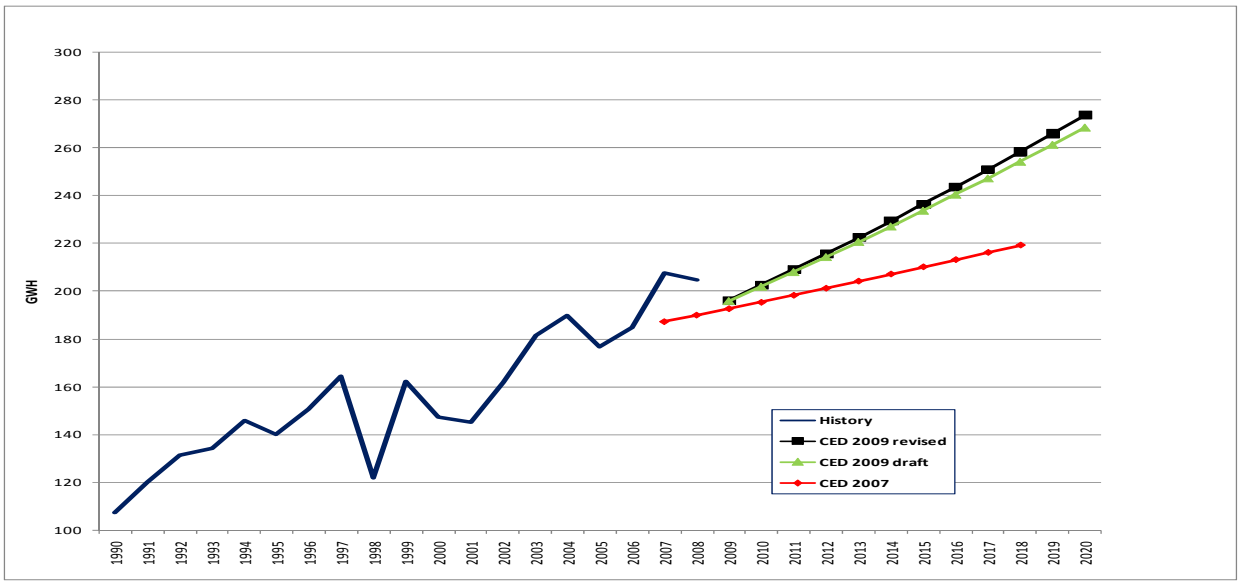
Figure 119 provides comparisons of the agriculture and water pumping sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of higher estimated historical consumption, but the increase is tempered by limitations on water that is available to pump.

Figure 118: SMUD Planning Area Transportation, Communication and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2009

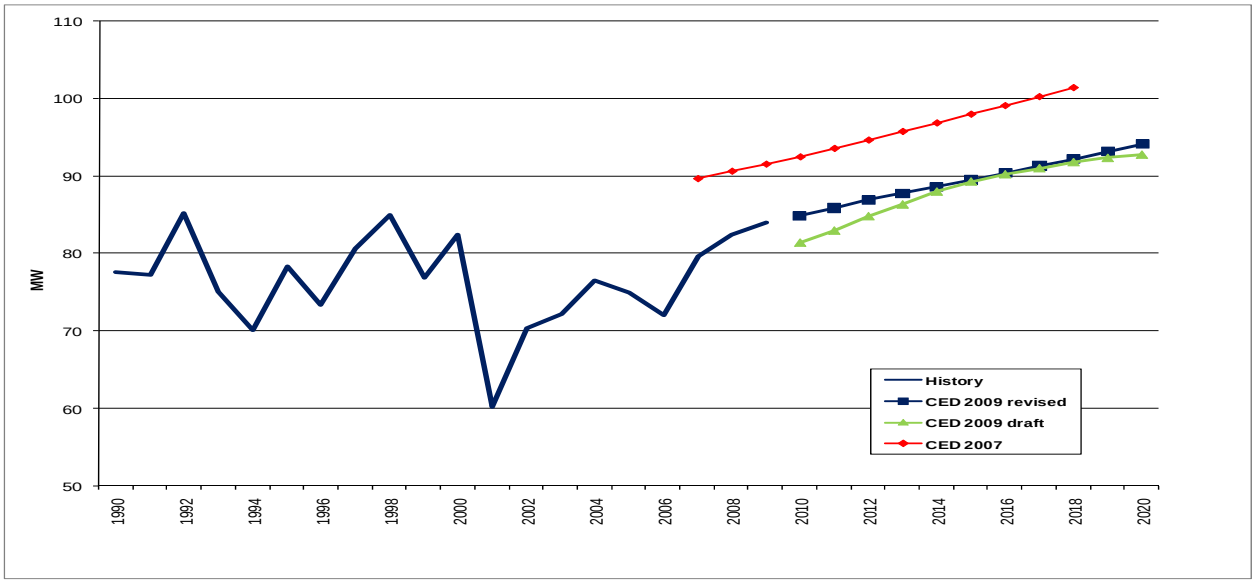
Figure 119: SMUD Planning Area Agriculture and Water Pumping Forecasts



Source: California Energy Commission, 2009

Figure 120 compares combined peaks for the TCU and street lighting sectors. *CED 2009 Revised* is slightly higher than *CED 2009 Draft* until the mid-years of the forecast. *CED 2009 Revised* is still noticeably lower than *CED 2007*.

Figure 120: SMUD Planning Area Other Sector Peak



Source: California Energy Commission, 2009

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Chapter 1. The effects of these programs are forecast based on recent trends in installations. Based on current trends, staff projects about 14 MW of peak reduction from photovoltaic systems by 2020. Annual values for the SMUD planning area are reported in Form 1.2 at the end of this chapter, and available in spreadsheet form on the Energy Commission's website.

Economic Scenarios

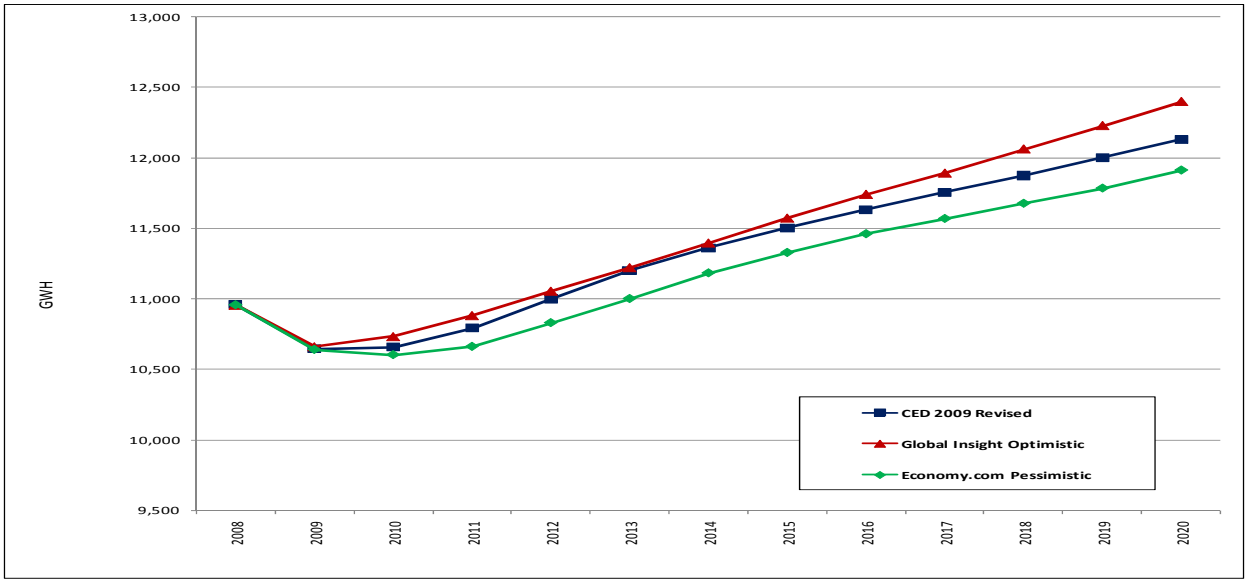
The results presented above rely on economic inputs from the *base case* Economy.com scenario. Staff also examined the effects of two alternative economic scenarios for electricity demand: an *optimistic* case provided by Global Insight and an Economy.com *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth among the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models.

The estimated models were run for SMUD for the two economic scenarios as well as the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2007 Revised* consumption projections. **Figure 121** shows the projected impacts of the optimistic and pessimistic scenarios on SMUD consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 122**.

Electricity consumption is projected to be 2.2 percent higher in the optimistic economic case than in *CED 2009 Revised* by 2020 and 1.8 percent lower in the pessimistic scenario. The peak demand forecast increases by 2.05 percent under the optimistic scenario by 2020 and falls by 2.1 percent in the pessimistic case. The percentage peak reduction is higher than that of consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Annual growth rates from 2010-2020 for electricity consumption and peak demand increase from 1.2 percent each to 1.3 percent in the optimistic case and fall to 1.0 percent each under the pessimistic scenario.

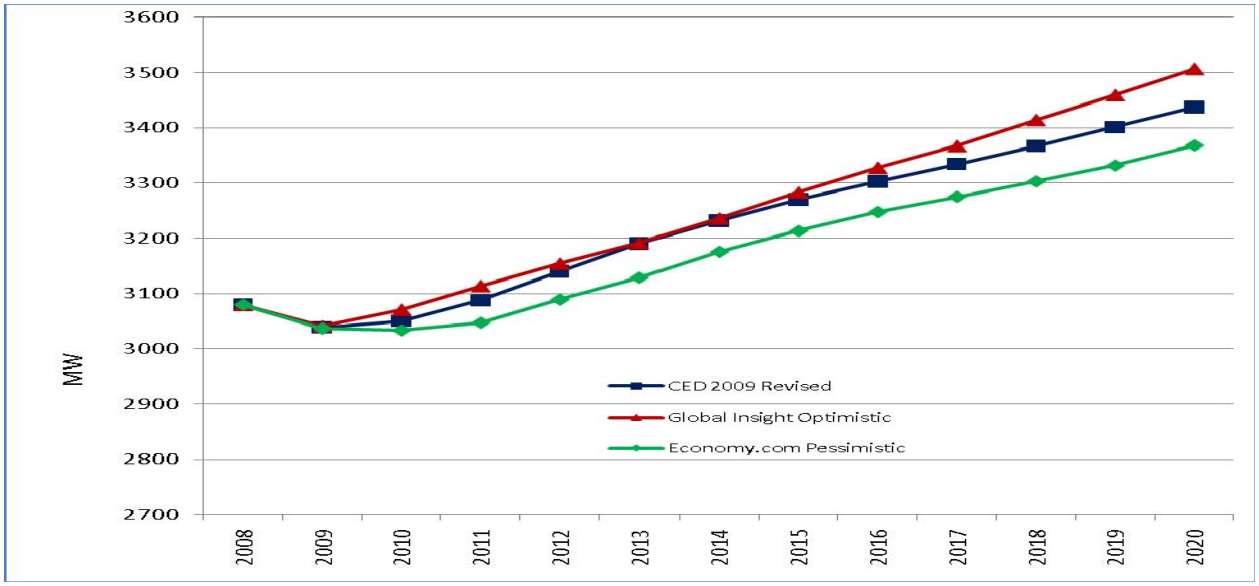
Changes in consumption and peak demand are small compared to *CED 2009 Revised* totals in percentage terms, and this is a reflection of the relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020.

Figure 121: Projected SMUD Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 122: Projected SMUD Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Staff spent a great deal of effort refining methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Tables 23** and **24** show electricity consumption and peak savings estimates for selected years, for building and appliance standards, utility and public agency programs, and *naturally occurring* savings, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts from rate changes and standards. Chapter 8 provides much more detail on staff work related to energy efficiency and conservation.

Table 23: SMUD Planning Area Electricity Consumption Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	423	551	641	712	746	793	857
Appliance Standards	163	374	533	705	794	905	1,023
Utility and Public Agency Programs	208	259	255	366	378	293	223
Naturally Occurring Savings	15	16	24	27	25	31	50
Total Residential Savings	809	1,200	1,455	1,810	1,944	2,022	2,153
Commercial Energy Savings							
Building Standards	72	143	247	368	399	482	570
Appliance Standards	39	81	128	186	196	230	260
Utility and Public Agency Programs*	5	55	55	93	114	87	74
Naturally Occurring Savings	631	575	789	874	891	1,012	1,200
Total Commercial Savings	747	854	1,219	1,521	1,600	1,811	2,104
Total Energy Savings	1,556	2,054	2,674	3,331	3,544	3,833	4,257

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Table 24: SMUD Planning Area Electricity Peak Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	131	191	216	250	268	286	311
Appliance Standards	51	130	179	247	286	327	372
Utility and Public Agency Programs	65	90	86	128	136	106	81
Naturally Occurring Savings	5	6	8	9	9	11	18
Total Residential Savings	252	416	489	635	700	730	782
Commercial Energy Savings							
Building Standards	16	33	57	80	87	105	123
Appliance Standards	9	19	30	40	43	50	56
Utility and Public Agency Programs*	1	13	13	20	25	19	16
Naturally Occurring Savings	138	133	184	190	195	221	260
Total Commercial Savings	163	198	284	331	351	395	455
Total Energy Savings	415	614	773	966	1,051	1,125	1,237

Source: California Energy Commission, 2009

*Commercial programs also include agricultural program savings.

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption and peak demand from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids. More details for this forecast are provided in Chapter 1. The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

Table 25 shows the resulting projections for electricity consumption and peak demand, by sector, for the SMUD planning area. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter. The survey also indicated that commercial establishments were much less willing to purchase electric vehicles than private households, so consumption is heavily weighted to the residential sector.

Table 25: SMUD Electric Vehicle Forecast

	Residential		Commercial	
Year	GWH	MW	GWH	MW
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	4	0	1	0
2012	10	0	1	0
2013	25	1	2	0
2014	45	2	3	0
2015	66	3	3	0
2016	85	4	4	0
2017	102	4	4	0
2018	122	5	5	0
2019	141	6	5	0
2020	160	7	5	0

Source: California Energy Commission, 2009

Form 1.1 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Street lighting	Total Consumption
1990	3,611	0	3,138	0	721	124	107	589	67	8,358
1991	3,603	0	3,083	0	721	133	120	620	68	8,349
1992	3,626	0	3,208	0	748	103	131	611	68	8,496
1993	3,636	0	3,216	0	734	100	134	547	68	8,435
1994	3,663	0	3,207	0	727	110	146	495	71	8,419
1995	3,604	0	3,269	0	720	112	140	542	72	8,459
1996	3,808	0	3,342	0	769	116	151	547	75	8,807
1997	3,840	0	3,465	0	773	119	164	572	75	9,009
1998	3,960	0	3,438	0	829	138	122	564	75	9,126
1999	3,967	0	3,552	0	850	165	162	553	80	9,330
2000	4,136	0	3,597	0	843	167	147	523	81	9,494
2001	4,021	0	3,513	0	737	146	145	436	79	9,076
2002	4,089	0	3,694	0	781	145	162	441	79	9,391
2003	4,363	0	3,923	0	784	125	181	476	80	9,933
2004	4,429	0	4,073	0	778	129	190	482	80	10,161
2005	4,558	0	4,315	0	787	128	177	490	81	10,536
2006	4,750	0	4,342	0	866	129	185	493	80	10,846
2007	4,638	0	4,367	0	918	136	208	525	85	10,877
2008	4,704	0	4,466	0	826	129	205	541	85	10,956
2009	4,621	0	4,294	0	799	106	196	542	86	10,644
2010	4,617	0	4,279	0	824	100	203	547	87	10,656
2011	4,668	4	4,321	1	848	105	209	554	88	10,793
2012	4,749	10	4,394	1	878	112	216	561	89	10,998
2013	4,840	25	4,472	2	893	117	222	566	90	11,200
2014	4,928	45	4,524	3	899	118	229	572	91	11,361
2015	5,010	66	4,565	3	904	119	236	577	92	11,504
2016	5,088	85	4,596	4	909	120	244	583	93	11,632
2017	5,163	102	4,625	4	912	120	251	589	94	11,754
2018	5,240	122	4,654	5	913	120	258	595	95	11,875
2019	5,320	141	4,685	5	913	120	266	601	96	12,001
2020	5,407	160	4,716	5	911	119	274	607	97	12,131

* Residential and commercial electric vehicle consumption included in residential and commercial totals.

Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)

1990-2000	1.37%	0.00%	1.37%	0.00%	1.57%	3.03%	3.21%	-1.19%	1.93%	1.28%
2000-2008	1.62%	0.00%	2.74%	0.00%	-0.26%	-3.19%	4.19%	0.42%	0.67%	1.81%
2008-2010	-0.94%	46.45%	-2.12%	-10.01%	-0.12%	-12.02%	-0.53%	0.61%	1.08%	-1.38%
2010-2020	1.59%	84.29%	0.98%	32.15%	1.01%	1.78%	3.06%	1.04%	1.08%	1.30%

Form 1.1b - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street lighting	Total Sales
1990	3,611	3,138	721	124	107	589	67	8,358
1991	3,603	3,083	721	133	120	620	68	8,349
1992	3,626	3,208	748	103	131	611	68	8,496
1993	3,636	3,216	734	100	134	547	68	8,435
1994	3,662	3,207	727	110	146	495	71	8,418
1995	3,604	3,268	719	112	140	542	72	8,458
1996	3,808	3,342	768	116	151	547	75	8,805
1997	3,839	3,464	772	119	164	572	75	9,006
1998	3,959	3,437	828	138	122	564	75	9,123
1999	3,966	3,551	849	165	162	553	80	9,326
2000	4,135	3,596	842	167	147	523	81	9,491
2001	4,019	3,511	735	146	145	436	79	9,070
2002	4,087	3,692	778	145	162	441	79	9,383
2003	4,361	3,921	780	125	181	476	80	9,924
2004	4,426	4,070	773	129	190	482	80	10,150
2005	4,554	4,311	781	128	177	490	81	10,523
2006	4,747	4,336	860	129	184	493	80	10,829
2007	4,634	4,360	912	136	207	524	85	10,860
2008	4,700	4,458	818	129	205	540	85	10,935
2009	4,616	4,285	790	106	196	542	86	10,620
2010	4,610	4,269	814	100	202	547	87	10,629
2011	4,661	4,310	836	105	209	553	88	10,762
2012	4,741	4,382	865	112	216	560	89	10,964
2013	4,830	4,459	879	117	222	566	90	11,164
2014	4,918	4,511	883	118	229	571	91	11,322
2015	4,999	4,551	887	119	236	577	92	11,461
2016	5,076	4,581	890	120	243	583	93	11,586
2017	5,150	4,609	892	120	251	588	94	11,704
2018	5,227	4,637	893	120	258	594	95	11,825
2019	5,307	4,668	892	120	266	600	96	11,949
2020	5,393	4,699	890	119	273	607	97	12,079

Last historic year is 2008. Sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	1.36%	1.37%	1.55%	3.03%	3.21%	-1.19%	1.93%	1.28%
2000-2008	1.61%	2.72%	-0.35%	-3.20%	4.17%	0.42%	0.67%	1.79%
2008-2010	-0.96%	-2.14%	-0.29%	-12.03%	-0.53%	0.61%	1.08%	-1.41%
2010-2020	1.58%	0.97%	0.90%	1.78%	3.06%	1.04%	1.08%	1.29%

Form 1.2 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	8,358	535	8,893	0	0	0	8,893
1991	8,349	534	8,884	0	0	0	8,884
1992	8,496	544	9,040	0	0	0	9,040
1993	8,435	540	8,974	0	0	0	8,974
1994	8,419	539	8,958	0	1	1	8,957
1995	8,459	541	9,000	0	2	2	8,999
1996	8,807	564	9,371	0	2	2	9,369
1997	9,009	576	9,586	0	3	3	9,583
1998	9,126	584	9,710	0	3	3	9,707
1999	9,330	597	9,927	0	3	3	9,923
2000	9,494	607	10,102	0	4	4	10,098
2001	9,076	580	9,656	0	6	6	9,650
2002	9,391	601	9,991	0	8	8	9,983
2003	9,933	635	10,568	0	9	9	10,559
2004	10,161	650	10,811	0	11	11	10,800
2005	10,536	673	11,209	0	13	13	11,196
2006	10,846	693	11,539	2	15	17	11,522
2007	10,877	695	11,572	2	16	17	11,555
2008	10,956	700	11,656	2	19	21	11,635
2009	10,644	680	11,324	2	22	24	11,299
2010	10,656	680	11,336	2	25	28	11,309
2011	10,793	689	11,482	2	28	31	11,451
2012	10,998	702	11,699	2	31	34	11,666
2013	11,200	714	11,915	2	34	37	11,878
2014	11,361	725	12,086	2	37	40	12,046
2015	11,504	734	12,237	2	40	43	12,195
2016	11,632	742	12,373	3	43	46	12,327
2017	11,754	749	12,503	3	47	49	12,454
2018	11,875	757	12,632	3	47	50	12,582
2019	12,001	765	12,765	3	48	51	12,714
2020	12,131	773	12,904	3	49	52	12,852

Loss Factor 0.135

Annual Growth Rates (%)

1990-2000	1.28%	1.28%	1.28%	0.00%	0.00%	0.00%	1.28%
2000-2008	1.81%	1.79%	1.80%	0.00%	22.30%	23.66%	1.79%
2008-2010	-1.38%	-1.41%	-1.38%	13.09%	14.25%	14.15%	-1.41%
2010-2020	1.30%	1.29%	1.30%	1.98%	6.93%	6.59%	1.29%

Form 1.3 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	1,122	0	686	0.00	116	11	78	2,013
1991	1,155	0	654	0.00	114	12	77	2,012
1992	1,039	0	693	0.00	122	15	85	1,953
1993	1,118	0	667	0.00	117	15	75	1,992
1994	983	0	701	0.00	128	17	70	1,899
1995	1,134	0	710	0.00	126	16	78	2,065
1996	1,284	0	708	0.00	124	15	73	2,204
1997	1,277	0	762	0.00	131	18	81	2,268
1998	1,373	0	797	0.00	151	14	85	2,420
1999	1,508	0	811	0.00	150	17	77	2,563
2000	1,402	0	834	0.00	161	17	82	2,497
2001	1,343	0	766	0.00	124	15	60	2,308
2002	1,459	0	886	0.00	147	18	70	2,581
2003	1,466	0	913	0.00	138	19	72	2,609
2004	1,326	0	923	0.00	136	20	77	2,482
2005	1,525	0	997	0.00	135	18	75	2,750
2006	1,814	0	1,002	0.00	140	18	72	3,047
2007	1,621	0	1,001	0.02	156	21	80	2,879
2008	1,651	0	972	0.02	141	21	82	2,866
2009	1,646	0	944	0.01	135	20	84	2,829
2010	1,659	0	940	0.01	137	21	85	2,841
2011	1,680	0	947	0.02	142	21	86	2,876
2012	1,707	0	962	0.04	148	22	87	2,926
2013	1,735	1	978	0.08	151	22	88	2,973
2014	1,762	2	987	0.11	152	23	89	3,013
2015	1,789	3	994	0.14	153	24	89	3,049
2016	1,812	4	999	0.17	154	24	90	3,080
2017	1,836	4	1,004	0.19	154	25	91	3,111
2018	1,860	5	1,009	0.20	155	25	92	3,141
2018	1,886	6	1,014	0.21	154	26	93	3,173
2020	1,913	7	1,019	0.21	154	27	94	3,207

* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)								
1990-2000	2.25%	0.00%	1.98%	0.00%	3.34%	4.03%	0.60%	2.18%
2000-2008	2.06%	0.00%	1.93%	0.00%	-1.66%	2.66%	-0.01%	1.74%
2008-2010	0.25%	46.45%	-1.67%	-10.01%	-1.44%	-0.05%	1.49%	-0.45%
2010-2020	1.44%	84.29%	0.82%	32.15%	1.18%	2.60%	1.04%	1.22%

Form 1.4 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	2,013	154	2,167	0.00	0	0	2,167	47
1991	2,012	154	2,166	0.00	0	0	2,166	47
1992	1,953	150	2,103	0.00	0	0	2,103	49
1993	1,992	153	2,145	0.00	0	0	2,145	48
1994	1,899	145	2,044	0.00	0	0	2,044	50
1995	2,065	158	2,223	0.00	0	0	2,223	46
1996	2,204	169	2,373	0.00	1	1	2,372	45
1997	2,268	174	2,442	0.00	1	1	2,441	45
1998	2,420	185	2,605	0.00	1	1	2,604	43
1999	2,563	196	2,759	0.00	1	1	2,758	41
2000	2,497	191	2,688	0.00	1	1	2,687	43
2001	2,308	177	2,485	0.00	2	2	2,483	44
2002	2,581	198	2,779	0.00	2	2	2,777	41
2003	2,609	200	2,809	0.00	2	2	2,806	43
2004	2,482	190	2,672	0.03	3	3	2,669	46
2005	2,750	210	2,960	0.06	4	4	2,956	43
2006	3,047	233	3,280	0.29	4	4	3,275	40
2007	2,879	220	3,099	0.31	4	5	3,094	43
2008	2,866	219	3,086	0.32	5	6	3,080	43
2009	2,829	216	3,045	0.32	6	7	3,039	42
2010	2,841	217	3,058	0.37	7	7	3,050	42
2011	2,876	220	3,096	0.38	8	8	3,088	42
2012	2,926	223	3,149	0.38	9	9	3,140	42
2013	2,973	227	3,200	0.39	10	10	3,190	43
2014	3,013	230	3,243	0.40	10	11	3,232	43
2015	3,049	233	3,282	0.40	11	12	3,270	43
2016	3,080	235	3,315	0.41	12	13	3,302	43
2017	3,111	237	3,348	0.42	13	13	3,334	43
2018	3,141	240	3,381	0.43	13	14	3,367	43
2019	3,173	242	3,415	0.44	14	14	3,401	43
2020	3,207	245	3,452	0.45	14	14	3,438	43

Loss Factor 0.0766

Annual Growth Rates (%)

1990-2000	2.18%	2.17%	2.18%	0.00%	0.00%	0.00%	2.17%	-0.87%
2000-2008	1.74%	1.72%	1.74%	0.00%	22.30%	23.17%	1.72%	0.06%
2008-2010	-0.45%	-0.48%	-0.45%	8.68%	14.25%	13.95%	-0.48%	-0.94%
2010-2020	1.22%	1.20%	1.22%	1.87%	6.93%	6.73%	1.20%	0.08%

Form 1.5 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Extreme Temperature Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2008	3,080	3,303	3,366	3,421	1.0725	1.0930	1.1108
2009	3,039	3,259	3,321	3,375	1.0725	1.0930	1.1108
2010	3,050	3,271	3,334	3,388	1.0725	1.0930	1.1108
2011	3,088	3,312	3,375	3,430	1.0725	1.0930	1.1108
2012	3,140	3,367	3,432	3,488	1.0725	1.0930	1.1108
2013	3,190	3,422	3,487	3,544	1.0725	1.0930	1.1108
2014	3,232	3,466	3,533	3,590	1.0725	1.0930	1.1108
2015	3,270	3,507	3,574	3,632	1.0725	1.0930	1.1108
2016	3,302	3,542	3,609	3,668	1.0725	1.0930	1.1108
2017	3,334	3,576	3,644	3,704	1.0725	1.0930	1.1108
2018	3,367	3,611	3,680	3,740	1.0725	1.0930	1.1108
2019	3,401	3,648	3,717	3,778	1.0725	1.0930	1.1108
2020	3,438	3,687	3,757	3,819	1.0725	1.0930	1.1108

Form 1.7a - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	0	0	0	0.00	0.00	0.00	0.00	0
1991	0	0	0	0.00	0.00	0.00	0.00	0
1992	0	0	0	0.00	0.00	0.00	0.00	0
1993	0	0	0	0.00	0.00	0.00	0.00	0
1994	0	0	1	0.00	0.00	0.00	0.00	1
1995	1	0	1	0.00	0.00	0.00	0.00	2
1996	1	1	1	0.00	0.00	0.00	0.00	2
1997	1	1	1	0.00	0.00	0.00	0.00	3
1998	1	1	1	0.00	0.00	0.00	0.00	3
1999	1	1	2	0.00	0.00	0.00	0.00	3
2000	1	1	2	0.00	0.00	0.00	0.00	4
2001	2	1	3	0.00	0.00	0.00	0.00	6
2002	2	2	4	0.00	0.00	0.00	0.00	8
2003	3	2	4	0.00	0.00	0.00	0.00	9
2004	3	3	5	0.00	0.09	0.06	0.00	11
2005	3	4	5	0.01	0.10	0.10	0.00	13
2006	4	7	6	0.05	0.16	0.35	0.00	17
2007	4	7	6	0.05	0.17	0.36	0.00	17
2008	5	8	8	0.05	0.18	0.36	0.00	21
2009	6	9	9	0.05	0.18	0.37	0.00	24
2010	6	10	10	0.05	0.18	0.37	0.00	28
2011	7	11	12	0.05	0.18	0.37	0.00	31
2012	8	12	13	0.05	0.18	0.37	0.00	34
2013	9	12	14	0.05	0.19	0.37	0.00	37
2014	10	13	16	0.05	0.20	0.37	0.00	40
2015	11	14	17	0.05	0.21	0.37	0.00	43
2016	12	15	19	0.05	0.22	0.37	0.00	46
2017	13	16	20	0.05	0.22	0.37	0.00	49
2018	13	16	20	0.05	0.23	0.37	0.00	50
2019	13	16	21	0.05	0.24	0.37	0.00	51
2020	14	17	21	0.05	0.25	0.37	0.00	52

Annual Growth Rates (%)

1990-2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000-2008	18.68%	32.16%	19.74%	0.00%	0.00%	0.00%	0.00%	23.66%
2008-2010	17.83%	10.58%	16.71%	0.43%	1.04%	0.39%	0.00%	14.15%
2010-2020	7.70%	5.14%	7.44%	0.00%	3.40%	0.13%	0.00%	6.59%

Form 2.2 - SMUD Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Household Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2007$)	Commercial Floorspace (MM Sqft.)
1990	1,018,434	396,134	2.57	30,833	2,200	173
1991	1,051,318	407,886	2.58	30,889	2,516	178
1992	1,068,645	415,085	2.58	31,521	2,390	184
1993	1,083,912	421,153	2.57	31,227	2,358	188
1994	1,090,145	427,082	2.55	31,986	2,353	191
1995	1,095,153	432,887	2.53	33,106	2,443	194
1996	1,109,748	438,011	2.53	33,406	2,628	197
1997	1,123,820	440,189	2.55	34,696	3,066	200
1998	1,140,219	443,015	2.57	36,996	3,489	205
1999	1,179,071	449,589	2.62	38,608	4,191	210
2000	1,205,302	455,605	2.65	41,199	5,321	216
2001	1,244,648	464,057	2.68	42,903	4,818	222
2002	1,277,346	474,117	2.69	43,922	4,945	227
2003	1,306,513	484,835	2.70	45,449	5,159	233
2004	1,331,629	495,584	2.69	47,177	5,328	238
2005	1,352,292	506,611	2.67	48,098	7,056	244
2006	1,370,908	516,357	2.66	49,367	8,124	247
2007	1,389,506	523,717	2.65	50,157	8,041	253
2008	1,404,712	528,387	2.66	50,047	8,028	256
2009	1,419,826	534,072	2.66	49,497	7,839	259
2010	1,435,101	539,818	2.66	49,181	7,983	261
2011	1,450,536	545,624	2.66	49,772	8,184	263
2012	1,466,135	551,492	2.66	51,152	8,431	267
2013	1,481,898	557,421	2.66	52,541	8,572	270
2014	1,497,828	563,413	2.66	53,683	8,642	274
2015	1,513,927	569,469	2.66	54,692	8,726	278
2016	1,530,195	575,588	2.66	55,726	8,807	281
2017	1,546,636	581,772	2.66	56,780	8,876	284
2018	1,563,250	588,022	2.66	57,827	8,933	288
2019	1,580,040	594,337	2.66	58,880	8,969	291
2020	1,597,008	600,720	2.66	59,922	8,995	294

Annual Growth Rates (%)						
1990-2000	1.70%	1.41%	0.31%	2.94%	9.23%	2.23%
2000-2008	1.93%	1.87%	0.05%	2.46%	5.28%	2.15%
2008-2010	1.08%	1.08%	0.00%	-0.87%	-0.28%	0.95%
2010-2020	1.07%	1.07%	0.00%	1.99%	1.20%	1.21%

Form 2.3 Electricity Prices (2007$) - SMUD					
YEAR	Residential		Commercial		Industrial
1990	10.68		12.60		10.54
1991	10.29		12.31		10.26
1992	10.08		11.69		10.08
1993	9.20		11.39		9.15
1994	9.43		10.54		8.92
1995	9.40		10.32		8.96
1996	9.38		10.14		8.83
1997	8.59		9.91		8.59
1998	8.49		9.78		8.56
1999	8.37		9.67		8.52
2000	8.19		9.47		8.28
2001	9.35		10.96		9.75
2002	9.17		11.57		9.83
2003	10.22		11.20		9.50
2004	12.03		10.72		9.09
2005	12.10		10.78		9.06
2006	11.97		10.71		8.97
2007	11.54		10.37		8.73
2008	11.91		10.79		9.07
2009	11.95		10.98		9.24
2010	11.95		10.98		9.24
2011	12.07		11.09		9.33
2012	12.19		11.20		9.42
2013	12.30		11.30		9.51
2014	12.43		11.42		9.61
2015	12.55		11.53		9.70
2016	12.78		11.74		9.88
2017	13.01		11.95		10.06
2018	13.25		12.17		10.25
2019	13.49		12.40		10.43
2020	13.74		12.63		10.63

CHAPTER 6: Los Angeles Department of Water and Power Planning Area

The Los Angeles Department of Water and Power (LADWP) planning area includes LADWP bundled retail customers and customers served by any energy service providers (ESPs) using the LADWP distribution system to deliver electricity to end users.

This chapter first discusses forecasted consumption and peak loads for the LADWP planning area; both total and per capita values are presented. *CED 2009 Revised* values are compared to both *CED 2009 Draft* and *CED 2007* and differences between forecasts are explained. The forecasted load factor, jointly determined by the consumption and peak load estimates, is also discussed. Next, the chapter presents sector consumption and peak load forecasts. Residential, commercial, industrial, and other sector forecasts are compared, and differences are discussed.

For *CED 2009 Draft*, three price scenarios were developed for electricity rates: high rates, low (constant) rates, and a *mid-rate* scenario in between the two. The high-rate case assumed approximately 30 percent higher rates by 2020 relative to 2010, while the mid-rate case assumed 15 percent higher rates over the same period. In the low-rate case, rates remained at 2010 levels through 2020 as was done in *CED 2007*. In *CED 2009 Revised,* the mid-rate price forecast is used and all comparisons to *CED 2009 Draft* are made to the mid-rate scenario. Chapter 1 provides more detail on price assumptions.

Forecast Results

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* forecasts of LADWP planning area electricity consumption and peak demand are higher than *CED 2007* levels by 2018.
- Although projected total consumption and peak are higher, per capita electricity consumption and peak demand are forecast to be lower than in *CED 2007* because LADWP planning area population is assumed to make up a higher share of the projected state total than in *CED 2007*.
- Residential and industrial electricity consumption and peak are higher than in *CED 2007*; commercial consumption is lower, but peak demand higher than in *CED 2007*.
- Alternative economic scenarios increase or decrease electricity consumption and peak demand by 2.2 and 2.6 percent, respectively, in 2020.
- Self-generation impacts are projected to be higher than in *CED 2007* and *CED 2009 Draft* mainly because of increased adoption of photovoltaic systems.

- Electric vehicles are projected to increase electricity consumption by more than 400 GWH in 2020.

Table 26 compares planning area electricity consumption and peak demand forecasts for selected years. The revised electricity consumption forecast is higher than *CED 2009 Draft* by more than 8 percent by the end of the forecast period. This is caused by economic forecast revisions specific to the LADWP planning area, inclusion of an electric vehicle forecast, and use of June 2009 Economy.com data. *CED 2009 Revised* consumption is now over 1 percent higher than *CED 2007* by the end of the period. *CED 2009 Revised* peak is now higher than both previous forecasts after 2012. The *CED 2009 Revised* peak is over 3 percent higher than *CED 2007* and 2.7 percent higher than *CED 2009 Draft* by 2018. The larger increase in the peak forecast relative to the changes in consumption comes from efficiency programs, which have a greater impact on overall consumption than peak. Forecasted long-term growth rates of both consumption and peak are now higher than the two previous forecasts.

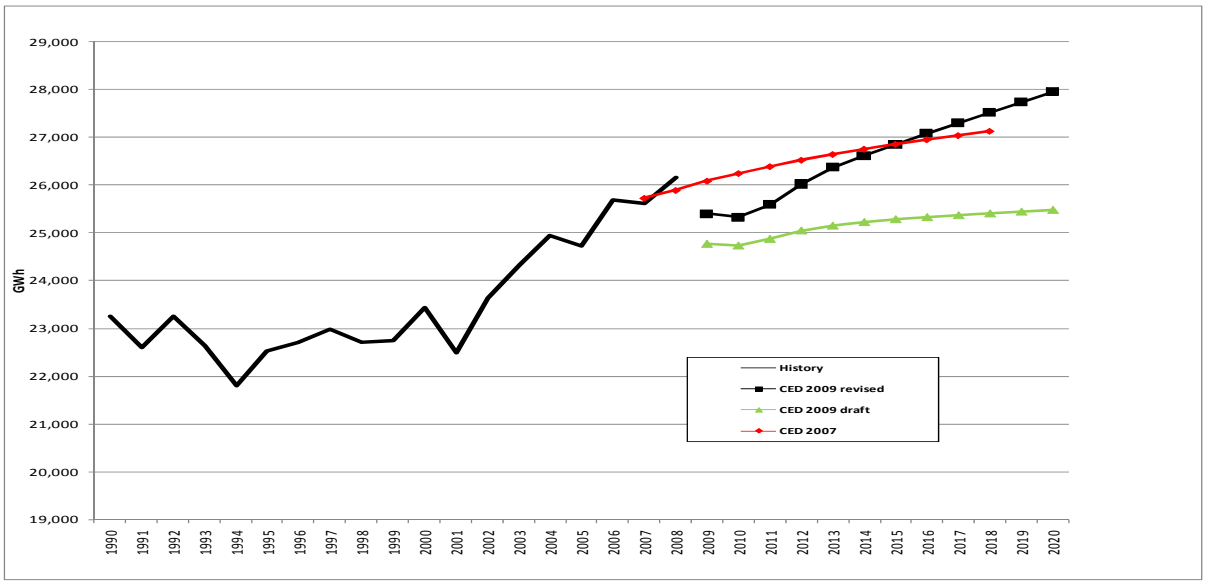
Table 26: LADWP Planning Area Forecast Comparison

Consumption (GWH)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	23,263	23,263	23,263	0.00%	0.00%
2000	23,437	23,437	23,438	0.00%	0.00%
2008	25,890	25,138	26,153	1.02%	4.04%
2010	26,241	24,729	25,326	-3.49%	2.41%
2015	26,846	25,279	26,841	-0.02%	6.18%
2018	27,120	25,401	27,507	1.43%	8.29%
Average Annual Growth Rates					
1990-2000	0.07%	0.07%	0.08%		
2000-2008	1.25%	0.88%	1.38%		
2008-2010	0.68%	-0.82%	-1.59%		
2010-2018	0.41%	0.34%	1.04%		
Peak (MW)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* mid-rate case (June 2009)	*CED 2009 Revised* (Oct. 2009)	Percent Difference, *CED 2009 Revised* and *CED 2007*	Percent Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	5,326	5,326	5,341	0.28%	0.28%
2000	5,325	5,325	5,344	0.36%	0.36%
2008	5,717	6,223	6,015	5.21%	-3.34%
2010	5,786	5,838	5,791	0.09%	-0.81%
2015	5,907	5,978	6,060	2.59%	1.37%
2018	5,966	6,008	6,168	3.39%	2.66%
Average Annual Growth Rates					
1990-2000	0.00%	0.00%	0.01%		
2000-2008	0.89%	1.97%	1.49%		
2008-2010	0.60%	-3.14%	-1.88%		
2010-2018	0.38%	0.36%	0.79%		
Historic values are shaded					

Source: California Energy Commission, 2009

As shown in **Figure 123**, *CED 2009 Revised* consumption is over 2 percent higher than *CED 2009 Draft* at the beginning of the forecast period and grows to more than 8 percent higher by the end of that period. The dip in the early years of *CED 2009 Revised* is caused by both revised economic projections and by expectations of increased savings from energy efficiency programs.

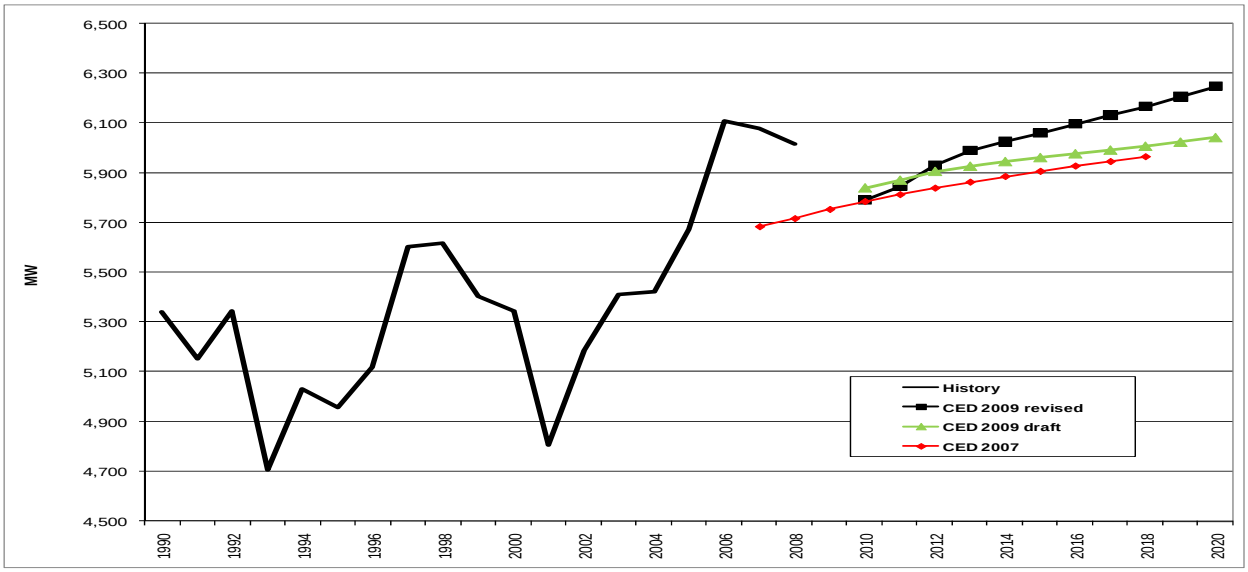
Figure 123: LADWP Planning Area Electricity Forecast



Source: California Energy Commission, 2009

The *CED 2009 Revised* LADWP planning area peak demand forecast, shown in **Figure 124**, is slightly lower than *CED 2009 Draft* at the start of the forecast period. It then grows to more than 2 percent higher than the previous two forecasts by the end of the forecast period.

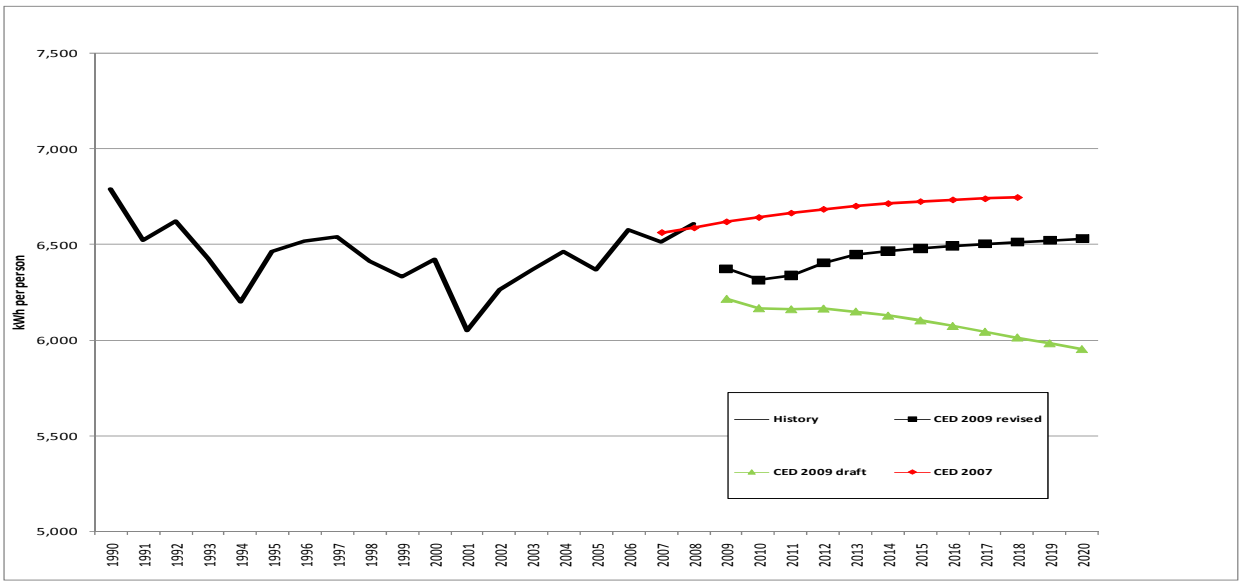
Figure 124: LADWP Planning Area Peak



Source: California Energy Commission, 2009

Figure 125 compares forecasted per capita electricity consumption. *CED 2009 Revised* per capita consumption is higher than in *CED 2009 Draft* but is well below the projections in *CED 2007*. The revised projections begin at a lower level than recently recorded history. *CED 2009 Revised* increases slightly after recovery from the current economic downturn primarily because of the inclusion of electric vehicle consumption after 2011.

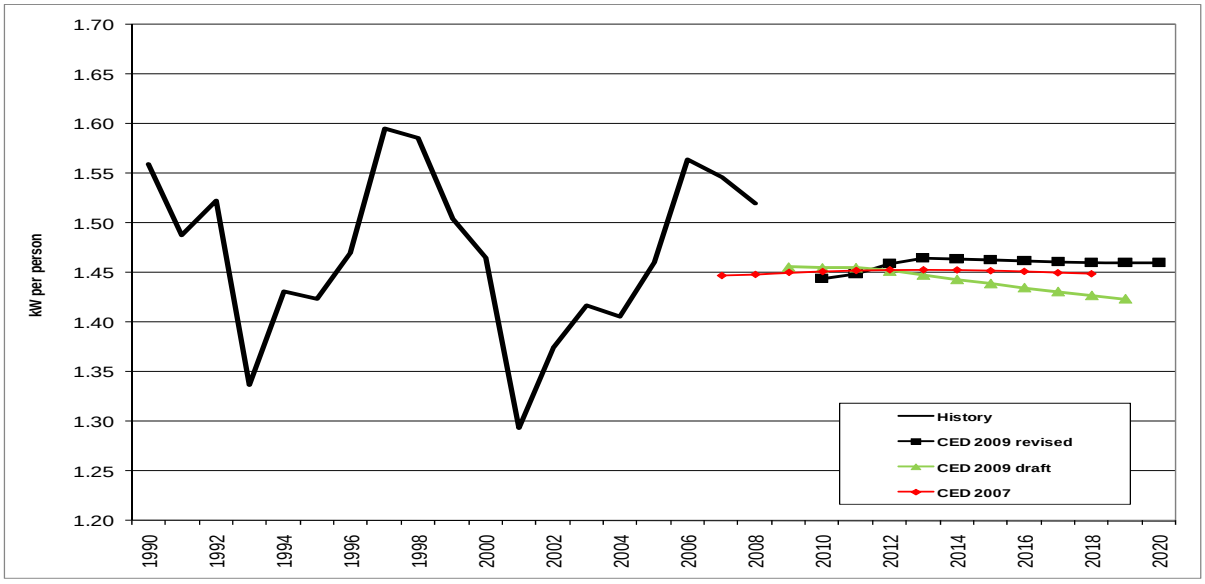
Figure 125: LADWP Planning Area per Capita Electricity Consumption



Source: California Energy Commission, 2009

CED 2009 Revised per capita peak demand, shown in **Figure 126**, is higher than *CED 2009 Draft* in the mid- to long-term. *CED 2009 Revised* per capita peak demand increases slightly in the mid-term, after which it is relatively constant over the remainder of the forecast period, in contrast to the decrease projected in the draft forecast.

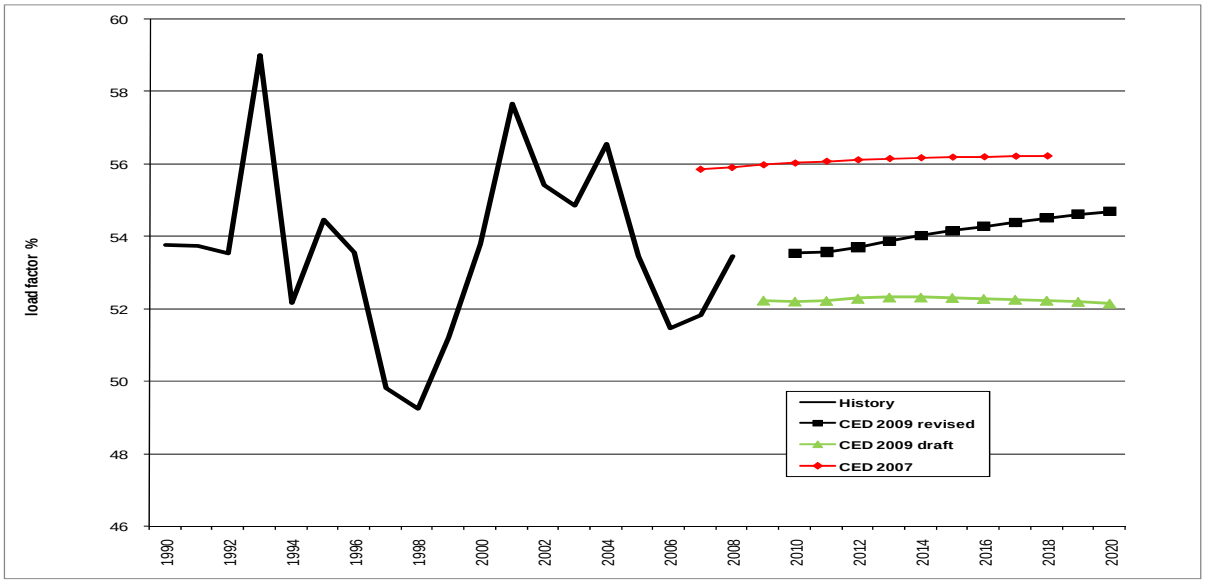
Figure 126: LADWP Planning Area per Capita Peak Demand



Source: California Energy Commission, 2009

Figure 127 compares the load factors of the three forecasts. The load factor represents the relationship between average energy demand and peak: the smaller the load factor, the greater the difference between peak and average hourly demand. The load factor varies with temperature; in extremely hot years (for example, 1998 and 2006) demand is *peakier*. The LADWP load factor has varied widely in recent history. The revised load factor is higher than the draft load factor and increases over the forecast period because of high relative growth in the commercial and industrial sectors, which are less *peaky* than the residential sector. Also contributing to the increase is the assumption of off-peak recharging of electric vehicles included in the forecast.

Figure 127: LADWP Planning Area Peak Load Factor



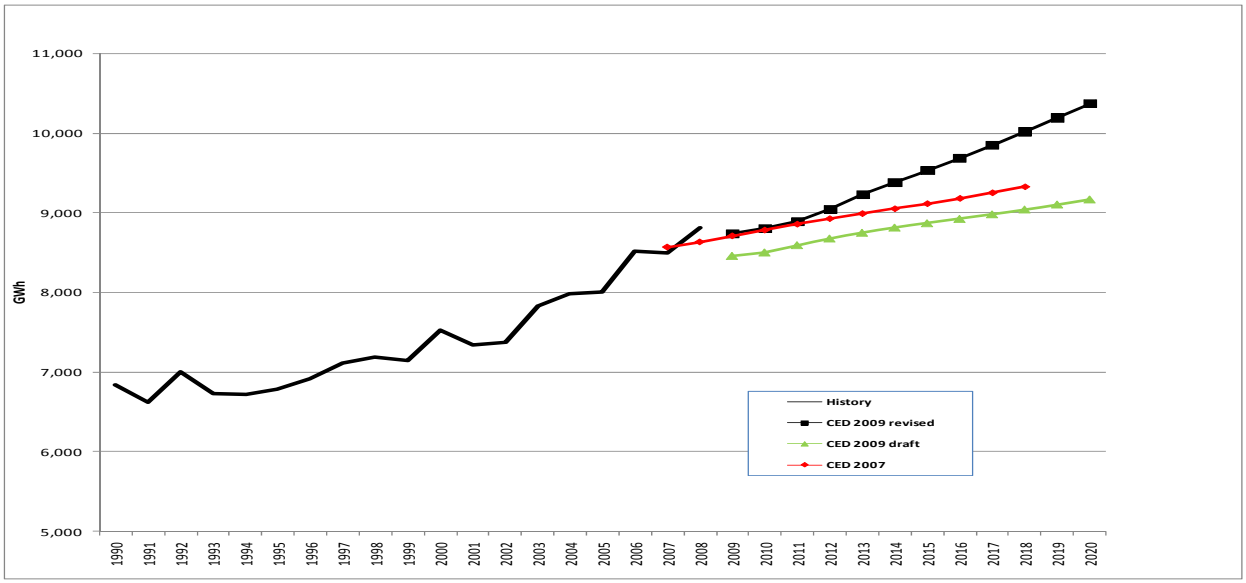
Source: California Energy Commission, 2009

Sector Level Results and Input Assumptions

Residential

Figure 128 compares residential forecasts. *CED 2009 Revised* is higher over the entire forecast period compared to *CED 2009 Draft*. The increase comes from higher projections of household income and slightly more projected households, corresponding to reduced persons per household.

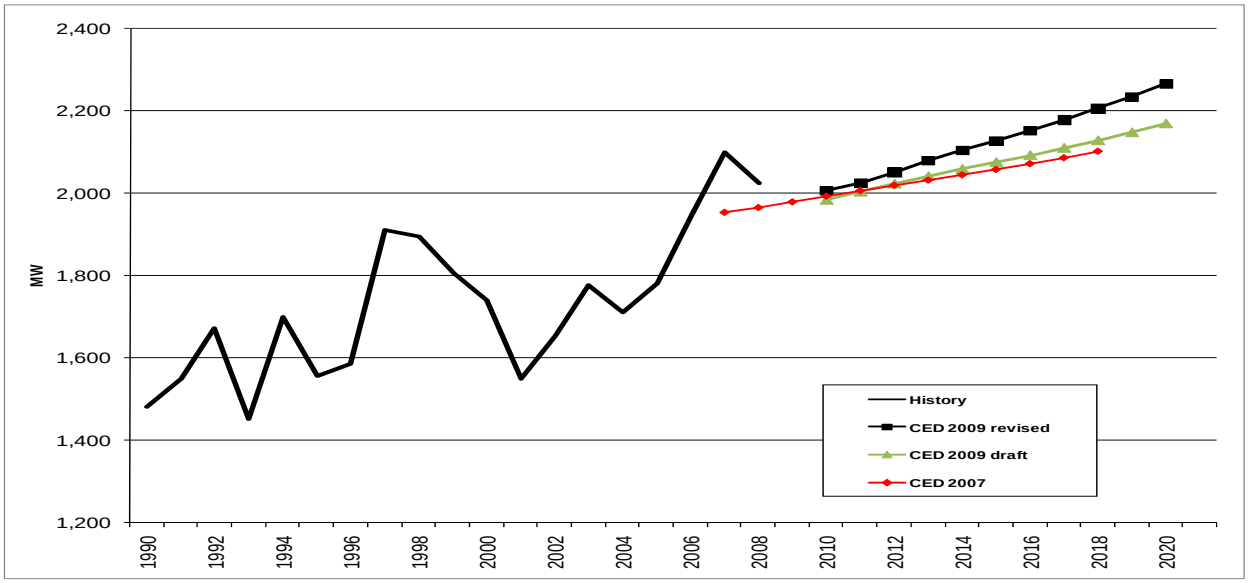
Figure 128: LADWP Planning Area Residential Consumption



Source: California Energy Commission, 2009

Figure 129 compares residential peak demand forecasts. The differences in peak demand mirror those in consumption.

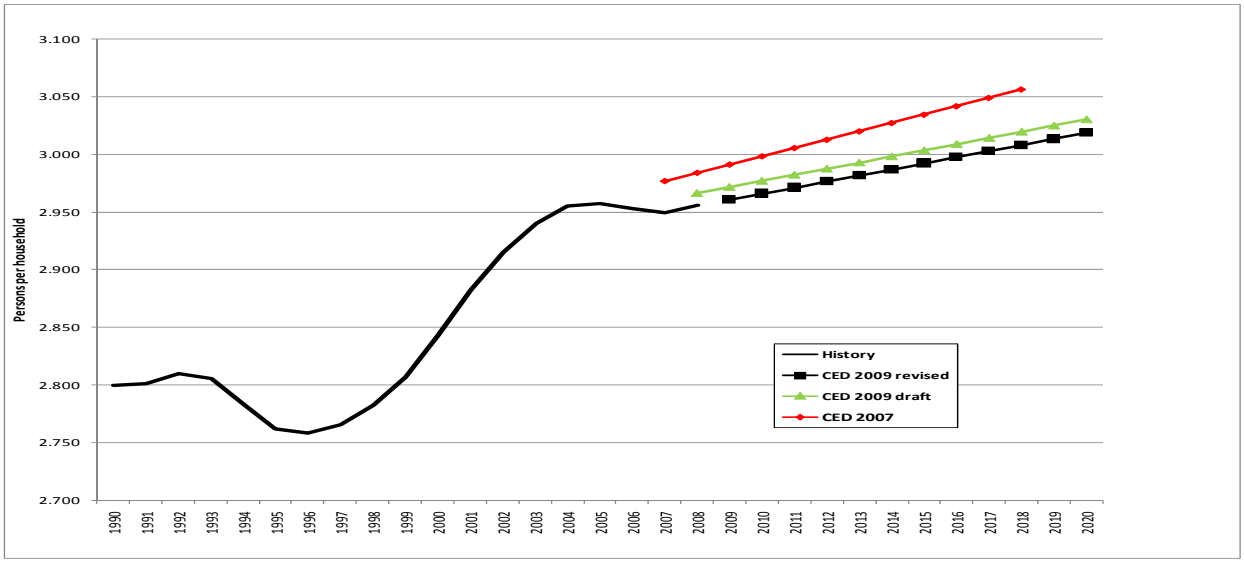
Figure 129: LADWP Planning Area Residential Peak



Source: California Energy Commission, 2009

Figures 130 and **131** compare the residential drivers used in the forecasts. **Figure 130** shows persons-per-household projections. There is a slight decrease compared to *CED 2009 Draft*. The change in *CED 2009 Revised* projections compared to *CED 2009 Draft* increases the household forecast by about 5,400 households by the end of the forecast period (less than 0.4 percent).

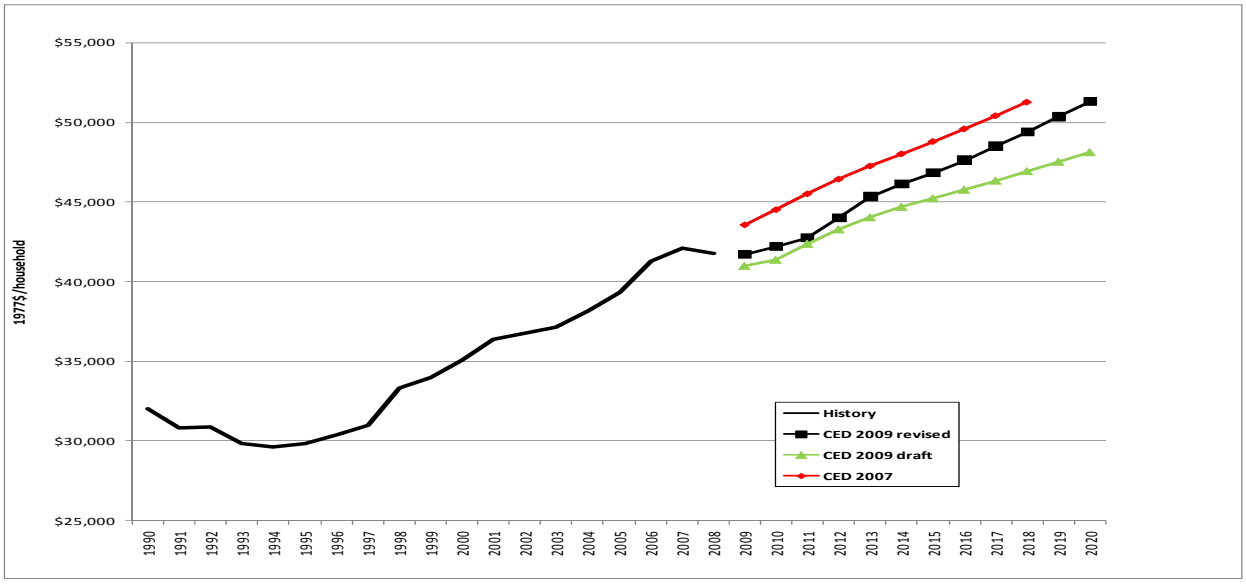
Figure 130: LADWP Planning Area Persons per Household Projections



Source: California Energy Commission, 2009

Figure 131 compares household income used in the respective forecasts. The *CED 2009 Revised* projections are higher than in *CED 2009 Draft*. Both are still below the income projections used in *CED 2007*. *CED 2009 Revised* uses the June 2009 projections from Economy.com while the previous forecasts used earlier vintages of Economy.com projections. The new projections produce long-term growth that is slightly higher than that in *CED 2009 Draft* as the economy recovers from the current slump.

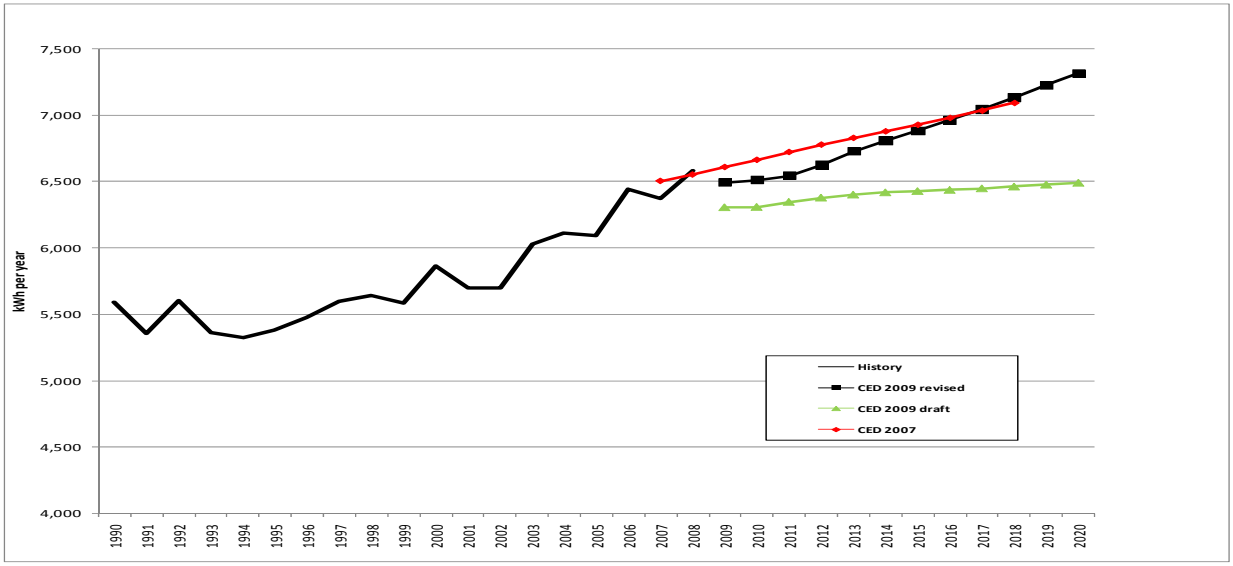
Figure 131: LADWP Planning Area Household Income Projections



Source: California Energy Commission, 2009

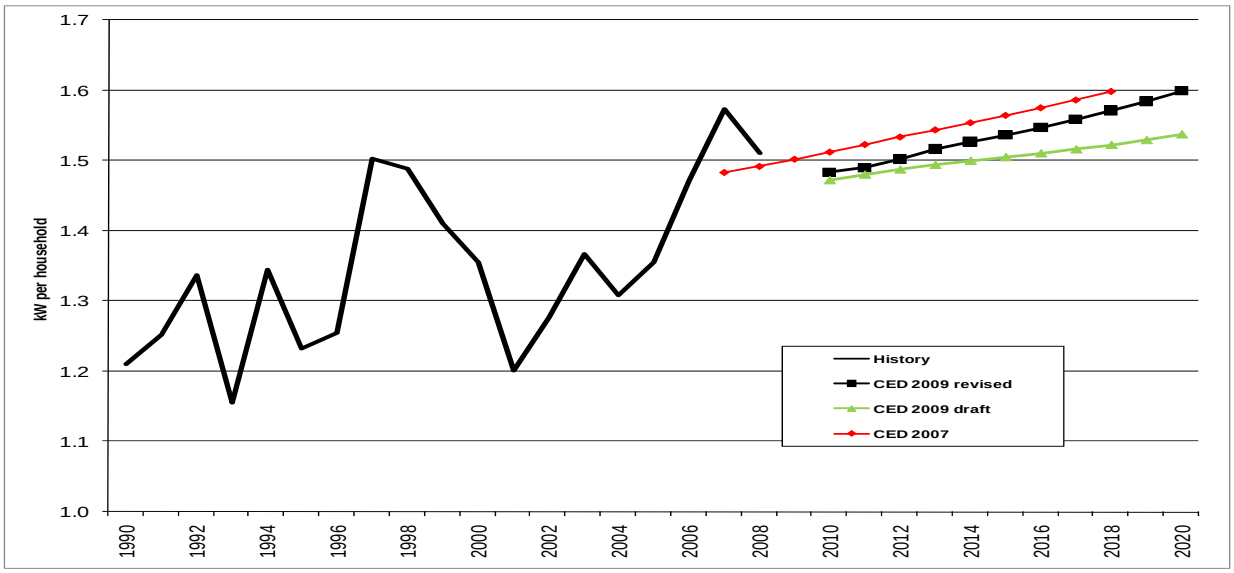
Figures 132 and **133** compare residential use per household and residential peak use per household, respectively. *CED 2009 Revised* use per household (**Figure 132**) is higher than *CED 2009 Draft*. This is caused by both increased household income projections and inclusion of electric vehicles in the residential forecast. About 60% of the 2011-2020 increase in use per household in *CED 2009 Revised* is caused by the inclusion of electric vehicle use. Use per household is now projected to be slightly higher than the *CED 2007* by the end of the forecast period. The difference in peak use per household (**Figure 133**) is smaller than the difference in consumption forecast because most electric vehicle charging is assumed to be done in off-peak periods.

Figure 132: LADWP Planning Area Use per Household



Source: California Energy Commission, 2009

Figure 133: LADWP Planning Area Peak Use per Household

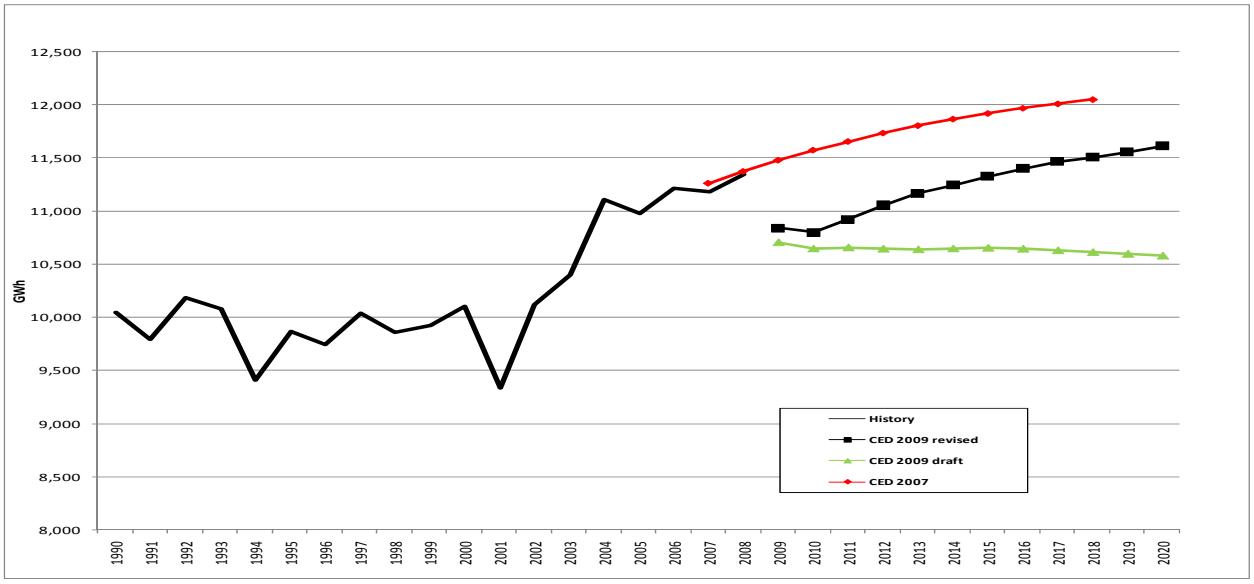


Source: California Energy Commission, 2009

Commercial Building Sector

Figures 134 and **135** compare commercial building sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of increases in commercial sector floor space. The growth rate in consumption after the economic recovery is very similar to that of *CED 2007,* although both *CED 2009* forecasts are lower than *CED 2007*.

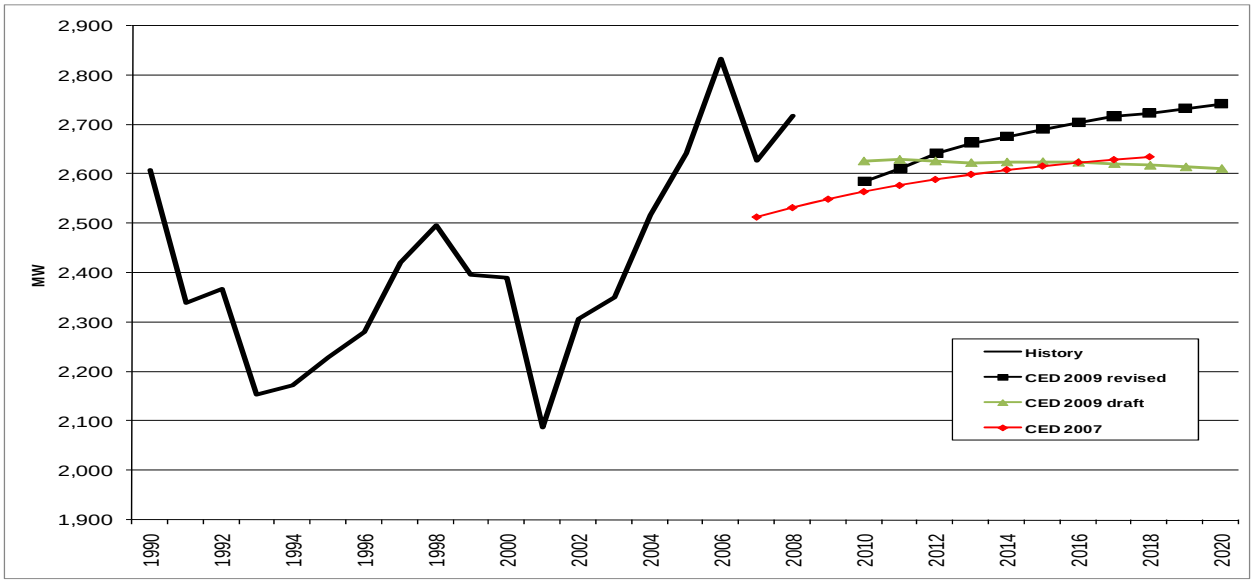
Figure 134: LADWP Planning Area Commercial Consumption



Source: California Energy Commission, 2009

Figure 135 compares commercial building sector peak demand forecasts. *CED 2009 Revised* is higher than both *CED 2009 Draft* and *CED 2007*. The differences between the revised and draft forecasts are similar to the differences in consumption forecasts. Both *CED 2009* forecasts start from a higher value than was assumed in *CED 2007*.

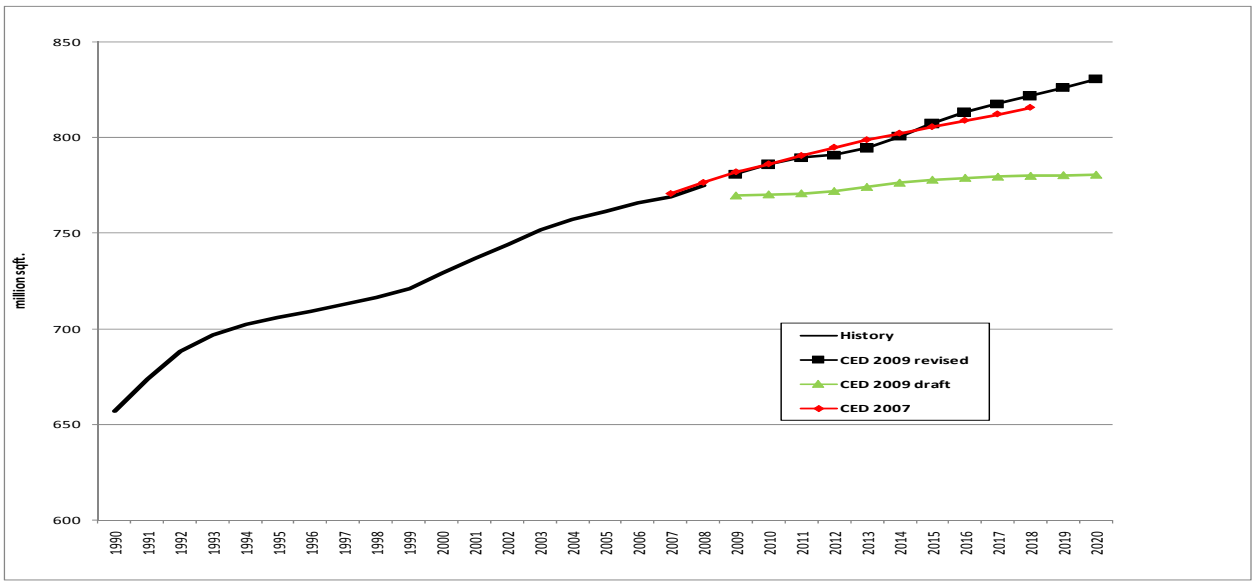
Figure 135: LADWP Planning Area Commercial Sector Peak



Source: California Energy Commission, 2009

In staff's commercial building sector forecasting model, floor space by building type (that is, retail, schools, offices, and so forth) is the key driver of energy use for each specific building type. **Figure 136** compares total commercial floor space projections. *CED 2009 Revised* floor space is higher than the draft values. This is caused by revised estimates of economic drivers, specifically for the LADWP planning area, along with use of a different floor space forecasting method than in the draft forecast, as discussed in Chapter 1. *CED 2009 Revised* is now essentially the same in the near term and slightly higher in the long term compared to *CED 2007*.

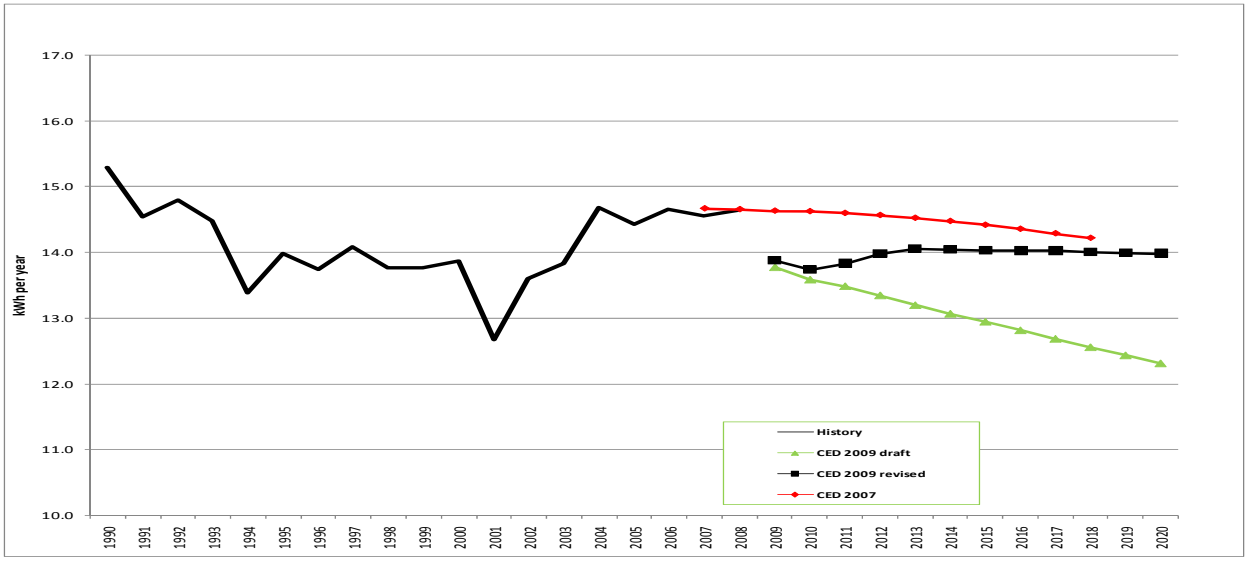
Figure 136: LADWP Planning Area Commercial Floor Space



Source: California Energy Commission, 2009

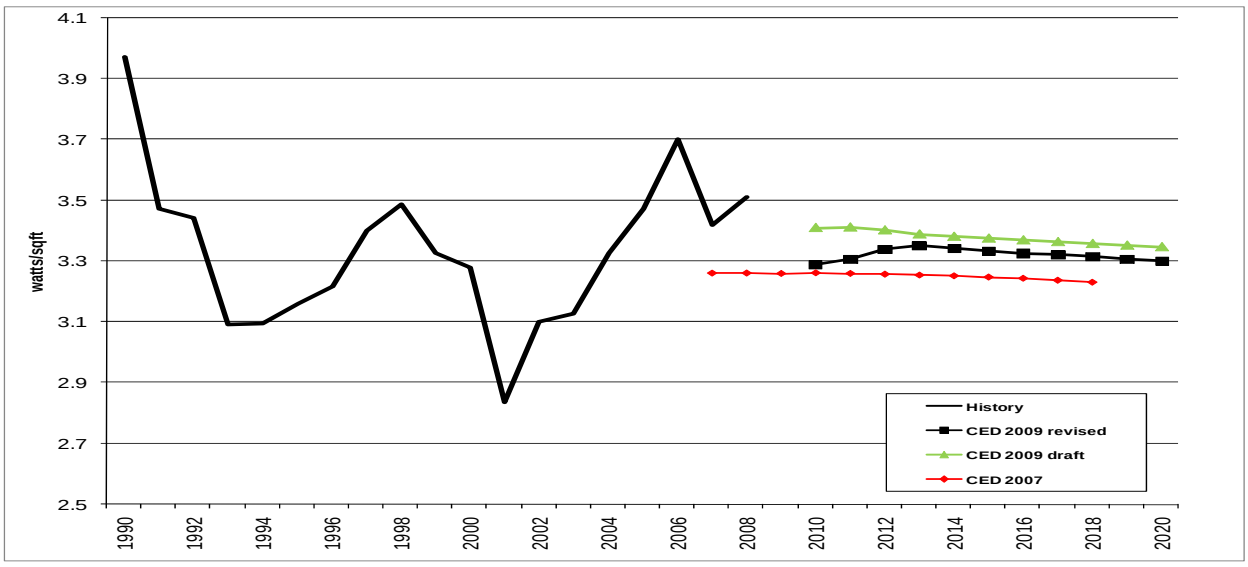
Historical and projected commercial sector annual consumption and peak use per square foot are shown in **Figures 137** and **138**, respectively. Use per square foot (**Figure 137**) in *CED 2009 Revised* is higher than *CED 2009 Draft* once the economy improves. This value is still below that projected in *CED 2007*. Revised peak use per square foot (**Figure 138**) is now lower than *CED 2009 Draft* because of revisions to the expected commercial contribution to total peak.

Figure 137: LADWP Planning Area Commercial kWh per Square Foot



Source: California Energy Commission, 2009

Figure 138: LADWP Planning Area Commercial Watts per Square Foot

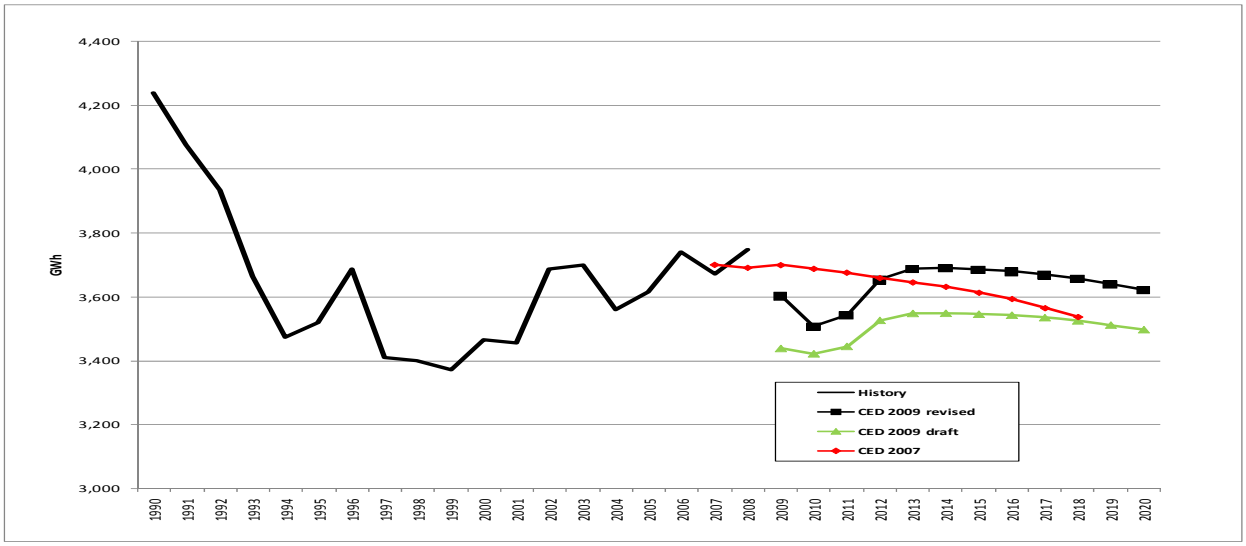


Source: California Energy Commission, 2009

Industrial Sector

Figure 139 compares industrial sector electricity consumption forecasts for the LADWP planning area. *CED 2009 Revised* is higher throughout the entire forecast period compared to *CED 2009 Draft* because of a higher assumed starting value resulting from inclusion of 2008 consumption in the historical period. The long-term growth of *CED 2009 Revised* is similar to *CED 2009 Draft*.

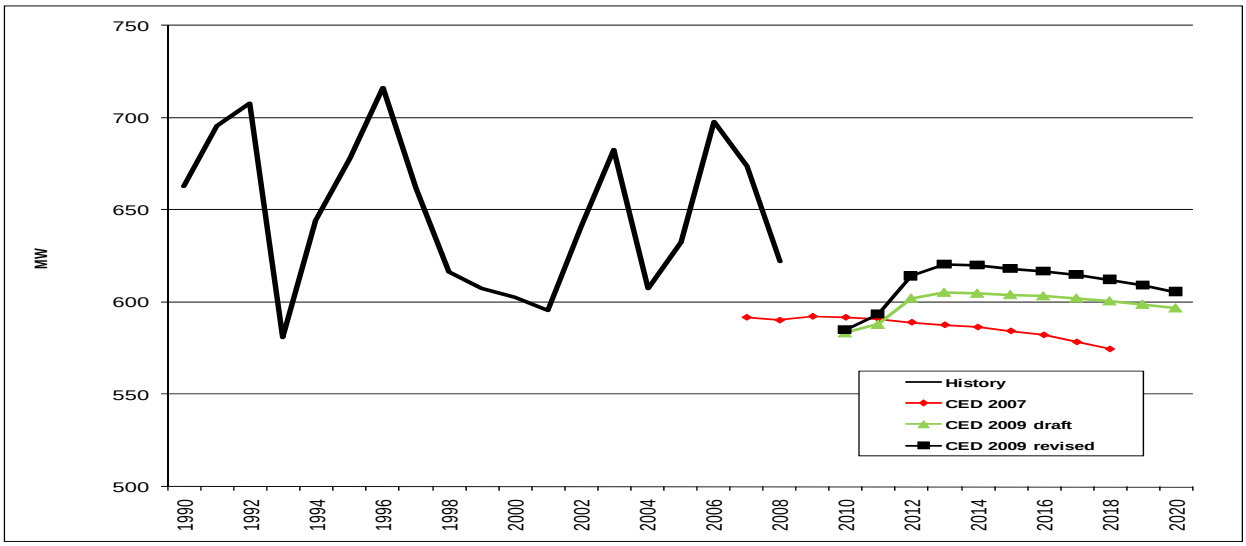
Figure 139: LADWP Planning Area Industrial Consumption



Source: California Energy Commission, 2009

Figure 140 compares industrial sector peak forecasts. The differences are similar to the differences in the consumption forecast. The expected short-term recovery produces a peak higher than *CED 2007*.

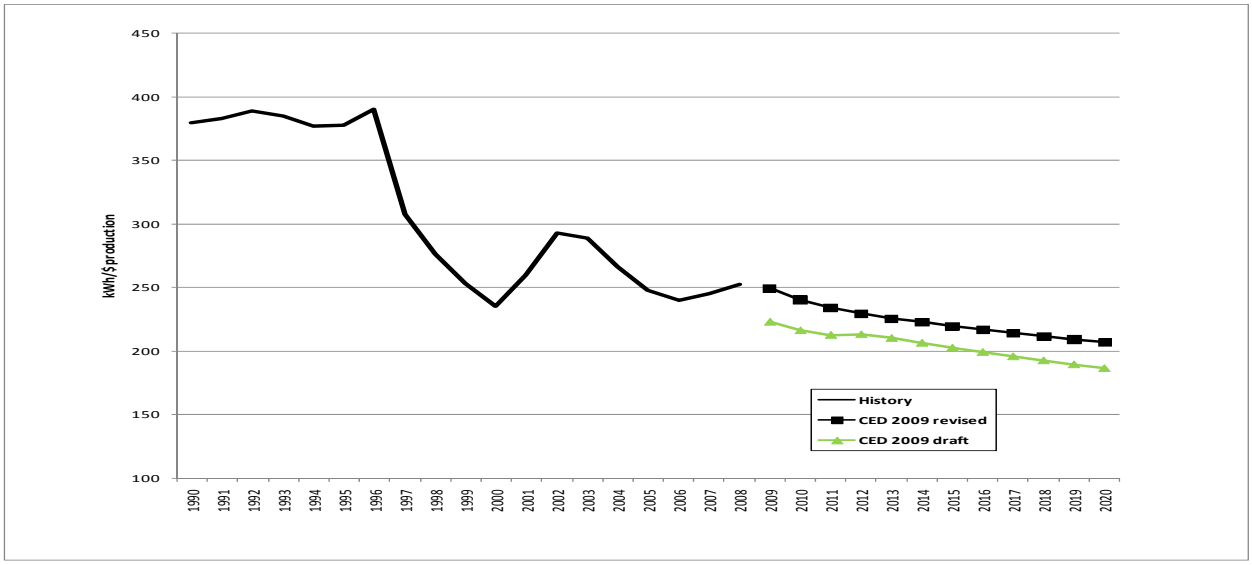
Figure 140: LADWP Planning Area Industrial Sector Peak



Source: California Energy Commission, 2009

Figure 141 compares electricity use per dollar value of production for *CED 2009 Revised* and *CED 2009 Draft*. *CED 2009 Revised* has a higher level of electricity use per dollar of value added than *CED 2009 Draft*. This is primarily caused by a higher historical starting point from inclusion of 2008 consumption history. The forecasted growth rates are similar in both forecasts.

Figure 141: LADWP Planning Area Industrial Use per Production Unit

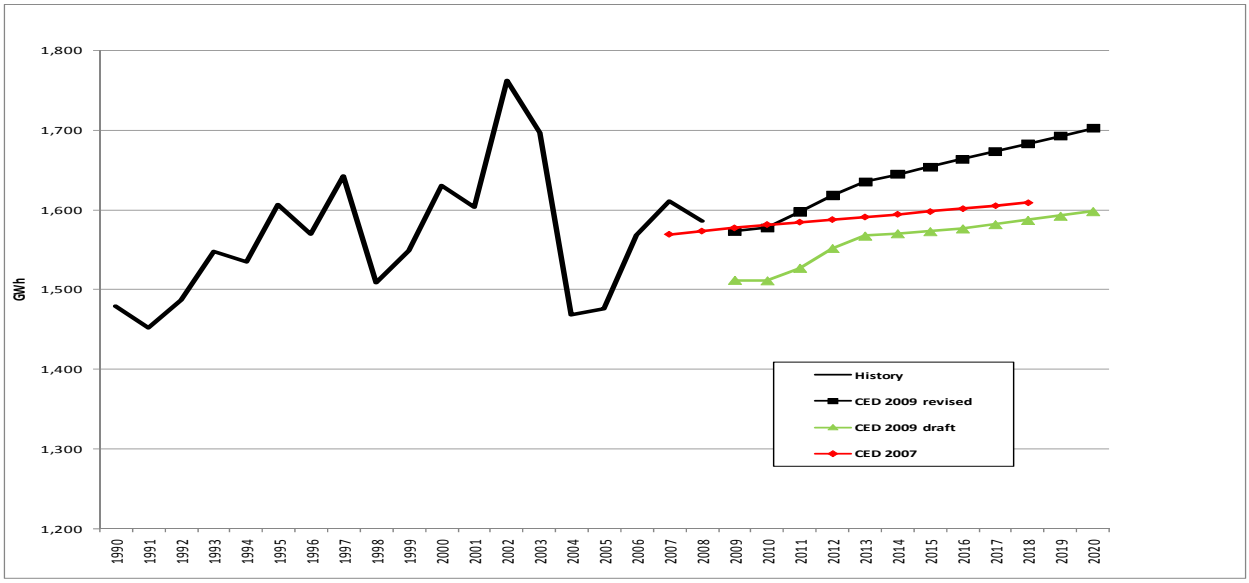


Source: California Energy Commission, 2009

Other Sectors

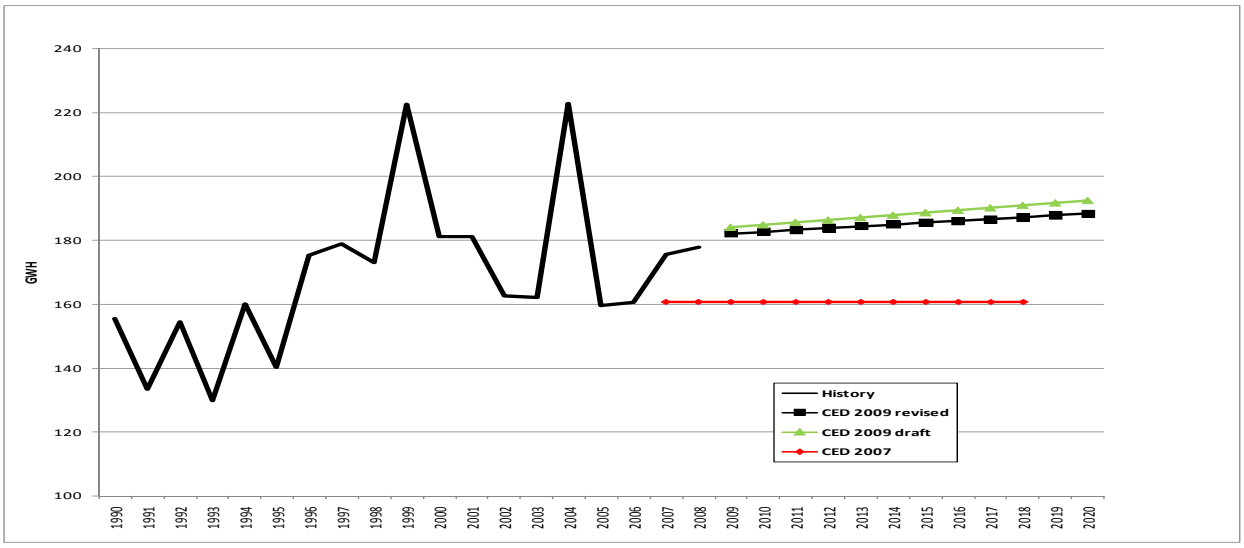
Figures 142 and **143** compare the remaining sector electricity consumption forecasts. **Figure 142** compares transportation, communication, and utilities (TCU) sector forecasts. *CED 2009 Revised* is higher than *CED 2009 Draft* because of a higher starting point. Growth in both *CED 2009* forecasts is similar. *CED 2009 Revised* has a higher growth rate than *CED 2007.* **Figure 143** compares the agriculture and water pumping sector forecasts. *CED 2009 Revised* is slightly lower than *CED 2009 Draft*.

Figure 142: LADWP Planning Area Transportation, Communication and Utilities Sector Electricity Consumption



Source: California Energy Commission, 2009

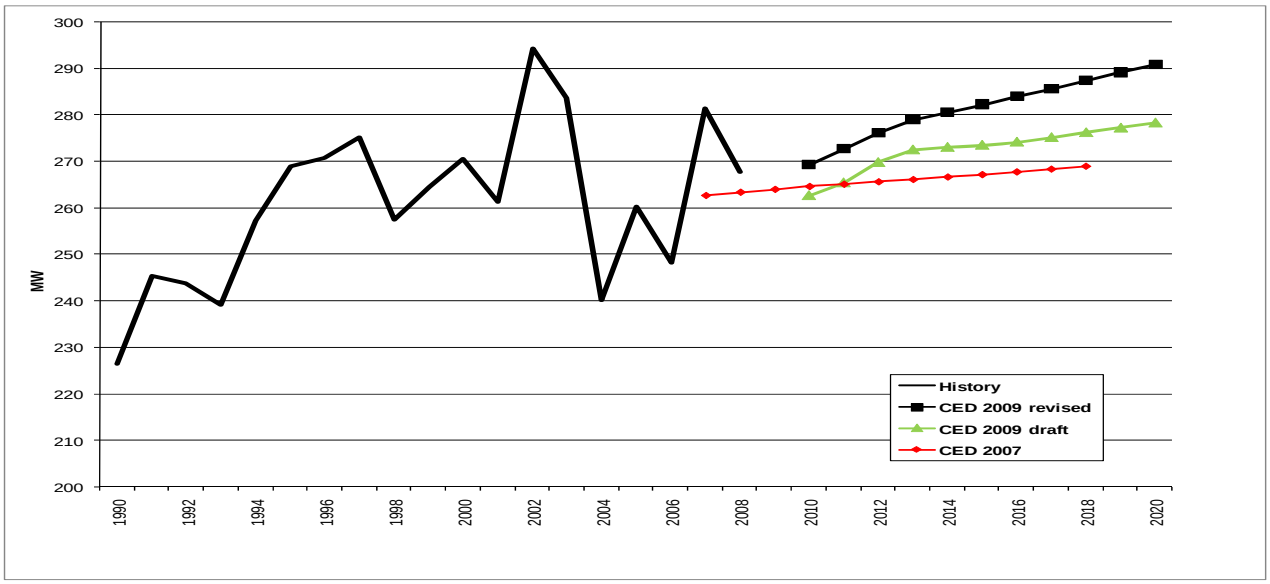
Figure 143: LADWP Planning Area Agriculture and Water Pumping Forecasts



Source: California Energy Commission, 2009

Figure 144 compares combined peaks for the TCU, street lighting, and agricultural sectors. *CED 2009 Revised* is higher than *CED 2009 Draft* over the entire forecast period. This is caused by an assumed higher starting point for *CED 2009 Revised*. *CED 2009 Revised* is also higher than *CED 2007*.

Figure 144: LADWP Planning Area Other Sector Peak

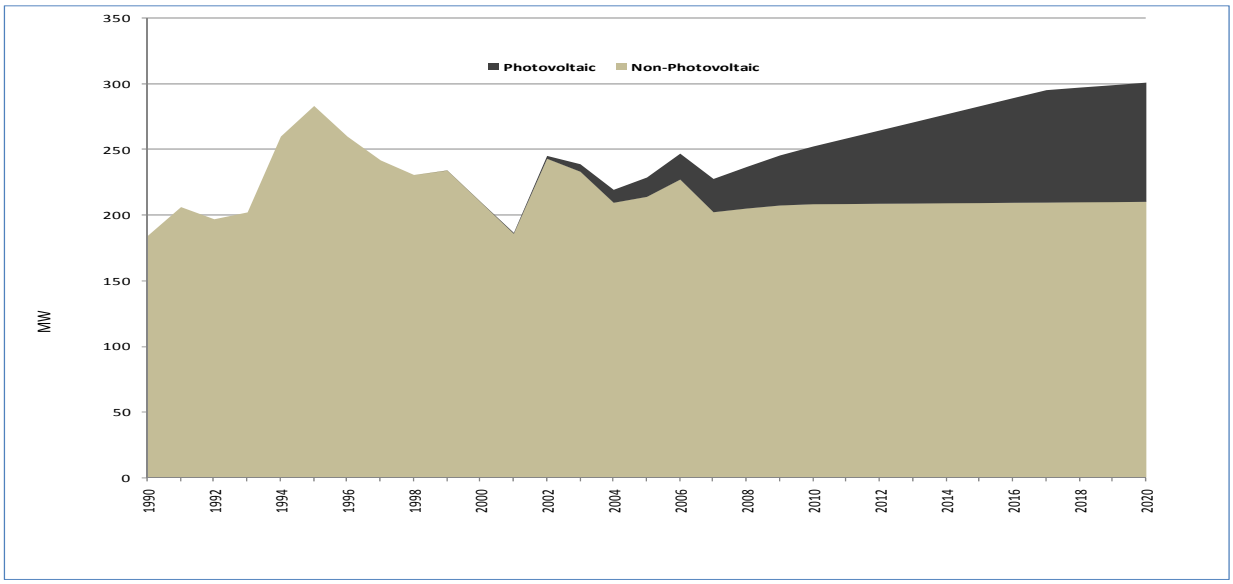


Source: California Energy Commission, 2009

Self-Generation

The peak demand forecast is reduced by self-generation, including the effects of the SGIP, CSI, and other programs, as discussed in Chapter 1. The effects of these programs are forecast based on recent trends in installations. **Figure 145** shows *CED 2009 Revised* peak impacts from photovoltaic and non-photovoltaic self-generation. Based on these trends, staff projects about 100 MW of peak reduction from photovoltaic systems by 2020.

Figure 145: LADWP Planning Area Self Generation Peak Forecast



Source: California Energy Commission, 2009

Economic Scenarios

The results presented above rely on economic inputs from the *base case* Economy.com scenario. Staff also examined the effects of two alternative economic scenarios for electricity demand: Global Insight's *optimistic* case and Economy.com's *pessimistic* case. These two cases, in general, project the highest and lowest rates of economic growth among the various scenarios provided by the two companies. For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. The Appendix provides details on the scenarios and the econometric models.

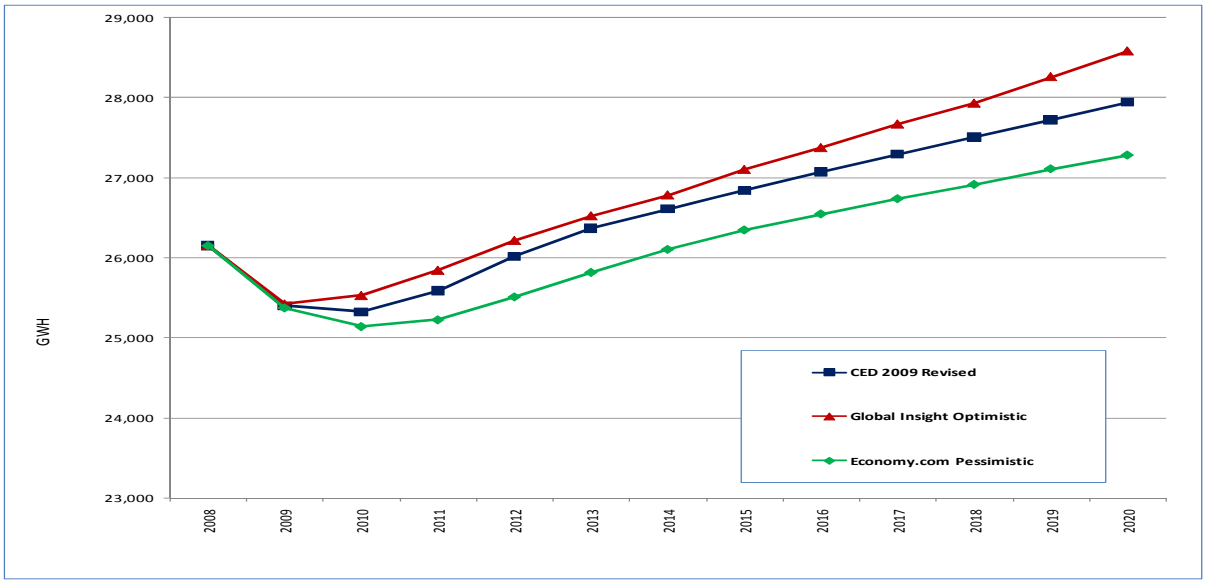
The estimated models were run for LADWP for the two economic scenarios as well as for the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2009 Revised* consumption projections. **Figure 146** shows the projected impacts of the optimistic and pessimistic scenarios on LADWP consumption. Peak demand was developed by applying projected load factors from *CED 2009 Revised* at the sector level to the consumption results for each scenario. Projected peak impacts are shown in **Figure 147**.

Electricity consumption is projected to be 2.3 percent higher in the optimistic economic case than in *CED 2009 Revised* by 2020 and 2.4 percent lower in the pessimistic scenario. The peak

demand forecast increases by 2.4 percent under the optimistic scenario by 2020 and falls by 2.6 percent in the pessimistic case. The percentage peak reduction is higher than that of consumption in the pessimistic case because the relative decrease in consumption is projected to be higher for the residential and commercial sectors than for the industrial, which has a higher load factor (is less *peaky*). Growth rates from 2010-2020 for electricity consumption and peak demand increase from 0.9 percent and 0.7 percent, respectively, to 1.0 percent and 0.9 percent in the optimistic case, and fall to 0.7 percent and 0.5 percent under the pessimistic scenario.

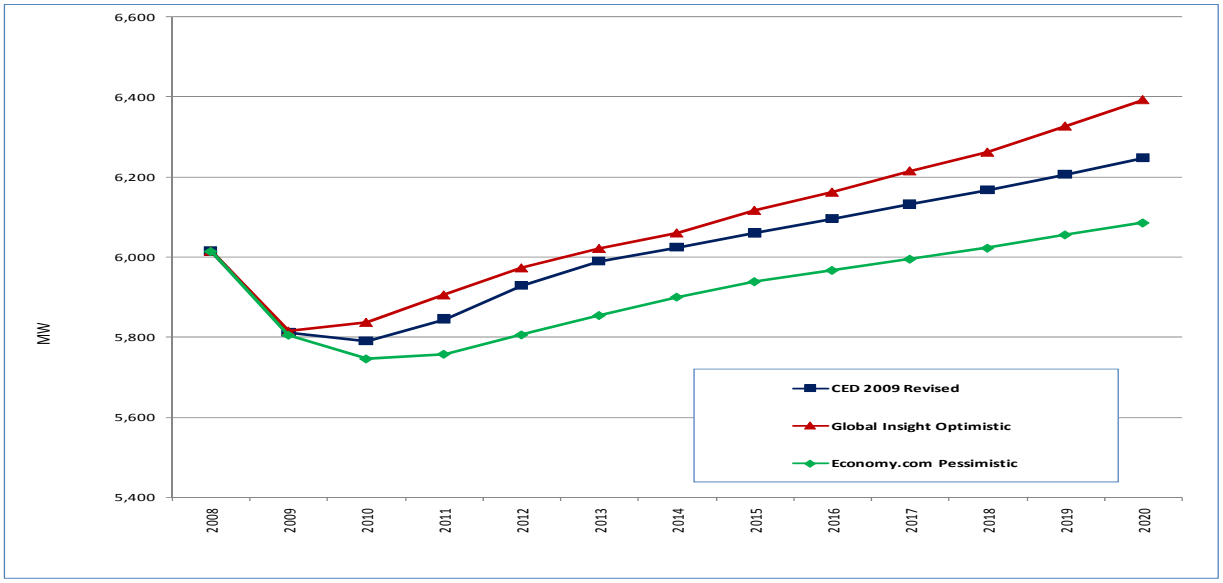
Changes in consumption and peak demand are small compared to *CED 2009 Revised* totals in percentage terms, and this is a reflection of the relatively narrow spread among the three economic scenarios. For example, retail employment is projected to be only 2 percent higher or lower in the alternative scenarios than in the Economy.com base case, and projected industrial output under the pessimistic scenario is almost identical to that of the base case by 2020.

Figure 146: Projected LADWP Electricity Consumption, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Figure 147: Projected LADWP Peak Demand, *CED 2009 Revised* and Alternative Economic Scenarios



Source: California Energy Commission, 2009

Conservation/Efficiency Impacts

Staff spent a great deal of effort refining methods to account for energy efficiency and conservation impacts while preparing this forecast, particularly for utility efficiency programs. **Tables 27** and **28** show electricity consumption and peak savings estimates for selected years, for building and appliance standards, utility and public agency programs, and *naturally occurring* savings, or savings associated with rate changes and certain market trends not directly related to programs or standards. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts from rate changes and standards. Chapter 8 provides much more detail on staff work related to energy efficiency and conservation.

Table 27: LADWP Planning Area Electricity Consumption Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	159	299	358	405	430	463	710
Appliance Standards	60	364	583	856	1,008	1,189	1,378
Utility and Public Agency Programs	31	77	30	64	138	137	76
Naturally Occurring Savings	8	10	9	9	40	63	94
Total Residential Savings	258	750	980	1,333	1,616	1,851	2,258
Commercial Energy Savings							
Building Standards	129	280	422	599	698	879	1,095
Appliance Standards	86	188	260	357	399	479	572
Utility and Public Agency Programs*	37	14	2	69	125	79	69
Naturally Occurring Savings	961	1,142	785	538	979	1,149	1,525
Total Commercial Savings	1,213	1,624	1,469	1,563	2,201	2,586	3,261
Total Energy Savings	1,470	2,374	2,449	2,897	3,817	4,437	5,519

Source: California Energy Commission, 2009
*Commercial programs also include agricultural program savings.

Table 28: LADWP Planning Area Electricity Peak Savings Estimates

	1990	1998	2003	2008	2011	2015	2020
Residential Energy Savings							
Building Standards	34	79	81	93	98	105	160
Appliance Standards	13	96	132	196	230	269	311
Utility and Public Agency Programs	7	20	7	15	31	31	17
Naturally Occurring Savings	2	3	2	2	9	14	21
Total Residential Savings	56	198	222	306	368	419	510
Commercial Energy Savings							
Building Standards	34	71	95	144	167	209	259
Appliance Standards	22	48	59	86	95	114	135
Utility and Public Agency Programs*	10	4	0	17	30	19	16
Naturally Occurring Savings	250	289	178	129	234	273	360
Total Commercial Savings	315	412	332	375	526	615	771
Total Energy Savings	371	610	555	681	895	1,034	1,280

Source: California Energy Commission, 2009

*Commercial programs also include agricultural program savings.

Electric Vehicles

CED 2009 Revised incorporates a forecast for electricity consumption and peak demand from light-duty electric vehicles (EVs), including both dedicated EVs and plug-in hybrids. More details for this forecast are provided in Chapter 1. The EV forecast includes a breakout of personal and commercial EVs, so electricity use by these vehicles could be assigned to the residential and commercial sectors in *CED 2009 Revised*.

Table 29 shows the resulting projections for electricity consumption and peak demand, by sector, for the LADWP planning area. More than 90 percent of these vehicles are plug-in hybrids, reflecting stated preferences from a 2008 statewide vehicle survey conducted by the Energy Commission. In the survey, respondents generally indicated that a vehicle with plug-in hybrid technology was much more appealing than a dedicated electric vehicle, given the range and refueling limitations of the latter. The survey also indicated that commercial establishments were much less willing to purchase electric vehicles than private households, so consumption is heavily weighted to the residential sector.

Table 29: LADWP Electric Vehicle Forecast

	Residential		Commercial	
year	GWH	MW	GWH	MW
2008	0	0	1	0
2009	0	0	1	0
2010	1	0	1	0
2011	9	0	1	0
2012	26	1	2	0
2013	64	3	5	0
2014	116	5	7	0
2015	169	7	9	0
2016	217	9	10	0
2017	259	11	11	0
2018	308	13	12	1
2019	355	15	12	1
2020	400	17	13	1

Source: California Energy Commission, 2009

Form 1.1 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Consumption by Sector (GWh)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Mining	Agricultural	TCU	Street lighting	Total Consumption
1990	6,835	0	10,042	0	4,237	224	156	1,479	290	23,263
1991	6,620	0	9,791	0	4,075	232	133	1,452	292	22,595
1992	7,000	0	10,183	0	3,934	205	155	1,487	290	23,253
1993	6,726	0	10,080	0	3,663	199	130	1,548	289	22,635
1994	6,723	0	9,405	0	3,473	220	160	1,535	289	21,805
1995	6,788	0	9,862	0	3,517	321	140	1,607	290	22,526
1996	6,917	0	9,744	0	3,686	332	175	1,569	292	22,715
1997	7,106	0	10,035	0	3,409	313	179	1,643	296	22,980
1998	7,183	0	9,857	0	3,399	302	173	1,509	296	22,719
1999	7,140	0	9,922	0	3,371	263	223	1,549	284	22,752
2000	7,520	0	10,105	0	3,465	252	181	1,631	284	23,438
2001	7,341	0	9,334	0	3,456	278	181	1,603	298	22,491
2002	7,376	0	10,119	0	3,686	242	163	1,763	287	23,635
2003	7,833	0	10,393	0	3,698	234	162	1,698	305	24,322
2004	7,977	0	11,108	0	3,559	296	223	1,468	311	24,942
2005	7,999	0	10,976	0	3,614	189	160	1,476	314	24,728
2006	8,518	0	11,214	0	3,738	186	161	1,569	293	25,679
2007	8,491	0	11,184	1	3,671	180	177	1,611	298	25,611
2008	8,811	0	11,344	1	3,748	183	179	1,587	301	26,153
2009	8,736	0	10,839	1	3,602	163	183	1,573	302	25,399
2010	8,801	1	10,800	1	3,508	152	184	1,578	304	25,326
2011	8,883	9	10,920	1	3,542	157	185	1,598	304	25,589
2012	9,038	26	11,057	2	3,653	161	185	1,618	305	26,018
2013	9,223	64	11,168	5	3,688	162	186	1,635	306	26,368
2014	9,378	116	11,246	7	3,690	159	186	1,645	306	26,611
2015	9,526	169	11,328	9	3,685	155	187	1,654	307	26,841
2016	9,680	217	11,403	10	3,679	151	187	1,663	308	27,073
2017	9,841	259	11,467	11	3,669	149	188	1,673	309	27,294
2018	10,013	308	11,512	12	3,656	146	189	1,683	309	27,507
2019	10,188	355	11,561	12	3,640	143	189	1,692	310	27,724
2020	10,364	400	11,615	13	3,621	140	190	1,702	311	27,943

* Residential and commercial electric vehicle consumption included in residential and commercial totals.

Last historic year is 2008. Consumption includes self-generation.

Annual Growth Rates (%)

1990-2000	0.96%	0.00%	0.06%	0.00%	-1.99%	1.16%	1.54%	0.98%	-0.21%	0.08%
2000-2008	2.00%	0.00%	1.46%	0.00%	0.98%	-3.90%	-0.15%	-0.34%	0.74%	1.38%
2008-2010	-0.06%	45.85%	-2.43%	-9.73%	-3.26%	-8.78%	1.34%	-0.28%	0.39%	-1.59%
2010-2020	1.65%	83.55%	0.73%	32.23%	0.32%	-0.81%	0.30%	0.76%	0.24%	0.99%

Form 1.1b - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Electricity Sales by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Street lighting	Total Sales
1990	6,835	10,004	3,366	224	156	1,291	290	22,166
1991	6,620	9,736	3,090	232	133	1,264	292	21,368
1992	7,000	10,118	3,001	205	155	1,313	290	22,081
1993	6,726	10,013	2,707	199	130	1,368	289	21,432
1994	6,723	9,121	2,402	220	160	1,342	289	20,258
1995	6,788	9,527	2,395	321	140	1,379	290	20,839
1996	6,917	9,471	2,504	332	175	1,476	292	21,168
1997	7,106	9,735	2,369	313	179	1,544	296	21,541
1998	7,183	9,555	2,359	302	173	1,478	296	21,346
1999	7,140	9,618	2,290	263	223	1,539	284	21,357
2000	7,519	9,810	2,515	252	181	1,625	284	22,186
2001	7,339	9,102	2,579	278	181	1,603	298	21,381
2002	7,370	9,849	2,558	242	163	1,710	287	22,179
2003	7,818	10,089	2,608	234	162	1,697	305	22,914
2004	7,951	10,832	2,581	296	223	1,466	311	23,661
2005	7,961	10,687	2,619	189	159	1,473	314	23,403
2006	8,467	10,967	2,675	185	161	1,510	293	24,258
2007	8,426	10,920	2,757	180	176	1,561	298	24,317
2008	8,729	11,057	2,792	182	178	1,581	301	24,820
2009	8,637	10,537	2,644	162	182	1,566	302	24,029
2010	8,685	10,487	2,549	151	182	1,568	304	23,927
2011	8,751	10,602	2,583	156	183	1,588	304	24,167
2012	8,889	10,734	2,694	160	183	1,608	305	24,574
2013	9,057	10,840	2,729	161	184	1,625	306	24,901
2014	9,195	10,913	2,730	158	184	1,634	306	25,121
2015	9,326	10,990	2,725	154	185	1,643	307	25,330
2016	9,464	11,060	2,719	150	185	1,653	308	25,539
2017	9,607	11,118	2,708	148	186	1,663	309	25,738
2018	9,774	11,161	2,696	145	186	1,672	309	25,944
2019	9,945	11,208	2,679	142	187	1,682	310	26,153
2020	10,116	11,260	2,660	139	188	1,691	311	26,365

Last historic year is 2008. Sales excludes self-generation.

Annual Growth Rates (%)

1990-2000	0.96%	-0.20%	-2.87%	1.16%	1.54%	2.32%	-0.21%	0.01%
2000-2008	1.88%	1.51%	1.31%	-3.96%	-0.23%	-0.34%	0.74%	1.41%
2008-2010	-0.25%	-2.61%	-4.45%	-8.87%	1.20%	-0.40%	0.39%	-1.82%
2010-2020	1.54%	0.71%	0.43%	-0.81%	0.29%	0.76%	0.24%	0.98%

Form 1.2 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Energy for Load (GWh)

Year	Total Consumption	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Energy for Load
1990	23,263	2,992	26,255	1,097	0	1,097	25,159
1991	22,595	2,885	25,480	1,227	0	1,227	24,253
1992	23,253	2,981	26,234	1,172	0	1,172	25,062
1993	22,635	2,893	25,529	1,204	0	1,204	24,325
1994	21,805	2,735	24,540	1,548	0	1,548	22,993
1995	22,526	2,813	25,339	1,686	0	1,686	23,653
1996	22,715	2,858	25,573	1,548	0	1,548	24,025
1997	22,980	2,908	25,888	1,439	0	1,439	24,449
1998	22,719	2,882	25,601	1,373	0	1,373	24,228
1999	22,752	2,883	25,635	1,395	0	1,395	24,240
2000	23,438	2,995	26,433	1,251	1	1,252	25,181
2001	22,491	2,886	25,378	1,108	3	1,110	24,267
2002	23,635	2,994	26,630	1,448	8	1,456	25,173
2003	24,322	3,093	27,416	1,388	20	1,409	26,007
2004	24,942	3,194	28,137	1,246	35	1,281	26,855
2005	24,728	3,159	27,888	1,273	52	1,326	26,562
2006	25,679	3,275	28,954	1,351	70	1,421	27,533
2007	25,611	3,283	28,894	1,204	90	1,294	27,600
2008	26,153	3,351	29,504	1,221	113	1,333	28,170
2009	25,399	3,244	28,643	1,234	136	1,370	27,273
2010	25,326	3,230	28,556	1,242	157	1,399	27,157
2011	25,589	3,263	28,852	1,244	178	1,422	27,430
2012	26,018	3,317	29,336	1,246	199	1,445	27,891
2013	26,368	3,362	29,730	1,247	220	1,467	28,263
2014	26,611	3,391	30,002	1,248	241	1,489	28,513
2015	26,841	3,420	30,261	1,249	263	1,512	28,749
2016	27,073	3,448	30,520	1,250	284	1,534	28,986
2017	27,294	3,475	30,769	1,251	305	1,556	29,213
2018	27,507	3,502	31,010	1,252	311	1,563	29,446
2019	27,724	3,531	31,255	1,253	317	1,571	29,684
2020	27,943	3,559	31,503	1,255	323	1,578	29,925

Loss Factor 0.135

Annual Growth Rates (%)

1990-2000	0.08%	0.01%	0.07%	1.33%	0.00%	1.34%	0.01%
2000-2008	1.38%	1.41%	1.38%	-0.31%	82.81%	0.79%	1.41%
2008-2010	-1.59%	-1.82%	-1.62%	0.89%	17.92%	2.44%	-1.82%
2010-2020	0.99%	0.98%	0.99%	0.10%	7.50%	1.21%	0.98%

Form 1.3 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Coincident Peak Demand by Sector (MW)

Year	Residential	Residential Electric Vehicles*	Commercial	Commercial Electric Vehicles*	Industrial	Agricultural	Other	Total Demand
1990	1,482	0	2,608	0	663	8	226	4,987
1991	1,549	0	2,339	0	695	10	245	4,839
1992	1,672	0	2,369	0	708	11	244	5,003
1993	1,451	0	2,154	0	581	9	239	4,434
1994	1,699	0	2,173	0	644	11	257	4,785
1995	1,555	0	2,231	0	678	10	269	4,742
1996	1,585	0	2,281	0	716	13	271	4,865
1997	1,909	0	2,422	0	662	13	275	5,281
1998	1,895	0	2,498	0	616	14	257	5,281
1999	1,805	0	2,398	0	607	18	265	5,092
2000	1,739	0	2,390	0	602	14	271	5,016
2001	1,549	0	2,088	0	595	14	261	4,508
2002	1,654	0	2,307	0	640	13	294	4,909
2003	1,776	0	2,351	0	682	12	284	5,106
2004	1,709	0	2,518	0	607	20	240	5,094
2005	1,780	0	2,643	0	632	13	260	5,329
2006	1,947	0	2,834	0	698	12	248	5,739
2007	2,098	0	2,627	0	674	13	281	5,694
2008	2,023	0	2,719	0	622	14	268	5,646
2009	1,991	0	2,597	0	601	15	268	5,472
2010	2,006	0	2,585	0	585	15	269	5,460
2011	2,024	0	2,611	0	594	15	273	5,516
2012	2,050	1	2,641	0	614	15	276	5,597
2013	2,079	3	2,663	0	620	15	279	5,657
2014	2,104	5	2,676	0	620	15	281	5,695
2015	2,127	7	2,691	0	618	15	282	5,733
2016	2,152	9	2,705	0	617	15	284	5,772
2017	2,178	11	2,717	0	615	15	286	5,810
2018	2,206	13	2,724	1	612	15	287	5,844
2018	2,235	15	2,733	1	609	15	289	5,880
2020	2,266	17	2,742	1	606	15	291	5,919

* Residential and commercial electric vehicle peak demand included in residential and commercial totals.

Annual Growth Rates (%)

1990-2000	1.62%	0.00%	-0.87%	0.00%	-0.95%	5.57%	1.80%	0.06%
2000-2008	1.91%	0.00%	1.62%	0.00%	0.40%	0.17%	-0.13%	1.49%
2008-2010	-0.42%	45.85%	-2.50%	-9.73%	-3.02%	1.88%	0.29%	-1.66%
2010-2020	1.22%	83.55%	0.59%	32.23%	0.34%	0.30%	0.77%	0.81%

Form 1.4 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Net Peak Demand (MW)

Year	Total End Use Load	Net Losses	Gross Generation	Non-PV Self Generation	PV	Total Private Supply	Net Peak Demand	Load Factor (%)
1990	4,987	538	5,525	184	0	184	5,341	54
1991	4,839	519	5,358	206	0	206	5,152	54
1992	5,003	538	5,541	197	0	197	5,344	54
1993	4,434	474	4,908	202	0	202	4,706	59
1994	4,785	507	5,292	260	0	260	5,032	52
1995	4,742	499	5,241	283	0	283	4,958	54
1996	4,865	516	5,381	260	0	260	5,121	54
1997	5,281	564	5,845	242	0	242	5,603	50
1998	5,281	566	5,846	231	0	231	5,616	49
1999	5,092	544	5,636	234	0	234	5,402	51
2000	5,016	538	5,555	210	0	210	5,344	54
2001	4,508	484	4,992	186	1	187	4,805	58
2002	4,909	522	5,431	243	2	245	5,186	55
2003	5,106	545	5,651	233	6	239	5,412	55
2004	5,094	546	5,640	210	10	219	5,421	57
2005	5,329	571	5,900	214	15	229	5,671	53
2006	5,739	615	6,354	227	20	247	6,107	51
2007	5,694	612	6,306	202	25	228	6,078	52
2008	5,646	606	6,252	205	32	237	6,015	53
2009	5,472	585	6,057	208	38	246	5,812	54
2010	5,460	583	6,043	208	44	253	5,791	54
2011	5,516	589	6,105	209	50	259	5,846	54
2012	5,597	597	6,194	209	56	265	5,929	54
2013	5,657	603	6,260	209	62	271	5,989	54
2014	5,695	607	6,302	209	68	277	6,025	54
2015	5,733	610	6,344	209	74	283	6,060	54
2016	5,772	614	6,386	210	80	289	6,096	54
2017	5,810	618	6,428	210	86	296	6,132	54
2018	5,844	621	6,465	210	87	297	6,168	54
2019	5,880	625	6,505	210	89	299	6,206	55
2020	5,919	629	6,549	210	91	301	6,247	55

Loss Factor 0.112

Annual Growth Rates (%)

1990-2000	0.06%	0.01%	0.05%	1.33%	0.00%	1.34%	0.01%	0.00%
2000-2008	1.49%	1.49%	1.49%	-0.29%	82.81%	1.50%	1.49%	-0.07%
2008-2010	-1.66%	-1.88%	-1.68%	0.78%	17.92%	3.24%	-1.88%	0.07%
2010-2020	0.81%	0.76%	0.81%	0.09%	7.50%	1.78%	0.76%	0.21%

Form 1.5 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Extreme Temperature Peak Demand (MW)

Year	1-in-2 Temperatures	1-in-5 Temperatures	1-in-10 Temperatures	1-in-20 Temperatures	1-in-5 Multiplier	1-in-10 Multiplier	1-in-20 Multiplier
2008	6,015	6,414	6,527	6,625	1.0663	1.0851	1.1014
2009	5,812	6,197	6,306	6,401	1.0663	1.0851	1.1014
2010	5,791	6,175	6,284	6,378	1.0663	1.0851	1.1014
2011	5,846	6,233	6,343	6,439	1.0663	1.0851	1.1014
2012	5,929	6,322	6,434	6,530	1.0663	1.0851	1.1014
2013	5,989	6,386	6,499	6,597	1.0663	1.0851	1.1014
2014	6,025	6,425	6,538	6,636	1.0663	1.0851	1.1014
2015	6,060	6,462	6,576	6,675	1.0663	1.0851	1.1014
2016	6,096	6,501	6,615	6,715	1.0663	1.0851	1.1014
2017	6,132	6,539	6,654	6,754	1.0663	1.0851	1.1014
2018	6,168	6,577	6,693	6,793	1.0663	1.0851	1.1014
2019	6,206	6,617	6,734	6,835	1.0663	1.0851	1.1014
2020	6,247	6,662	6,779	6,881	1.0663	1.0851	1.1014

Form 1.7a - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Private Supply by Sector (GWh)

Year	Residential	Commercial	Industrial	Mining	Agricultural	TCU	Streetlighting	Total Consumption
1990	0	37	872	0	0	188	0.00	1,097
1991	0	55	985	0	0	188	0.00	1,227
1992	0	65	933	0	0	174	0.00	1,172
1993	0	67	957	0	0	180	0.00	1,204
1994	0	284	1,070	0	0	193	0.00	1,548
1995	0	335	1,122	0	0	229	0.00	1,686
1996	0	273	1,182	0	0	93	0.00	1,548
1997	0	301	1,040	0	0	99	0.00	1,439
1998	0	302	1,040	0	0	31	0.00	1,373
1999	0	304	1,081	0	0	10	0.00	1,395
2000	1	295	951	0	0	6	0.00	1,252
2001	2	232	876	0	0		0.00	1,110
2002	6	269	1,128	0	0	52	0.00	1,456
2003	15	304	1,089	0	0	1	0.00	1,409
2004	26	276	978	0	0	2	0.00	1,281
2005	38	289	995	0	1	3	0.00	1,326
2006	51	248	1,063	0	1	59	0.00	1,421
2007	65	264	914	0	1	50	0.00	1,294
2008	82	287	956	1	1	6	0.00	1,333
2009	99	302	959	1	1	8	0.00	1,370
2010	116	313	959	1	2	9	0.00	1,399
2011	133	318	959	1	2	10	0.00	1,422
2012	149	323	959	1	2	10	0.00	1,445
2013	166	328	959	1	2	10	0.00	1,467
2014	183	333	959	1	2	10	0.00	1,489
2015	200	339	960	1	2	10	0.00	1,512
2016	217	344	960	1	2	10	0.00	1,534
2017	234	349	960	1	2	10	0.00	1,556
2018	238	351	961	1	2	10	0.00	1,563
2019	243	353	961	1	2	10	0.00	1,571
2020	248	355	961	1	2	10	0.00	1,578

Annual Growth Rates (%)

1990-2000	0.00%	22.92%	0.87%	0.00%	0.00%	-29.49%	0.00%	1.34%
2000-2008	80.62%	-0.35%	0.07%	0.00%	0.00%	0.14%	0.00%	0.79%
2008-2010	18.79%	4.33%	0.14%	6.94%	19.60%	27.31%	0.00%	2.44%
2010-2020	7.92%	1.29%	0.02%	0.00%	1.74%	0.95%	0.00%	1.21%

Form 2.2 - LADWP Planning Area
California Energy Demand 2010-2020 Staff Revised Forecast
Planning Area Economic and Demographic Assumptions

Year	Household Population	Households	Persons per Household	Real Personal Income (Millions 2007$)	Industrial Output (Millions 2007$)	Commercial Floorspace (MM Sqft.)
1990	3,426,296	1,223,732	2.80	111,682	13,050	657
1991	3,463,915	1,236,470	2.80	108,285	12,434	674
1992	3,511,437	1,249,708	2.81	109,627	11,830	688
1993	3,521,944	1,255,214	2.81	106,556	11,128	697
1994	3,515,762	1,263,373	2.78	106,228	10,769	702
1995	3,484,020	1,261,432	2.76	106,819	10,884	706
1996	3,483,861	1,262,971	2.76	109,213	11,048	709
1997	3,513,380	1,270,234	2.77	111,996	12,966	712
1998	3,542,203	1,273,218	2.78	121,037	14,379	716
1999	3,592,108	1,279,798	2.81	123,964	15,560	721
2000	3,647,823	1,283,007	2.84	127,660	17,235	729
2001	3,715,952	1,289,097	2.88	131,886	15,572	736
2002	3,772,717	1,294,226	2.92	132,815	14,734	744
2003	3,819,236	1,299,069	2.94	133,905	14,956	752
2004	3,857,834	1,305,563	2.96	137,424	15,593	757
2005	3,883,718	1,313,239	2.96	141,453	16,970	761
2006	3,905,707	1,322,704	2.95	148,514	18,104	766
2007	3,932,923	1,333,507	2.95	151,337	17,429	769
2008	3,958,628	1,339,254	2.96	150,642	17,251	775
2009	3,984,328	1,345,747	2.96	151,414	16,806	781
2010	4,010,193	1,352,098	2.97	154,345	16,973	786
2011	4,036,223	1,358,478	2.97	157,916	17,598	790
2012	4,062,422	1,364,893	2.98	164,152	18,515	791
2013	4,088,792	1,371,333	2.98	170,713	19,031	795
2014	4,115,330	1,377,806	2.99	175,283	19,267	801
2015	4,142,040	1,384,306	2.99	179,404	19,502	807
2016	4,168,921	1,390,840	3.00	184,063	19,726	813
2017	4,195,975	1,397,399	3.00	189,156	19,919	818
2018	4,223,206	1,403,994	3.01	194,426	20,089	822
2019	4,250,610	1,410,619	3.01	199,867	20,224	826
2020	4,278,192	1,417,276	3.02	205,485	20,332	831

Annual Growth Rates (%)						
1990-2000	0.63%	0.47%	0.14%	1.35%	2.82%	1.05%
2000-2008	1.03%	0.54%	0.52%	2.09%	0.01%	0.77%
2008-2010	0.65%	0.48%	0.17%	1.22%	-0.81%	0.73%
2010-2020	0.65%	0.47%	0.17%	2.90%	1.82%	0.55%

Form 2.3 Electricity Prices (2007$) - LADWP					
YEAR	**Residential**		**Commercial**		**Industrial**
1990	11.57		12.64		10.94
1991	11.29		12.79		10.63
1992	11.29		12.94		10.87
1993	11.84		13.15		11.61
1994	11.73		12.83		11.55
1995	11.34		12.45		11.08
1996	11.12		12.84		10.62
1997	11.61		12.82		10.65
1998	11.48		12.45		10.82
1999	11.32		12.01		10.66
2000	11.08		11.78		10.54
2001	10.82		11.59		10.18
2002	10.64		11.25		9.75
2003	10.45		10.88		10.02
2004	10.25		10.39		9.47
2005	10.10		10.06		9.24
2006	9.77		9.66		9.10
2007	9.75		9.69		9.01
2008	9.91		9.89		9.34
2009	10.73		11.02		9.99
2010	11.21		11.56		10.51
2011	11.32		11.67		10.61
2012	11.43		11.78		10.71
2013	11.55		11.90		10.82
2014	11.66		12.02		10.93
2015	11.77		12.13		11.03
2016	11.99		12.36		11.24
2017	12.21		12.58		11.44
2018	12.43		12.81		11.65
2019	12.66		13.05		11.87
2020	12.90		13.29		12.08

CHAPTER 7: End-User Natural Gas Demand Forecast

This chapter presents the *CED 2009 Revised* forecast of end-user natural gas demand for the Pacific Gas and Electric (PG&E), Southern California Gas (SCG), and San Diego Gas & Electric (SDG&E) natural gas planning areas. Staff prepares these forecasts in parallel with its electricity demand forecasts. The models used by staff are organized along electricity planning area boundaries. The gas demand forecasts presented here are the aggregate of gas demand in the corresponding electricity planning areas. These forecasts do not include natural gas used by utilities or others for electric generation.[24]

CED 2009 Revised incorporates forecasts of historical consumption data through 2008. See Chapter 1 for a discussion of economic and demographic assumptions. *CED 2009 Revised* uses the mid-rate scenario[25] from *CED 2009 Draft* for natural gas prices, rates lower than those used in *CED 2007*.

The following summarizes the results presented in this chapter:

- *CED 2009 Revised* projected natural gas consumption is below *CED 2007* because of lower recorded consumption in 2007 and 2008 than predicted in the 2007 forecast and because of the current recession.
- As the economy recovers, projected annual growth in natural gas consumption is expected to exceed *CED 2007* forecast growth.
- Per-capita natural gas consumption is projected to continue the historical downward trend.
- Annual growth in natural gas consumption beyond 2010 is projected to be highest for the SDG&E planning area and lowest for PG&E.

Statewide Forecast Results

Table 30 compares *CED 2009 Revised* and *CED 2009 Draft* natural gas forecasts with *CED 2007* for selected years. *CED 2009 Revised* corresponds to the mid-rate scenario in *CED 2009 Draft*; thus the comparison is made to the draft mid-rate case. *CED 2009 Revised* uses slightly higher rates, roughly equivalent to those in the draft high-rate scenario.

Reported 2008 natural gas consumption for *CED 2009 Revised* is well below that predicted in *CED 2009 Draft* and *CED 2007*. This difference, along with a projected reduction from 2008-2010 for industrial and mining consumption, leads to a lower forecast through 2020. However, as the

[24] There is also a small amount of natural gas use by light-duty vehicles projected by the Energy Commission's Fuels Office (43 million-62 million therms statewide in 2020, depending on the scenario) not included in this forecast.

[25] In *CED 2009 Draft*, three price scenarios were developed for natural gas rates: high rates, low (constant) rates, and a rate scenario in between the two, the mid-rate case, which assumed a 10 percent rate increase between 2010 and 2020.

economy recovers beyond 2010, the growth rate exceeds that of the two previous forecasts because of lower projected rates in the case of *CED 2007* and higher economic growth in the case of *CED 2009 Draft*.

Figure 148 compares the forecast by region. As in the state forecast, gas consumption projections in both Southern and Northern California fall in the short term and increase thereafter at a higher rate compared to *CED 2009 Draft* and *CED 2007*. In Southern California, a strong recovery in the industrial and mining sectors projected in the more recent economic forecast (relative to *CED 2009 Draft*) pushes *CED 2009 Revised* gas consumption above *CED 2009 Draft* levels by 2012.

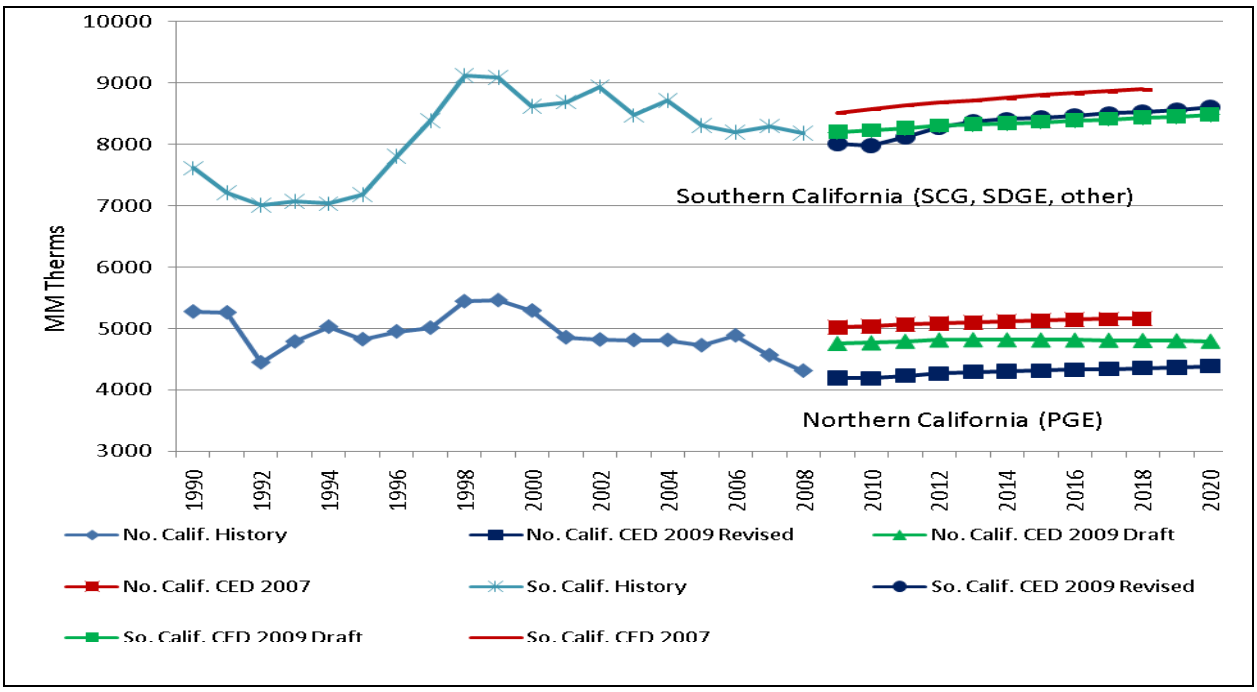
Figure 149 compares *CED 2009 Revised* per capita natural gas consumption with *CED 2009 Draft* and *CED 2007*. Annual per capita demand varies in response to annual temperatures and business conditions but has generally been declining over time. As would be expected from statewide consumption results, per capita natural gas consumption is below *CED 2009 Draft* and *CED 2007* levels. All three forecasts project a decline in per capita consumption over the forecast period, although the rate of decrease is lower in *CED 2009 Revised* than in the two previous forecasts.

Table 30: Statewide End-User Natural Gas Forecast Comparison

End-User Consumption (MM Therms)					
	CED 2007 (Oct. 2007)	*CED 2009 Draft* Mid-rate Case (June 2009)	*CED 2009 Revised* (Nov. 2009)	Difference, *CED 2009 Revised* and *CED 2007*	Difference, *CED 2009 Revised* and *CED 2009 Draft*
1990	12,893	12,893	12,893	0.00%	0.00%
2000	13,913	13,913	13,913	0.00%	0.00%
2008	13,445	12,941	12,494	-7.07%	-3.46%
2010	13,616	12,992	12,162	-10.68%	-6.48%
2015	13,932	13,218	12,751	-8.48%	-3.54%
2018	14,058	13,319	12,894	-8.28%	-3.20%
Average Annual Growth Rates					
1990-2000	0.76%	0.76%	0.76%		
2000-2008	-0.43%	-0.90%	-0.89%		
2008-2010	0.63%	0.19%	-1.34%		
2010-2018	0.40%	0.31%	0.73%		
Historical values are shaded					
End-user consumption excludes natural gas used to generate electricity					

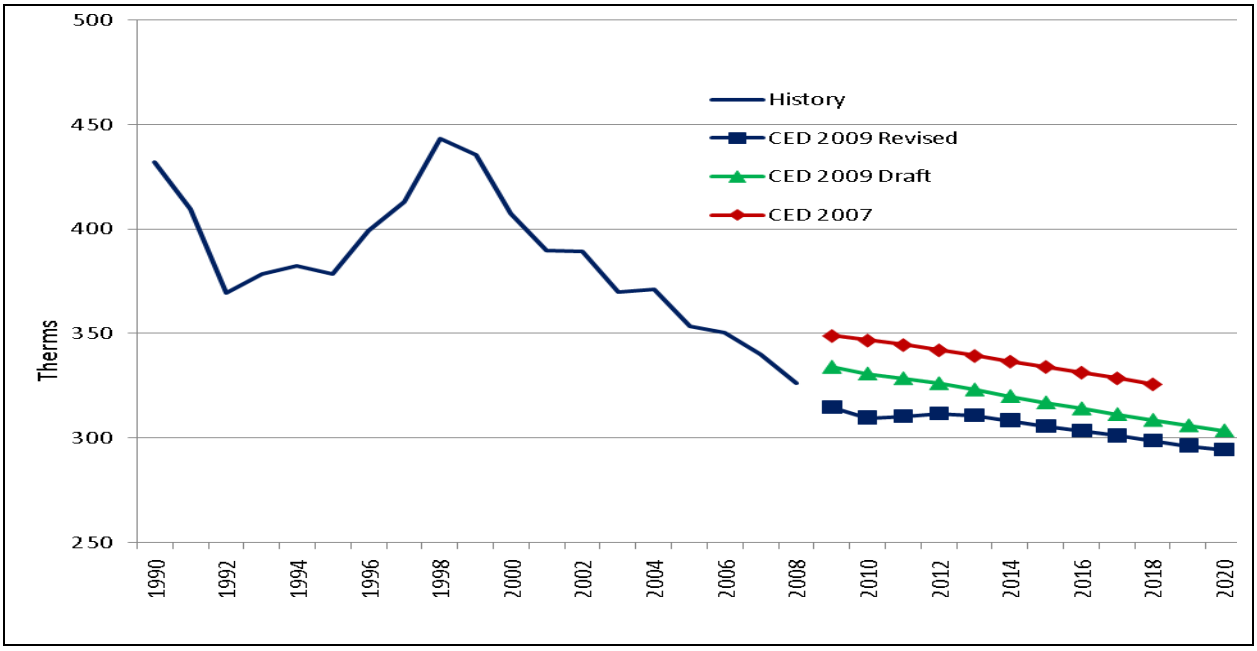
Source: California Energy Commission, 2009

Figure 148: End-User Natural Gas Consumption Forecast



Source: California Energy Commission, 2009

Figure 149: Statewide per Capita Natural Gas Consumption



Source: California Energy Commission, 2009

Planning Area Results

This section presents *CED 2009 Revised* results for each of the three planning areas, including sector level projections. Comparisons are made to *CED 2007* only. In general, results for *CED 2009 Revised* are similar to those of the draft forecast, with a difference in 2008 as a result of updated historical data and a slightly higher long-term growth rate.

Pacific Gas and Electric Planning Area

The PG&E natural gas planning area is defined as the combined PG&E and SMUD electric planning areas. It includes all PG&E retail gas customers and customers of private marketers using the PG&E natural gas distribution system.

Table 31 compares the revised PG&E planning area forecast with *CED 2007*. As in the statewide case, demand drops from 2008 to 2010, so consumption is projected to be almost 17 percent less than *CED 2007* by 2010. Most of this decrease is from lower recorded consumption in 2007 and 2008 compared to *CED 2007* projections, and the remainder is a result of economic decline. Longer-term growth is expected to be higher than in the 2007 forecast, reducing the difference between the two forecasts to 15.6 percent by 2018.

Table 31: PG&E Natural Gas Forecast Comparison

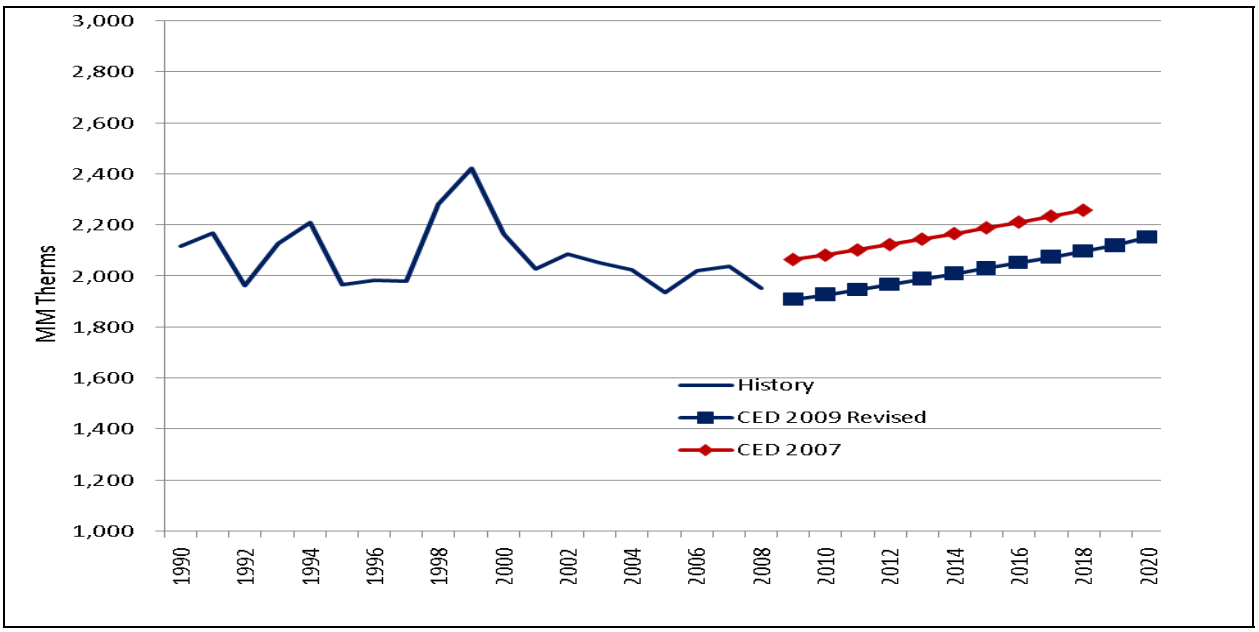
	Consumption (MM Therms)		
	CED 2007	*CED 2009* Revised	Percentage Difference
1990	5,275	5,275	0. 00%
2000	5,291	5,291	0. 00%
2008	4,985	4,309	-13.50%
2010	5,038	4,186	-16.90%
2018	5,163	4,358	-15.60%
Historical values are shaded			
	Annual Average Growth Rates		
1990- 2000	0. 03%	0. 03%	
2000- 2008	-0. 74%	-2. 53%	
2008- 2010	0. 52%	-1.43%	
2010- 2018	0. 31%	0. 50%	

Source: California Energy Commission, 2009

Figure 150 compares *CED 2009 Revised* and *CED 2007* PG&E planning area residential forecasts. *CED 2009 Revised* is lower throughout the entire forecast period, as actual consumption recorded in 2008 was lower than predicted in *CED 2007*, but the two forecasts have nearly the same growth rate from 2010-2020, just over 1 percent.

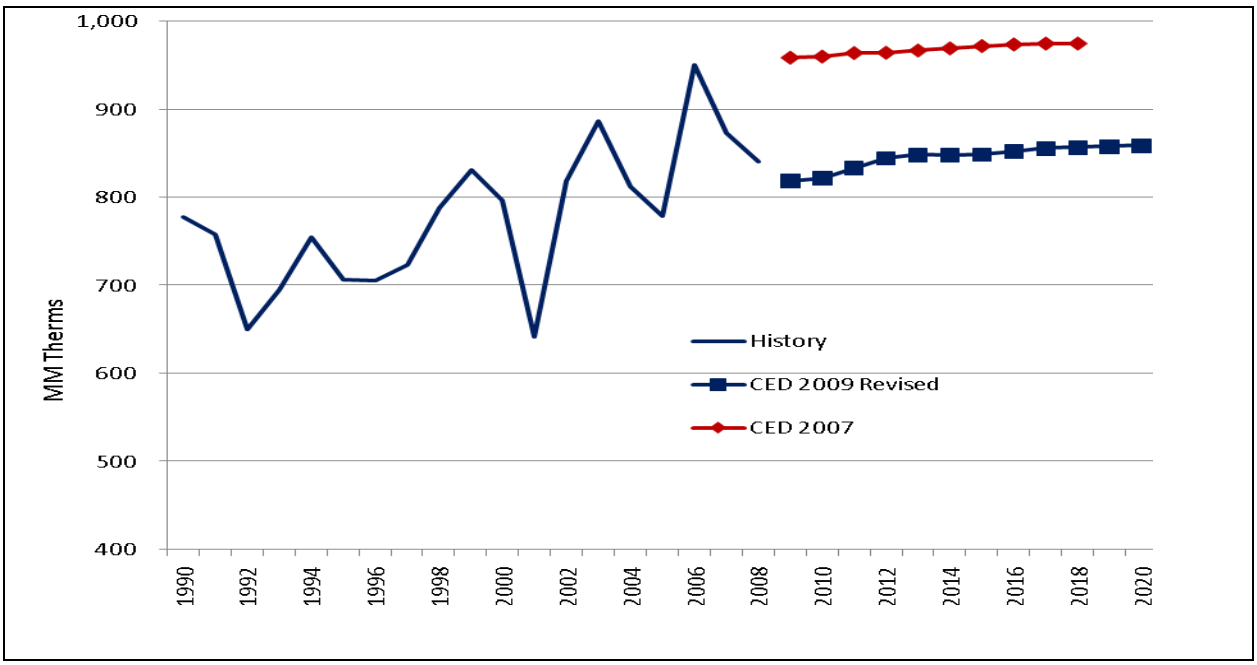
Figures 151 and **152** show the forecasts for the PG&E commercial and industrial plus mining sectors, the latter responsible for most of the reduction in recorded 2007 and 2008 consumption relative to *CED 2007* projections. In 2010, projected consumption is down by around 14 percent in the commercial sector and by more than 27 percent in the industrial sector. Commercial consumption grows at a higher rate in *CED 2009 Revised* than in *CED 2007*, while the rate of consumption decline in the industrial plus mining sector is slightly higher.

Figure 150: PG&E Planning Area Residential Gas Consumption



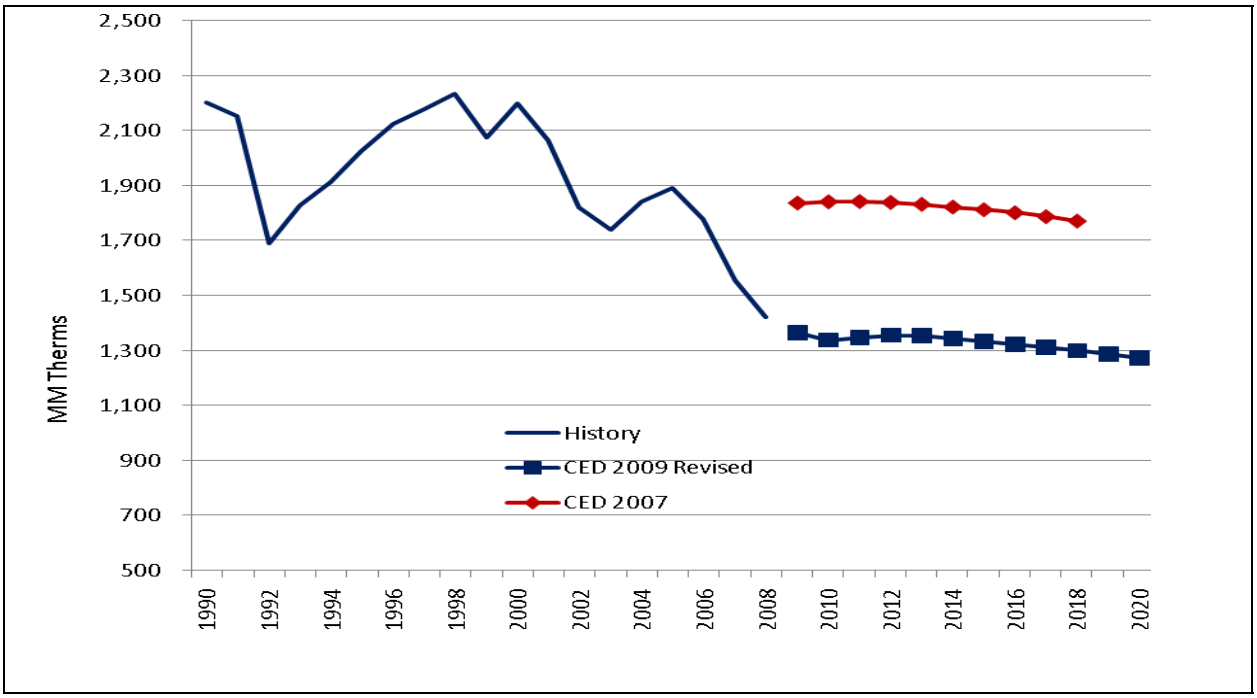
Source: California Energy Commission, 2009

Figure 151: PG&E Planning Area Commercial Gas Consumption



Source: California Energy Commission, 2009

Figure 152: PG&E Planning Area Industrial Plus Mining Gas Consumption



Source: California Energy Commission, 2009

Southern California Gas Company Planning Area

The SCG planning area is composed of the SCE, Burbank/Glendale, Pasadena, and LADWP electric planning areas. It includes customers of those utilities, plus customers of private marketers using the SCG natural gas distribution system.

Table 32 compares the revised SCG planning area forecast with *CED 2007*. Recorded consumption is lower in 2007 and 2008 than *CED 2007* projections; this reduction and the impacts of the current recession drive *CED 2009 Revised* gas consumption almost 7 percent below the 2007 forecast by 2010. The projected economic recovery leads to higher longer-term growth: 0.8 percent per year from 2010-2018 in *CED 2009 Revised* compared to 0.4 percent in *CED 2007*.

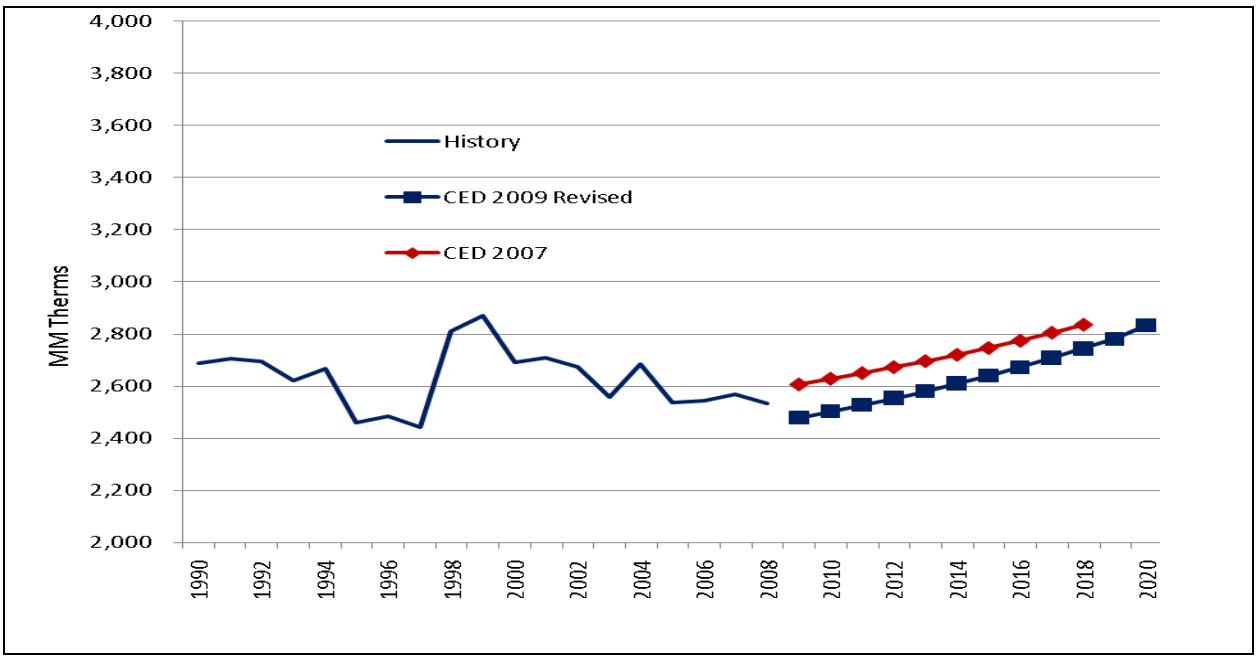
Table 32: SCG Natural Gas Forecast Comparison

	Consumption (MM Therms)		
	CED 2007	*CED 2009 Revised*	Percentage Difference
1990	6,806	6,806	0. 00%
2000	7,938	7,938	0. 00%
2008	7,734	7,491	-3.14%
2010	7,835	7,290	-6.96%
2018	8,083	7,772	-3.85%
Historical values are shaded			
	Annual Average Growth Rates		
1990- 2000	1. 55%	1. 55%	
2000- 2008	-0. 33%	-0. 72%	
2008- 2010	0. 65%	-1. 35%	
2010- 2018	0. 39%	0. 80%	

Source: California Energy Commission, 2009

Figure 153 compares *CED 2009 Revised* and *CED 2007* SCG planning area residential gas forecasts. *CED 2009 Revised* projects a higher rate of growth than the 2007 forecast between 2010 and 2018, so the difference in projected residential consumption is reduced from almost 5 percent in 2010 to just over 3 percent by 2018.

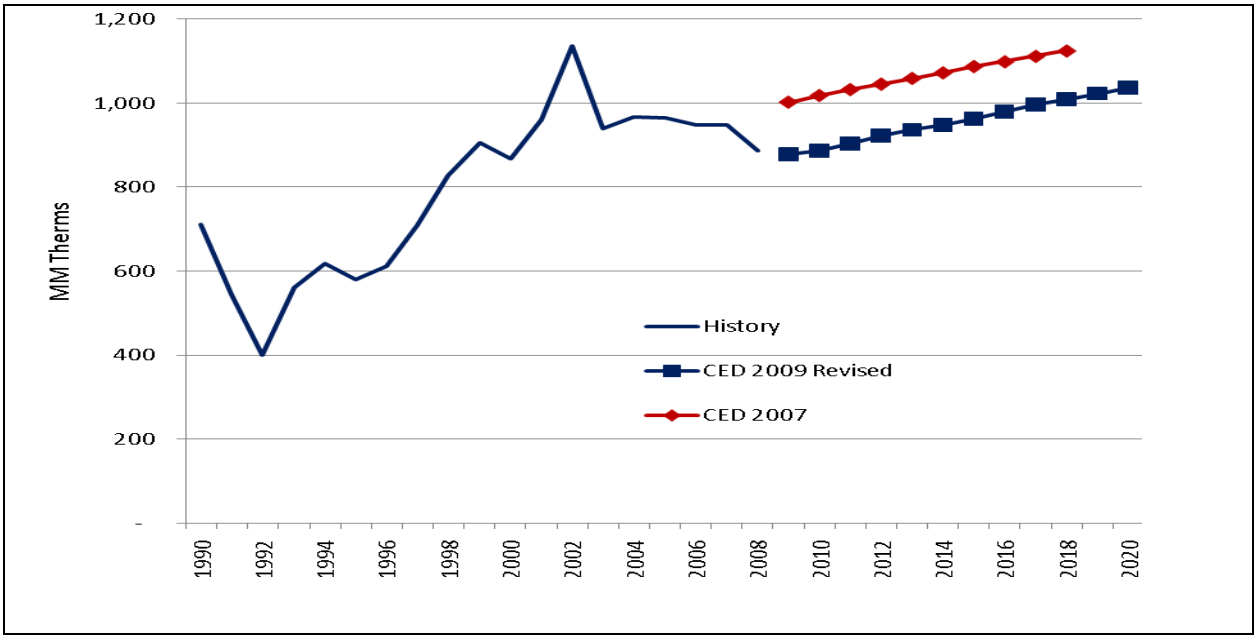
Figure 153: SCG Planning Area Residential Gas Consumption



Source: California Energy Commission, 2009

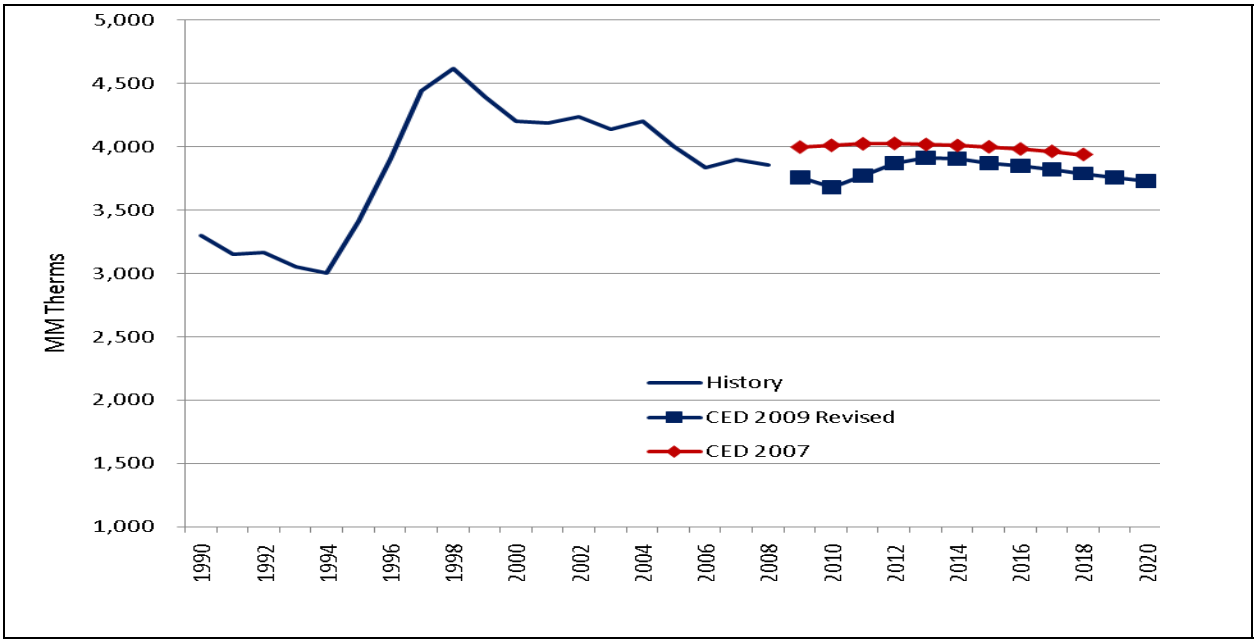
Figures 154 and **155** show the forecasts for the SCG commercial and industrial plus mining sectors compared to *CED 2007*. As in the residential sector, commercial consumption increases at a higher rate than in the 2007 forecast from 2010-2018, so the difference in projected consumption is reduced from around 12 percent in 2010 to just over 10 percent by 2018. The projected economic recovery increases industrial plus mining consumption to just below *CED 2007* level by 2012, although the rate of decline thereafter is slightly higher than in the 2007 forecast.

Figure 154: SCG Planning Area Commercial Gas Consumption



Source: California Energy Commission, 2009

Figure 155: SCG Planning Area Industrial Plus Mining Gas Consumption



Source: California Energy Commission, 2009

San Diego Gas & Electric Planning Area

The SDG&E planning area contains SDG&E customers plus customers of private marketers using the SDG&E natural gas distribution system.

Table 33 compares the revised SDG&E planning area gas forecast with *CED 2007*. As in the other two planning areas, recorded consumption is lower in 2008 than projected in the 2007 forecast, and this difference combined with current economic conditions reduces projected consumption to almost 10 percent below *CED 2007* in 2010. The projected economic recovery leads to a higher growth rate from 2010-2018 than in the 2007 forecast, so the difference in projected consumption falls to 7.5 percent by 2018.

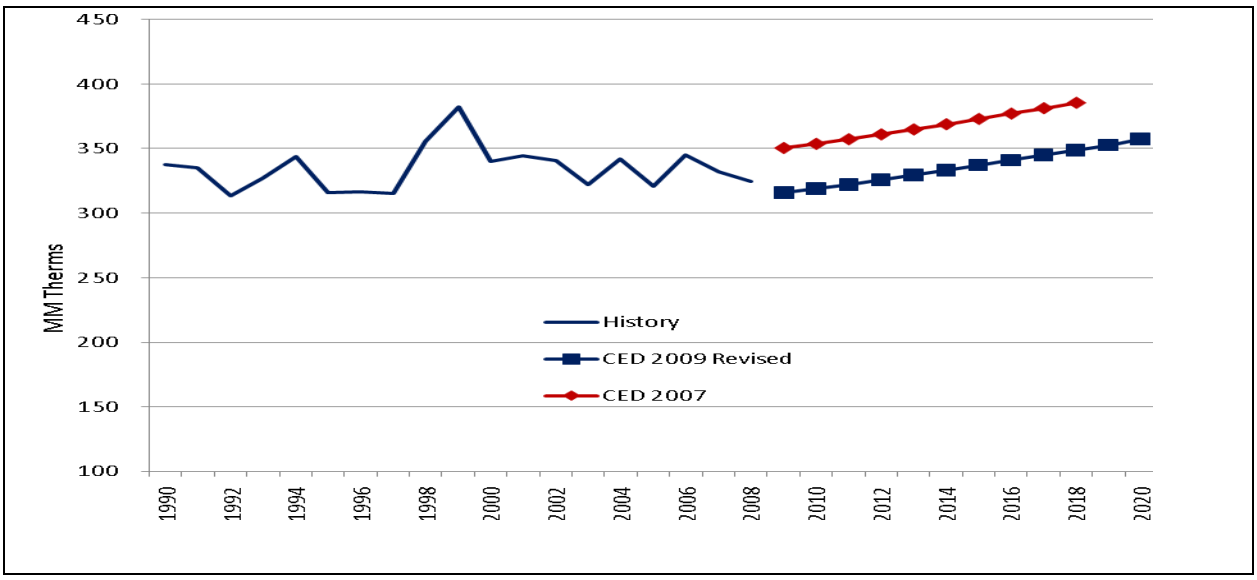
Table 33: SDG&E Natural Gas Forecast Comparison

	Consumption (MM Therms)		
	CED 2007	*CED 2009 Revised*	Percentage Difference
1990	717	717	0. 00%
2000	565	565	0. 00%
2008	573	541	-5.53%
2010	588	531	-9.78%
2018	645	596	-7.49%
Historical values are shaded			
	Annual Average Growth Rates		
1990- 2000	-2. 35%	-2. 35%	
2000- 2008	0.17%	-0. 54%	
2008- 2010	1. 30%	-1. 01%	
2010- 2018	1. 16%	1. 47%	

Source: California Energy Commission, 2009

Figure 156 compares the *CED 2009 Revised* and *CED 2007* SDG&E planning area residential forecasts. The growth rate in *CED 2009 Revised* is slightly higher than in the 2007 forecast, so the difference in projected consumption falls from 9.8 percent in 2010 to 9.5 percent by 2018.

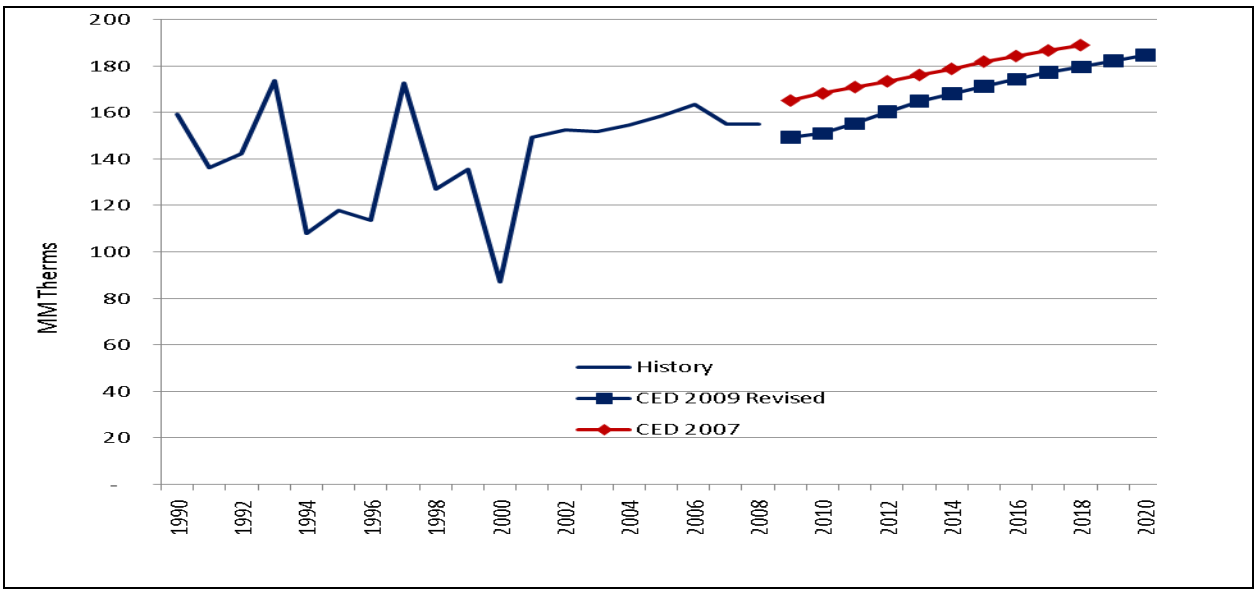
Figure 156: SDG&E Planning Area Residential Gas Consumption



Source: California Energy Commission, 2009

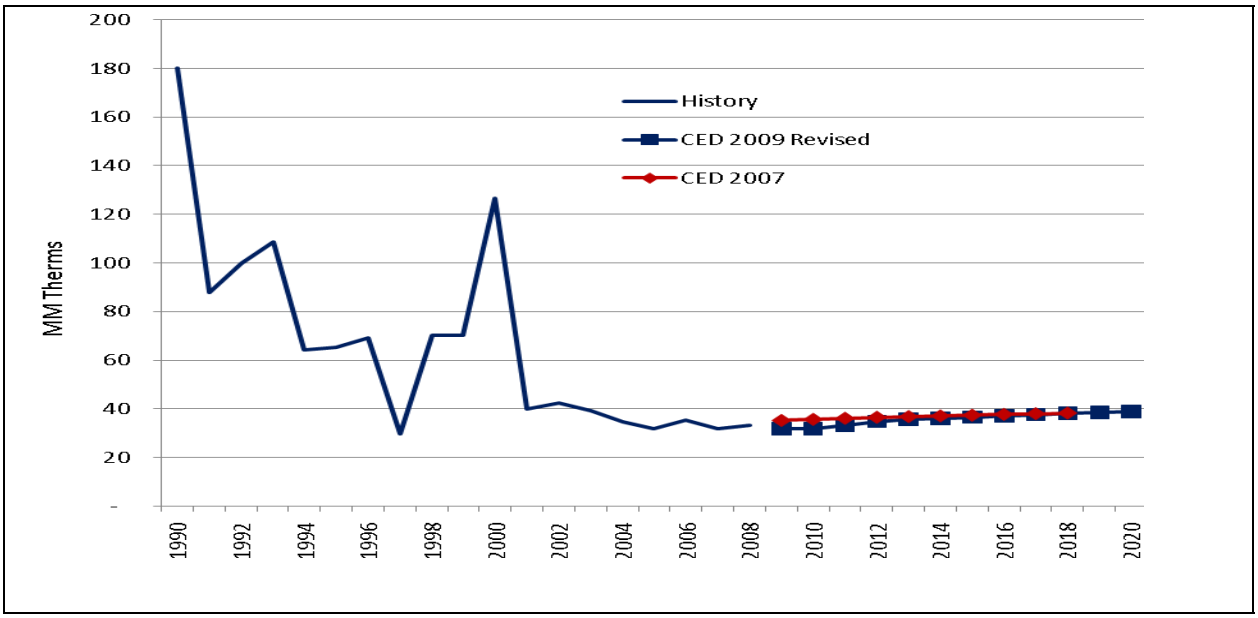
Figures 157 and **158** show *CED 2009 Revised* projections for the SDG&E commercial and industrial plus mining sectors relative to *CED 2007*. Growth is higher for both sectors from 2010-2018 compared to the 2007 forecast. Between 2010 and 2018, the difference in projected commercial consumption between the two forecasts decreases from almost 10 percent to less than 5 percent, while the difference in industrial plus mining consumption falls from around 10 percent to less than 1 percent.

Figure 157: SDG&E Planning Area Commercial Gas Consumption



Source: California Energy Commission, 2009

Figure 158: SDG&E Planning Area Industrial plus Mining Gas Consumption



Source: California Energy Commission, 2009

Form 1.1 - PG&E Natural Gas Planning Area
Natural Gas Consumption by Sector (10^6 Therms)

	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1990	2,118	778	1,962	238	65	114	5,275
1991	2,169	758	1,733	418	60	122	5,260
1992	1,963	651	1,530	162	50	90	4,445
1993	2,126	696	1,732	96	40	95	4,786
1994	2,211	755	1,840	71	52	98	5,027
1995	1,966	707	1,950	77	47	76	4,822
1996	1,982	706	2,081	44	55	81	4,950
1997	1,978	723	2,014	163	64	67	5,010
1998	2,283	789	1,914	319	70	67	5,442
1999	2,422	831	1,837	236	71	64	5,461
2000	2,164	797	1,909	288	79	55	5,291
2001	2,029	642	1,770	296	50	67	4,853
2002	2,086	819	1,547	272	59	35	4,818
2003	2,051	887	1,471	268	85	49	4,810
2004	2,024	812	1,538	304	65	68	4,811
2005	1,935	779	1,560	329	41	79	4,724
2006	2,021	950	1,747	29	41	98	4,886
2007	2,039	873	1,516	39	46	50	4,563
2008	1,951	841	1,375	46	41	55	4,309
2009	1,910	819	1,321	45	41	55	4,192
2010	1,928	822	1,296	43	41	56	4,186
2011	1,947	834	1,304	44	41	56	4,227
2012	1,968	845	1,312	45	41	57	4,268
2013	1,990	849	1,310	46	41	57	4,293
2014	2,011	848	1,299	45	41	58	4,302
2015	2,032	849	1,289	45	41	58	4,315
2016	2,054	852	1,280	44	41	59	4,330
2017	2,076	856	1,270	43	41	59	4,346
2018	2,099	857	1,258	42	41	60	4,358
2019	2,122	858	1,246	42	41	61	4,369
2020	2,153	859	1,232	41	41	61	4,388

Annual Growth Rates (%)

1990-2000	0.22%	0.24%	-0.28%	1.93%	-	-6.96%	0.03%
2000-2008	-1.28%	0.67%	-4.02%	-20.41%	-7.71%	-0.14%	-2.53%
2008-2010	-0.60%	-1.10%	-2.92%	-3.13%	0.00%	1.08%	-1.43%
2010-2020	1.11%	0.52%	-0.37%	-0.33%	0.00%	0.88%	0.50%

Form 1.1 - SCG Natural Gas Planning Area
Natural Gas Consumption by Sector (10^6 Therms)

	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1990	2,687	710	1,002	2,295	45	67	6,806
1991	2,705	543	954	2,194	34	109	6,539
1992	2,694	399	710	2,452	26	47	6,329
1993	2,620	559	899	2,153	33	58	6,322
1994	2,666	617	990	2,011	44	62	6,390
1995	2,459	578	919	2,494	40	67	6,557
1996	2,482	611	1,257	2,646	48	130	7,174
1997	2,441	709	1,132	3,311	63	87	7,743
1998	2,812	827	1,721	2,900	69	87	8,416
1999	2,870	905	1,757	2,635	87	92	8,347
2000	2,692	867	1,725	2,476	90	87	7,938
2001	2,707	960	1,636	2,556	86	74	8,020
2002	2,673	1,136	2,044	2,195	114	99	8,261
2003	2,558	939	1,529	2,608	102	77	7,814
2004	2,685	968	1,569	2,636	101	66	8,025
2005	2,536	965	1,578	2,427	85	71	7,662
2006	2,544	947	1,463	2,371	87	71	7,482
2007	2,568	948	1,527	2,369	86	106	7,605
2008	2,533	886	1,565	2,289	86	135	7,495
2009	2,478	878	1,517	2,242	83	137	7,334
2010	2,502	886	1,490	2,191	83	137	7,290
2011	2,526	903	1,521	2,251	83	138	7,422
2012	2,553	922	1,559	2,311	83	139	7,566
2013	2,581	936	1,575	2,337	83	140	7,652
2014	2,609	947	1,578	2,324	83	141	7,682
2015	2,640	962	1,579	2,293	83	142	7,698
2016	2,672	979	1,581	2,265	83	143	7,723
2017	2,709	995	1,582	2,238	83	144	7,751
2018	2,745	1,009	1,581	2,209	83	145	7,772
2019	2,782	1,022	1,579	2,182	83	146	7,794
2020	2,834	1,036	1,575	2,155	83	147	7,829

Annual Growth Rates (%)

1990-2000	0.02%	2.03%	5.59%	0.76%	-	2.66%	1.55%
2000-2008	-0.76%	0.27%	-1.21%	-0.97%	-0.55%	5.56%	-0.72%
2008-2010	-0.61%	-0.01%	-2.42%	-2.16%	-2.18%	1.01%	-1.38%
2010-2020	1.25%	1.64%	0.74%	0.10%	0.00%	0.67%	0.80%

Form 1.1 - SDG&E Natural Gas Planning Area
Natural Gas Consumption by Sector (10^6 Therms)

Year	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1990	338	160	172	8	6	33	717
1991	335	136	82	6	5	23	588
1992	314	143	94	6	4	26	586
1993	327	174	104	5	8	30	648
1994	344	108	60	4	6	16	538
1995	316	118	62	4	6	16	521
1996	317	114	63	6	8	20	527
1997	316	173	29	1	3	7	528
1998	356	127	68	2	7	18	578
1999	382	136	68	2	8	20	616
2000	340	87	125	2	3	9	565
2001	345	149	38	2	6	19	559
2002	341	153	40	3	7	16	559
2003	322	152	34	6	6	14	533
2004	342	155	29	5	6	13	551
2005	321	159	27	5	5	13	530
2006	345	164	30	5	5	25	574
2007	332	155	27	4	4	24	547
2008	325	155	29	4	4	24	541
2009	316	149	28	4	4	25	525
2010	319	151	28	3	4	25	531
2011	322	155	30	3	4	25	539
2012	326	160	31	3	4	25	550
2013	330	165	32	3	4	25	559
2014	334	168	33	3	4	25	567
2015	337	171	33	3	4	25	574
2016	341	174	34	3	4	26	582
2017	345	177	34	3	4	26	589
2018	349	180	35	3	4	26	596
2019	353	182	35	3	4	26	603
2020	358	185	35	3	4	26	611

Annual Growth Rates (%)

1990-2000	0.07%	-5.85%	-3.18%	-13.57%	-	-12.66%	-2.35%
2000-2008	-0.58%	7.45%	-16.65%	11.00%	4.08%	13.88%	-0.54%
2008-2010	-0.86%	-1.35%	-0.91%	-12.47%	0.00%	0.87%	-1.01%
2010-2020	1.15%	2.19%	2.46%	0.24%	0.00%	0.58%	1.47%

Form 1.1 - Other Natural Gas Planning Area
Natural Gas Consumption by Sector (10^6 Therms)

Year	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1990	72	19	1	1	1	1	95
1991	61	24	1	1	1	1	88
1992	67	16	8	1	0	2	94
1993	72	17	10	1	0	3	102
1994	75	19	9	3	0	3	109
1995	71	14	11	4	0	2	103
1996	70	20	16	4	0	3	113
1997	76	21	17	4	0	3	121
1998	91	23	14	3	0	3	134
1999	86	22	17	4	0	3	132
2000	75	17	20	4	0	3	119
2001	78	20	15	2	0	2	117
2002	80	20	17	3	0	3	124
2003	84	23	16	4	0	3	130
2004	99	26	8	3	1	3	140
2005	93	25	2	1	0	3	124
2006	94	33	7	2	0	15	150
2007	95	33	2	0	15	7	152
2008	96	34	2	0	15	7	153
2009	97	34	2	0	15	7	154
2010	98	34	2	0	15	7	156
2011	99	35	2	0	15	7	157
2012	100	35	2	0	15	7	159
2013	102	35	2	0	15	7	160
2014	103	36	2	0	15	7	162
2015	104	36	2	0	15	7	163
2016	105	36	2	0	15	7	165
2017	106	37	2	0	15	7	166
2018	108	37	2	0	15	7	168
2019	108	37	2	0	15	7	168
2020	108	37	2	0	15	7	168

Annual Growth Rates (%)

1990-2000	0.38%	-1.42%	40.45%	19.58%	-	8.89%	2.30%
2000-2008	3.12%	9.24%	-26.99%	-38.45%	74.71%	11.50%	3.22%
2008-2010	1.13%	1.00%	0.00%	0.00%	0.00%	0.00%	0.93%
2010-2020	0.90%	1.00%	0.00%	0.00%	0.00%	0.00%	0.94%

Form 1.1 - Statewide End-User Natural Gas Consumption
Consumption by Sector (10^6 Therms)

	Residential	Commercial	Industrial	Mining	Agricultural	Other	Total Consumption
1990	5,215	1,667	3,137	2,542	117	215	12,893
1991	5,270	1,461	2,770	2,619	100	255	12,475
1992	5,038	1,209	2,341	2,620	80	166	11,454
1993	5,145	1,446	2,745	2,254	82	186	11,859
1994	5,296	1,499	2,899	2,088	102	178	12,063
1995	4,812	1,418	2,941	2,579	93	161	12,003
1996	4,852	1,450	3,416	2,700	111	235	12,764
1997	4,811	1,626	3,192	3,479	131	164	13,403
1998	5,541	1,767	3,717	3,224	146	175	14,571
1999	5,760	1,894	3,680	2,877	166	179	14,556
2000	5,271	1,768	3,779	2,769	172	154	13,913
2001	5,159	1,772	3,459	2,856	142	162	13,549
2002	5,180	2,128	3,648	2,472	180	153	13,762
2003	5,016	2,001	3,049	2,886	193	142	13,288
2004	5,150	1,960	3,145	2,948	173	150	13,527
2005	4,885	1,929	3,166	2,763	131	166	13,039
2006	5,004	2,094	3,247	2,406	133	209	13,092
2007	5,034	2,009	3,072	2,413	152	187	12,866
2008	4,905	1,916	2,971	2,340	146	220	12,498
2009	4,801	1,880	2,868	2,291	143	223	12,206
2010	4,847	1,894	2,816	2,238	143	225	12,162
2011	4,895	1,927	2,856	2,299	143	226	12,346
2012	4,948	1,962	2,903	2,360	143	228	12,544
2013	5,002	1,985	2,918	2,387	143	229	12,664
2014	5,056	2,000	2,911	2,373	143	231	12,713
2015	5,113	2,018	2,903	2,341	143	233	12,751
2016	5,172	2,042	2,896	2,312	143	234	12,800
2017	5,237	2,065	2,887	2,285	143	236	12,852
2018	5,301	2,083	2,876	2,254	143	238	12,894
2019	5,365	2,100	2,862	2,227	143	239	12,935
2020	5,452	2,117	2,845	2,199	143	241	12,997

Annual Growth Rates (%)

1990-2000	0.11%	0.60%	1.88%	0.86%	-	-3.30%	0.76%
2000-2008	-0.90%	1.00%	-2.96%	-2.08%	-1.97%	4.57%	-1.33%
2008-2010	-0.59%	-0.58%	-2.64%	-2.20%	-1.28%	0.98%	-1.35%
2010-2020	1.18%	1.20%	0.26%	0.09%	0.00%	0.69%	0.73%

Form 2.3 - CED 2009 Natural Gas Rates

	Industrial (2005$ per mmtherms)			Commercial (2005$/mBTU)			Residential (1977 cents/therm)		
	PG&E	SCG	SDG&E	PG&E	SCG	SDG&E	PG&E	SCG	SDG&E
1990	0.84	0.86	0.83	8.37	8.59	8.32	28.71	28.54	28.68
1991	0.83	0.94	0.48	8.31	9.37	4.76	28.99	31.74	27.90
1992	0.84	0.86	0.48	8.39	8.56	4.84	27.95	28.77	27.88
1993	0.77	0.91	0.46	7.69	9.10	4.57	26.58	30.53	29.25
1994	0.77	0.88	0.43	7.72	8.81	4.33	27.62	30.35	29.50
1995	0.80	0.87	0.33	8.02	8.72	3.33	28.95	31.71	28.75
1996	0.70	0.77	0.39	7.02	7.67	3.89	26.03	30.32	29.55
1997	0.73	0.80	0.44	7.30	7.98	4.37	26.92	31.72	31.22
1998	0.75	0.72	0.48	7.53	7.17	4.84	27.89	30.70	32.44
1999	0.75	0.65	0.53	7.48	6.46	5.32	28.28	27.33	33.39
2000	0.91	0.82	0.64	9.09	8.21	6.45	33.49	32.67	34.42
2001	0.73	0.92	1.18	7.27	9.22	11.81	23.86	30.01	52.93
2002	0.69	0.72	0.39	6.87	7.25	3.93	27.55	26.92	27.91
2003	0.95	0.85	0.63	9.46	8.47	6.29	36.66	34.68	34.40
2004	0.96	0.91	0.68	9.56	9.08	6.85	37.49	37.56	36.16
2005	1.18	1.22	0.76	11.77	12.22	7.60	40.47	37.91	38.65
2006	1.17	1.03	0.76	11.70	10.32	5.71	40.47	37.91	38.65
2007	1.18	1.04	0.77	11.78	10.39	5.75	40.76	38.18	38.93
2008	1.53	1.35	0.99	15.29	13.49	7.46	52.88	49.53	50.51
2009	1.11	0.98	0.72	11.07	9.77	5.40	38.30	35.88	36.58
2010	1.11	0.98	0.72	11.07	9.77	5.40	38.30	35.88	36.58
2011	1.12	0.99	0.73	11.18	9.86	5.46	38.67	36.22	36.93
2012	1.13	1.00	0.73	11.29	9.96	5.51	39.05	36.57	37.29
2013	1.14	1.01	0.74	11.40	10.05	5.56	39.42	36.93	37.65
2014	1.15	1.02	0.75	11.51	10.15	5.62	39.81	37.28	38.02
2015	1.16	1.02	0.75	11.62	10.25	5.67	40.19	37.65	38.38
2016	1.17	1.03	0.76	11.73	10.35	5.73	40.58	38.01	38.76
2017	1.18	1.04	0.77	11.85	10.45	5.78	40.97	38.38	39.13
2018	1.20	1.05	0.78	11.96	10.55	5.84	41.37	38.75	39.51
2019	1.21	1.07	0.78	12.08	10.65	5.89	41.77	39.12	39.89
2020	1.22	1.08	0.79	12.19	10.75	5.95	42.17	39.50	40.28

CHAPTER 8: Energy Efficiency and Conservation

Introduction

With the state's adoption of the first *Energy Action Plan (EAP)* in 2003, energy efficiency became the resource of first choice for meeting the state's future energy needs. Assembly Bill 2021 (Levine, Chapter 734, Statutes of 2006) set a statewide goal of reducing total forecasted electricity consumption by 10 percent over the next 10 years. Under AB 2021, the Energy Commission, in consultation with the CPUC, is responsible for setting annual statewide efficiency potential estimates and targets in a public process every three years using the most recent IOU and publicly owned utility data. These targets, combined with California's greenhouse gas emission reduction goals, make it essential for the Energy Commission to properly account for energy efficiency impacts when forecasting future electricity and natural gas demand.

Utilities and other stakeholders expressed concern during the *2007 IEPR* process about the lack of transparency in staff methods that account for efficiency program impacts in the Energy Commission's demand forecast. In particular, parties asked for clarification of how much uncommitted savings — savings from efficiency programs reasonably expected to occur but not yet implemented or funded — are accounted for in the forecast. Prompted by these concerns, the *2007 IEPR* committed the Energy Commission in 2009 and beyond to examining these methods in a public process that includes the CPUC staff, utilities, and other stakeholders.

To better measure and attribute energy efficiency impacts, staff has undertaken the following steps, as detailed in the *2008 IEPR Update*, during the *2009 IEPR* process:

1. Develop a standardized taxonomy of terms encompassing all major concepts applying to efficiency potential studies and energy demand forecasts.
2. Organize and participate in a stakeholder working group designed to address technical efficiency issues and to develop consistent metrics for efficiency analysis across utilities and various agencies.
3. Review and compare the modeling methods, inputs, and data sources used in Commission forecasts of efficiency savings with the consulting firm Itron's Asset Model. Compare interim savings estimates from the Energy Commission's demand forecast and Asset Model for selected programs given common sets of input and modeling assumptions.
4. Refine and improve the Energy Commission's forecasting models to allow more detailed and complete output of committed efficiency savings. Committed savings are those from efficiency programs that have already been implemented or have been approved and funded.

5. Investigate alternative forecasting methods

6. Develop an uncommitted energy efficiency projection capability.

Step 1 is designed to improve communication between the Energy Commission, the CPUC, energy utilities, and other interested parties on matters related to energy efficiency impacts. This ongoing, effort includes Energy Commission and CPUC staff, as well as input from various utilities.

The stakeholder working group (Step 2) has been meeting since November 2008 and has provided valuable information related to available energy efficiency program data. Step 2, along with progress made in Steps 3 and 4, provides the basis for the committed (funded and/or implemented) energy efficiency program impacts presented below. Step 5 is discussed in the Appendix. Estimation of uncommitted efficiency savings (Step 6) is ongoing, and will be finalized later this year.

Statewide Results

The following summarizes the results presented in this chapter:

- Total projected efficiency/conservation electricity consumption savings reach almost 80,000 GWH by 2020; peak savings reach more than 19,500 MW by 2020.
- The majority of savings comes from building and appliance standards.
- Impacts from utility efficiency programs are responsible for around 20 percent of total savings in 2012.
- Compared to *CED 2007*, IOU efficiency program consumption impacts are projected to be more than five times higher in 2012; publicly owned utility consumption impacts are projected to be around four times higher in 2009.
- Additional residential lighting savings beyond utility program effects are projected to reach more than 4,500 GWH in 2020.
- The results in this chapter reflect the recent shift of the 2009-2011 IOU program cycle to 2010-2012.

Staff estimates the savings in energy demand associated with three sources: committed utility and public agency efficiency programs, building and appliance standards, and *naturally occurring* savings, which are intended to capture the impacts from energy price changes and certain market trends not directly associated with programs or standards. Each of these sources is discussed in the following sections. **Table 34** shows the estimated statewide historical and projected impacts on residential and commercial electricity consumption and peak demand from each source estimated for *CED 2009 Revised*. The *Total Savings* column represents the

amount of savings from programs, standards, and naturally occurring savings explicitly accounted for in the demand forecast.

To give some perspective on the impacts of these savings, **Table 34** also shows historical and projected electricity use from *CED 2009 Revised*, as well as historical and projected *unmanaged* use, which refers to estimated use in the absence of these savings impacts. The last column shows the percentage reduction in use attributed to the impacts of the three sources of savings, calculated by dividing total savings by unmanaged use. **Table A-8**, provided at the end of this chapter and in spreadsheet form on the Energy Commission's website, provides detailed results for the five major planning areas.

Table 34: Statewide Electricity Savings by Category

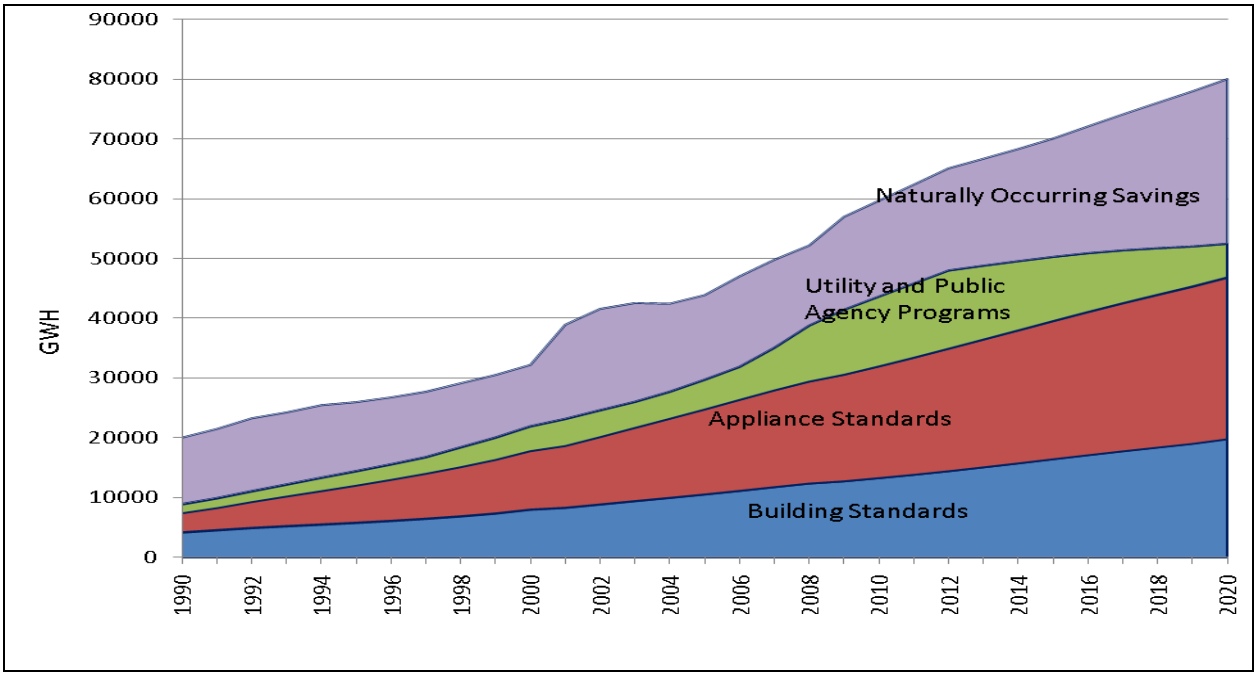
Year	Building and Appliance Standards	Utility and Public Agency Programs	Total Savings-Programs, Standards	Naturally Occurring Savings	Total Savings	Elec. Use *CED 2009 Revised*	Elec. Use 2009 Un-managed Forecast	Percentage Reduction in Use from Savings
Residential plus Commercial* Consumption Impacts								
1990	7,411	1,453	8,863	11,085	19,948	228,473	248,421	8.0
1998	15,117	3,267	18,384	10,675	29,059	242,564	271,623	10.7
2003	21,676	4,313	25,989	16,502	42,491	262,255	304,746	13.9
2008	29,419	9,322	38,741	13,380	52,120	286,771	338,891	15.4
2011	33,410	12,365	45,775	16,531	62,307	283,908	346,215	18.0
2015	39,537	10,702	50,239	19,789	70,028	297,649	367,677	19.0
2020	46,838	5,591	52,429	27,559	79,989	311,890	391,879	20.4
Residential plus Commercial* Peak Impacts								
1990	1,811	358	2,170	2,272	4,441	47,521	51,963	8.5
1998	3,933	806	4,739	2,267	7,005	54,525	61,530	11.4
2003	5,196	998	6,195	3,383	9,578	55,106	64,684	14.8
2008	7,182	2,259	9,441	2,570	12,011	61,682	73,692	16.3
2011	8,533	3,165	11,698	3,309	15,007	63,023	78,030	19.2
2015	10,192	2,808	13,000	4,052	17,052	66,475	83,527	20.4
2020	12,142	1,434	13,575	5,948	19,523	70,387	89,910	21.7

Source: California Energy Commission, 2009
*Commercial also includes agricultural program savings.

Figure 159 shows the distribution of savings by source from 1990-2020, with building and appliance standards broken out separately. Staff tracks historical impacts back to 1975, so naturally occurring savings in 1990 includes the impacts from rate increases in the 1970s and 1980s. Similarly, the entries for 1990 building and appliance standards include accumulated savings from standards implemented before 1990. Naturally occurring savings increase significantly from 2001-2004 because of substantial rate increases in the IOU planning areas, mainly in the commercial sector. From 2010 on, this category increases once again as a result of rate increases assumed in *CED 2009 Revised* and lighting savings, as discussed later in the

chapter. Savings from building and appliance standards together make up the largest share of the total from 1995 on. Utility and public agency program savings reach a maximum share of more than 20 percent of savings in 2012, the end of the current three-year CPUC program cycle. Beyond 2012, program savings decline since *CED 2009 Revised* incorporates only committed impacts.

Figure 159: Distribution of Efficiency/Conservation Consumption Savings by Source

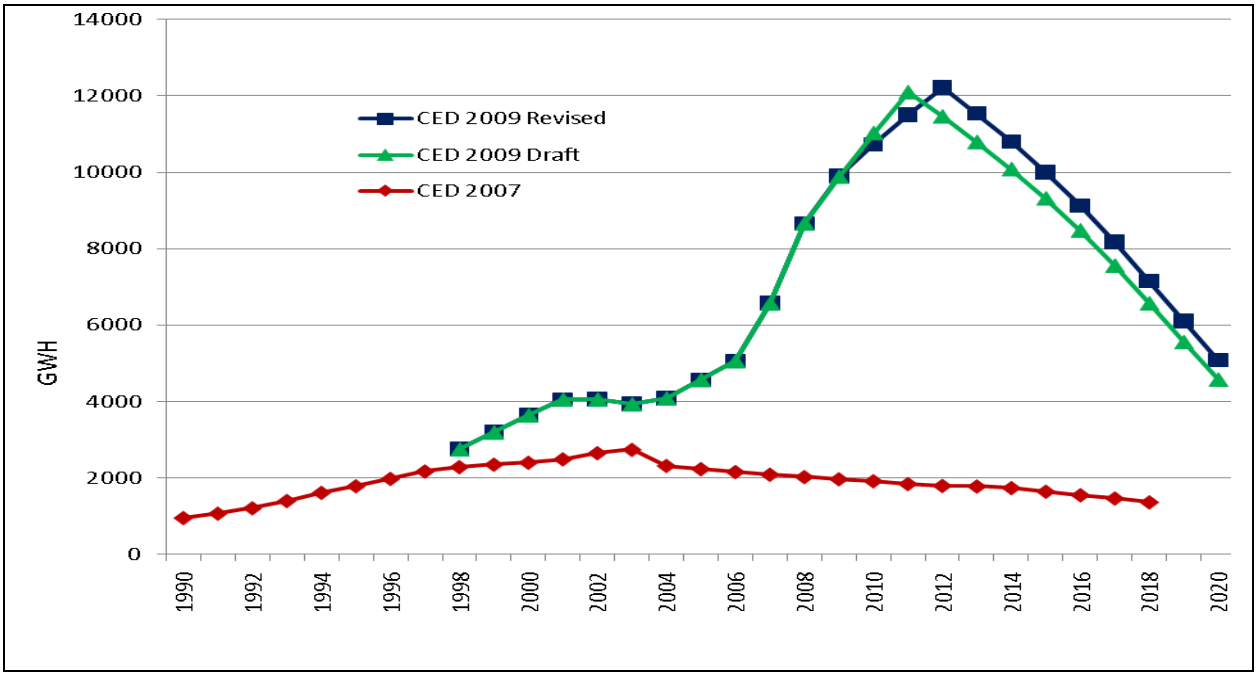


Source: California Energy Commission, 2009

Utility and Public Agency Programs

The main focus of the effort by staff since the *2007 IEPR* process has been to revise and update estimates of the impacts of utility programs on electricity demand. With the help of the CPUC and the consulting firm Itron, staff set out to re-estimate the historical electricity savings from utility programs as well as to measure the impacts of the 2010-2012 (formerly 2009-2011) program plans, with the idea of estimating program impacts not previously incorporated in Energy Commission forecasts. **Figure 160** shows the results of this analysis for IOUs for the draft and revised forecasts compared to *CED 2007*. The *CED 2009 Revised* forecast estimates differ from those in *CED 2009 Draft* due to the shift in program cycle from 2009-2011 to 2010-2012 and because staff assumed a lower realization rate for 2010-12 IOU efficiency programs, as discussed later in this chapter.

Figure 160: Comparison of Committed Utility Program Consumption Impacts for IOUs

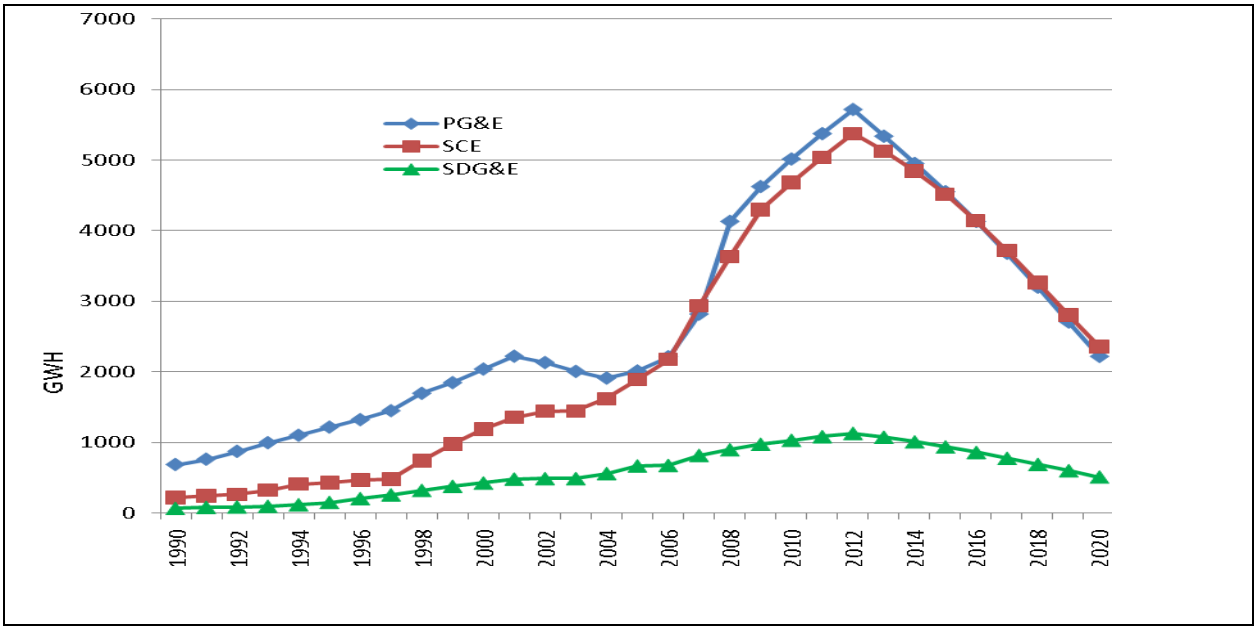


Source: California Energy Commission, 2009

The main difference between impacts in the revised forecast and *CED 2007* occurs in 2008 and beyond, particularly during the 2010-12 program period, which was not included in the 2007 forecast as the programs were not considered committed. Staff updated program impacts beginning in 1998; the savings estimates from *CED 2007* are used for the 1990-1997 period. Further savings from possible future programs are not considered since the forecast incorporates only committed programs. Additional savings potential will be examined in staff's uncommitted efficiency savings forecast.

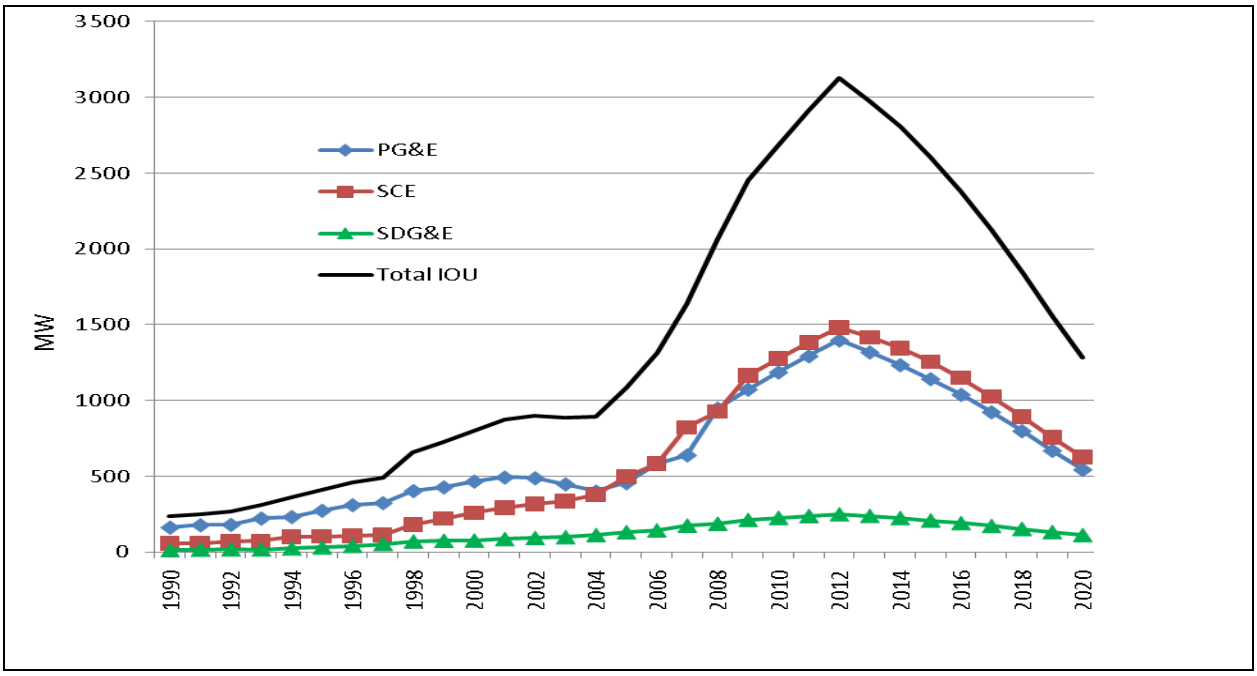
Figure 161 shows the impacts on electricity consumption from utility programs by IOU. The impact of IOU utility programs reaches a maximum in 2012 and then declines as measure savings decay. **Figure 162** provides corresponding peak load impacts and includes the total for the IOUs. **Table 35** breaks out the IOU program consumption impacts by sector.

Figure 161: Estimated Cumulative Consumption Impacts from Utility Programs by IOU



Source: California Energy Commission, 2009

Figure 162: Estimated Cumulative Peak Impacts from IOU Programs



Source: California Energy Commission, 2009

Table 35: Estimated IOU Cumulative Program Impacts by Sector

	Consumption Impacts				Peak Impacts			
	Resi-dential	Commer-cial	Agricul-ture	Total	Resi-dential	Commer-cial	Agricul-ture	Total
1990	849	110	0	959	211	23	0	234
1998	1,253	1,499	0	2,751	340	316	0	656
2003	1,755	2,178	0	3,933	437	445	0	882
2008	5,426	3,080	155	8,661	1,454	577	29	2,060
2012	7,973	3,834	421	12,227	2,294	758	77	3,128
2015	6,677	2,911	421	10,008	1,953	578	77	2,607
2020	2,817	1,846	418	5,081	839	369	76	1,284

Source: California Energy Commission, 2009

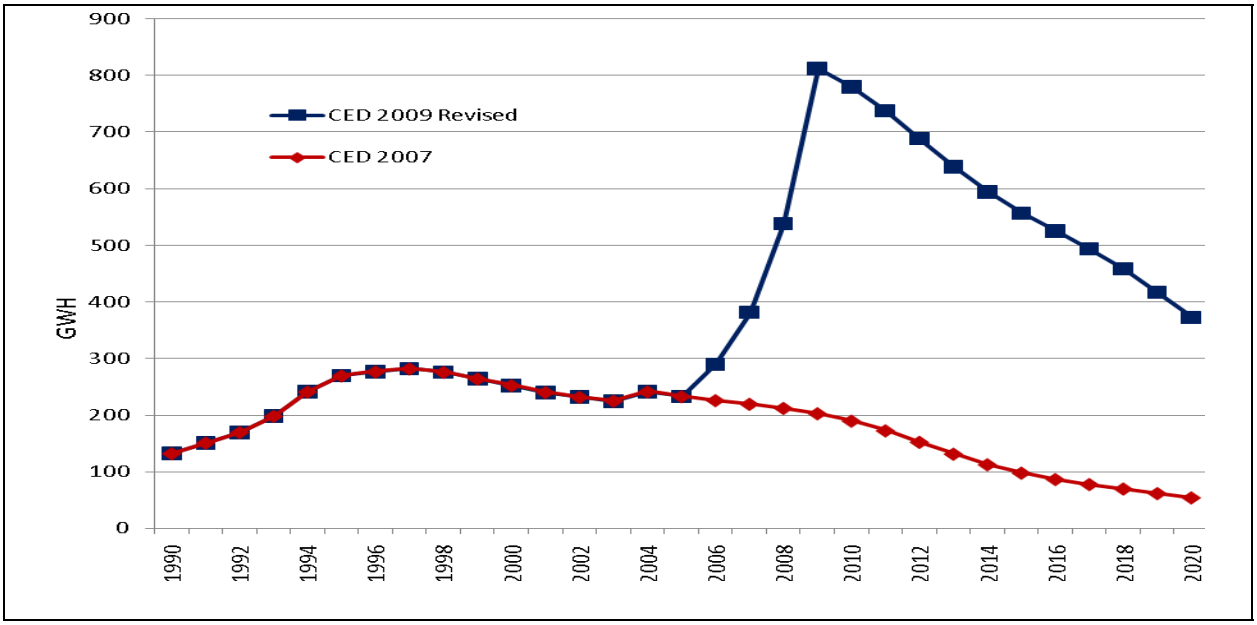
CED 2009 Revised includes updated efficiency program impacts for the publicly owned utilities, based on reported and estimated savings for 2006-2009 filed per the requirements of Senate Bill 1037 (Kehoe, Chapter 366, Statutes of 2005). Assumptions for realization rates, expected useful life of measures, and net-to-gross impacts were similar to those used for the IOUs, as discussed in the next section.

Figure 163 provides a comparison of cumulative publicly owned utility program impacts estimated for the *CED 2009 Revised* forecast with *CED 2007* estimates.[26] The impacts begin to decline beyond 2009, as potential future year new efficiency savings are not considered committed.[27] **Table 36** shows estimated cumulative program impacts by sector.

[26] The *CED 2009 Draft* forecast used *CED 2007* estimates.

[27] Publicly owned utility efficiency goals extend out to 2016, but no specific program plans are available beyond 2009.

Figure 163: Estimated Efficiency Program Cumulative Impacts for Publicly Owned Utilities



Source: California Energy Commission, 2009

Table 36: Estimated Publicly Owned Utility Cumulative Program Impacts by Sector

	Consumption Impacts			Peak Impacts		
	Residential	Commercial	Total	Residential	Commercial	Total
1990	132	1	132	41	0	41
1998	221	55	276	73	13	85
2003	170	56	225	56	13	69
2006	214	76	290	90	14	104
2009	490	322	812	153	79	232
2015	358	199	557	108	49	157
2020	204	169	373	63	41	105

Source: California Energy Commission, 2009

Method

To develop efficiency program impacts, staff, with the support of Itron, reviewed data associated with historical, current, and near-term energy efficiency programs as reported to the CPUC and the Energy Commission. To estimate verified cumulative program savings by end use for each year, staff and Itron took the following steps:

- Collected reliable data for first-year efficiency program impacts in a disaggregated form such that gross GWh impacts could be attributed to categories that align with Energy Commission end-use models. In the program years where only highly aggregate data was available for the IOUs (1998-2002), allocations were made for residential and commercial programs to specific end-use categories using distributions from the 2003 data. Industrial and agricultural program savings were not separated; models for these sectors do not operate at the end-use level.
- Applied net-to-gross (NTG) ratios to estimate net GWh impacts by end use category. This adjustment is intended to account for free ridership; that is, to account for measure adoptions that would have occurred without any utility program.
- Applied realization rates to adjust for *real world* effects. Although staff assumes that the utilities' estimates of their own portfolio performance are consistent with all relevant mandates, additional data sources such as evaluation, measurement, and verification (EM&V) reports suggest that the reported impacts are typically higher than the realized impacts. This occurs for various reasons including measures purchased and not installed and lower actual savings per measure than anticipated. EM&V data yielded estimates of realized savings.
- Estimated residual impacts for measures beyond the installation year. As is common practice, staff assumed a logistic decay of measure savings, so that 50 percent of installations remain in operation at the end of the estimated expected useful life (EUL). The logistic function models decay in such a way that installations are taken out of service at a rapid rate shortly before and after reaching the EUL.

Table 37 summarizes the data inputs and assumptions made in this process for the IOUs. The realization rate of 70 percent, applied throughout, derives from CPUC Energy Division recommendations for *ex-post* adjustment of program savings. [28] For *CED 2009 Draft*, the rate was assumed to increase from 70 to 85 percent for the IOUs in the 2009-11 (now 2010-2012) program cycle, consistent with expectations of more efficient delivery mechanisms. However, in the *CED 2009 Revised* forecast, no increase was assumed for 2010-2012, as staff felt that realization rates should be based on empirical evidence, which consistently shows rates of around 60-70 percent. Staff will re-evaluate realization rates in the *2011 IEPR* cycle if there is evidence of improved delivery in 2010.

To accommodate the recent IOU program cycle shift to 2010-2012, staff reassigned the same first-year savings previously estimated for each year in the 2009-2011 period to one year later.

[28] CPUC Energy Division, *Energy Efficiency 2006-2007 Verification Report*, November, 2008. Energy Division staff recommended adjustment (realization) rates from 60 to 80 percent, depending on the utility.

To assess program savings in 2009, during which the IOUs have continued with 2006-2008 programs, staff estimated program impacts based on reported savings to date.[29]

Table 37: Data Sources and Assumptions for IOU Efficiency Program Impacts

Program Year	1998-2002	2003-2007	2008-2009	2010-2012
Program Accomplishments	IOU Annual Reports	Monthly and Quarterly IOU Reports—Processed by Itron	IOU Quarterly Reports	March 2009 IOU Filings
Level of Disaggregation	Sector (residential, commercial, etc.)	End Use Category for Residential and Commercial	Measure	End-Use Category for Residential and Commercial
Attribution to End Use	Applied 2003 Distribution for Residential and Commercial	Residential and Commercial—Provided by Itron	By Measure Description	IOU Projections
Net-to-Gross Ratios	Assumed 80 Percent	Provided by Itron	From IOU Workbooks	Assumed 80 Percent
Realization Rates	Assumed 70 Percent			
Expected Useful Life of Measures	Averages determined for each end use category based on 2006 – 2008 program workbook data			
Decay of Measures	Logistic decay of *realized* savings – 100 percent first year, 50 percent at the end of expected useful life			

Source: California Energy Commission, 2009

Publicly owned utility savings impacts were based on reported and estimated savings for 2006-2009 filed with the Energy Commission per the requirements of Senate Bill 1037. Staff applied the assumed IOU realization rate and expected useful life and decay by end use to publicly owned utility reported savings. Net to gross ratios were assumed to be 80 percent. The appendix to this report provides more details on assumptions and includes first-year reported program impacts.

Following Steps 1-4, and using the assumptions given above, staff developed estimates of cumulative realized savings for each year–that is, savings adjusted by net-to-gross ratios and realization rates. **Table 38** shows these estimates for selected years by end use/sector for the IOUs, and **Table 39** provides the same information for the publicly owned utilities.

[29] SCE and SDG&E have reported first-year program savings thus far in 2009 to be at around the same level as in the corresponding period in 2008, so these utilities were assigned the same level of first-year savings as in 2008. PG&E has reported around 50 percent of 2008 totals in 2009 to date, so it was assigned one-half of 2008 first-year savings.

Table 38: Estimated IOU Accumulated Program Savings

Sector	End Use	1998	2002	2008	2012	2015	2020
Residential	Heating, Ventilation, Air Conditioning*	11	65	215	326	295	173
	Compact Fluorescent Lighting	53	303	3570	5,401	4,523	1,526
	Other Residential Lighting	10	56	487	731	713	597
	New Construction	9	49	64	64	62	39
	Pool Pumps	7	42	67	44	24	3
	Refrigerator Recycling	62	358	523	635	482	236
	Other Refrigerator	0	0	99	179	165	44
	Water Heating	2	13	58	67	60	39
	Misc. /Non-descriptive	0	0	5	293	164	9
	Accumulated from Pre-1998**	396	275	9	0	0	0
	Total Residential	550	1,162	5,098	7,739	6,489	2,668
Commercial	Heating, Ventilation, Air Conditioning*	33	143	533	1,313	1,252	1,062
	Compact Fluorescent Lighting	138	352	922	765	178	5
	Other Commercial Lighting	121	521	1,713	2,598	2,279	1,294
	New Construction	162	694	873	880	856	514
	Refrigeration	26	97	334	394	176	11
	Water Heating	0	0	1	2	2	1
	Misc. /Non-descriptive	84	287	391	480	447	252
	Accumulated from Pre-1998**	1,056	734	25	1	0	0
	Total Commercial	1,620	2,828	4,793	6,431	5,189	3,140
Industrial	--	0	0	562	1,483	1,482	1,415
Agricultural	--	0	0	155	421	421	418
Grand Total	--	2,170	3,991	10,607	16,075	13,581	7,640

Source: California Energy Commission, 2009
* Includes building shell measures
** Represents continuing savings from 1997 and previous years from measures not yet decayed.

Once cumulative realized program savings were developed for each year, staff determined whether these savings actually represented reductions in consumption or could be considered overlapping with savings impacts already incorporated in the model through building and appliance standards or some other source of savings. This step eliminated commercial (non-CFL) lighting, considered redundant with existing lighting standards, and industrial program savings, assumed to overlap with savings attributable to *natural* competitive market forces in this sector. [30]

For those program impacts determined to correspond to load reductions, staff incorporated these effects in *CED 2009 Revised* either through *post-processing* (subtracting estimated impacts

[30] The effects of reduced energy intensity for industrial processes caused by market competition dwarf the impacts of industrial programs.

from model output) or by integrating estimated savings directly into the model through changes in inputs. **Table 40** summarizes the treatment by end use/sector. **Figure 164** shows the effects of these treatments for the IOUs, starting with the total realized program savings given in **Table 38**. **Figure 165** shows the effects for publicly owned utilities, starting with the estimates shown in **Table 39**.

Table 39: Estimated Publicly Owned Utility Accumulated Program Savings

Sector	End Use	2006	2008	2009	2011	2015	2020
Residential	Heating, Ventilation, Air Conditioning*	8	34	61	61	60	36
	Lighting	29	111	180	180	177	141
	New Construction	0	2	6	6	6	6
	Pool Pumps	1	3	7	6	6	2
	Refrigerator Recycling	3	31	66	65	59	15
	Water Heating	0	1	2	2	2	2
	Misc. /Non-descriptive	0	6	18	14	3	0
	Accumulated from Pre-2006**	171	157	147	117	43	0
	Total Residential	213	345	487	453	355	202
Commercial	Heating, Ventilation, Air Conditioning*	10	36	57	57	56	49
	Lighting	25	104	180	160	134	65
	New Construction	2	26	58	58	58	58
	Refrigeration	1	5	10	9	3	0
	Misc. /Non-descriptive	8	47	97	78	24	7
	Accumulated from Pre-2006**	56	56	56	56	56	55
	Total Commercial	100	274	458	418	330	234
Grand Total	--	313	619	945	871	686	436

Source: California Energy Commission, 2009
* Includes building shell measures
** Represents continuing savings from 1997 and previous years from measures not yet decayed.

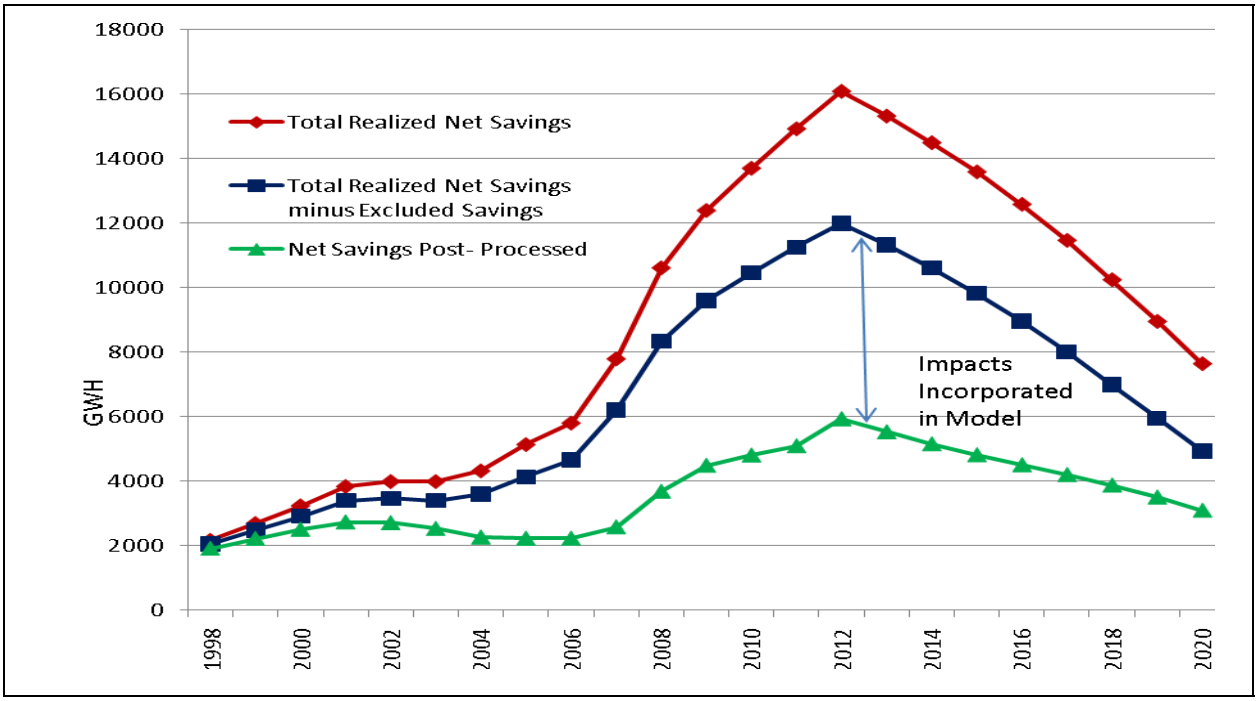
For years prior to 1998 (IOUs) and 2006 (publicly owned utilities), staff used the same Energy Commission estimates for historical efficiency program impacts as in *CED 2007*. For the later years, staff added the pre-1998 and pre-2006 historical impacts not yet fully decayed to the estimates represented by the curves labeled *Total Realized Net Savings Less Excluded Savings* in **Figure 160** and **Figure 161** to give the totals for *CED 2009 Revised* shown in **Figure 158** and **Figure 159**, respectively. **Figure 160** and **Figure 161** also show the savings incorporated directly in the forecasting models, as indicated in **Table 40**, represented by the vertical distance between the *Total Realized Net Savings Less Excluded Savings* and *Net Savings Post-Processed* curves.

Table 40: Treatment of IOU Program Savings by End Use/Sector

Sector	End Use	Treatment
Residential	Heating, Ventilation, Air Conditioning*	Subtracted from model output
	Compact Fluorescent Lighting	Incorporated in model
	Other Residential Lighting	Subtracted from model output
	New Construction	Subtracted from model output
	Pool Pumps	Incorporated in model
	Refrigerator Recycling	Incorporated in model
	Other Refrigerator	Subtracted from model output
	Water Heating	Subtracted from model output
	Misc. /Non-descriptive	Subtracted from model output
	Accumulated from Pre-1998**	Subtracted from model output
Commercial	Heating, Ventilation, Air Conditioning*	Subtracted from model output
	Compact Fluorescent Lighting	Subtracted from model output
	Other Commercial Lighting	Excluded
	New Construction	Subtracted from model output
	Refrigeration	Subtracted from model output
	Water Heating	Subtracted from model output
	Misc. /Non-descriptive	Subtracted from model output
	Accumulated from Pre-1998**	Subtracted from model output
Industrial	--	Excluded
Agricultural	--	Subtracted from model output

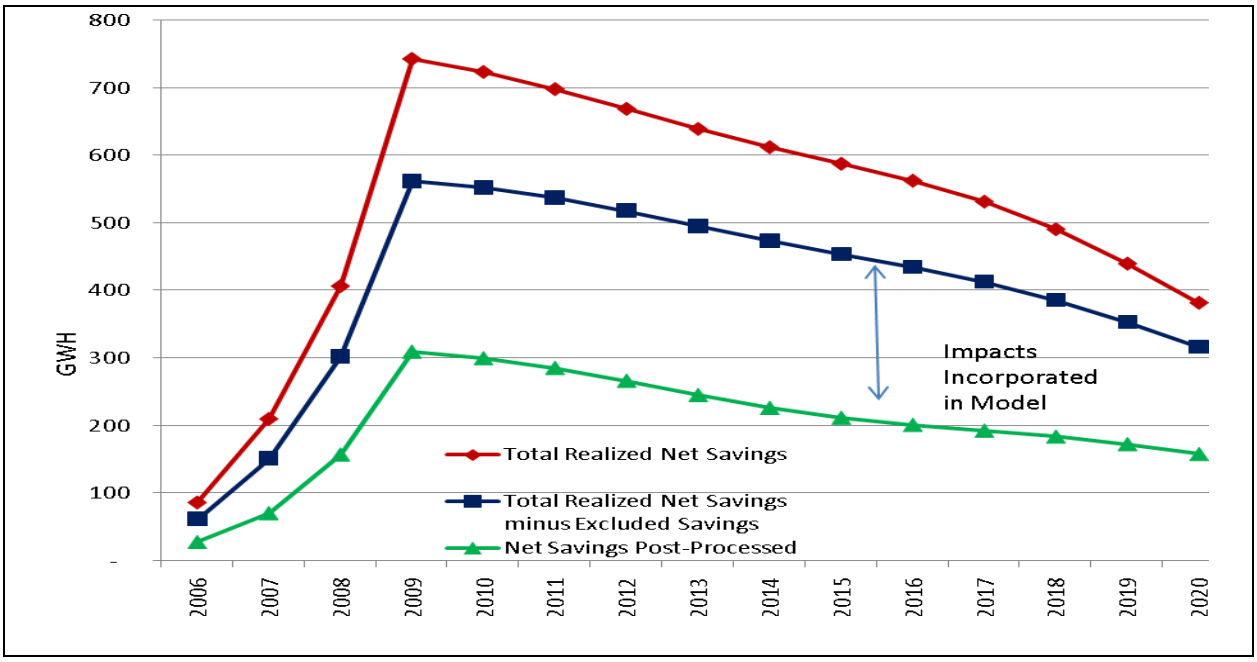
Source: California Energy Commission, 2009
* Includes building shell measures.
** Represents continuing savings from 1997 and previous years from measures not yet fully decayed.

Figure 164: Estimated Historical and Projected IOU Program Savings and Consumption Impacts



Source: California Energy Commission, 2009

Figure 165: Estimated Historical and Projected Publicly Owned Utility Program Savings and Consumption Impacts



Source: California Energy Commission, 2009

Building and Appliance Standards

Energy Commission forecasting models incorporate building and appliance standards through changes in inputs: estimated end use consumption per household in the residential sector and end-use consumption per square foot in the commercial sector. **Table 41** shows the standards currently included in the *CED 2009 Revised* forecast by sector.

To measure the impact of each set of standards, staff removed the input effect from standards one set at a time, beginning with the most recent standards, and calculated savings as the difference in energy demand output between model runs with the set of standards incorporated and without. For example, for the commercial sector, staff began by running the Commercial Model with all sets of standards included and then ran the model excluding changes in inputs associated with the *2005 Title 24 Nonresidential Building Standards* (the most recent standards). The difference in output between the two model runs gives an estimate of the electricity savings associated with the 2005 standards. Next, staff removed the input changes associated with the next-most recent set of standards, the *2004 Title 20 Equipment Standards*, and compared the results from model runs without the 2005 standards and without both the 2005 and 2004 standards, which provided an estimate of the impact of the 2004 standards. The process was repeated until all sets of standards had been "removed" from the model.

Table 41: Building and Appliance Standards Incorporated in the *CED 2009 Revised* Forecast

Residential Model	
1975 HCD Building Standards 1978 Title 24 Residential Building Standards 1983 Title 24 Residential Building Standards 1991 Title 24 Residential Building Standards 2005 Title 24 Residential Building Standards	1976-82 Title 20 Appliance Standards 1988 Federal Appliance Standards 1990 Federal Appliance Standards 1992 Federal Appliance Standards 2002 Refrigerator Standards
Commercial Model	
1978 Title 24 Nonresidential Building Standards 1978 Title 20 Equipment Standards 1984 Title 24 Nonresidential Building Standards 1984 Title 20 Nonres. Equipment Standards 1985-88 Title 24 Nonresidential Building Standards	1992 Title 24 Nonresidential Building Standards 1998 Title 24 Nonresidential Building Standards 2001 Title 24 Nonresidential Building Standards 2004 Title 20 Equipment Standards 2005 Title 24 Nonresidential Building Standards

Source: California Energy Commission, 2009

Naturally Occurring Savings

Staff estimates of naturally occurring savings are meant to capture load impacts of rate changes, certain market trends, and other changes in consumption not directly associated with standards or efficiency programs. For the *CED 2009 Revised* forecast, staff included impacts from historical and projected rate changes, referred to as *price effects*, and expected reductions in average lighting use. There are certainly other consumption trends leading to reduced energy that could be included in this category,[31] but staff focused on those savings that potentially overlap with programs and standards. Rate increases provide a greater incentive to participate in utility programs and help improve standards compliance rates. Therefore, at least some price impacts could be attributed to programs and standards; for example, a rate increase could yield savings beyond what would otherwise occur because of the availability of program measures. [32] Utility programs currently tend to emphasize lighting measures, so naturally occurring savings from lighting assumed in this forecast could overlap with program impacts.

Lighting Savings

For the *CED 2009 Revised* forecast, residential lighting was broken out as a separate end use to better capture the impacts of residential lighting efficiency programs. The Appendix provides details on this process and on estimated average lighting use per household. The focus of utility programs and state and federal legislation related to lighting led staff to assume some additional residential[33] savings for this end use, incorporated in the Residential Model.

No direct IOU lighting programs impacts were assumed beyond 2012, the end of the current three-year program cycle. Similarly, no lighting impacts were assumed for publicly owned utilities beyond 2009. However, staff assumed average lighting per household would remain at 2012 levels in the IOU planning areas and at 2009 levels for the publicly owned utilities without incentives through the rest of the forecast period. The difference between the 2009 or 2012 average and an increasing average that would have occurred as utility impacts decayed was assigned to naturally occurring savings. Admittedly these are somewhat crude estimates, but staff felt that it was unrealistic to assume no continued lighting savings beyond utility programs. These numbers are meant to provide a placeholder for further refinement in the uncommitted forecast. **Figure 166** shows the statewide savings associated with these assumptions relative to price effects and total naturally occurring savings.

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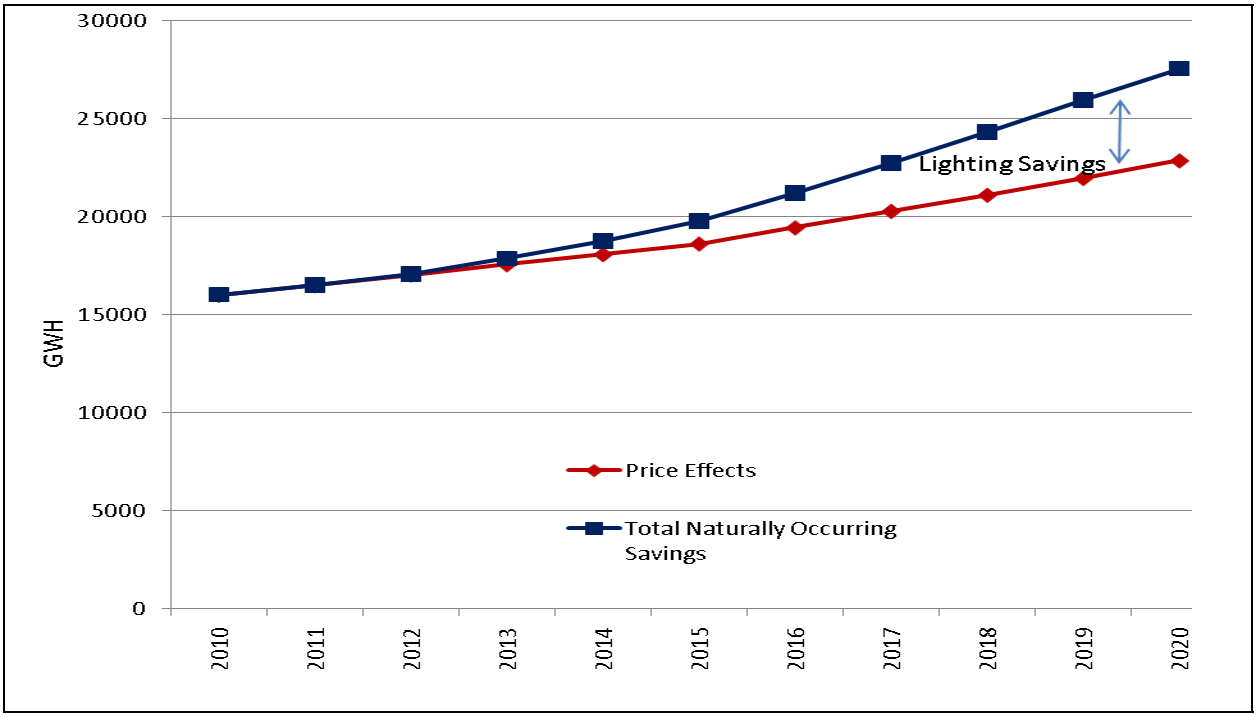
[31] Although not included in naturally occurring savings, other trends are accounted for in the forecast. For example, personal computers have become more efficient in recent years for technological/competitive reasons, and savings associated with this trend are captured through model inputs and calibration to actual consumption.

[32] A utility customer, faced with a rate increase, could reduce electricity usage by switching to incandescent light bulbs with a lower wattage. However, if the utility is offering incentives for CFL bulbs, the incentive might be enough that the customer instead begins to use CFLs and saves even more energy.

[33] Staff assumed that savings in the commercial sector would be covered by lighting standards incorporated in the Commercial Model.

Figure 166: Statewide Naturally Occurring Savings, Price Effects, and Additional Residential Lighting Savings



Source: California Energy Commission, 2009

Uncommitted Energy Efficiency Forecast

Clearly defining and measuring the conservation impacts incorporated in the *CED 2009 Revised* forecast are necessary steps in developing the uncommitted forecast to be used for CPUC long-term procurement. Staff and Itron will use *CED 2009 Revised* as a starting point for the uncommitted forecast and estimate the *incremental* impacts from future efficiency programs and standards reasonably expected to occur but not yet committed.

APPENDIX: *CED 2009 Revised* Supporting Documentation

This Appendix provides additional details on work related to the *California Energy Demand 2010-2020 Staff Revised Forecast* (*CED 2009 Revised*). The following sections include information on the economic scenarios, the impact of climate change on electricity peak demand, model performance relative to historical electricity use, residential lighting, self-generation, utility efficiency program impacts, and an ongoing evaluation of staff modeling methods and alternative forecasting approaches. Forms at the end of each chapter and posted in spreadsheet form on the Energy Commission's website provide additional detail on model inputs and forecast results.

Economic Scenarios

Staff examined the impacts of two alternative economic scenarios for California electricity demand: an *optimistic* case provided by IHS Global Insight and a *pessimistic* case provided by Moody's Economy.com. The scenarios include changes for a host of variables, including total employment and employment by economic sector (for example, retail), gross state product and output by sector, personal income, and average household size.[34]

In general, the two cases project the highest and the lowest rates of economic growth for California among the various scenarios provided by each of the two companies. The Global Insight optimistic case includes the following characteristics:

- The federal stimulus package has significant impact in the near term, producing growth in gross domestic product (GDP) of more than 3 percent in the third quarter of 2009.
- GDP rises by 3.5 percent in 2010.
- The unemployment rate nationwide peaks at less than 10 percent and falls to less than 7 percent by 2014.
- Business fixed investment rebounds to increase by 6.5 percent in 2010 after suffering a severe contraction in 2009.

The pessimistic case, referred to by Economy.com as *aborted recovery*, incorporates the following assumptions:

- Consumer demand growth remains relatively weak.
- Unemployment rises higher than in the baseline case and remains above 10 percent from the beginning of 2010 through the end of 2011.

[34] The scenarios assume no change in total population, only in number of households.

- Real GDP growth averages 1 percent per year lower than in the baseline case over the next five years.

The state forms posted with this report on the Energy Commission's website show the differences in California for various projected economic and demographic variables among the scenarios.

For this analysis, staff developed econometric models for the three largest sectors (residential, commercial, and industrial plus mining) at the planning area level, using historical data for electricity consumption, electricity rates, weather, and various economic and demographic variables. **Table A-1** shows the predicted and explanatory variables used for each sector.

Table A-1: Variables Used for Econometric Models by Sector

Sector	Predicted (dependent) Variable	Explanatory Variables
Residential	Electricity Consumption per Household	Average Household Income, Unemployment Rate, Average Persons per Household, Cooling Degree Days, Heating Degree Days, Percentage of Single-Family Homes out of Total Homes, Residential Electricity Rate
Commercial	Total Commercial Electricity Consumption	Total Commercial Floor Space, Total Employment, Percent of Floor Space Refrigerated, Cooling Degree Days, Commercial Electricity Rate
Industrial (plus mining)	Industrial Energy Use per Dollar of Output	Ratio of Manufacturing Employment to Total Industrial Employment, Ratio of High Tech Employment to Total Manufacturing Employment, Industrial Electricity Rate, Trend

Source: California Energy Commission, 2009

Table A-1 lists the final explanatory variables included in the regressions; many other variables were tested. Regressions included cross sections of the eight planning areas for 29 years (1980-2008), accounting for correlation among planning areas and over time (autocorrelation). Electricity consumption for the remaining sectors was held constant (*CED 2009 Revised* levels) in the alternative scenarios. Full estimation results are available upon request.

Residential electricity consumption was forecast by multiplying predicted consumption per household by projected number of households for each planning area. Average persons per household is projected to increase and total number of households decrease in the pessimistic scenario, the typical case during an economic downturn. The opposite is true in the optimistic case.

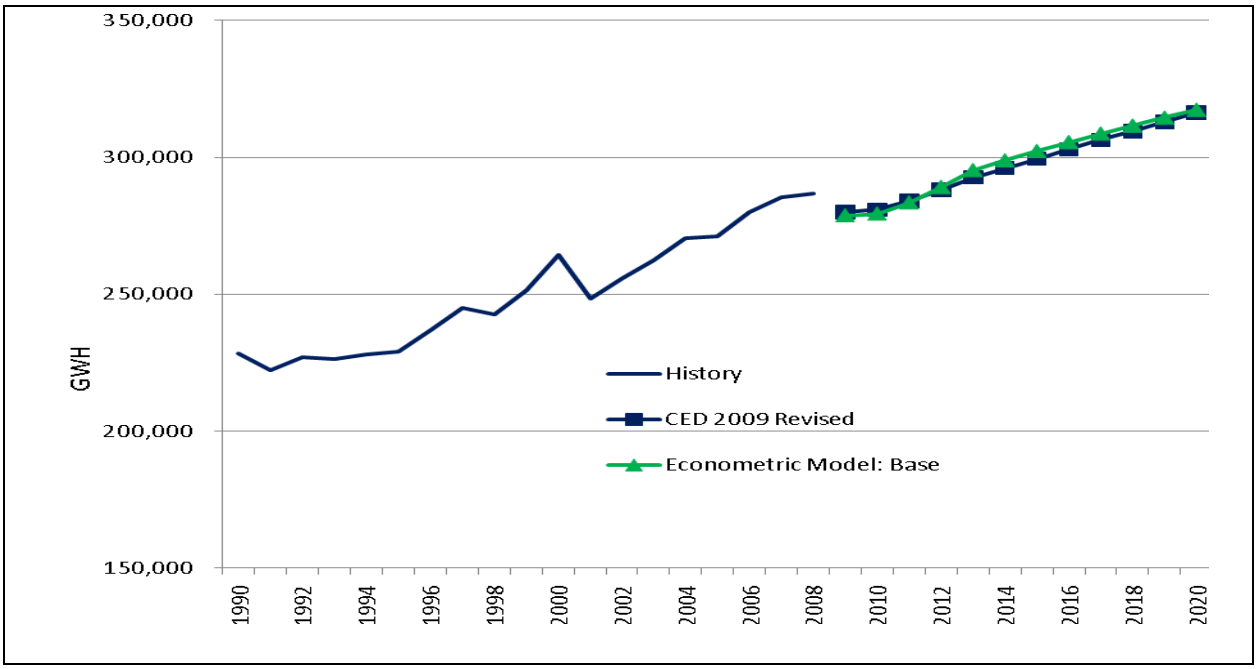
For the commercial scenarios, the impact (coefficient) of commercial floor space on electricity consumption was adjusted downward over the forecast period to account for increasing floor

space efficiency as a result of building and appliance standards and utility efficiency programs. In addition, the coefficient for the commercial electricity rate was adjusted to match the elasticity of demand relative to price assumed in the Commercial Model.

Industrial electricity consumption is heavily influenced by processes and efficiencies that have led to a marked decline in energy use per dollar of output over the last 30 years, factors beyond the scope of a relatively simple econometric model. Instead, staff took the historical and projected (by the Energy Commission's Industrial Model) trend in consumption per output dollar as given and estimated the impact of the composition of industry by planning area, which differs by economic scenario, and average industrial electricity rate on this trend. To forecast industrial electricity use for each scenario, predicted energy consumption per dollar of output was multiplied by projected industrial output.

Figure A-1 shows a comparison of forecast statewide electricity consumption using the estimated econometric models with *CED 2009 Revised*, assuming the same economic and demographic inputs. The two forecasts match quite closely between 2009 and 2020, with a difference of less than 0.5 percent at the end of the forecast period. Among the five major planning areas, the largest difference between the base econometric forecast and *CED 2009 Revised* in 2020 was less than 1 percent.

Figure A-1: Comparison of *CED 2009 Revised* With Econometric Forecast



Source: California Energy Commission, 2009

The estimated models were run for the two economic scenarios and for the Economy.com base case. The resulting percentage differences in electricity consumption between the two alternative scenarios and the base case were applied to *CED 2009 Revised* consumption

projections. Peak demand for each planning area was developed by applying projected load factors from *CED 2009 Revised* at the planning area and sector level to the consumption results for each scenario.

Peak Demand and Climate Change

The Energy Commission demand forecasting process incorporates the potential impacts of global climate change by adjusting upward the number of cooling and heating degree days in the forecast period, based on the historical ratio of degree days in the last 12 years to that of the last 30 years. The result of this adjustment is an increase in the projected amount of cooling and a reduction in projected heating relative to the historical period. This correction attempts to account for the likelihood of a general warming trend. However, temperatures assumed in the peak forecast, an average of daily temperatures over the last 30 years, are not affected by the adjustment. Therefore, the forecast may not fully capture the impact on peak demand of possibly more frequent *heat storm* weather events, in the form of higher maximum temperatures in a given year.

To examine the impact of maximum temperatures on annual peaks, staff developed an econometric model using estimated historical system peaks by planning area for 1980-2008. Peak demand per capita by planning area was specified as a function of per capita income, the unemployment rate, average residential and commercial electricity rates, and *631* maximum annual temperatures. The latter variable results from an adjustment of daily maximums recorded at each weather station representing the 16 Energy Commission forecasting climate zones in California, as follows:

631 Daily Maximum =
Daily Maximum Temperature × 0.6
+ *Previous Day's Maximum Temperature* × 0.3
+ *Two Day's Previous Maximum Temperature* × 0.1.

This adjustment is meant to provide a better indicator of sustained temperature warming than a simple daily maximum.[35] The maximum of these values occurring on a weekday in a given year and planning area[36] was used in the regression.

The regression accounted for correlation among planning areas and over time (autocorrelation). All variables in the regression yielded statistically significant (at least 10 percent level) coefficients with the expected signs. The estimated coefficient for temperature corresponds to an elasticity of peak demand with respect to temperature of 0.47: a 10 percent increase in annual

[35] Evidence shows that response to high temperatures increases if warming is sustained over a period of days, as customers do not always adjust immediately to changing weather.

[36] For planning areas consisting of more than one climate zone, *631* maximum annual temperatures were weighted according to population in each climate zone.

631 maximums was estimated to increase system peak by an average of 4.7 percent. Full estimation results are available upon request.

To gauge the potential impact of climate change on *631* annual maximum temperatures through 2020, staff took advantage of a recent climate change impact assessment by the California Climate Change Center, sponsored by the Energy Commission.[37] This assessment evaluated a set of 12 climate change model simulations for California using six different models, providing scenario results for daily maximum and minimum temperatures, average daily humidity, and sea level rises through 2099.

Climate change model simulations were performed for *grids* of 50 square miles within the state. For the peak analysis, staff used simulated daily maximum and minimum temperatures for grids corresponding to the 10 weather stations used for the 16 climate zones. Staff chose the two climate change scenarios that resulted in the most and least temperature impact on the state as a whole.[38] These scenarios are referred to below as the *high* and *low temperature increase scenarios*, respectively. Staff converted simulated daily maximums for each weather station to *631* daily and annual maximums for each planning area, as described above.

Rather than using the resulting 2020 *631* annual maximum temperatures directly, staff used an average of annual *631* maximums for each temperature scenario for 2018-2022, to better capture the general trend upward in temperature and avoid cases where simulated temperatures in 2020 in a given planning area varied well above or below this trend. Staff then applied the estimated econometric peak model to a *base case* for 2020, which assumed no increase in maximum temperature above the 30-year average for 1979-2008,[39] and each of the two temperature scenarios. **Figures A-2** and **A-3** show the increase in annual *631* maximum temperatures and resulting estimated percentage increases in peak demand for the five major planning areas and for the state as a whole for the high and low temperature increase scenarios, respectively, relative to the base case. The figures also show the impact in MW, applying the estimated percentage increases to the *CED 2009 Revised* peak forecast.

For the state as a whole, non-coincident[40] peak impacts vary from less than 500 MW (0.7 percent) to more than 1,300 MW (1.9 percent). The climate change models, in general, predict more temperature impact in the inland areas than on the coast. Thus, SDG&E peak impacts are smaller than in the other planning areas and become negative in the low temperature increase scenario as maximum temperatures drop below the 30-year average during the 2018-2022 period. Otherwise, the difference in peak impacts between scenarios is largest for PG&E, as the coastal portions of the planning area experience little or no change in maximum temperatures in the low temperature increase scenario.

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[37] California Energy Commission, *Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment*, March 2009, CEC-500-2009-014-D.

[38] Staff wishes to thank Mary Tyree at the Scripps Institute of Oceanography for providing the simulation data.

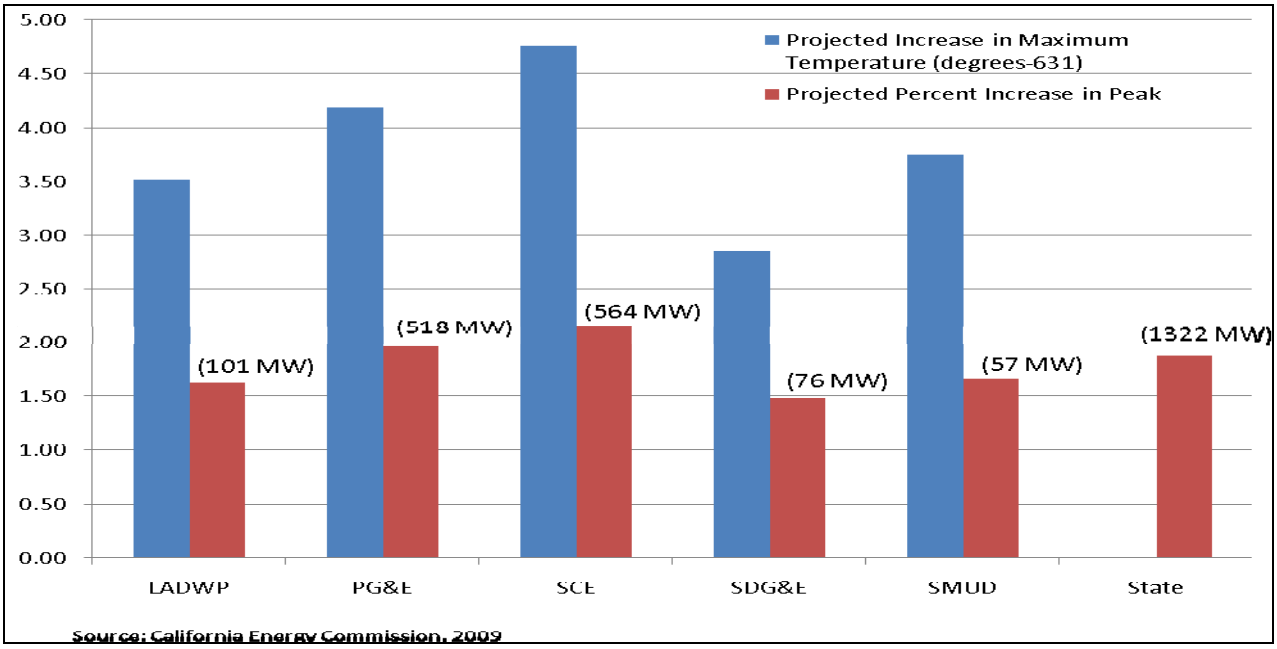
[39] This is consistent with assumed temperatures used in the Energy Commission Peak Model for *CED 2009 Revised*.

[40] The state totals are simply the sum of planning area coincident peaks.

For some perspective on potential impacts of climate change, the impact on peak demand in the high temperature scenario in 2020 is slightly less than the increase relative to the base case estimated in the optimistic economic scenario. The impact is more than twice as high in 2020 as would occur with a reduction in electricity rates from those assumed in this forecast to flat rates from 2010-2020, based on the peak price scenario differences in the draft forecast.

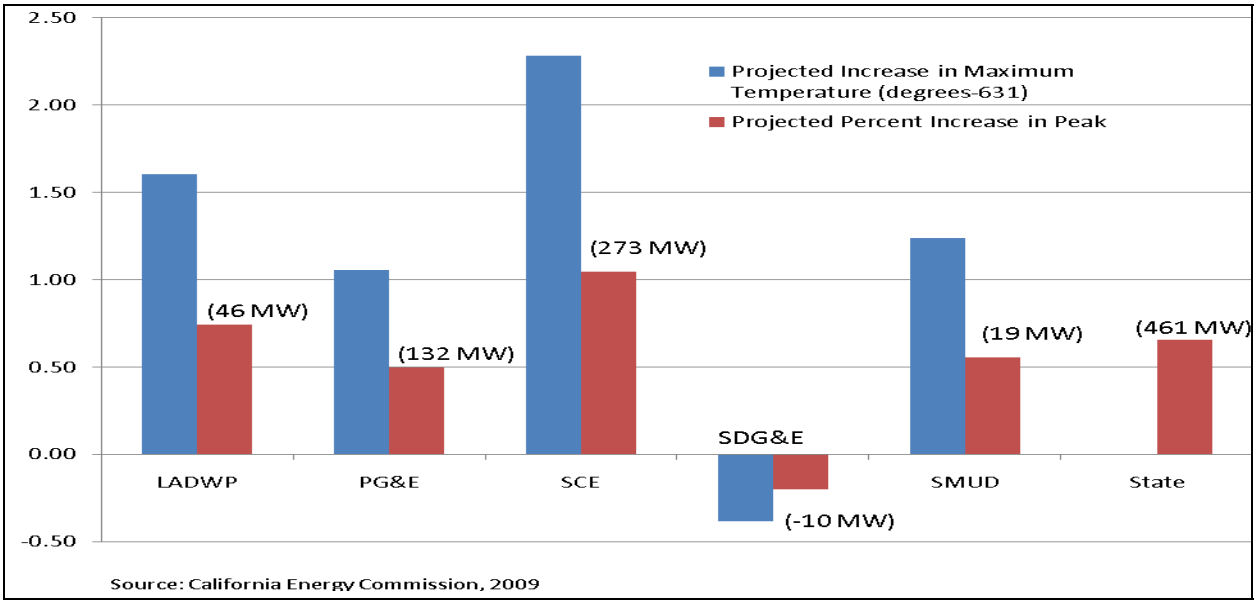
It is important to note that the climate change simulations are not meant to be predictions, but rather "possible scenarios of plausible climate sequences,"[41] and, therefore, are not incorporated directly into the *CED 2009 Revised*. In addition, as discussed above, staff already includes an adjustment to the forecast that increases projected peak demand, meaning impacts presented here are likely overstated. However, the results of this analysis suggest the need to incorporate temperatures directly in any climate change adjustment for the forecast. Staff plans to revisit and refine climate change adjustment methods for the *2011 IEPR* process.

Figure A-2: Projected Impact on Peak Demand of High Temperature Increase Scenario, 2020



[41] *Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment*, p. xi.

Figure A-3: Projected Impact on Peak Demand of Low Temperature Increase Scenario, 2020



Energy Commission Model Performance

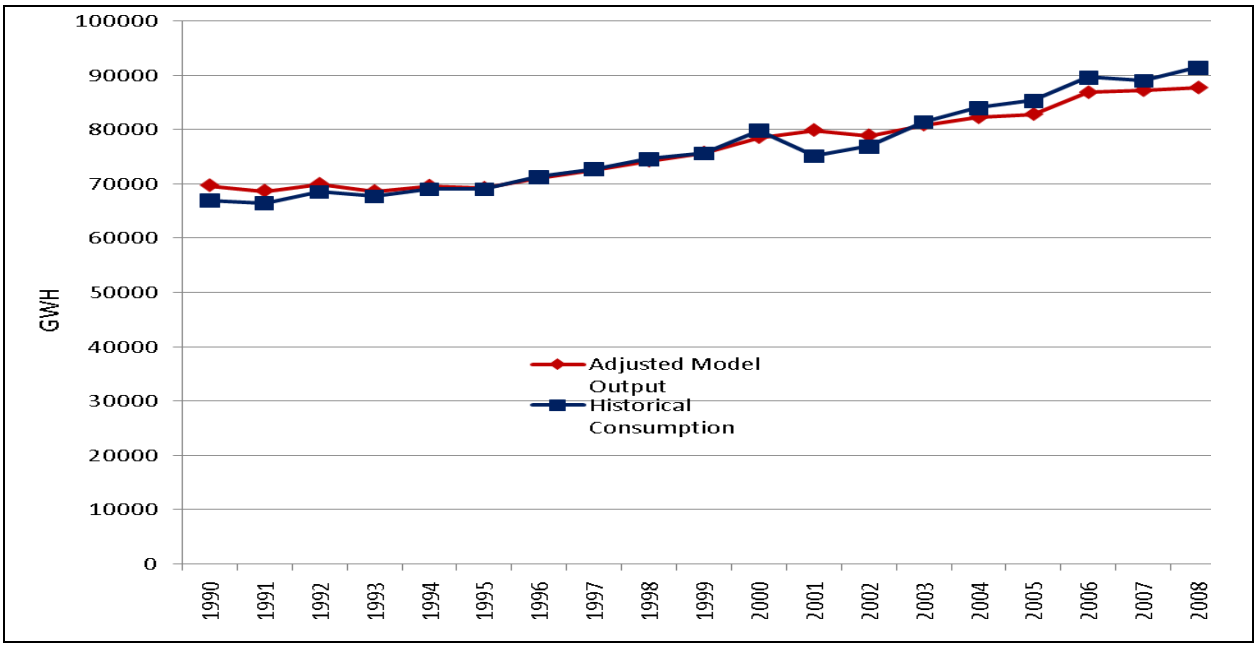
This section discusses the performance of the demand forecasting models relative to actual electricity consumption. First, *CED 2009 Revised backcasts* are compared to historical consumption in the residential and commercial sectors. Models for the other sectors do not provide full backcasts, but rather index base year (currently 2008) results to actual consumption in that year. Second, past forecasts are compared to subsequent actual consumption.

Raw output from the Residential and Commercial Models is weather-adjusted— modified to account for differences between weather averaged over a period of years and actual historical weather— by scaling results based on the number of actual heating and cooling degree days in a given year relative to long-term averages. Next, impacts from efficiency programs not incorporated directly in the models are subtracted from weather-adjusted results. After the efficiency adjustment, results are calibrated to actual 2008 consumption. **Figures A-4** and **A-5** compare the statewide weather- and efficiency-adjusted model output from *CED 2009 Revised* with historical consumption at the statewide level for 1990-2008, before calibration.

The Residential Model performs well through the 1990s but does not simulate the full impact of the electricity crisis in 2001. To some degree, this is a result of a lack of strong price responsiveness in the model, but also because 2001 decreases in consumption came about through events difficult for any forecasting model to capture properly. After 2002, the Residential Model output falls below historical consumption, although model results capture the general trend upward.

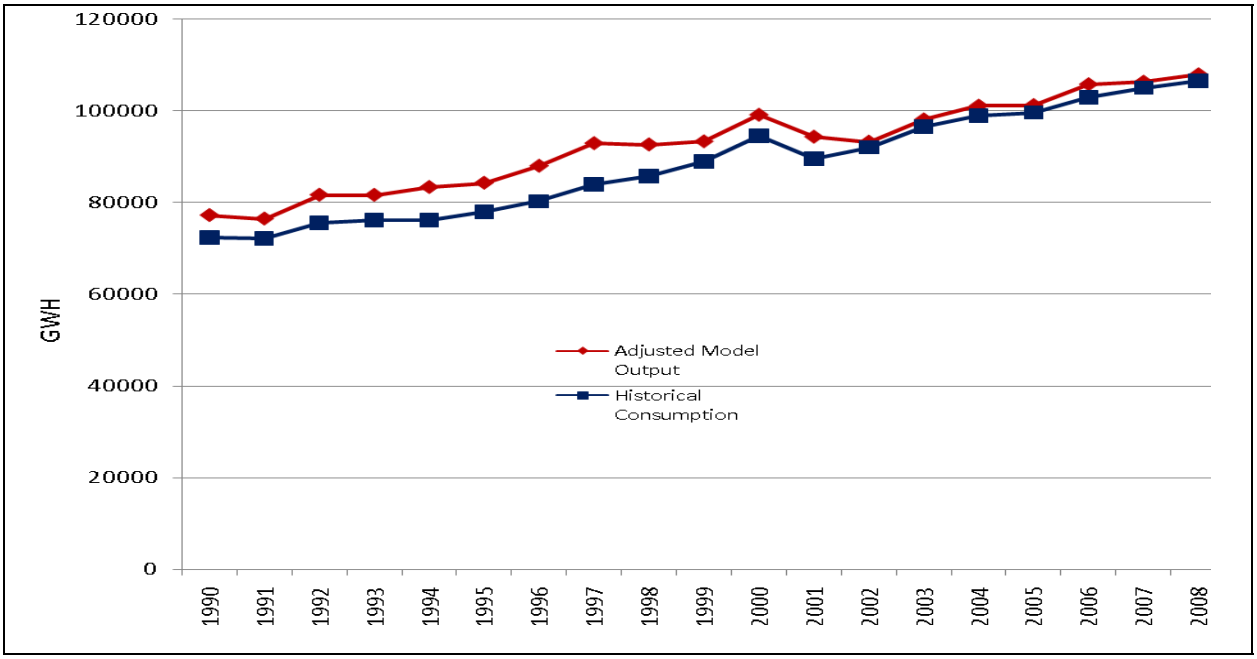
Adjusted Commercial Model output is significantly higher than historical consumption through the 1990s, and staff will analyze the reasons for this difference after the *2009 IEPR* cycle. However, the model simulates the magnitude of the impact of the electricity crisis in 2001 properly and follows the trend in consumption after 2001 fairly accurately.

Figure A-4: Statewide Comparison of Historical Residential Consumption With Adjusted Residential Model Output



Source: California Energy Commission, 2009

Figure A-5: Statewide Comparison of Historical Commercial Sector Consumption with Adjusted Commercial Model Output



Source: California Energy Commission, 2009

Staff also compared electricity consumption predictions from previous forecasts with subsequent electricity use. **Figure A-6** shows actual and forecasted electricity consumption for California from 1980 to 2020, including all staff forecasts from 1990 through 2005.[42] The starting points of the forecasts typically differ from historical consumption because staff relied on billing data for years before to the dated forecast year.[43] Long-term trends in these forecasts generally correlate with electricity consumption in subsequent years. Short-term patterns are often missed, usually due to unforeseen short-term economic and other impacts. For example, pre-1999 forecasts underpredicted the consumption increase in the late 1990s as actual economic growth exceeded growth projected for these forecasts.

Given the importance of the economy and demographics to electricity consumption growth, a proper comparison of the forecasts with actual use would require replacing projected economic and demographic growth with subsequent realized growth for each forecast.[44] Therefore, the backcasts shown in **Figures A-4** and **A-5**, which by definition incorporate actual economic/demographic changes, provide a more meaningful evaluation of the Energy Commission forecasting models.

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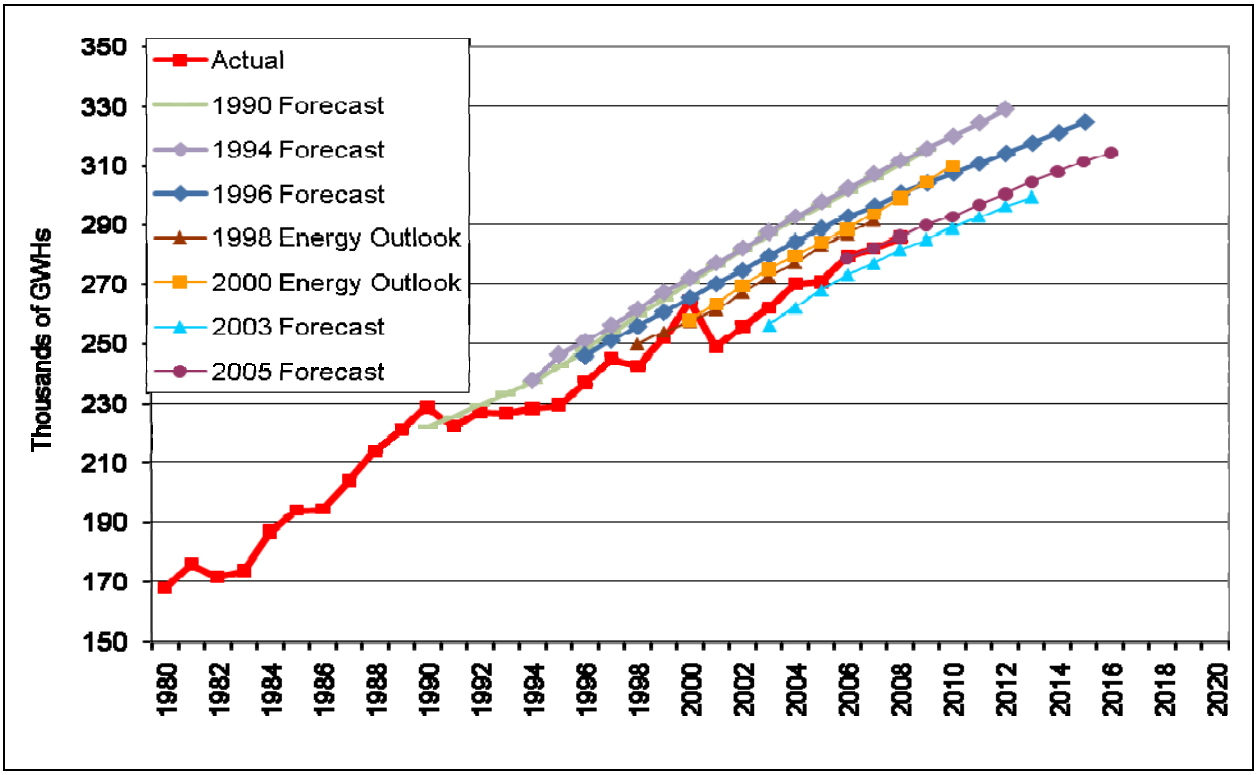
[42] The 1998 and 2000 *Energy Outlook* provided less comprehensive forecasts based on key economic and demographic variables.

[43] That is, the first year in the forecast is actually a projection using a previous years' recorded consumption.

[44] Staff nevertheless calculated averages of annual percentage error (or difference) in the forecasts relative to subsequent consumption. These errors ranged from 0.15 percent for the 2005 forecast to 7 percent for the 1994 forecast.

Figure A-6: Past State Electricity Forecasts versus Historical Consumption



Source: California Energy Commission, 2009

Residential Lighting

To estimate residential lighting use separately within the Residential Model, staff developed estimates of statewide average lighting energy consumption per household by household type (single and multi-family homes) for 1980 through 2004. Data for this purpose came from the consulting firm Itron and various *California Lighting and Appliance Saturation Studies*. Staff then created a new end use for the model, breaking out lighting from the *miscellaneous* category of end uses so that total lighting use plus revised miscellaneous use equaled original miscellaneous consumption for the historical period.

For the investor-owned utility (IOU) planning areas, staff used reported lighting program savings for 2005-2008 and program plans for 2009-2011, adjusted as described in Chapter 8, to estimate reductions to average lighting values for 2005-2011. For the publicly owned utilities, reported program savings for 2006-2008 and projected impacts in 2009 were used to estimate averages for 2006-2009. No direct lighting programs impacts were assumed beyond 2011 for the IOU service territories and beyond 2009 for the publicly owned utilities. However, staff assumed average lighting per household would remain at 2011 levels in the IOU planning areas and at 2009 levels for the publicly owned utilities without incentives through the rest of the forecast period. The difference between the 2009 or 2011 average and an increasing average that

would have occurred as utility impacts decayed was assigned to naturally occurring savings. **Table A-2** shows historical estimates for average lighting use per household by type for selected years and gives projected values for each of the five major planning areas based on lighting program impacts.

Given the focus of utility programs and state and federal legislation related to lighting, staff felt it was unrealistic to assume no lighting savings beyond 2009 for the publicly owned utilities and 2011 for the IOUs. These numbers are meant to provide a placeholder for further refinement in the uncommitted forecast.

Table A-2: Estimated Historical and Projected Lighting Use per Household for the Investor-Owned Utilities (kWh per Year)

Planning Area	Housing Type	1980	1990	1995	2000	2004	2009	2011 and Beyond
PGE	Single Family	1,093	1,597	1,719	1,764	1,800	1,412	1,355
	Multi-Family	607	887	955	980	1,000	816	753
SCE	Single Family	1,093	1,597	1,719	1,764	1,800	1,391	1,247
	Multi-Family	607	887	955	980	1,000	773	693
SDGE	Single Family	1,093	1,597	1,719	1,764	1,800	1,465	1,345
	Multi-Family	607	887	955	980	1,000	814	747
LADWP	Single Family	1,093	1,597	1,719	1,764	1,800	1,791	1,791
	Multi-Family	607	887	955	980	1,000	995	995
SMUD	Single Family	1,093	1,597	1,719	1,764	1,800	1,737	1,737
	Multi-Family	607	887	955	980	1,000	965	965

Source: California Energy Commission, 2009

Self-Generation

Staff has developed a method to predict adoption of residential photovoltaic (PV) systems, based on the self-generation model used by the Energy Information Agency (EIA).[45] The new

[45] The description of the EIA self-generation model begins on page 124 of *Model Documentation Report: Residential Sector Demand Module of the National Energy Modeling System*, DOE/EIA-MO67, April 2007, Office of Integrated Analysis and Forecasting, Energy Information Administration. http://tonto.eia.doe.gov/FTPROOT/modeldoc/m067(2007).pdf.

model includes two distinct steps. The first step examines the private financial benefit from investing in a PV system. This essentially casts the decision to purchase a system as an investment decision to be made by a prospective homeowner. Under this framework, the homeowner will evaluate the direct financial benefits relative to the cost of investing in a PV system. If the total private financial benefit exceeds the cost, it is assumed that the homeowner will invest in the system. The metric used to capture the overall financial attractiveness of investing in a PV system is the payback period, which measures how long it would take a household to recoup its initial investment in a project given projected returns, a function of the present value of expected annual electricity cost savings.

The extent of investment in PV systems made by households is handled in the second step of the model, which uses a logistic or *s shaped* penetration function to estimate the share of households that would invest in a system in any given year, based on payback. Systems with relatively fast payback will achieve greater penetration than systems with longer payback. As in the EIA model, projects with a payback period of one year are limited to capturing 30 percent of the market for new single family residential construction while projects with less than a one-year payback are limited to capturing 50 percent of the market.

Once the penetration rate is determined, it is multiplied by the projected amount of new single-family residential units to arrive at an estimate of the projected number of new homes that purchase a PV system. Multiplying the number of homes adopting a system by system size provides an estimate of the incremental PV capacity installed.

The method is applied separately for the existing stock of single-family homes. Given the size of the existing housing stock relative to new construction, the penetration of PV systems in the existing housing stock is limited to a maximum of 15 percent under a one-year payback scenario and 25 percent under a scenario with less than a one-year payback. For each projected year, the existing stock in each year is adjusted to account for PV penetration occurring in prior years.

Utility Efficiency Program Impacts

Staff, along with Itron, began the process of measuring the savings impacts from utility efficiency programs described in Chapter 8 by collecting first-year reported and projected savings data from the IOUs for 1998-2012 and distributing the savings into end uses. Where specific end-use attribution was unavailable in the data (1998-2002), staff assigned savings to each end use based on the 2003 distributions. **Tables A-3** through **A-6** give the results of this initial process for selected years, showing *ex-ante* first-year net savings[46] for each IOU and for combined publicly owned utilities by end use and sector. The tables clearly show the predominance of lighting measures in each utility; for example, reported first-year lighting savings make up more than 70 percent of the total for each of the IOUs in 2007.

[46] Savings estimates have been adjusted from gross totals using net-to-gross ratios (adjusting for free-ridership), but not adjusted by realization rates.

Table A-3: Reported and Projected First-Year Program Savings for PG&E by End Use and Sector

Sector	End Use	1998	2001	2006	2007	2008	2009	2010-2012*
Residential	Heating, Ventilation, Air Conditioning**	4	17	3	24	14	7	13
	Compact Fluorescent Lighting	21	80	264	476	878	439	360
	Other Residential Lighting	4	15	22	77	68	34	40
	New Construction	3	13	-	1	-	-	-
	Pool Pumps	3	11	1	3	3	2	-
	Refrigerator Recycling	-	-	-	-	32	16	-
	Other Refrigerator	24	95	17	32	-	-	82
	Water Heating	1	3	5	17	28	14	-
	Misc./Non-descriptive	-	-	-	-	1	1	139
	Total Residential	60	234	312	630	1,024	512	633
Commercial	Heating, Ventilation, Air Conditioning**	21	22	26	51	121	60	95
	Compact Fluorescent Lighting	109	111	228	385	683	342	255
	Other Commercial Lighting	78	80	45	124	255	128	51
	New Construction	104	106	1	5	-	-	-
	Refrigeration	17	17	23	68	162	81	46
	Water Heating	-	-	1	-	1	0	-
	Misc./Non-descriptive	57	58	10	29	188	94	-
	Total Commercial	388	394	334	662	1,410	705	447
Industrial	--	-	-	13	4	220	110	168
Agricultural	--	-	-	3	17	105	53	24
Grand Total	--	448	628	662	1,313	2,759	1,379	1,272

Source: California Energy Commission, 2009
* Utility projected first year savings are the same in each year 2010-2012.
** Includes building shell measures.

Table A-4: Reported and Projected First-Year Program Savings for SCE by End Use and Sector

Sector	End Use	1998	2001	2006	2007	2008	2009	2010-2012*
Residential	Heating, Ventilation, Air Conditioning**	7	10	8	29	66	66	21
	Compact Fluorescent Lighting	33	48	334	787	487	487	302
	Other Residential Lighting	6	9	52	124	34	34	43
	New Construction	5	8	-	-	-	-	-
	Pool Pumps	5	7	1	2	4	4	-
	Refrigerator Recycling	-	-	2	3	89	89	-
	Other Refrigerator	39	57	48	79	-	-	63
	Water Heating	1	2	-	-	-	-	0
	Misc./Non-descriptive	-	-	-	-	-	-	17
	Total Residential	96	141	445	1,024	680	680	446
Commercial	Heating, Ventilation, Air Conditioning**	23	17	15	50	80	80	205
	Compact Fluorescent Lighting	118	88	36	40	296	296	67
	Other Commercial Lighting	85	63	95	181	188	188	289
	New Construction	113	84	16	10	-	-	-
	Refrigeration	18	14	27	7	32	32	25
	Water Heating	-	-	-	-	-	-	-
	Misc./Non-descriptive	62	46	43	60	62	62	4
	Total Commercial	419	313	232	348	658	658	590
Industrial	--	-	-	-	195	223	223	160
Agricultural	--	-	-	-	48	40	40	72
Grand Total	--	515	454	677	1,615	1,601	1,601	1,268

Source: California Energy Commission, 2009
* Utility projected first year savings are the same in each year 2010-2012.
** Includes building shell measures.

Table A-5: Reported and Projected First-Year Program Savings for SDG&E by End Use and Sector

Sector	End Use	1998	2001	2006	2007	2008	2009	2010-2012*
Residential	Heating, Ventilation, Air Conditioning**	5	4	-	5	3	3	2
	Compact Fluorescent Lighting	22	20	38	151	67	67	46
	Other Residential Lighting	4	4	7	25	17	17	7
	New Construction	4	3	-	-	-	-	0
	Pool Pumps	3	3	3	2	1	1	-
	Refrigerator Recycling	-	-	-	1	8	8	1
	Other Refrigerator	26	23	5	11	-	-	16
	Water Heating	1	1	-	-	2	2	-
	Misc./Non-descriptive	-	-	-	-	-	-	-
	Total Residential	64	57	53	195	98	98	73
Commercial	Heating, Ventilation, Air Conditioning**	3	5	5	18	15	15	30
	Compact Fluorescent Lighting	14	26	3	6	-	-	3
	Other Commercial Lighting	10	19	45	105	134	134	51
	New Construction	14	25	6	4	-	-	5
	Refrigeration	2	4	9	12	21	21	7
	Water Heating	-	-	-	-	-	-	-
	Misc./Non-descriptive	7	14	-	28	34	34	20
	Total Commercial	50	92	68	173	204	204	116
Industrial	--	-	-	-	38	-	-	-
Agricultural	--	-	-	-	1	-	-	-
Grand Total	--	114	149	121	407	302	302	189

Source: California Energy Commission, 2009
* Utility projected first year savings are the same in each year 2010-2012.
** Includes building shell measures.

Table A-6: Reported and Projected First-Year Program Savings for Publicly Owned Utilities by End Use and Sector

Sector	End Use	2006	2007	2008	2009
Commercial	Heating, Ventilation, Air Conditioning**	9.6	9.3	17.5	20.1
	Lighting	25.6	35.4	49.9	86.7
	New Construction	1.6	8.8	15.7	32.3
	Refrigeration	0.6	1.6	2.7	5.7
	Water Heating	0.0	0.0	0.0	0.0
	Misc./Non-Descriptive	8.0	15.1	27.5	56.2
	Total Commercial	45.4	70.2	113.4	201.0
Residential	Heating, Ventilation, Air Conditioning**	8.1	6.1	19.9	27.3
	Lighting	28.9	35.0	47.2	68.9
	New Construction	0.3	0.6	1.2	4.0
	Pool Pumps	0.8	0.7	1.4	3.6
	Refrigeration	3.3	11.8	15.6	35.0
	Water Heating	0.1	0.3	0.5	1.1
	Misc./Non-descriptive	0.4	2.0	4.6	12.5
	Total Residential	42.0	56.4	90.5	152.4
Grand Total	--	87.4	126.7	203.9	353.4

Source: California Energy Commission, 2009
** Includes building shell measures.

Table A-7 shows the expected useful lives (EULs) of adopted efficiency measures estimated for each end use/sector, applied to decay measure savings over time. These were calculated by averaging IOU reported EULs over all measures within an end use for residential and commercial programs and over the entire sector in the case of the agricultural and industrial programs.

The EULs were applied in a logistic decay function to develop accumulated program savings in each year. The function was specified as follows:

$$\text{Decay Rate} = 1 - 1 / (1 + \exp(-.75 * (\text{Years after implementation} - \text{EUL}))).$$

This function yields an *s shaped* curve with the following characteristics: little initial decay over time, accelerated decay in the years immediately before and after the EUL, and little decay throughout the rest of the forecast period.

Table A-7: Estimated Expected Useful Life by End Use/Sector

End Use	Average Expected Useful Life (Years)	End Use	Average Expected Useful Life (Years)
Residential Sector			
Heating, Ventilation, Air Conditioning	12	Refrigerator Recycling	10
Building Shell	18	Other Refrigerator	10
Compact Fluorescent	10	Water Heating	14
Other Residential	16	Miscellaneous	4
New Construction	20	Non-Descriptive	4
Pool Pumps	10		
Commercial Sector			
Heating, Ventilation, Air Conditioning	15	Refrigeration	5
Building Shell	13	Water Heating	12
Compact Fluorescent	2	Misc	12
Other Commercial	12	Non-descriptive	4
New Construction	20		
Agricultural	18	Industrial	16

Source: California Energy Commission, 2009

Evaluation of Staff Forecasting Methods

As discussed in *CED 2009 Revised Chapter 8*, various parties expressed confusion during the *2007 IEPR* process about energy efficiency impacts incorporated within the Energy Commission Demand Forecast. Prompted by these concerns, the *2007 IEPR* committed the Energy Commission, in 2008 and beyond, to examine the methods used to incorporate efficiency in the Commission's demand forecast. Also, the Commission launched an effort to evaluate the forecasting models themselves to identify potential areas for improvement in the forecasting process. Aspen Environmental Group and R.W. Beck, consultants in this effort, completed a preliminary assessment of the staff demand forecasting method. Key findings include:

- The Energy Commission end-use approach is useful, has many advantages, and is a valuable counterweight to the econometric models used by the utilities. However, the approach is data-intensive, and requires major staff effort to maintain and update the individual models. Currently, updated data is lacking in some areas and staff resources may not be adequate to take full advantage of the end-use approach.
- If the end-use approach is continued, the Energy Commission should consider adding more flexible, short-term econometric models to address policy questions.
- The current method requires:

  - An updated and more comprehensive price response capability.
  - A more transparent backcasting/calibration procedure.
  - An uncertainty analysis capability.
- Staff's forecast is undermined by inconsistency in energy demand reporting and data sources through time, which may be driven in part by a changing regulatory regime, historically, and a lack of consistency through time with respect to data management and submission protocols on the part of individual utilities to the Energy Commission.

The consultants also suggested the Energy Commission evaluate whether continuing to meet all of the individual tailored needs for the demand forecast is feasible given current methods, data requirements, reporting requirements, and resource limitations. This suggestion prompted staff to begin a second evaluation phase involving an assessment of the applications of the demand forecast, a judgment whether all of these applications are feasible given stakeholder needs and staff resource constraints, and consideration of alternative or additional methods for those applications considered feasible. Phase II of the evaluation effort has begun and will be completed by May 2010.

Electricity Consumption Savings from All Sources

Table A-8 shows total savings for the five major California utilities as well as state totals and is also available on-line at http://www.energy.ca.gov/2009publications/CEC-200-2009-012/index.html.

Table A-8: Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
State/Residential (Consumption in GWH)	1990	2,801	2,472	1,087	0	196	6,556
	1991	2,992	2,849	1,120	0	204	7,165
	1992	3,156	3,357	1,171	0	219	7,903
	1993	3,305	3,874	1,240	0	215	8,634
	1994	3,453	4,383	1,330	0	217	9,384
	1995	3,590	4,884	1,388	0	222	10,084
	1996	3,710	5,379	1,423	0	235	10,747
	1997	3,825	5,863	1,441	0	244	11,374
	1998	3,948	6,359	1,588	0	241	12,136
	1999	4,086	6,863	1,725	0	250	12,924
	2000	4,221	7,363	1,883	0	279	13,746
	2001	4,377	7,868	2,060	0	325	14,630
	2002	4,537	8,605	2,039	0	318	15,498
	2003	4,643	9,300	2,040	0	330	16,313
	2004	4,770	10,047	2,433	0	343	17,592
	2005	4,901	10,763	2,914	0	350	18,929
	2006	5,114	11,528	3,419	0	435	20,496
	2007	5,299	12,250	4,663	0	438	22,650
	2008	5,439	12,897	5,894	0	410	24,639
	2009	5,621	13,602	6,803	0	461	26,487
	2010	5,811	14,306	7,425	0	489	28,032
	2011	6,002	14,998	8,006	0	516	29,522
	2012	6,196	15,680	8,535	0	547	30,957
	2013	6,392	16,350	8,187	0	850	31,778
	2014	6,595	17,007	7,738	0	1,238	32,578
	2015	6,800	17,649	7,171	0	1,737	33,357
	2016	7,013	18,276	6,482	0	2,361	34,131
	2017	7,226	18,886	5,690	0	3,089	34,891
	2018	7,440	19,478	4,836	0	3,881	35,635
	2019	7,653	20,053	3,974	0	4,679	36,360
	2020	8,011	20,606	3,159	0	5,427	37,203

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
State/Residential (Peak in MW)	1990	716	631	282	0	50	1,679
	1991	739	693	288	0	50	1,771
	1992	800	845	281	0	55	1,982
	1993	806	933	310	0	52	2,102
	1994	878	1,116	324	0	55	2,373
	1995	949	1,282	360	0	59	2,650
	1996	996	1,420	388	0	63	2,867
	1997	1,066	1,618	389	0	67	3,141
	1998	1,115	1,763	450	0	67	3,395
	1999	1,125	1,820	483	0	67	3,496
	2000	1,114	1,890	503	0	71	3,578
	2001	1,137	1,984	540	0	82	3,742
	2002	1,211	2,197	548	0	81	4,037
	2003	1,213	2,358	531	0	84	4,185
	2004	1,152	2,382	584	0	81	4,199
	2005	1,335	2,882	789	0	93	5,100
	2006	1,558	3,405	1,022	0	129	6,114
	2007	1,483	3,373	1,307	0	120	6,283
	2008	1,509	3,486	1,609	0	111	6,715
	2009	1,599	3,791	1,922	0	129	7,441
	2010	1,668	4,025	2,116	0	137	7,945
	2011	1,735	4,254	2,298	0	145	8,432
	2012	1,805	4,484	2,469	0	155	8,914
	2013	1,867	4,692	2,377	0	242	9,179
	2014	1,935	4,905	2,258	0	356	9,455
	2015	2,005	5,117	2,105	0	503	9,730
	2016	2,075	5,322	1,911	0	689	9,997
	2017	2,145	5,518	1,685	0	906	10,254
	2018	2,215	5,710	1,438	0	1,143	10,506
	2019	2,284	5,895	1,186	0	1,383	10,749
	2020	2,384	6,078	947	0	1,611	11,021

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
State/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	1,321	817	111	255	10,889	13,393
	1991	1,499	929	213	262	11,335	14,238
	1992	1,705	1,065	321	254	11,949	15,293
	1993	1,855	1,171	473	239	11,812	15,550
	1994	1,984	1,284	641	223	11,880	16,012
	1995	2,140	1,412	784	198	11,283	15,817
	1996	2,337	1,563	949	170	10,926	15,946
	1997	2,578	1,750	1,130	147	10,665	16,270
	1998	2,855	1,956	1,553	125	10,434	16,923
	1999	3,197	2,185	1,847	104	10,199	17,533
	2000	3,707	2,505	2,129	85	9,953	18,379
	2001	3,850	2,555	2,347	68	15,411	24,232
	2002	4,248	2,742	2,363	52	16,610	26,015
	2003	4,705	3,028	2,233	40	16,171	26,178
	2004	5,121	3,267	2,009	29	14,363	24,790
	2005	5,558	3,526	2,002	19	13,780	24,885
	2006	5,942	3,773	2,048	12	14,683	26,458
	2007	6,387	4,010	2,406	7	14,275	27,085
	2008	6,847	4,236	3,425	3	12,970	27,481
	2009	7,044	4,294	4,030	1	15,078	30,448
	2010	7,381	4,455	4,211	1	15,540	31,588
	2011	7,750	4,660	4,360	0	16,015	32,785
	2012	8,156	4,883	4,511	0	16,537	34,087
	2013	8,609	5,100	4,126	0	17,031	34,866
	2014	9,072	5,311	3,798	0	17,527	35,707
	2015	9,557	5,531	3,531	0	18,052	36,671
	2016	10,024	5,747	3,311	0	18,847	37,929
	2017	10,467	5,951	3,114	0	19,657	39,188
	2018	10,880	6,141	2,911	0	20,447	40,379
	2019	11,292	6,328	2,685	0	21,272	41,577
	2020	11,711	6,511	2,432	0	22,133	42,786

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
State/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	285	179	24	53	2,222	2,762
	1991	306	191	43	51	2,185	2,777
	1992	355	222	64	50	2,341	3,033
	1993	365	231	91	46	2,271	3,004
	1994	406	263	127	44	2,321	3,161
	1995	438	289	157	40	2,269	3,193
	1996	480	321	189	34	2,181	3,206
	1997	528	358	224	30	2,126	3,267
	1998	626	428	329	27	2,200	3,610
	1999	658	449	368	21	2,030	3,525
	2000	737	497	411	17	1,986	3,647
	2001	742	491	438	13	2,901	4,585
	2002	858	553	463	10	3,243	5,127
	2003	990	636	459	8	3,299	5,392
	2004	1,070	682	409	6	2,881	5,048
	2005	1,160	734	403	4	2,734	5,036
	2006	1,277	810	428	3	3,073	5,591
	2007	1,337	837	485	1	2,836	5,496
	2008	1,352	835	649	1	2,459	5,296
	2009	1,448	881	800	0	2,974	6,104
	2010	1,515	913	836	0	3,071	6,336
	2011	1,590	954	867	0	3,164	6,575
	2012	1,671	999	898	0	3,266	6,834
	2013	1,760	1,041	821	0	3,358	6,981
	2014	1,851	1,082	756	0	3,450	7,139
	2015	1,946	1,124	703	0	3,549	7,322
	2016	2,037	1,166	660	0	3,702	7,566
	2017	2,124	1,206	621	0	3,859	7,810
	2018	2,205	1,242	581	0	4,011	8,039
	2019	2,285	1,278	536	0	4,170	8,270
	2020	2,366	1,313	486	0	4,336	8,502

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
PG&E/Residential (Consumption in GWH)	1990	858	993	646	0	83	2,580
	1991	961	1,150	687	0	88	2,885
	1992	1,058	1,359	727	0	97	3,241
	1993	1,144	1,572	766	0	98	3,580
	1994	1,230	1,784	808	0	100	3,922
	1995	1,310	1,989	857	0	98	4,254
	1996	1,388	2,194	894	0	107	4,583
	1997	1,469	2,397	926	0	112	4,904
	1998	1,555	2,605	984	0	111	5,255
	1999	1,643	2,814	1,048	0	117	5,622
	2000	1,732	3,019	1,093	0	129	5,974
	2001	1,830	3,223	1,161	0	140	6,353
	2002	1,936	3,518	1,084	0	134	6,672
	2003	1,992	3,798	997	0	139	6,926
	2004	2,055	4,079	1,031	0	146	7,311
	2005	2,129	4,367	1,128	0	155	7,779
	2006	2,234	4,676	1,271	0	189	8,370
	2007	2,319	4,956	1,646	0	198	9,119
	2008	2,385	5,210	2,298	0	188	10,080
	2009	2,478	5,496	2,589	0	191	10,755
	2010	2,577	5,785	2,952	0	193	11,507
	2011	2,676	6,067	3,302	0	200	12,244
	2012	2,776	6,346	3,632	0	210	12,964
	2013	2,878	6,622	3,493	0	322	13,315
	2014	2,984	6,893	3,312	0	467	13,657
	2015	3,092	7,160	3,078	0	660	13,990
	2016	3,202	7,422	2,788	0	912	14,324
	2017	3,313	7,678	2,448	0	1,221	14,661
	2018	3,425	7,929	2,074	0	1,575	15,003
	2019	3,538	8,173	1,692	0	1,942	15,345
	2020	3,616	8,406	1,328	0	2,294	15,643

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
PG&E/Residential (Peak in MW)	1990	209	242	157	0	20	629
	1991	234	280	167	0	21	702
	1992	229	294	157	0	21	700
	1993	272	374	182	0	23	852
	1994	277	402	182	0	22	884
	1995	316	479	206	0	24	1,025
	1996	360	570	232	0	28	1,190
	1997	362	591	229	0	28	1,210
	1998	421	706	267	0	30	1,423
	1999	441	754	281	0	31	1,507
	2000	453	790	286	0	34	1,562
	2001	478	842	303	0	37	1,659
	2002	532	967	298	0	37	1,834
	2003	507	966	254	0	35	1,762
	2004	468	930	235	0	33	1,666
	2005	553	1,134	293	0	40	2,020
	2006	697	1,459	396	0	59	2,611
	2007	599	1,281	425	0	51	2,357
	2008	648	1,416	625	0	51	2,740
	2009	678	1,504	708	0	52	2,943
	2010	713	1,600	816	0	53	3,182
	2011	747	1,693	921	0	56	3,416
	2012	782	1,788	1,024	0	59	3,653
	2013	814	1,873	988	0	91	3,767
	2014	848	1,960	942	0	133	3,882
	2015	883	2,046	879	0	188	3,997
	2016	919	2,130	800	0	262	4,110
	2017	954	2,211	705	0	352	4,222
	2018	990	2,292	599	0	455	4,336
	2019	1,026	2,369	491	0	563	4,449
	2020	1,053	2,448	387	0	668	4,556

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
PG&E/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	432	238	35	132	5,806	6,643
	1991	470	273	70	136	6,036	6,985
	1992	506	305	142	130	6,427	7,510
	1993	545	339	225	120	6,481	7,710
	1994	576	371	288	106	6,557	7,898
	1995	627	417	355	91	6,133	7,623
	1996	681	466	424	76	6,078	7,725
	1997	750	531	519	63	6,231	8,094
	1998	815	580	707	52	6,145	8,299
	1999	938	665	795	42	6,162	8,602
	2000	1,071	744	943	33	6,068	8,859
	2001	1,114	758	1,058	26	8,854	11,810
	2002	1,270	827	1,045	19	9,280	12,441
	2003	1,370	902	1,006	15	9,339	12,632
	2004	1,467	961	877	9	8,706	12,020
	2005	1,572	1,024	882	6	8,376	11,860
	2006	1,714	1,106	940	3	8,003	11,766
	2007	1,837	1,184	1,171	2	8,003	12,197
	2008	1,971	1,250	1,834	1	7,182	12,238
	2009	2,044	1,279	2,038	0	7,773	13,134
	2010	2,163	1,344	2,066	0	7,861	13,434
	2011	2,292	1,410	2,077	0	8,094	13,873
	2012	2,431	1,484	2,089	0	8,348	14,352
	2013	2,569	1,550	1,849	0	8,563	14,531
	2014	2,699	1,613	1,643	0	8,766	14,721
	2015	2,836	1,676	1,476	0	8,980	14,968
	2016	2,972	1,739	1,343	0	9,311	15,365
	2017	3,105	1,804	1,232	0	9,652	15,793
	2018	3,230	1,861	1,125	0	9,978	16,194
	2019	3,352	1,918	1,011	0	10,319	16,600
	2020	3,476	1,975	888	0	10,669	17,008

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
PG&E/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	76	42	6	23	1,027	1,175
	1991	79	46	12	23	1,018	1,179
	1992	87	53	25	22	1,111	1,298
	1993	100	62	41	22	1,185	1,410
	1994	103	66	51	19	1,173	1,412
	1995	121	80	69	18	1,183	1,470
	1996	127	87	79	14	1,138	1,446
	1997	140	99	97	12	1,163	1,511
	1998	160	114	139	10	1,204	1,626
	1999	174	124	148	8	1,145	1,598
	2000	206	143	182	6	1,168	1,706
	2001	201	137	191	5	1,597	2,131
	2002	232	151	191	3	1,697	2,275
	2003	266	175	195	3	1,814	2,454
	2004	279	182	167	2	1,653	2,282
	2005	292	190	164	1	1,556	2,203
	2006	345	222	189	1	1,609	2,366
	2007	337	217	215	0	1,468	2,237
	2008	348	221	324	0	1,269	2,162
	2009	367	230	366	0	1,395	2,358
	2010	388	241	371	0	1,410	2,410
	2011	411	253	372	0	1,451	2,487
	2012	436	266	374	0	1,496	2,571
	2013	459	277	331	0	1,531	2,599
	2014	482	288	293	0	1,565	2,629
	2015	506	299	263	0	1,601	2,669
	2016	529	310	239	0	1,659	2,738
	2017	553	321	219	0	1,718	2,811
	2018	575	331	200	0	1,775	2,880
	2019	596	341	180	0	1,834	2,951
	2020	617	351	158	0	1,895	3,021

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SCE/Residential (Consumption in GWH)	1990	966	990	176	0	75	2,208
	1991	1,008	1,121	150	0	81	2,359
	1992	1,035	1,287	146	0	86	2,553
	1993	1,057	1,466	150	0	80	2,753
	1994	1,072	1,633	163	0	81	2,949
	1995	1,091	1,809	160	0	87	3,148
	1996	1,107	1,977	158	0	87	3,330
	1997	1,120	2,135	151	0	89	3,495
	1998	1,138	2,305	207	0	85	3,736
	1999	1,154	2,469	277	0	87	3,987
	2000	1,168	2,630	384	0	89	4,272
	2001	1,187	2,795	466	0	120	4,568
	2002	1,207	3,052	517	0	119	4,894
	2003	1,239	3,310	577	0	122	5,249
	2004	1,269	3,582	833	0	112	5,796
	2005	1,306	3,856	1,137	0	110	6,410
	2006	1,376	4,147	1,431	0	154	7,108
	2007	1,436	4,412	2,121	0	150	8,119
	2008	1,487	4,656	2,558	0	132	8,834
	2009	1,547	4,915	2,981	0	176	9,618
	2010	1,607	5,174	3,222	0	188	10,191
	2011	1,669	5,429	3,445	0	194	10,738
	2012	1,732	5,682	3,646	0	204	11,263
	2013	1,795	5,930	3,500	0	349	11,573
	2014	1,860	6,173	3,303	0	540	11,876
	2015	1,926	6,411	3,049	0	785	12,171
	2016	1,993	6,643	2,736	0	1,088	12,459
	2017	2,059	6,869	2,376	0	1,433	12,737
	2018	2,126	7,088	1,992	0	1,796	13,003
	2019	2,192	7,301	1,611	0	2,153	13,257
	2020	2,238	7,500	1,255	0	2,485	13,478

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SCE/Residential (Peak in MW)	1990	269	276	49	0	21	615
	1991	250	278	37	0	20	584
	1992	306	381	43	0	25	755
	1993	269	373	38	0	20	700
	1994	319	485	49	0	24	876
	1995	327	541	48	0	26	942
	1996	312	557	45	0	25	939
	1997	353	673	47	0	28	1,101
	1998	331	671	60	0	25	1,088
	1999	313	669	75	0	24	1,081
	2000	312	702	102	0	24	1,141
	2001	308	726	121	0	31	1,187
	2002	295	747	126	0	29	1,198
	2003	324	864	151	0	32	1,371
	2004	320	903	210	0	28	1,461
	2005	386	1,139	336	0	33	1,894
	2006	407	1,227	423	0	46	2,104
	2007	438	1,346	647	0	46	2,477
	2008	413	1,292	710	0	37	2,452
	2009	457	1,454	882	0	52	2,845
	2010	480	1,545	962	0	56	3,043
	2011	503	1,636	1,038	0	59	3,236
	2012	527	1,729	1,109	0	62	3,427
	2013	548	1,811	1,069	0	107	3,535
	2014	572	1,897	1,015	0	166	3,649
	2015	596	1,982	943	0	243	3,763
	2016	619	2,064	850	0	338	3,871
	2017	642	2,142	741	0	447	3,971
	2018	665	2,217	623	0	562	4,067
	2019	687	2,290	505	0	675	4,158
	2020	704	2,359	395	0	782	4,240

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SCE/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	508	342	40	49	2,597	3,536
	1991	592	389	91	53	2,778	3,903
	1992	691	450	117	55	2,852	4,165
	1993	754	493	172	57	2,517	3,993
	1994	810	538	244	62	2,501	4,155
	1995	867	588	271	59	2,416	4,201
	1996	950	650	305	55	2,039	3,999
	1997	1,042	721	326	51	1,854	3,994
	1998	1,192	833	535	47	1,681	4,288
	1999	1,317	920	696	42	1,531	4,506
	2000	1,550	1,084	802	37	1,441	4,914
	2001	1,589	1,099	887	32	3,535	7,142
	2002	1,719	1,168	924	26	4,389	8,226
	2003	1,942	1,306	867	21	4,050	8,186
	2004	2,122	1,409	786	17	3,120	7,454
	2005	2,309	1,523	752	12	2,902	7,498
	2006	2,447	1,629	745	8	4,310	9,139
	2007	2,643	1,724	815	5	3,794	8,981
	2008	2,851	1,830	1,074	2	3,268	9,025
	2009	2,901	1,832	1,316	1	4,445	10,495
	2010	3,019	1,890	1,460	1	4,683	11,053
	2011	3,144	1,966	1,594	0	4,820	11,524
	2012	3,280	2,047	1,730	0	4,963	12,020
	2013	3,448	2,131	1,627	0	5,118	12,324
	2014	3,640	2,216	1,541	0	5,290	12,687
	2015	3,847	2,311	1,469	0	5,480	13,107
	2016	4,043	2,405	1,406	0	5,757	13,611
	2017	4,223	2,492	1,343	0	6,032	14,090
	2018	4,392	2,572	1,273	0	6,302	14,539
	2019	4,563	2,650	1,192	0	6,586	14,991
	2020	4,734	2,729	1,101	0	6,884	15,448

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SCE/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	121	81	10	12	616	839
	1991	129	85	20	12	605	849
	1992	156	102	26	12	644	940
	1993	153	100	35	12	509	808
	1994	172	115	52	13	533	885
	1995	177	120	55	12	494	858
	1996	199	136	64	12	428	840
	1997	215	149	67	11	382	823
	1998	268	187	120	11	378	965
	1999	275	192	145	9	319	940
	2000	302	211	156	7	280	956
	2001	306	212	171	6	681	1,375
	2002	354	240	190	5	903	1,692
	2003	418	281	187	5	872	1,762
	2004	461	306	171	4	678	1,620
	2005	495	326	161	3	622	1,607
	2006	526	350	160	2	926	1,964
	2007	568	370	175	1	815	1,928
	2008	573	368	216	0	657	1,813
	2009	623	393	283	0	955	2,254
	2010	648	406	313	0	1,005	2,373
	2011	675	422	342	0	1,035	2,474
	2012	704	440	372	0	1,066	2,581
	2013	739	456	348	0	1,096	2,640
	2014	777	473	329	0	1,130	2,710
	2015	820	492	313	0	1,168	2,793
	2016	860	511	299	0	1,224	2,895
	2017	897	529	285	0	1,281	2,992
	2018	931	545	270	0	1,336	3,082
	2019	965	561	252	0	1,393	3,172
	2020	1,000	576	233	0	1,454	3,263

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SDG&E/Residential (Consumption in GWH)	1990	328	207	27	0	14	576
	1991	329	240	25	0	14	607
	1992	328	285	23	0	14	650
	1993	327	330	22	0	14	693
	1994	325	375	22	0	13	735
	1995	323	420	20	0	13	777
	1996	319	464	19	0	18	820
	1997	315	511	18	0	18	863
	1998	312	559	61	0	18	951
	1999	309	611	76	0	19	1,015
	2000	306	661	93	0	33	1,092
	2001	302	709	133	0	33	1,177
	2002	297	781	146	0	33	1,258
	2003	297	847	180	0	35	1,359
	2004	298	909	267	0	46	1,520
	2005	298	968	354	0	47	1,667
	2006	304	1,031	386	0	55	1,777
	2007	310	1,090	514	0	55	1,969
	2008	314	1,149	570	0	54	2,087
	2009	319	1,207	621	0	54	2,202
	2010	324	1,263	650	0	55	2,293
	2011	329	1,318	675	0	57	2,379
	2012	334	1,371	695	0	59	2,459
	2013	339	1,424	656	0	96	2,514
	2014	344	1,475	607	0	143	2,568
	2015	349	1,524	550	0	199	2,622
	2016	355	1,572	486	0	260	2,674
	2017	360	1,619	420	0	325	2,724
	2018	366	1,663	354	0	389	2,772
	2019	371	1,706	291	0	449	2,818
	2020	375	1,747	234	0	503	2,859

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SDG&E/Residential (Peak in MW)	1990	55	35	4	0	2	97
	1991	54	40	4	0	2	100
	1992	67	58	5	0	3	132
	1993	51	52	3	0	2	108
	1994	65	75	4	0	3	148
	1995	61	79	4	0	2	146
	1996	57	83	3	0	3	147
	1997	68	110	4	0	4	186
	1998	66	119	13	0	4	202
	1999	50	98	12	0	3	164
	2000	48	104	15	0	5	172
	2001	47	110	21	0	5	183
	2002	49	129	24	0	5	208
	2003	56	158	34	0	7	254
	2004	58	179	52	0	9	299
	2005	55	178	65	0	9	307
	2006	64	218	82	0	12	376
	2007	64	225	106	0	11	407
	2008	67	246	122	0	12	448
	2009	71	270	139	0	12	492
	2010	73	285	147	0	12	518
	2011	75	301	154	0	13	543
	2012	77	316	160	0	14	567
	2013	79	330	152	0	22	584
	2014	81	345	142	0	33	601
	2015	82	360	130	0	47	618
	2016	84	374	116	0	62	636
	2017	86	388	101	0	78	652
	2018	88	401	85	0	94	668
	2019	90	414	71	0	109	683
	2020	91	425	57	0	122	696

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SDG&E/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	144	90	34	33	599	900
	1991	164	98	51	34	565	912
	1992	191	118	59	32	616	1,016
	1993	206	127	70	29	673	1,105
	1994	223	139	92	25	731	1,210
	1995	241	152	126	22	709	1,250
	1996	271	170	182	17	703	1,343
	1997	312	196	236	15	459	1,218
	1998	334	212	257	11	560	1,374
	1999	380	238	301	9	550	1,478
	2000	450	278	329	7	536	1,600
	2001	463	277	346	5	852	1,943
	2002	520	304	339	3	774	1,940
	2003	578	338	305	2	707	1,930
	2004	647	376	291	2	639	1,955
	2005	695	404	312	0	608	2,019
	2006	739	427	286	0	566	2,018
	2007	788	454	302	0	698	2,242
	2008	844	480	326	0	702	2,352
	2009	881	496	354	0	692	2,423
	2010	921	514	380	0	691	2,506
	2011	969	540	407	0	719	2,635
	2012	1,027	571	435	0	754	2,787
	2013	1,090	603	418	0	790	2,901
	2014	1,150	633	402	0	824	3,009
	2015	1,210	660	387	0	858	3,115
	2016	1,265	685	372	0	913	3,235
	2017	1,317	707	355	0	970	3,349
	2018	1,365	730	334	0	1,028	3,457
	2019	1,413	751	307	0	1,087	3,558
	2020	1,464	768	274	0	1,152	3,658

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SDG&E/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	31	20	8	7	131	197
	1991	37	22	11	8	126	203
	1992	41	25	12	7	131	216
	1993	40	25	14	6	130	214
	1994	47	29	19	5	154	254
	1995	51	32	27	5	149	263
	1996	56	35	38	4	146	280
	1997	65	41	49	3	96	254
	1998	74	47	57	2	125	306
	1999	79	49	62	2	114	305
	2000	84	52	61	1	99	297
	2001	86	52	65	1	159	363
	2002	105	61	69	1	156	392
	2003	122	71	64	0	149	407
	2004	133	77	60	0	131	401
	2005	146	85	65	0	127	423
	2006	158	91	61	0	121	430
	2007	177	102	68	0	157	503
	2008	165	94	64	0	138	461
	2009	181	102	73	0	142	498
	2010	189	105	78	0	142	514
	2011	198	111	83	0	147	539
	2012	210	117	89	0	154	570
	2013	222	123	85	0	161	591
	2014	233	129	82	0	167	611
	2015	245	133	78	0	174	630
	2016	255	138	75	0	184	652
	2017	265	142	71	0	195	673
	2018	274	146	67	0	206	693
	2019	282	150	61	0	217	711
	2020	292	153	55	0	230	729

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SMUD/Residential (Consumption in GWH)	1990	423	163	208	0	15	809
	1991	446	188	224	0	15	872
	1992	463	217	225	0	15	920
	1993	481	245	231	0	14	972
	1994	499	273	244	0	15	1,031
	1995	517	300	253	0	15	1,086
	1996	530	327	258	0	15	1,130
	1997	540	350	259	0	15	1,164
	1998	551	374	259	0	16	1,200
	1999	568	399	259	0	17	1,243
	2000	583	425	259	0	18	1,286
	2001	604	453	258	0	22	1,338
	2002	628	496	257	0	22	1,403
	2003	641	533	255	0	24	1,455
	2004	655	569	261	0	29	1,515
	2005	669	604	261	0	29	1,563
	2006	688	642	291	0	29	1,650
	2007	703	676	328	0	28	1,735
	2008	712	705	366	0	27	1,810
	2009	723	735	409	0	25	1,892
	2010	734	765	396	0	24	1,920
	2011	746	794	378	0	25	1,944
	2012	757	823	356	0	27	1,963
	2013	768	851	333	0	28	1,981
	2014	781	879	311	0	29	2,000
	2015	793	905	293	0	31	2,022
	2016	807	931	279	0	33	2,049
	2017	820	956	266	0	35	2,077
	2018	834	979	254	0	38	2,105
	2019	847	1,002	239	0	43	2,131
	2020	857	1,023	223	0	50	2,153

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SMUD/Residential (Peak in MW)	1990	131	51	65	0	5	252
	1991	143	60	72	0	5	280
	1992	133	62	64	0	4	263
	1993	148	75	71	0	4	299
	1994	134	73	65	0	4	276
	1995	163	95	80	0	5	342
	1996	179	110	87	0	5	381
	1997	179	116	86	0	5	387
	1998	191	130	90	0	6	416
	1999	216	152	99	0	6	473
	2000	198	144	88	0	6	436
	2001	202	151	86	0	7	447
	2002	224	177	92	0	8	501
	2003	216	179	86	0	8	489
	2004	196	170	78	0	9	453
	2005	224	202	87	0	10	523
	2006	263	245	111	0	11	630
	2007	246	236	115	0	10	606
	2008	250	247	128	0	9	635
	2009	257	262	146	0	9	674
	2010	264	275	142	0	9	690
	2011	268	286	136	0	9	700
	2012	273	296	128	0	10	707
	2013	277	307	120	0	10	713
	2014	281	317	112	0	11	721
	2015	286	327	106	0	11	730
	2016	292	337	101	0	12	741
	2017	297	346	96	0	13	752
	2018	302	355	92	0	14	763
	2019	307	364	87	0	16	773
	2020	311	372	81	0	18	782

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SMUD/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	72	39	0	5	631	747
	1991	76	44	0	5	624	749
	1992	88	48	2	5	622	765
	1993	97	51	5	3	619	776
	1994	101	56	16	3	573	749
	1995	109	62	30	2	572	775
	1996	118	68	38	2	575	801
	1997	133	75	49	1	582	840
	1998	143	81	54	1	575	854
	1999	163	92	55	0	584	894
	2000	185	101	56	0	579	921
	2001	195	104	55	0	697	1,051
	2002	218	114	55	0	774	1,161
	2003	247	128	55	0	789	1,219
	2004	272	140	56	0	780	1,248
	2005	308	158	56	0	838	1,360
	2006	325	167	65	0	840	1,397
	2007	350	177	75	0	821	1,423
	2008	368	186	93	0	874	1,521
	2009	373	186	123	0	871	1,553
	2010	385	187	120	0	870	1,562
	2011	399	196	114	0	891	1,600
	2012	419	206	107	0	922	1,654
	2013	443	215	99	0	955	1,712
	2014	464	222	92	0	984	1,762
	2015	482	230	87	0	1,012	1,811
	2016	501	236	84	0	1,047	1,868
	2017	519	242	82	0	1,084	1,927
	2018	537	247	79	0	1,122	1,985
	2019	553	254	76	0	1,160	2,043
	2020	570	260	74	0	1,200	2,104

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
SMUD/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	16	9	0	1	138	163
	1991	16	9	0	1	132	159
	1992	19	10	0	1	134	165
	1993	20	11	1	1	128	161
	1994	22	12	3	1	125	164
	1995	24	13	7	0	124	169
	1996	25	14	8	0	122	170
	1997	29	16	11	0	128	185
	1998	33	19	13	0	133	198
	1999	37	21	13	0	133	204
	2000	43	23	13	0	134	213
	2001	43	23	12	0	152	229
	2002	52	27	13	0	186	279
	2003	57	30	13	0	184	284
	2004	62	32	13	0	177	283
	2005	71	36	13	0	194	314
	2006	75	39	15	0	194	322
	2007	80	41	17	0	188	326
	2008	80	40	20	0	190	331
	2009	82	41	27	0	192	342
	2010	85	41	26	0	191	343
	2011	87	43	25	0	195	351
	2012	92	45	23	0	202	362
	2013	97	47	22	0	209	374
	2014	101	48	20	0	215	385
	2015	105	50	19	0	221	395
	2016	109	51	18	0	228	406
	2017	113	53	18	0	235	419
	2018	116	54	17	0	243	430
	2019	120	55	17	0	251	443
	2020	123	56	16	0	260	455

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
LADWP/Residential (Consumption in GWH)	1990	16	9	0	1	138	163
	1991	16	9	0	1	132	159
	1992	19	10	0	1	134	165
	1993	20	11	1	1	128	161
	1994	22	12	3	1	125	164
	1995	24	13	7	0	124	169
	1996	25	14	8	0	122	170
	1997	29	16	11	0	128	185
	1998	33	19	13	0	133	198
	1999	37	21	13	0	133	204
	2000	43	23	13	0	134	213
	2001	43	23	12	0	152	229
	2002	52	27	13	0	186	279
	2003	57	30	13	0	184	284
	2004	62	32	13	0	177	283
	2005	71	36	13	0	194	314
	2006	75	39	15	0	194	322
	2007	80	41	17	0	188	326
	2008	80	40	20	0	190	331
	2009	82	41	27	0	192	342
	2010	85	41	26	0	191	343
	2011	87	43	25	0	195	351
	2012	92	45	23	0	202	362
	2013	97	47	22	0	209	374
	2014	101	48	20	0	215	385
	2015	105	50	19	0	221	395
	2016	109	51	18	0	228	406
	2017	113	53	18	0	235	419
	2018	116	54	17	0	243	430
	2019	120	55	17	0	251	443
	2020	123	56	16	0	260	455

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
LADWP/Residential (Peak in MW)	1990	34	13	7	0	2	56
	1991	42	20	8	0	2	72
	1992	47	30	12	0	2	91
	1993	47	36	15	0	2	100
	1994	61	54	23	0	2	140
	1995	59	57	23	0	2	140
	1996	63	65	22	0	2	151
	1997	77	87	23	0	3	191
	1998	79	96	20	0	3	198
	1999	79	102	16	0	3	200
	2000	75	102	12	0	2	193
	2001	72	101	9	0	2	184
	2002	79	120	8	0	2	209
	2003	81	132	7	0	2	222
	2004	78	136	9	0	2	225
	2005	82	152	8	0	2	244
	2006	88	169	8	0	2	267
	2007	98	198	10	0	2	309
	2008	93	196	15	0	2	306
	2009	94	207	31	0	3	336
	2010	96	219	31	0	7	353
	2011	98	230	31	0	9	368
	2012	100	240	32	0	11	382
	2013	101	250	32	0	12	395
	2014	103	260	31	0	13	408
	2015	105	269	31	0	14	419
	2016	107	278	29	0	15	430
	2017	109	286	27	0	17	440
	2018	111	294	24	0	18	448
	2019	113	301	20	0	21	456
	2020	160	311	17	0	21	510

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
LADWP/Commercial (Consumption in GWH) Note: commercial savings include agricultural	1990	129	86	1	36	961	1,213
	1991	156	100	1	34	1,023	1,314
	1992	180	113	1	32	1,089	1,415
	1993	196	125	1	30	1,159	1,511
	1994	211	139	1	27	1,141	1,519
	1995	227	148	1	24	1,091	1,491
	1996	242	159	0	20	1,180	1,601
	1997	259	172	0	17	1,201	1,649
	1998	280	188	0	14	1,142	1,624
	1999	301	203	0	11	1,058	1,573
	2000	337	221	0	8	1,023	1,589
	2001	362	233	0	5	964	1,564
	2002	387	243	0	4	871	1,505
	2003	422	260	0	2	785	1,469
	2004	456	281	0	1	677	1,415
	2005	495	303	0	1	612	1,411
	2006	532	326	4	1	506	1,369
	2007	563	342	28	0	499	1,432
	2008	599	357	69	0	538	1,563
	2009	622	365	152	0	819	1,958
	2010	658	378	140	0	940	2,116
	2011	698	399	125	0	979	2,201
	2012	738	419	110	0	1,021	2,288
	2013	784	438	96	0	1,062	2,380
	2014	830	458	86	0	1,105	2,479
	2015	879	479	79	0	1,149	2,586
	2016	925	500	75	0	1,222	2,722
	2017	971	517	72	0	1,296	2,856
	2018	1,011	536	71	0	1,369	2,987
	2019	1,053	554	70	0	1,445	3,122
	2020	1,095	572	69	0	1,525	3,261

Source: California Energy Commission, 2009

Table A-8 (cont.): Electricity Efficiency/Conservation by Planning Area and Sector

Planning Area/Sector (Type)	Year	Building Standards	Appliance Standards	Utility Programs	Public Agency Programs	Naturally Occurring Savings	Total Savings
LADWP/Commercial (Peak in MW) Note: commercial savings include agricultural	1990	34	22	0	9	250	315
	1991	37	24	0	8	244	314
	1992	42	26	0	7	253	329
	1993	42	27	0	6	248	323
	1994	49	32	0	6	264	351
	1995	51	33	0	5	247	337
	1996	57	37	0	5	276	375
	1997	63	42	0	4	290	398
	1998	71	48	0	4	289	412
	1999	73	49	0	3	256	380
	2000	80	52	0	2	242	376
	2001	81	52	0	1	216	350
	2002	88	55	0	1	199	343
	2003	95	59	0	0	178	332
	2004	103	64	0	0	153	321
	2005	119	73	0	0	147	340
	2006	134	82	1	0	128	346
	2007	132	80	7	0	117	336
	2008	144	86	17	0	129	375
	2009	149	87	37	0	196	469
	2010	157	90	34	0	225	506
	2011	167	95	30	0	234	526
	2012	176	100	26	0	244	547
	2013	187	104	23	0	253	568
	2014	198	109	20	0	263	590
	2015	209	114	19	0	273	615
	2016	220	119	18	0	290	646
	2017	230	123	17	0	307	677
	2018	239	127	17	0	324	707
	2019	249	131	17	0	342	739
	2020	259	135	16	0	360	771

Source: California Energy Commission, 2009