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CALIFORNIA ENERGY DEMAND 2014-2024 FINAL FORECAST

Volume 2: Electricity Demand by Utility Planning Area

CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

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ABSTRACT

The *California Energy Demand 2014 – 2024 Final Forecast, Volume 2: Electricity Demand by Utility Planning Area* describes the California Energy Commission's final baseline forecasts for 2014 – 2024 electricity consumption and peak demand for each of five major electricity planning areas and for distinct climate zones within those planning areas. This forecast supports the analysis and recommendations of the *2013 Integrated Energy Policy Report.* The forecast includes three scenarios: a high energy demand case, a low energy demand case, and a mid energy demand case. The high energy demand case incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low efficiency program and self-generation impacts. The low energy demand case includes lower economic/demographic growth, higher assumed rates, and higher efficiency program and self-generation impacts. The mid case uses input assumptions at levels between the high and low cases. In addition to the baseline forecasts, additional achievable energy efficiency savings are estimated for the three investor-owned utility service territories. Adjusted forecasts incorporating these savings are provided for these areas.

Keywords: Electricity, demand, consumption, forecast, weather normalization, peak, self-generation, conservation, energy efficiency, climate zone, investor-owned, public, utilities, additional achievable

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EXECUTIVE SUMMARY

Introduction

The *California Energy Demand 2014 – 2024 Final Forecast (CED 2013 Final)* describes the California Energy Commission's final forecasts for 2014 – 2024 electricity consumption, peak demand, and natural gas consumption for each of five major electricity planning areas and three major natural gas distribution areas. This forecast supports the analysis and recommendations of the *2013 Integrated Energy Policy Report* (*2013 IEPR*) and includes three baseline scenarios: a high energy demand case, a low energy demand case, and a mid energy demand case. The high energy demand case incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low efficiency program and self-generation impacts. The low energy demand case includes lower economic/demographic growth, higher assumed rates, and higher efficiency program and self-generation impacts. The mid case uses input assumptions at levels between the high and low cases.

Staff also developed estimates of additional achievable energy efficiency impacts for investor-owned utilities that do not overlap with committed efficiency savings included in the baseline demand scenarios for the investor-owned utility service territories. Forecasts adjusted to reflect these additional savings are presented in the relevant chapters of this report.

This report is organized into two volumes. Volume 1 examines electricity and end-user natural gas consumption, as well as peak electricity demand for California as a whole. Also, Volume 1 describes key aspects of the methods used to produce the forecast, including economic and demographic assumptions; historical consumption estimates; electricity and natural gas rate projections; conservation and efficiency impacts; and demand response, distributed generation, electric vehicle, and climate change considerations. Volume 2 presents forecasts of electricity consumption and peak electricity demand for each of five utility planning areas: Los Angeles Department of Water and Power (LADWP), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Sacramento Municipal Utility District (SMUD).

Stakeholders have expressed a strong interest in a more disaggregated demand forecast to better inform resource and infrastructure-related analyses and decisions. As a first step in this direction, staff developed results at the climate zone level for *CED 2013 Final* in addition to the usual planning area forecasts. Three of the five planning areas discussed in this volume represent multiple climate zones. For those planning areas—LADWP, PG&E, and SCE—results of the climate zone analysis will be presented at the end of each respective chapter.

Electricity Forecast Results

Each chapter in Volume 2 describes electricity forecast results for a particular utility planning area. Forecasts of total consumption and peak loads lead into a discussion of per capita values, load factors, key economic and demographic drivers, and individual sector results. Demand impacts due to electric vehicles, distributed generation, and conservation/energy efficiency are considered at the end of each chapter. For each result, the *California Energy Demand 2014 – 2024 Final Forecast* (*CED 2013 Final*) values are presented alongside the adopted *California Energy Demand 2012 – 2022 Adopted Forecast (CED 2011)* mid case, accompanied by an explanation of any significant differences between the two.

Pacific Gas and Electric

Chapter 1 describes the PG&E planning area and forecast results. Notable features of this forecast include the following:

- Electricity consumption is projected to reach between 121,804 gigawatt hours (GWh) in the low demand scenario and 132,510 GWh in the high demand scenario by 2024.
- Peak electricity demand is projected to reach between 25,578 and 28,298 megawatts (MW) by 2024.
- The fastest growth in both consumption and peak demand over the forecast period is projected to be inland, in Climate Zones 2 and 3.
- Self-generation is expected to reduce peak demand by 2,000 MW in the mid demand case by 2024, more than 1,000 MW of which is due to photovoltaic (PV) systems.
- Electric vehicles (EVs) are expected to increase electricity consumption by roughly 2,000 GWh in the mid demand case by 2024.
- Additional achievable energy efficiency (AAEE) scenarios for the PG&E service territory range from 5,332 to 14,924 GWh of energy savings and from 1,398 to 3,964 MW of peak demand savings.

Southern California Edison

Chapter 2 describes the SCE planning area and forecast results. Notable features of this planning area forecast include the following:

- Electricity consumption is projected to reach between 109,206 GWh in the low demand scenario and 120,745 GWh in the high demand scenario by 2024.
- Peak electricity demand is projected to reach between 24,482 and 27,513 MW by 2024.
- The fastest growth in both consumption and peak demand over the forecast period is projected to be inland, in Climate Zones 7 and 10.

- Self-generation is expected to reduce peak demand by 1,532 MW in the mid demand case by 2024, more than 700 MW of which is due to PV systems.
- EVs are expected to increase electricity consumption by roughly 2,000 GWh in the mid demand case by 2024.
- AAEE scenarios for the SCE service territory range from 5,554 to 15,492 GWh of energy savings and from 1,471 to 3,908 MW of peak demand savings.

San Diego Gas & Electric

Chapter 3 describes the SDG&E planning area and forecast results. Notable features of this planning area forecast include the following:

- Electricity consumption is projected to reach between 23,337 GWh in the low demand scenario and 25,983 GWh in the high demand scenario by 2024.
- Peak electricity demand is projected to reach between 5,009 and 5,724 MW by 2024.
- Self-generation is expected to reduce peak demand by 400 MW in the mid demand case by 2024, of which 250 MW is due to PV systems.
- EVs are expected to increase electricity consumption by roughly 500 GWh in the mid demand case by 2024.
- AAEE scenarios for the SDG&E service territory range from 1,280 to 3,530 GWh of energy savings and from 353 to 938 MW of peak demand savings.

Sacramento Municipal Utility District

Chapter 4 describes the SMUD planning area and forecast results. Notable features of this planning area forecast include the following.

- Electricity consumption is projected to reach between 11,883 GWh in the low demand scenario and 13,119 GWh in the high demand scenario by 2024.
- Peak electricity demand is projected to reach between 3,338 and 3,780 MW by 2024.
- Self-generation is expected to reduce peak demand by roughly 70 MW in the mid demand case by 2024, almost all of which is due to PV systems.
- EVs are expected to increase electricity consumption by roughly 200 GWh in the mid demand case by 2024.

Los Angeles Department of Water and Power

Chapter 5 describes the LADWP planning area and forecast results. Notable features of this planning area forecast include the following:

- Electricity consumption is projected to reach between 26,945 GWh in the low demand scenario and 29,576 GWh in the high demand scenario by 2024.

- Peak electricity demand is projected to reach between 6,119 and 6,912 MW by 2024.
- The fastest growth in both consumption and peak demand over the forecast period is projected to be inland, in Climate Zone 12.
- Self-generation is expected to reduce peak demand by more than 280 MW in the mid demand case by 2024, nearly 55 MW of which is due to PV systems.
- EVs are expected to increase electricity consumption by roughly 550 GWh in the mid demand case by 2024.

CHAPTER 1:
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 and community choice aggregators 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, as discussed in a later chapter.

For purposes of this chapter, the PG&E planning area forecast includes other members of the SMUD control area, which are not in the SMUD service area. These entities include 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 in the statewide forms accompanying this forecast report.[1] The baseline forecast 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. The *California Energy Demand 2014-2024 Final Forecast* (*CED 2013 Final)* values are compared to the *California Energy Demand 2012-2022 Adopted Forecast* (*CED 2011)* mid scenario, with differences between the two forecasts explained. The forecasted load factors, jointly determined by the consumption and peak load estimates, are 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 2011,* and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the historical and forecasted impacts of conservation and efficiency programs. Fourth, forecasts of electricity consumption and peak demand are presented for each climate zone within the PG&E planning area. Finally, the chapter presents the additional achievable energy efficiency (AAEE) scenarios developed for the PG&E service territory and shows the impact of these scenarios on sales and peak demand forecasts.

1 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Bay Area Economic and Demographic Outlook

This section provides general information on the economic and demographic outlook for the San Francisco Bay Area using outlooks provided by Moody's, IHS Global Insight, the University of California Los Angeles (UCLA), the California Department of Finance, and the United States Census Bureau (U.S. Census Bureau). These outlooks are based on economic data available in August 2013.

The San Francisco Bay Area was the first region to recover from the recession but is showing an uneven recovery. San Francisco and Marin Counties are approaching expansion. Surging technology services, construction, and visitor-dependent industries are picking up the slack from contractions in federal, state, and local government. San Jose is the only major California metro area already in expansion, lifted by burgeoning technology services and residential and nonresidential construction. Oakland's recovery slowed in the second quarter of 2013 as rising interest rates cooled financial services and federal budget cuts took hold.

Tech services will be a major driver for San Francisco's near- to medium-term outlook. In addition to burgeoning homegrown social media and application firms, a number of out-of-state companies are setting up e-commerce and information technology shops. In San Jose, tech, business services, and consumer services led recent payroll gains. In Oakland, a decline in banking payrolls partly offset increases in manufacturing, technology, and other services.

In San Francisco and San Jose, new multifamily and office buildings, as well as public infrastructure, are lifting construction; however, in Oakland, real estate is showing signs of slowing. The median price of single-family homes is still edging upward, but rising interest rates appear to have cooled sales, causing the inventory of homes for sale to increase modestly.

The Bay Area's recovery has continued in 2013. In San Francisco, technology and tourism are the primary drivers with contribution from financial services. San Jose's biggest contributor to recovery is technology, but growth will expand to other sectors. Oakland's economic drivers are trade and health care.

Longer term, the Bay Area will benefit from its growing cluster of technology and research and development centers, which could help offset slower growth in finance and high business and living costs.

Baseline Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections, and low-efficiency impact assumptions. The low demand scenario includes low economic and demographic projections, high energy price projections, and high-efficiency impact assumptions. Volume 1 provides more detail on the construction of the demand scenarios.

Table 1 compares *CED 2013 Final* high, mid, and low demand scenarios with the *CED 2011* mid demand scenario for electricity consumption and peak demand for selected years. Comprehensive results are available electronically as a set of forms posted alongside this report.[2]

In the PG&E planning area, the *CED 2013 Final* mid demand electricity consumption is 0.2 percent lower than *CED 2011* in 2020, the result of a lower-than-projected level of consumption in 2012. By 2024, the *CED 2013 Final* high demand level is 4.6 percent higher than the mid case, while the low demand scenario is 3.9 percent lower. For peak demand, the *CED 2013 Final* high and low scenarios are 4.8 percent higher and 5.3 percent lower, respectively, than the mid case by 2024. Weather-normalized peak demand in 2012 was 2.6 percent lower than predicted in *CED 2011*.

Peak demand estimates for PG&E reflect changes made since CED 2013 Final was submitted for adoption by the Energy Commission on December 11, 2013. These changes are described further in Volume 1, Chapter 1 of this report.

2 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 1: PG&E Planning Area Baseline Forecast Comparison

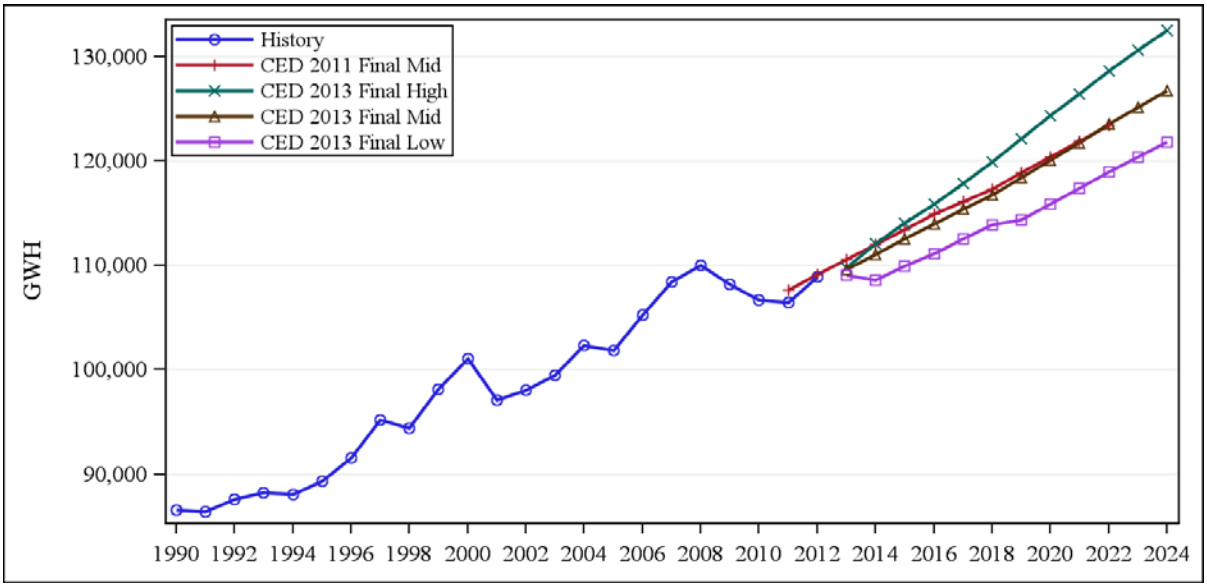
Consumption (GWH)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	86,597	86,596	86,596	86,596
2000	100,878	101,050	101,050	101,050
2012	109,133	108,871	108,871	108,871
2015	113,455	114,051	112,566	109,901
2020	120,372	124,374	120,090	115,908
2024	--	132,510	126,699	121,804
Average Annual Growth Rates				
1990 - 2000	1.54%	1.56%	1.56%	1.56%
2000 - 2012	0.66%	0.62%	0.62%	0.62%
2012 - 2015	1.30%	1.56%	1.12%	0.31%
2012 - 2020	1.23%	1.68%	1.23%	0.79%
2012 - 2024	--	1.65%	1.27%	0.94%
Peak (MW)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	17,250	17,250	17,250	17,250
2000	20,628	20,628	20,628	20,628
2012	-	21,881	21,881	21,881
2012*	22,840	22,251	22,251	22,251
2015	24,060	24,489	24,229	23,418
2020	25,620	26,749	25,866	24,715
2024	--	28,298	27,010	25,578
Average Annual Growth Rates				
1990 - 2000	1.80%	1.80%	1.80%	1.80%
2000 - 2012	0.85%	0.63%	0.63%	0.63%
2012* - 2015	1.75%	3.25%	2.88%	1.72%
2012* - 2020	1.45%	2.33%	1.90%	1.32%
2012* - 2024	--	2.02%	1.63%	1.17%
Historical values are shaded				
*Weather normalized: *CED 2013 Final* uses a weather-normalized peak value derived from the actual 2012 peak for calculating growth rates during the forecast period				

Source: California Energy Commission, Demand Analysis Office, 2013.

As shown in **Figure 1**, *CED 2013 Final* electricity consumption forecasts are slightly lower at the beginning of the forecast period than projected by *CED 2011*. Consumption dips slightly from 2012 to 2013, due to a combination of slow economic growth, an increase in residential and commercial electricity rates, and the assumption of normal weather (The year 2012 was particularly warm). Growth in the mid case is similar to *CED 2011* as the impact of higher rates is offset by greater decay in energy efficiency program impacts and higher penetration of electric vehicles (EVs).

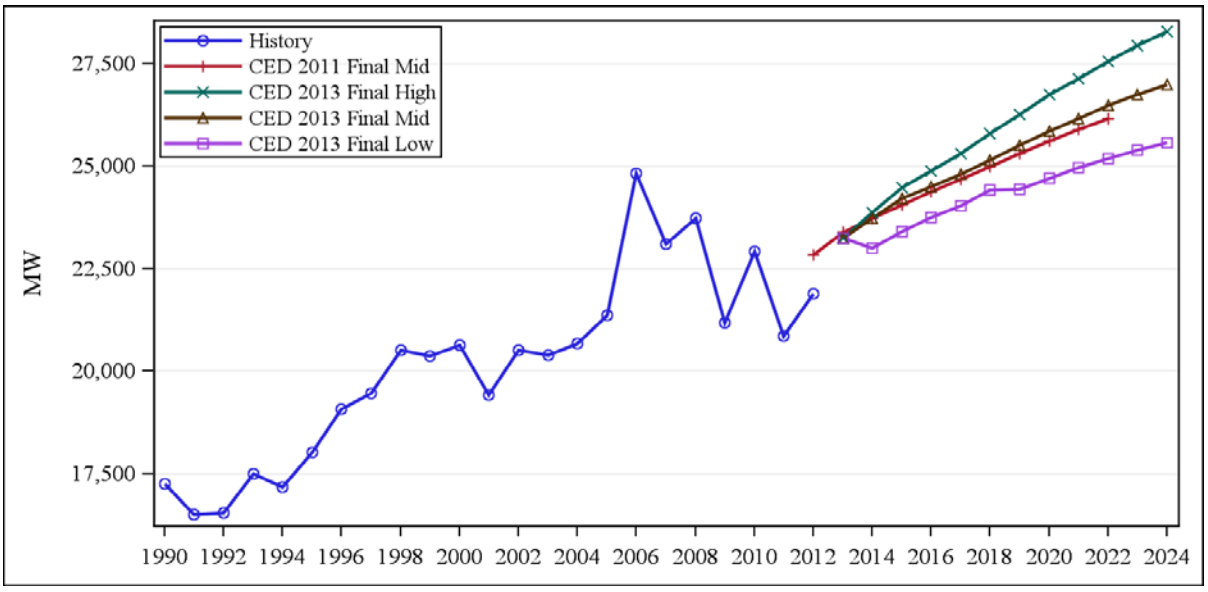
While 2012 was a warm year on average, the PG&E planning area did not experience particularly extreme high temperatures, so actual peak load was only slightly lower than weather-normalized peak. The relationship between peak demand scenarios, shown in **Figure 2**, follows a similar pattern as the consumption forecast. As with consumption, the peak demand forecast begins at a lower value than projected in *CED 2011,* and the mid scenario reaches *CED 2011* by the end of the forecast period. Peak growth is slightly higher than consumption due in part to efficiency considerations—such as increasing lighting efficiency—that have a greater impact on consumption than on peak.

Figure 1: PG&E Planning Area Baseline Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 2: PG&E Planning Area Baseline Peak

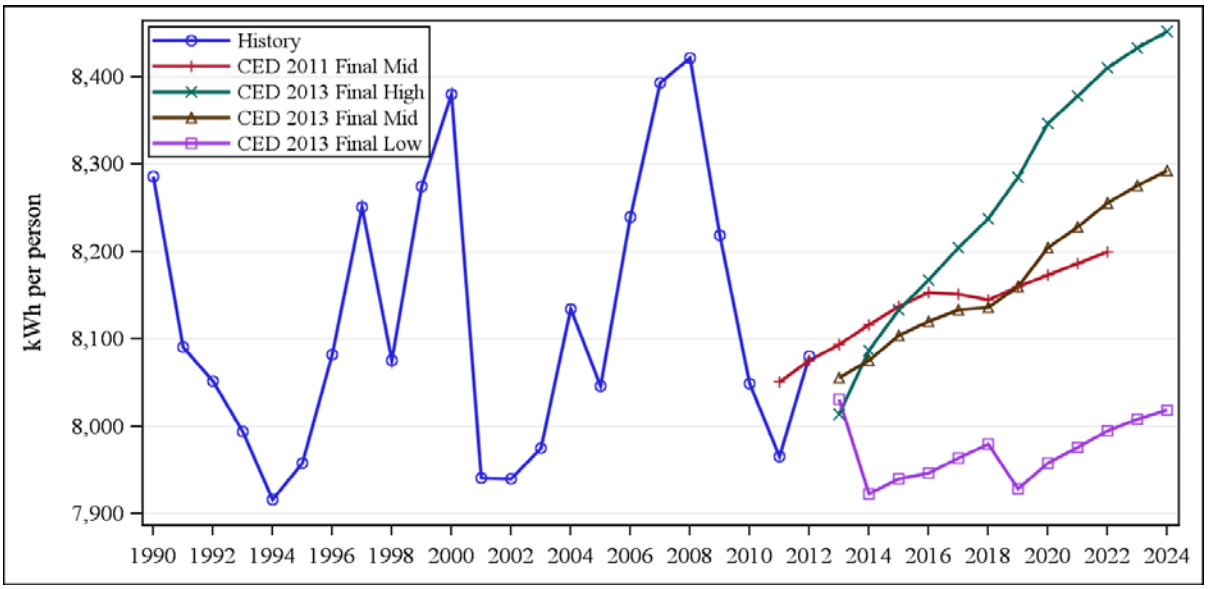


Source: California Energy Commission, Demand Analysis Office, 2013.

PG&E's projected peaks reflect staff estimates of future non-event-based demand response committed program impacts incremental to 2012 impacts, including real-time or time-of-use pricing and permanent load shifting. Some event-based programs, such as time-of-use and peak-time rebate programs are also included in *CED 2013 Final*. See Volume 1 for more details.

As **Figure 3** shows, per capita electricity consumption is lower in the *CED 2013 Final* demand scenarios through the initial forecast period compared to *CED 2011*. The drop in 2013 shows the combined effect of decreased consumption and increased population. Unlike *CED 2011*, which considered only a single population scenario, *CED 2013 Final* incorporates high, mid, and low population projections. While the high and mid consumption forecasts are nearly identical in 2013, there is some spread between population estimates for that year. As a result, the high per capita consumption scenario shown below actually begins from a lower point than the mid scenario.

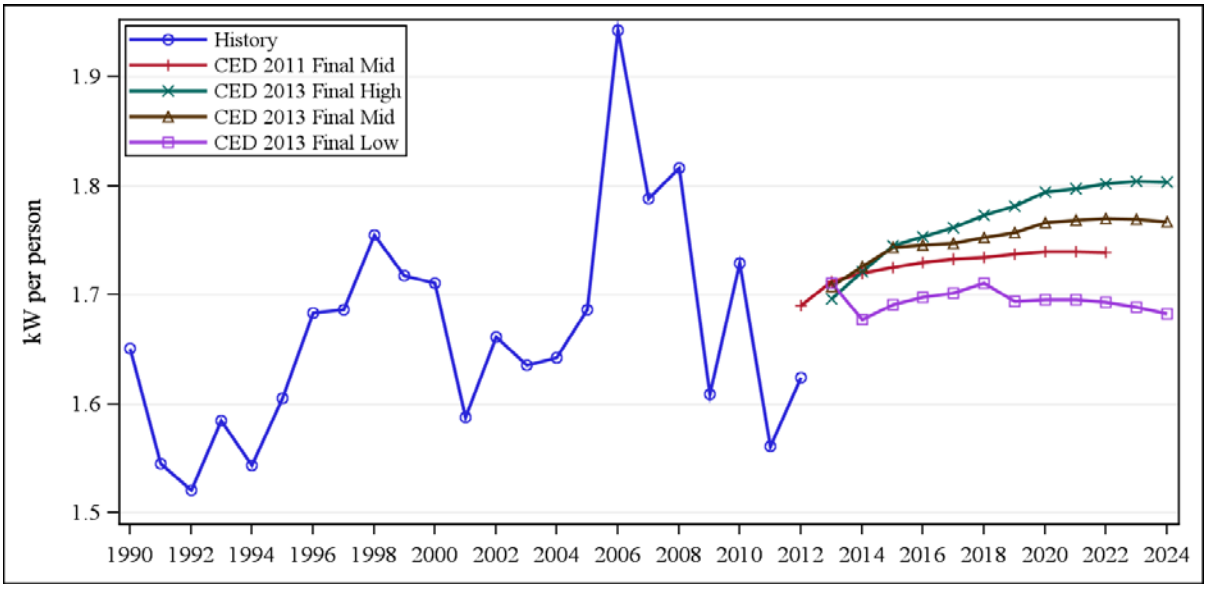
Figure 3: PG&E Planning Area Baseline per Capita Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 4 shows per capita peak demand. *CED 2013 Final* per capita peak scenarios follow a similar pattern as the per capita consumption scenarios, though the peak scenarios do not increase as drastically toward the end of the forecast period. This reflects the relatively small impact electric vehicles (EVs) are expected to have on peak demand. The per capita peak values are projected to remain in the range of recent historical levels for all three scenarios.

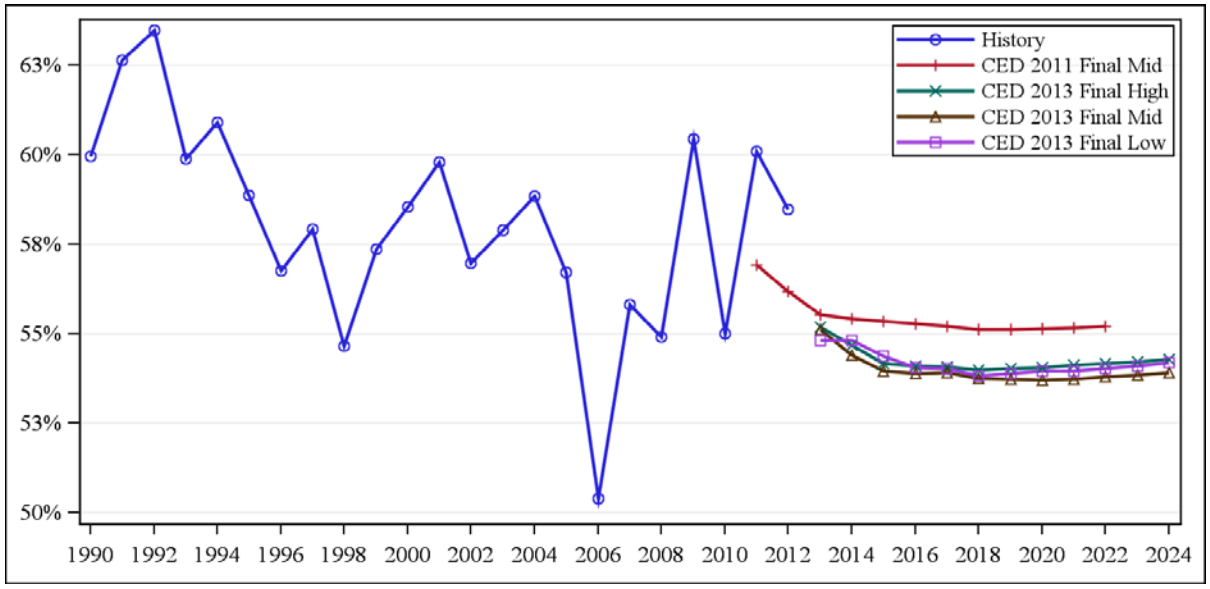
Figure 4: PG&E Planning Area Baseline per Capita Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 5 compares forecasted load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate "a needle peak"; higher load factors indicate a more stable load. Greater population and economic growth in the PG&E planning area has been taking place in hotter inland areas, leading to a higher saturation of central air conditioning. In addition, recent years have seen a greater use of air-conditioning equipment in the cooler Bay Area on warm days. *CED 2013 Final* projects load factors to be relatively constant over the forecast period.

Figure 5: PG&E Planning Area Baseline Load Factors



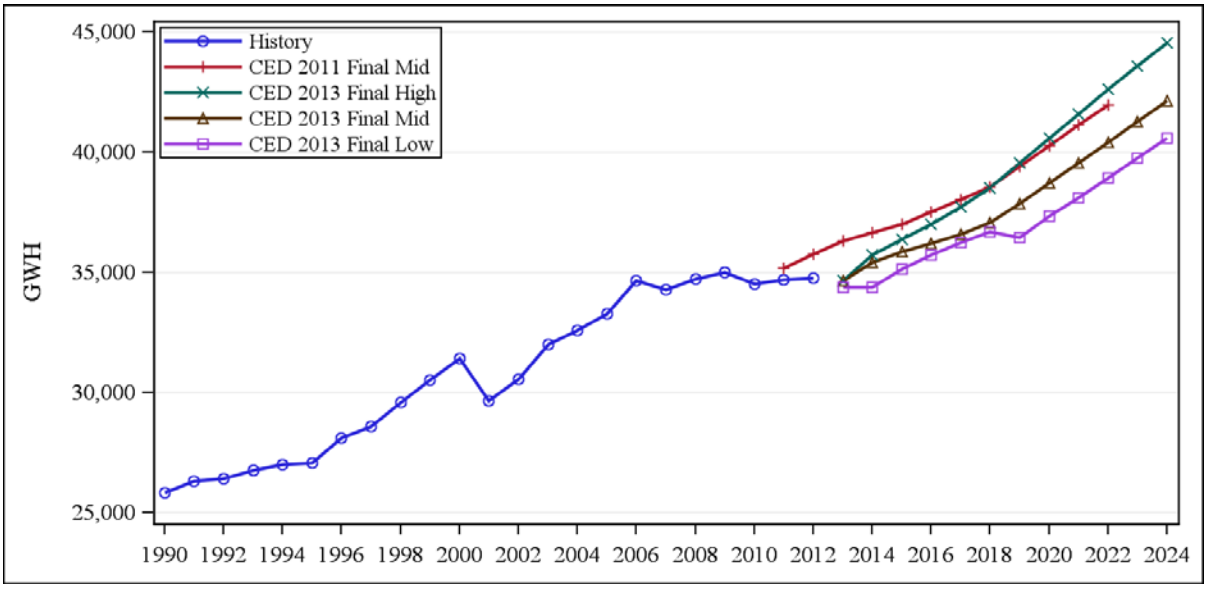
Source: California Energy Commission, Demand Analysis Office, 2013.

Sector Level Baseline Results and Input Assumptions

Residential Sector

Figure 6 compares *CED 2013 Final* and *CED 2011* PG&E planning area residential forecasts. All three *CED 2013 Final* forecast scenarios are lower through most of the forecast period, mainly due to a lower starting point, continued slow economic recovery, and lower number-of-household projections. The low demand scenario also has a small decline in 2019 due to changes in household incomes.

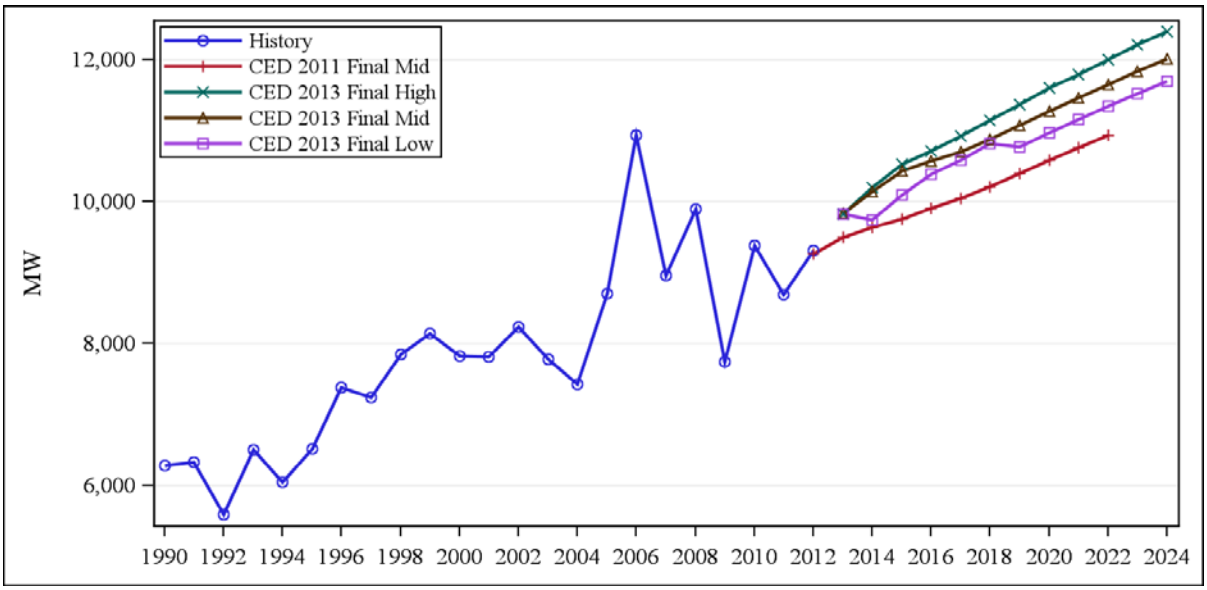
Figure 6: PG&E Planning Area Baseline Residential Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 7 compares *CED 2013 Final* and *CED 2011* residential peak demand forecasts. The *CED 2013 Final* residential peak forecasts are higher than the *CED 2011* forecast due to a higher 2012 actual residential peak. The differences between peak forecasts follow a similar pattern to differences in the consumption forecasts since the peak forecasts are driven primarily by electricity consumption.

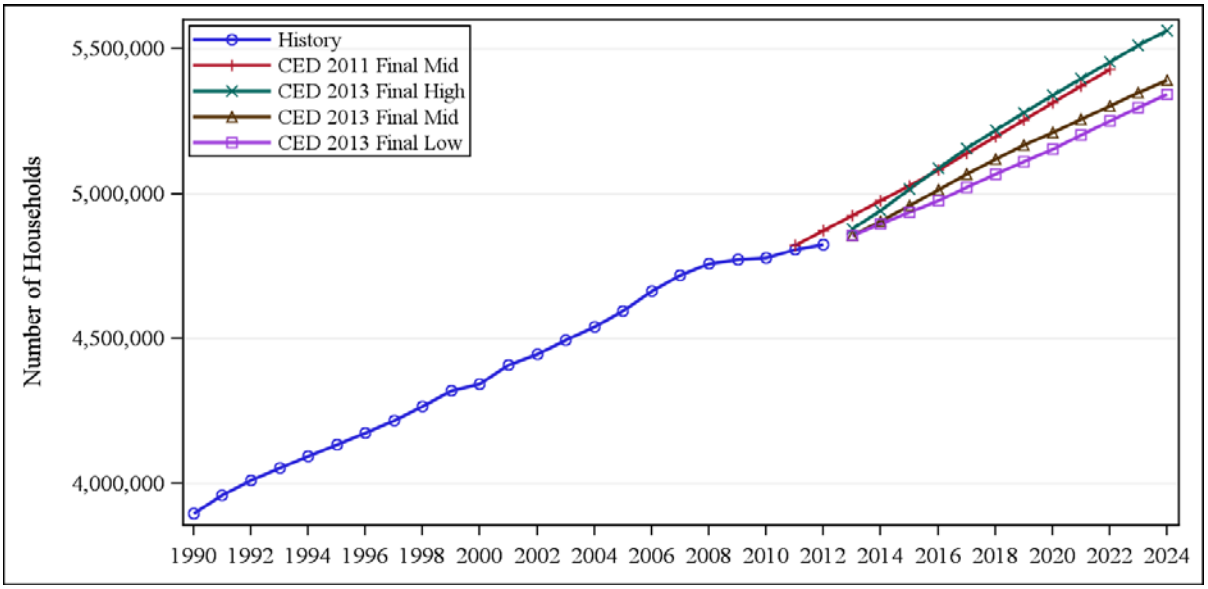
Figure 7: PG&E Planning Area Baseline Residential Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 8, Figure 9, and **Figure 10** compare residential drivers used in *CED 2013 Final* with those used for *CED 2011*. **Figure 8** shows total households. The *CED 2013 Final* mid and low demand scenarios are lower than the previous forecast because of lower near-term number-of-household values and moderate rates of growth. The *CED 2013 Final* forecast includes the most recent updated county population and household estimates from the California Department of Finance, as well as recent population projections from California Department of Finance, IHS Global Insight, and Moody's.

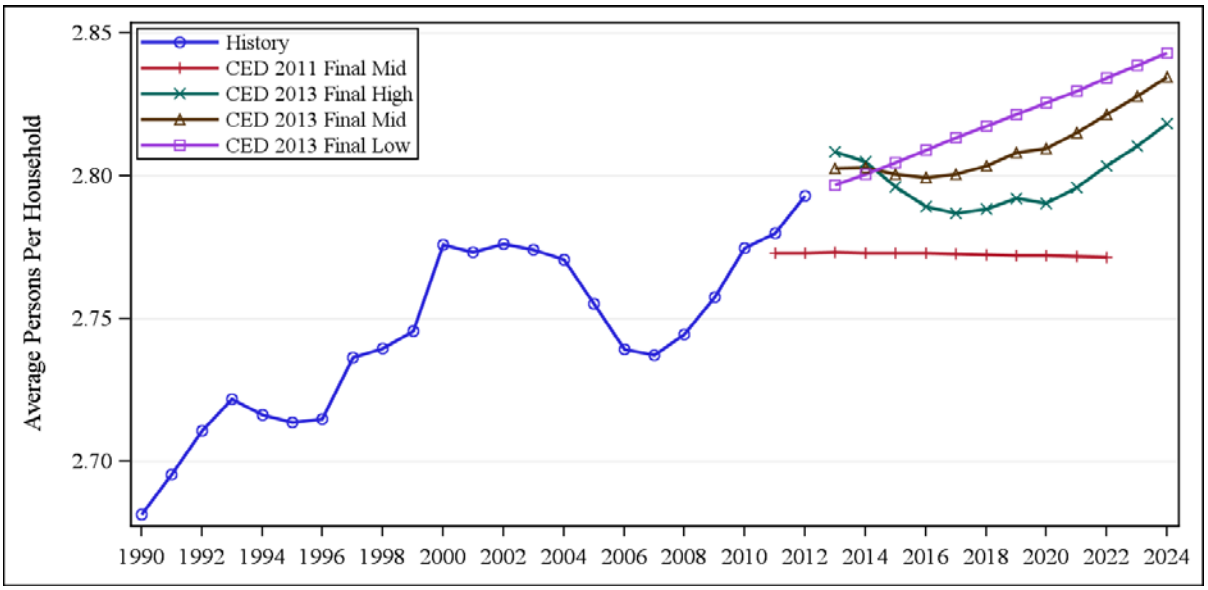
Figure 8: PG&E Planning Area Residential Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

The household scenarios are based on persons-per-household changes, shown in **Figure 9**. The high demand scenario uses a lower persons-per-household projection (more households) taken from Moody's projections. The low demand scenario uses a higher persons-per-household projection (fewer households) constructed using a basic trend analysis. Toward the end of the forecast period, all three scenarios return to the historical increasing trend.

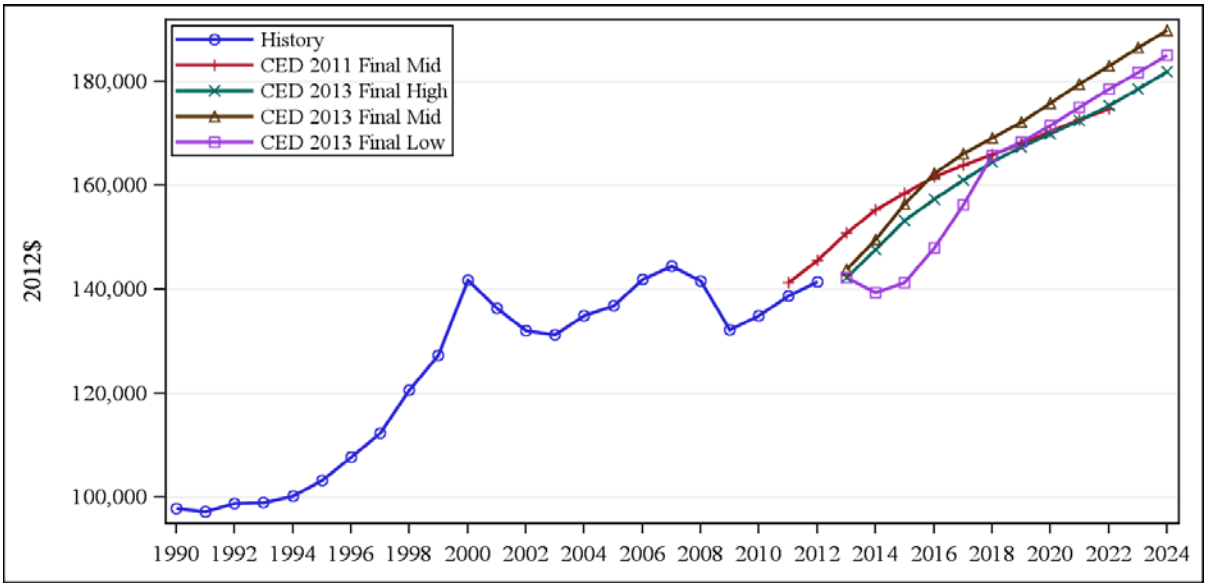
Figure 9: PG&E Planning Area Persons per Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 10 compares average household income (per capita income multiplied by persons per household) in the two forecasts. The mid and high *CED 2013 Final* scenario household income estimates are roughly equal at the end of the forecast period to *CED 2011*. However, the near-term values of the low scenario are significantly lower than the *CED 2011*, reflecting the lagged economic recovery included in the low demand scenario. The difference between scenarios is a function of the variation in per capita income and persons per household used to define the scenarios.

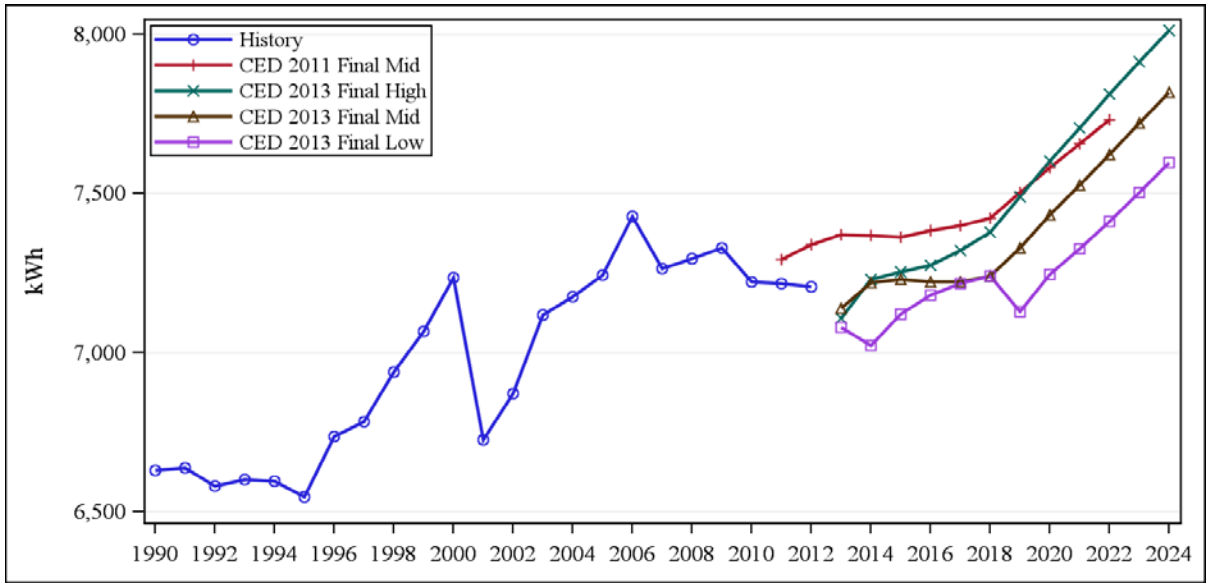
Figure 10: PG&E Planning Area Average Household Income Projections



Source: California Energy Commission, Demand Analysis Office, 2013

Figure 11 gives a comparison of annual electricity consumption per household. *CED 2013 Final* mid and high demand scenario growth rates are higher than *CED 2011* beyond 2018. The low demand scenario has a significant drop in 2019 caused by the underlying low scenario economic and demographic assumptions. As with *CED 2011* most of the growth in use per household after 2015 is caused by increased numbers of electric vehicles in the residential sector. Without the inclusion of electric vehicle charging, residential use would not grow as rapidly over the forecast period after the economic recovery.

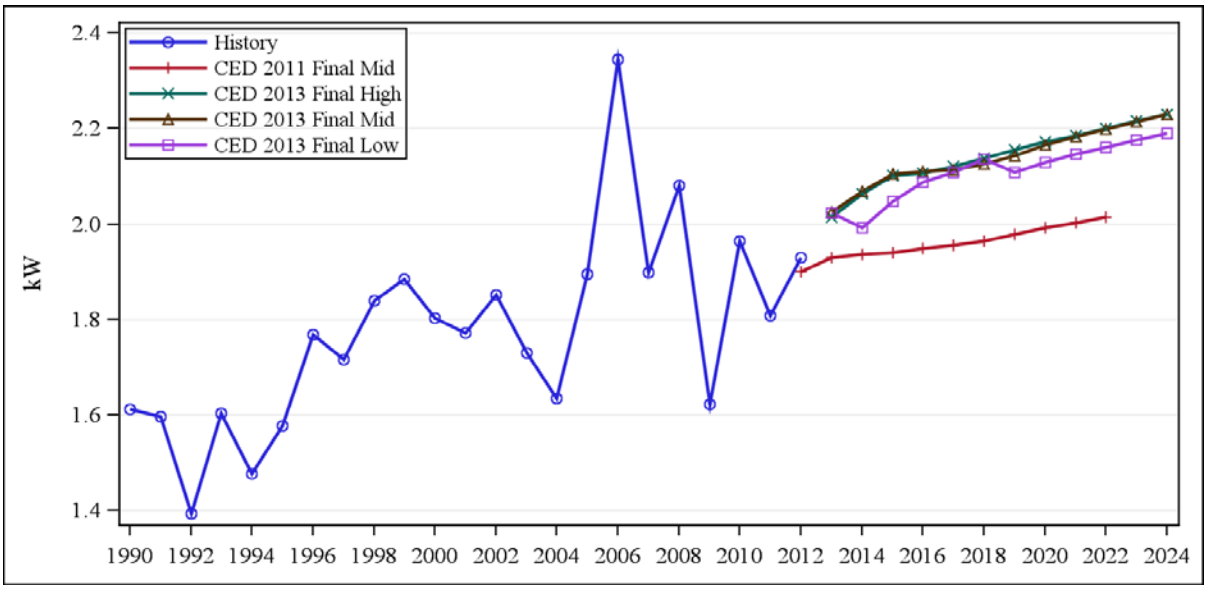
Figure 11: PG&E Planning Area Baseline Consumption per Household



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 12 shows forecasts of peak use per household. The *CED 2013 Final* projections grow modestly over the forecast period in a pattern similar to but at slightly higher levels than the *CED 2011* forecast. The increase in level is caused by higher recent historical estimates of residential peak. When compared to consumption per household, the forecast of peak per household shows relatively little impact from electric vehicle adoption. This is due to the assumption that personal electric vehicles will be charged primarily during off-peak hours.

Figure 12: PG&E Planning Area Baseline Peak Use per Household

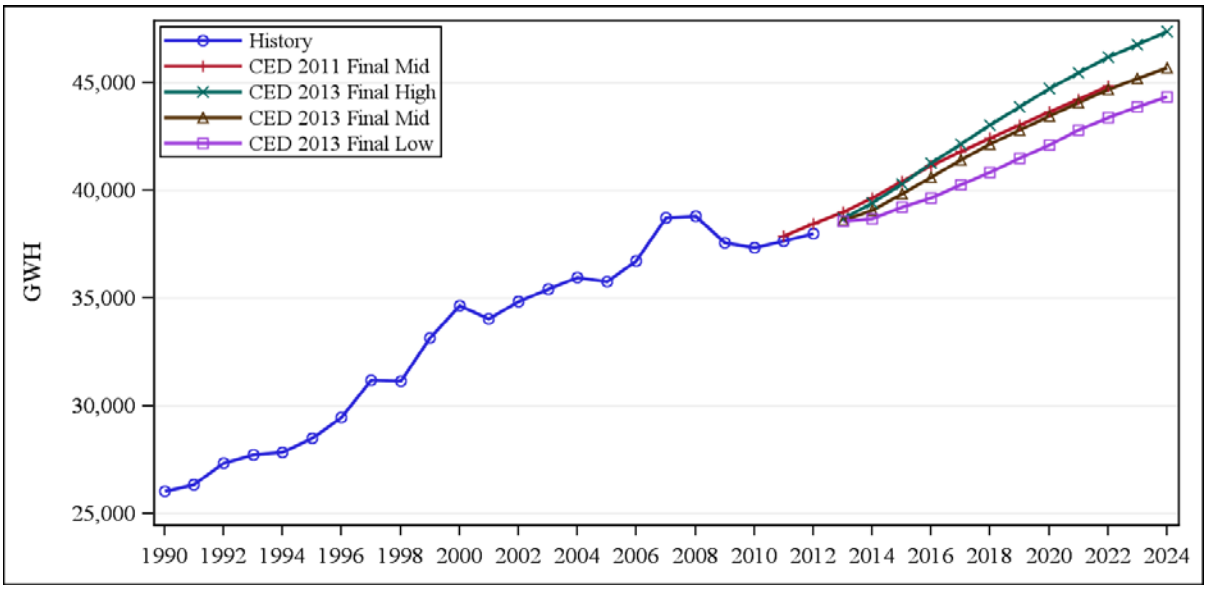


Source: California Energy Commission, Demand Analysis Office, 2013.

Commercial Sector

Figure 13 compares the PG&E commercial sector electricity consumption forecasts. The *CED 2013 Final* mid and low consumption scenarios are lower than *CED 2011* forecast throughout the forecast period. The differences are caused primarily by a lower starting point and additional efficiency impacts. The growth rate of each of the consumption scenarios is similar to the *CED 2011* forecast.

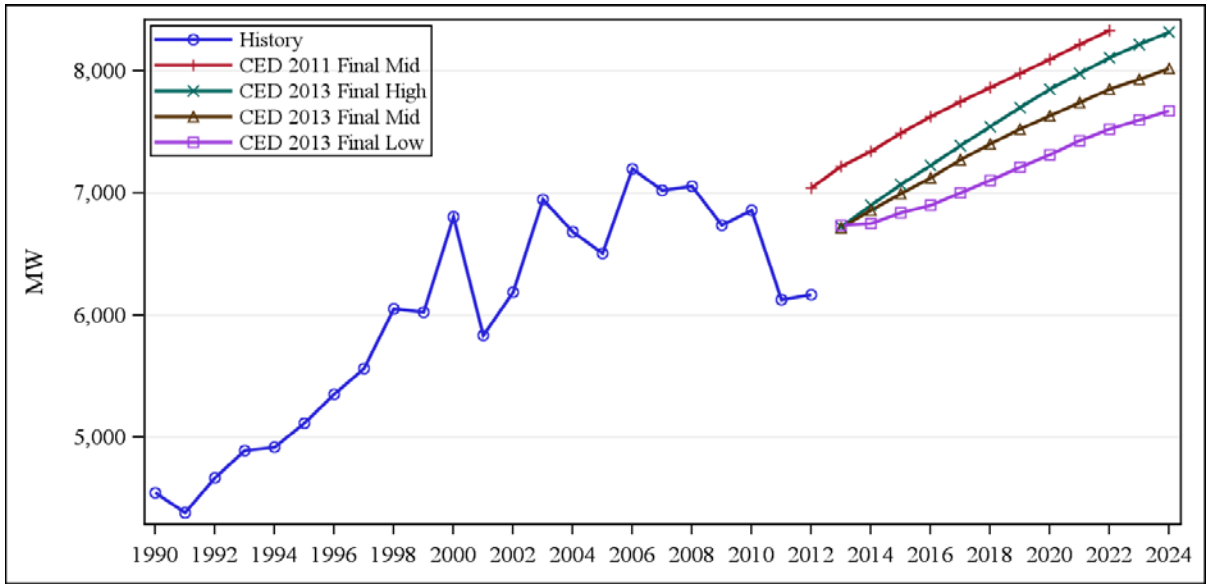
Figure 13: PG&E Planning Area Baseline Commercial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 14 compares the PG&E commercial sector peak demand forecasts. Growth in the *CED 2013 Final* peak scenarios is driven by the underlying electricity consumption forecast, which exhibits a similar pattern. The *CED 2013* low case scenario produces a slightly lower peak forecast due to slower growth in projected floor space.

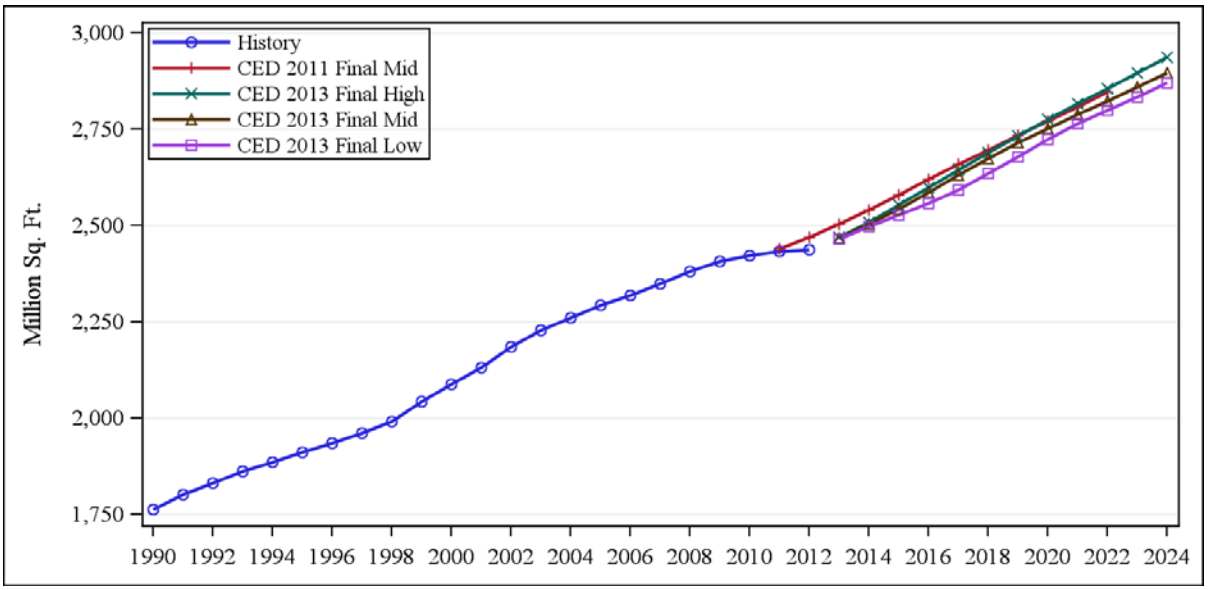
Figure 14: PG&E Planning Area Baseline Commercial Sector Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

In staff's commercial building sector forecasting model, floor space by building type (such as retail, offices, and schools) is the key driver. **Figure 15** compares PG&E commercial floor space projections. *CED 2013 Final* low and mid case floor space projections are somewhat lower over the forecast period than those used in the previous forecast due to a lower starting point and slower population growth. However, the *CED 2013 Final* high case floor space projection increases to *CED 2011* toward the end of the forecast period.

Figure 15: PG&E Planning Area Commercial Floor Space

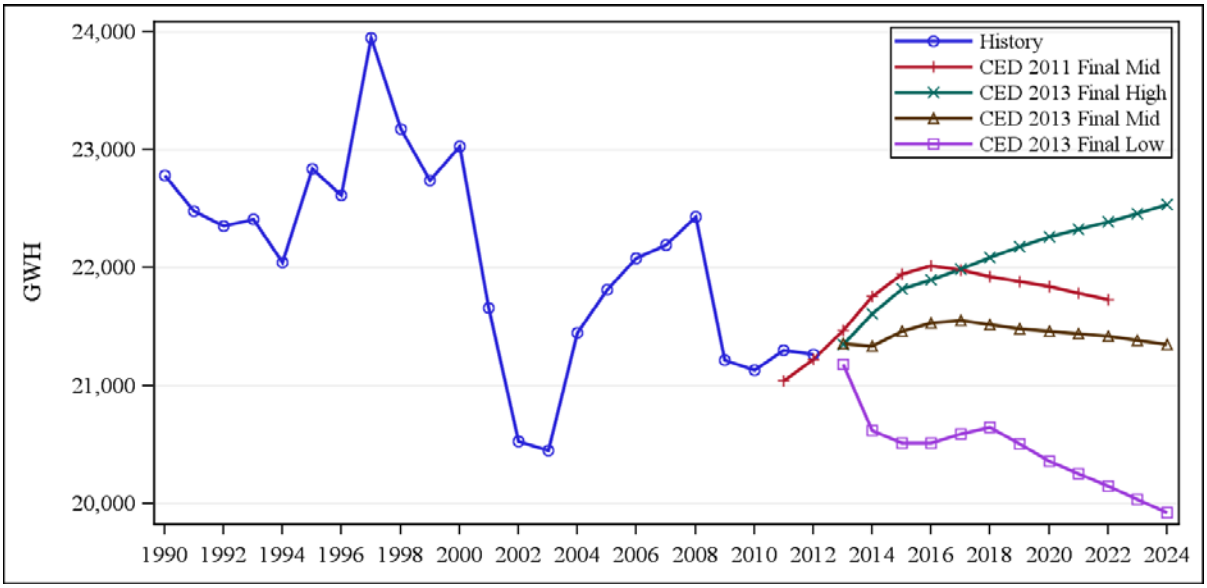


Source: California Energy Commission, Demand Analysis Office, 2013.

Industrial Sector

Figure 16 compares the PG&E planning area industrial sector electricity consumption forecasts. *CED 2013 Final* industrial consumption forecast scenarios are all lower than the *CED 2011* forecast in the short term. However, projected growth in the high case is higher near the end of the forecast term than the *CED 2011* forecast due to more optimistic economic projections and effects of climate change.[3] The growth rate for all three *CED 2013 Final* scenarios in the beginning of the forecast period is lower than the *CED 2011* forecast, reflecting lower projected growth in resource extraction and construction.

Figure 16: PG&E Planning Area Baseline Industrial Consumption

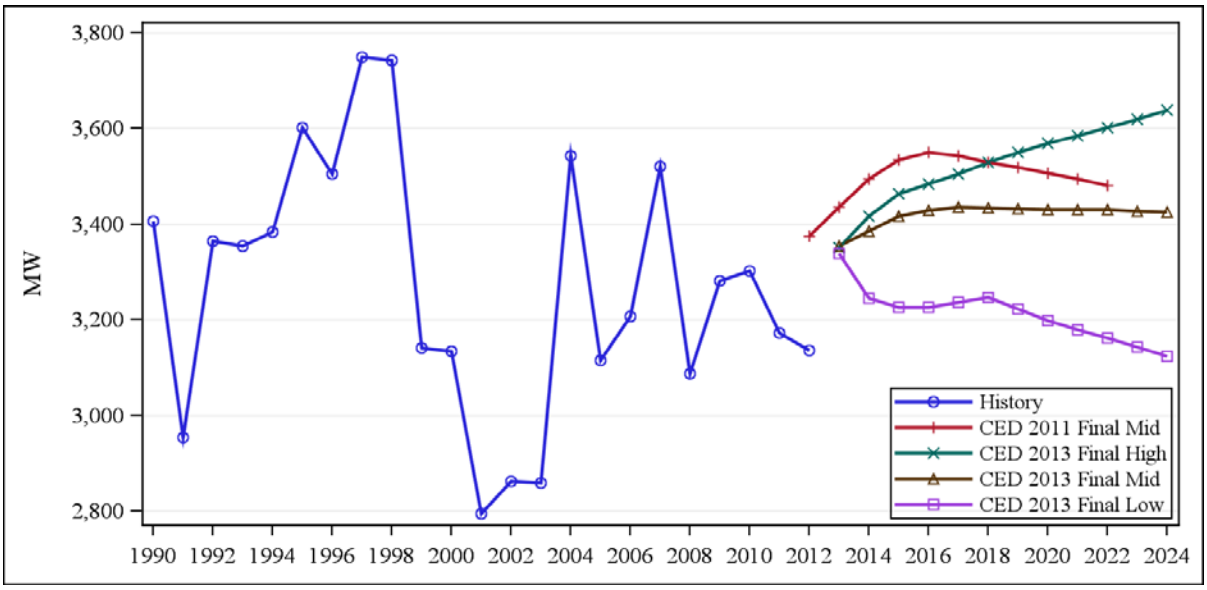


Source: California Energy Commission, Demand Analysis Office, 2013.

3 *CED 2013 Final* estimates the impacts of potential climate change on electricity consumption and peak demand. These impacts are included in the mid and high energy demand cases. More information about the climate change estimates is available in Volume 1, Appendix A.

Figure 17 compares the PG&E industrial sector peak forecasts. The *CED 2013 Final* industrial peak forecasts follow the same pattern as the industrial consumption forecasts.

Figure 17: PG&E Planning Area Baseline Industrial Sector Peak

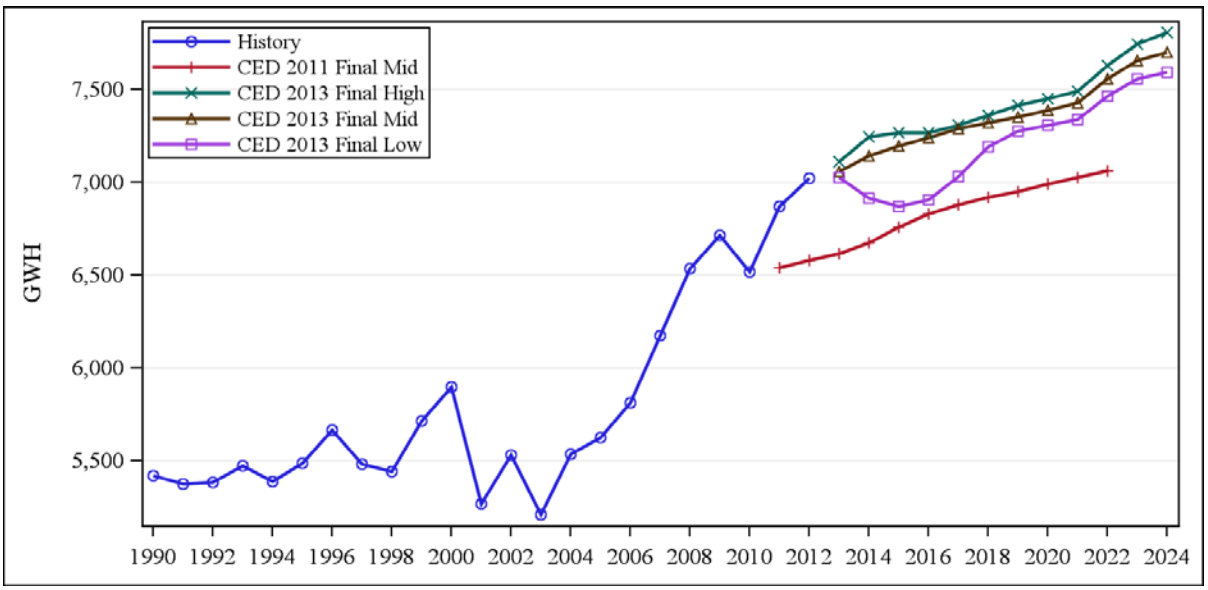


Source: California Energy Commission, Demand Analysis Office, 2013.

Other Sectors

Figure 18 compares the electricity consumption forecasts for the transportation, communications, and utilities (TCU) sector, which includes street lighting. *CED 2013 Final* mid starts higher than *CED 2011* but the two forecasts eventually trend together in the mid and long term. In the recession scenario modeled in the low case, electricity consumption bottoms out in 2015 and is subsequently followed by a strong recovery though 2018 where growth resumes at a rate similar to that of the mid case.

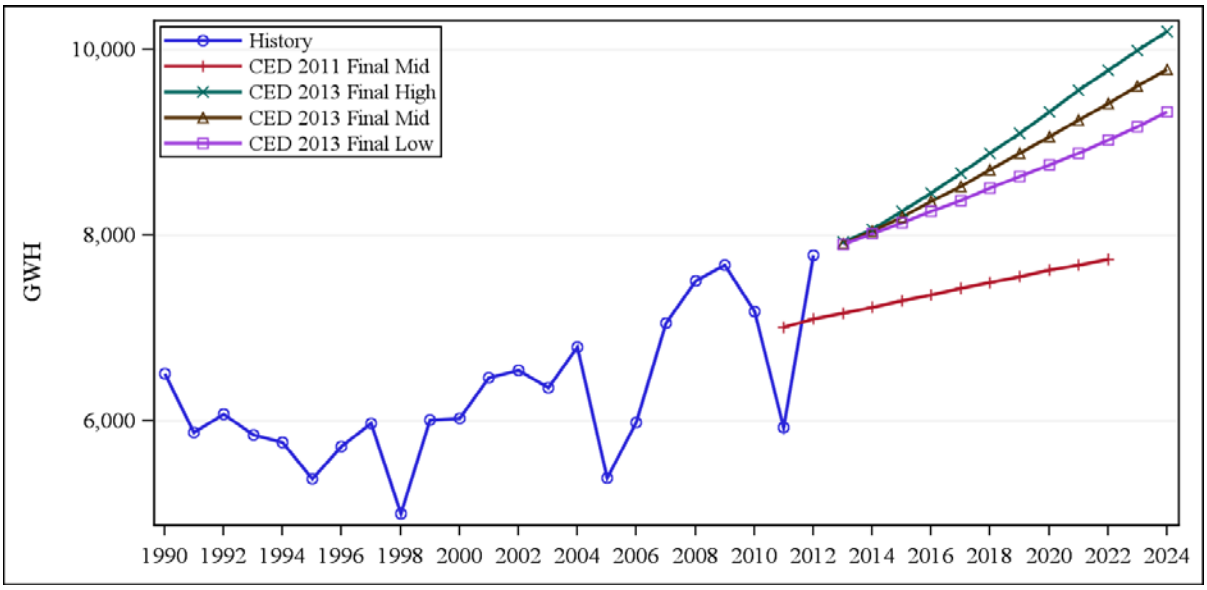
Figure 18: PG&E Planning Area Baseline Transportation, Communication, Utilities, and Street Lighting Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 19 compares the electricity consumption forecasts for the agriculture and water pumping sectors. The *CED 2013 Final* mid starts slightly higher than *CED 2011* and has similar growth rates until the end of the forecast period, where the newer forecast begins to grow slightly faster. All three demand scenarios are projected to grow over time because of a projected increase in ground-water pumping.

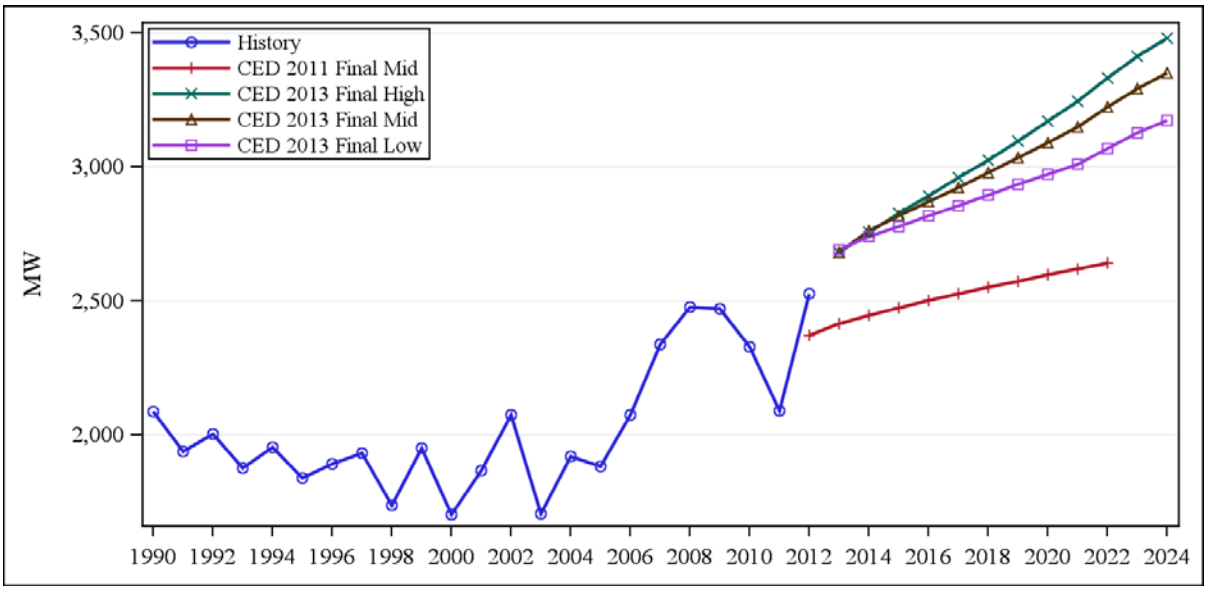
Figure 19: PG&E Planning Area Baseline Agriculture and Water Pumping Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 20 compares projected combined peak for the TCU, street lighting, agriculture, and water pumping sectors. *CED 2013 Final* is higher over the entire forecast period for both the mid and high cases compared to *CED 2011* because of a higher starting point. The *CED 2013 Final* mid growth rate over the entire forecast period is similar to that of the *CED 2011.*

Figure 20: PG&E Planning Area Baseline Other Sector Peak

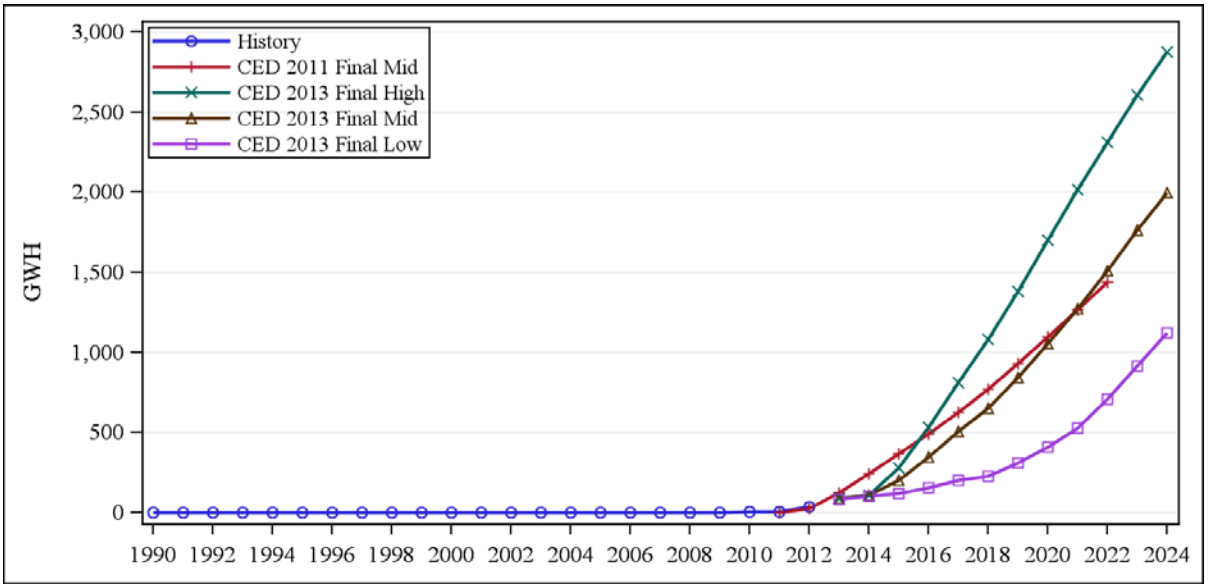


Source: California Energy Commission, Demand Analysis Office, 2013.

Electric Vehicles

By the end of the forecast period, consumption by electric vehicles is projected to reach more than 1,100 gigawatt-hours (GWh) in the low demand scenario and nearly 2,800 GWh in the high demand scenario. Staff assumes most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 21** presents the PG&E planning area electric vehicle consumption forecast for each of the demand scenarios.

Figure 21: PG&E Electricity Consumption by Electric Vehicles



Source: California Energy Commission, Demand Analysis Office, 2013.

Self-Generation

The peak demand forecast is reduced by the projected impacts of distributed photovoltaics (PV), solar thermal, and combined heat and power (CHP) systems, including the effects of the Self-Generation Incentive Program (SGIP), California Solar Initiative (CSI), and other programs, as discussed in Appendix B to Volume 1. The effects of these programs are forecast based on a combination of installation trend analysis and predictive modeling. **Table 2** shows the forecast of peak impacts from PV and non-PV self-generation. Staff projects between 1,000 and 1,314 MW of peak reduction from PV systems by 2024. Peak reductions are based on installed PV system capacities ranging from 2,180 MW by 2024 in the high demand case to 2,800 MW by 2024 in the low demand case.

Table 2: PG&E Planning Area Self-Generation Peak Impacts (MW)

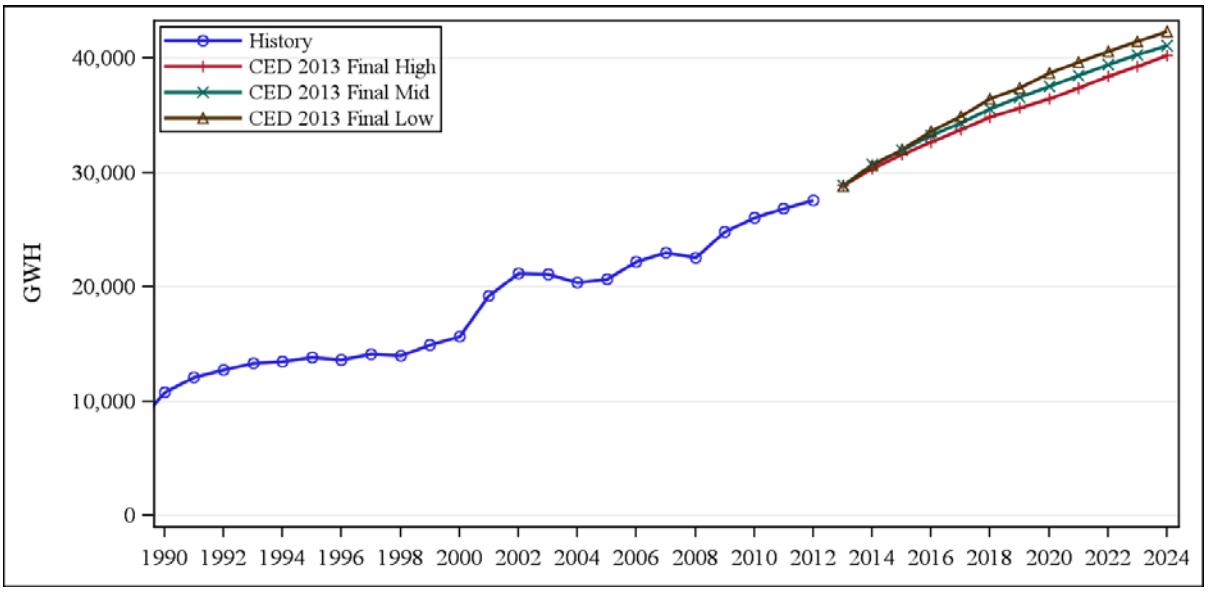
Scenario	Technology	1990	2000	2012	2015	2020	2024
Low Demand	Photovoltaic	0.0	0.4	348.6	660.7	908.4	1,313.9
	Non-Photovoltaic	597.4	670.9	813.7	865.9	914.2	936.3
	Total	**597.4**	**671.3**	**1162.3**	**1526.6**	**1822.6**	**2250.2**
Mid Demand	Photovoltaic	0.0	0.4	348.6	646.8	839.8	1144.4
	Non-Photovoltaic	597.4	670.9	813.7	865.0	912.4	934.9
	Total	**597.4**	**671.3**	**1162.3**	**1511.8**	**1752.2**	**2079.3**
High Demand	Photovoltaic	0.0	0.4	348.6	638.7	789.6	1003.8
	Non-Photovoltaic	597.4	670.9	813.7	863.6	907.1	928.9
	Total	**597.4**	**671.3**	**1162.3**	**1502.3**	**1696.7**	**1932.7**

Source: California Energy Commission, Demand Analysis Office, 2013.

Conservation/Efficiency Impacts

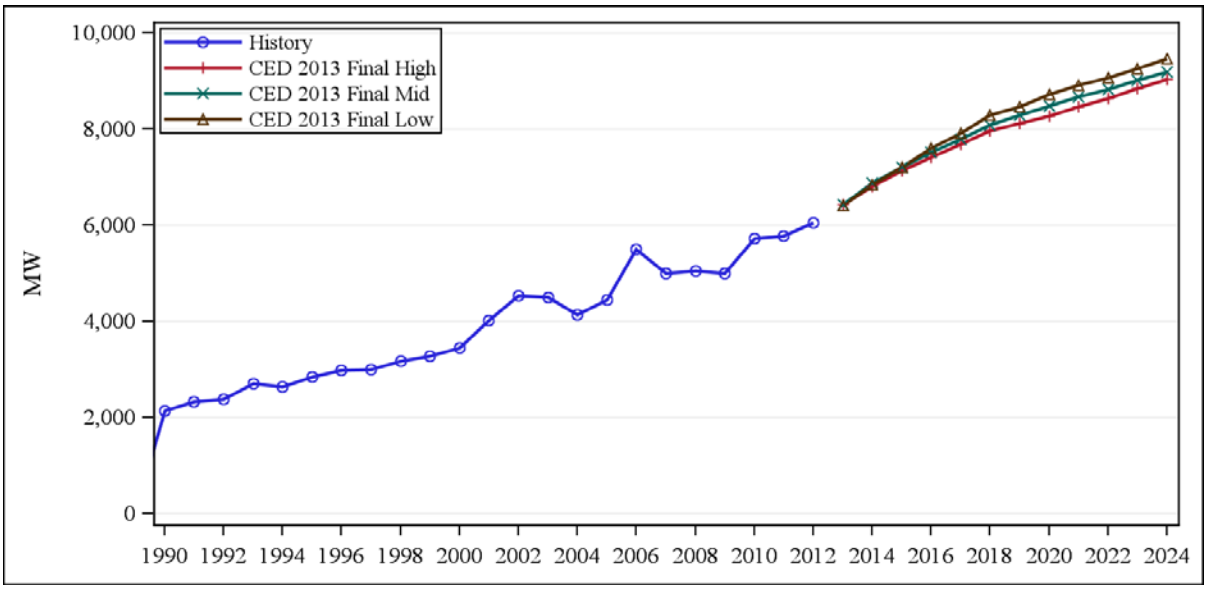
Figure 22 and **Figure 23** show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented through 2014; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Within the demand scenarios, higher demand yields more standards savings since new construction and appliance usage increase, while lower demand is associated with more program savings and higher rates (and therefore more price effects). The net result is that savings totals among the scenarios are very similar.

Figure 22: PG&E Planning Area Baseline Electricity Consumption Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 23: PG&E Planning Area Baseline Electricity Peak Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Table 3 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5 – 2.0 percent due to higher home and commercial floor space construction and 1.5 – 2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as Assembly Bill 1109 (Huffman, Chapter 534, Statutes of 2007) (AB 1109) lighting savings and television standard savings, just as they were in *CED 2011*. For *CED 2013 Final*, new standards savings impacts for the 2013 Title 24 standards update and impacts from standards affecting battery chargers were included. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1, Chapter 3 provides more detail on staff work related to energy efficiency and conservation.

Table 3: PG&E Planning Area Baseline Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	892	1,001	**1,893**	419	235	**654**	**2,548**
2000	1,960	3,085	**5,045**	953	710	**1,663**	**6,708**
2012	2,913	7,274	**10,187**	1,829	1,283	**3,111**	**13,298**
2015	3,261	9,459	**12,721**	2,292	1,655	**3,947**	**16,668**
2020	3,965	11,727	**15,692**	3,389	2,513	**5,902**	**21,594**
2024	4,441	12,713	**17,154**	4,188	2,956	**7,144**	**24,298**
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	216	243	**459**	73	41	**115**	**574**
2000	486	765	**1,251**	188	140	**328**	**1,580**
2012	755	1,885	**2,640**	335	235	**570**	**3,210**
2015	867	2,513	**3,380**	425	307	**731**	**4,111**
2020	1,053	3,115	**4,168**	630	467	**1,097**	**5,265**
2024	1,160	3,320	**4,480**	779	550	**1,330**	**5,810**

Source: California Energy Commission, Demand Analysis Office, 2013.

Port Electrification

Potentially significant increases in electricity use in California are expected to occur through port electrification. **Table 4** shows, for select years, the portion of these impacts that are anticipated in the PG&E planning area. For more details, see Volume 1, Chapter 1.

Table 4: PG&E Planning Area Port Electrification

Year	Additional Consumption (GWh)		
	High	Mid	Low
2015	56.11	55.46	54.81
2020	90.99	81.08	71.16
2024	108.59	89.88	71.16

Source: California Energy Commission, Demand Analysis Office, 2013.

Climate Zone Forecasts

For *CED 2013 Final*, staff developed electricity consumption and peak demand forecasts for each climate zone. (See Volume 1, Chapter 1 for more details.) The PG&E planning area has five climate zones, each with a designated weather station, as shown in **Table 5**.

Table 5: PG&E Planning Area Climate Zones

Climate Zone Number	Weather Station	Description
1	Ukiah	PG&E planning area not covered in Climate Zones 2-5
2	Fresno	San Joaquin Valley and Northern Sacramento Valley
3	Sacramento	Southern Sacramento Valley
4	San Jose	Rest of Bay Area not covered in Climate Zone 5, Central Coast to Santa Barbara, Santa Rosa, Napa
5	San Francisco	San Francisco, Oakland, Marin County

Source: California Energy Commission, Demand Analysis Office, 2013.

Table 6 shows the forecast results for electricity consumption and peak demand by climate zone for each demand scenario. To better show forecast trends and to avoid mischaracterizing average annual growth because of 2012-specific weather impacts, growth rates are provided relative to 2013. Full climate zone results are shown in the forms posted alongside this report.[4] The fastest growth in both consumption and peak demand over the

4 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

forecast period is projected to be inland, in Climate Zones 2 and 3. These results reflect expected resumption of migration from coastal to inland areas, migration that decreased during the recent recession. For example, growth in population from 2013 – 2024 in the mid demand case is projected to be 21 and 23 percent, respectively, for Climate Zones 2 and 3, compared to 8 and 4 percent for Climate Zones 4 and 5. Potential climate change impacts contribute to faster peak demand growth in Climate Zone 3; projected increases in annual maximum temperature are highest in this climate zone in both the mid and high demand cases.

Table 6: PG&E Planning Area Baseline Climate Zone Forecast Results

		Consumption by Climate Zone (GWh)					Peak Demand by Climate Zone (MW)				
		1	2	3	4	5	1	2	3	4	5
High Demand Case	2013	4,924	10,282	31,627	38,526	24,420	984	2,429	7,236	7,199	5,394
	2015	5,061	10,786	32,847	39,958	25,399	1,022	2,599	7,661	7,574	5,634
	2020	5,372	11,955	36,111	43,354	27,582	1,069	2,875	8,410	8,305	6,091
	2024	5,639	12,911	38,950	45,874	29,136	1,095	3,070	8,931	8,811	6,392
	Avg. Growth 2013-2020	1.25%	2.18%	1.91%	1.70%	1.75%	1.19%	2.42%	2.16%	2.06%	1.75%
	Avg. Growth 2013-2024	1.24%	2.09%	1.91%	1.60%	1.62%	0.97%	2.15%	1.93%	1.85%	1.55%
Mid Demand Case	2013	4,924	10,273	31,572	38,477	24,387	984	2,429	7,236	7,199	5,394
	2015	5,017	10,646	32,515	39,370	25,015	1,018	2,556	7,610	7,474	5,572
	2020	5,280	11,507	35,243	41,627	26,433	1,071	2,769	8,303	7,908	5,816
	2024	5,546	12,299	37,751	43,531	27,572	1,105	2,926	8,794	8,214	5,972
	Avg. Growth 2013-2020	1.00%	1.63%	1.58%	1.13%	1.16%	1.21%	1.87%	1.98%	1.34%	1.08%
	Avg. Growth 2013-2024	1.09%	1.65%	1.64%	1.13%	1.12%	1.05%	1.70%	1.78%	1.20%	0.93%
Low Demand Case	2013	4,898	10,215	31,414	38,277	24,283	984	2,429	7,236	7,199	5,394
	2015	4,919	10,392	31,768	38,370	24,452	992	2,456	7,338	7,236	5,396
	2020	5,189	11,106	34,290	39,916	25,407	1,060	2,652	8,061	7,471	5,472
	2024	5,488	11,856	36,659	41,444	26,357	1,108	2,798	8,528	7,635	5,509
	Avg. Growth 2013-2020	0.83%	1.20%	1.26%	0.60%	0.65%	1.06%	1.25%	1.55%	0.52%	0.20%
	Avg. Growth 2013-2024	1.04%	1.36%	1.41%	0.73%	0.75%	1.08%	1.28%	1.50%	0.53%	0.19%

Source: California Energy Commission, Demand Analysis Office, 2013.

Additional Achievable Energy Efficiency

As an investor-owned utility, PG&E is one of the three service territories for which staff developed AAEE estimates. These savings are not yet considered committed but are reasonably likely to occur and include impacts from future updates of building codes and appliance standards as well as utility efficiency programs expected to continue beyond the current planning cycle.

Staff developed five AAEE scenarios, based on recommendations from the Joint Agency Steering Committee[5] and input from Navigant and forecast stakeholders through the Demand Analysis Working Group (DAWG). These scenarios varied by assumptions related to economic growth, changes in electricity and natural gas rates, and a host of inputs associated with efficiency measure adoption and the impact of building codes and appliance standards. **Table 7** shows the annual savings associated with each scenario. A detailed description of the inputs and assumptions used to develop the AAEE scenarios is available in Volume 1, Chapter 4 of this report.

5 The Joint Agency Steering Committee is composed of managerial representatives from the Energy Commission, the California Independent System Operator, and the California Public Utilities Commission and is committed to improving coordination and process alignment across state planning processes that use the Energy Commission's demand forecast.

Table 7: PG&E Additional Achievable Efficiency Savings

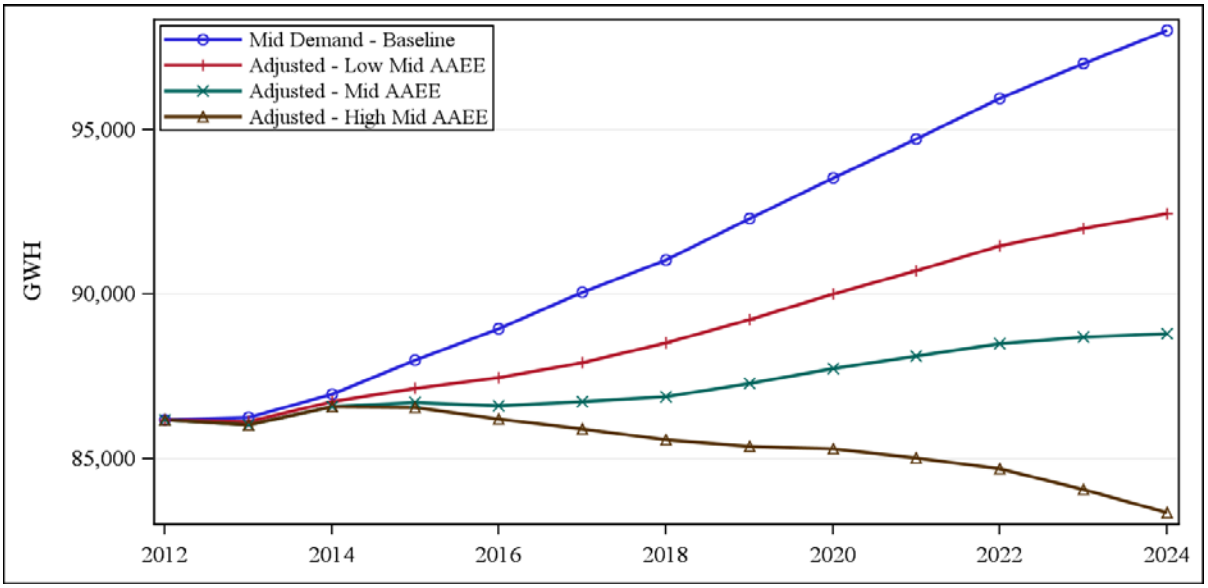
Year	Energy Savings (GWh)				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012	-	-	-	-	-
2013	138	138	225	225	230
2014	224	228	392	392	419
2015	844	858	1,294	1,446	1,489
2016	1,464	1,487	2,335	2,742	2,805
2017	2,084	2,128	3,331	4,152	4,255
2018	2,450	2,518	4,151	5,478	5,611
2019	2,961	3,049	4,998	6,906	7,102
2020	3,411	3,521	5,777	8,217	8,443
2021	3,846	3,987	6,595	9,682	9,938
2022	4,320	4,476	7,431	11,249	11,504
2023	4,837	5,029	8,316	12,932	13,200
2024	5,332	5,562	9,208	14,646	14,924
Year	Peak Savings (MW)				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012	-	-	-	-	-
2013	22	22	36	36	37
2014	44	45	73	73	77
2015	194	197	279	322	332
2016	345	349	522	651	669
2017	497	506	753	1,000	1,033
2018	607	621	976	1,361	1,406
2019	742	761	1,193	1,733	1,794
2020	864	888	1,399	2,093	2,169
2021	986	1,016	1,619	2,494	2,578
2022	1,115	1,148	1,847	2,920	3,013
2023	1,258	1,299	2,097	3,382	3,484
2024	1,398	1,447	2,348	3,855	3,964

Source: California Energy Commission, Demand Analysis Office, 2013.

The AAEE scenarios are intended to be used to adjust the baseline demand forecasts (which include only committed efficiency savings). The adjusted service territory forecasts provided in this report constitute options to form the basis for a "managed" forecast to be used for planning in Energy Commission, CPUC, and California ISO proceedings. The choice of scenarios (baseline and AAEE) to use for this purpose will be made by the leadership of these agencies shortly after this report is adopted on December 11, 2013, and documented in the adopted *2013 IEPR*.

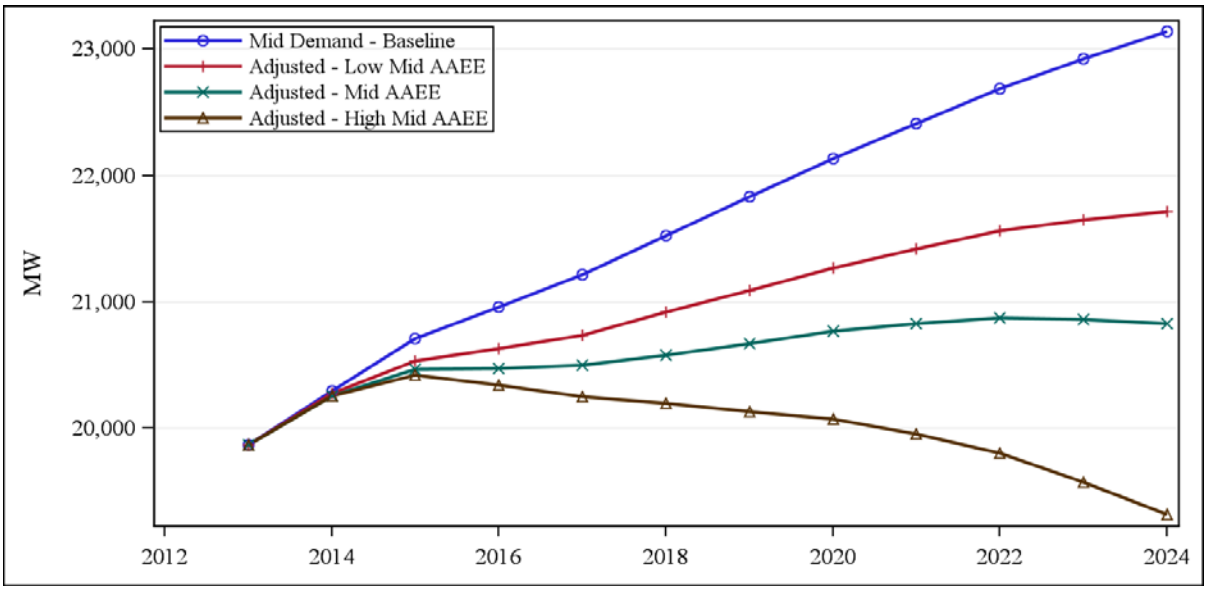
Figure 24 shows the effects of the estimated low mid, mid, and high mid AAEE savings on *CED 2013 Final* mid baseline demand for the PG&E Service Territory. The mid demand scenario flattens out when adjusted by the mid AAEE savings and declines when the high mid AAEE savings are applied. The same can be said for the peak forecast, as illustrated in **Figure 25**.

Figure 24: PG&E Service Territory Baseline and Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

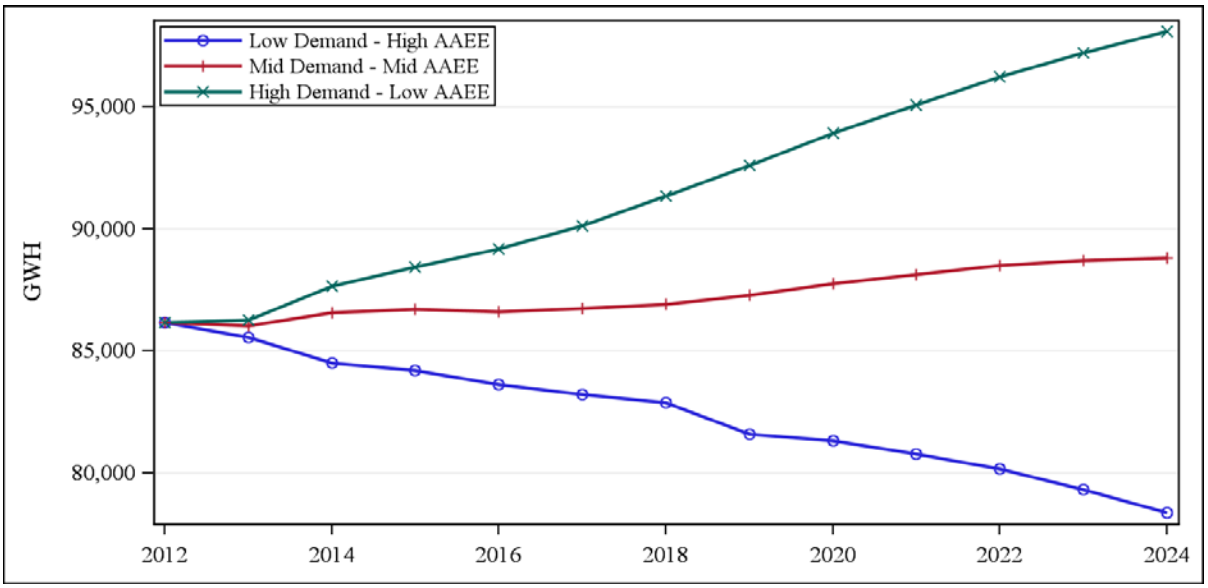
Figure 25: PG&E Service Territory Baseline and Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

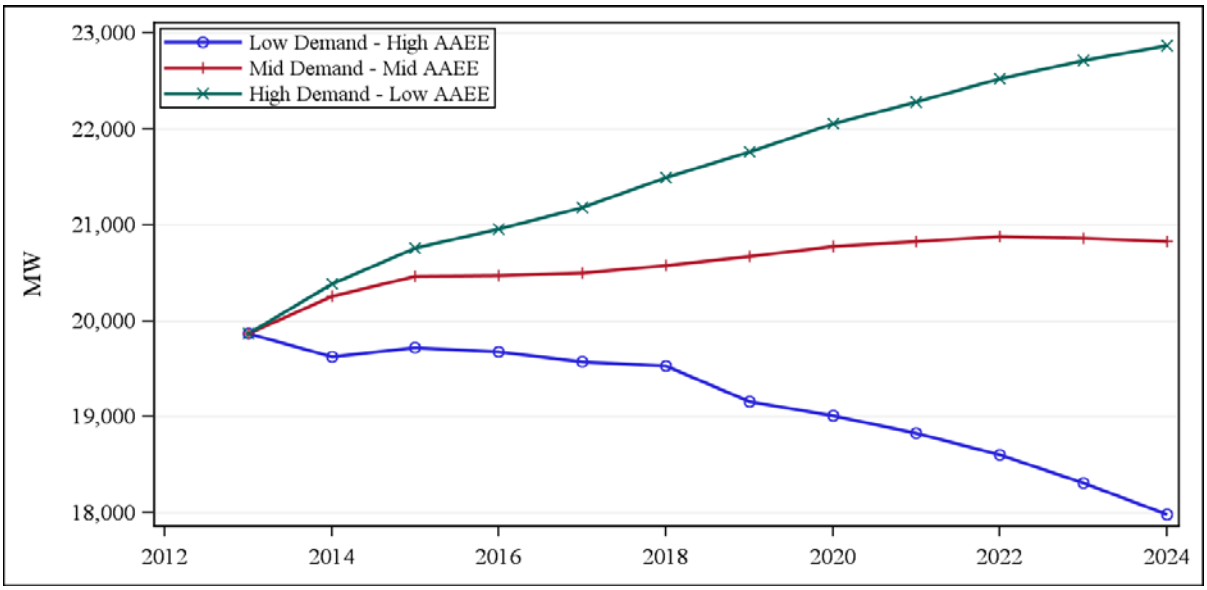
Figure 26 shows the low baseline sales forecast adjusted by the high AAEE savings scenario, the mid baseline adjusted by the mid AAEE, and the high baseline adjusted by the low AAEE. These parings were chosen to produce the maximum spread among potential managed sales forecasts for the PG&E service territory. **Figure 27** shows a similar set of adjusted peak demand forecasts.

Figure 26: PG&E Service Territory Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 27: PG&E Service Territory Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

CHAPTER 2:
Southern California Edison Planning Area

The Southern California Edison (SCE) planning area includes:

- SCE bundled retail customers.
- Customers served by energy service providers 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 Imperial Irrigation District and the cities of Los Angeles, Pasadena, Glendale, and Burbank. Also excluded from the SCE planning area are San Diego County and the southern portion of Orange County, served by San Diego Gas & Electric (SDG&E).

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 in the statewide forms accompanying this forecast report.[6] The baseline forecast results in this chapter are for the entire SCE transmission planning area.

This chapter is organized as follows. First, forecasted consumption and peak loads for the SCE planning area are discussed; both total and per capita values are presented. The *CED 2013 Final* values are compared to the adopted *CED 2011* mid scenario, with differences between the two forecasts explained. The forecasted load factors, jointly determined by the consumption and peak load estimates, are 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 2011,* and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the historical and forecasted impacts of conservation and efficiency programs. Fourth, forecasts of electricity consumption and peak demand are presented for each climate zone within the SCE planning area. Finally, the chapter presents AAEE scenarios developed for the SCE service territory and explores the impact of these scenarios on sales and peak demand forecasts.

6 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Los Angeles Area Economic and Demographic Outlook

This section provides general information on the economic and demographic outlook for the Los Angeles Area using outlooks provided by Moody's, IHS Global Insight, UCLA, the California Department of Finance, and the U.S. Census Bureau. These outlooks are based on economic data available in August 2013.

The pace of Los Angeles County's recovery slowed modestly in the second quarter of 2013. Strengthening consumer services were partially offset by weakness in manufacturing and local K-12 expenditures and payrolls. Orange County's recovery is improving on the strength of regional and national housing markets, technology, and professional and consumer services. Riverside and San Bernardino Counties' recovery showed signs of weakening midway through the year. Homebuilding has yet to fill the void left by the completion of large-scale solar plants, and medical manufacturing continues to downsize.

Los Angeles total payrolls increased, lifted by restaurants and health care, but layoffs in tech, manufacturing, filmmaking, and local government tempered the gains. The unemployment rate has stopped its descent, but employment stalled, and the labor force continued to grow. According to UCLA, since the recession, the Los Angeles increase in labor force has been self-employed workers. Orange County has the strongest payroll gains from semiconductor manufacturing and restaurant hiring, but improvements are visible in nearly all industries. Riverside and San Bernardino Counties have increased payrolls in transportation and warehousing. The unemployment rate has fallen to its lowest level since the fourth quarter of 2008, but mainly because of a decline in the labor force.

Housing market conditions in the Los Angeles region are improving throughout all counties. The median price for a single-family existing house is rising as the inventory of houses for sale dwindles. The improving outlook for construction extends to nonresidential building.

Los Angeles County's recovery will strengthen in 2014 because of housing, visitor-dependent industries, and increased spending on entertainment production and advertising. Spending and payroll cuts by cash-strapped local and federal governments remain a near-term risk. Steady job gains will push the unemployment rate below 9 percent by the mid-2014. Orange County's recovery will strengthen in 2014 and remain strong through 2015. Technology, tourism, and renewed housing-related industries will be significant drivers. Federal and local budget austerity in 2014 is a downside risk. Riverside and San Bernardino Count recovery will broaden in 2014, boosted by renewed housing and expanding transportation and warehousing. Local governments will trail improvements elsewhere and will be the metro area's lingering weakness.

In the long term, high business and housing costs and net domestic outmigration in Los Angeles will dampen job and output growth. Orange County's links to the global economy and a skilled workforce will support expansion and help attract investments. However, high business and housing costs will slow growth. Longer term, Riverside and San Bernardino Counties' available land and low costs will help drive growth.

Baseline Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections, and low efficiency impact assumptions. The low demand scenario includes low economic and demographic projections, high energy price projections, and high efficiency impact assumptions. Volume 1 provides more detail on construction of the demand scenarios.

Table 8 compares *CED 2013 Final* high, mid, and low demand scenarios with the *CED 2011* mid demand scenario for electricity consumption and peak demand for selected years. Comprehensive results are available electronically as a set of forms posted alongside this report.[7]

In the SCE planning area, the *CED 2013 Final* mid demand electricity consumption is 1.2 percent lower than *CED 2011* in 2020, the result of a lower-than-projected level of consumption in 2012 and a lower growth rate over the forecast period. By 2024, the *CED 2013 Final* high demand level is 5.4 percent higher than the mid case, while the low demand scenario is 4.6 percent lower. For peak demand, the *CED 2013 Final* high and low scenarios are 5.7 percent higher and 5.9 percent lower, respectively, than the mid case by 2024. Weather-normalized peak demand in 2012 was 3.5 percent lower than predicted in *CED 2011*.

Peak demand estimates for SCE reflect changes made since CED 2013 Final was submitted for adoption by the Energy Commission on December 11, 2013. These changes are described further in Volume 1, Chapter 1 of this report.

7 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 8: SCE Planning Area Baseline Forecast Comparison

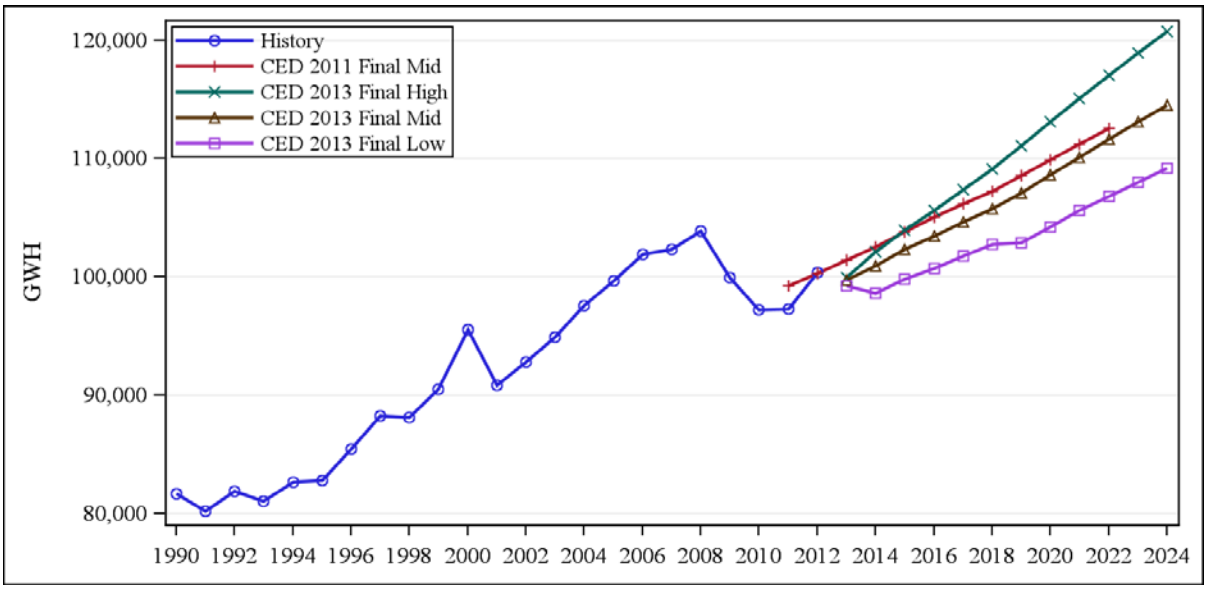
Consumption (GWH)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	81,671	81,671	81,671	81,671
2000	96,811	95,515	95,515	95,515
2012	100,292	100,365	100,365	100,365
2015	103,791	103,936	102,317	99,786
2020	109,888	113,127	108,600	104,247
2024	--	120,745	114,503	109,206
Average Annual Growth Rates				
1990 - 2000	1.72%	1.58%	1.58%	1.58%
2000 - 2012	0.29%	0.41%	0.41%	0.41%
2012 - 2015	1.15%	1.17%	0.64%	-0.19%
2012 - 2020	1.15%	1.51%	0.99%	0.48%
2012 - 2024	--	1.55%	1.10%	0.71%
Peak (MW)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	17,647	17,647	17,647	17,647
2000	19,506	19,506	19,506	19,506
2012	-	22,038	22,038	22,038
2012*	22,340	21,549	21,549	21,549
2015	23,484	23,604	23,306	22,515
2020	25,054	25,871	24,875	23,649
2024	--	27,513	26,028	24,482
Average Annual Growth Rates				
1990 - 2000	1.01%	1.01%	1.01%	1.01%
2000 - 2012	1.14%	0.83%	0.83%	0.83%
2012* - 2015	1.68%	3.08%	2.65%	1.47%
2012* - 2020	1.44%	2.31%	1.81%	1.17%
2012* - 2024	--	2.06%	1.59%	1.07%
Historical values are shaded				
*Weather normalized: *CED 2013 Final* uses a weather-normalized peak value derived from the actual 2012 peak for calculating growth rates during the forecast period				

Source: California Energy Commission, Demand Analysis Office, 2013.

As shown in **Figure 28**, *CED 2013 Final* electricity consumption forecasts are lower at the beginning of the forecast period than projected by *CED 2011*. Consumption dips slightly from 2012 to 2013, due to a combination of slow economic growth, an increase in average electricity rates, and the assumption of normal weather (2012 was a particularly warm year). Growth in the mid case is less than *CED 2011*, due to rate increases and the addition of building and appliance standards.

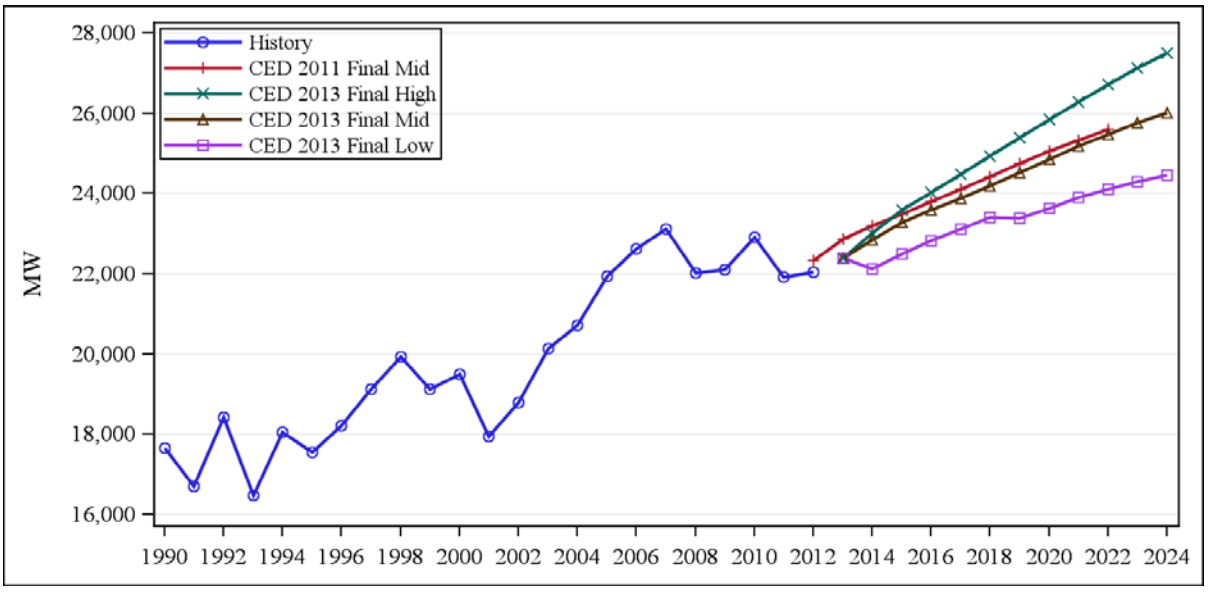
The SCE planning area experienced warmer-than-usual temperatures in 2012, so actual peak load was higher than weather-normalized peak. The relationship between peak demand scenarios, shown in **Figure 29**, follows a similar pattern as the consumption forecast. As with consumption, the peak demand forecast begins at a lower value than projected in *CED 2011*, and all three scenarios remain below *CED 2011* values for most of the forecast period. Peak growth is slightly higher than consumption due in part to efficiency considerations—such as increasing lighting efficiency—that have a greater impact on consumption than on peak.

Figure 28: SCE Planning Area Baseline Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 29: SCE Planning Area Baseline Peak

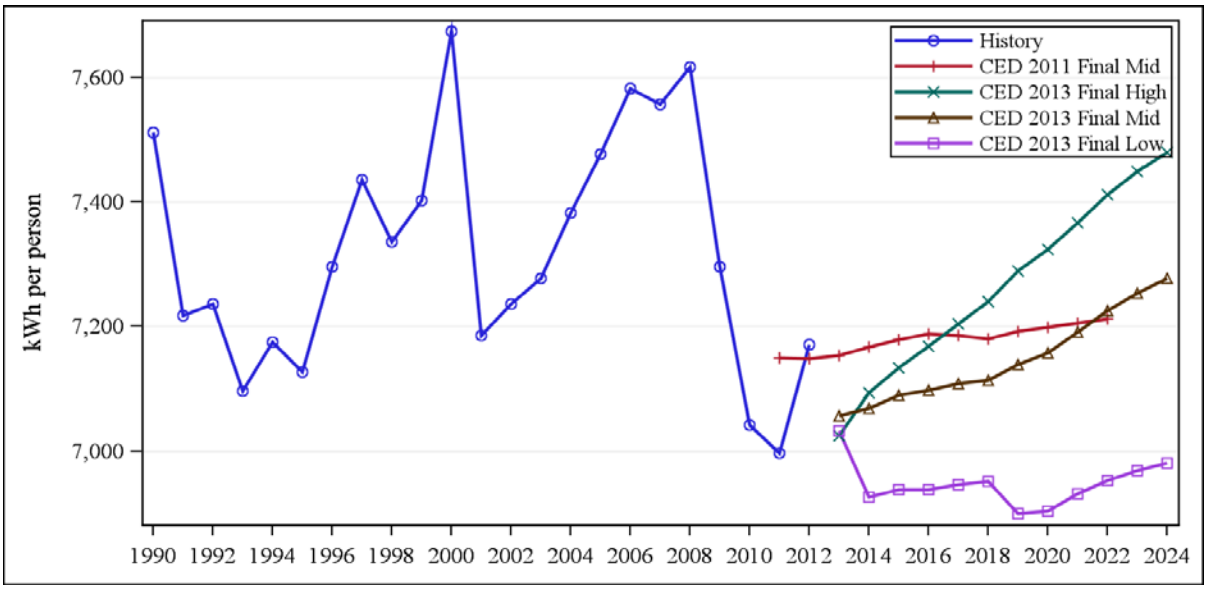


Source: California Energy Commission, Demand Analysis Office, 2013.

SCE's projected peaks reflect staff estimates of future non-event-based demand response committed program impacts incremental to 2012 impacts, including real-time or time-of-use pricing and permanent load shifting. Some event-based programs, such as time-of-use and peak-time-rebate programs, are also included in *CED 2013 Final*. See Volume 1 for more details.

As **Figure 30** shows, per capita electricity consumption is lower in the *CED 2013 Final* demand scenarios throughout most of the forecast period compared to *CED 2011*. The drop in 2013 shows the combined effect of decreased consumption and increased population. Unlike *CED 2011*, which considered only a single population scenario, *CED 2013 Final* incorporates high, mid, and low population projections. While the high and mid consumption forecasts are nearly identical in 2013, there is some spread between population estimates for that year. As a result, the high per capita consumption scenario shown below actually begins from a lower point than the mid scenario.

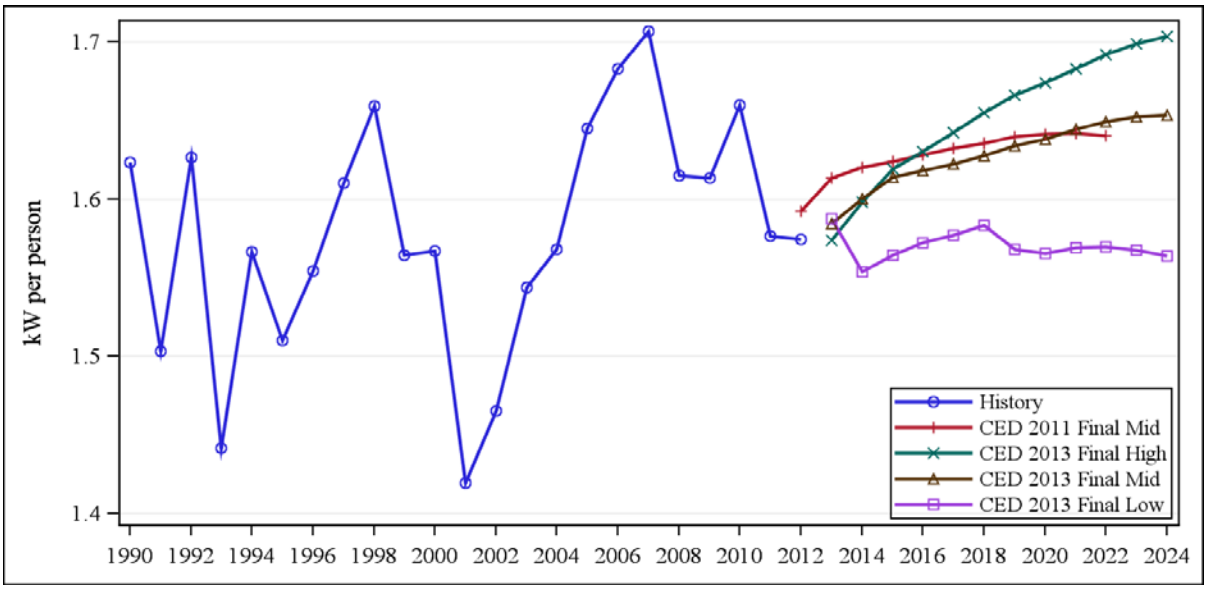
Figure 30: SCE Planning Area Baseline per Capita Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 31 shows per capita peak demand. *CED 2013 Final* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. The per capita peak values are projected to remain in the range of recent historical levels for all three scenarios.

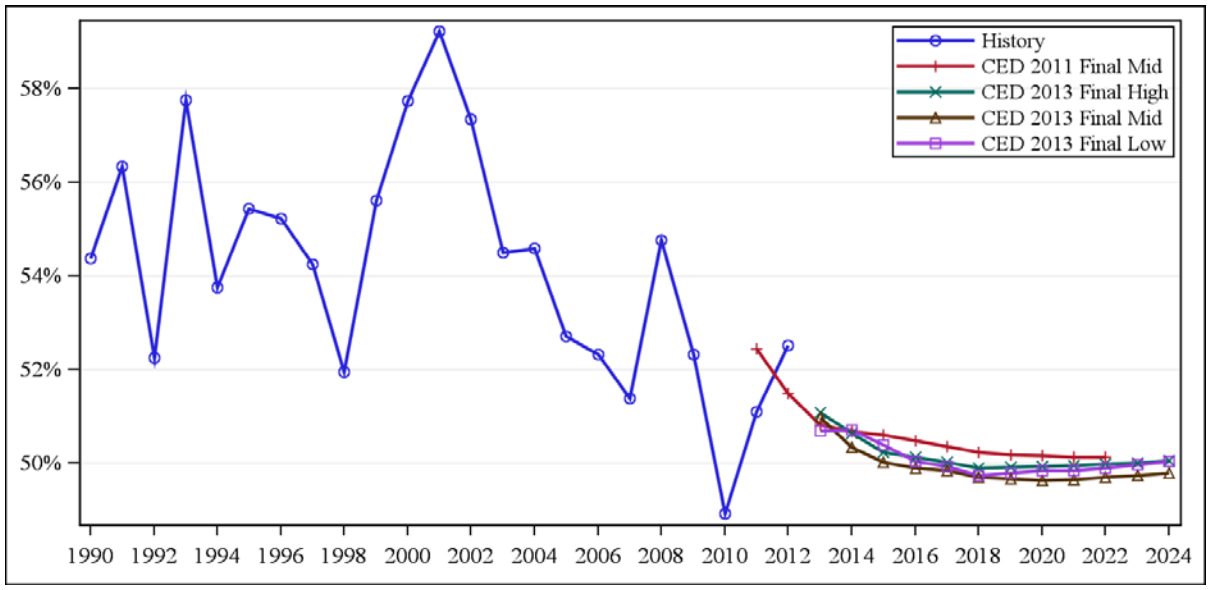
Figure 31: SCE Planning Area Baseline per Capita Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 32 compares forecasted load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate "a needle peak"; higher load factors indicate a more stable load. Greater population and economic growth in the SCE planning area has been taking place in hotter inland areas, leading to a higher saturation and use of central air conditioning. *CED 2013 Final* projects load factors to decline slightly in the initial years of the forecast as additional efficiency measures reduce consumption with little impact on peak. This trend tapers off in the latter half of the forecast period as electric vehicle use increases consumption with little impact on peak.

Figure 32: SCE Planning Area Load Factors



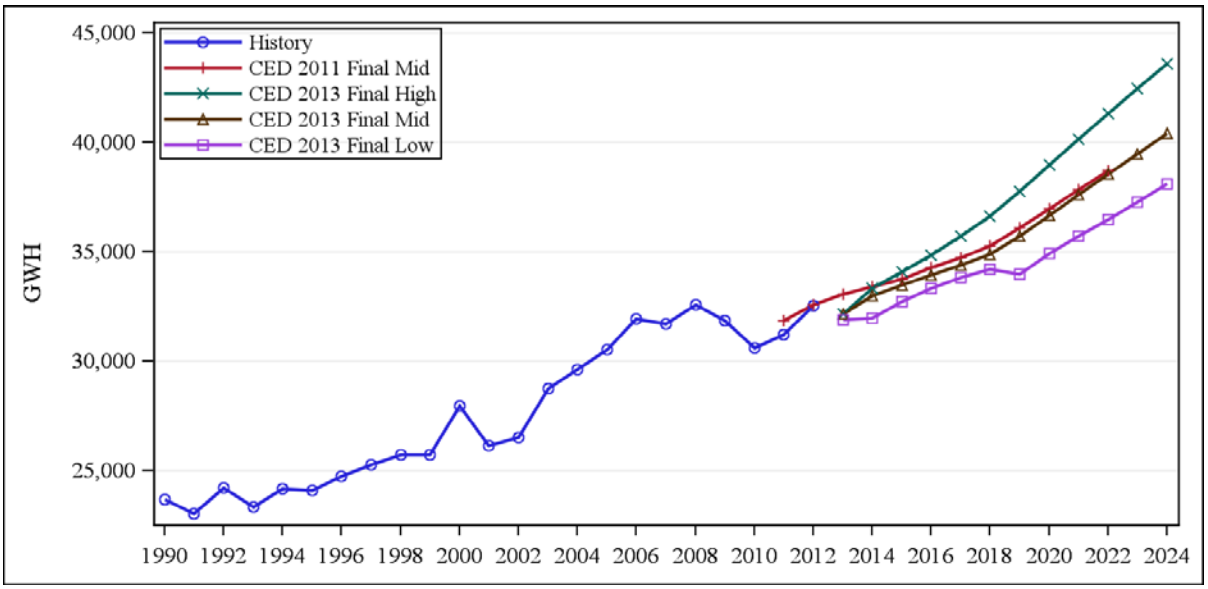
Source: California Energy Commission, Demand Analysis Office, 2013.

Sector Level Baseline Results and Input Assumptions

Residential Sector

Figure 33 compares *CED 2013 Final* and *CED 2011* SCE planning area residential forecasts. The mid demand scenario consumption after 2014 is roughly equal to *CED 2011*. Low and high demand scenarios bound the mid case reflecting differences in underlying economic and demographic assumptions.

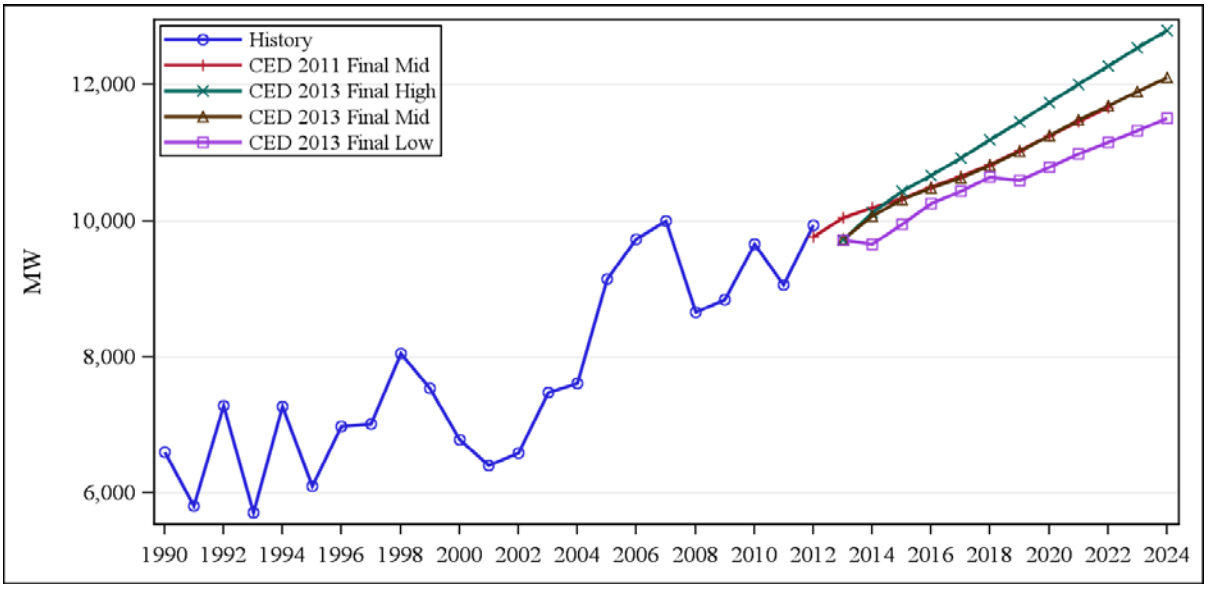
Figure 33: SCE Planning Area Baseline Residential Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 34 compares *CED 2013 Final* and *CED 2011* residential peak demand forecasts. The differences between peak forecasts follow a similar pattern to differences in the consumption forecasts since the peak forecasts are driven primarily by electricity consumption with lower peak demand resulting from consistently lower consumption in the low and mid scenarios.

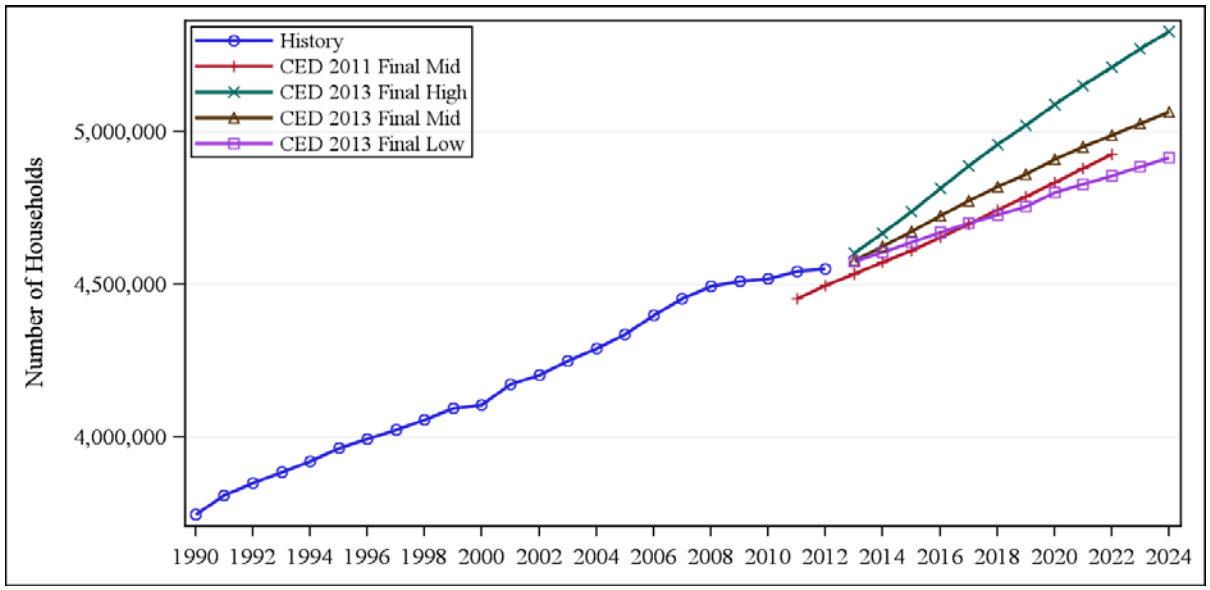
Figure 34: SCE Planning Area Baseline Residential Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 35, **Figure 36**, and **Figure 37** compare the residential drivers used in *CED 2013 Final* with those used in *CED 2011*. **Figure 37** compares total household projections. All *CED 2013 Final* scenarios begin higher than the previous forecast due primarily to a change in the household projection method. The *CED 2013 Final* forecast includes the most recent updated county population and housing estimates from the California Department of Finance, as well as recent population projections from California Department of Finance, IHS Global Insight, and Moody's.

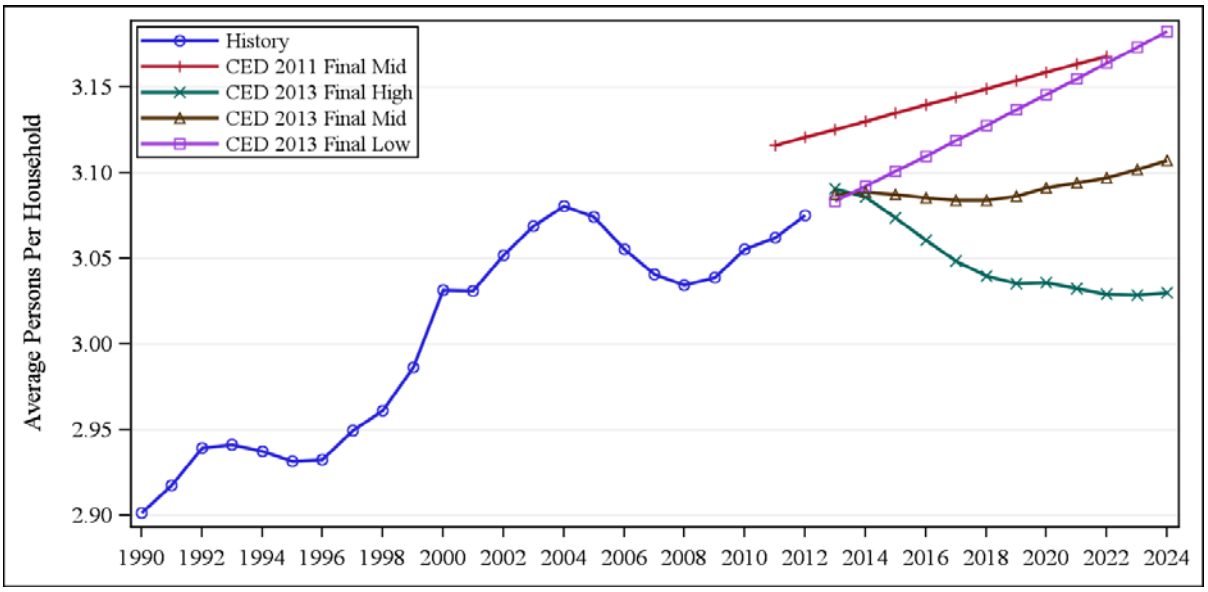
Figure 35: SCE Planning Area Baseline Residential Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

The household scenarios are based on persons-per-household estimates (shown in **Figure 36**) and total population. The high demand scenario uses a lower persons-per-household projection (based on a Moody's scenario), which leads to a greater number of households. The low demand scenario uses a higher persons-per-household projection (based on a simple trend analysis), leading to fewer households. The mid demand scenario assumes growth in persons-per-household similar to the projection used in the *CED 2011* forecast.

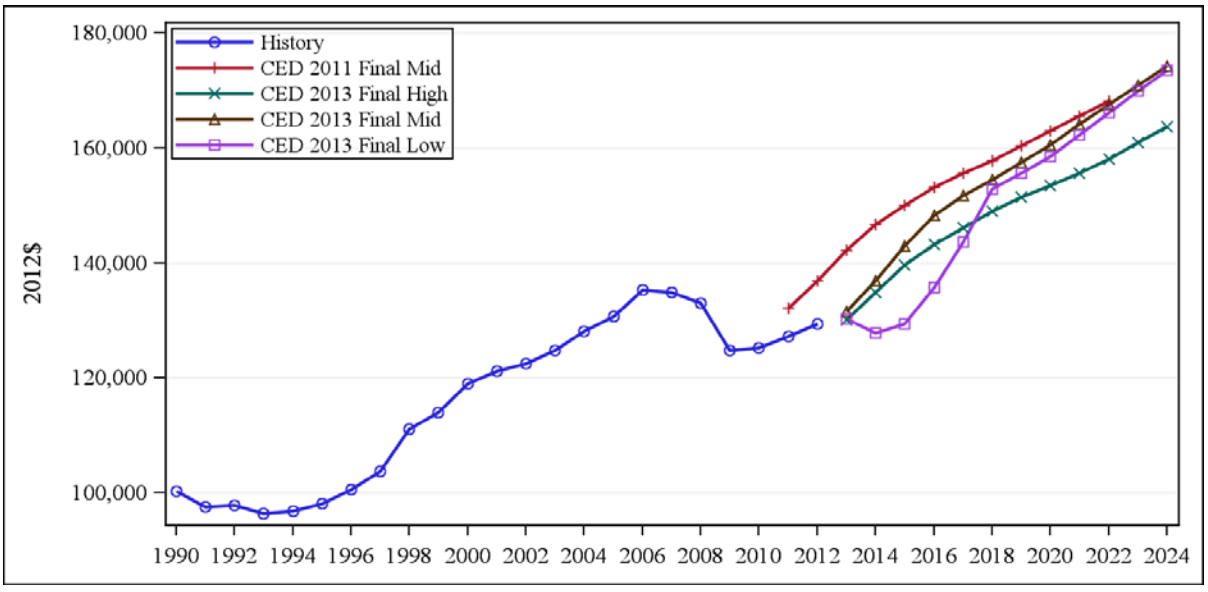
Figure 36: SCE Planning Area Persons per Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 37 compares average household income (per capita income multiplied by persons per household) between the two forecasts. *CED 2013 Final* estimates of household income growth are lower than *CED 2011*. This is caused by lower persons-per-household values. The difference between scenarios is a function of the variation in per capita income and persons per household used to define the scenarios. In the case of the low demand scenario, the per capita income assumptions are significantly different than the mid and high scenarios.

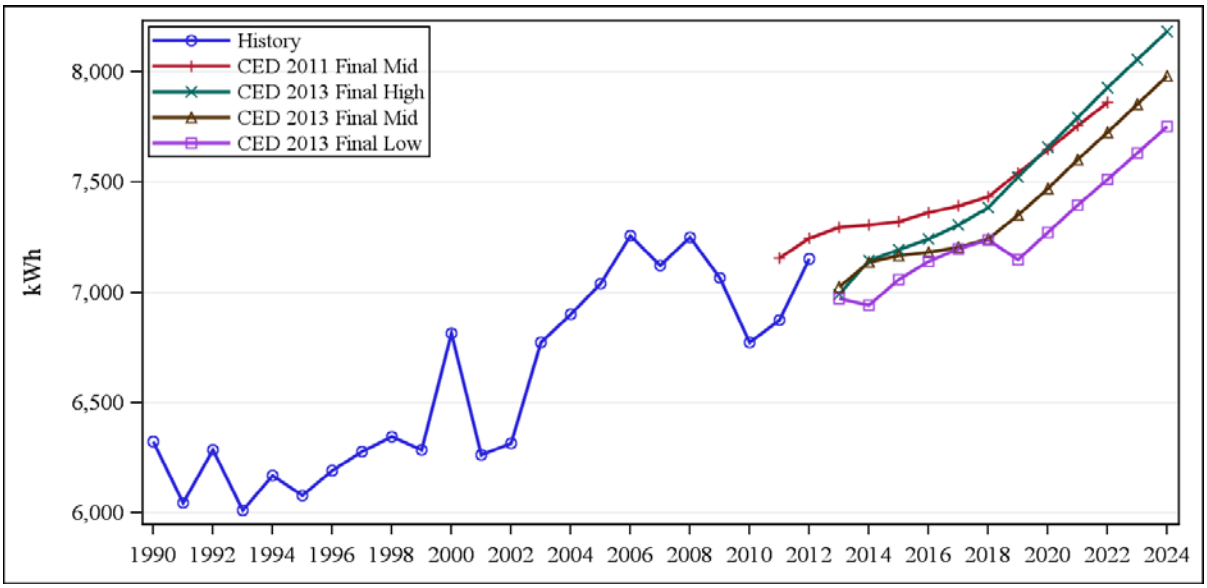
Figure 37: SCE Planning Area Average Household Income Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 38 shows annual electricity consumption per household. *CED 2013 Final* consumption per household in all demand scenarios is lower than *CED 2011*. This is caused by differences in the underlying economic and demographic assumptions, including changes in the housing projection method. The low demand scenario has a significant drop in 2019, caused by the underlying low scenario economic and demographic assumptions. Most of the growth in use per household after 2015 is caused by increasing numbers of electric vehicles in the residential sector. Without the inclusion of electric vehicle charging, residential use would not grow as rapidly over the forecast period after the economic recovery.

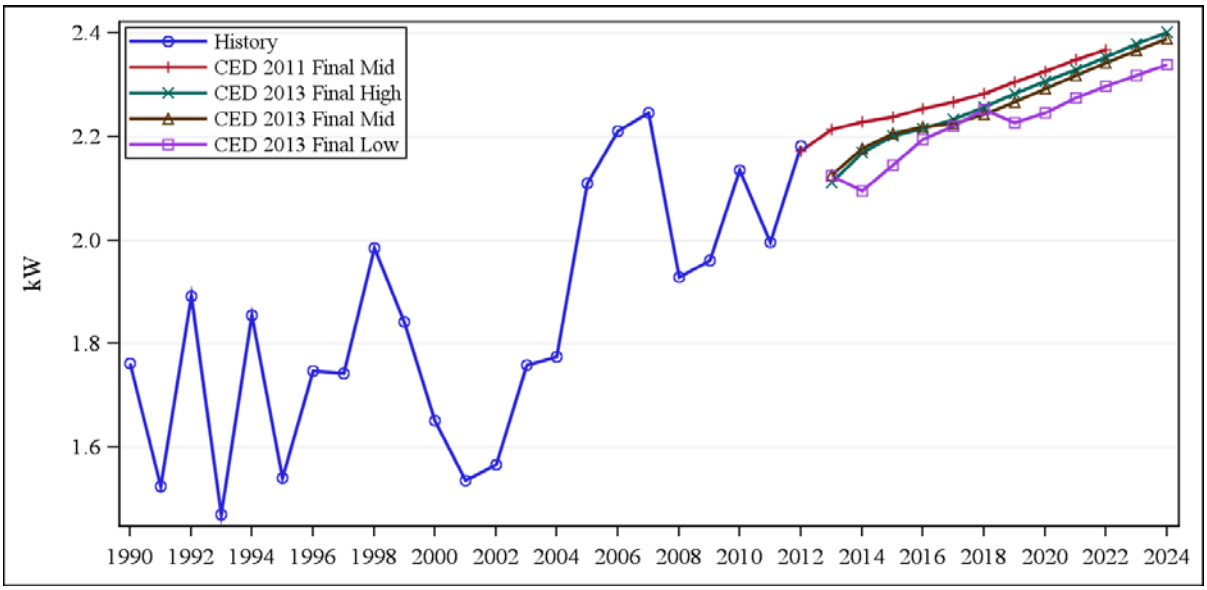
Figure 38: SCE Planning Area Baseline Consumption per Household



Source: California Energy Commission, Demand Analysis Office, 2013.

CED 2013 Final peak use per household, presented in **Figure 39**, is also lower in all demand cases than projected in *CED 2011*. This is in part driven by the short-term difference in energy forecasts and the housing projection method changes. The general growth trend over the forecast is similar to *CED 2011* in the mid and high demand scenarios.

Figure 39: SCE Planning Area Baseline Peak Use per Household

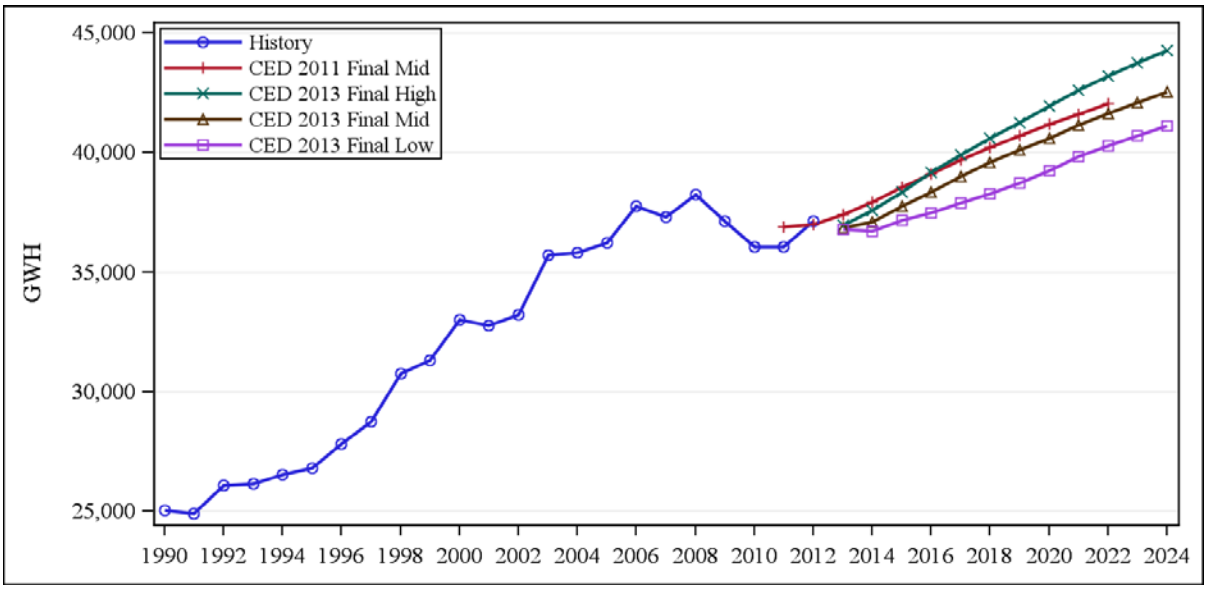


Source: California Energy Commission, Demand Analysis Office, 2013.

Commercial Sector

Figure 40 compares the SCE commercial sector electricity consumption forecasts. The *CED 2013 Final* mid and low consumption scenarios are lower than *CED 2011* throughout the forecast period. The differences are caused primarily by a lower starting point due to lower estimates of recent historical commercial consumption. The growth rate of the *CED 2013 Final* high case is slightly higher than in *CED 2011* because of faster growth in projected floor space in the longer term. The growth rate of the mid and low scenarios is similar to the *CED 2011* forecast.

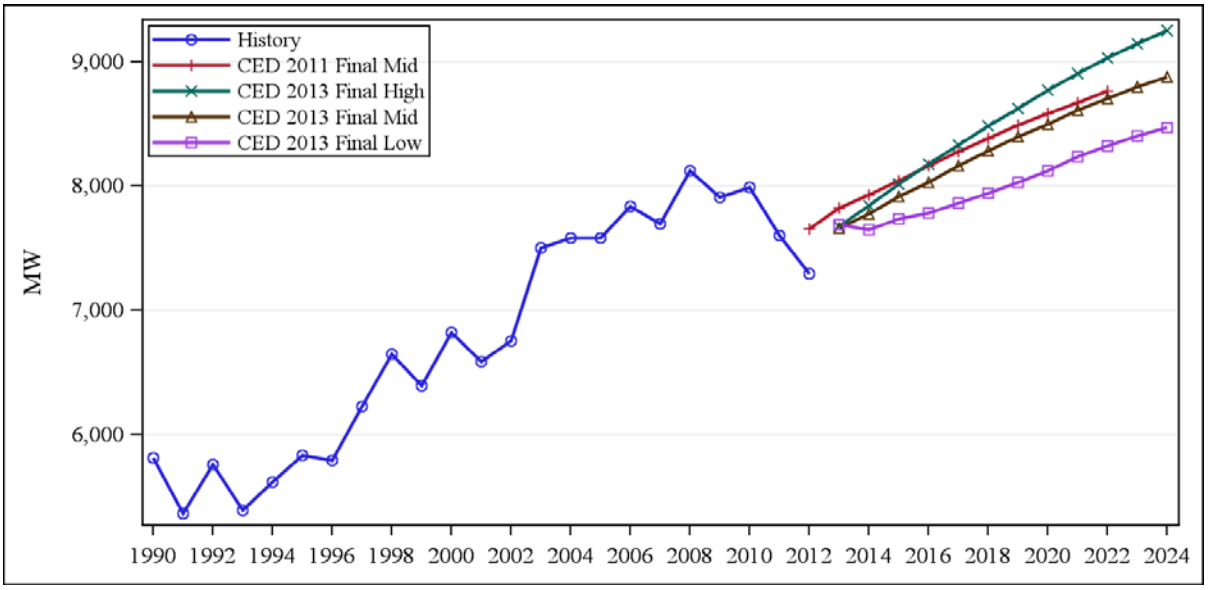
Figure 40: SCE Planning Area Baseline Commercial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 41 compares the SCE commercial sector peak demand forecasts. Growth in both forecasts is driven by the underlying electricity consumption forecast, which exhibits a similar pattern. The *CED 2013 Final* low demand scenario is lower throughout the forecast period due to lower floor space projections.

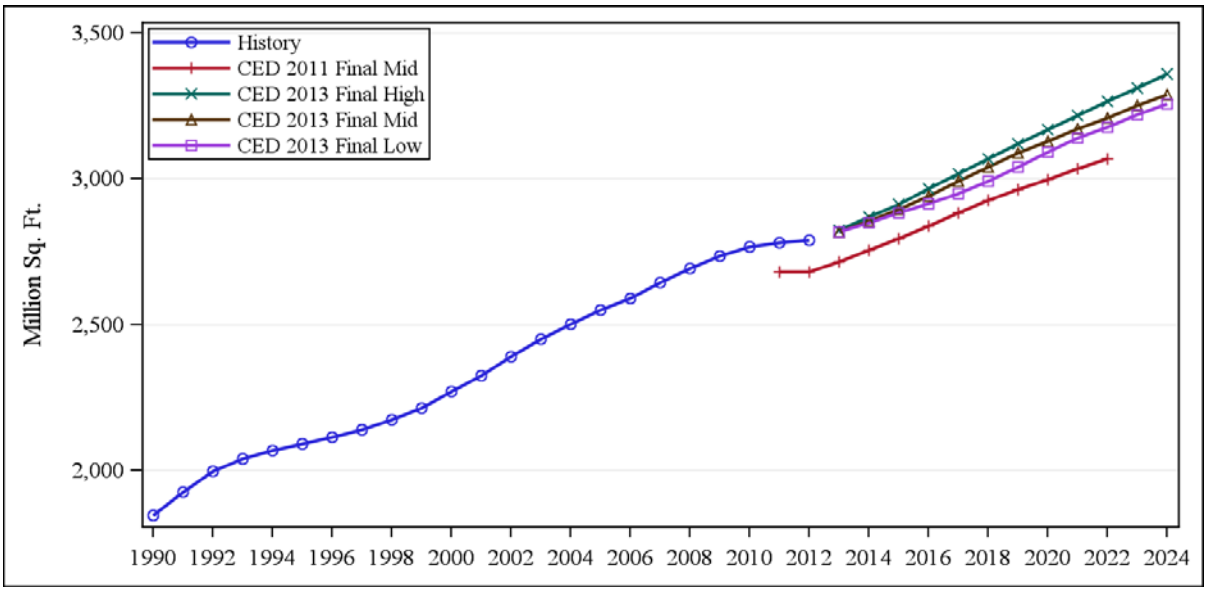
Figure 41: SCE Planning Area Baseline Commercial Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

In staff's commercial building sector forecasting model, floor space by building type (such as retail, offices, and schools) is the key driver. **Figure 42** compares SCE commercial floor space projections. *CED 2013 Final* floor space projections are higher over the forecast period than those used in the previous forecast due to a higher starting point. However, the growth rate in the high case *CED 2013 Final* scenario is slightly higher than in *CED 2011*.

Figure 42: SCE Planning Area Commercial Floor Space

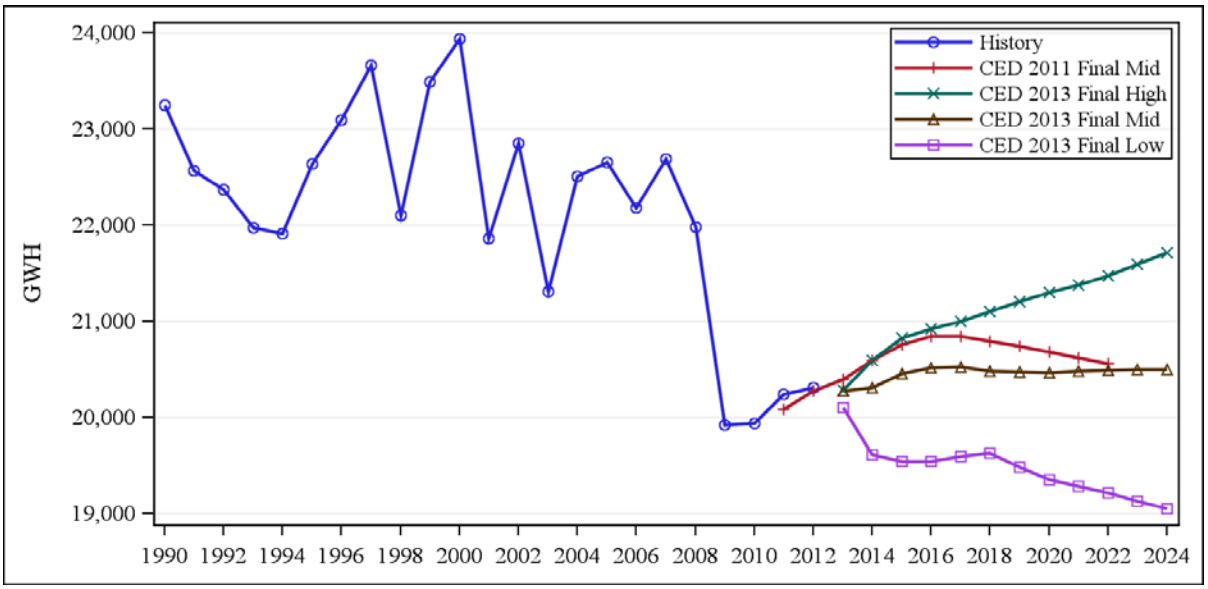


Source: California Energy Commission, Demand Analysis Office, 2013.

Industrial Sector

Figure 43 compares the SCE planning area industrial sector electricity consumption forecasts. *CED 2013 Final* industrial consumption scenario forecasts are all lower than the *CED 2011* forecast in the short term. However, projected growth in the high demand case is higher in the longer term than was projected in the *CED 2011* forecast due to more optimistic economic projections and impact of climate change.

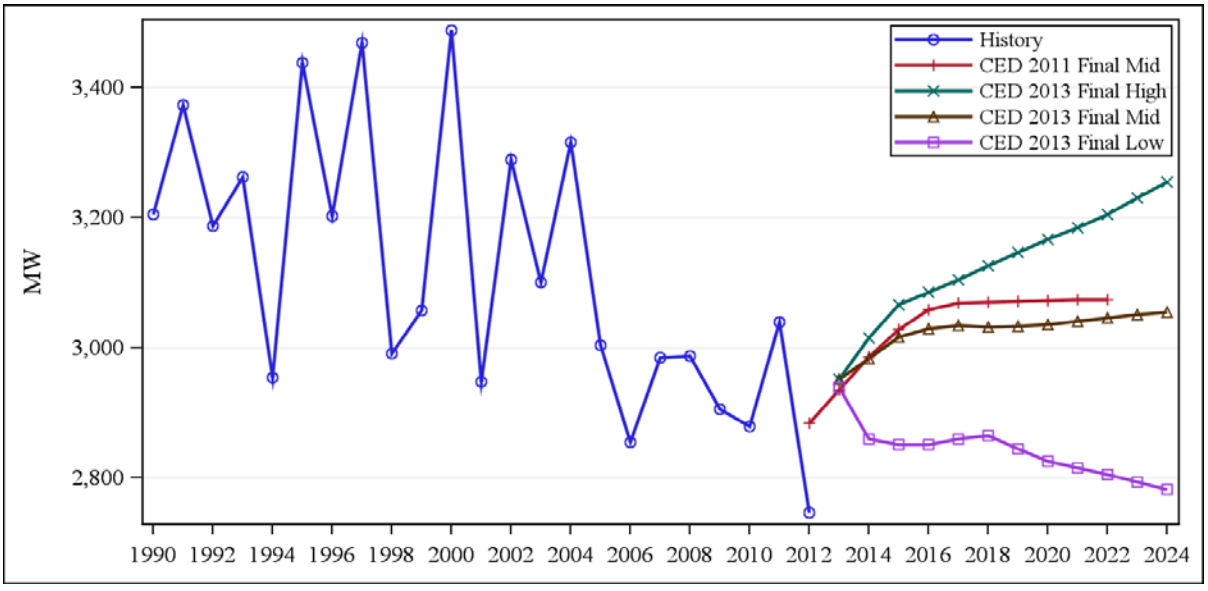
Figure 43: SCE Planning Area Baseline Industrial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 44 compares the SCE industrial sector peak forecasts. The *CED 2013 Final* industrial peak forecasts follow the same pattern as the consumption forecasts.

Figure 44: SCE Planning Area Baseline Industrial Sector Peak

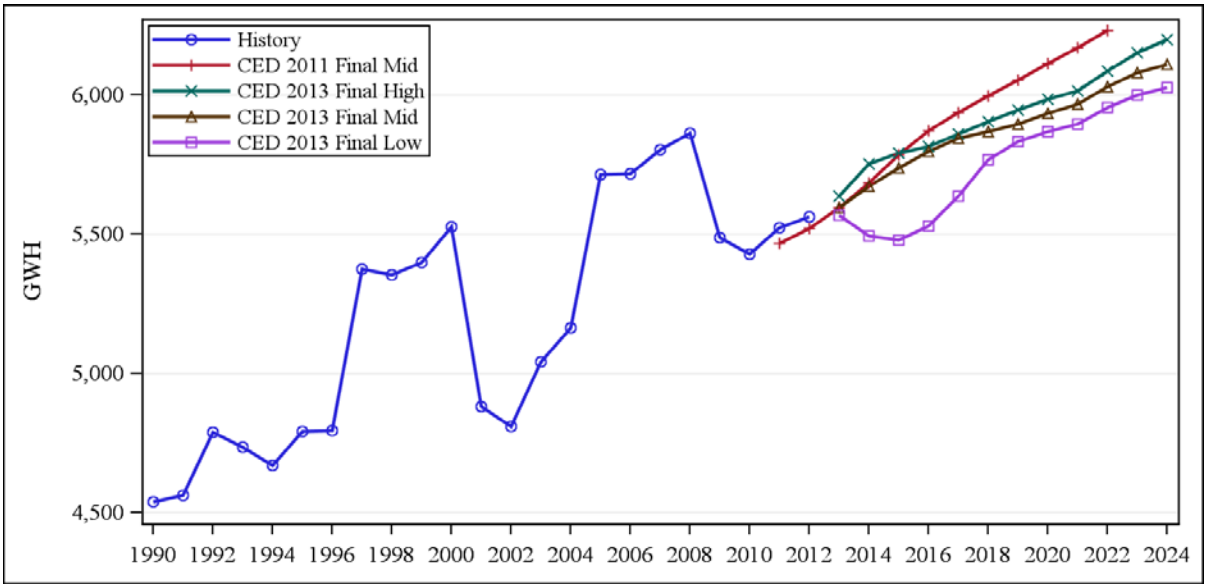


Source: California Energy Commission, Demand Analysis Office, 2013.

Other Sectors

Figure 45 compares the electricity consumption forecasts for the TCU sector, which includes street lighting. Although both forecasts are nearly identical in 2013, by 2015 all three *CED 2013 Final* scenarios are lower than *CED 2011* and continue to grow at a slower pace over the forecast period. In the recession scenario modeled in the low case, electricity consumption bottoms out in 2015 and is subsequently followed by a strong recovery though 2018, where growth resumes at a rate similar to that of the mid case.

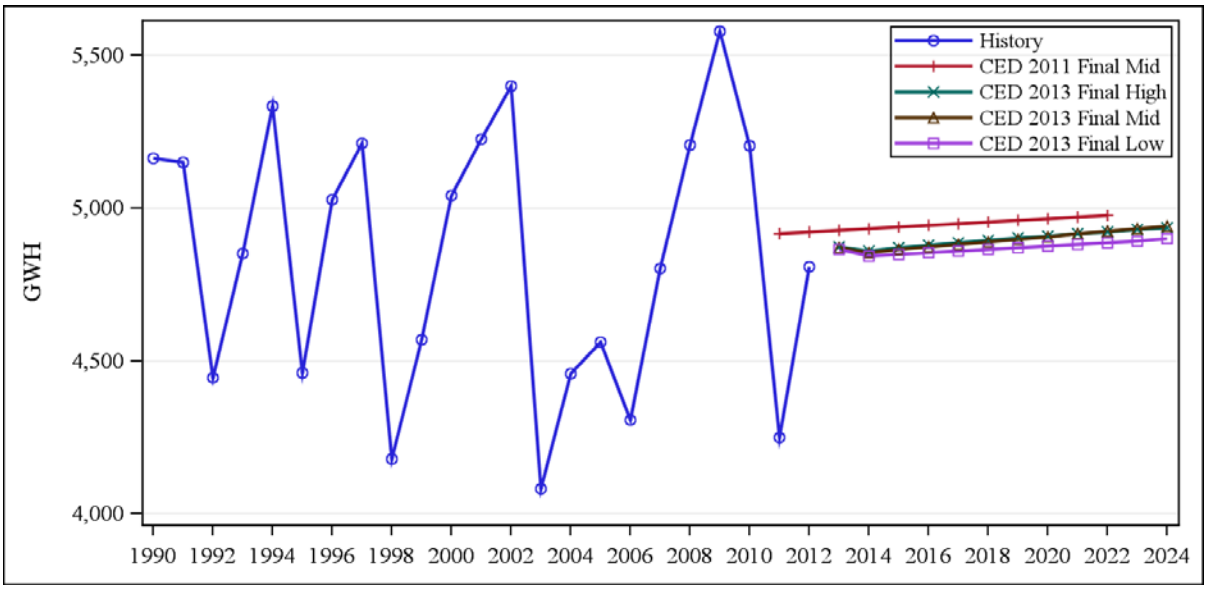
Figure 45: SCE Planning Area Baseline Transportation, Communication, Utilities, and Street Lighting Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 46 compares the electricity consumption forecasts for the agriculture and water pumping sectors. All three *CED 2013 Final* scenarios start slightly lower than *CED 2011* and have similar growth rates over the forecast period. All three demand scenarios are projected to slightly grow over time because of a small projected increase in groundwater pumping.

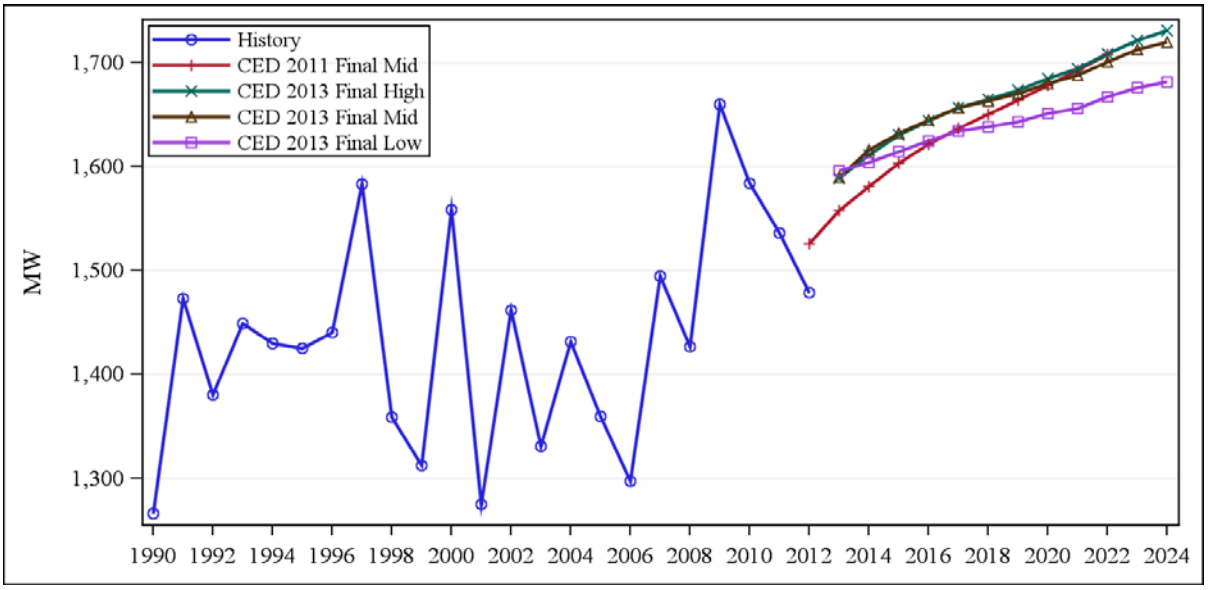
Figure 46: SCE Planning Area Baseline Agriculture and Water Pumping Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 47 compares projected combined peak for the TCU, street lighting, agriculture, and water pumping sectors. Although both forecasts are nearly 1,560 MW in 2013, the *CED 2013 Final* mid case grows at a slower rate compared to *CED 2011* so that by 2022 *CED 2013 Final* mid case is 37 MW lower than *CED 2011*.

Figure 47: SCE Planning Area Baseline Other Sector Peak

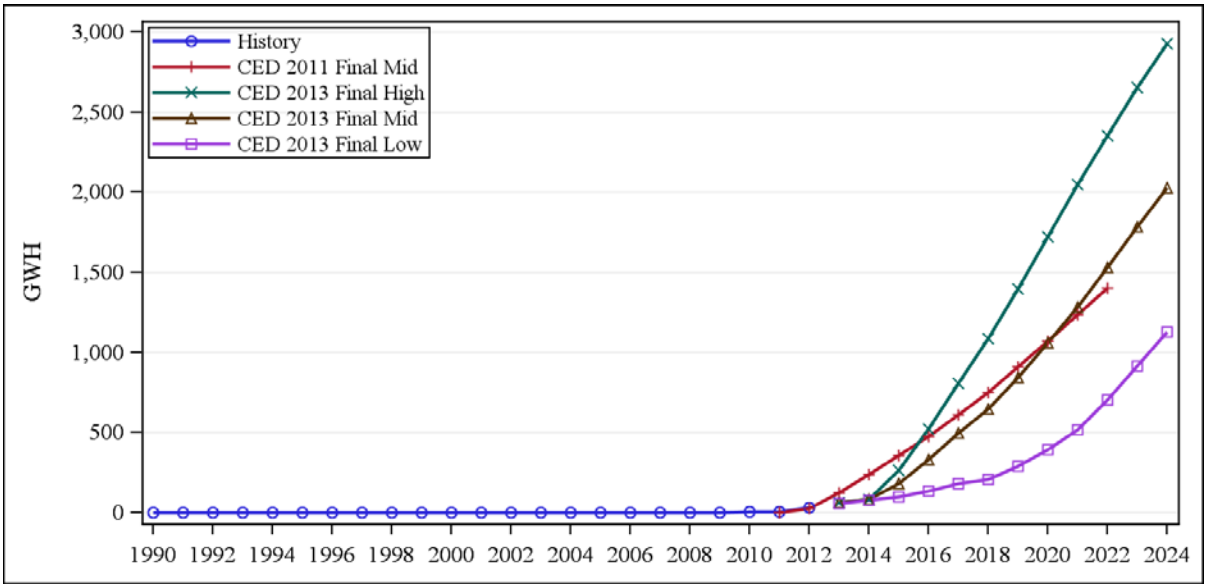


Source: California Energy Commission, Demand Analysis Office, 2013.

Electric Vehicles

Consumption by EVs in the SCE planning area is projected to reach more than 1,100 GWh in the low demand scenario and nearly 2,800 GWh in the high demand scenario. Staff assumes most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 48** presents the SCE planning area EV consumption forecast for each of the demand scenarios.

Figure 48: SCE Electricity Consumption by Electric Vehicles



Source: California Energy Commission, Demand Analysis Office, 2013.

Self-Generation

The peak demand forecast is reduced by the projected impacts of distributed PV, solar thermal, and CHP systems, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on a combination installation trend analysis and predictive modeling. **Table 9** shows the forecast of peak impacts from PV and non-PV self-generation. Staff projects between 638 and 850 MW of peak reduction from PV systems by 2024. Peak reductions are based on installed PV system capacities ranging from 1,374 MW by 2024 in the high demand case to 1,807 MW by 2024 in the low demand case.

Table 9: SCE Planning Area Self-Generation Peak Impacts (MW)

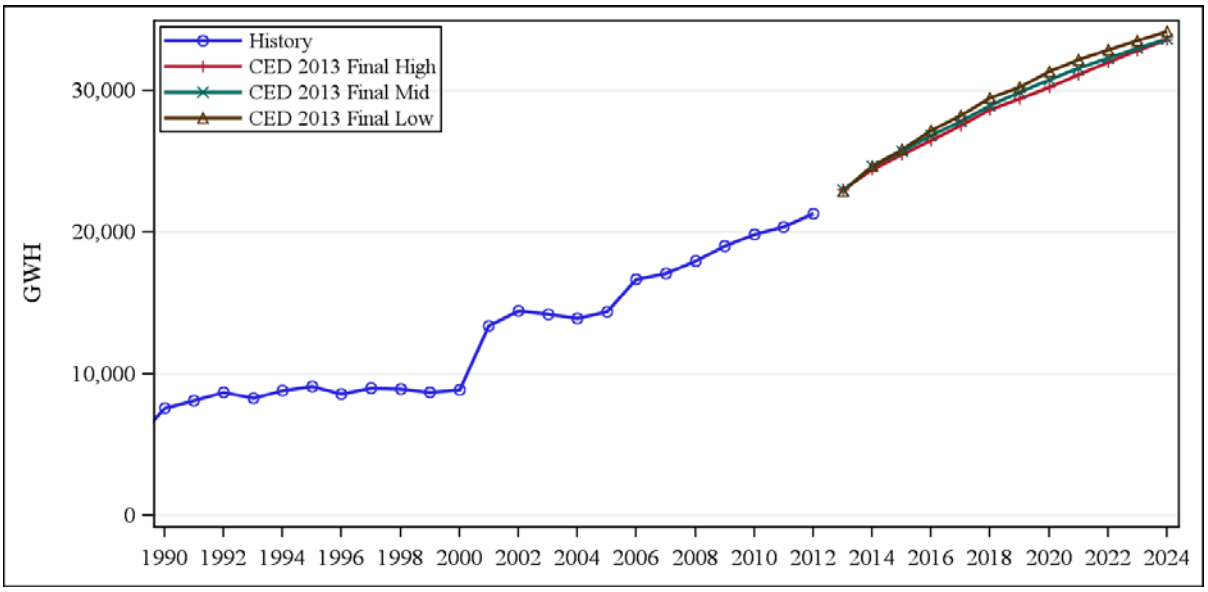
Scenario	Technology	1990	2000	2012	2015	2020	2024
Low Demand	Photovoltaic	0.0	0.3	227.9	446.3	595.0	851.3
	Non-Photovoltaic	489.7	517.3	701.2	750.0	783.6	802.8
	Total	**489.7**	**517.6**	**929.1**	**1196.3**	**1378.6**	**1654.1**
Mid Demand	Photovoltaic	0.0	0.3	227.9	434.3	539.0	731.7
	Non-Photovoltaic	489.7	517.3	701.2	749.3	781.9	800.5
	Total	**489.7**	**517.6**	**929.1**	**1183.6**	**1320.9**	**1532.2**
High Demand	Photovoltaic	0.0	0.3	227.9	431.3	513.6	637.7
	Non-Photovoltaic	489.7	517.3	701.2	747.9	777.5	796.7
	Total	**489.7**	**517.6**	**929.1**	**1179.2**	**1291.1**	**1434.4**

Source: California Energy Commission, Demand Analysis Office, 2013.

Conservation/Efficiency Impacts

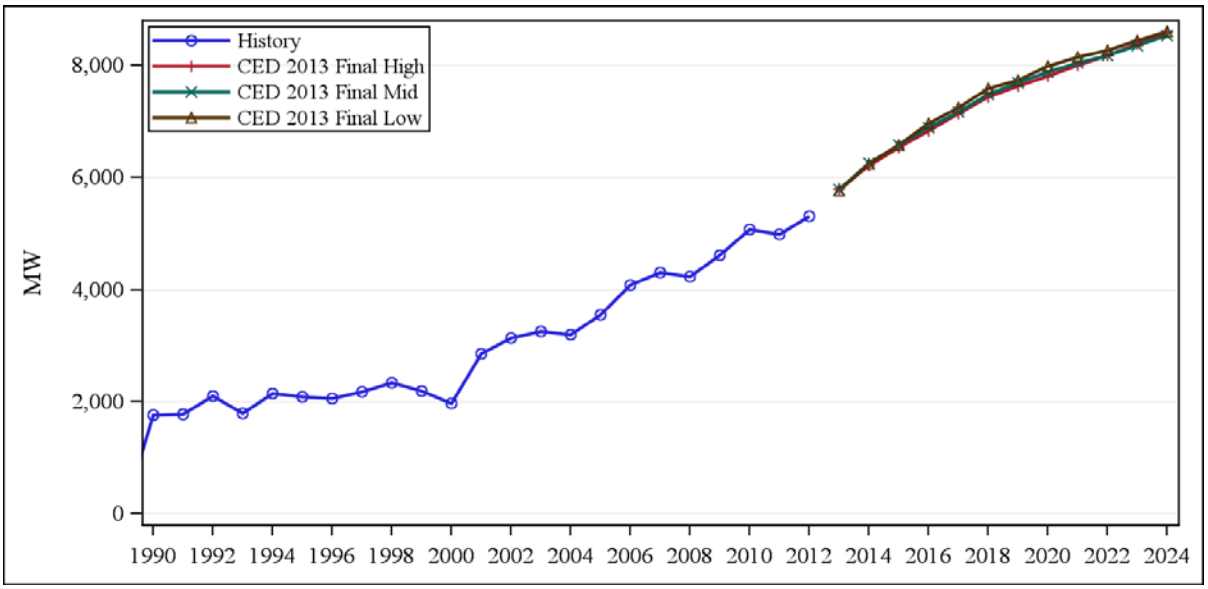
Figure 49 and **Figure 50** show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented through 2014; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Within the demand scenarios, higher demand yields more standards savings since new construction and appliance usage increase, while lower demand is associated with more program savings and higher rates (and therefore more price effects). The net result is that savings totals among the scenarios are very similar.

Figure 49: SCE Planning Area Baseline Electricity Consumption Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 50: SCE Planning Area Baseline Electricity Peak Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Table 10 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5 – 2.0 percent due to higher home and commercial floor space construction and 1.5 – 2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings, just as they were in *CED 2011*. For *CED 2013 Final*, new standards savings impacts were included for the 2013 Title 24 standards update and impacts from standards affecting battery chargers. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1, Chapter 3 provides more detail on staff work related to energy efficiency and conservation.

Table 10: SCE Planning Area Baseline Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	983	1,017	2,000	536	364	900	2,900
2000	1,500	2,698	4,197	1,462	1,050	2,513	6,710
2012	2,621	6,677	9,298	3,002	1,941	4,943	14,241
2015	2,959	8,584	11,544	3,485	2,321	5,806	17,350
2020	3,632	10,548	14,180	4,706	3,249	7,955	22,135
2024	4,097	11,389	15,486	5,611	3,746	9,357	24,843
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	269	279	548	126	86	212	759
2000	348	627	975	300	215	515	1,490
2012	792	2,018	2,810	623	403	1,026	3,836
2015	920	2,667	3,587	731	487	1,218	4,804
2020	1,126	3,269	4,395	987	681	1,668	6,062
2024	1,245	3,461	4,706	1,177	786	1,962	6,668

Source: California Energy Commission, Demand Analysis Office, 2013.

Port Electrification

Potentially significant increases in electricity use in California are expected to occur through port electrification. **Table 11** shows, for select years, the portion of these impacts that are anticipated in the SCE planning area. For more details, see Volume 1, Chapter 1.

Table 11: SCE Planning Area Port Electrification

Year	Additional Consumption (GWh)		
	High	Mid	Low
2015	45.61	44.97	44.34
2020	76.29	68.29	60.30
2024	91.81	76.05	60.30

Source: California Energy Commission, Demand Analysis Office, 2013.

Climate Zone Forecasts

For *CED 2013 Final*, staff developed electricity consumption and peak demand forecasts for individual climate zones (see Volume 1, Chapter 1 for more details). The SCE planning area has four climate zones, each with a designated weather station, as shown in **Table 12**.

Table 12: SCE Planning Area Climate Zones

Climate Zone Number	Weather Station	Description
7	Fresno	Southern San Joaquin Valley
8	Long Beach	Long Beach, Orange County, Ventura County
9	Burbank	Inland Los Angeles Basin
10	Riverside	Riverside, San Bernardino Counties

Source: California Energy Commission, Demand Analysis Office, 2013.

Table 13 shows the forecast results for electricity consumption and peak demand by climate zone for each demand scenario. To better show forecast trends and to avoid mischaracterizing average annual growth because of 2012-specific weather impacts, growth rates are provided relative to 2013. Full climate zone results are shown in the forms posted alongside this report.[8]

The fastest growth in both consumption and peak demand over the forecast period is projected to be inland in Climate Zones 7 and 10. These results reflect expected resumption of migration from coastal to inland areas, migration that decreased during the recent recession. For example, growth in population from 2013 – 2024 in the mid demand case is projected to be 28 and 19 percent, respectively, for Climate Zones 7 and 10, compared to 5 and 9 percent for Climate Zones 8 and 9. Potential climate change impacts contribute to faster peak demand growth in Climate Zone 7 in the mid demand scenario; projected increases in annual maximum temperature are highest in this climate zone.

8 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 13: SCE Planning Area Climate Zone Forecast Results

		Consumption by Climate Zone (GWh)				Peak Demand by Climate Zone (MW)			
		7	8	9	10	7	8	9	10
High Demand Case	2013	6,394	38,707	28,256	26,627	740	8,550	5,558	7,551
	2015	6,656	40,002	29,499	27,849	795	8,957	5,862	7,990
	2020	7,360	42,680	32,253	30,934	893	9,683	6,423	8,871
	2024	8,073	44,940	34,378	33,529	966	10,238	6,804	9,505
	Avg. Growth 2013-2020	2.03%	1.41%	1.91%	2.16%	2.71%	1.79%	2.08%	2.32%
	Avg. Growth 2013-2024	2.14%	1.37%	1.80%	2.12%	2.46%	1.65%	1.85%	2.11%
Mid Demand Case	2013	8,386	40,629	28,199	26,579	740	8,550	5,558	7,551
	2015	8,593	41,361	29,003	27,433	790	8,839	5,778	7,899
	2020	9,162	42,944	30,897	29,706	885	9,251	6,164	8,574
	2024	9,777	44,573	32,514	31,824	957	9,581	6,419	9,071
	Avg. Growth 2013-2020	1.27%	0.79%	1.31%	1.60%	2.59%	1.12%	1.48%	1.82%
	Avg. Growth 2013-2024	1.40%	0.85%	1.30%	1.65%	2.36%	1.04%	1.31%	1.68%
Low Demand Case	2013	6,347	38,428	28,050	26,428	740	8,550	5,558	7,551
	2015	6,472	38,428	28,249	26,742	767	8,559	5,574	7,615
	2020	7,077	39,521	29,619	28,525	866	8,746	5,859	8,178
	2024	7,740	40,963	30,948	30,385	940	8,926	6,036	8,579
	Avg. Growth 2013-2020	1.57%	0.40%	0.78%	1.10%	2.27%	0.32%	0.75%	1.14%
	Avg. Growth 2013-2024	1.82%	0.58%	0.90%	1.28%	2.20%	0.39%	0.75%	1.16%

Source: California Energy Commission, Demand Analysis Office, 2013.

Additional Achievable Energy Efficiency

As an investor-owned utility, SCE is one of the three service territories for which staff developed AAEE estimates. These savings are not yet considered committed but are reasonably likely to occur and include impacts from future updates of building codes and appliance standards as well as utility efficiency programs expected to continue beyond the current planning cycle.

Staff developed five AAEE scenarios, based on recommendations from the Joint Agency Steering Committee and input from Navigant and forecast stakeholders through the DAWG. These scenarios varied by assumptions related to economic growth, changes in electricity and natural gas rates, and a host of inputs associated with efficiency measure adoption and the impact of building codes and appliance standards.

Table 14 shows the annual savings associated with each scenario. A detailed description of the inputs and assumptions used to develop the AAEE scenarios is available in Volume 1, Chapter 4 of this report.

Table 14: SCE Additional Achievable Efficiency Savings

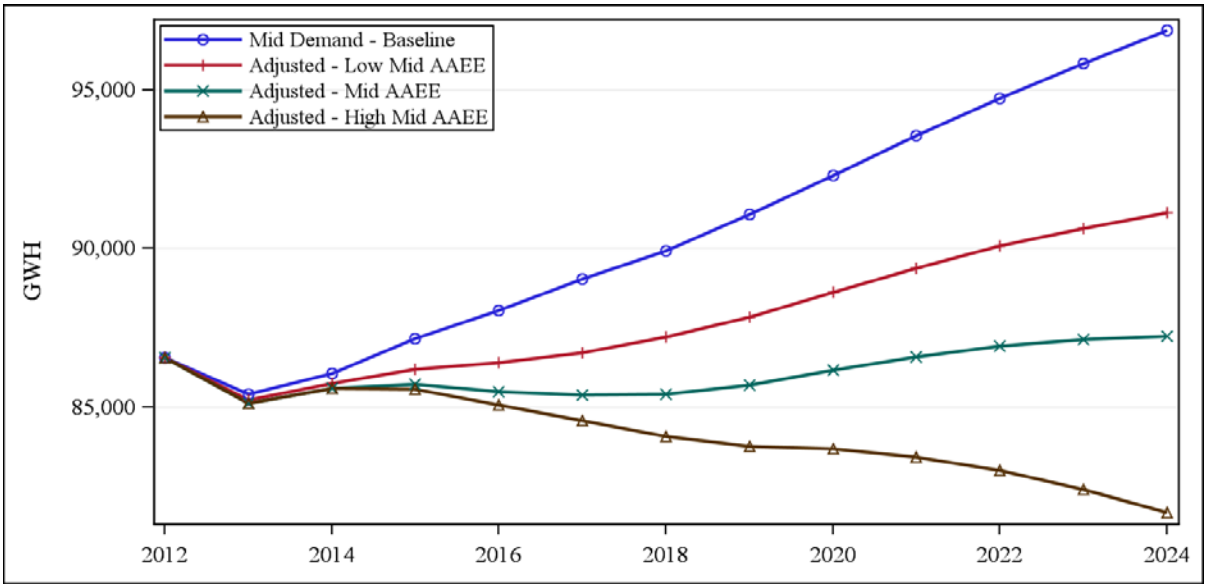
	Energy Savings (GWh)				
Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012	-	-	-	-	-
2013	174	174	264	264	269
2014	296	300	469	469	496
2015	965	970	1,445	1,589	1,619
2016	1,624	1,647	2,579	2,981	3,037
2017	2,281	2,327	3,648	4,473	4,574
2018	2,663	2,728	4,512	5,854	6,009
2019	3,167	3,244	5,378	7,310	7,525
2020	3,603	3,698	6,151	8,626	8,870
2021	4,039	4,162	6,975	10,129	10,402
2022	4,500	4,637	7,806	11,713	11,985
2023	5,032	5,199	8,709	13,440	13,721
2024	5,554	5,748	9,628	15,205	15,492
	Peak Savings (MW)				
Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012	-	-	-	-	-
2013	27	27	41	41	42
2014	55	55	84	84	88
2015	217	218	303	330	336
2016	380	383	562	663	674
2017	540	548	799	1,014	1,034
2018	656	669	1,024	1,369	1,400
2019	794	810	1,239	1,732	1,779
2020	916	936	1,433	2,077	2,135
2021	1,041	1,066	1,643	2,469	2,539
2022	1,173	1,199	1,860	2,886	2,964
2023	1,323	1,354	2,102	3,342	3,429
2024	1,471	1,508	2,349	3,814	3,908

Source: California Energy Commission, Demand Analysis Office, 2013.

The AAEE scenarios are intended to be used to adjust the baseline demand forecasts (which include only committed efficiency savings) to create a managed forecast. The adjusted service territory forecasts provided in this report constitute options to form the basis for a "managed" forecast to be used for planning purposes in Energy Commission, CPUC, and California ISO proceedings. The choice of scenarios (baseline and AAEE) to use for this purpose will be made by the leadership of these agencies shortly after this report is adopted on December 11, 2013, and documented in the adopted *2013 IEPR*.

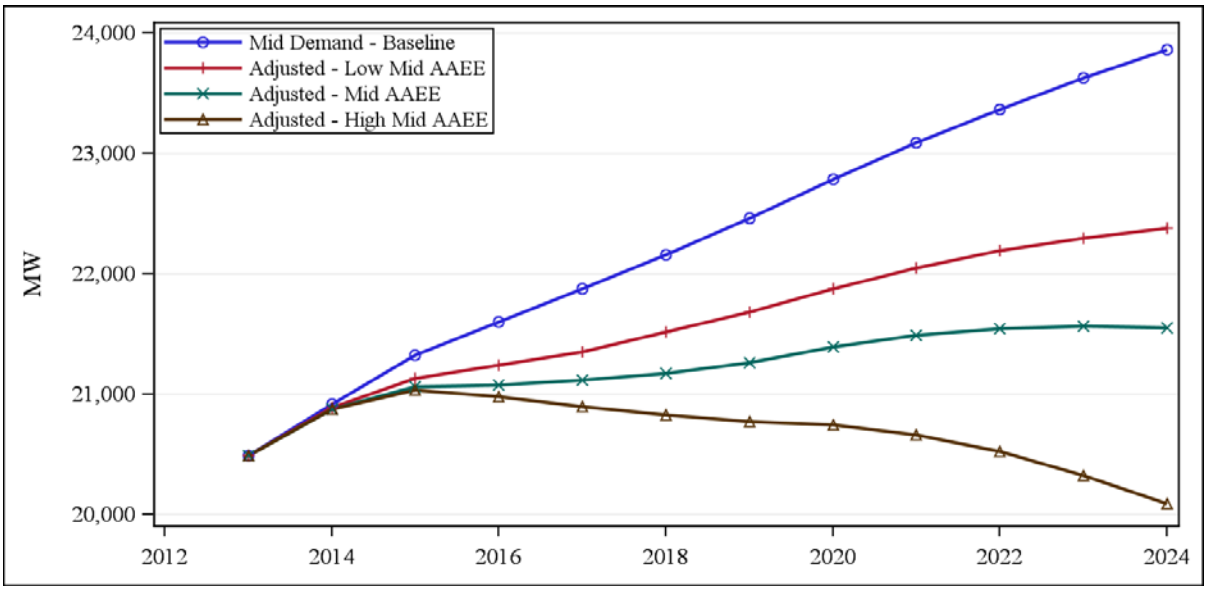
Figure 51 shows the effects of the estimated low mid, mid, and high mid AAEE savings on *CED 2013 Final* mid baseline demand for the PG&E Service Territory. The mid demand scenario flattens out when adjusted by the mid AAEE savings and declines when the high mid AAEE savings are applied. The same can be said for the peak forecast, as illustrated in **Figure 52**.

Figure 51: SCE Service Territory Baseline and Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

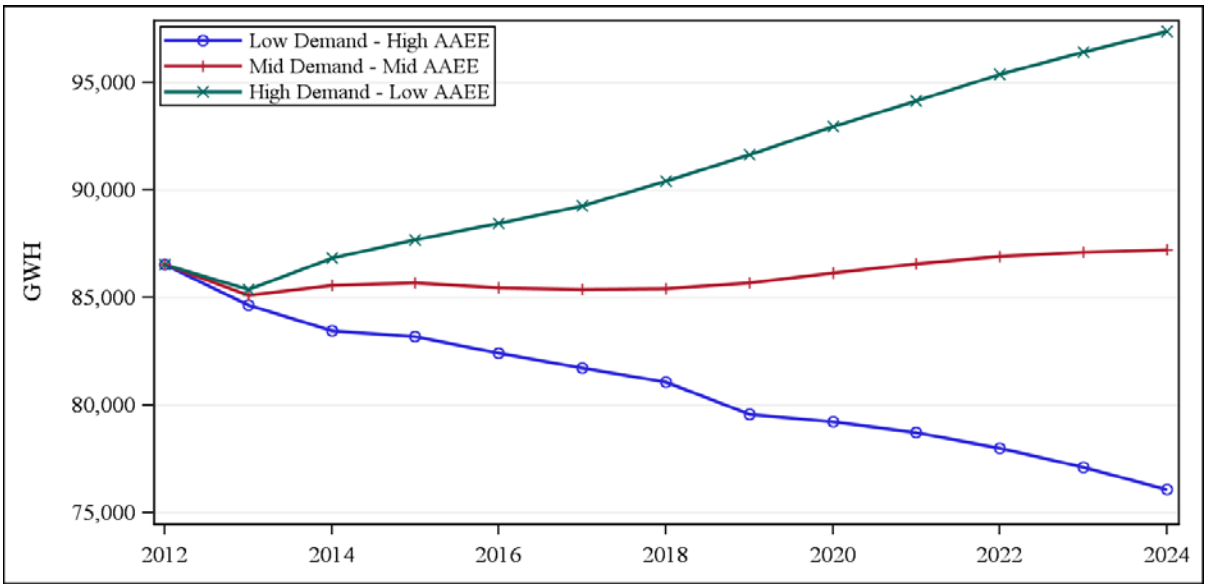
Figure 52: SCE Service Territory Baseline and Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

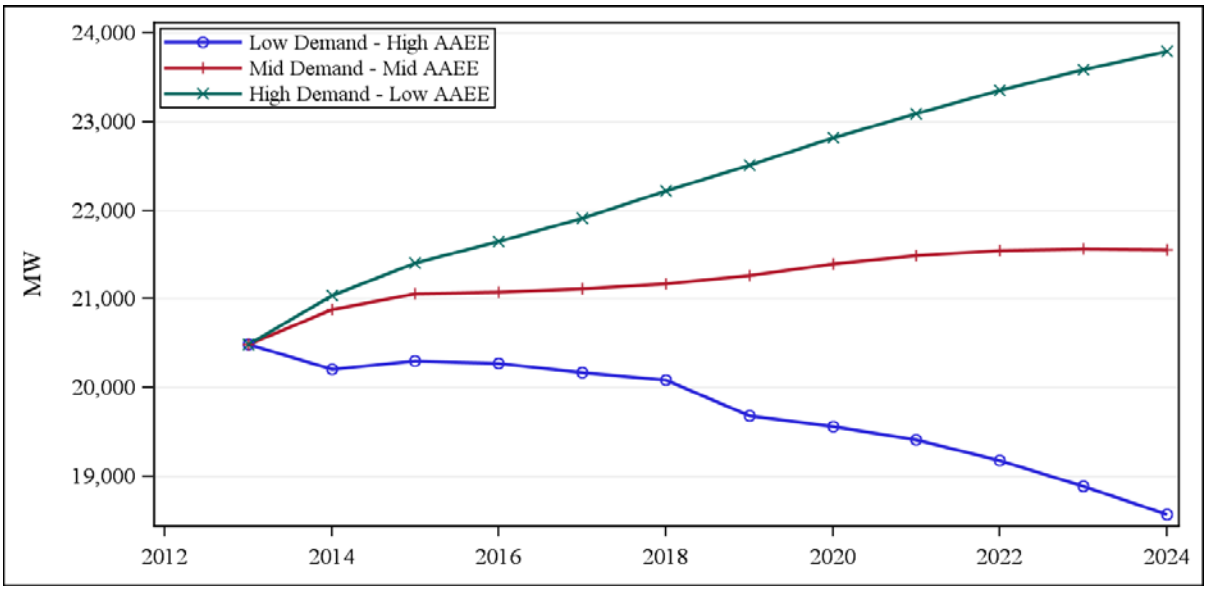
Figure 53 shows the low baseline sales forecast adjusted by the high AAEE savings scenario, the mid baseline adjusted by the mid AAEE, and the high baseline adjusted by the low AAEE. These parings were chosen to produce the maximum spread among potential managed sales forecasts for the PG&E service territory. **Figure 54** shows a similar set of adjusted peak demand forecasts.

Figure 53: SCE Service Territory Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 54: SCE Service Territory Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

CHAPTER 3:
San Diego Gas & Electric Planning Area

The SDG&E planning area includes SDG&E bundled retail customers and customers served by various energy service providers using the SDG&E distribution system to deliver electricity to end users.

This chapter is organized as follows. First, forecasted consumption and peak loads for the SDG&E planning area are discussed; both total and per capita values are presented. The *CED 2013 Final* values are compared to the adopted *CED 2011* mid scenario, with differences between the two forecasts explained. The forecasted load factors, jointly determined by the consumption and peak load estimates, are 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 2011*, and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the historical and forecasted impacts of conservation and efficiency programs. Finally, the chapter presents AAEE scenarios developed for the SDG&E service territory and explores their impact on sales and peak demand forecasts.

San Diego Area Economic and Demographic Outlook

This section provides general information on the economic and demographic outlook for the San Diego Area using outlooks provided by Moody's, IHS Global Insight, UCLA, the California Department of Finance, and the U.S. Census Bureau. These outlooks are based on economic data available in August 2013.

San Diego's recovery has largely maintained its momentum, supported by the strength of business and other services. Hiring has also broadened, led by recovering financial services, health care, and other services.

Housing market indicators are positive. House prices and sales are rising. The inventory of homes for sale is dwindling, while the issuance of multifamily permits is on the rise.

San Diego's recovery is forecast to strengthen in 2014 and 2015, though it faces downside risk from federal budget austerity. Weakness in military and visitor-dependent industries may offset growth in technology, trade, and real estate. Employment will surpass its previous peak in late 2014.

In the long term, San Diego is well-positioned to take advantage of high-value-added tech research and development and the Pentagon's reorientation toward the Pacific Rim. High business and living costs will remain a major problem.

Baseline Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections, and low efficiency impact assumptions. The low demand scenario includes low economic and demographic projections, high energy price projections, and high efficiency impact assumptions. Volume 1 provides more detail on the construction of the demand scenarios.

Table 15 compares *CED 2013 Final* high, mid, and low demand scenarios with the mid demand scenario from *CED 2011* for electricity consumption and peak demand for selected years. Comprehensive results are available electronically as a set of forms posted alongside this report.[9]

In the SDG&E planning area, the *CED 2013 Final* mid demand electricity consumption is 7.0 percent lower than *CED 2011* in 2020, the result of a lower-than-projected level of consumption in 2012 and a lower growth rate over the forecast period. By 2024, the *CED 2013 Final* high demand level is 5.8 percent higher than the mid case, while the low demand scenario is 5.0 percent lower. For peak demand, the *CED 2013 Final* high and low scenarios are 6.8 percent higher and 6.5 percent lower, respectively, than the mid case by 2024. Weather-normalized peak demand in 2012 was 0.2 percent lower than predicted in *CED 2011*.

9 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 15: SDG&E Planning Area Baseline Forecast Comparison

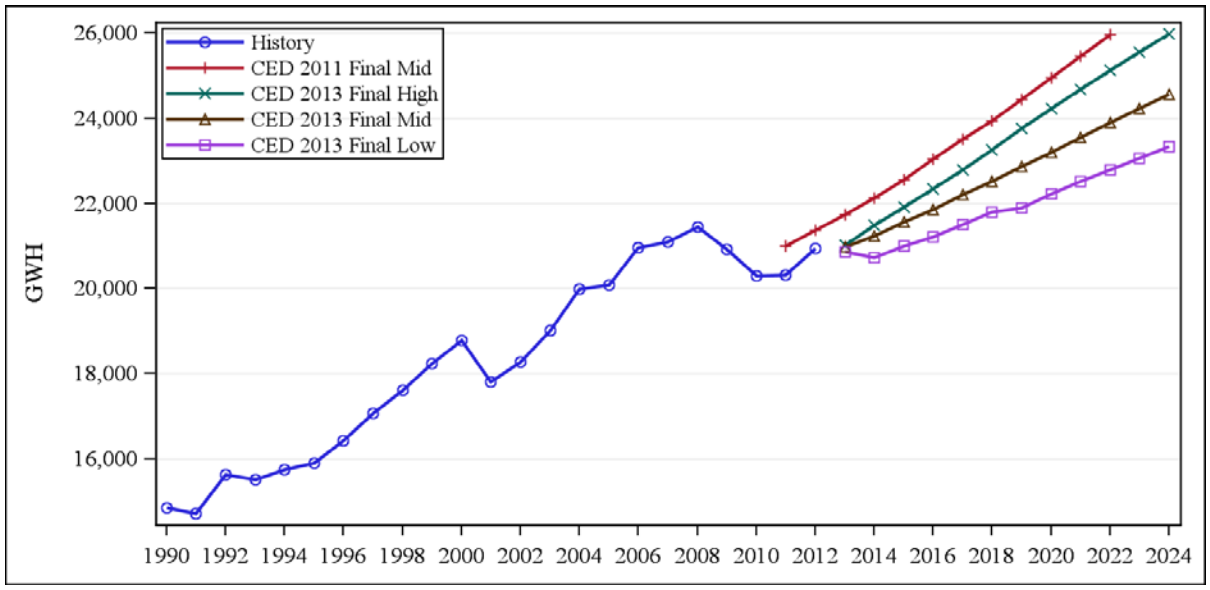
Consumption (GWH)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	14,863	14,857	14,857	14,857
2000	19,125	18,784	18,784	18,784
2012	21,363	20,939	20,939	20,939
2015	22,550	21,919	21,556	20,995
2020	24,943	24,224	23,204	22,225
2024	--	25,983	24,564	23,337
Average Annual Growth Rates				
1990 - 2000	2.55%	2.37%	2.37%	2.37%
2000 - 2012	0.93%	0.91%	0.91%	0.91%
2012 - 2015	1.82%	1.54%	0.97%	0.09%
2012 - 2020	1.96%	1.84%	1.29%	0.75%
2012 - 2024	--	1.81%	1.34%	0.91%
Peak (MW)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	2,978	2,978	2,978	2,978
2000	3,485	3,485	3,485	3,485
2012	-	4,599	4,599	4,599
2012*	4,560	4,571	4,571	4,571
2015	4,865	4,928	4,850	4,678
2020	5,359	5,437	5,188	4,913
2024	--	5,724	5,357	5,009
Average Annual Growth Rates				
1990 - 2000	1.58%	1.58%	1.58%	1.58%
2000 - 2012	2.27%	2.29%	2.29%	2.29%
2012* - 2015	2.18%	2.54%	2.00%	0.78%
2012* - 2020	2.04%	2.19%	1.60%	0.91%
2012* - 2024	--	1.89%	1.33%	0.77%
Historical values are shaded				
*Weather normalized: *CED 2013 Final* uses a weather-normalized peak value derived from the actual 2012 peak for calculating growth rates during the forecast period				

Source: California Energy Commission, Demand Analysis Office, 2013

As shown in **Figure 55**, *CED 2013 Final* electricity consumption forecasts are lower at the beginning of the forecast period than projected by *CED 2011*. Consumption remains relatively flat from 2012 to 2013, due to a combination of slow economic growth, an increase in residential and commercial electricity rates, and the assumption of normal weather (the year 2012 was relatively warm). Growth in the mid case is slightly less than *CED 2011*, due to rate increases and the addition of building and appliance standards. In 2022, all three consumption scenarios remain below the level projected by *CED 2011*.

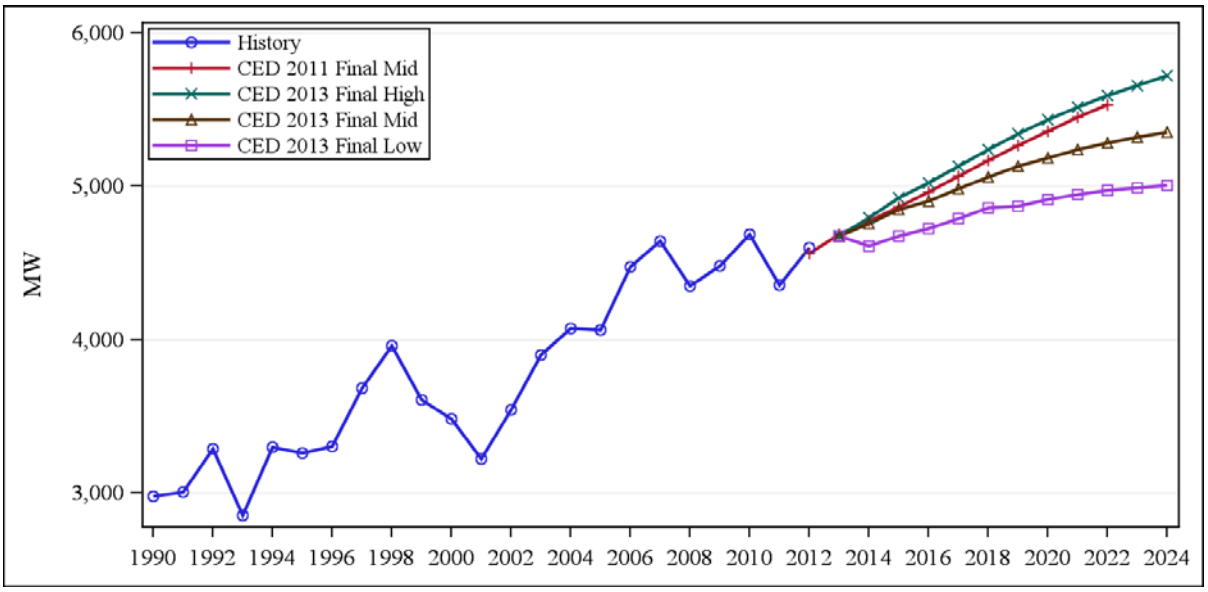
While 2012 was a warm year on average, the SDG&E planning area experienced a below-average peak temperature. Actual peak load was only slightly lower than weather-normalized peak. The relationship between peak demand scenarios, shown in **Figure 56**, follows a similar pattern as the consumption forecast. While the *CED 2013 Final* mid peak demand forecast begins at a higher value than projected in *CED 2011*, the lower growth rate causes the mid scenario to dip below *CED 2011* levels by 2016.

Figure 55: SDG&E Planning Area Baseline Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 56: SDG&E Planning Area Baseline Peak

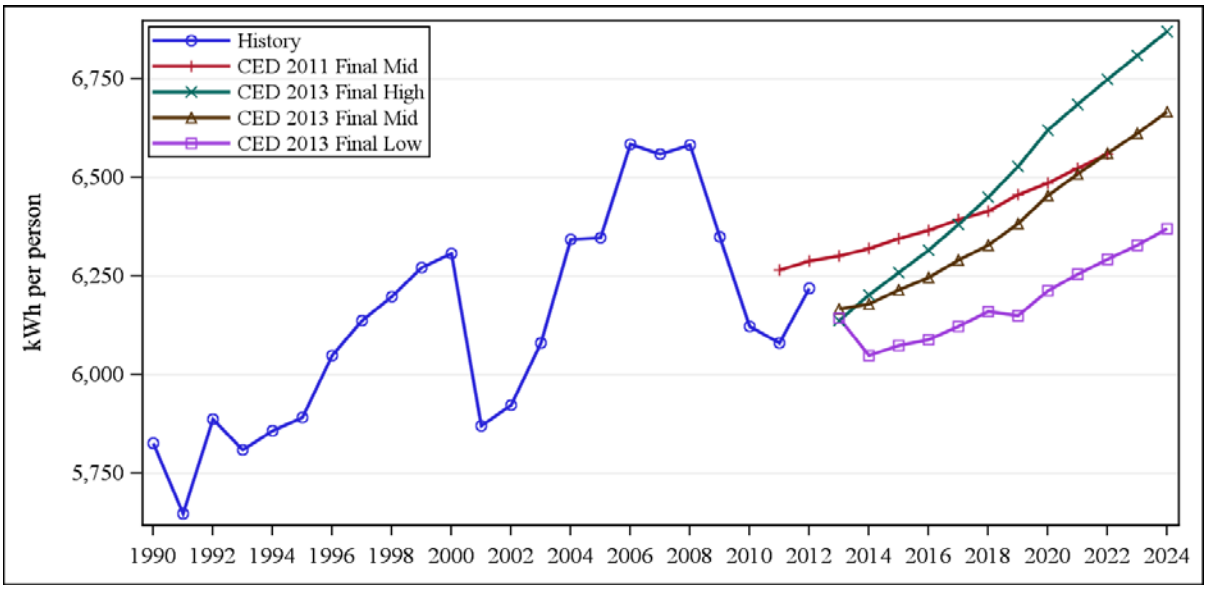


Source: California Energy Commission, Demand Analysis Office, 2013.

SDG&E's projected peaks reflect staff estimates of future non-event-based demand response committed program impacts incremental to 2012 impacts, including real-time or time-of-use pricing and permanent load shifting. Some event-based programs, such as time-of-use and peak-time-rebate programs are also included in *CED 2013 Final*. See Volume 1 for more details.

As **Figure 57** shows, per capita electricity consumption is lower in the *CED 2013 Final* demand scenarios throughout the forecast period compared to *CED 2011*. The drop in 2013 shows the combined effect of flat consumption and increased population. Unlike *CED 2011*, which considered only a single population scenario, *CED 2013 Final* incorporates high, mid, and low population projections. While the high and mid consumption forecasts are nearly identical in 2013, there is some spread between population estimates for that year. As a result, the high per capita consumption scenario shown in **Figure 57** actually begins from a lower point than the mid scenario.

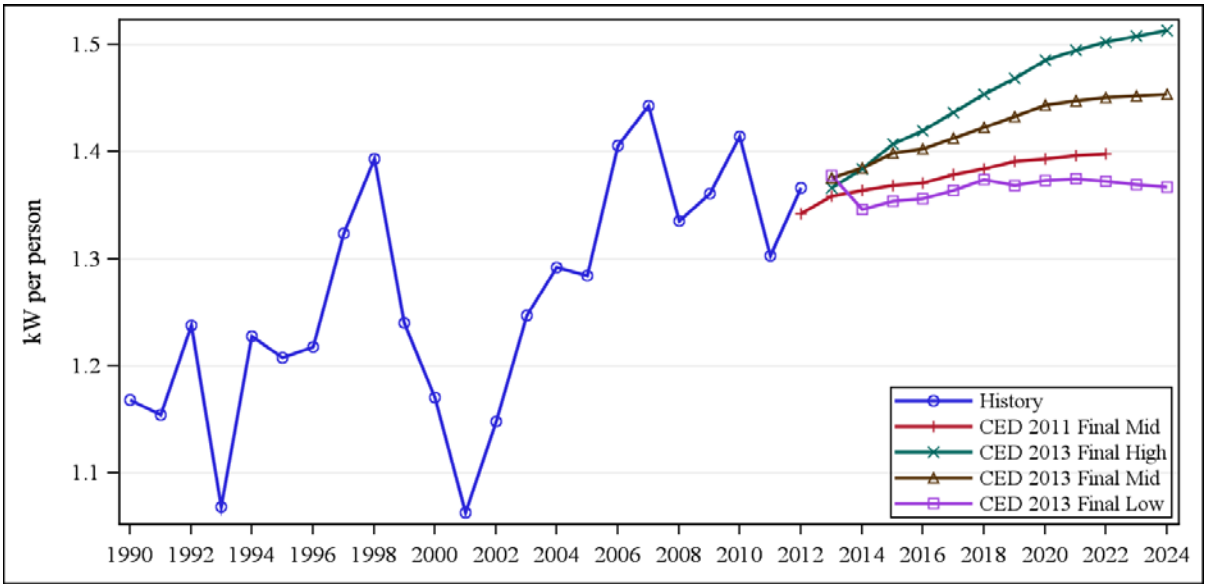
Figure 57: SDG&E Planning Area Baseline per Capita Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 58 shows per capita peak demand. *CED 2013 Final* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. Both per capita consumption and per capita peak values are projected to surpass the range of recent historical levels in the mid and high scenarios.

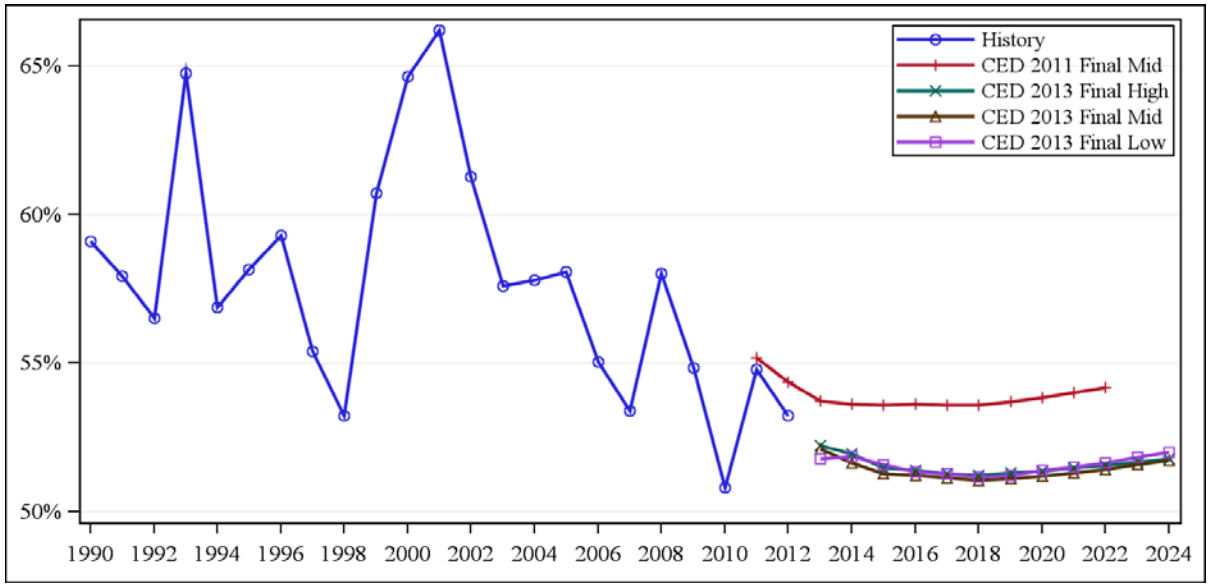
Figure 58: SDG&E Planning Area Baseline per Capita Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 59 compares forecasted load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate "a needle peak"; higher load factors indicate a more stable load. Greater population and economic growth in the SDG&E planning area has been taking place in hotter inland areas, leading to a higher saturation and use of central air conditioning. *CED 2013 Final* projects load factors to be relatively constant over the forecast period, increasing somewhat in the later years as electric vehicles usage has a greater impact on consumption than demand.

Figure 59: SDG&E Planning Area Load Factors



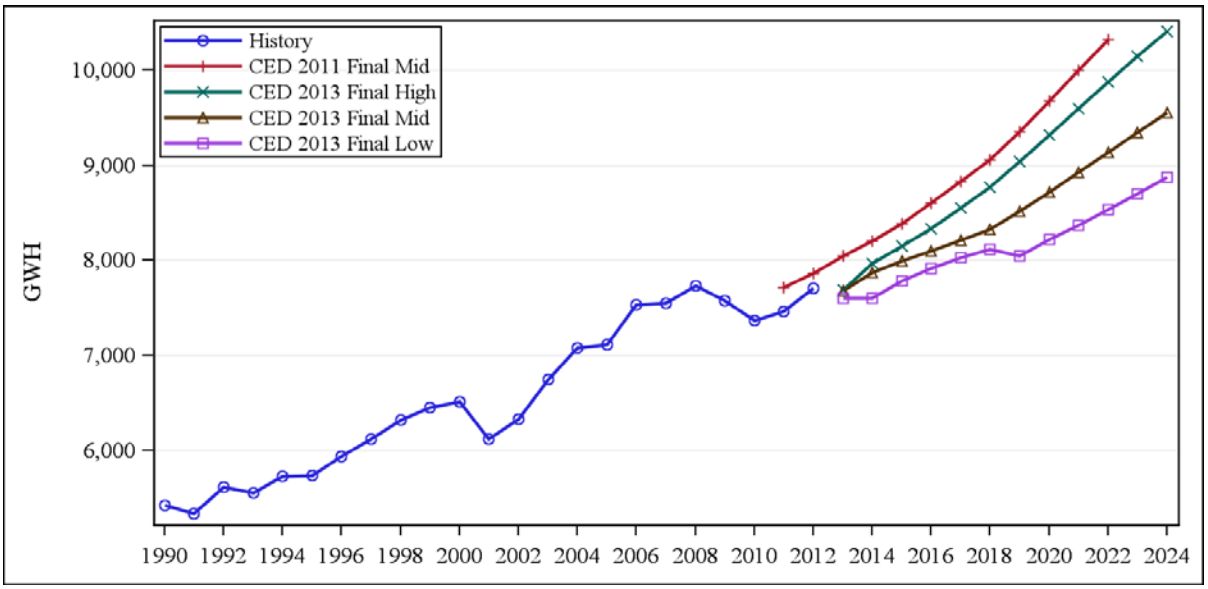
Source: California Energy Commission, Demand Analysis Office, 2013.

Sector Level Results and Input Assumptions

Residential Sector

Figure 60 compares *CED 2013 Final* and *CED 2011* planning area residential forecasts. The low and mid scenarios project lower levels of consumption than *CED 2011* due primarily to fewer expected households and a declining number of persons per household. The high demand scenario is slightly higher than *CED 2011* and roughly matches the growth rates.

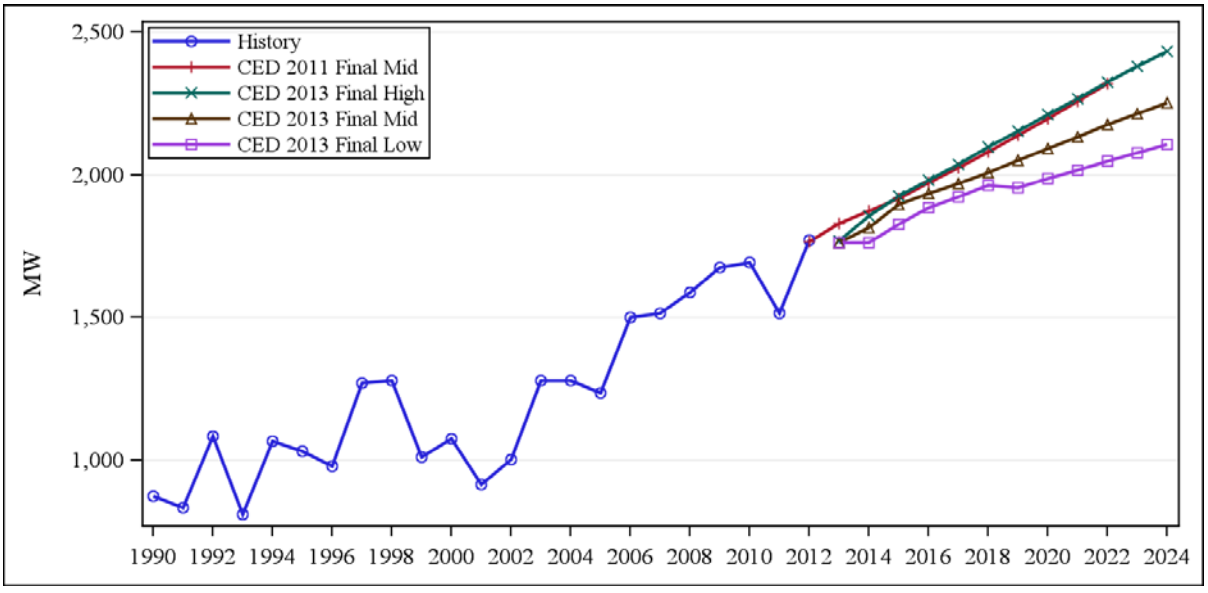
Figure 60: SDG&E Planning Area Baseline Residential Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 61 compares *CED 2013 Final* and *CED 2011* residential peak demand forecasts. The low and mid *CED 2013 Final* forecasts are both lower than *CED 2011,* while the high demand scenario is slightly higher and roughly parallel to *CED 2011*.

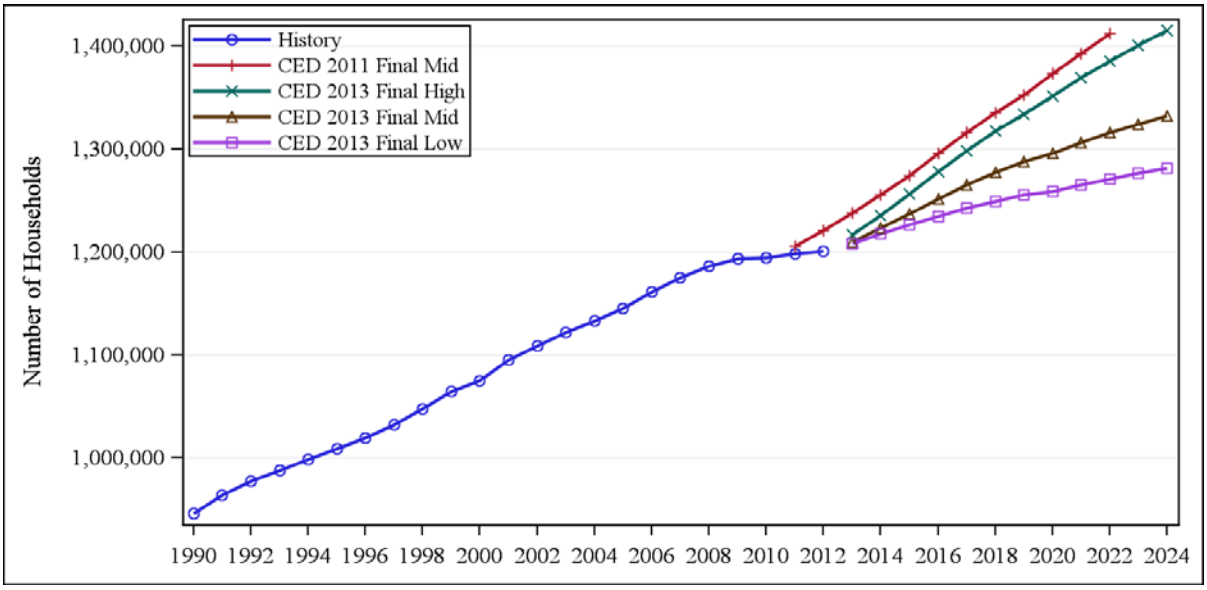
Figure 61: SDG&E Planning Area Baseline Residential Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 62, **Figure 63**, and **Figure 64** compare the residential economic/demographic drivers used in *CED 2013 Final* with those used in *CED 2011*. **Figure 62** provides comparisons of total household projections. Although the high demand scenario housing number growth rates are similar to *CED 2011,* the mid and low demand scenarios have significantly lower number of households projected over the forecast period. This results in a much wider spread of households in the *CED 2013 Final* than was used in *CED 2011*.

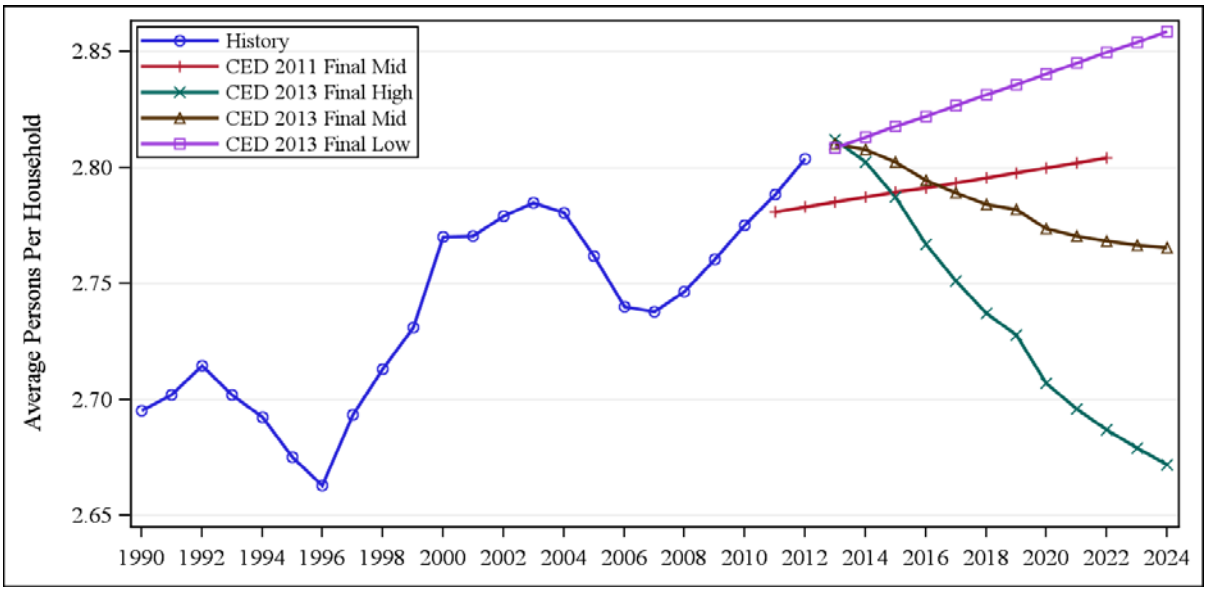
Figure 62: SDG&E Planning Area Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 63 compares persons per household. *CED 2013 Final* persons per household is higher in the near term due to the starting point. However, the mid and low demand scenarios have significantly lower long-term persons per household primarily due to the wide spread of household projections across the three demand scenarios. The *CED 2013 Final* high demand scenario begins higher than *CED 2011* and grows at a faster rate than *CED 2011* due to the population projection differences.

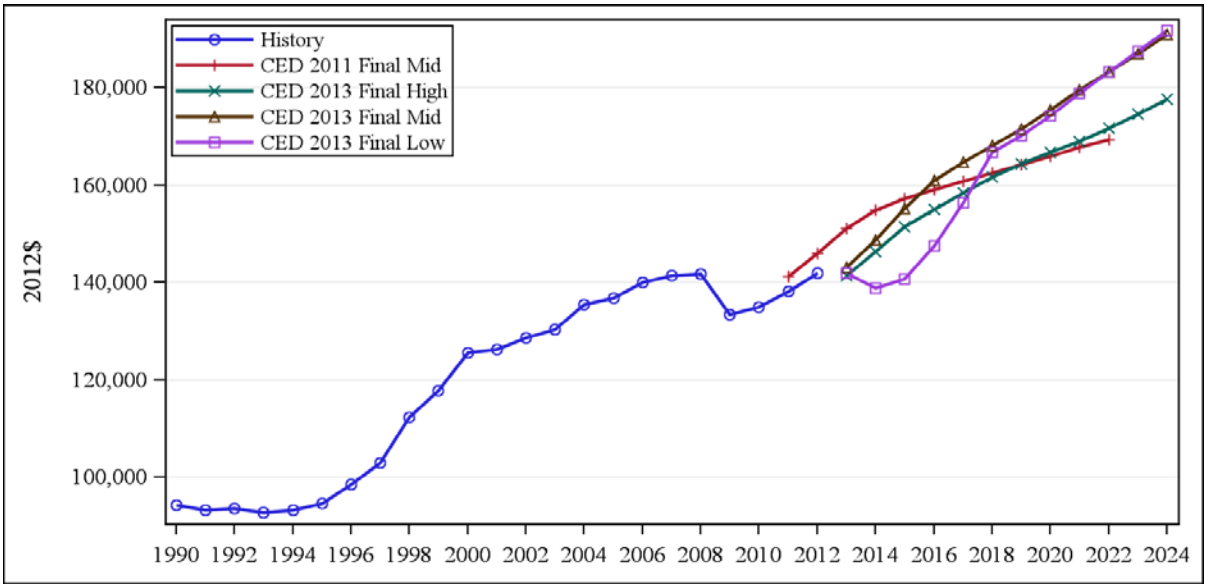
Figure 63: SDG&E Planning Area Persons per Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 64 compares average household income between forecasts. Near-term *CED 2013 Final* average household incomes are lower but in all cases increase more rapidly through the forecast and exceed *CED 2011* demand scenario by 2019. The significantly lower household growth rates in the *CED 2013 Final* low demand scenario result in average household incomes exceeding the mid demand scenario by 2017.

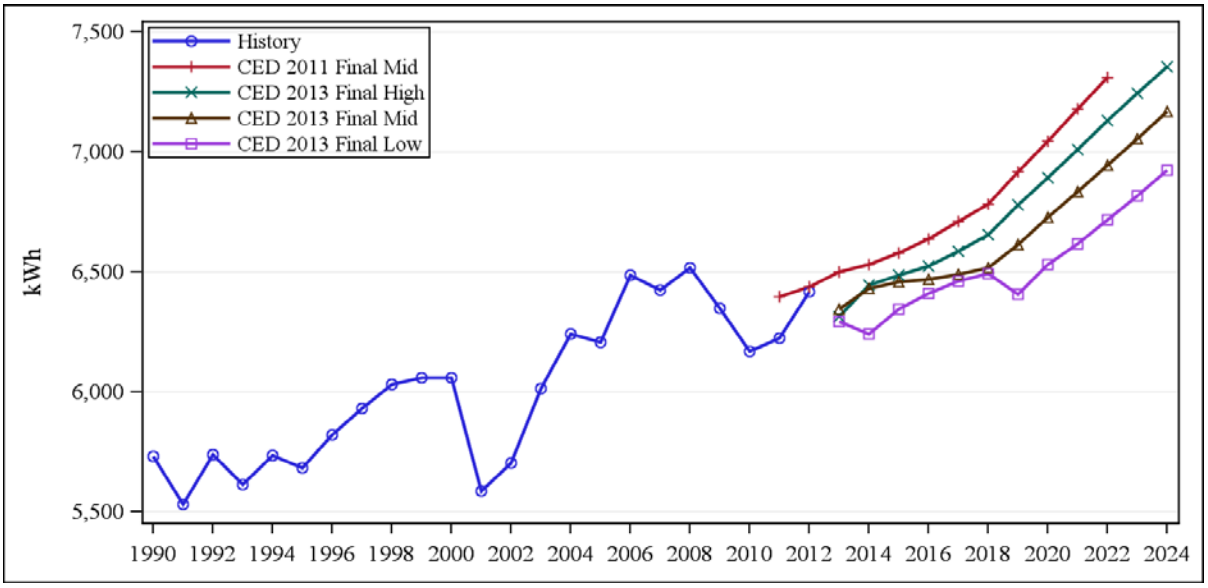
Figure 64: SDG&E Planning Area Average Household Income Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

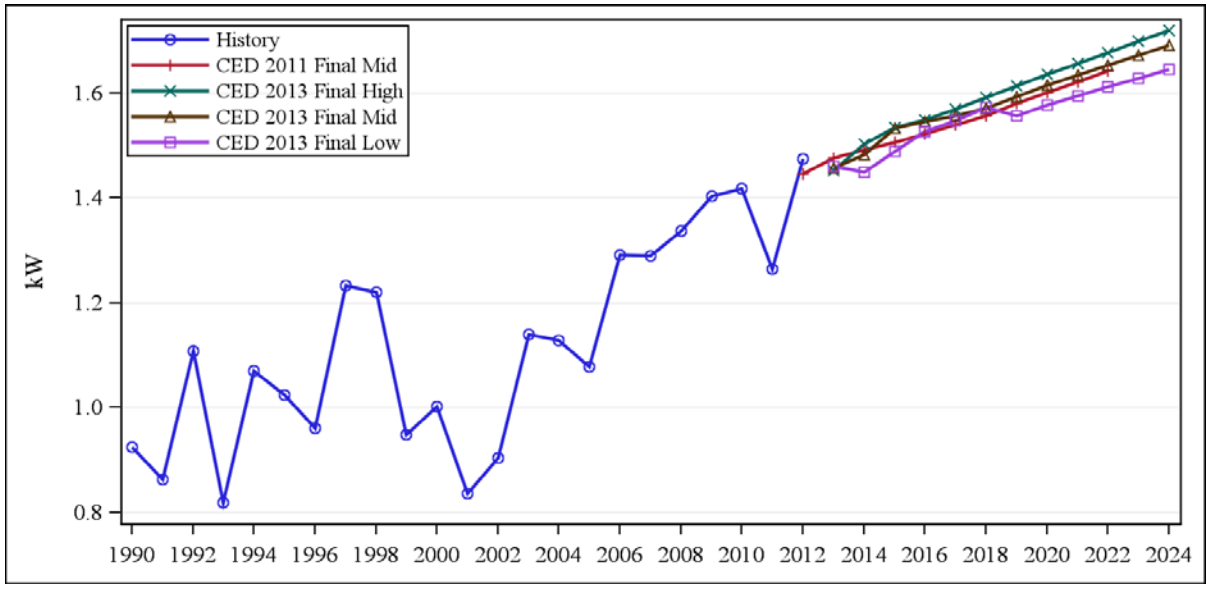
Figure 65 and **Figure 66** compare residential consumption per household and residential peak use per household, respectively. The *CED 2013 Final* forecast of consumption per household begins at a lower point but grows at a similar rate in the mid scenario compared to *CED 2011.* The low and high *CED 2013 Final* scenarios bound *CED 2011* and the *CED 2013 Final* mid demand scenarios. As with *CED 2011*, long-term consumption growth rates are influenced by increases in electric vehicle demand growth. The 2013 peak use per household roughly matches that projected in *CED 2011.* However, in the mid and high scenario near-term peak, growth results in a forecast slightly higher than in *CED 2011.* In the low *CED 2013 Final* demand scenario, the growth rate is similar to *CED 2011* with the exception of a few years. Since electric vehicles are expected to be charged during off-peak hours, the electricity demand of these vehicles shouldn't affect residential peak demand.

Figure 65: SDG&E Planning Area Baseline Consumption per Household



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 66: SDG&E Planning Area Baseline Peak Use per Household

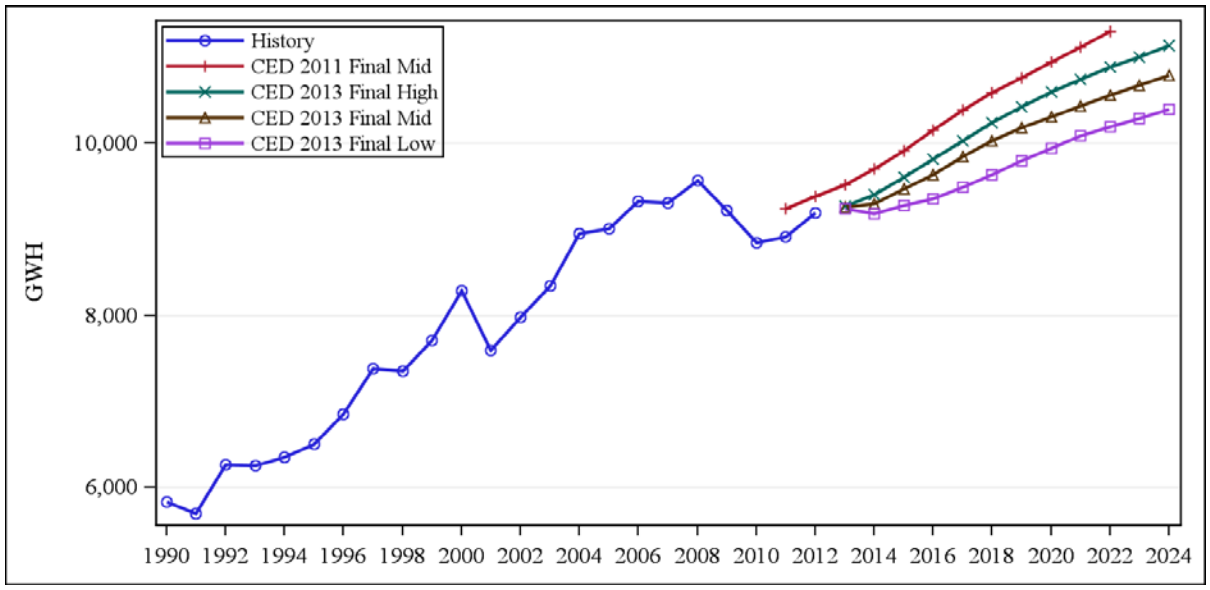


Source: California Energy Commission, Demand Analysis Office, 2013.

Commercial Sector

Figure 67 compares the SDG&E commercial sector electricity consumption forecasts. The *CED 2013 Final* consumption scenarios are lower than *CED 2011* throughout the forecast period. The differences are caused primarily by a lower starting point due to lower estimates of recent historical commercial consumption. The growth rate of commercial consumption is slightly lower in the scenarios than in *CED 2011* because of lower growth in projected floor space along with increased efficiency impacts.

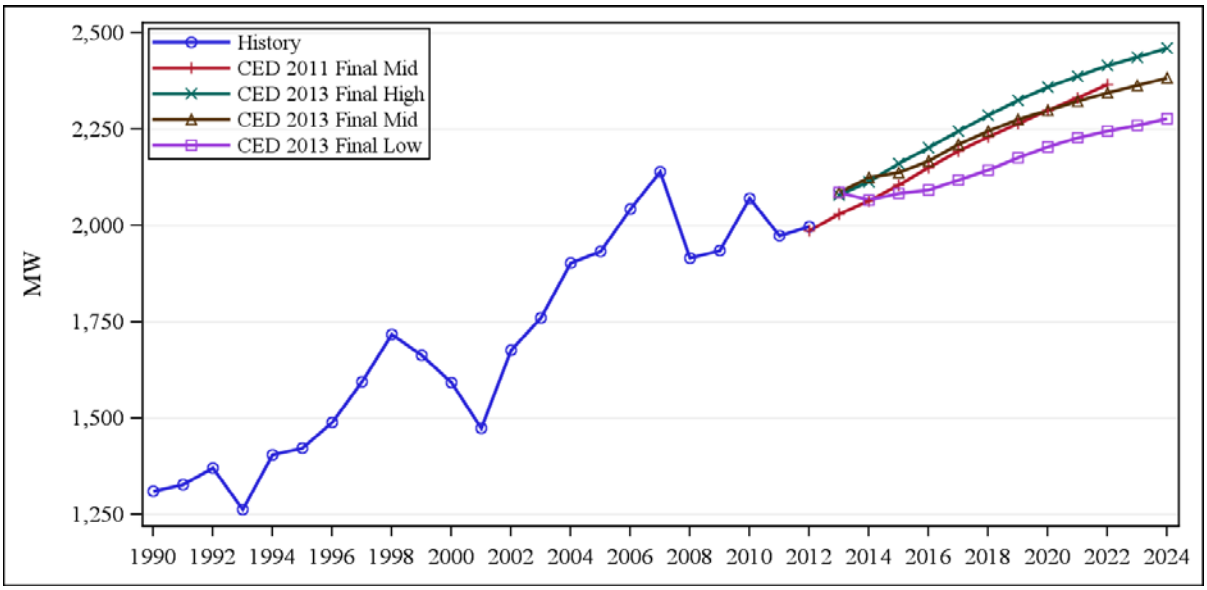
Figure 67: SDG&E Planning Area Baseline Commercial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 68 compares the SDG&E commercial sector peak demand forecasts. Growth in the scenario forecasts is driven by the underlying electricity consumption forecast, which exhibits a similar pattern. Initially, all three peak scenario forecasts start higher than *CED 2011* due to higher estimates of recent historical commercial demand. However, all three demand scenarios reduce to *CED 2011* levels or below after the initial period of the forecast as a result of lower growth in projected floor space.

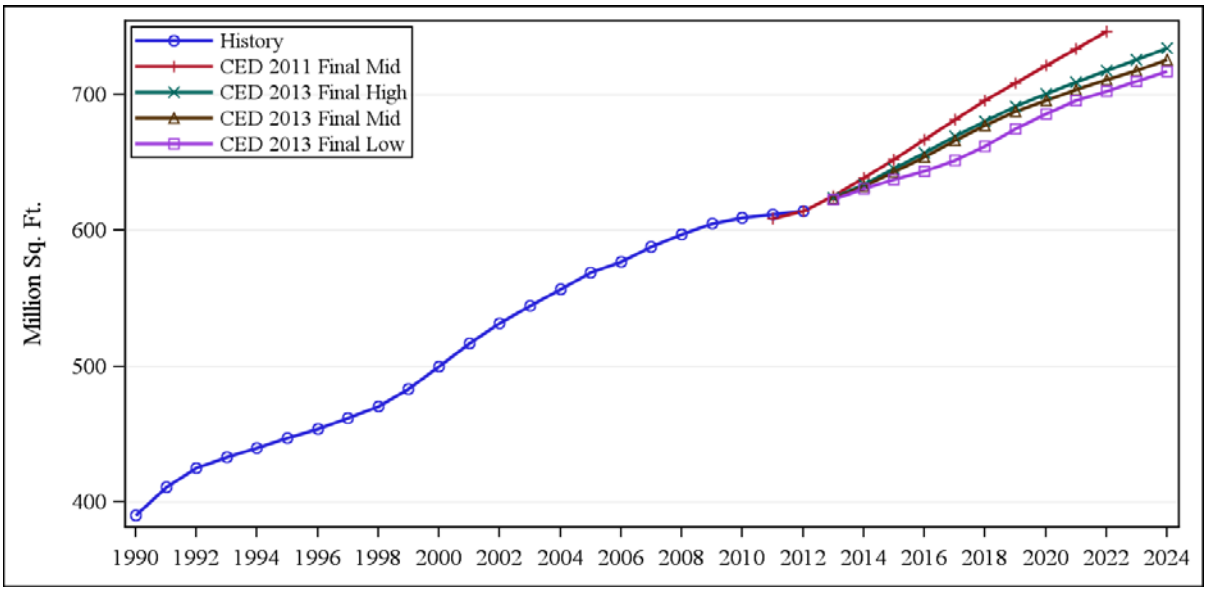
Figure 68: SDG&E Planning Area Baseline Commercial Sector Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

In staff's commercial building sector forecasting model, floor space by building type (such as retail, offices, and schools) is the key driver. **Figure 69** compares SDG&E commercial floor space projections. *CED 2013 Final* floor space projections start at the same level as *CED 2011* but progressively decrease over the forecast period compared to *CED 2011,* due mainly to lower population growth.

Figure 69: SDG&E Planning Area Commercial Floor Space

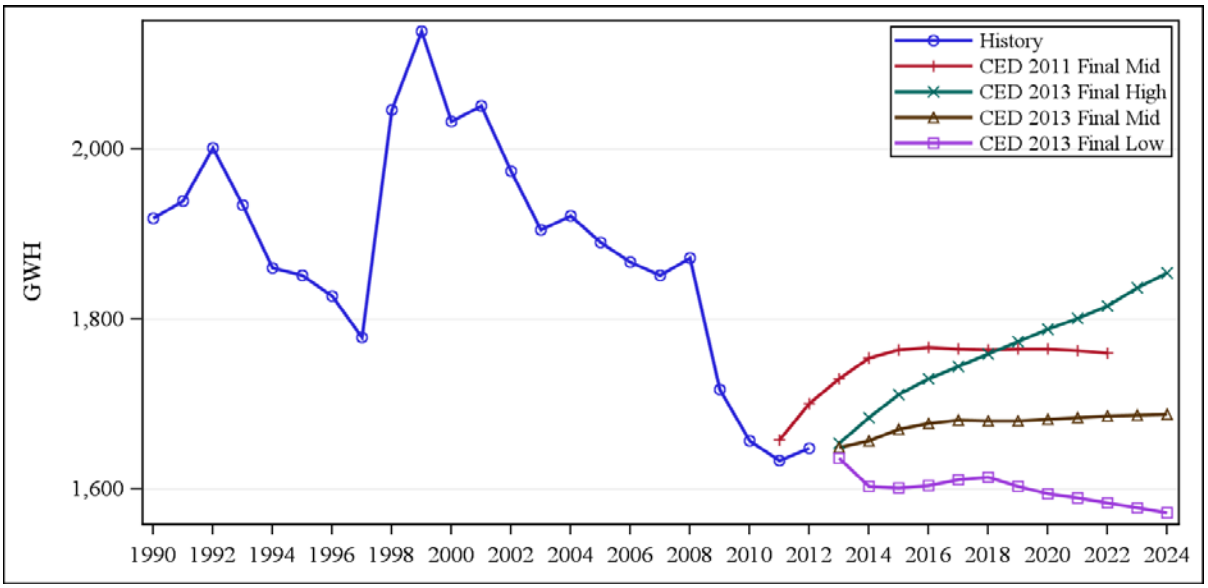


Source: California Energy Commission, Demand Analysis Office, 2013.

Industrial Sector

Figure 70 compares the SDG&E planning area industrial sector electricity consumption forecasts. *CED 2013 Final* industrial consumption forecasts are lower than the *CED 2011* forecast in the short term. However, projected growth in the high case is higher in the longer term than was projected in the *CED 2011* forecast due to more optimistic economic projections. The differences in consumption scenarios are driven mainly by differences in economic output.

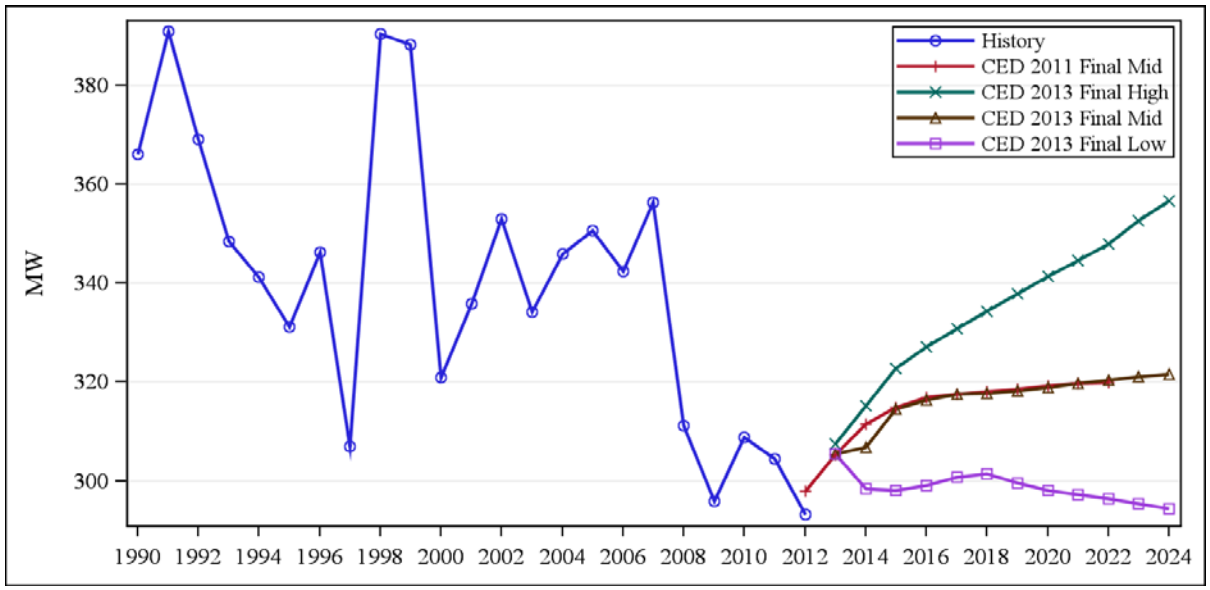
Figure 70: SDG&E Planning Area Baseline Industrial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 71 compares the SDG&E industrial sector peak forecasts. The *CED 2013 Final* industrial peak forecasts follow the same pattern as the industrial consumption forecasts.

Figure 71: SDG&E Planning Area Baseline Industrial Sector Peak

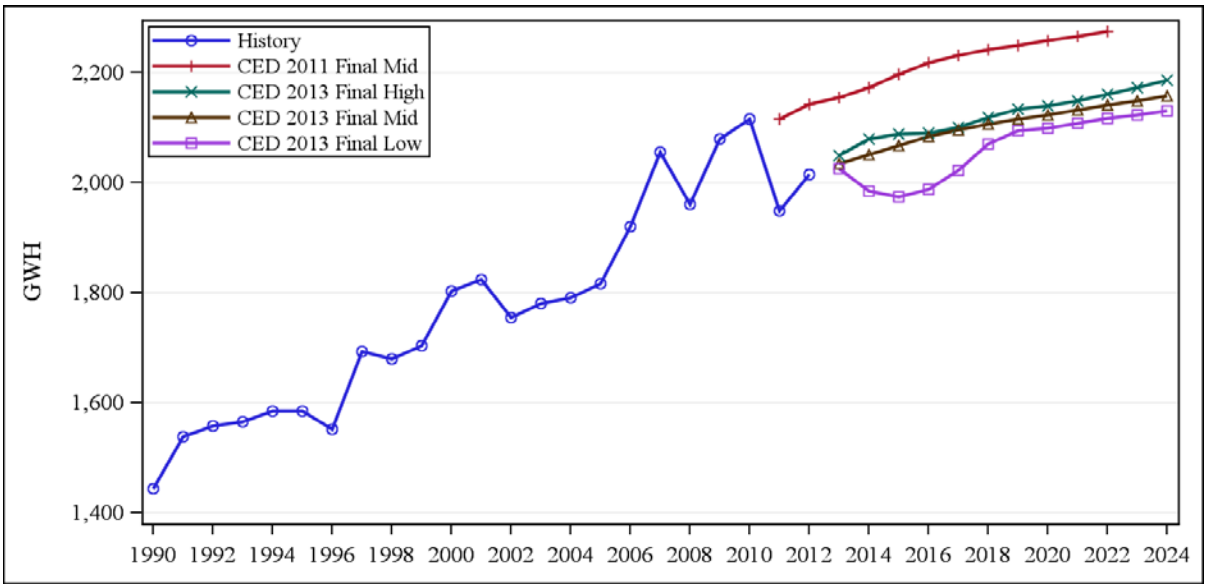


Source: California Energy Commission, Demand Analysis Office, 2013.

Other Sectors

Figure 72 compares the electricity consumption forecasts for the TCU sector, which includes street lighting. Historical consumption dropped more than 120 GWh from 2010 to 2012, so that the new forecasts start at a significantly lower point. *CED 2013 Final* high case has a very similar growth rate to *CED 2011.* In the recession scenario modeled in the low case, electricity consumption bottoms out in 2015 and is subsequently followed by a strong recovery though 2018, where growth resumes at a rate similar to that of the mid case.

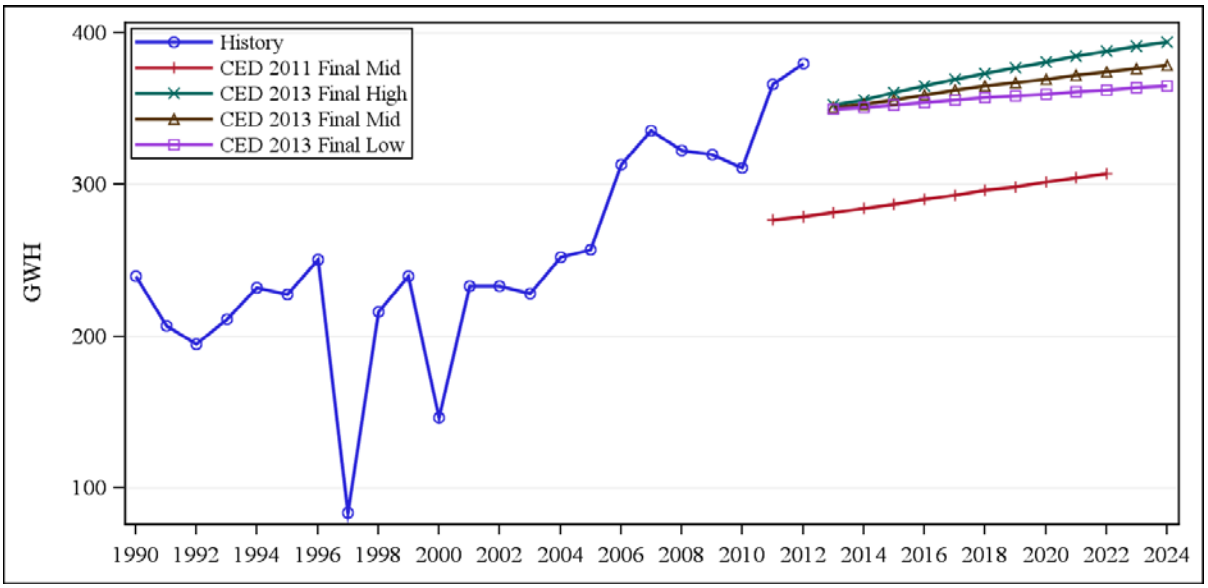
Figure 72: SDG&E Planning Area Baseline Transportation, Communication, Utilities, and Street Lighting Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 73 compares the electricity consumption forecasts for the agriculture and water pumping sectors. The *CED 2013 Final* scenarios start at a point more than 20 percent higher than *CED 2011,* but the two mid cases have similar rates of growth over the forecast period. All three demand scenarios are projected to grow over time, primarily because of a projected increase in groundwater pumping.

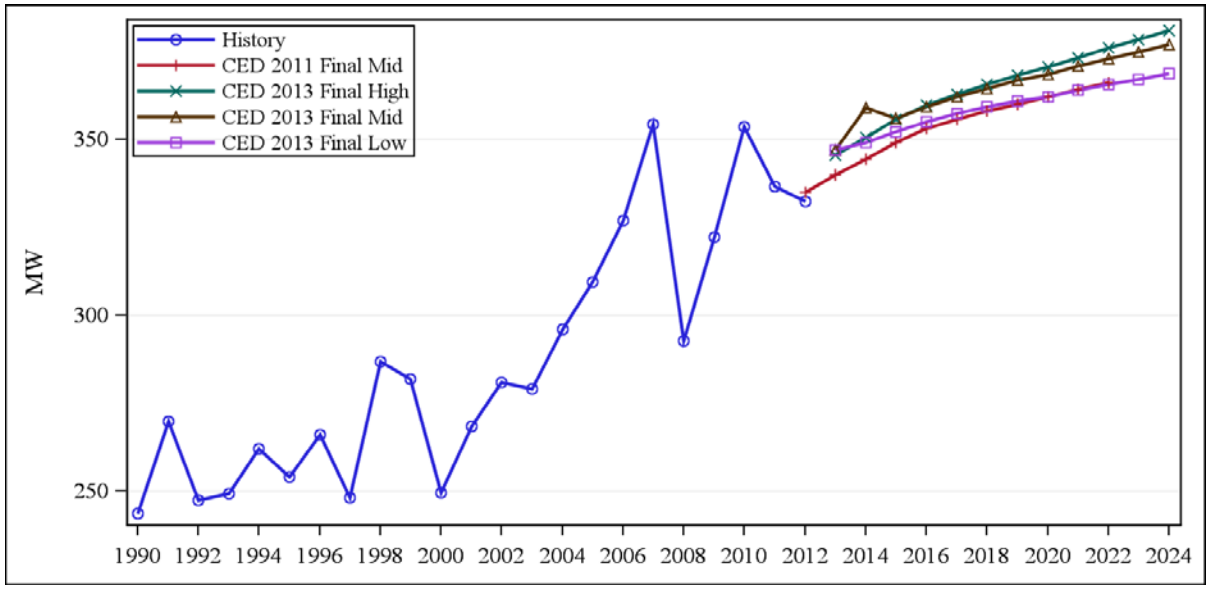
Figure 73: SDG&E Planning Area Baseline Agriculture and Water Pumping Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 74 compares projected combined peak for the TCU, street lighting, agriculture, and water pumping sectors. The *CED 2013 Final* mid starts somewhat above *CED 2011* but grows at a similar rate over the entire forecast period. By 2018, the new mid case is just 8 MW higher than predicted by *CED 2011*.

Figure 74: SDG&E Planning Area Baseline Other Sector Peak

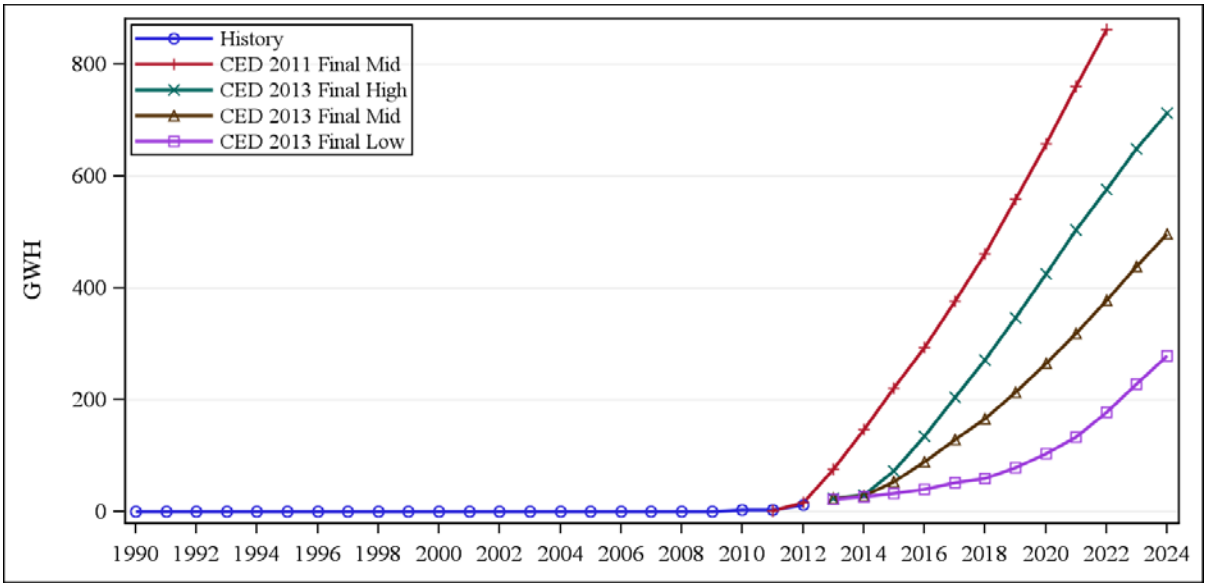


Source: California Energy Commission, Demand Analysis Office, 2013.

Electric Vehicles

Consumption by EVs in the SDG&E planning area is expected to reach nearly 300 GWh in the low demand scenario and roughly 700 GWh in the high demand scenario. All three scenarios are significantly lower than *CED 2011*, since SDG&E's territory saw a disproportionately large share of statewide EV sales through 2011—a trend that did not continue in subsequent years. Staff assumes most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 75** presents the SDG&E planning area electric vehicle consumption forecast for each of the demand scenarios.

Figure 75: SDG&E Electricity Consumption by Electric Vehicles



Source: California Energy Commission, Demand Analysis Office, 2013.

Port Electrification

Potentially significant increases in electricity use in California are expected to occur through port electrification. **Table 16** shows, for select years, the portion of these impacts that are anticipated in the SDG&E planning area. For more details, see Volume 1, Chapter 1.

Table 16: SDG&E Planning Area Port Electrification

Year	Additional Consumption (GWh)		
	High	Mid	Low
2015	13.15	12.92	12.68
2020	16.22	14.45	12.68
2024	19.01	15.85	12.68

Source: California Energy Commission, Demand Analysis Office, 2013.

Self-Generation

The peak demand forecast is reduced by the projected impacts of distributed PV, solar thermal, and CHP systems, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on a combination installation trend analysis and predictive modeling. **Table 17** shows the forecast of peak impacts from PV and non-PV self-generation. Staff projects between 367 and 435 MW of peak reduction from PV systems by 2024. Peak reductions are based on installed PV system capacities ranging from 683 MW by 2024 in the high demand case, to 819 MW by 2024 in the low demand case.

Table 17: SDG&E Planning Area Self-Generation Peak Impacts (MW)

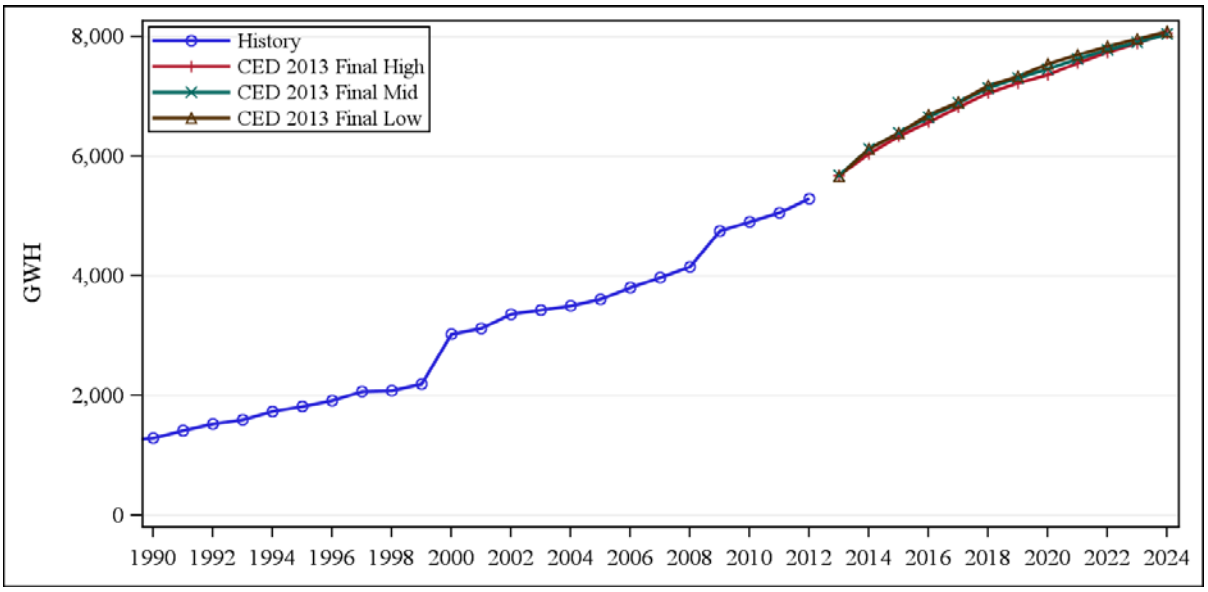
Scenario	Technology	1990	2000	2012	2015	2020	2024
Low Demand	Photovoltaic	0.0	0.0	67.9	132.7	186.8	282.2
	Non-Photovoltaic	77.7	59.9	111.8	120.0	138.8	153.0
	Total	**77.7**	**59.9**	**179.7**	**252.7**	**325.6**	**435.2**
Mid Demand	Photovoltaic	0.0	0.0	67.9	120.4	164.6	251.1
	Non-Photovoltaic	77.7	59.9	111.8	120.8	139.5	153.1
	Total	**77.7**	**59.9**	**179.7**	**241.2**	**304.1**	**404.2**
High Demand	Photovoltaic	0.0	0.0	67.9	111.0	142.5	217.8
	Non-Photovoltaic	77.7	59.9	111.8	120.2	137.0	149.3
	Total	**77.7**	**59.9**	**179.7**	**231.2**	**279.5**	**367.1**

Source: California Energy Commission, Demand Analysis Office, 2013.

Conservation/Efficiency Impacts

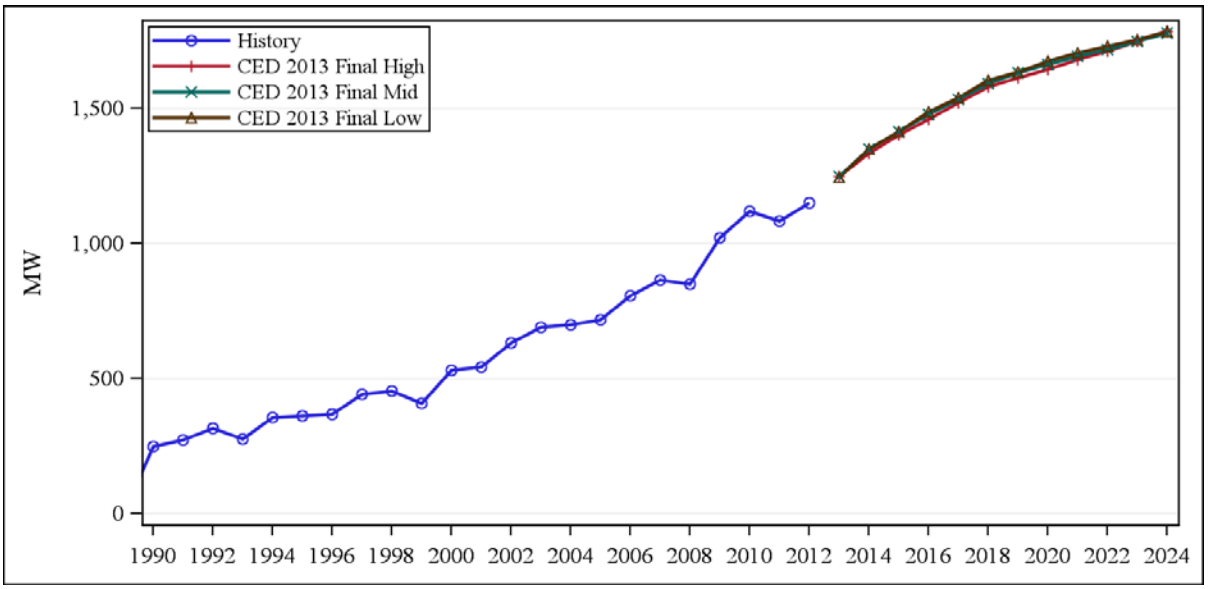
Figure 76 and **Figure 77** show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented through 2014; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Within the demand scenarios, higher demand yields more standards savings since new construction and appliance usage increase, while lower demand is associated with more program savings and higher rates (and therefore more price effects). The net result is that savings totals among the scenarios are very similar.

Figure 76: SDG&E Planning Area Baseline Electricity Consumption Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 77: SDG&E Planning Area Baseline Electricity Peak Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Table 18 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5 – 2.0 percent due to higher home and commercial floor space construction and 1.5 – 2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings, just as they were in *CED 2011*. For *CED 2013 Final*, new standards savings impacts were included for the 2013 Title 24 standards update and impacts from standards affecting battery chargers. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1, Chapter 3 provides more detail on staff work related to energy efficiency and conservation.

Table 18: SDG&E Planning Area Baseline Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	255	254	509	144	94	**238**	**747**
2000	277	705	983	398	258	**657**	**1,640**
2012	288	1,683	1,972	815	475	**1,289**	**3,261**
2015	330	2,191	2,521	951	570	**1,521**	**4,042**
2020	418	2,716	3,133	1,256	780	**2,036**	**5,169**
2024	473	2,924	3,397	1,459	885	**2,344**	**5,741**
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	42	41	83	32	21	**53**	**136**
2000	45	114	159	74	48	**122**	**281**
2012	65	380	445	172	100	**273**	**718**
2015	77	512	589	201	121	**321**	**910**
2020	99	643	742	263	163	**427**	**1,169**
2024	111	684	794	305	185	**490**	**1,285**

Source: California Energy Commission, Demand Analysis Office, 2013.

Additional Achievable Energy Efficiency

As an investor-owned utility, SDG&E is one of the three service territories for which staff developed AAEE estimates. These savings are not yet considered committed but are reasonably likely to occur and include impacts from future updates of building codes and appliance standards as well as utility efficiency programs expected to continue beyond the current planning cycle.

Staff developed five AAEE scenarios, based on recommendations from the Joint Agency Steering Committee and input from Navigant and forecast stakeholders through the DAWG. These scenarios varied by assumptions related to economic growth, changes in electricity and natural gas rates, and a host of inputs associated with efficiency measure adoption and the impact of building codes and appliance standards.

Table 19**Table 19** shows the annual savings associated with each scenario. A detailed description of the inputs and assumptions used to develop the AAEE scenarios is available in Volume 1, Chapter 4 of this report.

Table 19: SDG&E Additional Achievable Energy Efficiency Savings

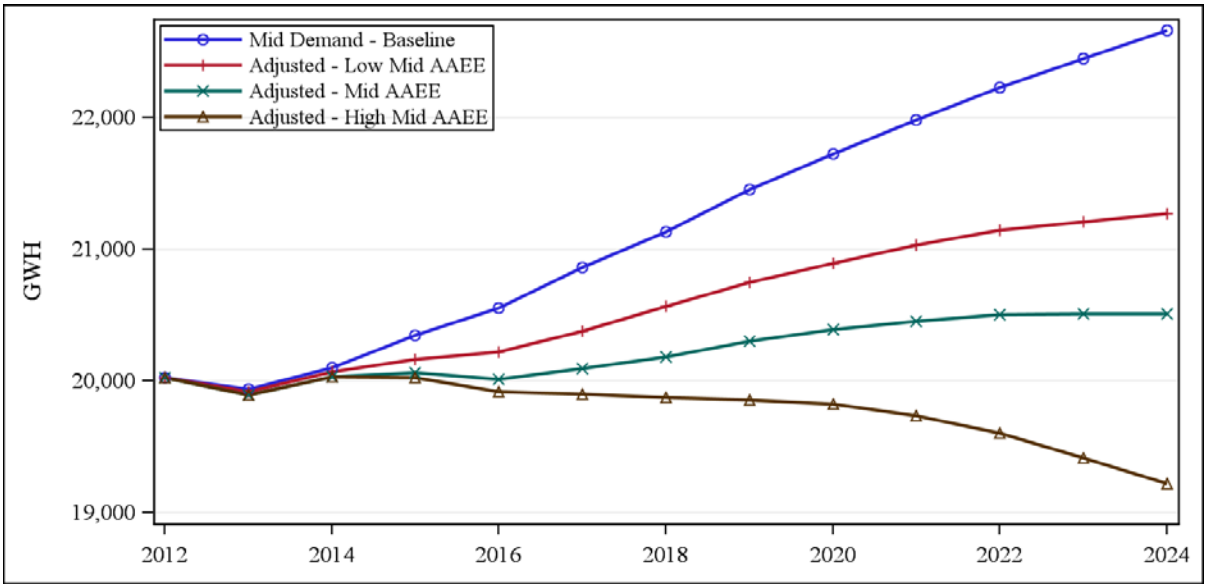
Year	GWH savings				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012					
2013	22	22	42	42	44
2014	30	32	70	70	77
2015	171	182	288	326	341
2016	313	332	538	634	658
2017	456	485	770	964	995
2018	531	568	951	1,258	1,300
2019	658	703	1,152	1,598	1,659
2020	772	826	1,330	1,896	1,963
2021	884	951	1,525	2,244	2,322
2022	1,011	1,088	1,727	2,624	2,703
2023	1,149	1,242	1,940	3,031	3,115
2024	1,280	1,389	2,154	3,442	3,530
	MW Savings				
Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2012					
2013	4	4	7	7	7
2014	7	7	14	14	15
2015	44	46	66	74	76
2016	81	84	127	152	157
2017	118	124	183	234	241
2018	145	152	236	316	325
2019	180	189	289	403	418
2020	212	222	337	483	503
2021	244	257	390	576	603
2022	278	294	445	676	708
2023	316	335	506	784	822
2024	353	375	567	895	938

Source: California Energy Commission, Demand Analysis Office, 2013.

The AAEE scenarios are intended to be used to adjust the baseline demand forecasts (which include only committed efficiency savings) to create managed forecasts. The adjusted service territory forecasts provided in this report constitute options to form the basis for a "managed" forecast to be used for planning in Energy Commission, CPUC, and California ISO proceedings. The choice of scenarios (baseline and AAEE) to use for this purpose will be made by the leadership of these agencies shortly after this report is adopted on December 11, 2013, and documented in the adopted *2013 IEPR*.

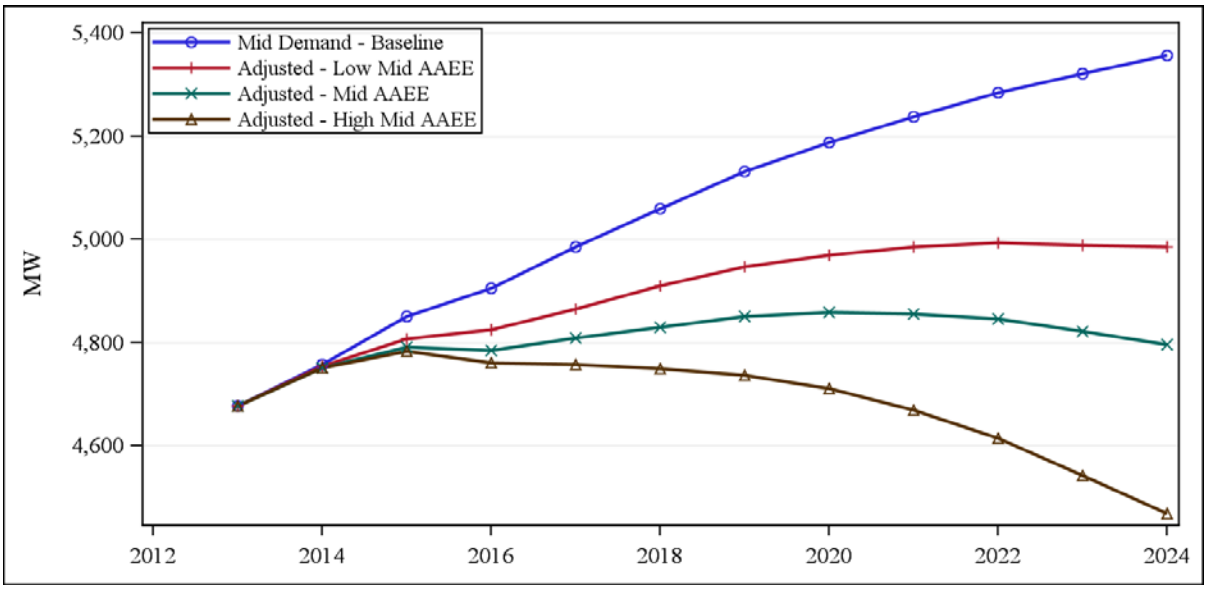
Figure 78 shows the effects of the estimated low mid, mid, and high mid AAEE savings on *CED 2013 Final* mid baseline demand for the SDG&E service territory. The mid demand scenario flattens out when adjusted by the mid AAEE savings and declines when the high mid AAEE savings are applied. The same can be said for the peak forecast, as illustrated in **Figure 79**.

Figure 78: SDG&E Service Territory Baseline and Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

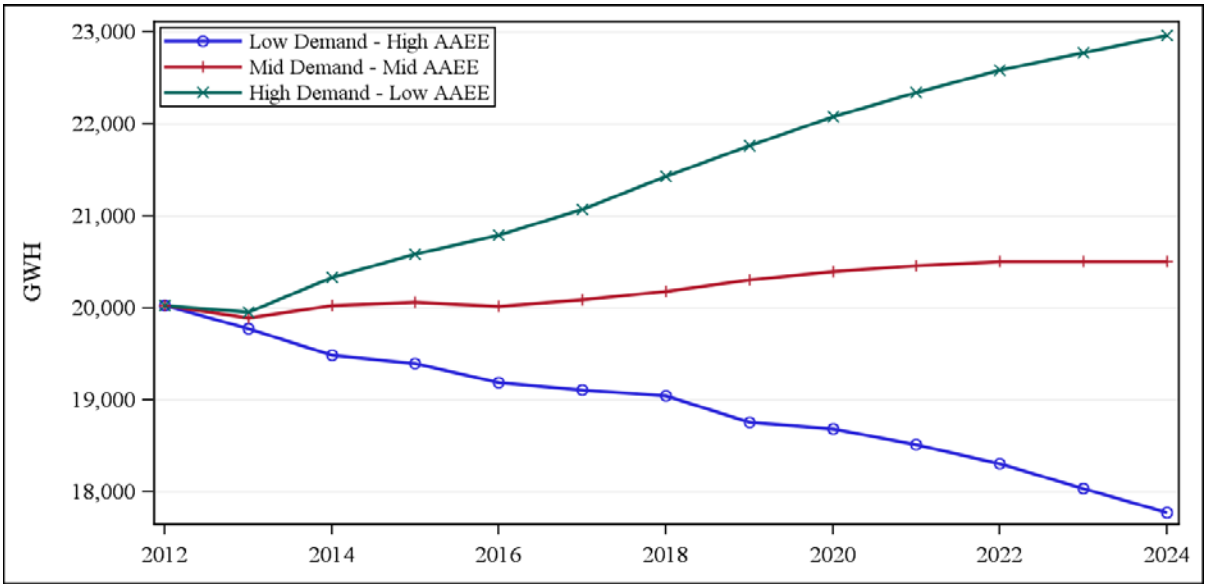
Figure 79: SDG&E Service Territory Baseline and Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

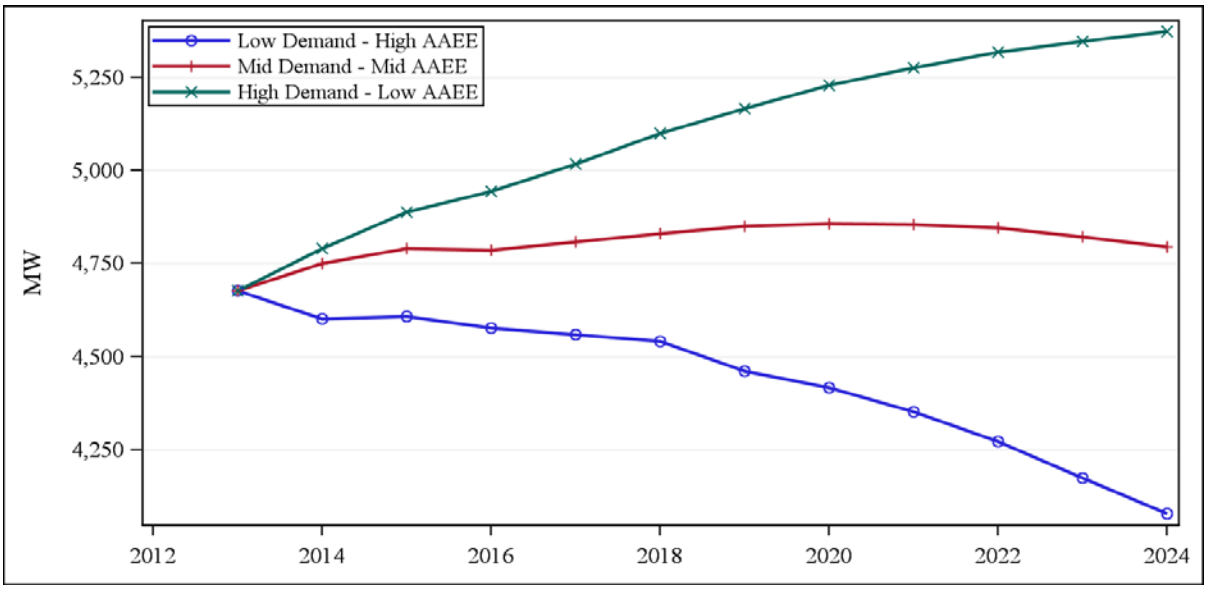
Figure 80 shows the low baseline sales forecast adjusted by the high AAEE savings scenario, the mid baseline adjusted by the mid AAEE, and the high baseline adjusted by the low AAEE. These pairings were chosen to produce the maximum spread among potential managed sales forecasts for the PG&E service territory. **Figure 81** shows a similar set of adjusted peak demand forecasts.

Figure 80: SDG&E Service Territory Adjusted Sales



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 81: SDG&E Service Territory Adjusted Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

CHAPTER 4:
Sacramento Municipal Utility District Planning Area

The SMUD planning area includes SMUD retail customers but does not include new members of the SMUD control area, Roseville, Redding, and WAPA. To support electricity system analysis, staff derives forecasts by control area and California Independent System Operator 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, rather than the SMUD control area.

This chapter is organized as follows: First, forecasted consumption and peak loads for the SMUD planning area are discussed; both total and per capita values are presented. The *CED 2013 Final* values are compared to the adopted *CED 2011* mid scenario, with differences between the two forecasts explained. The forecasted load factors, jointly determined by the consumption and peak load estimates, are 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 2011*, and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the historical and forecasted impacts of conservation and efficiency programs.

Sacramento Area Economic and Demographic Outlook

This section provides general information on the economic and demographic outlook for the Sacramento Area using outlooks provided by Moody's, IHS Global Insight, UCLA, the California Department of Finance, and the U.S. Census Bureau. These outlooks are based on economic data available in August 2013.

Sacramento's recovery stayed largely on track entering the middle of the year as improving housing and consumer spending more than offset diminishing local public sector weakness. Increasing residential construction and the State Capitol's rapidly improving fiscal condition should soon show improvements in payroll.

A contracting inventory of homes for sale has helped to increase the median price of existing single-family houses. Construction is showing signs of life, as residential permit issuance rises.

Sacramento's recovery will broaden in 2014 and 2015 as state government finances strengthen and housing becomes a larger positive driver. Over the long term, the metro area will benefit from above-average population growth as relatively low costs attract residents and businesses from other parts of the state.

Baseline Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections, and low efficiency impact assumptions. The low demand scenario includes low economic and demographic projections, high energy price projections, and high efficiency impact assumptions. Volume 1 provides more detail on the construction of the demand scenarios.

Table 20 compares *CED 2013 Final* high, mid, and low demand scenarios with the mid demand scenario from *CED 2011* for electricity consumption and peak demand for selected years. Comprehensive results are available electronically as a set of forms posted alongside this report.[10]

In the SMUD planning area, the *CED 2013 Final* mid demand electricity consumption is 1.5 percent lower than *CED 2011* in 2020, the result of a lower-than-projected level of consumption in 2012 and a lower growth rate over the forecast period. By 2024, the *CED 2013 Final* high demand level is 5.5 percent higher than the mid case, while the low demand scenario is 4.4 percent lower. For peak demand, the *CED 2013 Final* high and low scenarios are 6.3 percent higher and 6.1 percent lower, respectively, than the mid case by 2024. Weather-normalized peak demand in 2012 was 1.4 percent lower than predicted in *CED 2011*.

10 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 20: SMUD Planning Area Baseline Forecast Comparison

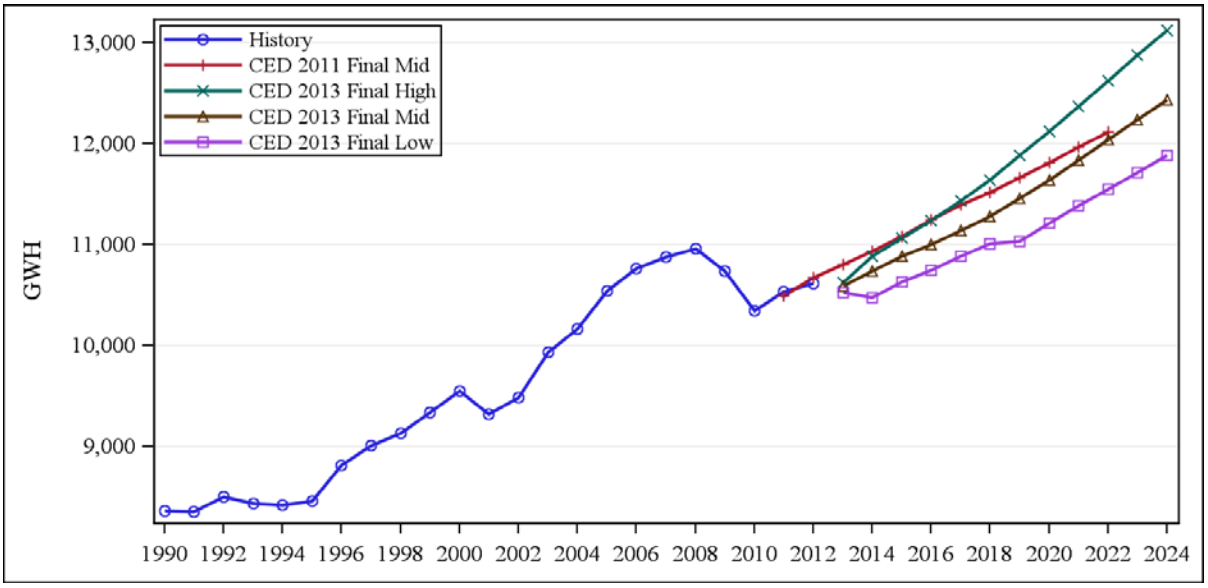
Consumption (GWH)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	8,361	8,358	8,358	8,358
2000	9,502	9,550	9,550	9,550
2012	10,667	10,609	10,609	10,609
2015	11,082	11,061	10,879	10,631
2020	11,812	12,121	11,639	11,207
2024	--	13,119	12,430	11,883
Average Annual Growth Rates				
1990 - 2000	1.29%	1.34%	1.34%	1.34%
2000 - 2012	0.97%	0.88%	0.88%	0.88%
2012 - 2015	1.28%	1.40%	0.84%	0.07%
2012 - 2020	1.28%	1.68%	1.17%	0.69%
2012 - 2024	--	1.79%	1.33%	0.95%
Peak (MW)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	2,193	2,194	2,194	2,194
2000	2,686	2,687	2,687	2,687
2012	-	2,953	2,953	2,953
2012*	3,096	3,052	3,052	3,052
2015	3,255	3,239	3,196	3,084
2020	3,467	3,532	3,387	3,219
2024	--	3,780	3,555	3,338
Average Annual Growth Rates				
1990 - 2000	2.05%	2.05%	2.05%	2.05%
2000 - 2012	1.19%	1.07%	1.07%	1.07%
2012* - 2015	1.68%	2.00%	1.54%	0.35%
2012* - 2020	1.42%	1.84%	1.31%	0.67%
2012* - 2024	--	1.80%	1.28%	0.75%
Historical values are shaded				
*Weather normalized: *CED 2013 Final* uses a weather-normalized peak value derived from the actual 2012 peak for calculating growth rates during the forecast period				

Source: California Energy Commission, Demand Analysis Office, 2013.

As shown in **Figure 82**, *CED 2013 Final* electricity consumption forecasts are lower at the beginning of the forecast period than projected by *CED 2011*. Consumption dips slightly from 2012 to 2013, due to a combination of slow economic growth and an expected increase in electricity rates. Growth in the mid case is slightly less than *CED 2011*, due to rate increases and the addition of building and appliance standards. In 2022, only the high consumption scenario surpasses the level projected by *CED 2011*.

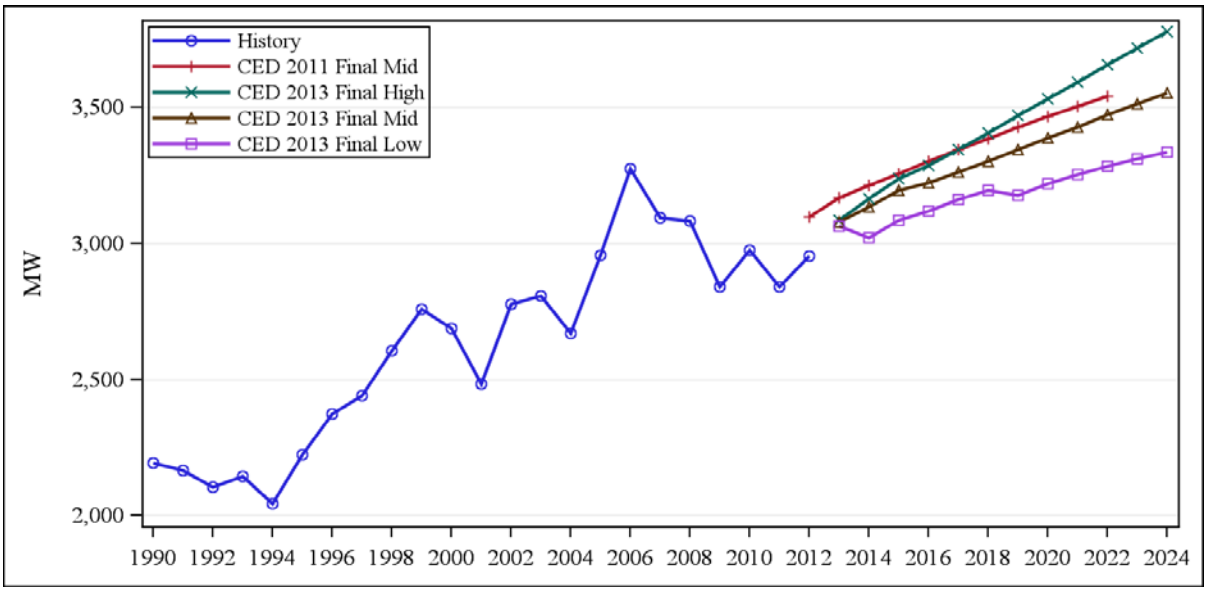
The SMUD planning area extreme temperatures were below average in 2012, so actual peak load was slightly lower than weather-normalized peak. The relationship between peak demand scenarios, shown in **Figure 83**, follows a similar pattern as the consumption forecast. As with consumption, the peak demand forecast begins at a lower value than projected in *CED 2011*, and all three scenarios remain below *CED 2011* values for most of the forecast period.

Figure 82: SMUD Planning Area Baseline Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

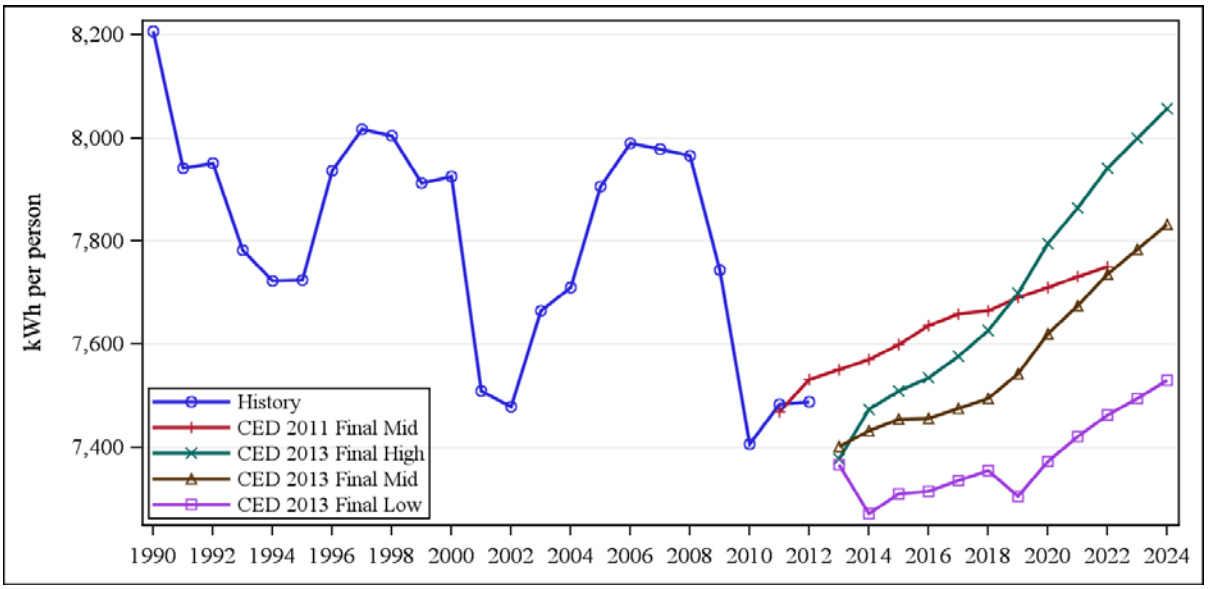
Figure 83: SMUD Planning Area Baseline Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

As **Figure 84** shows, per capita electricity consumption is lower in the *CED 2013 Final* demand scenarios throughout the forecast period compared to *CED 2011*. The drop in 2013 shows the combined effect of decreased consumption and increased population. Unlike *CED 2011*, which considered only a single population scenario, *CED 2013 Final* incorporates high, mid, and low population projections. While the high and mid consumption forecasts are nearly identical in 2013, there is some spread between population estimates for that year. As a result, the high per capita consumption scenario shown below actually begins from a lower point than the mid scenario.

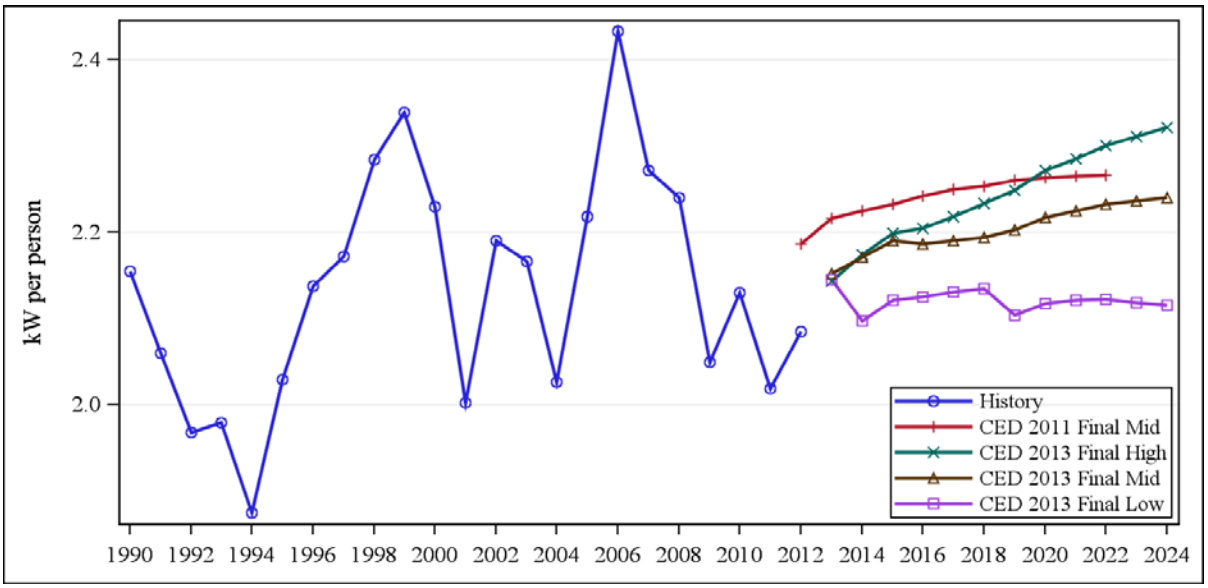
Figure 84: SMUD Planning Area Baseline per Capita Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 85 shows per capita peak demand. *CED 2013 Final* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. The per capita peak values are projected to remain in the range of recent historical levels for all three scenarios.

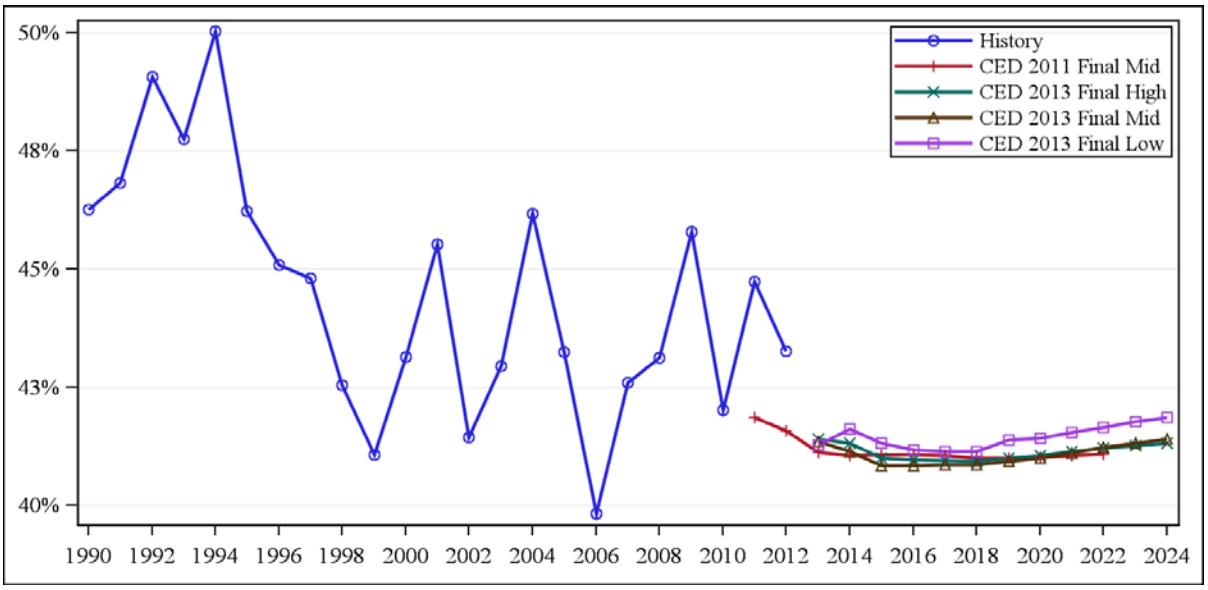
Figure 85: SMUD Planning Area Baseline per Capita Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 86 compares forecasted load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate "a needle peak"; higher load factors indicate a more stable load. SMUD's warm inland territory has a high saturation of air conditioners, leading to lower load factors than the other planning areas described in this volume. *CED 2013 Final* projects load factors are relatively constant over the forecast period and similar to *CED 2011*.

Figure 86: SMUD Planning Area Load Factors



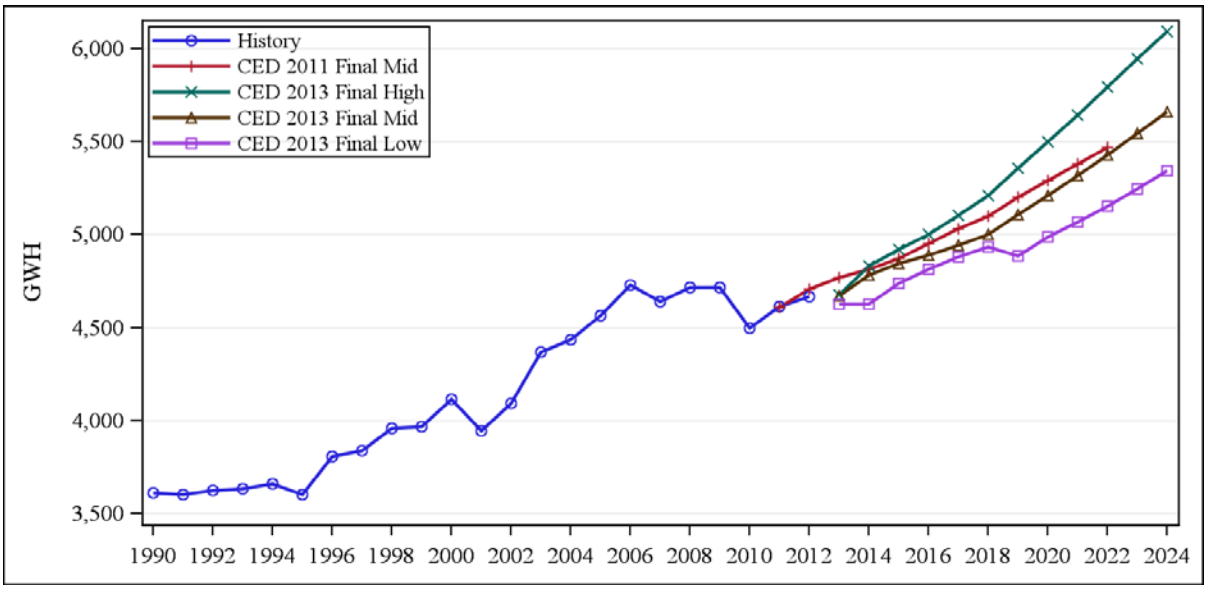
Source: California Energy Commission, Demand Analysis Office, 2013.

Sector Level Results and Input Assumptions

Residential Sector

Figure 87 compares *CED 2013 Final* and *CED 2011* SMUD residential forecasts. The growth rate for residential consumption over the entire forecast period is lower in the mid and low scenarios compared to *CED 2011* mainly because of income- and population-driven lower near-term consumption. The *CED 2013 Final* mid scenario growth rate is slightly higher than *CED 2011* after 2019 driven, in part, by the adoption of electric vehicles. The *CED 2013 Final* low demand scenario has a decline in 2019 due to the differences in the economic and demographic input assumptions.

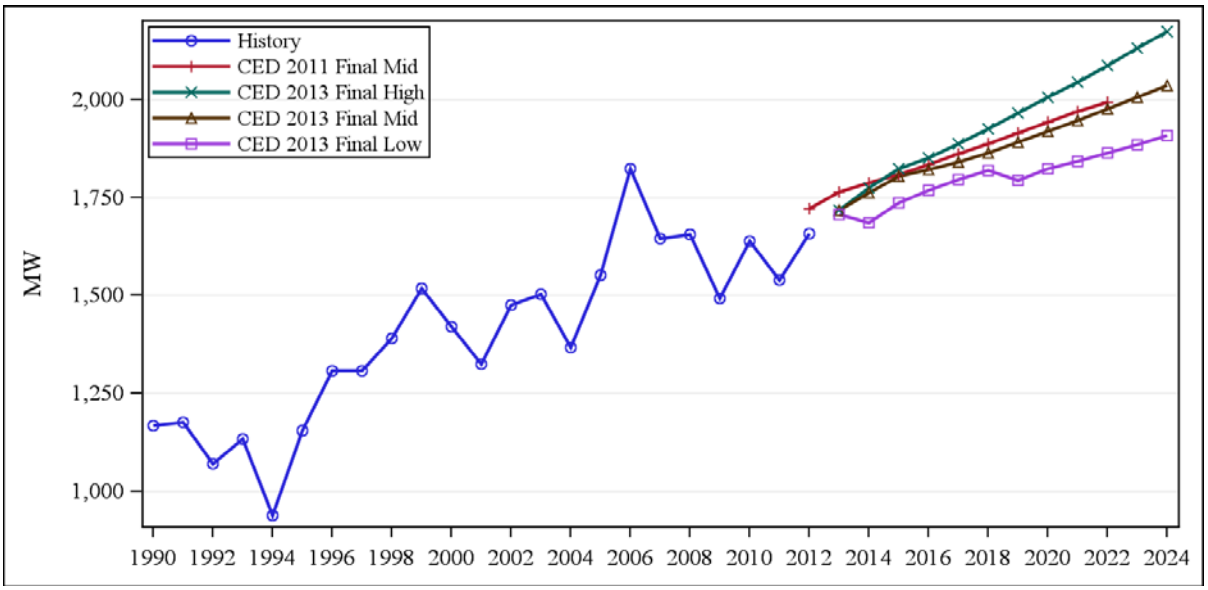
Figure 87: SMUD Planning Area Baseline Residential Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 88 compares the *CED 2013 Final* and *CED 2011* residential peak demand forecasts. As with consumption, lower near-term peaks result in the low and mid *CED 2013 Final* scenarios, remaining lower than *CED 2011*. The high *CED 2013 Final* scenario exceeds *CED 2011* in the long term.

Figure 88: SMUD Planning Area Baseline Residential Peak

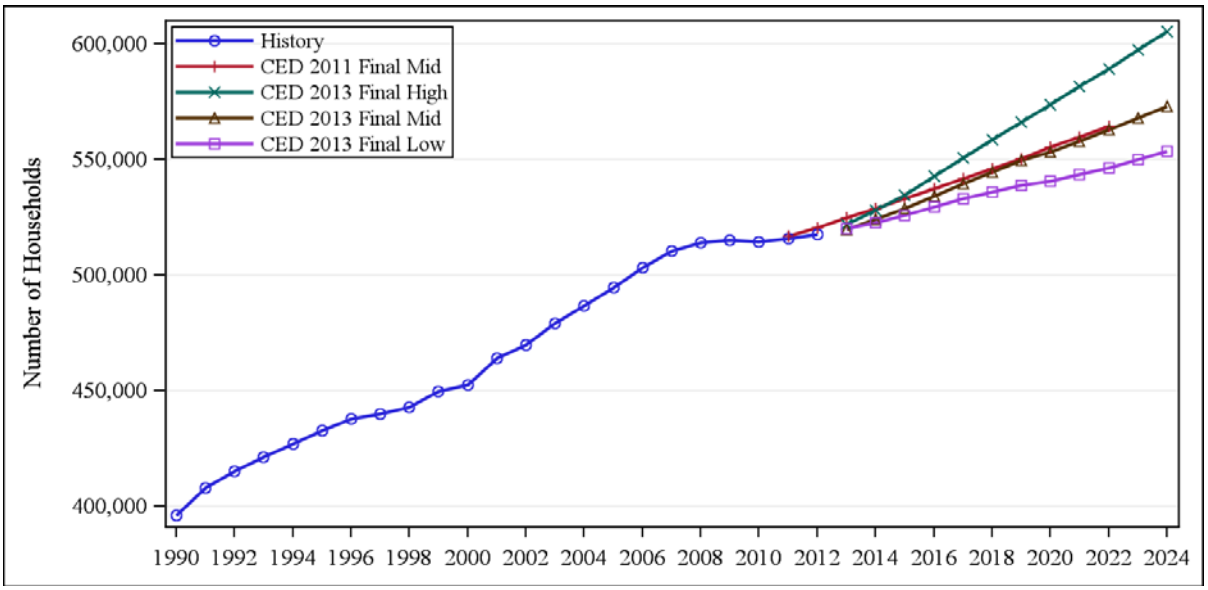


Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 89 and **Figure 90** compare the residential economic/demographic drivers used in the *CED 2013 Final* forecast with drivers used in *CED 2011*. **Figure 89** compares total households, and **Figure 90** compares persons-per-household projections. The mid *CED 2013 Final* forecast of households is slightly lower than *CED 2011* but roughly matches through 2022.

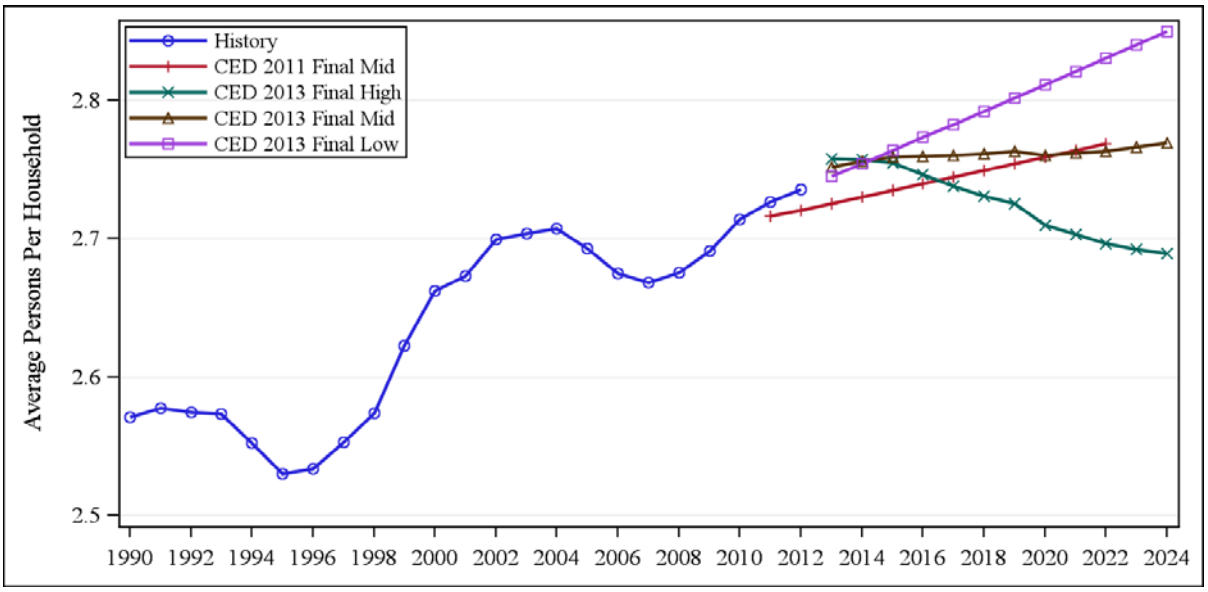
The low and mid *CED 2013 Final* scenario persons per household growth rates are lower than the *CED 2011* scenario. However, both the high and mid *CED 2013 Final* scenarios remain higher than the *CED 2011* persons per household throughout the forecast. In the *CED 2013 Final* low scenario, persons per household decline below the *CED 2011* persons per household in 2017.

Figure 89: SMUD Planning Area Residential Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

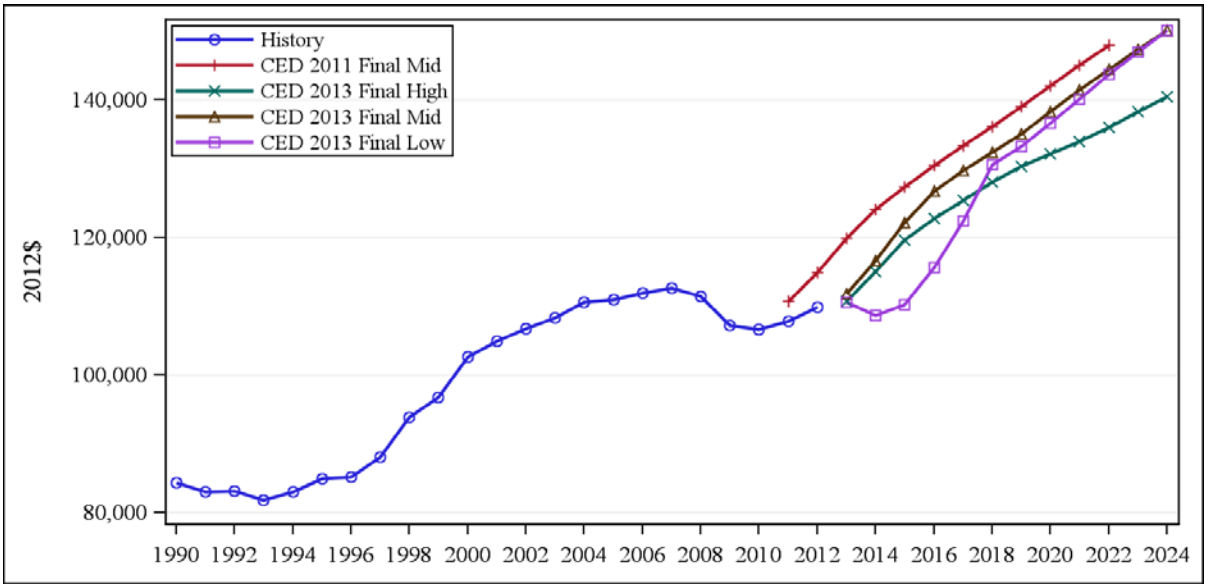
Figure 90: SMUD Planning Area Persons per Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 91 compares average household income in the two forecasts. Lower near-term average household incomes and growth rates that never consistently exceed *CED 2011* growth rates result in average household incomes lower than incomes in *CED 2011*. The significantly lower household growth rates in the *CED 2013 Final* low demand scenario results in average household incomes exceeding the mid demand scenario by 2017.

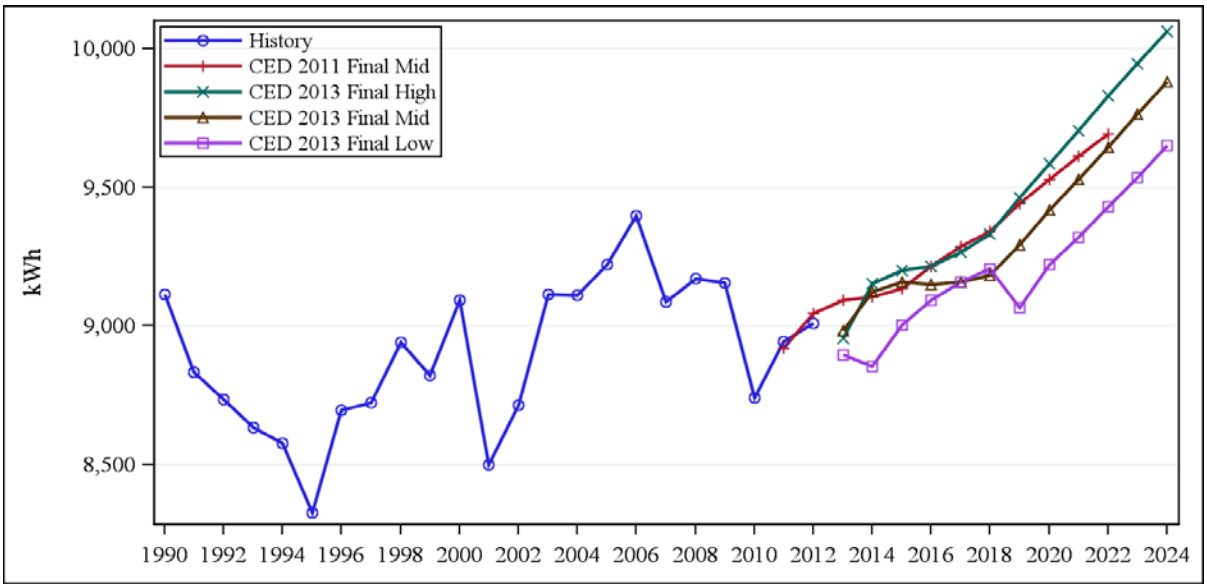
Figure 91: SMUD Planning Area Average Household Income Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 92 compares electricity consumption per household in the two forecasts. Consumption per household stays near the middle of the historical series for the first five forecast years but significantly surpasses historical highs by the end of the forecast period. As in the case of per capita electricity consumption, higher growth in consumption per household results from faster income growth and increased numbers of electric vehicles. The use per household for all three scenarios has decreased relative to *CED 2011* due to lower near-term consumption in the low and mid scenarios and rapid household growth in the high demand scenario.

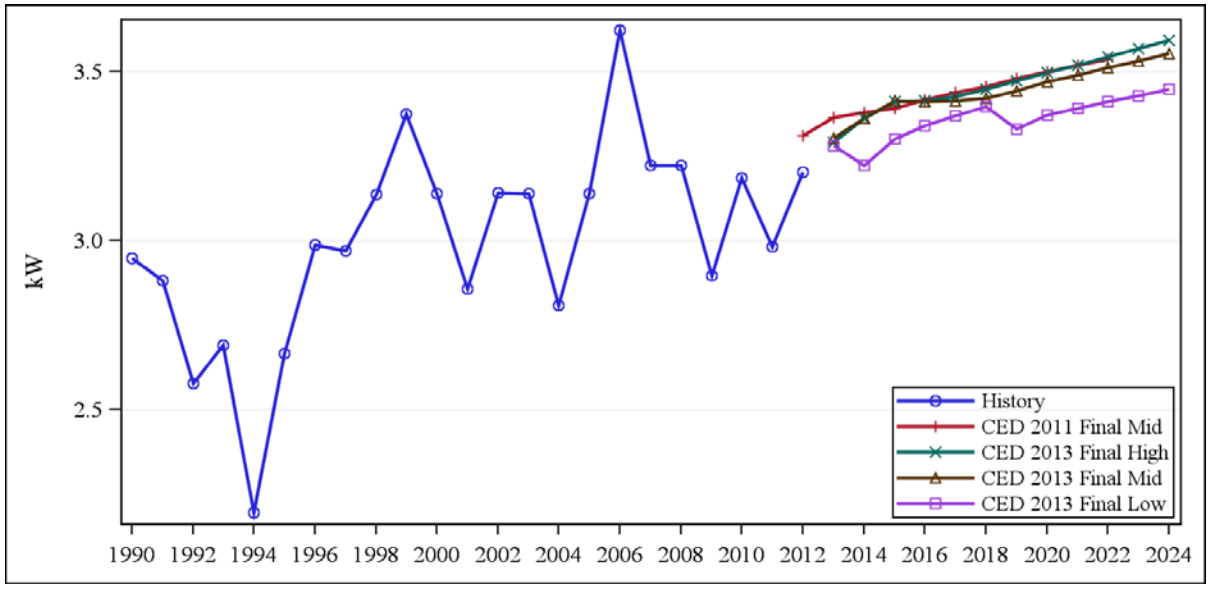
Figure 92: SMUD Planning Area Baseline Electricity Use per Household



Source: California Energy Commission, Demand Analysis Office, 2013.

The increases in peak use per household for all three new scenarios shown in **Figure 93** are less than those predicted for energy use per household, since charging electric vehicles has little effect on peak compared to consumption. Dampened near-term demand due to lower consumption and higher housing results in a relatively flat near-term peak household demand. By 2020 *CED 2013 Final* per household peak use growth rates are consistent with the *CED 2011* scenario.

Figure 93: SMUD Planning Area Baseline Peak Use per Household

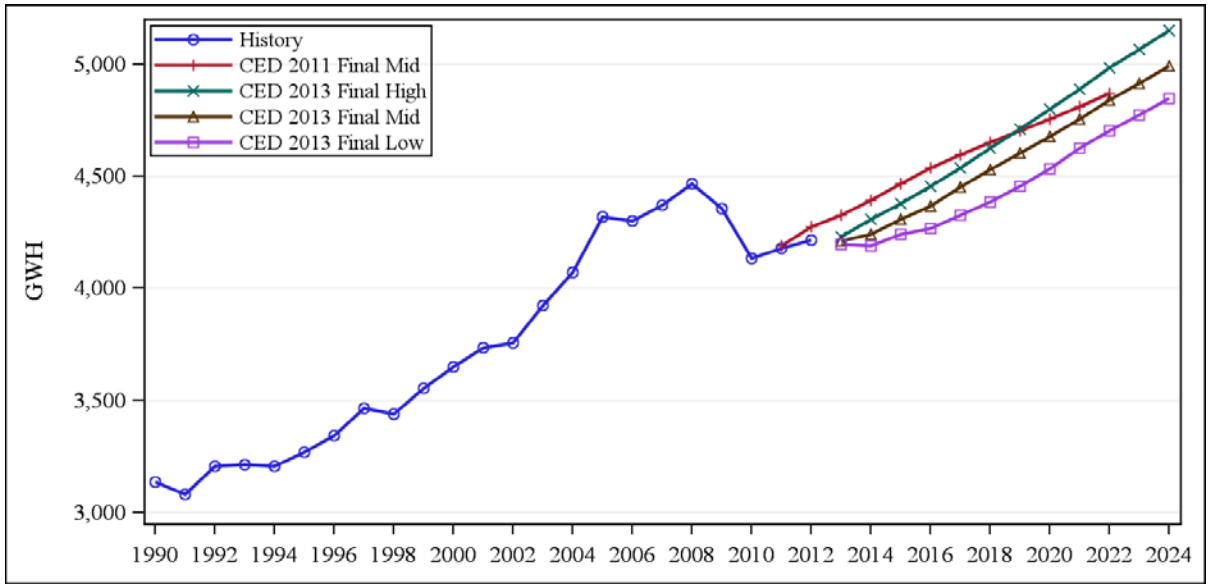


Source: California Energy Commission, Demand Analysis Office, 2013.

Commercial Sector

Figure 94 compares the SMUD commercial sector electricity consumption forecasts. The *CED 2013 Final* consumption scenarios are lower than *CED 2011* throughout the forecast period. The differences are primarily caused by a lower starting point due to lower estimates of recent historical commercial consumption. The growth rate of commercial consumption later in the forecast period is slightly higher in all three scenarios than in *CED 2011* because of faster growth in projected floor space.

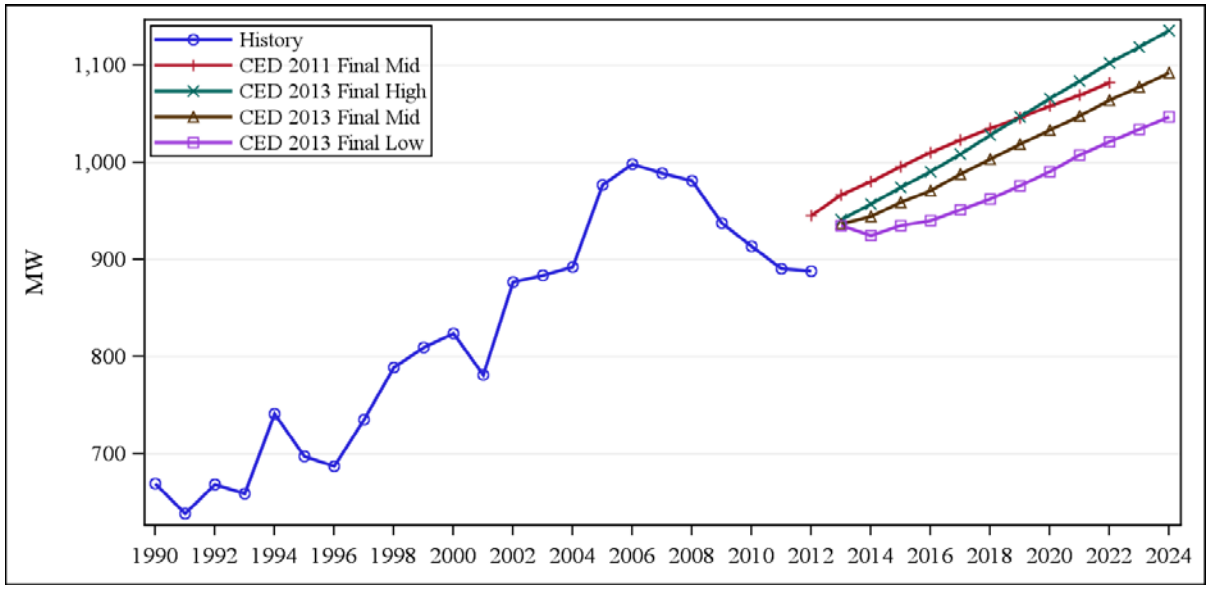
Figure 94: SMUD Planning Area Baseline Commercial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 95 compares the SMUD commercial sector peak demand forecasts. Growth in both forecasts is driven by the underlying electricity consumption forecast, which exhibits a similar pattern. The *CED 2013 Final* high demand scenario produces a higher peak forecast due to faster growth in projected floor space.

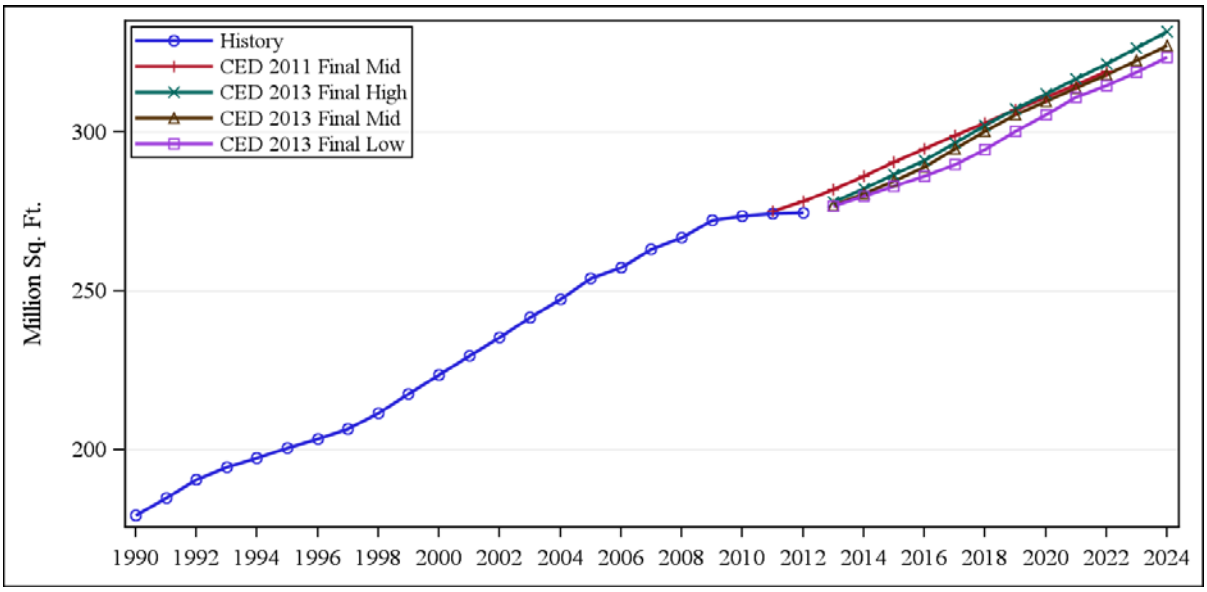
Figure 95: SMUD Planning Area Baseline Commercial Sector Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

In staff's commercial building sector forecasting model, floor space by building type (such as retail, offices, and schools) is the key driver. **Figure 96** compares SMUD commercial floor space projections. *CED 2013 Final* floor space projections are somewhat lower over the forecast period than those used in the previous forecast due to a lower starting point. However, the growth rate in the high case *CED 2013 Final* scenario is slightly higher than in *CED 2011*.

Figure 96: SMUD Planning Area Commercial Floor Space

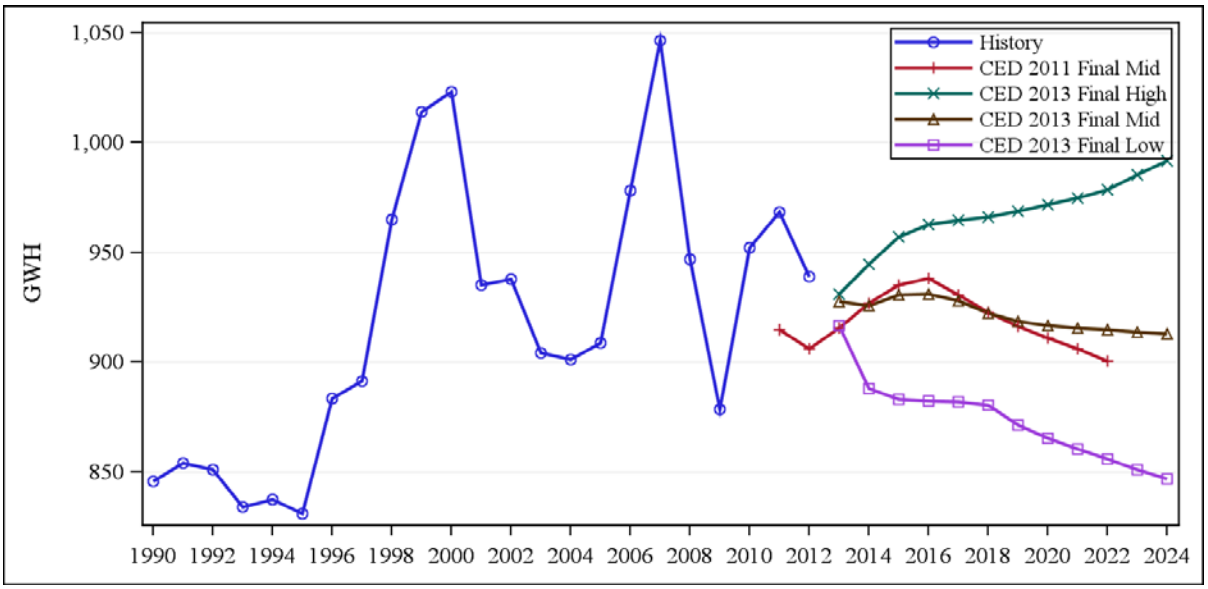


Source: California Energy Commission, Demand Analysis Office, 2013.

Industrial Sector

Figure 97 compares the SMUD planning area industrial sector electricity consumption forecasts. For *CED 2013 Final,* the mid and low case industrial consumption forecasts are lower than the *CED 2011* forecast. However, projected growth in the high case is higher than was projected in the *CED 2011* forecast due to more optimistic economic projections. The mid case scenario follows a similar growth pattern as the *CED 2011* forecast but starts from a slightly higher historical starting point. The differences in consumption scenarios are mainly driven by differences in economic output.

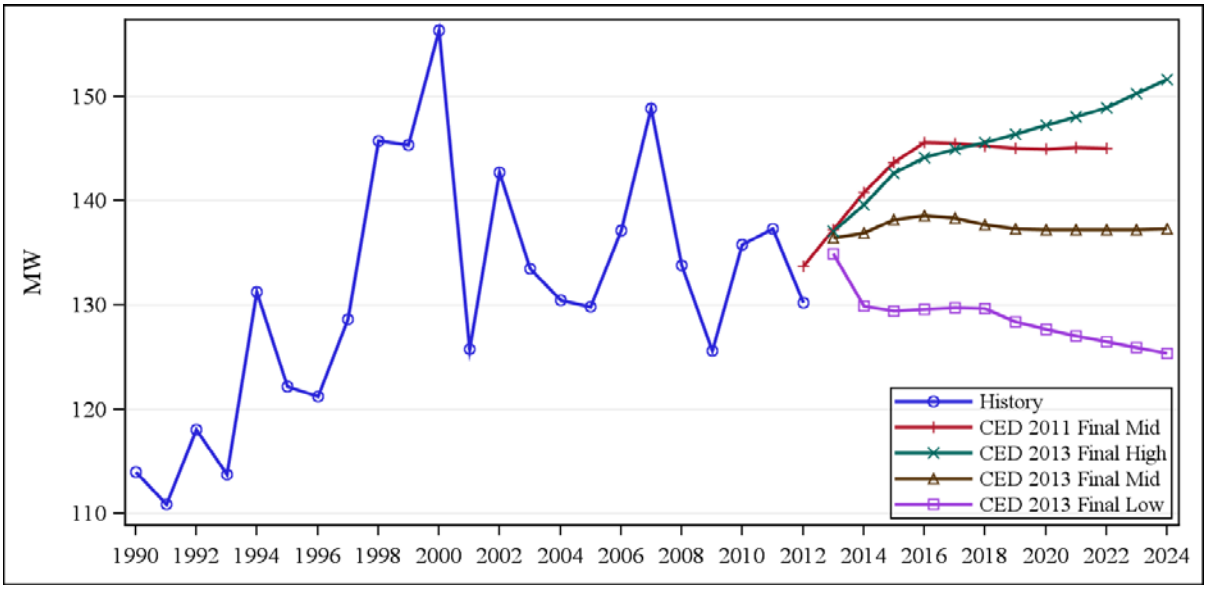
Figure 97: SMUD Planning Area Baseline Industrial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 98 compares the SMUD industrial sector peak forecasts. The *CED 2013 Final* industrial peak forecasts follow the same pattern as the consumption forecasts. The *CED 2013 Final* mid and low case scenarios are lower than *CED 2011* throughout the forecast period. For *CED 2013 Final* high case, the growth rate later in the forecast period is higher than in *CED 2011* because of faster growth in projected floor space.

Figure 98: SMUD Planning Area Baseline Industrial Sector Peak

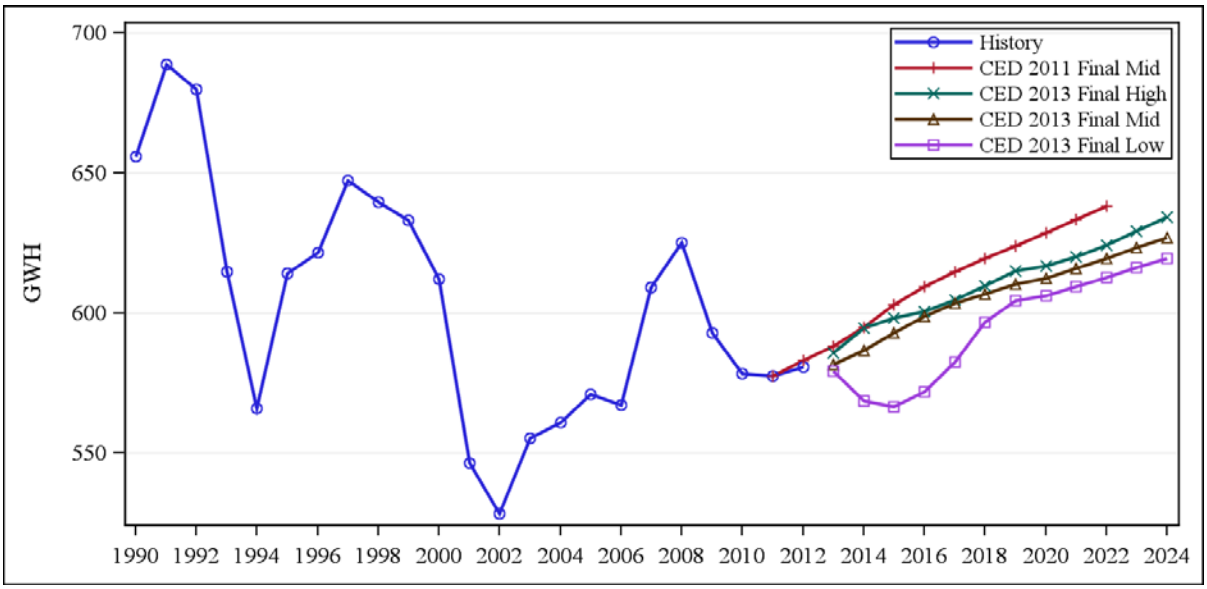


Source: California Energy Commission, Demand Analysis Office, 2013.

Other Sectors

Figure 99 compares the electricity consumption forecasts for the TCU sector, which includes street lighting. *CED 2013 Final* high case is nearly identical to *CED 2011.* The mid case in the new forecast grows at a slower rate than *CED 2011* and is roughly 15 GWh lower by the end of the forecast. In the recession scenario modeled in the low case, electricity consumption bottoms out in 2015 and is subsequently followed by a strong recovery though 2018, where growth resumes at a rate similar to that of the mid case.

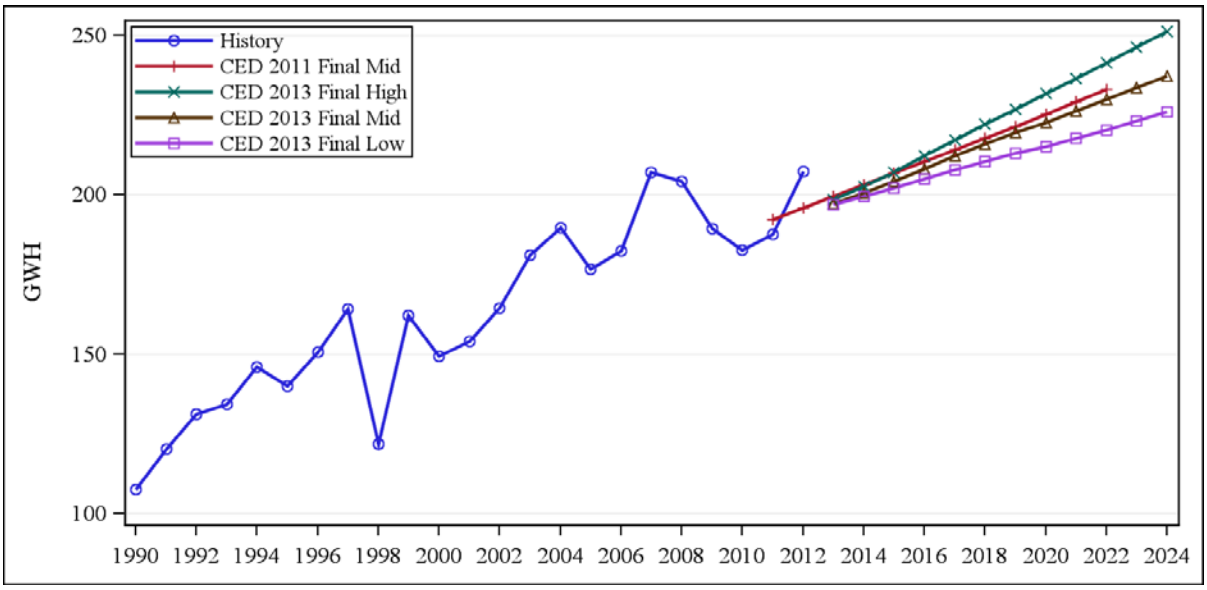
Figure 99: SMUD Planning Area Baseline Transportation, Communication, Utilities, and Street Lighting Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 100 compares the electricity consumption forecasts for the agriculture and water pumping sectors. The *CED 2013 Final* mid case starts just below what was predicted by *CED 2011* and has a similar rate of growth over the forecast period. All three demand scenarios are projected to grow over time, primarily because of a projected increase in groundwater pumping.

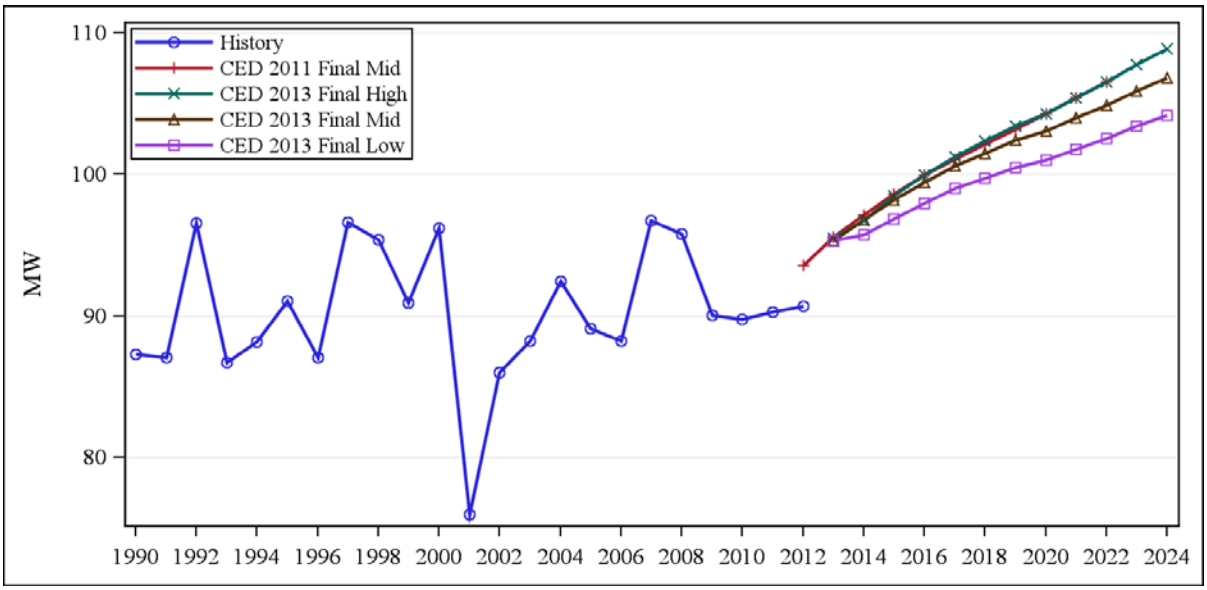
Figure 100: SMUD Planning Area Baseline Agriculture and Water Pumping Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 101 compares projected combined peak for the transportation, communication, utilities, street lighting, agriculture, and water pumping sectors. The *CED 2013 Final* mid and high cases are similar to *CED 2011*. The difference in the low case reaches 4 MW by the end of the forecast period.

Figure 101: SMUD Planning Area Baseline Other Sector Peak

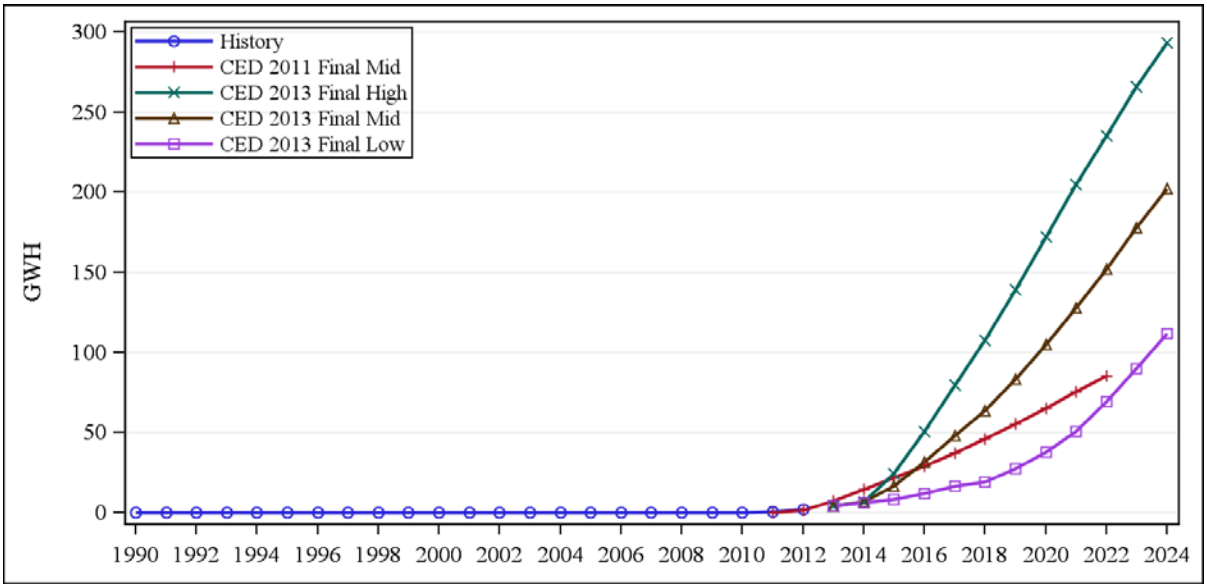


Source: California Energy Commission, Demand Analysis Office, 2013.

Electric Vehicles

Consumption by EVs in the SMUD planning area is expected to reach more than 100 GWh in the low demand scenario and nearly 300 GWh in the high demand scenario. Staff assumes most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 102** presents the SMUD planning area EV consumption forecast for each of the demand scenarios.

Figure 102: SMUD Electricity Consumption by Electric Vehicles



Source: California Energy Commission, Demand Analysis Office, 2013.

Self-Generation

The peak demand forecast is reduced by the projected impacts of distributed PV, solar thermal, and CHP systems, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on a combination of installation trend analysis and predictive modeling. **Table 21** shows the forecast of peak impacts from PV and non-PV self-generation. Staff projects between 60 and 84 MW of peak reduction from PV systems by 2024. Peak reductions are based on installed PV system capacities ranging from 157 MW by 2024 in the high demand case to 218 MW by 2024 in the low demand case.

Table 21: SMUD Planning Area Self-Generation Peak Impacts (MW)

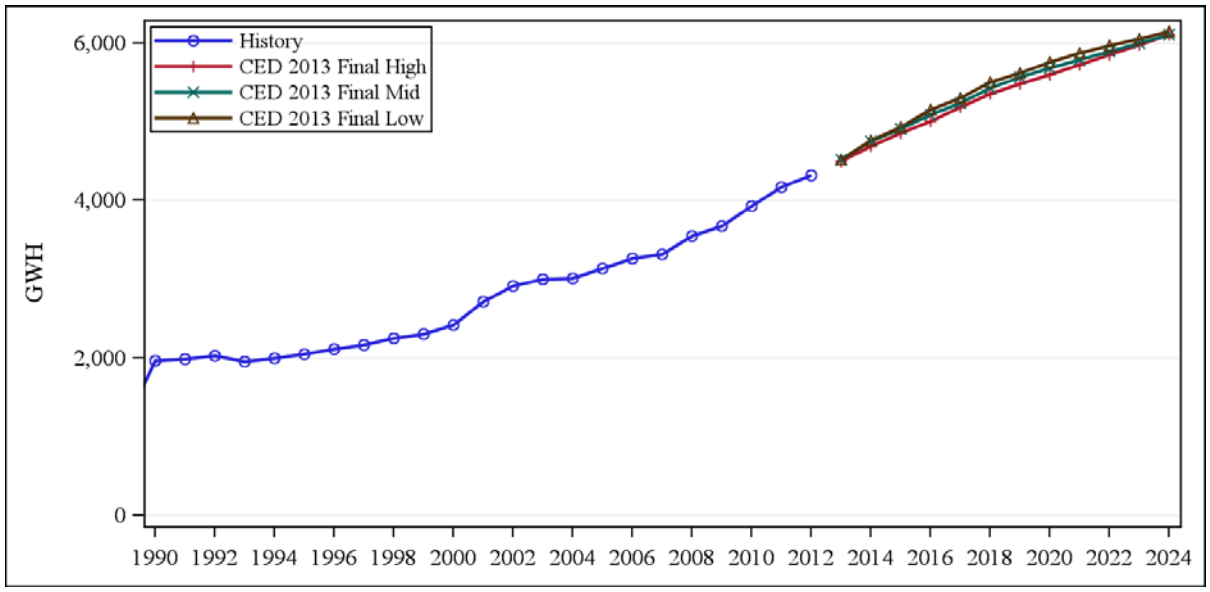
Scenario	Technology	1990	2000	2012	2015	2020	2024
Low Demand	Photovoltaic	0.0	1.0	23.8	33.1	52.1	84.2
	Non-Photovoltaic	0.0	0.0	0.1	0.1	0.1	0.1
	Total	**0.0**	**1.0**	**23.9**	**33.2**	**52.2**	**84.3**
Mid Demand	Photovoltaic	0.0	1.0	23.8	31.8	47.0	70.1
	Non-Photovoltaic	0.0	0.0	0.1	0.1	0.1	0.1
	Total	**0.0**	**1.0**	**23.9**	**31.9**	**47.1**	**70.2**
High Demand	Photovoltaic	0.0	1.0	23.8	30.5	41.9	60.0
	Non-Photovoltaic	0.0	0.0	0.1	0.1	0.1	0.1
	Total	**0.0**	**1.0**	**23.9**	**30.6**	**42.0**	**60.1**

Source: California Energy Commission, Demand Analysis Office, 2013.

Conservation/Efficiency Impacts

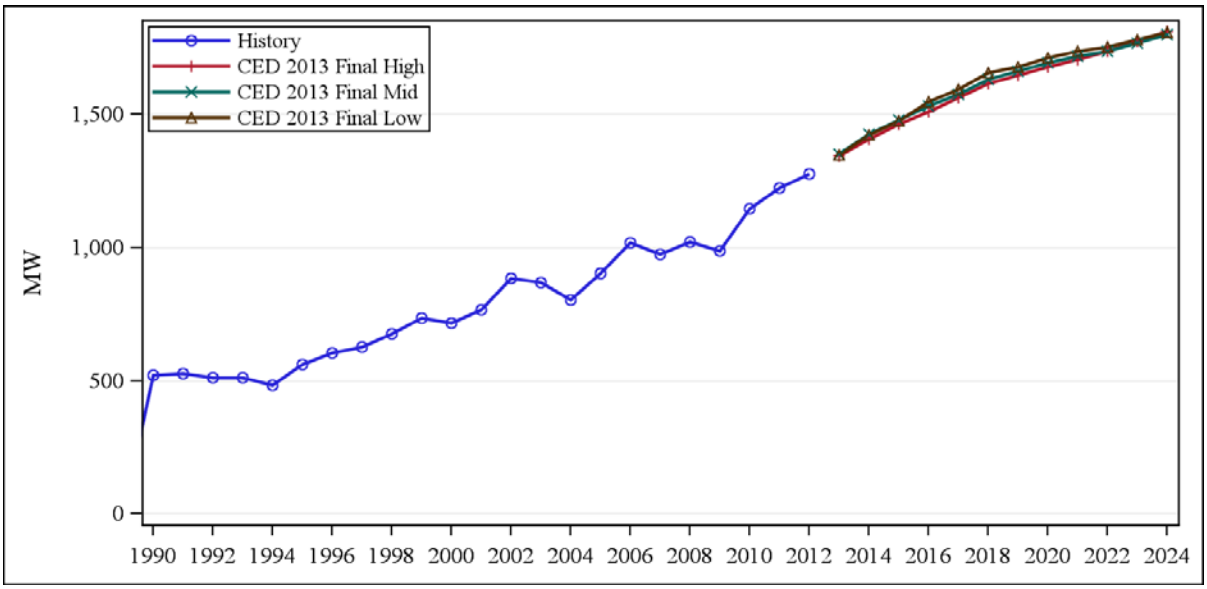
Figure 103 and **Figure 104** show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented through 2014; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Within the demand scenarios, higher demand yields more standards savings since new construction and appliance usage increase, while lower demand is associated with more program savings and higher rates (and therefore more price effects). The net result is that savings totals among the scenarios are very similar.

Figure 103: SMUD Planning Area Baseline Electricity Consumption Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 104: SMUD Planning Area Baseline Electricity Peak Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Table 22 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5 – 2.0 percent due to higher home and commercial floor space construction and 1.5 – 2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings, just as they were in *CED 2011*. For *CED 2013 Final*, new savings impacts were included for the 2013 Title 24 standards update and impacts from standards affecting battery chargers. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1, Chapter 3 provides more detail on staff work related to energy efficiency and conservation.

Table 22: SMUD Planning Area Baseline Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	402	171	**573**	72	40	**112**	**684**
2000	609	412	**1,021**	185	106	**290**	**1,311**
2012	785	835	**1,620**	368	190	**558**	**2,178**
2015	840	1,090	**1,930**	419	229	**648**	**2,578**
2020	936	1,347	**2,283**	566	325	**891**	**3,174**
2024	1,007	1,444	**2,451**	679	378	**1,058**	**3,509**
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	129	55	**184**	15	9	**24**	**208**
2000	210	142	**351**	42	24	**66**	**418**
2012	287	305	**592**	82	42	**124**	**716**
2015	312	405	**716**	93	51	**144**	**861**
2020	343	493	**836**	126	72	**198**	**1,034**
2024	363	521	**884**	151	84	**235**	**1,119**

Source: California Energy Commission, Demand Analysis Office, 2013.

CHAPTER 5:
Los Angeles Department of Water and Power

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

This chapter is organized as follows. First, forecasted consumption and peak loads for the LADWP planning area are discussed; both total and per capita values are presented. The *CED 2013 Final* values are compared to the adopted *CED 2011* mid scenario, with differences between the two forecasts explained. The forecasted load factors, jointly determined by the consumption and peak load estimates, are 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 2011,* and differences between the two are discussed. Third, the chapter discusses the forecasts of electric vehicles, self-generation, and the impacts of conservation and efficiency programs. Finally, forecasts of electricity consumption and peak demand are presented for each climate zone within the LADWP planning area.

Los Angeles Area Economic and Demographic Outlook

This section provides general information on the economic and demographic outlook for the Los Angeles Area using outlooks provided by Moody's, IHS Global Insight, UCLA, the California Department of Finance, and the U.S. Census Bureau. These outlooks are based on economic data available in August 2013.

The pace of Los Angeles County's recovery slowed modestly in the second quarter of 2013. Strengthening consumer services were partially offset by weakness in manufacturing and local K-12 expenditures and payrolls. Orange County's recovery is improving on the strength of regional and national housing markets, technology, and professional and consumer services. Riverside and San Bernardino Counties' recovery showed signs of weakening midway through the year. Homebuilding has yet to fill the void left by the completion of large-scale solar plants, and medical manufacturing continues to downsize.

Payrolls in Los Angeles increased, lifted by restaurants and health care, but layoffs in tech manufacturing, filmmaking, and local government tempered the gains. The unemployment rate has stopped its descent, but employment stalled, and the labor force continued to grow. According to UCLA, since the recession, the Los Angeles increase in labor force has been self-employed workers. Orange County has the strongest payroll gains from semiconductor manufacturing and restaurant hiring, but improvements are visible in nearly all industries. Riverside and San Bernardino Counties have increased payrolls in transportation and warehousing. The unemployment rate has fallen to its lowest level since the fourth quarter of 2008, but mainly because of a decline in the labor force.

Housing market conditions in the Los Angeles region are improving throughout all counties. The median price for a single-family existing house is rising as the inventory of houses for sale dwindles. The improving outlook for construction extends to nonresidential building.

Los Angeles County's recovery will strengthen in 2014 because of housing, visitor-dependent industries, and increased spending on entertainment production and advertising. Spending and payroll cuts by cash-strapped local and federal governments remain a near-term risk. Steady job gains will push the unemployment rate below 9 percent by the mid-2014. Orange County's recovery will strengthen in 2014 and remain strong through 2015. Technology, tourism, and renewed housing-related industries will be significant drivers. Federal and local budget austerity in 2014 is a downside risk. Riverside and San Bernardino Counties' recovery will broaden in 2014, boosted by renewed housing and expanding transportation and warehousing. Local governments will trail improvements elsewhere and will be the metro area's lingering weakness.

In the long term, high business and housing costs and net domestic outmigration in Los Angeles will dampen job and output growth. Orange County's links to the global economy and a skilled workforce will support expansion and help attract investments. However, high business and housing costs will slow growth. Longer term, Riverside and San Bernardino Counties' available land and low costs will help drive growth.

Baseline Forecast Results

For this forecast, three demand scenarios were developed. The high demand scenario includes high economic and demographic projections, low energy price projections, and low efficiency impact assumptions. The low demand scenario includes low economic and demographic projections, high energy price projections, and high efficiency impact assumptions. Volume 1 provides more detail on the construction of the demand scenarios.

Table 23 compares *CED 2013 Final* high, mid, and low demand scenarios with the mid scenario from *CED 2011* for electricity consumption and peak demand for selected years. Comprehensive results are available electronically as a set of forms posted alongside this report.[11]

13 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 23: LADWP Planning Area Baseline Forecast Comparison

Consumption (GWH)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	23,038	23,038	23,038	23,038
2000	23,562	24,018	24,018	24,018
2012	25,212	25,220	25,220	25,220
2015	26,074	25,954	25,531	24,910
2020	27,587	27,815	26,772	25,788
2024	--	29,576	28,162	26,945
Average Annual Growth Rates				
1990 - 2000	0.23%	0.42%	0.42%	0.42%
2000 - 2012	0.57%	0.41%	0.41%	0.41%
2012 - 2015	1.13%	0.96%	0.41%	-0.41%
2012 - 2020	1.13%	1.23%	0.75%	0.28%
2012 - 2024	--	1.34%	0.92%	0.55%
Peak (MW)				
	CED 2011 Mid	*CED 2013 Final High*	*CED 2013 Final Mid*	*CED 2013 Final Low*
1990	5,341	5,341	5,341	5,341
2000	5,344	5,344	5,344	5,344
2012	-	5,782	5,782	5,782
2012*	6,084	5,731	5,731	5,731
2015	6,386	6,095	5,983	5,737
2020	6,774	6,542	6,279	5,926
2024	--	6,912	6,546	6,119
Average Annual Growth Rates				
1990 - 2000	0.01%	0.01%	0.01%	0.01%
2000 - 2012	1.09%	0.58%	0.58%	0.58%
2012* - 2015	1.63%	2.07%	1.44%	0.03%
2012* - 2020	1.35%	1.67%	1.15%	0.42%
2012* - 2024	--	1.57%	1.11%	0.55%
Historical values are shaded				
*Weather normalized: *CED 2013 Final* uses a weather-normalized peak value derived from the actual 2012 peak for calculating growth rates during the forecast period				

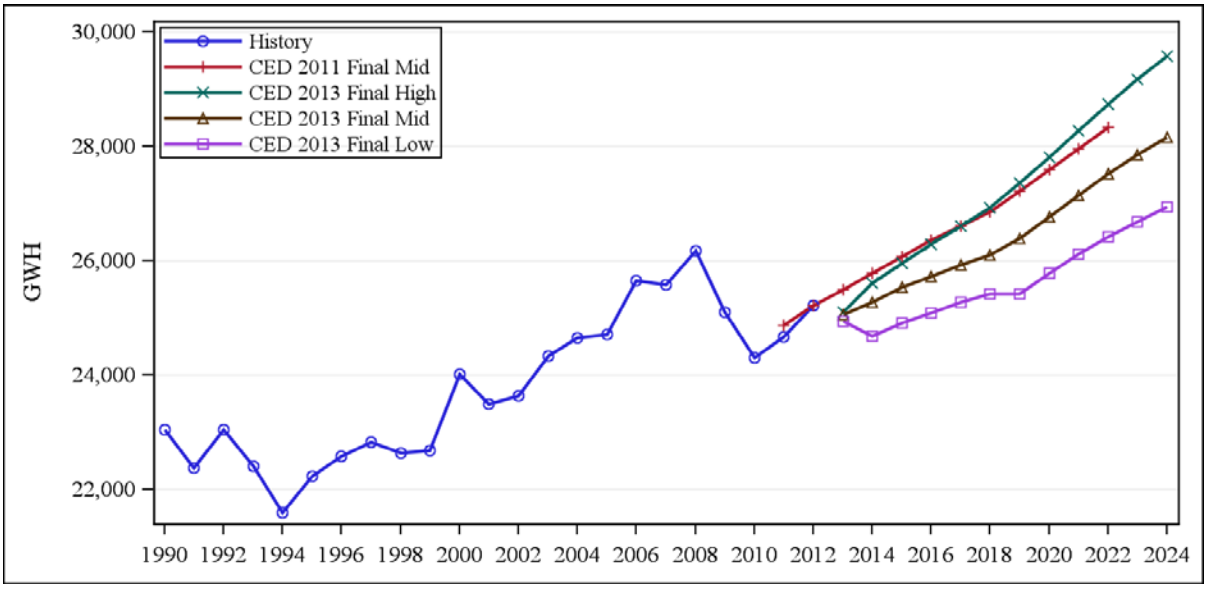
Source: California Energy Commission, Demand Analysis Office, 2013.

In the LADWP planning area, the *CED 2013 Final* mid demand electricity consumption is 3.0 percent lower than *CED 2011* in 2020, the result of a lower-than-projected level of consumption in 2012 and a lower growth rate over the forecast period. By 2024, the *CED 2013 Final* high demand level is 5.0 percent higher than the mid case, while the low demand scenario is 4.3 percent lower. For peak demand, the *CED 2013 Final* high and low scenarios are 5.6 percent higher and 6.5 percent lower, respectively, than the mid case by 2024. Weather-normalized peak demand in 2012 was 5.8 percent lower than predicted in *CED 2011*.

As shown in **Figure 105**, *CED 2013 Final* electricity consumption forecasts are lower at the beginning of the forecast period than projected by *CED 2011*. Consumption dips slightly from 2012 to 2013, due to a combination of slow economic growth, an increase in electricity rates, and the assumption of normal weather (2012 was a particularly warm year). Growth in the mid case is less than *CED 2011*, due to rate increases and the addition of building and appliance standards. In 2022, only the high consumption scenario surpasses the level projected by *CED 2011*.

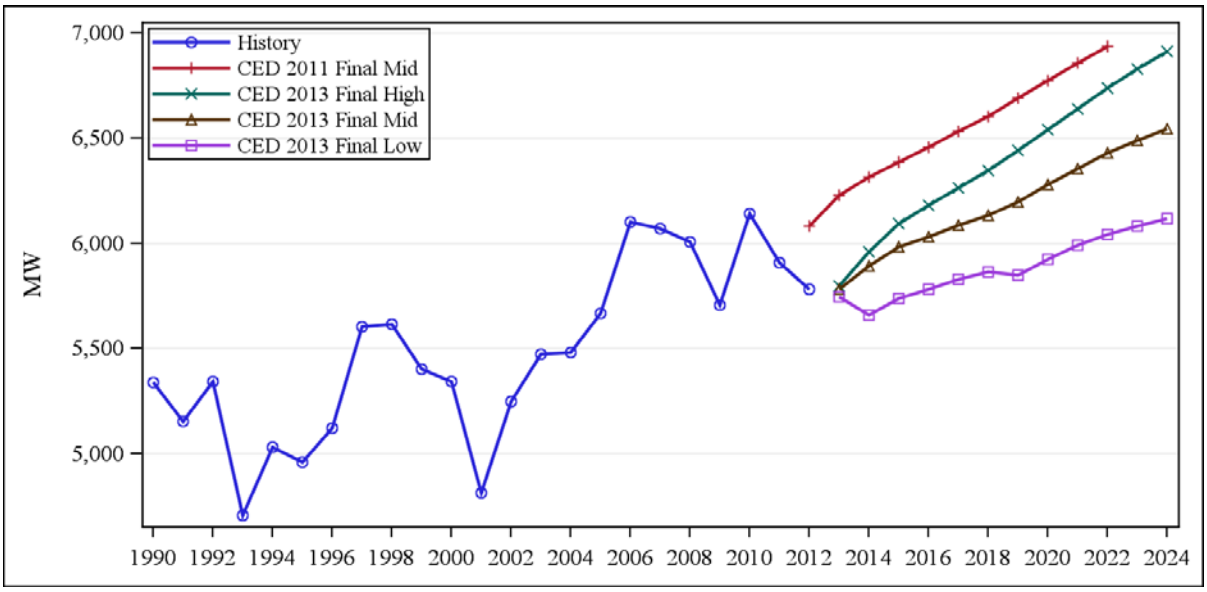
In 2012, the LADWP planning area experienced an above-average peak temperature. The actual peak load was higher than weather-normalized peak. The relationship between peak demand scenarios, shown in **Figure 106**, follows a similar pattern as the consumption forecast. As with consumption, the peak demand forecast begins at a lower value than projected in *CED 2011*, and all three scenarios remain below *CED 2011* values for the entire forecast period. Peak growth is slightly higher than consumption due in part to efficiency considerations—such as increasing lighting efficiency—that have a greater impact on consumption than on peak.

Figure 105: LADWP Planning Area Baseline Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

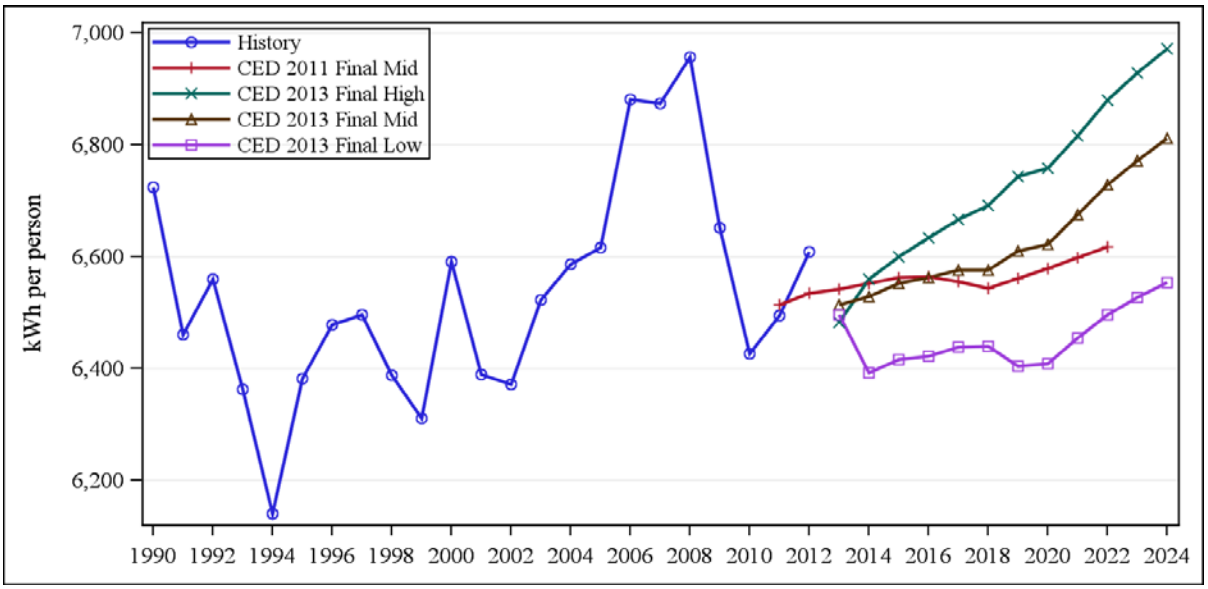
Figure 106: LADWP Planning Area Baseline Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

As **Figure 107** shows, per capita electricity consumption in the *CED 2013 Final* forecast begins at a lower point but grows at a faster rate when compared to *CED 2011*. The drop in 2013 shows the combined effect of decreased consumption and increased population. Unlike *CED 2011*, which considered only a single population scenario, *CED 2013 Final* incorporates high, mid, and low population projections. While the high and mid consumption forecasts are nearly identical in 2013, there is some spread between population estimates for that year. As a result, the high per capita consumption scenario shown below actually begins from a lower point than the mid scenario.

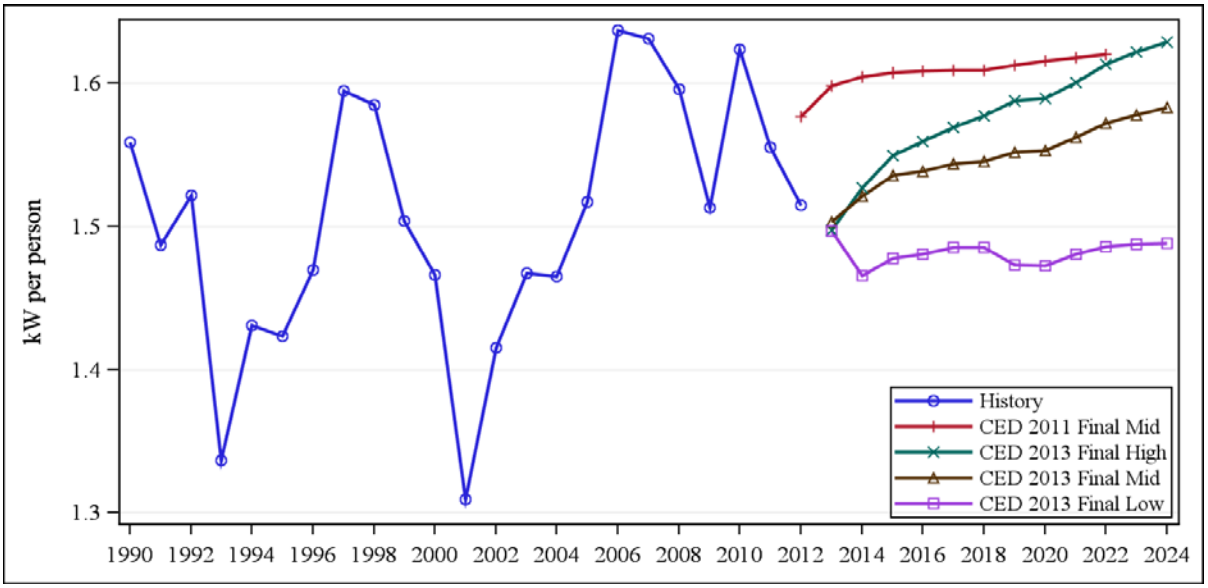
Figure 107: LADWP Planning Area Baseline per Capita Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 108 shows per capita peak demand. *CED 2013 Final* per capita peak scenarios follow the same pattern as the per capita consumption scenarios. The per capita peak values are projected to remain in the range of recent historical levels for all three scenarios and below the values projected by *CED 2011*.

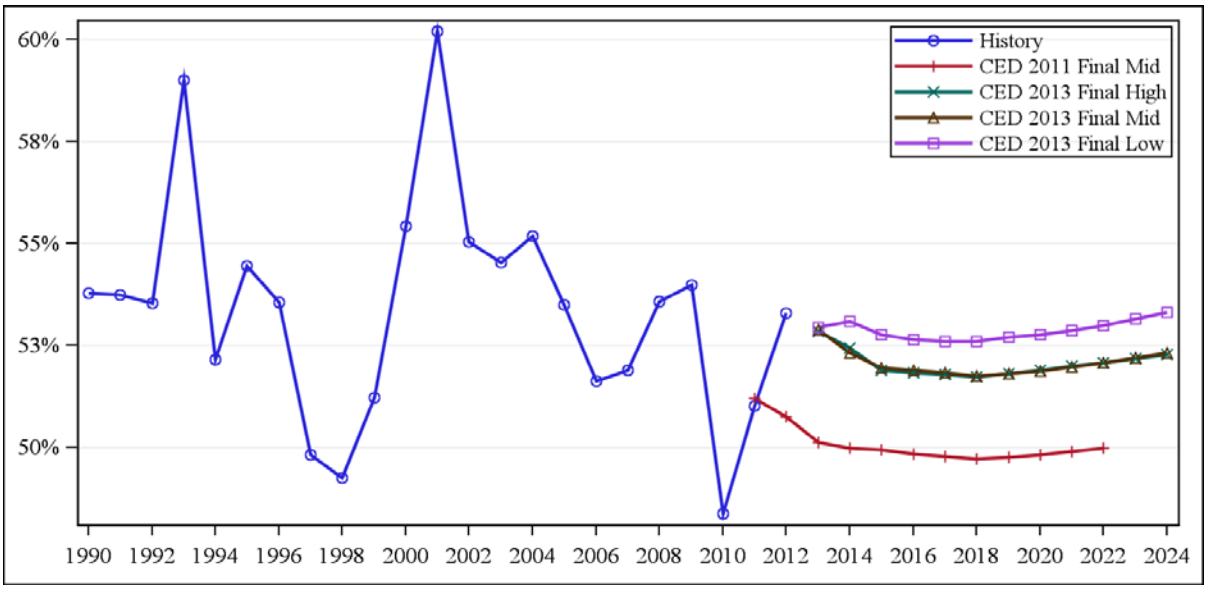
Figure 108: LADWP Planning Area Baseline Per Capita Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 109 compares forecasted load factors. The load factor is a measure of the increase in peak demand relative to annual electricity consumption. Lower load factors indicate "a needle peak;" higher load factors indicate a more stable load. Greater population and economic growth in the LADWP planning area has been taking place in hotter inland areas, leading to a higher saturation and use of central air conditioning. *CED 2013 Final* projects load factors are relatively constant over the forecast period.

Figure 109: LADWP Planning Area Load Factors



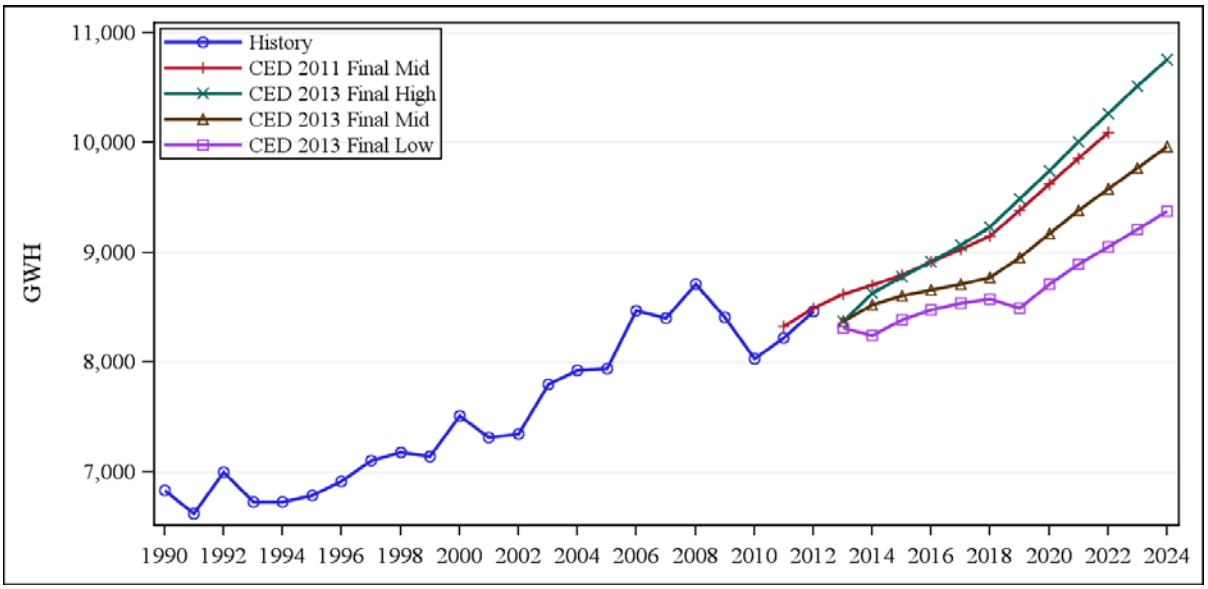
Source: California Energy Commission, Demand Analysis Office, 2013.

Sector Level Results and Input Assumptions

Residential Sector

Figure 110 compares the *CED 2013 Final* and *CED 2011* LADWP planning area residential forecasts. *CED 2013 Final* is lower than *CED 2011* over the entire forecast period for the low and mid scenarios due to slow economic growth, lower income levels, and population change impacts. The high *CED 2013 Final* scenario exceeds the *CED 2011* scenario by 2014 due to higher average household incomes and increased household populations. The *CED 2013 Final* mid and low scenario growth rates roughly match the *CED 2011* scenario after 2019 and are driven, in part, by the adoption of electric vehicles. The *CED 2013 Final* low demand scenario has a decline in 2019 due to the differences in the economic and demographic input assumptions.

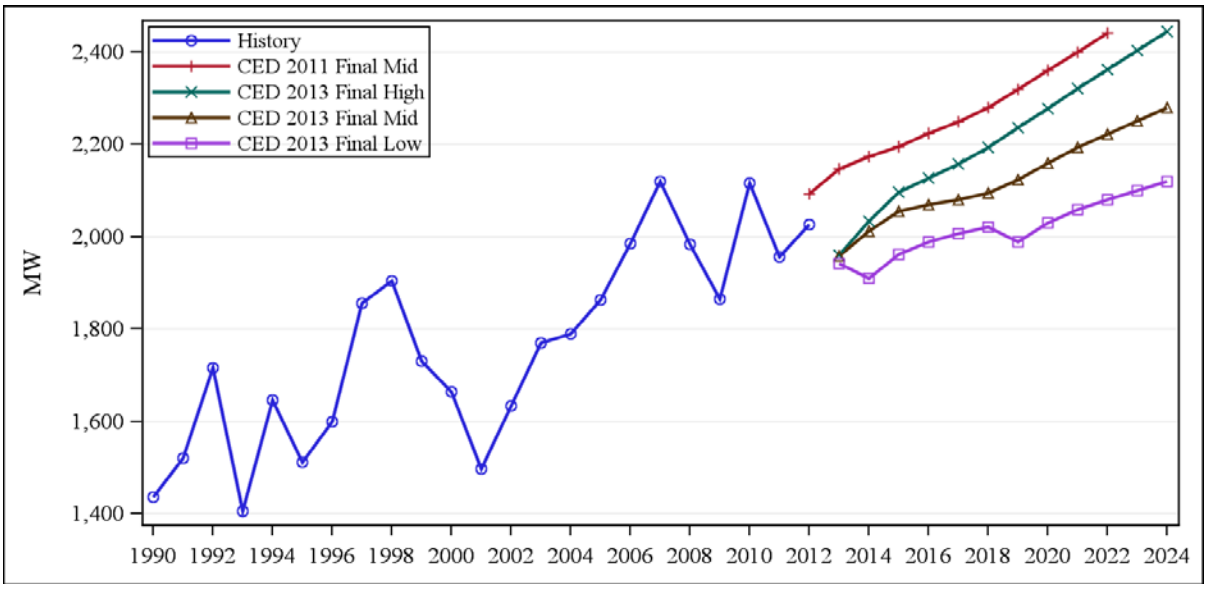
Figure 110: LADWP Planning Area Baseline Residential Consumption



Source: California Energy Commission, Demand Analysis Office, 2013

Figure 111 compares *CED 2013 Final* and *CED 2011* residential peak demand forecasts. Peak demand is lower in all *CED 2013 Final* scenarios than the *CED 2011* scenario. Significant climate change adjustments have been made to the peak demands, which result in a lower near-term peak level. Peak demand is directly influenced by demand growth, which, in the near term, will be slower for the low and mid scenarios than in *CED 2011.*

Figure 111: LADWP Planning Area Baseline Residential Peak



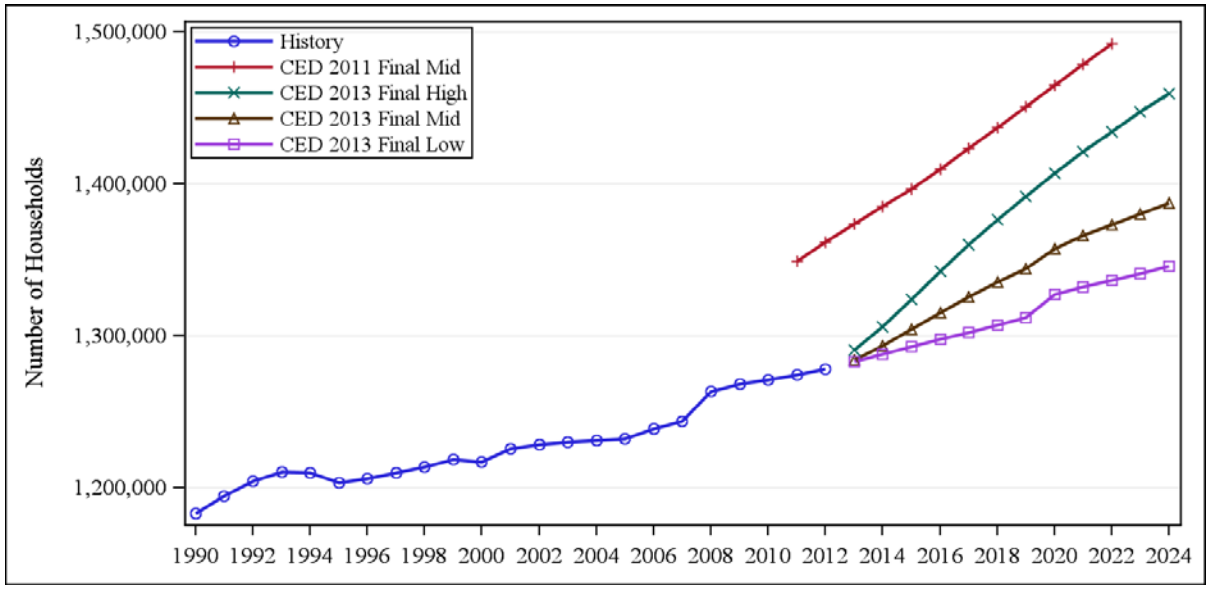
Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 112 and

Figure 113 compare the residential economic/demographic drivers used in *CED 2013 Final* with drivers used in *CED 2011*. **Figure 112** compares total households while

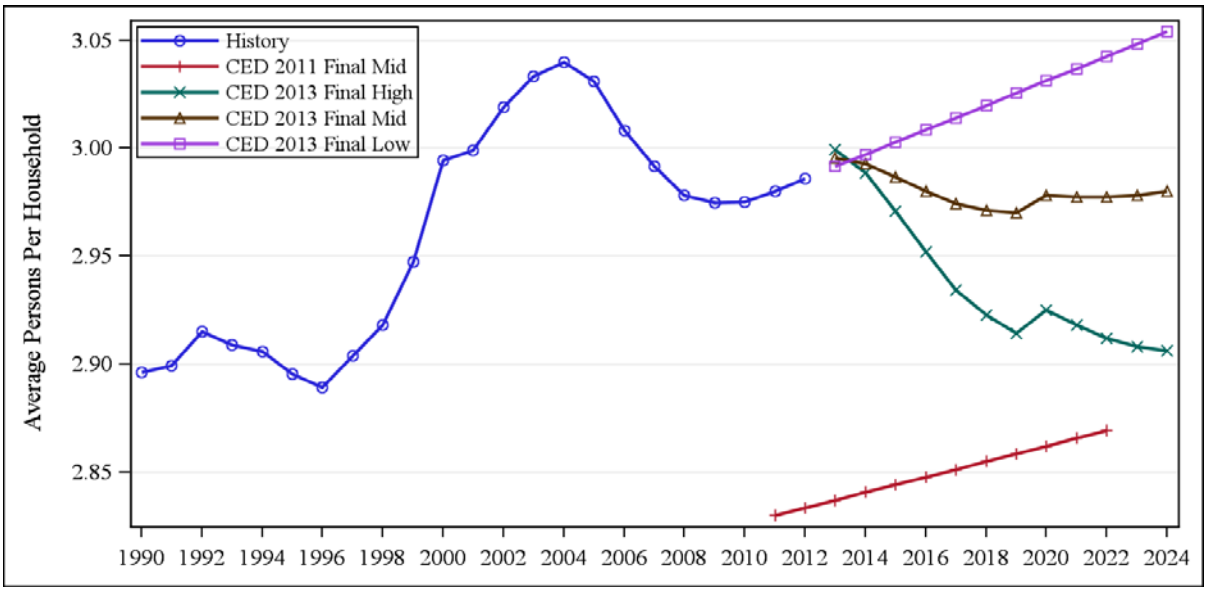
Figure 113 compares persons per household projections. *CED 2013 Final* projected number of households is lower than *CED 2011* in all three scenarios. Though the persons per household was revised downward in this forecast due to a change in the way staff distributed households in Los Angeles County across different climate zones, the projected growth rate is similar to *CED 2011*.

Figure 112: LADWP Planning Area Residential Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

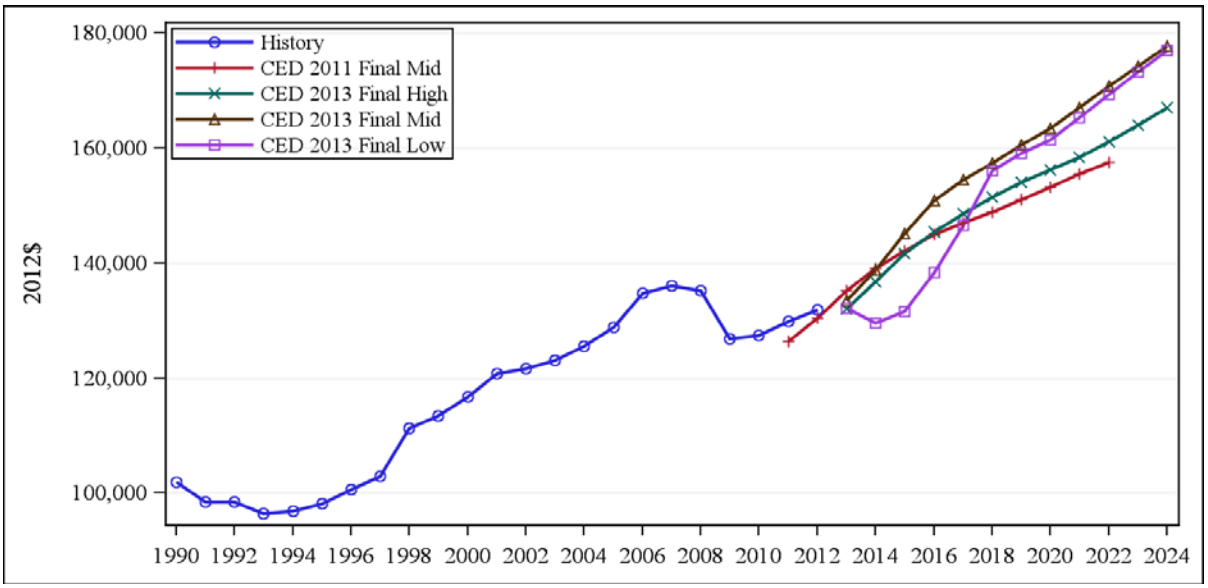
Figure 113: LADWP Planning Area Persons per Household Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 114 compares average household income in the two forecasts. The low demand scenario is lower than the *CED 2011* forecast in the near term. By 2015 the mid and high *CED 2013 Final* scenarios exceed the *CED 2011* forecast, and by 2017 the low *CED 2013 Final* scenario exceeds the *CED 2011* forecast.

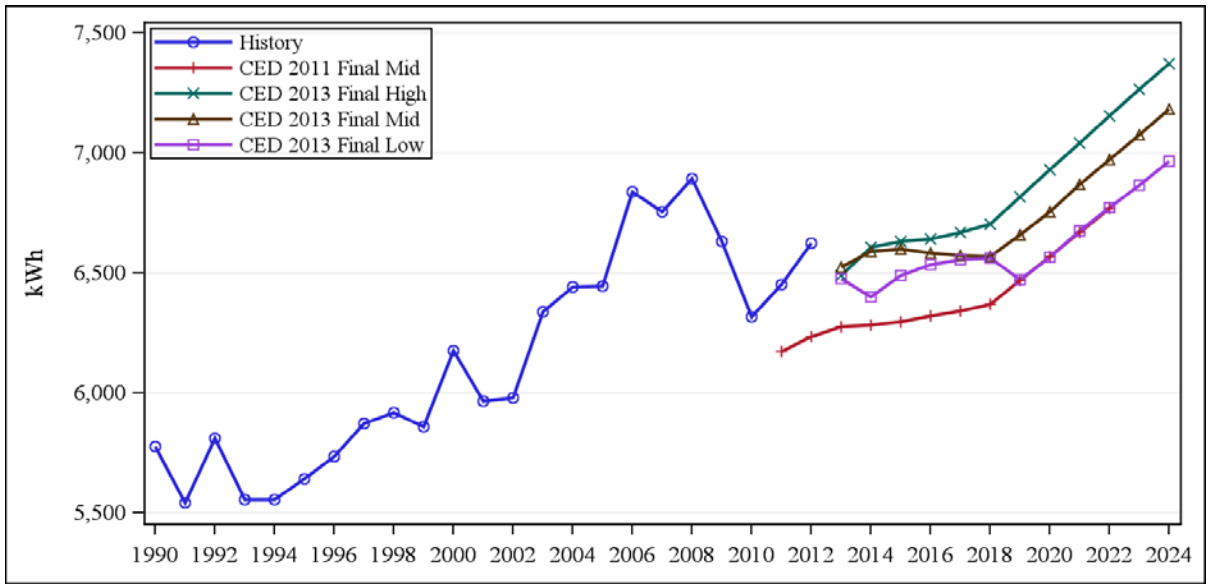
Figure 114: LADWP Planning Area Average Household Income Projections



Source: California Energy Commission, Demand Analysis Office, 2013.

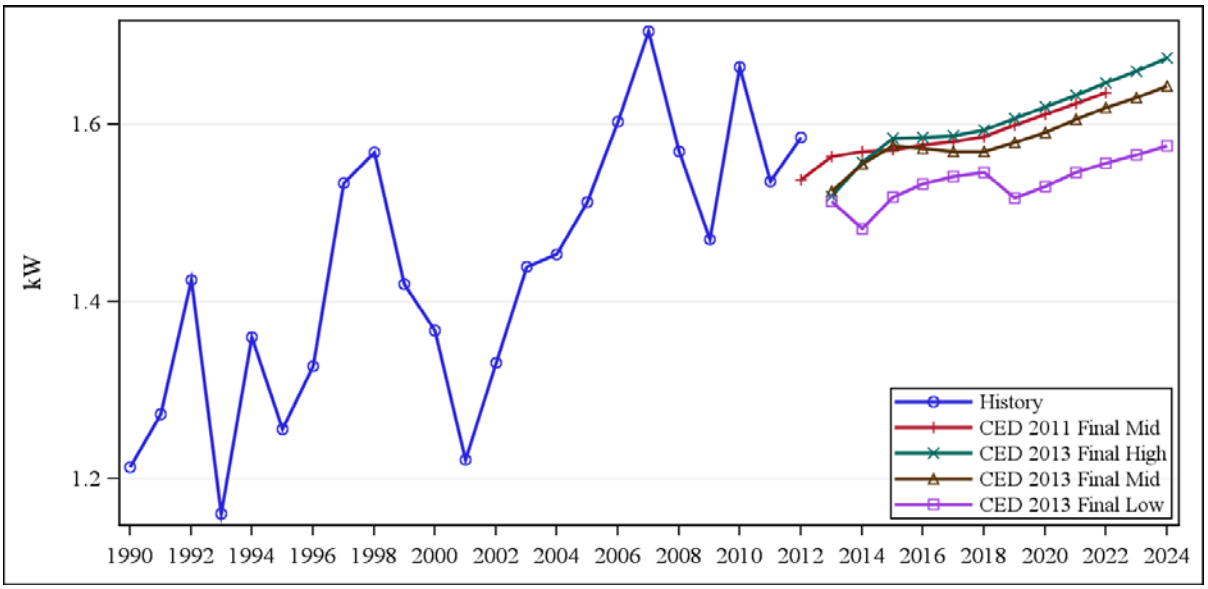
Figure 115 compares electricity consumption per household in the two forecasts. *CED 2013 Final* use per household grows similarly to the *CED 2011* forecast in the later forecast years, although it begins from a higher level due to the lower number of projected households. Peak use per household begins at a slightly lower point than *CED 2011*, as seen in **Figure 116**, but the mid and high scenarios increase to roughly the *CED 2011* level, remaining roughly equal for the high scenario and declining slightly to just below in the mid scenario. The low *CED 2013 Final* demand scenario remains below the *CED 2011* scenario, although after 2019 the growth rates are roughly equal.

Figure 115: LADWP Planning Area Baseline Electricity Consumption per Household



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 116: LADWP Planning Area Baseline Peak Use per Household

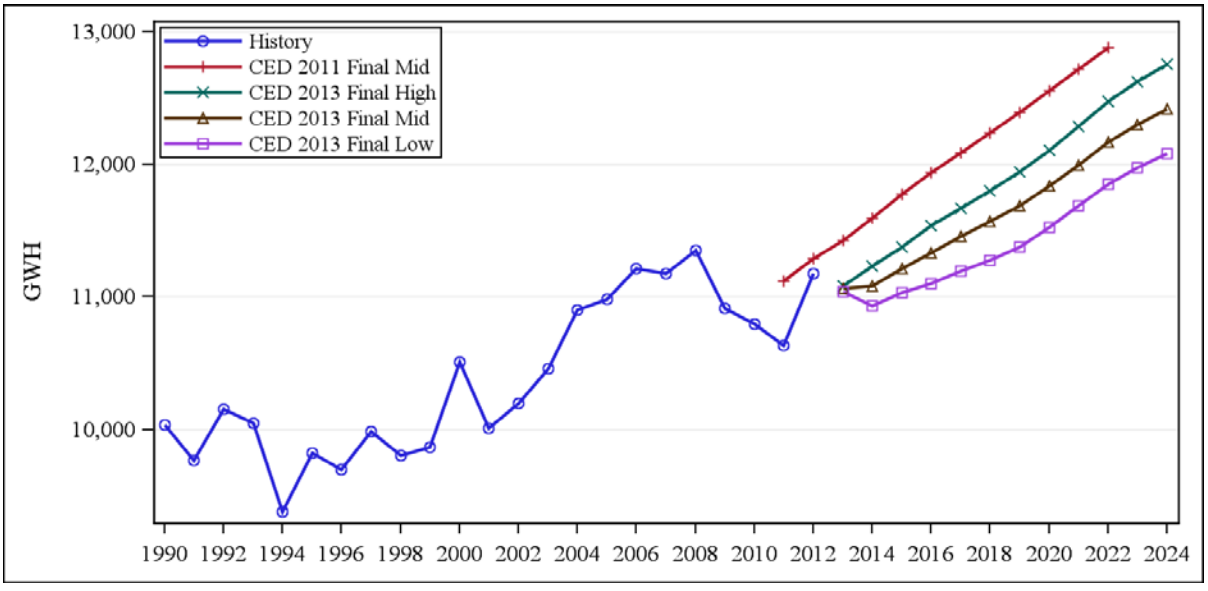


Source: California Energy Commission, Demand Analysis Office, 2013.

Commercial Sector

Figure 117 compares the LADWP commercial sector electricity consumption forecasts. The *CED 2013 Final* consumption scenarios are lower than *CED 2011* throughout the forecast period. The differences are caused primarily by a lower starting point due to lower estimates of recent historical commercial consumption. The growth rate of commercial consumption in all three scenarios is similar to *CED 2011*.

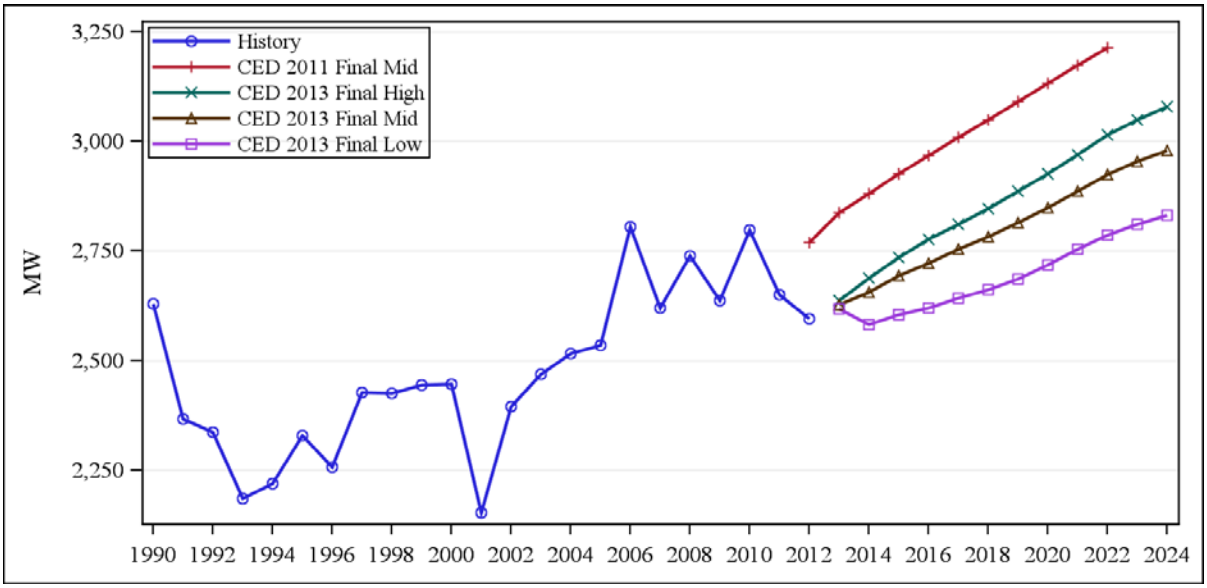
Figure 117: LADWP Planning Area Baseline Commercial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 118 compares the LADWP commercial sector peak demand forecasts. Growth in both forecasts is driven by the underlying electricity consumption forecast, which exhibits a similar pattern.

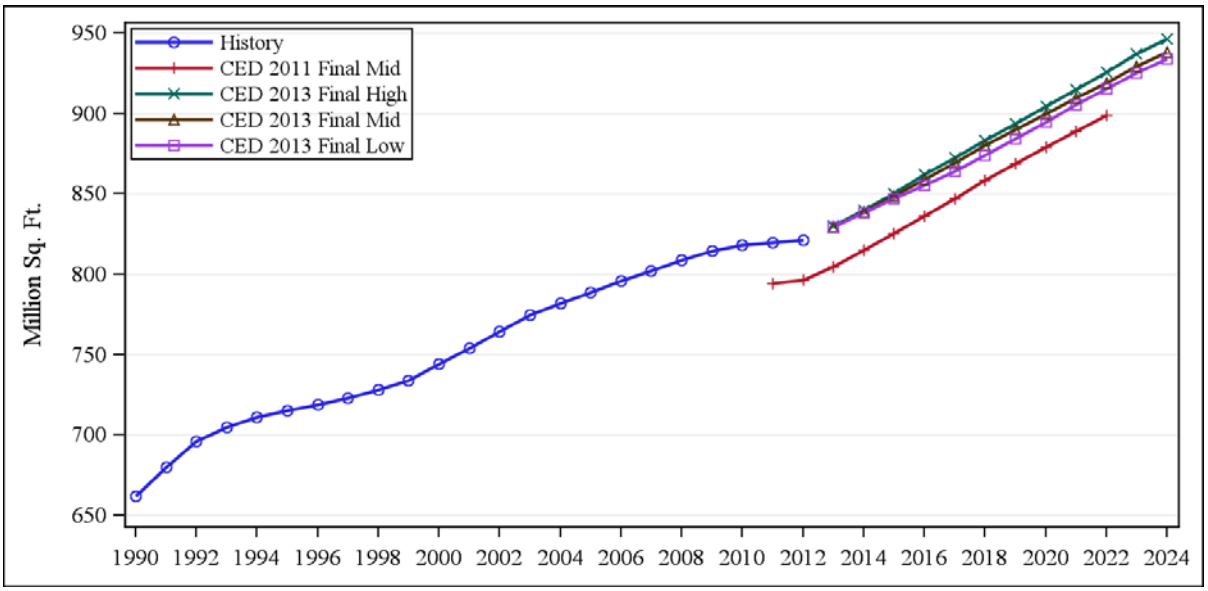
Figure 118: LADWP Planning Area Baseline Commercial Peak



Source: California Energy Commission, Demand Analysis Office, 2013.

In staff's commercial building sector forecasting model, floor space by building type (such as retail, offices, and schools) is the key driver. **Figure 119** compares LADWP commercial floor space projections. *CED 2013 Final* floor space projections are somewhat higher over the forecast period than those used in *CED 2011* due to a higher starting point. However, the growth rate in the high case *CED 2013 Final* scenario is slightly higher than in *CED 2011*.

Figure 119: LADWP Planning Area Commercial Floor Space

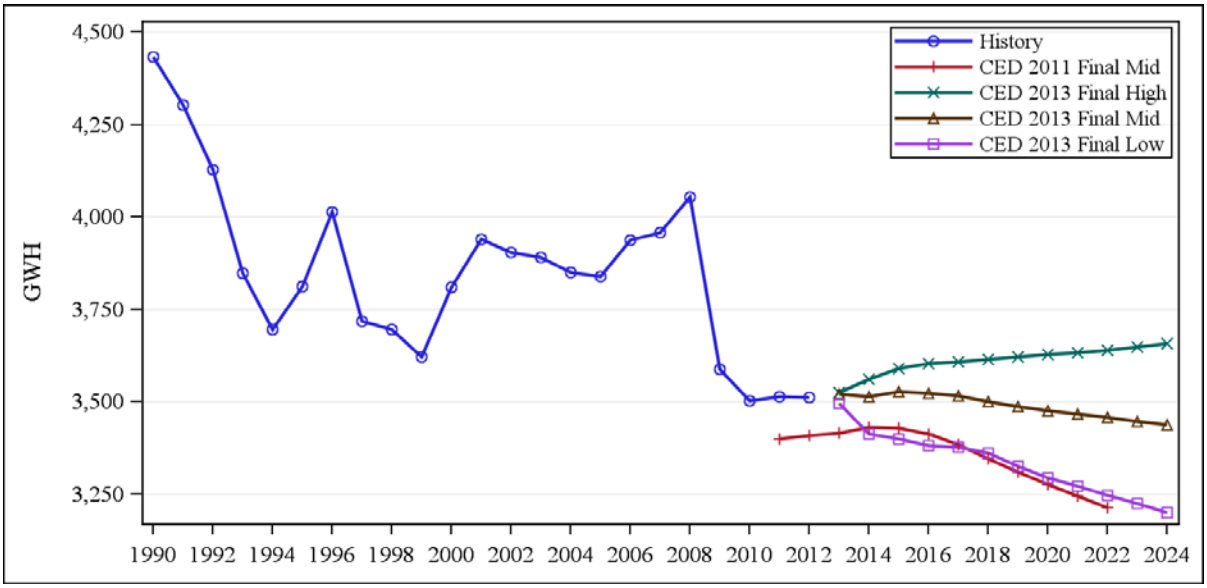


Source: California Energy Commission, Demand Analysis Office, 2013.

Industrial Sector

Figure 120 compares the LADWP planning area industrial sector electricity consumption forecasts. *CED 2013 Final* industrial consumption in the high and mid case scenarios is higher than the *CED 2011* through the forecast period. Projected growth of the low case *CED 2013 Final* scenario is initially higher than *CED 2011* but quickly goes lower than *CED 2011* due to more pessimistic economic projections. The differences in consumption scenarios are driven mainly by differences in economic output.

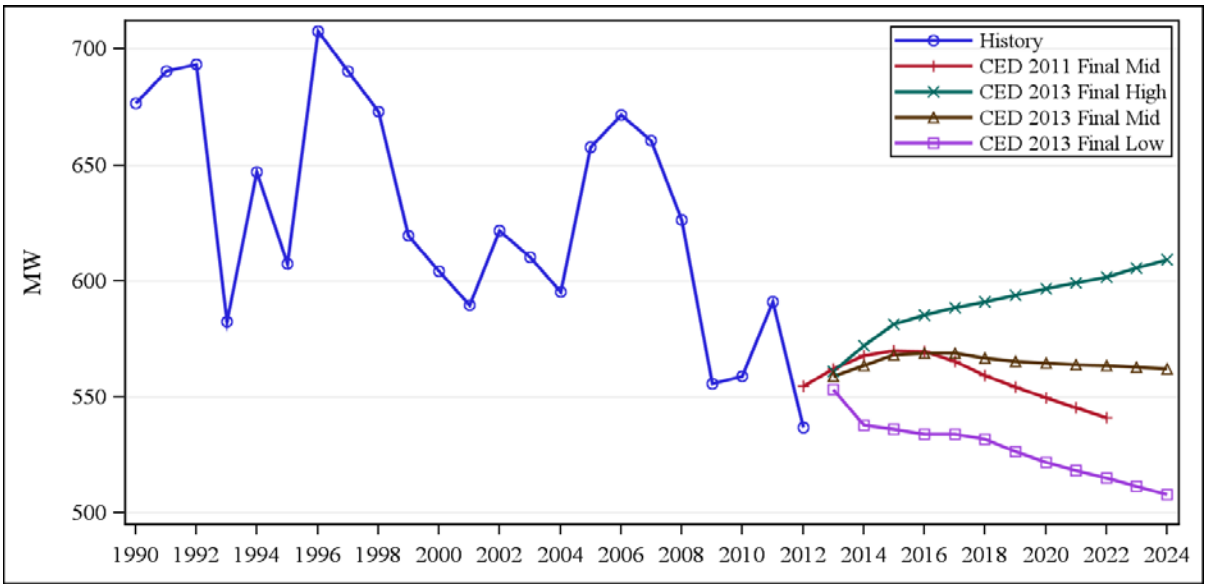
Figure 120: LADWP Planning Area Baseline Industrial Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 121 compares the LADWP industrial sector peak forecasts. The *CED 2013 Final* industrial peak forecasts follow the same pattern as the consumption forecasts.

Figure 121: LADWP Planning Area Baseline Industrial Peak

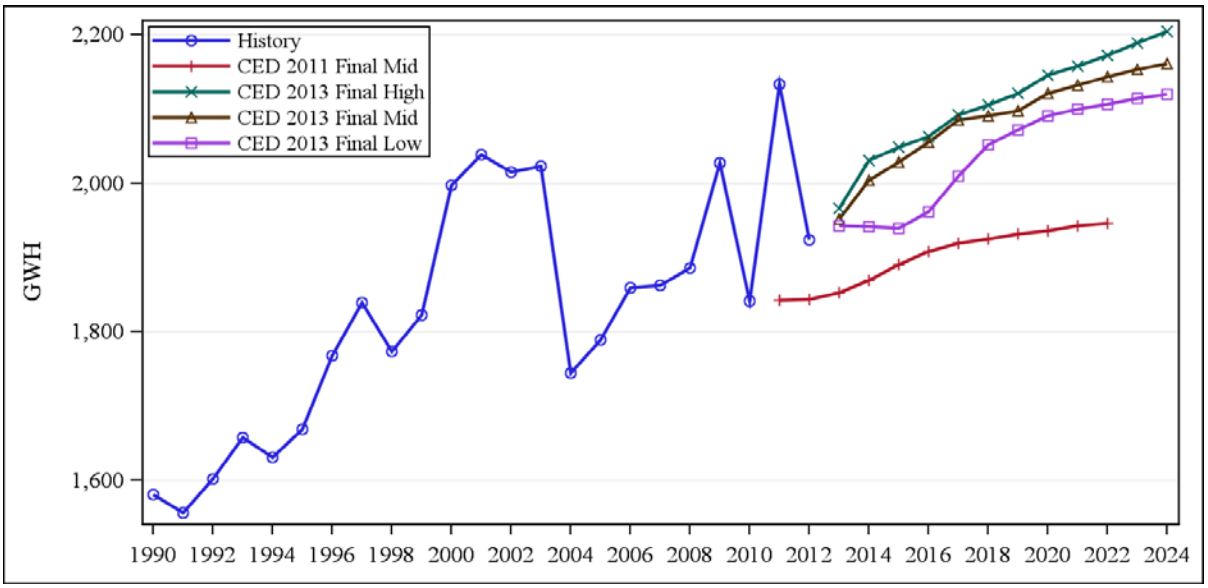


Source: California Energy Commission, Demand Analysis Office, 2013.

Other Sectors

Figure 122 compares the electricity consumption forecasts for the TCU sector, which includes street lighting. Although the growth rates of both mid cases are similar, *CED 2013 Final* mid starts higher than was predicted by *CED 2011* and remains higher throughout the forecast horizon. In the recession scenario modeled in the low case, electricity consumption bottoms out in 2015 and is subsequently followed by a strong recovery though 2018, where growth resumes at a rate similar to that of the mid case.

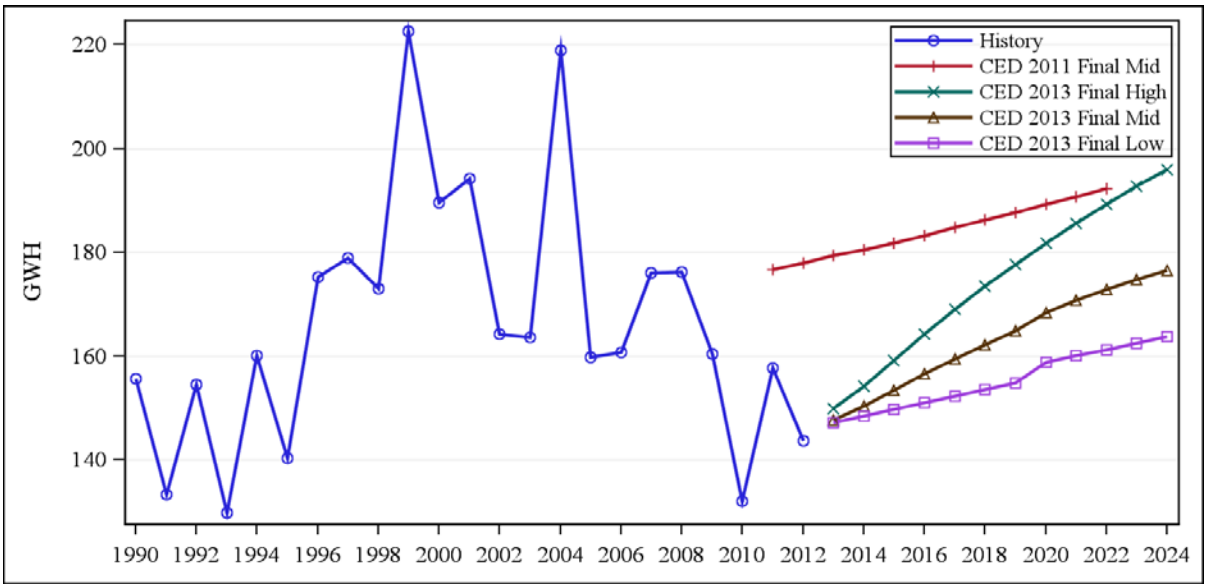
Figure 122: LADWP Planning Area Baseline Transportation, Communication, Utilities, and Street Lighting Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 123 compares the electricity consumption forecasts for the agriculture and water pumping sectors. The *CED 2013 Final* forecasts start significantly below what was predicted by *CED 2011*. For the new forecasts, electricity growth in the high case is much stronger compared to that of the mid and low scenarios. All three demand scenarios are projected to grow over time, primarily because of a projected increase in groundwater pumping.

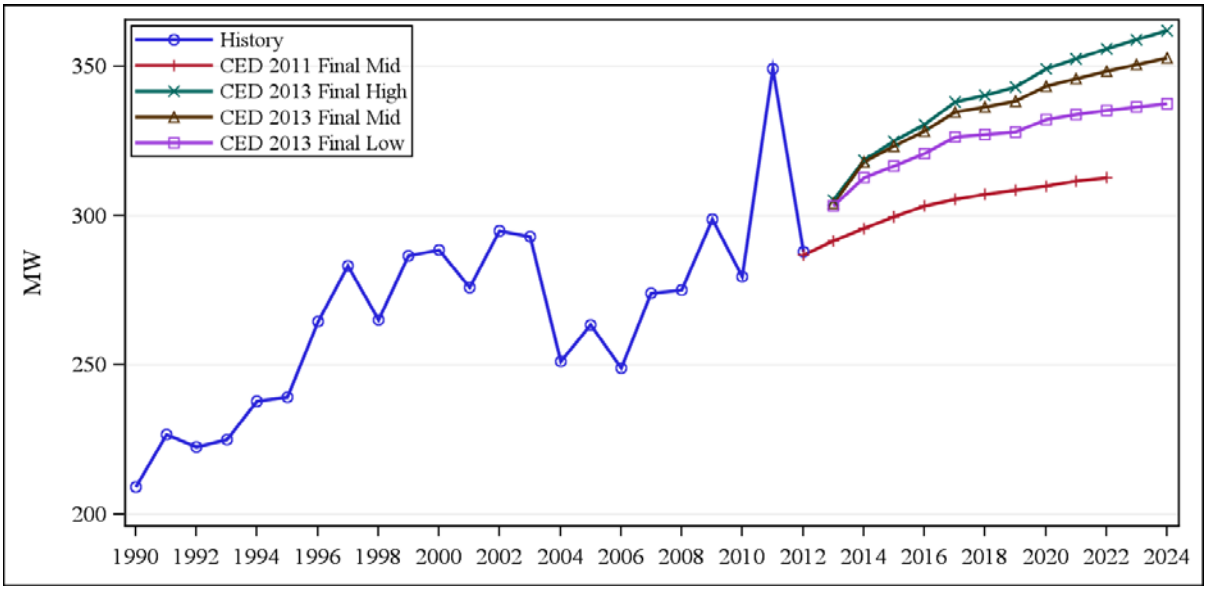
Figure 123: LADWP Planning Area Baseline Agriculture and Water Pumping Consumption



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 124 compares projected combined peak for the TCU, street lighting, agriculture, and water pumping sectors. The *CED 2013 Final* forecasts are all higher than what was predicted by *CED 2011*.

Figure 124: LADWP Planning Area Baseline Other Sector Peak

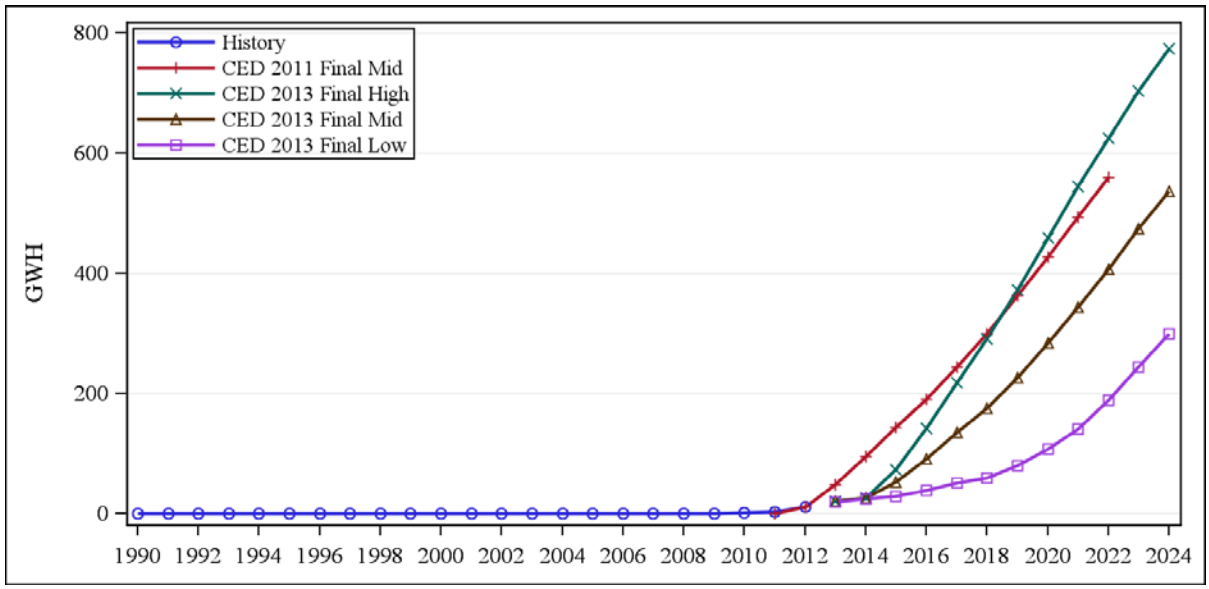


Source: California Energy Commission, Demand Analysis Office, 2013.

Electric Vehicles

Consumption by EVs in the LADWP planning area is expected to reach more than 300 GWh in the low demand scenario and nearly 800 GWh in the high demand scenario. Staff assumes most recharging would occur during off-peak hours, so peak impacts are projected to be relatively small. **Figure 125** presents the LADWP planning area EV consumption forecast for each of the demand scenarios.

Figure 125: LADWP Electricity Consumption by Electric Vehicles



Source: California Energy Commission, Demand Analysis Office, 2013.

Self-Generation

The peak demand forecast is reduced by the projected impacts of distributed PV, solar thermal, and CHP systems, including the effects of the SGIP, CSI, and other programs, as discussed in Volume 1. The effects of these programs are forecast based on a combination installation trend analysis and predictive modeling.

Table 24 shows the forecast of peak impacts from PV and non-PV self-generation. Staff projects between 47 and 62 MW of peak reduction from PV systems by 2024. Peak reductions are based on installed PV system capacities ranging from 125 MW by 2024 in the high demand case to 163 MW by 2024 in the low demand case.

Table 24: LADWP Planning Area Self-Generation Peak Impacts (MW)

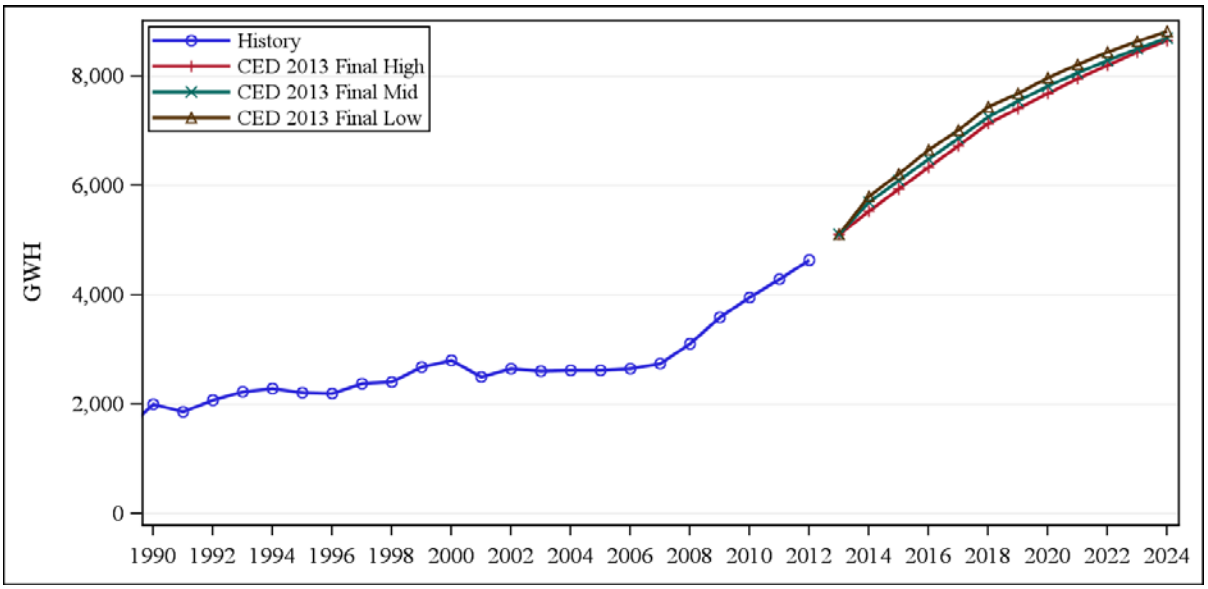
Scenario	Technology	1990	2000	2012	2015	2020	2024
Low Demand	Photovoltaic	0.0	0.2	29.5	34.4	44.0	62.4
	Non-Photovoltaic	148.5	196.6	217.1	226.0	230.7	233.1
	Total	**148.5**	**196.8**	**246.6**	**260.4**	**274.7**	**295.5**
Mid Demand	Photovoltaic	0.0	0.2	29.5	33.6	40.4	53.8
	Non-Photovoltaic	148.5	196.6	217.1	225.9	230.7	233.6
	Total	**148.5**	**196.8**	**246.6**	**259.5**	**271.1**	**287.4**
High Demand	Photovoltaic	0.0	0.2	29.5	32.8	37.6	47.0
	Non-Photovoltaic	148.5	196.6	217.1	225.8	230.4	233.4
	Total	**148.5**	**196.8**	**246.6**	**258.6**	**268.0**	**280.4**

Source: California Energy Commission, Demand Analysis Office, 2013.

Conservation/Efficiency Impacts

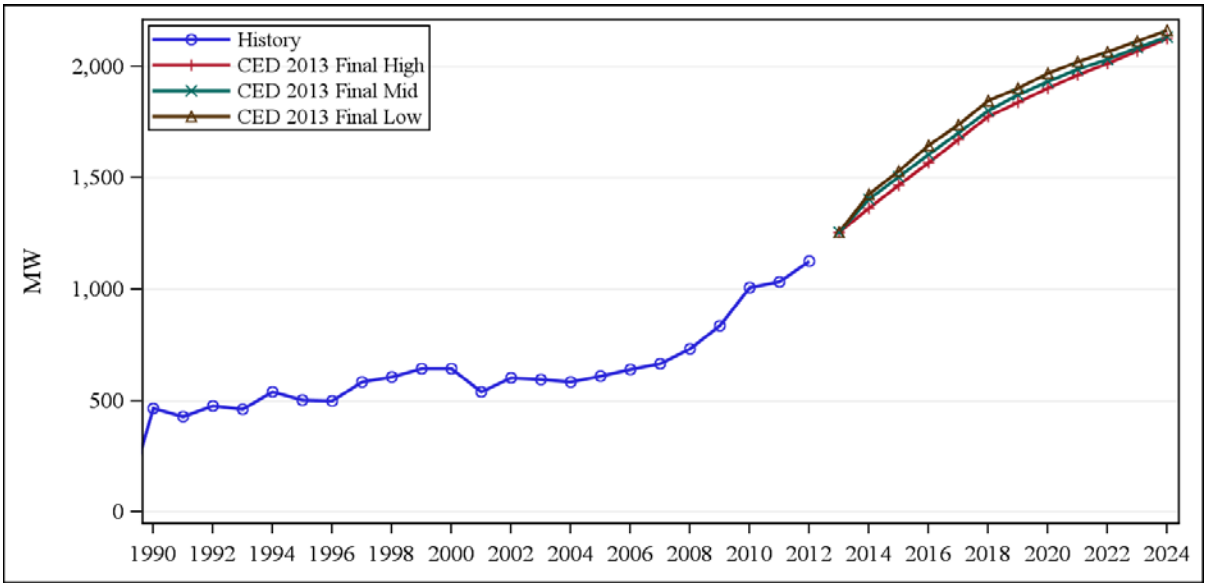
Figure 126 and **Figure 127** show committed electricity consumption and peak efficiency savings estimates from all sources, including building and appliance standards; utility programs implemented through 2014; and price and other effects, or savings associated with rate changes and certain market trends not directly related to programs or standards. Projected savings impacts are highest in the low demand scenario, since price and program effects are inversely related to the demand outcome. Within the demand scenarios, higher demand yields more standards savings since new construction and appliance usage increase, while lower demand is associated with more program savings and higher rates (and therefore more price effects). The net result is that savings totals among the scenarios are very similar.

Figure 126: LADWP Planning Area Baseline Electricity Consumption Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Figure 127: LADWP Planning Area Baseline Electricity Peak Savings Estimates



Source: California Energy Commission, Demand Analysis Office, 2013.

Table 25 presents estimated savings for building and appliance standards in the mid demand case for selected years. Total standards impacts are higher in the high demand case by 1.5 – 2.0 percent due to higher home and commercial floor space construction and 1.5 – 2.0 percent lower in the low demand case. The standards savings estimates include the 2010 revision to Title 24 building standards as well as AB 1109 lighting savings and television standard savings, just as they were in *CED 2011*. For *CED 2013 Final*, new standards savings impacts were included for the 2013 Title 24 standards update and impacts from standards affecting battery chargers. Savings are measured against a baseline before 1975, so they incorporate more than 30 years of impacts. Volume 1, Chapter 3 provides more detail on staff work related to energy efficiency and conservation.

Table 25: LADWP Planning Area Baseline Standards Savings Estimates

Electricity Consumption Savings (GWH)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	233	253	**487**	140	96	**235**	**722**
2000	292	711	**1,002**	292	208	**499**	**1,502**
2012	309	1,601	**1,911**	584	378	**963**	**2,873**
2015	356	2,191	**2,547**	721	486	**1,206**	**3,753**
2020	462	2,779	**3,241**	1,030	726	**1,756**	**4,997**
2024	532	2,990	**3,522**	1,273	854	**2,127**	**5,649**
Electricity Peak Demand Savings (MW)							
	Residential			Commercial			
	Building Standards	Appliance Standards	Total	Building Standards	Appliance Standards	Total	Total Standards
1990	53	57	**110**	35	24	59	169
2000	66	160	**225**	70	50	120	346
2012	76	393	**469**	144	93	237	706
2015	90	551	**641**	180	121	301	941
2020	116	695	**811**	258	182	440	1,250
2024	130	733	**863**	319	214	533	1,396

Source: California Energy Commission, Demand Analysis Office, 2013.

Port Electrification

Potentially significant increases in electricity use in California are expected to occur through port electrification. **Table 26** shows, for select years, the portion of these impacts that are anticipated in the LADWP planning area. For more details, see Volume 1, Chapter 1.

Table 26: LADWP Planning Area Port Electrification

Year	Additional Consumption (GWh)		
	High	Mid	Low
2015	13.15	12.92	12.68
2020	16.22	14.45	12.68
2024	19.01	15.85	12.68

Source: California Energy Commission, Demand Analysis Office, 2013.

Climate Zone Forecasts

For *CED 2013 Final*, staff developed electricity consumption and peak demand forecasts for individual climate zones (see Volume 1, Chapter 1 for more details). The LADWP planning area has two climate zones, each with a designated weather station. The southern, more coastal portion of Los Angeles is assigned to Climate Zone 11 (Long Beach weather station) and the northern, inland portion, along with the Owens Valley, to Climate Zone 12 (Burbank weather station).

Table 27 shows the forecast results for electricity consumption and peak demand by climate zone for each demand scenario. To better show forecast trends and to avoid mischaracterizing average annual growth because of 2012-specific weather impacts, growth rates are provided relative to 2013. Full climate zone results are shown in the forms posted alongside this report.[12]

The fastest growth in both consumption and peak demand over the forecast period is projected to be inland, in Climate Zone 12. These results reflect faster population growth in the Owens Valley than in Los Angeles County. For example, growth in population from 2013-2024 in the mid demand case is projected to be 8 percent for Climate Zone 12, compared to 6 percent for Climate Zones 11.

12 http://www.energy.ca.gov/2013_energypolicy/documents/#reportsnomeeting.

Table 27: LADWP Planning Area Baseline Climate Zone Forecast Results

		Consumption by Climate Zone (GWh)		Peak Demand by Climate Zone (MW)	
		11	**12**	**11**	**12**
High Demand Case	2013	8,516	16,584	1,720	4,078
	2015	8,787	17,168	1,802	4,292
	2020	9,312	18,503	1,920	4,622
	2024	9,819	19,756	2,021	4,891
	Average Growth 2013-2020	1.28%	1.58%	1.58%	1.81%
	Average Growth 2013-2024	1.30%	1.60%	1.48%	1.67%
Mid Demand Case	2013	8,503	16,553	1,715	4,066
	2015	8,648	16,882	1,770	4,213
	2020	8,972	17,800	1,843	4,436
	2024	9,356	18,806	1,915	4,630
	Average Growth 2013-2020	0.77%	1.04%	1.03%	1.25%
	Average Growth 2013-2024	0.87%	1.17%	1.01%	1.19%
Low Demand Case	2013	8,462	16,476	1,704	4,041
	2015	8,435	16,475	1,697	4,040
	2020	8,634	17,154	1,739	4,187
	2024	8,931	18,014	1,790	4,329
	Average Growth 2013-2020	0.29%	0.58%	0.29%	0.51%
	Average Growth 2013-2024	0.49%	0.81%	0.44%	0.63%

Source: California Energy Commission, Demand Analysis Office, 2013.

LIST OF ACRONYMS

Acronym	Definition
AAEE	Additional Achievable Energy Efficiency
AB 1109	Assembly Bill 1109
2013 IEPR	*2013 Integrated Energy Policy Report*
CED	*California Energy Demand*
CED 2011	*California Energy Demand 2012 – 2022 Adopted Forecast*
CED 2013 Final	*California Energy Demand 2014 – 2024 Final Forecast*
CHP	Combined heat and power
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DAWG	Demand Analysis Working Group
Energy Commission	California Energy Commission
ESP	Energy service provider
EV	Electric vehicle
GW	Gigawatt
GWh	Gigawatt hour
IEPR	*Integrated Energy Policy Report*
KW/KWh	Kilowatt/Kilowatt hours
LADWP	Los Angeles Department of Water and Power
MW	Megawatt
MWh	Megawatt hour
PG&E	Pacific Gas and Electric Company
PV	Photovoltaic
QFER	Quarterly Fuel Energy Report
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SGIP	Self-Generation Incentive Program
SMUD	Sacramento Municipal Utility District
TCU	Transportation, communications, and utilities
UCLA	University of California at Los Angeles
U.S. Census Bureau	United States Census Bureau
WAPA	Western Area Power Administration