California Energy Commission

STAFF FINAL REPORT

CALIFORNIA ENERGY DEMAND UPDATED FORECAST, 2015-2025

CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

DECEMBER 2014

CEC-200-2014-009-SF-REV

CALIFORNIA
ENERGY
COMMISSION

Chris Kavalec
Author

Chris Kavalec
Project Manager

Andrea Gough
Office Manager
DEMAND ANALYSIS OFFICE

Sylvia Bender
Deputy Director
ENERGY ASSESSMENTS DIVISION

Robert P. Oglesby
Executive Director

DISCLAIMER

Staff members of the California Energy Commission prepared this report. As such, it does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the Energy Commission nor has the Commission passed upon the accuracy or adequacy of the information in this report.

ACKNOWLEDGEMENTS

The demand forecast update is the combined product of the hard work and expertise of various California Energy Commission staff members in the Energy Assessment Division's Demand Analysis Office. In addition to the author listed previously, Ted Dang assisted with the econometric analysis. Asish Gautam provided the updated forecast for self-generation. Nancy Tran prepared the economic and demographic projections. Miguel Garcia-Cerrutti and Cary Garcia estimated weather-normalized peak demands for 2014. Steven Mac prepared updated historical energy consumption data. Nick Fugate developed updated energy efficiency program estimates. Malachi Weng-Gutierrez developed updated electricity rate projections. Ravinderpal Vaid provided projections of commercial floor space and Glen Sharp projections for the number of households.

ABSTRACT

The *California Energy Demand Updated Forecast 2015 – 2025* describes the California Energy Commission's update of the *California Energy Demand 2014 – 2024 Final Forecast* developed for the *2013 Integrated Energy Policy Report*. Updated projections for electricity consumption, sales, and peak demand are provided for each of eight electricity planning areas and for the state as a whole. The forecast includes three updated 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. Forecasts are provided at both the planning area and climate zone level. In addition to these baseline forecasts, updated managed forecasts that incorporate additional achievable energy efficiency are provided for the investor-owned utility service territories.

Keywords: Electricity, demand, consumption, forecast, weather normalization, peak, natural gas, self-generation, conservation, energy efficiency, climate zone, forecast methods, additional achievable energy efficiency.

Please use the following citation for this report:

Kavalec, Chris, 2014. *California Energy Demand Updated Forecast, 2015*-2025. California Energy Commission, Electricity Supply Analysis Division. Publication Number: CEC-200-2014-009-SF-REV.

TABLE OF CONTENTS

Page

Acknowledgements ..... **i**

Abstract ..... **ii**

EXECUTIVE SUMMARY **1**

Introduction 1

Results 1

CHAPTER 1: Statewide Baseline Forecast Results and Forecast Method **7**

Introduction 7

Statewide Results 9

Method 14

Key Inputs 17

CHAPTER 2: Planning Area Results **23**

PG&E Planning Area 23

Forecast Results 23

Key Inputs 25

SCE Planning Area 27

Forecast Results 27

Key Inputs 29

SDG&E Planning Area 31

Forecast Results 31

Key Inputs 33

LADWP Planning Area 35

Forecast Results 35

Key Inputs 37

SMUD Planning Area 38

Forecast Results 39

Key Inputs 41

CHAPTER 3: Managed Forecasts **43**

Results 43

List of Acronyms **55**

APPENDIX: Regression Results **A-1**

LIST OF FIGURES

Page

Figure ES-1: Statewide Baseline Annual Electricity Consumption 3

Figure ES-2: Statewide Baseline Annual Noncoincident Peak Demand 4

Figure ES-3: Managed Forecasts for Sales, Combined IOUs 5

Figure ES-4: Managed Forecasts for Peak Demand, Combined IOUs 5

Figure 1: Statewide Baseline Annual Electricity Consumption 11

Figure 2: Statewide Baseline Annual Noncoincident Peak Demand 12

Figure 3: Statewide Personal Income 20

Figure 4: Statewide Commercial Employment 20

Figure 5: Statewide Manufacturing Output 21

Figure 6: Baseline Electricity Sales by IOU Service Territory, Mid Demand Case 46

Figure 7: Baseline Peak Demand by IOU Service Territory, Mid Demand Case 47

Figure 8: Managed Forecasts for Sales, PG&E Service Territory 48

Figure 9: Managed Forecasts for Peak Demand, PG&E Service Territory 48

Figure 10: Managed Forecasts for Sales, SCE Service Territory 49

Figure 11: Managed Forecasts for Peak Demand, SCE Service Territory 50

Figure 12: Managed Forecasts for Sales, SDG&E Service Territory 51

Figure 13: Managed Forecasts for Peak Demand, SDG&E Service Territory 52

Figure 14: Managed Forecasts for Sales, Combined IOUs 53

Figure 15: Managed Forecasts for Peak Demand, Combined IOUs 54

LIST OF TABLES

Page

Table ES-1: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of Statewide Electricity Demand 2

Table 1: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of Statewide Electricity Demand 10

Table 2: Baseline Electricity Consumption by Sector 13

Table 3: Comparison of *CEDU 2014* and *CED 2013* Mid Case Statewide Self-Generation Impacts 14

Table 4: Key Explanatory Variables in *CEDU 2014* Econometric Models 15

Table 5: Key Assumptions Embodied in Economic Scenarios 18

Table 6: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of PG&E Electricity Demand 24

Table 7: Comparison of *CEDU 2014 and CED 2013* Mid Case PG&E Self-Generation Impacts 25

Table 8: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the PG&E Planning Area Using Average Annual Growth, 2013-2024 26

Table 9: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the PG&E Planning Area (2013 cents/kWh) 26

Table 10: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SCE Electricity Demand 28

Table 11: Comparison of *CEDU 2014* and *CED 2013* Mid Case SCE Self-Generation Impacts 29

Table 12: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the SCE Planning Area Using Average Annual Growth, 2013-2024 30

Table 13: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SCE Planning Area (2013 cents/kWh) 30

Table 14: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SDG&E Electricity Demand 32

Table 15: Comparison of *CEDU 2014* and *CED 2013* Mid Case SDG&E Self-Generation Impacts 33

Table 16: Comparison of *CEDU 2014 and CED 2013* Mid Case Economic and Demographic Drivers for the SDG&E Planning Area Using Average Annual Growth, 2013-2024 34

Table 17: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SDG&E Planning Area (2013 cents/kWh) 34

Table 18: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of LADWP Electricity Demand 36

Table 19: Comparison of *CEDU 2014* and *CED 2013* Mid Case LADWP Self-Generation Impacts 37

Table 20: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the LADWP Planning Area Using Average Annual Growth, 2013-2024 38

Table 21: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the LADWP Planning Area (2013 cents/kWh) 38

Table 22: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SMUD Electricity Demand 40

Table 23: Comparison of *CEDU 2014* and *CED 2013* Mid Case SMUD Self-Generation Impacts 41

Table 24: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the SMUD Planning Area Using Average Annual Growth, 2013-2024 42

Table 25: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SMUD Planning Area (2013 cents/kWh) 42

Table 26: AAEE Savings by Utility, Mid AAEE Scenario 44

Table 27: AAEE Savings by Utility, Low-Mid AAEE Scenario 45

Table A-1: Residential Sector Electricity Econometric Model A-1

Table A-2: Commercial Sector Electricity Econometric Model A-2

Table A-3: Manufacturing Sector Electricity Econometric Model A-3

Table A-4: Resource Extraction and Construction Sector Electricity Econometric Model A-4

Table A-5: Agriculture and Water Pumping Sector Electricity Econometric Model A-5

Table A-6: Transportation, Communications, and Utilities (TCU) Sector Electricity Econometric Model A-6

Table A-7: Street Lighting Sector Electricity Econometric Model A-7

Table A-8: Peak Demand Econometric Model A-8

EXECUTIVE SUMMARY

Introduction

The *California Energy Demand Updated Forecast, 2015 – 2025* (*CEDU 2014*) report describes updated 10-year forecasts for electricity in California and for major utility planning areas within the state. *CEDU 2014* updates the forecasts provided in the *California Energy Demand 2014 – 2024 Final Forecast* (*CED 2013*) by incorporating more recent economic and demographic projections and adjusting for the latest historical data available for consumption, peak demand, temperatures, and electricity rates.

CEDU 2014 includes three updated baseline scenarios designed to capture a reasonable range of demand outcomes over the next 10 years. The *high energy demand* case incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low committed efficiency program, self-generation, and climate change impacts. The *low energy demand* case includes lower economic/demographic growth, higher assumed rates, and higher committed efficiency program and self-generation impacts. The *mid* case uses input assumptions at levels between the *high* and *low* cases.

This report also provides updates to the two managed forecasts developed for the investor-owned utility (IOU) service territories in *CED 2013* and used for planning purposes, which combine the mid baseline demand case with two scenarios for additional achievable energy efficiency (AAEE) savings: the mid and low-mid scenarios. AAEE savings do not differ from *CED 2013* estimates, except for a rescaling to be incremental to 2013 for energy savings and 2014 for peak demand savings. Thus, the updated managed forecasts reflect changes to the baseline forecast only.

Results

Table ES-1 compares the *CEDU 2014* baseline forecast for selected years with the *CED 2013* mid demand case. For statewide electricity consumption, the new forecast begins about 1 percent below *CED 2013* in 2013, reflecting less actual economic growth in California than had been predicted early in 2013, particularly in Southern California. Consumption in the updated mid scenario grows at a slower rate through 2024 compared to the *CED 2013* mid case as a result of lower projected economic growth during the forecast period. The updated high demand case, with higher projected growth in consumption, matches the *CED 2013* mid case by 2015. Updated statewide noncoincident weather-normalized peak demand is around 0.75 percent lower than predicted in the *CED 2013* mid case in 2014 and grows at a lower rate from 2014-2024 in the new mid case for the same reason as consumption.

Table ES-1: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of Statewide Electricity Demand

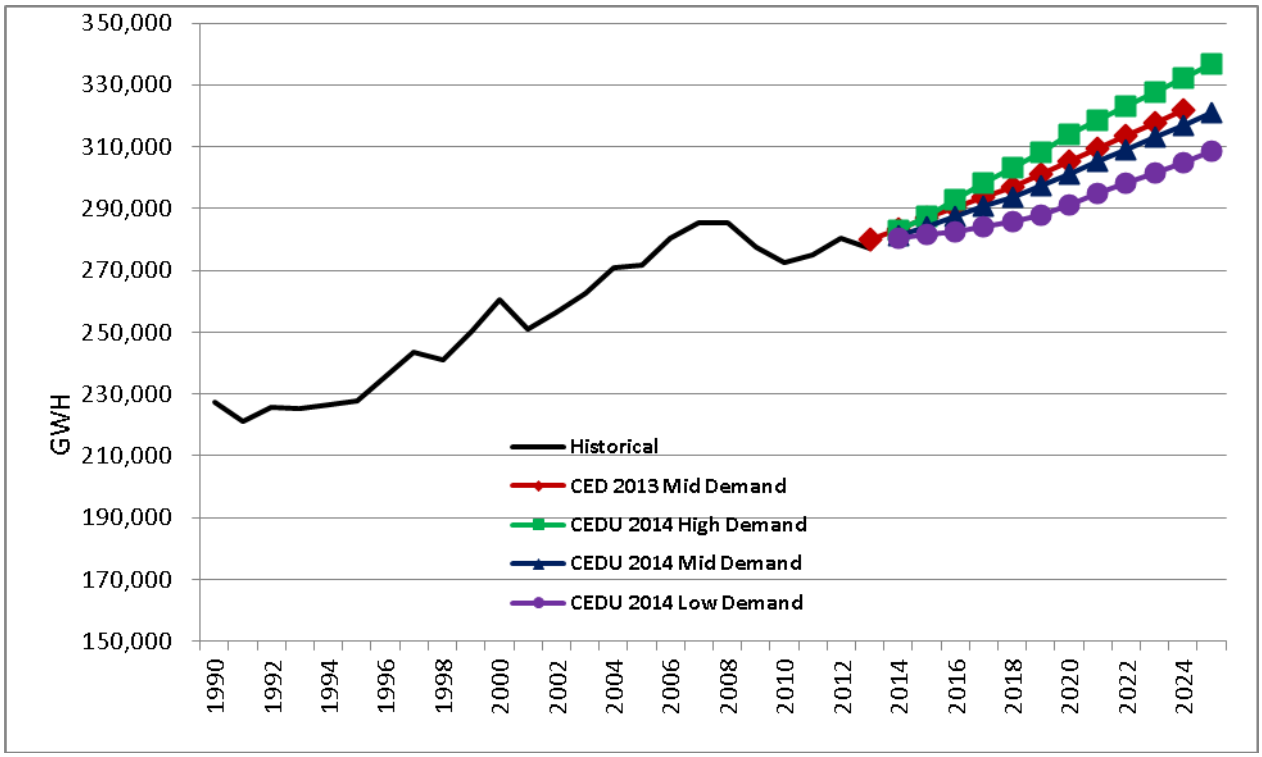
Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	227,576	227,576	227,576	227,576
2000	260,399	260,399	260,399	260,399
2013	280,053	277,140	277,140	277,140
2016	290,383	292,716	287,311	282,472
2020	305,218	313,866	301,290	291,388
2024	321,734	332,209	316,875	304,853
2025	--	336,892	320,862	308,405
	Average Annual Growth Rates			
1990-2000	1.36%	1.36%	1.36%	1.36%
2000-2013	0.56%	0.48%	0.48%	0.48%
2013-2016	1.21%	1.84%	1.21%	0.64%
2013-2024	1.27%	1.66%	1.23%	0.87%
2013-2025	--	1.64%	1.23%	0.89%
Noncoincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	47,543	47,543	47,543	47,543
2000	53,702	53,702	53,702	53,702
2014*	62,926	62,454	62,454	62,454
2016	64,871	64,672	64,039	62,560
2020	68,321	69,061	67,253	64,505
2024	71,312	72,651	70,003	66,505
2025	--	73,485	70,644	66,950
	Average Annual Growth Rates			
1990-2000	1.23%	1.23%	1.23%	1.23%
2000-2014	1.23%	1.17%	1.17%	1.17%
2014-2016	1.53%	1.76%	1.26%	0.08%
2014-2024	1.26%	1.52%	1.15%	0.63%
2014-2025	--	1.49%	1.13%	0.63%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Figure ES-1 shows projected *CEDU 2014* electricity consumption for the three baseline scenarios and the *CED 2013* mid demand forecast. By 2024, consumption in the updated mid scenario is projected to be 1.5 percent lower than the *CED 2013* mid case. Annual growth rates from 2013-2024 for the *CEDU 2014* scenarios average 1.66 percent, 1.23 percent, and 0.87 percent in the high, mid, and low scenarios, respectively, compared to 1.27 percent in the *CED 2013* mid case.

Slower growth rates personal income, employment, number of households, and population reduce the growth rate in the updated mid case compared to *CED 2013*.

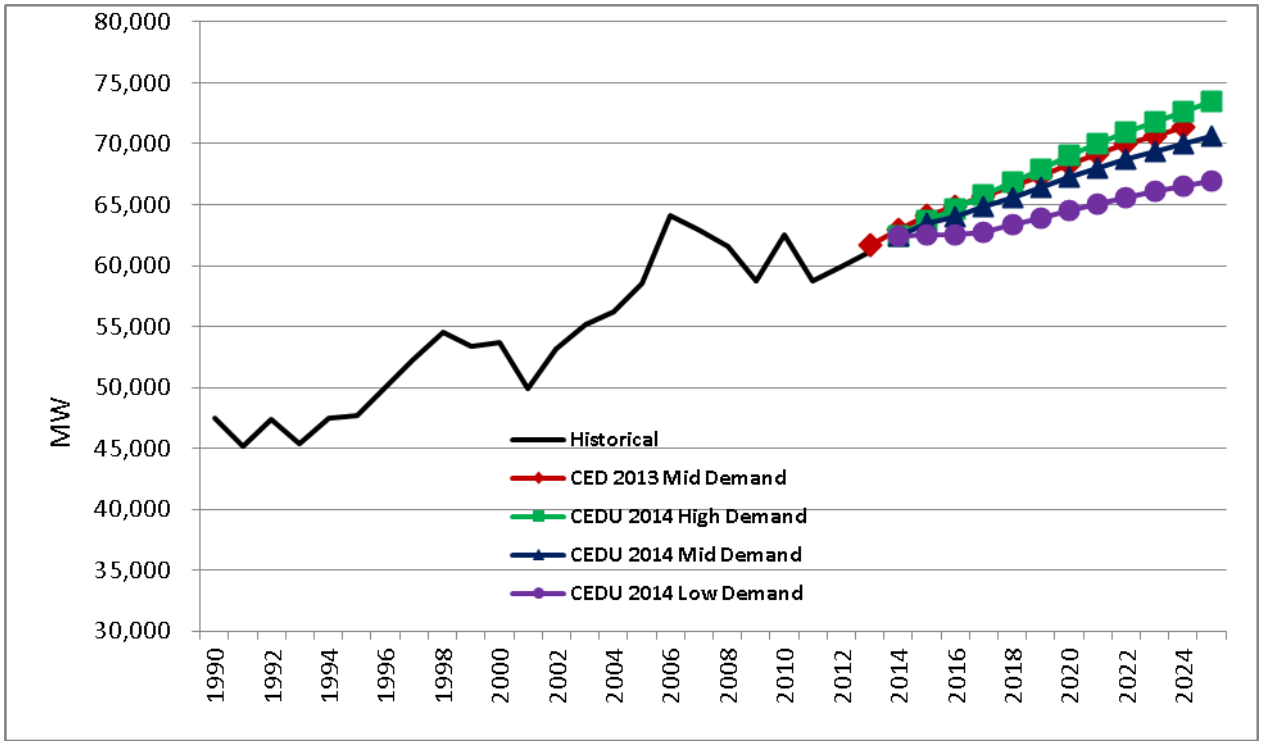
Figure ES-1: Statewide Baseline Annual Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2014.

Figure ES-2 shows projected *CEDU 2014* noncoincident peak demand for the three baseline scenarios and the *CED 2013* mid demand peak forecast. By 2024, statewide peak demand in the updated mid scenario is projected to be 1.8 percent lower than the *CED 2013* mid case. Annual growth rates from 2013-2024 for the *CEDU 2014* scenarios average 1.52 percent, 1.15 percent, and 0.63 percent in the high, mid, and low scenarios, respectively, compared to 1.26 percent in the *CED 2013* mid case. As with consumption, slower growth in personal income, employment, and population reduce the growth rate in the updated mid case compared to *CED 2013*.

Figure ES-2: Statewide Baseline Annual Noncoincident Peak Demand

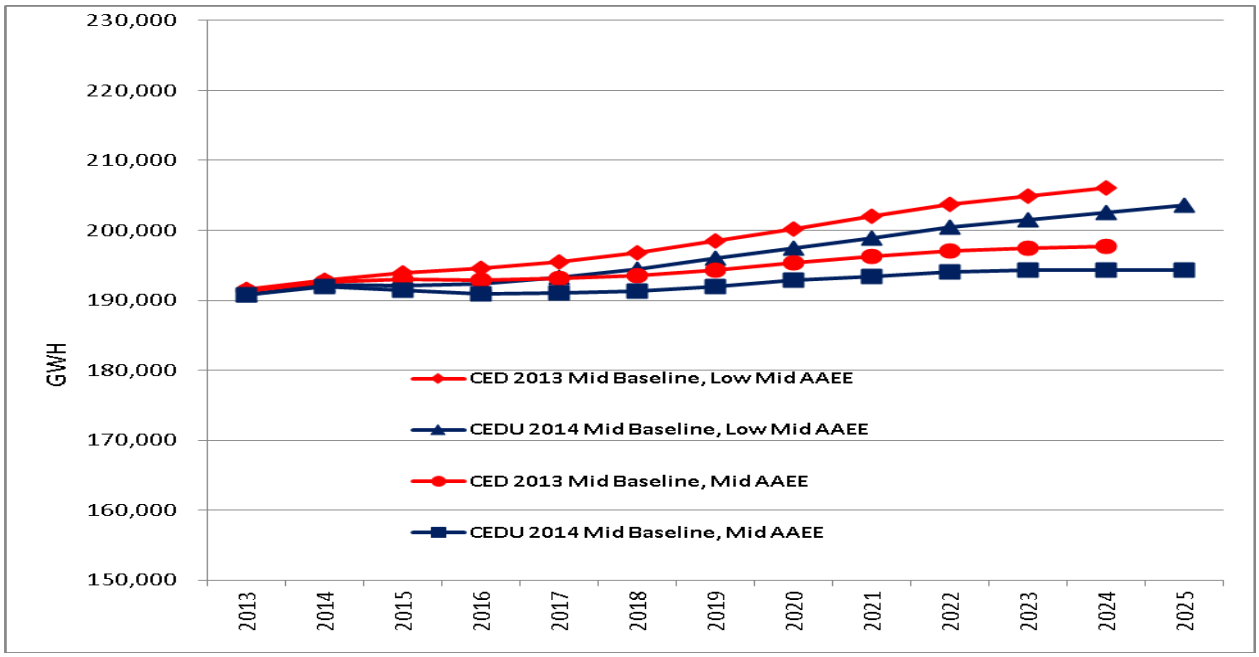


Source: California Energy Commission, Demand Analysis Office, 2014.

Updated forecast results for individual planning areas are generally similar, reflecting more pessimistic economic growth projections at a regional level. The largest reductions relative to *CED 2013* occur in planning areas covering the Los Angeles region, as assumed economic growth is affected more adversely than in other parts of the state.

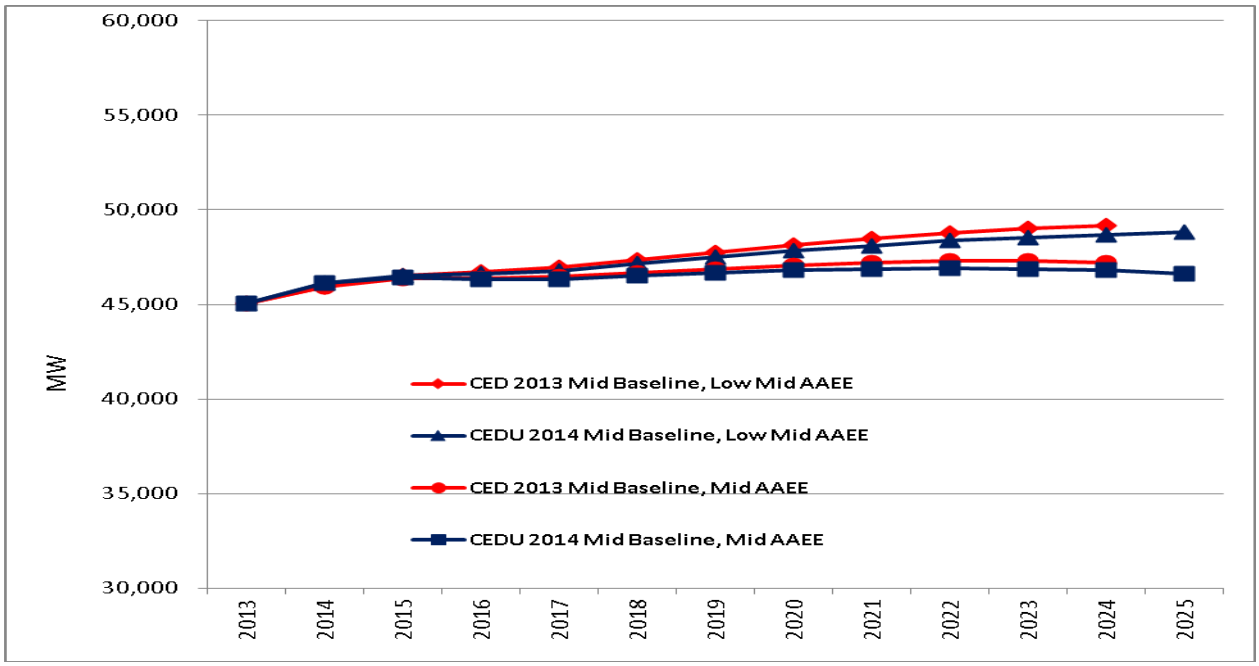
Updated managed forecasts for the IOU service territories, reflecting changes to mid baseline demand, are also lower relative to *CED 2013*. **Figure ES-3** and **Figure ES-4** compare *CEDU 2014* managed forecasts with *CED 2013* for electricity sales and peak demand, respectively, for the combined IOUs. By 2024, managed sales in the updated forecast are around 1.6 percent lower than *CED 2013,* assuming either the mid or low-mid scenario for AAEE. For managed peak demand, the reductions are around 0.9 percent for both mid and low-mid AAEE scenarios.

Figure ES-3: Managed Forecasts for Sales, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2014.

Figure ES-4: Managed Forecasts for Peak Demand, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2014.

Blank Page

CHAPTER 1:
Statewide Baseline Forecast Results and Forecast Method

Introduction

This California Energy Commission report presents updated forecasts of electricity consumption and peak demand for California and for each major utility planning area within the state for 2015–2025. The *California Energy Demand Updated Forecast, 2015–2025* (*CEDU 2014*) updates the forecasts provided in the *California Energy Demand 2014–2024 Final Forecast*[1] (*CED 2013*) by incorporating more recent economic and demographic projections and adjusting for the latest historical data available for consumption, peak demand, temperatures, and electricity rates.

The Energy Commission provides full forecasts for electricity and natural gas demand every two years (as in *CED 2013*) as part of the *Integrated Energy Policy Report* (*IEPR*) process. The forecasts are used in various proceedings, including the California Public Utility Commission (CPUC) Long-Term Procurement Planning (LTPP) process and the California Independent System Operator (California ISO) Transmission Planning Process (TPP). In the current form, the *IEPR* forecast consists of two parts: a baseline forecast, which includes energy efficiency savings from initiatives already in place or approved, and a forecast of future energy efficiency savings, referred to as *additional achievable energy efficiency* (AAEE) savings. Combinations of the two parts yield a "managed" forecast for resource planning purposes.

During the *2013 IEPR* process, staffs from the Energy Commission, the CPUC, and the California ISO met frequently to develop a "process alignment" calendar. The effort was "…structured around a two phased, biennial Long-Term Procurement Planning (LTPP) proceeding, with the [Energy Commission] and [California ISO] providing critical annual inputs to the procurement proceeding out of their *IEPR* demand forecasting and Transmission Planning Processes, respectively."[2] With respect to the demand forecast, the agencies agreed that the Energy Commission would "…update the demand forecast in even-numbered years using the most recent economic/demographic assumptions and an additional year of actual data. Even-year forecasts will not include demand-side program updates, such as additional

1 Kavalec, Chris, Nicholas Fugate, Bryan Alcorn, Mark Ciminelli, Asish Gautam, Kate Sullivan, and Malachi Weng-Gutierrez. 2014. *California Energy Demand 2014-2024 Final Forecast, Volumes 1 and 2.* Publication Number: CEC-200-2013-004-V1-CMF. Available at http://www.energy.ca.gov/2013_energypolicy/documents/#adoptedforecast

2 California Public Utilities Commission, California Independent System Operator, California Energy Commission, letter, addressed to Senators Padilla and Fuller, January 31, 2014.

achievable efficiency."[3] The Energy Commission also committed to "maintain timely decisions with regard to adoption of the demand forecast and *IEPR*."[4]

The Energy Commission's full demand forecast requires a great deal of time to develop. In addition, Energy Commission staff relies on *IEPR* off-years (even-numbered years) to update and improve input data and modeling methods. For these reasons, the Energy Commission agreed to a smaller-scale electricity forecast update in even-numbered years to meet the CPUC and California ISO requests, rather than a full new demand forecast. More specifically, the update replaces the economic and demographic drivers used in the previous full *IEPR* forecast with the most current projections and adds one more year of historical electricity consumption, peak demand data, and self-generation technology adoptions and pending adoptions, which are all used to recalibrate the forecast. In addition, historical temperatures and average electricity rates are updated through 2013, the latter using Energy Information Administration and utility data. Other factors that impact the forecast, including results of energy efficiency programs (including AAEE) and electric vehicles (EVs) and other electrification, are not updated. The forecast horizon is extended one year, to 2025, to meet the needs of the TPP.

As in previous full forecasts, *CEDU 2014* 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. Details on input assumptions for these scenarios are provided later in this chapter.

This report also provides updated results for managed forecasts, a product of combining baseline scenarios with AAEE scenarios. During the *2013 IEPR* process, the three agencies agreed to use two managed forecasts, combining 1) the mid baseline forecast with the mid AAEE scenario and 2) the mid baseline forecast with the low-mid AAEE scenario. The first combination was used for systemwide resource planning, while the second offered a more conservative alternative for use in localized analyses. Updated results are provided for these two managed forecasts, with the difference resulting from changes in the mid baseline forecast.

---

3 California Public Utilities Commission, California Independent System Operator, California Energy Commission, letter, addressed to Senators Padilla and Fuller, January 31, 2014.

4 Weisenmiller, Robert, B., California Energy Commission, letter, addressed to President Michael Peevey and Commissioners, California Public Utilities Commission, Support of Alignment with New LTPP Structure, December 17, 2013.

CEDU 2014 uses the same AAEE estimates as CED 2013, although the savings numbers are modified to be incremental to the last historical year.[5]

The report is structured as follows. This chapter provides forecast results at the statewide level, discusses the method used to generate the updated forecast, and describes the key inputs, comparing the inputs to those used in *CED 2013*. Chapter 2 provides updated baseline forecasts and inputs for the five major utility planning areas, and Chapter 3 updates the two managed forecasts. The forecast comparisons presented in this report show the three *CEDU 2014* cases versus the *CED 2013* mid demand case, except where otherwise noted.

The *IEPR* Lead Commissioner conducted a workshop on December 8, 2014, to receive public comments on a preliminary version of this forecast, with comments incorporated into a final version described in this report. The final forecast will be submitted for adoption by the Energy Commission at a business meeting on January 14, 2015.

Statewide Results

Table 1 compares the *CEDU 2014* baseline forecast for selected years with the *CED 2013* mid demand case.[6] For statewide electricity consumption, the new forecast begins about 1 percent below *CED 2013* in 2013, reflecting less actual economic growth in California than had been predicted early in 2013, particularly in Southern California. Consumption in the updated mid scenario grows at a slower rate through 2024 compared to the *CED 2013* mid case as a result of lower projected economic growth during the forecast period. The updated high demand case, with higher projected growth in consumption, matches the *CED 2013* mid case by 2015. Updated statewide noncoincident[7] weather-normalized[8] peak demand is around 0.75 percent lower than predicted in the *CED 2013* mid case in 2014 and grows at a lower rate from 2014-2024 in the new mid case for the same reason as consumption.

---

5 Any impacts from AAEE in the last historical year (2013 for consumption and 2014 for peak demand) will be captured in actual recorded consumption or peak demand for this year. Thus, AAEE impacts need to be measured as incremental to the last historical year.

6 All numerical forecast results presented in this report and associated spreadsheets represent expected values derived from model output that have associated uncertainty. The results should therefore be considered in this context rather than precise to the last digit.

7 The state's coincident peak is the actual peak, while the noncoincident peak is the sum of actual peaks for the planning areas, which may occur at different times.

8 Peak demand is weather-normalized in 2014 to provide the proper benchmark for comparison to future peak demand, which assumes either average (normalized) weather or hotter conditions measured relative to 2012 due to climate change.

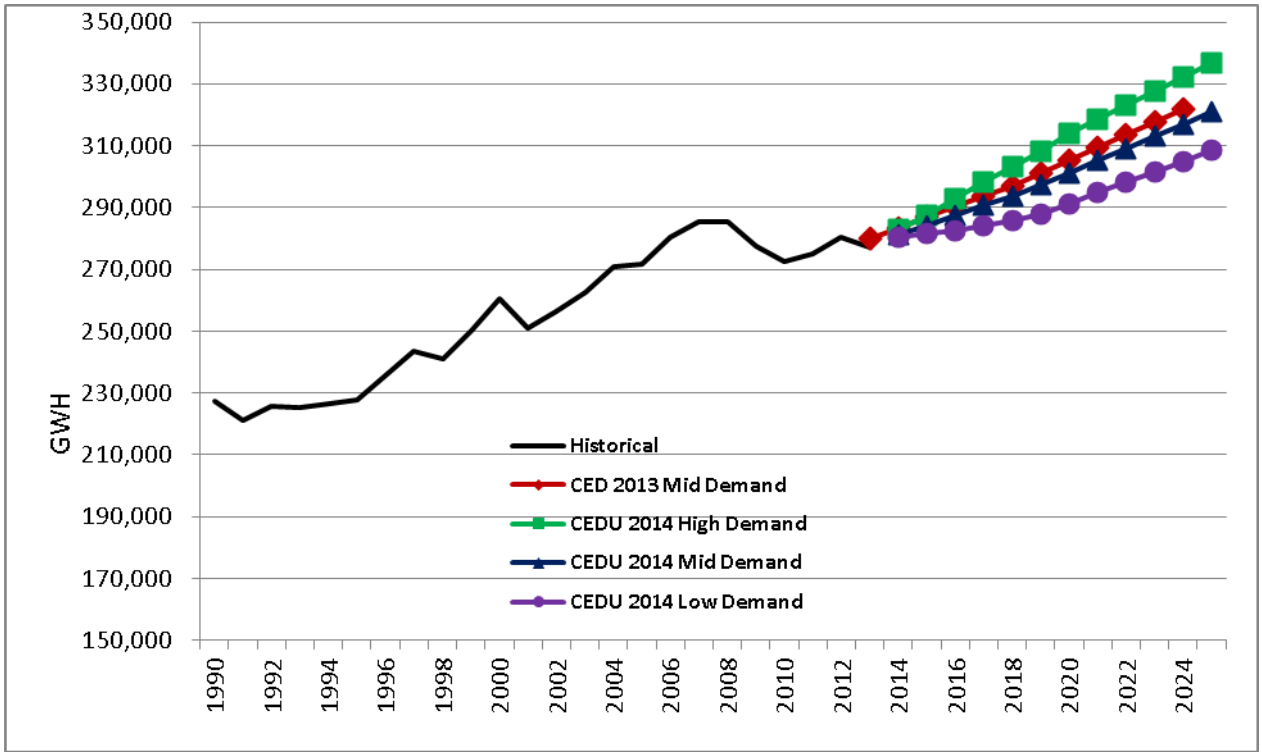
Table 1: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of Statewide Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	227,576	227,576	227,576	227,576
2000	260,399	260,399	260,399	260,399
2013	280,053	277,140	277,140	277,140
2016	290,383	292,716	287,311	282,472
2020	305,218	313,866	301,290	291,388
2024	321,734	332,209	316,875	304,853
2025	--	336,892	320,862	308,405
	Average Annual Growth Rates			
1990-2000	1.36%	1.36%	1.36%	1.36%
2000-2013	0.56%	0.48%	0.48%	0.48%
2013-2016	1.21%	1.84%	1.21%	0.64%
2013-2024	1.27%	1.66%	1.23%	0.87%
2013-2025	--	1.64%	1.23%	0.89%
Noncoincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	47,543	47,543	47,543	47,543
2000	53,702	53,702	53,702	53,702
2014*	62,926	62,454	62,454	62,454
2016	64,871	64,672	64,039	62,560
2020	68,321	69,061	67,253	64,505
2024	71,312	72,651	70,003	66,505
2025	--	73,485	70,644	66,950
	Average Annual Growth Rates			
1990-2000	1.23%	1.23%	1.23%	1.23%
2000-2014	1.23%	1.17%	1.17%	1.17%
2014-2016	1.53%	1.76%	1.26%	0.08%
2014-2024	1.26%	1.52%	1.15%	0.63%
2014-2025	--	1.49%	1.13%	0.63%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Figure 1 shows projected *CEDU 2014* electricity consumption for the three baseline scenarios and the *CED 2013* mid demand forecast. By 2024, consumption in the updated mid scenario is projected to be 1.5 percent lower than the *CED 2013* mid case. Annual growth rates from 2013-2024 for the *CEDU 2014* scenarios average 1.66 percent, 1.23 percent, and 0.87 percent in the high, mid and low scenarios, respectively, compared to 1.27 percent in the *CED 2013* mid case. Slower growth in personal income, employment, and population reduce the growth rate in the updated mid case compared to *CED 2013*.

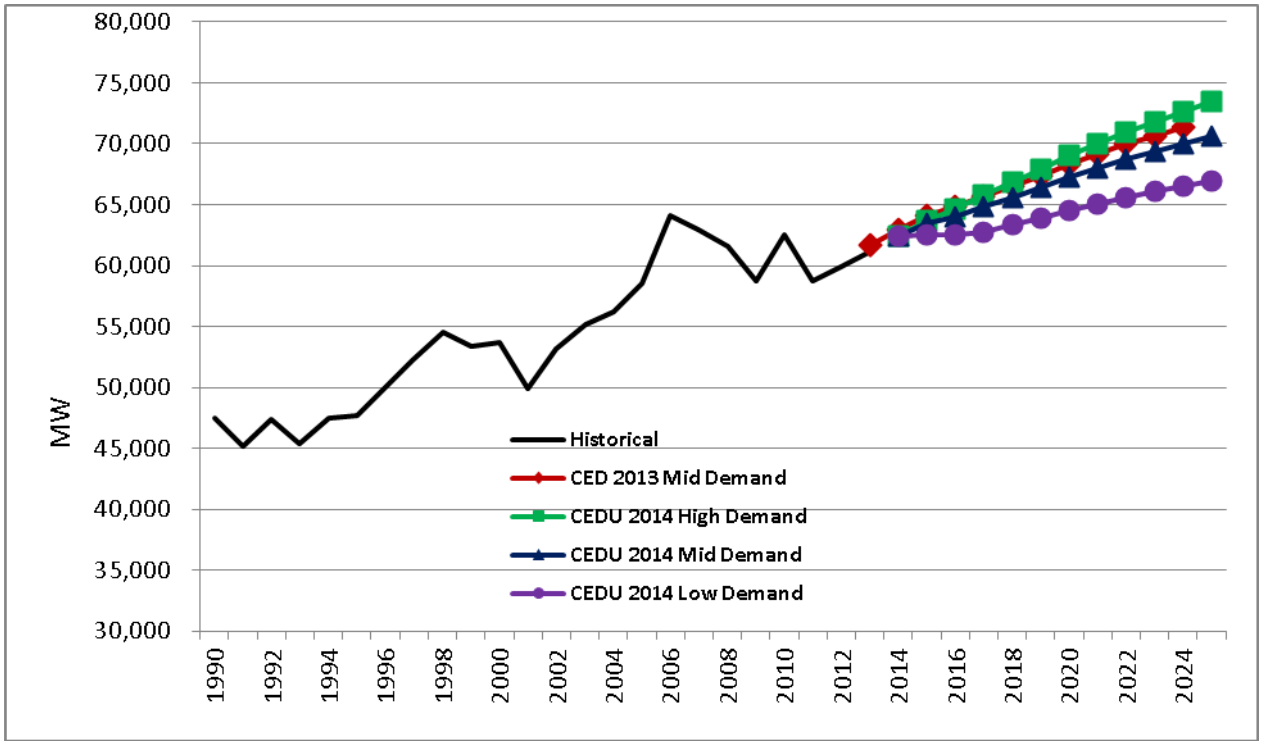
Figure 1: Statewide Baseline Annual Electricity Consumption



Source: California Energy Commission, Demand Analysis Office, 2014.

Figure 2 shows projected *CEDU 2014* noncoincident peak demand for the three baseline scenarios and the *CED 2013* mid demand peak forecast. By 2024, statewide peak demand in the updated mid scenario is projected to be 1.8 percent lower than the *CED 2013* mid case. Annual growth rates from 2013-2024 for the *CEDU 2014* scenarios average 1.52 percent, 1.15 percent, and 0.63 percent in the high, mid, and low scenarios, respectively, compared to 1.26 percent in the *CED 2013* mid case. As with consumption, slower growth in personal income, employment, and population reduce the growth rate in the updated mid case compared to *CED 2013*.

Figure 2: Statewide Baseline Annual Noncoincident Peak Demand



Source: California Energy Commission, Demand Analysis Office, 2014.

Table 2 compares projected baseline annual electricity consumption in each *CEDU 2014* scenario for the three major economic sectors—residential, commercial, and industrial (manufacturing, construction, and resource extraction)—with the *CED 2013* mid demand case. Residential and commercial consumption in the updated mid case grow at a slower rate from 2013-2024 compared to *CED 2013* mainly because of less projected growth in personal income and commercial employment. Residential consumption begins (2013) at a significantly lower level than predicted in *CED 2013,* reflecting a recorded consumption decrease compared to 2012. Growth in industrial consumption is faster in the updated mid case than in *CED 2013*, fueled by more optimistic growth projections for manufacturing output. (See next section.)

Table 2: Baseline Electricity Consumption by Sector

Residential Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	90,052	87,527	87,527	87,527
2015	93,452	91,229	90,217	89,785
2020	101,475	101,996	97,608	93,903
2025	--	114,833	108,807	103,923
Average Annual Growth, Residential Sector				
2013-2020	1.72%	2.21%	1.57%	1.01%
2013-2024	1.91%	2.29%	1.79%	1.37%
2013-2025	--	2.29%	1.83%	1.44%
Commercial Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	103,177	103,862	103,862	103,862
2015	105,788	108,090	105,966	105,895
2020	114,381	121,239	113,463	109,946
2025	--	128,500	120,252	116,620
Average Annual Growth, Commercial Sector				
2013-2020	1.48%	2.23%	1.27%	0.82%
2013-2024	1.40%	1.85%	1.24%	0.96%
2013-2025	--	1.79%	1.23%	0.97%
Industrial Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	48,163	47,978	47,978	47,978
2015	48,491	48,373	48,391	46,978
2020	48,438	49,404	48,980	46,746
2025	--	50,560	48,851	45,625
Average Annual Growth, Industrial Sector				
2013-2020	0.08%	0.42%	0.30%	-0.37%
2013-2024	0.03%	0.42%	0.17%	-0.41%
2013-2025	--	0.44%	0.15%	-0.42%
Historical values are shaded.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 3 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions on projected statewide self-generation impacts. The updated stock for 2013 is lower compared to *CED 2013*, but the large number of pending applications (through mid-2014) for photovoltaic (PV) systems eventually drive the *CEDU 2014* mid case impacts above those in *CED 2013*. The demand forms accompanying this report provide annual results for the state and each planning area for self-generation, broken out into PV and non-PV technologies.[9]

Table 3: Comparison of *CEDU 2014* and *CED 2013* Mid Case Statewide Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	16,103	15,294	15,294	15,294
2014	17,281	16,545	16,574	16,618
2016	18,508	18,507	18,722	19,038
2020	20,008	19,688	20,183	20,844
2024	22,883	21,756	23,021	24,477
2025	--	22,402	23,861	25,528
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	2,980	2,721	2,721	2,721
2014	3,151	3,007	3,014	3,024
2016	3,386	3,353	3,403	3,478
2020	3,733	3,627	3,744	3,901
2024	4,426	4,130	4,431	4,779
2025	--	4,288	4,636	5,034

Source: California Energy Commission, Demand Analysis Office, 2014.

Method

The Energy Commission uses detailed models for each sector (residential, commercial, and so on) to project electricity consumption and peak demand for full *IEPR* forecasts. Staff also estimates simpler, single-equation econometric models for sector electricity consumption as well as peak demand and compares the forecast results with those from the more complex

9 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

models. Typically, both types of models yield similar results at an aggregate level.[10] For *CEDU 2014*, staff relied on the econometric models, reestimated to incorporate historical data for 2013. **Table 4** shows the key explanatory variables used in the econometric models for each sector and for peak demand. Complete estimation results for each model are provided in the appendix to this report.

Table 4: Key Explanatory Variables in *CEDU 2014* Econometric Models

Sector	*Key Explanatory Variables*
Residential	Per Capita Income, Unemployment Rate, Persons Per Household, Residential Electricity Rate, Cooling Degree Days, Heating Degree Days
Commercial	Commercial Employment, Commercial Electricity Rate, Cooling Degree Days
Industrial: Manufacturing	Manufacturing Output, Manufacturing Output/Manufacturing Employment, Industrial Electricity Rate
Industrial: Resource Extraction/Construction	Resource Extraction Output, Construction Employment, Industrial Electricity Rate
Agriculture/Water Pumping	Population, Agricultural Electricity Rate, Cooling Degree Days, Heating Degree Days
Transportation, Communication, and Utilities	Population, Per Capita Income, Commercial Electricity Rate
Street Lighting	Population, Per Capita Income
Peak Demand	Per Capita Income, Persons Per Household, Unemployment Rate, Maximum Average Daily Temperature, Residential and Commercial Electricity Rates

Source: California Energy Commission, Demand Analysis Office, 2014.

To develop estimates of the effects on electricity consumption and demand of updated economic and demographic projections, staff ran the reestimated econometric models twice, once with the projections used in *CED 2013* (from July 2013) and once with newer projections from August 2014. Percentage differences from the two sets of runs were applied to *CED 2013* baseline forecasts extrapolated to 2025,[11] after adjusting for the new historical data (including

10 See Appendix A in Kavalec, Chris, Nicholas Fugate, Bryan Alcorn, Mark Ciminelli, Asish Gautam, Kate Sullivan, and Malachi Weng-Gutierrez. 2014. *California Energy Demand 2014-2024 Final Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency.* California Energy Commission, Electricity Supply Analysis Division. Publication Number: CEC-200-2013-004-V1-CMF.

11 Using the growth rates for 2023-2024.

rates) and netting out impacts that were postprocessed in the 2013 forecast. The latter, which include forecasted impacts of approved efficiency programs, climate change, electric vehicles (EVs), other electrification (including ports and high-speed rail), and demand response, were removed since they were not revised in this forecast update.

Staff estimated postprocessed impacts for 2025 in the following manner. For efficiency program impacts, the exponential function used in past forecasts to decay savings was applied for one more year. High-speed rail electricity use was estimated using High-Speed Rail Authority data for 2025. EV and other electrification impacts were extrapolated, based on growth from 2023-2024. Climate change was assumed to affect temperatures in 2025 by applying percentage increases in temperature from 2023-2024 to 2025. Once the percentage differences from the two sets of econometric runs were applied to the "net" *CED 2013*, the postprocessed impacts were reincorporated and rescaled, if necessary.[12]

As in the full *IEPR* forecasts, *CEDU 2014* includes subregional forecasting analysis for load-serving entities, local areas, and load pockets[13] within the California ISO control area that is used in the LTPP, TPP, and resource adequacy proceedings. Subregional results are based on disaggregation of planning area results combined with historical billing and hourly load data and are provided in the demand forms accompanying this report.[14] To develop subregional peak demand forecasts, staff estimates weather-normalized peaks for four transmission access charge (TAC) areas[15] using regression analysis and the latest three years of hourly load data available.[16] The regression results provide weather sensitivity for the latest historical year (in this case, 2014) so that peak demand can be normalized, assuming average weather ("1 in 2") and extreme weather ("1 in 10") using 30 years of temperature data. Weather-normalized peaks are then projected in a manner consistent with the demand forecasts for the appropriate planning area.[17] Local area peaks within TAC areas are estimated using the latest load data

---

12 For example, EV electricity use was rescaled to be incremental to 2013 for consumption and to 2014 for peak demand, since historical consumption and peak demand include any EV load impacts. The impacts of climate change on temperature and degree days were rescaled to account for one more year of historical temperatures, with the impact of climate change growing at the same rate as in *CED 2013* thereafter. High-speed rail use, on the other hand, did not need to be adjusted since projected impacts do not begin until 2022.

13 A load pocket is an area in which there is insufficient transmission capability to reliably supply 100 percent of the electric load without relying on generation that is physically located within the area.

14 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

15 The TAC areas include the three IOUs and Valley Electric, and, for Pacific Gas and Electric and Southern California Edison, publicly owned utilities using the IOU's transmission system.

16 Past forecasts have used the latest single historical year rather than three years for the regression analysis. Staff believes that using three years provides a more robust result that is less sensitive to temperature anomalies that may occur in a year.

17 For example, the PG&E TAC area peak demand is assumed to grow at the projected rate of the PG&E planning area.

available along with climate zone results and "trued up" (brought into alignment) to TAC totals. More details about these methods are available in a 2011 Energy Commission Committee report.[18]

To calculate a weather-normalized coincident peak for the California ISO balancing authority as a whole, staff applies a coincidence factor to the sum of the weather-normalized TAC peaks. For *CEDU 2014*, staff reexamined this coincidence factor and found that more recent historical data yield a lower factor (0.927) than had been used previously (0.976).[19] Thus, all else equal, California ISO coincident peaks are lower compared to *CED 2013* because of the lower coincidence factor.

Key Inputs

Projections for economic and demographic growth are summarized here. More detail, at the statewide level as well as for each planning area, is provided in the demand forms accompanying this report.[20]

As in *CED 2013*, staff used the IHS Global Insight *Optimistic* economic case for the high demand scenario and a mixture of Moody's Analytics *Mild Second Recession* and *Below-Trend Long-Term Growth* cases for the low demand scenario. The two Moody's cases were combined so that the *Second Recession* scenario drove the short-term results (through 2018) and the *Below-Trend Long-Term Growth* case the longer-term (2025). Moody's *Baseline* economic forecast was used for the mid energy demand scenario. For population, the low case again comes from the California Department of Finance 2013 long-term population projections, the mid case from Global Insight, and the high from Moody's.[21] **Table 5** provides the key assumptions used by the two companies to develop the three economic scenarios.

---

18 Garcia-Cerrutti, Miguel, Tom Gorin, Chris Kavalec, Lynn Marshall. 2011. *Final Short-Term (2011 – 2012) Peak Demand Forecast* Committee Final Report. California Energy Commission, Electricity Supply Analysis Division. Available at http://www.energy.ca.gov/2011publications/CEC-200-2011-002/CEC-200-2011-002-CTF.pdf.

19 This analysis involves a similar regression analysis to what is done for the TAC areas using total California ISO loads with climate zone weighted temperatures. The weather-normalized result for the California ISO is compared to the sum of the TAC area weather-normalized results to give a coincident factor.

20 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

21 Population in the low case is identical to that used in *CED 2013*; the Department of Finance has not developed a newer official population forecast. Global Insight and Moody's provide only one scenario for population, unlike other economic and demographic variables.

Table 5: Key Assumptions Embodied in Economic Scenarios

High Demand Scenario (IHS Global Insight *Optimistic* Scenario), May 2013	**Mid Demand Scenario (Moody's Analytics *Baseline* Scenario), May 2013**	**Low Demand Scenario (Combination of Moody's Analytics *Second Recession* and *Below-Trend Long-Term Growth* Scenarios), May 2013**
National unemployment rate falls to 5.8 percent by early 2015.	National unemployment rate Stays below 6 percent through 2017.	The unemployment rate is expected to hit a peak of 9.1 percent in the second quarter of 2016.
European Central Bank expands its monetary base, successfully steering the Eurozone away from deflation. Eurozone growth strengthens as fiscal conditions improve, credit conditions ease, and pent-up demand is released.	Some continued turmoil in Europe and weaker growth in the emerging world.	The Eurozone drops back into recession contributing to the economic and financial stress faced by heavily indebted nations in the region.
National light-duty vehicles sales reached more than 16.7 million in 2015.	National light-duty vehicle sales are above 16 million in 2015.	National light-duty vehicle sales decline throughout 2014 trough of only 14 million in early 2015.
National housing starts improve to near 1.02 million units by the end of 2014.	National housing starts are expected to break 1.9 million units by 2016.	Housing prices, as measured by the National Association of Realtors median sale price, drop cumulatively by 9 percent from the third quarter of 2014 through the third quarter of 2015.
Same as in mid demand scenario	Oil and gas prices are expected to trend steadily higher, just outpacing inflation.	Oil and gas prices fall in the short term.
The Federal Reserve's late-July policy meeting was notable for their evolving views on inflation. An interest rate hike is expected in the second half of 2015.	The Federal Reserve has begun what is expected to be a slow process to normalize monetary policy. The first step is to end its bond-buying program, which it is on track to do so by October.	The Fed keeps the fed funds target rate near 0 percent until the fourth quarter of 2015.
Discretionary spending levels from the Bipartisan Budget Act have assumed that no future government shutdowns will occur as a result of either budget or debt-ceiling stalemates.	Lawmakers reached a budget deal at the end of 2013 to keep the government running for the next two years. The budget deal replaces the sequester reductions. With this deal, the drag from fiscal policy will fade from a substantial close to 1.5 percentage points of GDP in 2013 to no more than 0.4 percentage points this year. The drag in 2015 and 2016 will be minimal.	The combination of much weaker exports, business investment and housing drives the U.S. economy into a second recession that begins in the fourth quarter of 2014.

Source: Moody's Analytics and IHS Global Insight, 2014

In general, current projections for economic growth in California are more pessimistic compared to those used in *CED 2013*. Both Moody's and Global Insight project slower growth for key economic variables such as personal income and employment at the national level, which translates, all else equal, to slower growth at the state level. According to Moody's, "structural damage" (less long-term investment, skilled labor, and so on) "…inflicted by the recession will be greater than initially anticipated."[22] Lower economic growth also yields slightly slower growth in population (and therefore number of households) for California in the high and mid scenarios.

Figure 3 shows historical and projected personal income at the statewide level for the three *CEDU 2014* scenarios and the *CED 2013* mid demand case.[23] By 2024, income is around 5.5 percent lower in the *CEDU 2014* mid case compared to *CED 2013*. Annual growth rates from 2013-2024 average 3.19 percent, 2.97 percent, and 2.68 percent in the *CEDU 2014* high, mid, and low scenarios, respectively, compared to 3.50 percent in the *CED 2013* mid case.

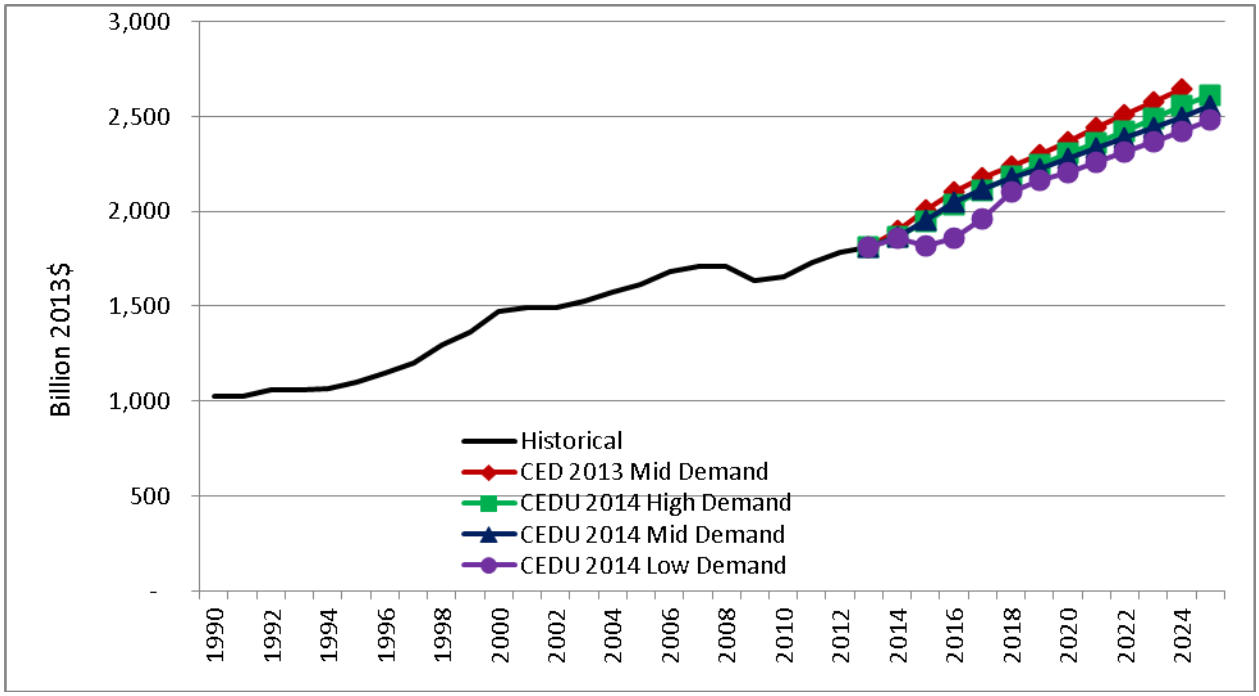
As shown in **Figure 4**, the projection for statewide commercial employment[24] in the *CEDU 2014* mid case is lower than in *CED 2013*, but the difference is less than for personal income. By 2024, commercial employment is around 0.8 percent lower in the new mid case compared to *CED 2013*. Annual growth rates from 2013-2024 average 1.34 percent, 1.14 percent, and 1.04 percent in the *CEDU 2014* high, mid, and low scenarios, respectively, compared to 1.21 percent in the *CED 2013* mid case.

22 Email communication with Chris Lafakis, California Analyst at Moody's Analytics, October 2014.

23 To account for periodic revisions to the historical data by Moody's and Global Insight, the *CED 2013* scenarios in this section are scaled so that levels matches those used in *CEDU 2014* in 2013.

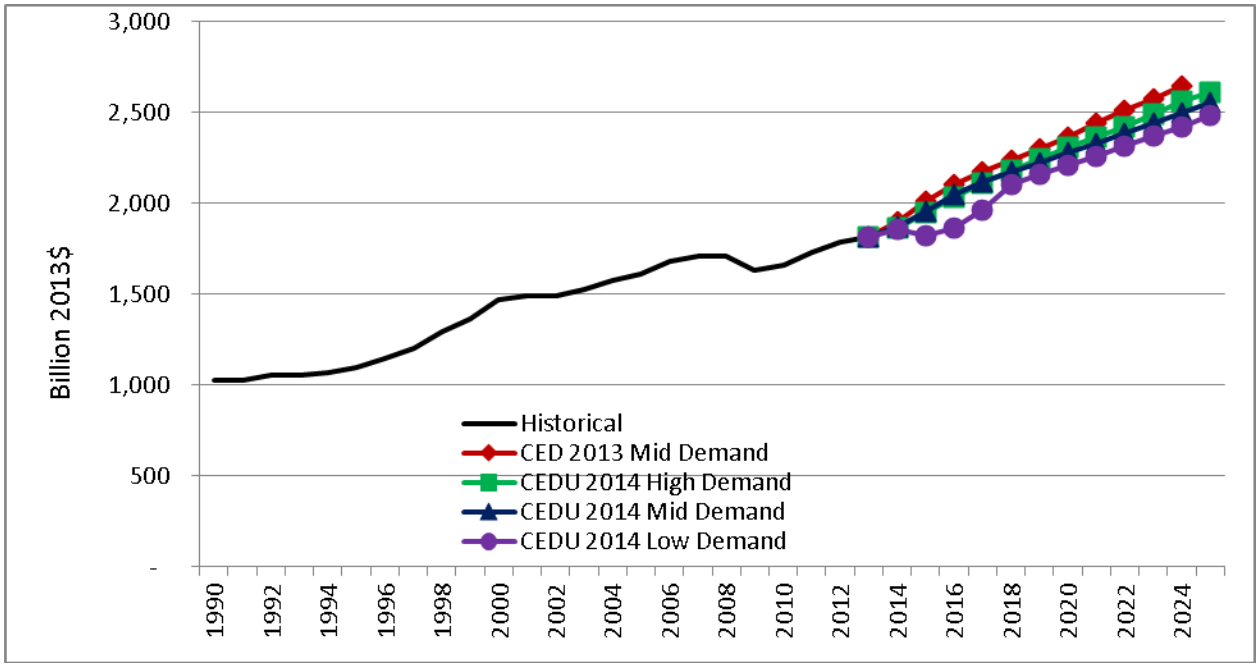
24 Total employment minus employment in the industrial and agricultural sectors.

Figure 3: Statewide Personal Income



Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Figure 4: Statewide Commercial Employment

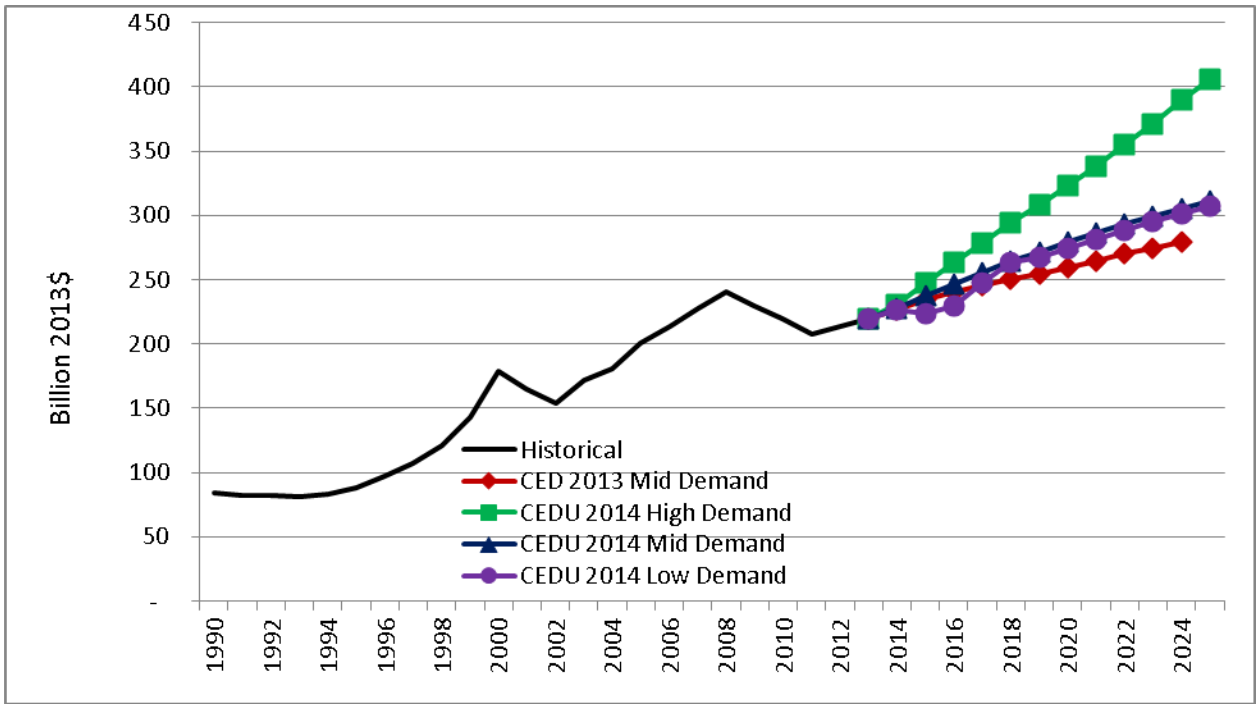


Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Population (and therefore number of households) in the *CEDU 2014* mid and high demand scenarios differs very slightly from the *CED 2013* counterparts. In 2024, population is down 0.3 percent in both the new mid and high cases versus *CED 2013*. Population in the new low case is identical to *CED 2013*; the California Department of Finance has not produced a new official long-term population forecast since 2013. Population and number of households data are provided in the demand forms accompanying this report.[25]

Manufacturing is projected to show faster growth in the *CEDU 2014* mid and low cases compared to *CED 2013* as a result of a change in forecast method for this sector by Moody's, designed to "align GDP and industrial production."[26] Statewide manufacturing dollar output is shown in **Figure 5**, including the three *CEDU 2014* scenarios and the *CED 2013* mid case. By 2024, manufacturing output in the *CEDU 2014* mid case is around 9 percent higher than the *CED 2013* mid scenario. As in recent past forecasts, Global Insight is much more optimistic about manufacturing than Moody's, thus the high scenario is significantly above the mid and low. Annual growth rates from 2013-2024 average 5.36 percent, 3.05 percent, and 2.91 percent in the *CEDU 2014* high, mid, and low scenarios, respectively, compared to 2.23 percent in the *CED 2013* mid case.

Figure 5: Statewide Manufacturing Output



Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

25 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

26 Email communication with Chris Lafakis, California analyst at Moody's Analytics, October 2014.

The next chapter provides information on economic and demographic projections at the planning area level. In addition, updated electricity rates, after incorporating historical rates through 2013, are provided.

CHAPTER 2:
Planning Area Results

As in full *IEPR* forecasts, *CEDU 2014* provides results for eight utility planning areas, along with 16 climate zones within these planning areas.[27] This chapter summarizes results for the five largest planning areas, including Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), the Los Angeles Department of Water and Power (LADWP), and the Sacramento Municipal Utility District (SMUD). In general, planning area results mirror those at the statewide level, with growth in consumption and peak demand slower compared to *CED 2013* as a result of more pessimistic economic projections. Comprehensive results for all eight planning areas and climate zones are available electronically as a set of forms posted with this report.[28]

PG&E Planning Area

The 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 SMUD. SMUD is treated as its own planning area, with results discussed later in this chapter.

For this forecast, the PG&E planning area forecast includes other members of the SMUD control area that are not in the SMUD service area. These entities include Roseville, Redding, and the Western Area Power Administration.

Forecast Results

Table 6 compares *CEDU 2014* high, mid, and low demand scenarios with the *CED 2013* mid demand scenario for electricity consumption and peak demand for selected years. Growth in both consumption (2013-2024) and peak demand (2014-2014) is slower in the *CEDU 2014* mid demand case versus *CED 2013*. As in the statewide forecast, these results derive from slower growth in personal income and population, which more than offsets the impact from faster growth in manufacturing. Growth in commercial employment in the updated mid case matches

27 For a description of the planning areas and climate zones, see pages 49-50 in Kavalec, Chris, Nicholas Fugate, Bryan Alcorn, Mark Ciminelli, Asish Gautam, Kate Sullivan, and Malachi Weng-Gutierrez. 2014. *California Energy Demand 2014-2024 Final Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency.* California Energy Commission, Electricity Supply Analysis Division. Publication Number: CEC-200-2013-004-V1-CMF.

28 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

that in the *CED 2013* mid case, so reductions in consumption and peak demand growth are not as severe as in other planning areas.

Table 6: Comparison of *CEDU 2014 and CED 2013* Mid Case Demand Baseline Forecasts of PG&E Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	86,596	86,596	86,596	86,596
2000	101,050	101,050	101,050	101,050
2013	109,636	109,461	109,461	109,461
2016	113,958	115,378	113,497	111,598
2020	120,090	124,169	119,554	115,852
2024	126,699	131,520	125,970	121,603
2025	--	133,390	127,607	123,120
	Average Annual Growth Rates			
1990-2000	1.56%	1.56%	1.56%	1.56%
2000-2013	0.63%	0.62%	0.62%	0.62%
2013-2016	1.30%	1.77%	1.21%	0.65%
2013-2024	1.32%	1.68%	1.29%	0.96%
2013-2025	--	1.66%	1.29%	0.98%
Coincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	17,250	17,250	17,250	17,250
2000	20,628	20,628	20,628	20,628
2014*	23,748	23,684	23,684	23,684
2016	24,519	24,527	24,319	23,767
2020	25,866	26,218	25,597	24,613
2024	27,010	27,545	26,675	25,434
2025	--	27,848	26,922	25,613
	Average Annual Growth Rates			
1990-2000	1.80%	1.80%	1.80%	1.80%
2000-2014	1.09%	1.07%	1.07%	1.07%
2014-2016	1.61%	1.77%	1.33%	0.17%
2014-2024	1.30%	1.52%	1.20%	0.72%
2014-2025	--	1.48%	1.17%	0.71%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 7 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions for the PG&E planning area. As in the statewide results, the updated stock for 2013 is lower compared to *CED 2013.* The large number of pending adoptions (through mid 2014) for PV systems reduces the difference in peak and energy impacts in the *CEDU 2014* mid case versus *CED 2013* throughout the forecast period.

Table 7: Comparison of *CEDU 2014 and CED 2013* Mid Case PG&E Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	7,261	6,751	6,751	6,751
2014	7,826	7,238	7,249	7,255
2016	8,392	8,067	8,145	8,259
2020	9,104	8,637	8,850	9,123
2024	10,385	9,538	10,125	10,803
2025	--	9,819	10,503	11,287
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	1,369	1,232	1,232	1,232
2014	1,460	1,343	1,345	1,347
2016	1,574	1,491	1,510	1,537
2020	1,752	1,634	1,688	1,755
2024	2,079	1,870	2,015	2,183
2025	--	1,944	2,113	2,306

Source: California Energy Commission, Demand Analysis Office, 2014.

Key Inputs

Table 8 compares the average annual growth rate of the key economic and demographic drivers used in *CEDU 2014* with those used in the *CED 2013* mid case for the PG&E planning area. As in the statewide case, the largest reduction in growth is for personal income: by 2024, *CEDU 2014* mid case income is around 4.5 percent lower than *CED 2013*. Growth in manufacturing output and commercial employment in the adjusted mid case is up compared to *CED 2013* (the latter very slightly), but, as shown above, not enough to overcome the effects of falling income.

Table 8: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the PG&E Planning Area Using Average Annual Growth, 2013-2024

Driver	*CED 2013* Mid Energy Demand	*CEDU 2014* High Energy Demand	*CEDU 2014* Mid Energy Demand	*CEDU* 2014 Low Energy Demand
Personal Income	3.51%	3.30%	3.08%	2.79%
Commercial Employment	1.22%	1.42%	1.23%	1.13%
Manufacturing Output	2.16%	5.29%	2.99%	2.85%
Population	1.03%	1.01%	1.00%	0.98%

Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Table 9 shows the effect of updating historical electricity rates on average cost per kilowatt-hour (kWh) in the *CEDU 2014* mid case versus *CED 2013*, by major economic sector. Commercial and industrial average rates were significantly higher in 2013 than predicted in the previous forecast, while residential rates were almost identical. Beyond 2013, rates in the *CEDU 2014* mid case grow at the same rate as *CED 2013*.

Table 9: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the PG&E Planning Area (2013 cents/kWh)

	Residential		Commercial		Industrial	
Year	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand
2013	16.08	16.02	14.01	15.43	10.79	11.27
2016	16.92	16.85	14.82	16.32	11.43	11.93
2020	17.62	17.55	15.44	17.00	11.91	12.43
2024	18.34	18.27	16.07	17.69	12.39	12.94
2025	--	18.45	--	17.87	--	13.07

Source: California Energy Commission, Demand Analysis Office, 2014.

SCE Planning Area

The 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).

Forecast Results

Table 10 compares *CEDU 2014* high, mid, and low demand scenarios with the *CED 2013* mid demand scenario for electricity consumption and peak demand for selected years. Growth in both consumption (2013-2024) and peak demand (2014-2014) is slower in the *CEDU 2014* mid demand case versus *CED 2013*. By 2024, consumption and peak demand in the updated mid case are around 2.0 percent and 1.0 percent lower than *CED 2013* mid, respectively. As in the statewide forecast, these results derive from slower growth in personal income, commercial employment, and population, as well as a lower starting point (2013) for consumption.

Table 10: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SCE Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	81,671	81,671	81,671	81,671
2000	95,515	95,515	95,515	95,515
2013	99,758	99,243	99,243	99,243
2016	103,480	104,253	102,218	100,348
2020	108,600	111,589	106,875	102,984
2024	114,503	118,080	112,247	107,488
2025	--	119,741	113,612	108,660
	Average Annual Growth Rates			
1990-2000	1.58%	1.58%	1.58%	1.58%
2000-2013	0.33%	0.29%	0.29%	0.29%
2013-2016	1.23%	1.66%	0.99%	0.37%
2013-2024	1.26%	1.59%	1.13%	0.73%
2013-2025	--	1.58%	1.13%	0.76%
Coincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	17,647	17,647	17,647	17,647
2000	19,506	19,506	19,506	19,506
2014*	22,873	22,943	22,943	22,943
2016	23,605	23,783	23,537	22,996
2020	24,875	25,448	24,724	23,657
2024	26,028	26,864	25,784	24,415
2025	--	27,194	26,030	24,580
	Average Annual Growth Rates			
1990-2000	1.01%	1.01%	1.01%	1.01%
2000-2014	1.23%	1.26%	1.26%	1.26%
2014-2016	1.59%	1.82%	1.29%	0.12%
2014-2024	1.30%	1.59%	1.17%	0.62%
2014-2025	--	1.56%	1.15%	0.63%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 11 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions for the SCE planning area. As in the statewide results, the updated stock for 2013 is lower compared to *CED 2013,* but the large number of pending applications (through mid 2014) for PV systems eventually drive the *CEDU 2014* mid case impacts above those in *CED 2013* for both peak demand and energy.

Table 11: Comparison of *CEDU 2014* and *CED 2013* Mid Case SCE Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	6,105	5,865	5,865	5,865
2014	6,570	6,429	6,436	6,440
2016	6,910	7,146	7,199	7,313
2020	7,368	7,514	7,640	7,878
2024	8,263	8,110	8,516	9,021
2025	--	8,306	8,779	9,354
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	1,099	982	982	982
2014	1,160	1,123	1,125	1,126
2016	1,220	1,253	1,265	1,292
2020	1,321	1,334	1,362	1,419
2024	1,532	1,473	1,569	1,690
2025	--	1,519	1,632	1,770

Source: California Energy Commission, Demand Analysis Office, 2014.

Key Inputs

Table 12 compares the average annual growth rate of the key economic and demographic drivers used in *CEDU 2014* with those used in the *CED 2013* mid case for the SCE planning area. Growth is down for the adjusted mid case for all variables except manufacturing output. The largest reduction in growth is for personal income: by 2024, *CEDU 2014* mid case income is around 6.5 percent lower than *CED 2013*. The Los Angeles region shows more adverse impacts on economic growth in the updated forecast compared to other regions in the state, a result of a 2013 regional output that was significantly lower than had been predicted.[29]

29 Email communication with Chris Lafakis, California analyst at Moody's Analytics, October 2014.

Table 12: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the SCE Planning Area Using Average Annual Growth, 2013-2024

Driver	*CED 2013* Mid Energy Demand	*CEDU 2014* High Energy Demand	*CEDU 2014* Mid Energy Demand	*CEDU* 2014 Low Energy Demand
Personal Income	3.51%	3.10%	2.88%	2.60%
Commercial Employment	1.21%	1.25%	1.05%	0.95%
Manufacturing Output	2.23%	5.38%	3.08%	2.94%
Population	0.96%	0.94%	0.93%	0.91%

Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Table 13 shows the effect of updating historical electricity rates on average cost per kWh in the *CEDU 2014* mid case versus *CED 2013*, by major economic sector. Residential and industrial average rates were significantly higher in 2013 than had been predicted in the previous forecast, while commercial rates were almost identical. Beyond 2013, rates in the *CEDU 2014* mid case grow at the same rate as *CED 2013*.

Table 13: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SCE Planning Area (2013 cents/kWh)

	Residential		Commercial		Industrial	
Year	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand
2013	15.83	17.30	14.27	14.28	9.64	10.29
2016	16.85	18.41	15.28	15.29	10.34	11.04
2020	17.75	19.39	16.12	16.13	10.91	11.64
2024	18.47	20.18	16.77	16.79	11.35	12.11
2025	--	20.38	--	16.95	--	12.24

Source: California Energy Commission, Demand Analysis Office, 2014.

SDG&E 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.

Forecast Results

Table 14 compares *CEDU 2014* high, mid, and low demand scenarios with the *CED 2013* mid demand scenario for electricity consumption and peak demand for selected years. Growth in both consumption (2013-2024) and peak demand (2014-2024) is slower in the *CEDU 2014* mid demand case versus *CED 2013*. As in the statewide forecast, reductions in growth derive from slower growth in personal income, commercial employment, and population. By 2024, consumption and peak demand in the updated mid case are around 1.5 percent and 2.6 percent lower than in *CED 2013* mid, respectively. The larger difference for peak demand results from an estimated weather-normalized peak for 2014 below that estimated for 2013.

Table 14: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SDG&E Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	14,857	14,857	14,857	14,857
2000	18,784	18,784	18,784	18,784
2013	20,972	20,817	20,817	20,817
2016	21,855	22,214	21,691	21,276
2020	23,204	24,095	22,914	22,063
2024	24,564	25,631	24,192	23,115
2025	--	26,022	24,523	23,399
	Average Annual Growth Rates			
1990-2000	2.37%	2.37%	2.37%	2.37%
2000-2013	0.85%	0.79%	0.79%	0.79%
2013-2016	1.38%	2.19%	1.38%	0.73%
2013-2024	1.45%	1.91%	1.38%	0.96%
2013-2025	--	1.88%	1.37%	0.98%
Coincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	2,978	2,978	2,978	2,978
2000	3,485	3,485	3,485	3,485
2014*	4,758	4,669	4,669	4,669
2016	4,906	4,889	4,818	4,696
2020	5,188	5,253	5,070	4,847
2024	5,357	5,486	5,214	4,925
2025	--	5,537	5,246	4,943
	Average Annual Growth Rates			
1990-2000	1.58%	1.58%	1.58%	1.58%
2000-2014	2.42%	2.28%	2.28%	2.28%
2014-2016	1.54%	2.32%	1.58%	0.29%
2014-2024	1.19%	1.62%	1.11%	0.53%
2014-2025	--	1.56%	1.07%	0.52%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 15 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions for the SDG&E planning area. As in the statewide results, the updated stock for 2013 is lower compared to *CED 2013,* but the large number of pending applications (through mid-2014) for PV systems eventually drive the *CEDU 2014* mid case impacts above those in *CED 2013* for both peak demand and energy.

Table 15: Comparison of *CEDU 2014* and *CED 2013* Mid Case SDG&E Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	1,033	959	959	959
2014	1,124	1,057	1,062	1,093
2016	1,301	1,287	1,351	1,416
2020	1,480	1,420	1,523	1,613
2024	1,900	1,781	1,938	2,067
2025	--	1,889	2,054	2,188
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	213	188	188	188
2014	226	216	217	224
2016	263	256	271	287
2020	304	287	311	333
2024	404	374	411	442
2025	--	400	439	471

Source: California Energy Commission, Demand Analysis Office, 2014.

Key Inputs

Table 16 compares the average annual growth rate of the key economic and demographic drivers used in *CEDU 2014* with those used in the *CED 2013* mid case for the SDG&E planning area. Growth is down for the adjusted mid case for all variables except manufacturing output. The largest reduction in growth is for personal income: by 2024, *CEDU 2014* mid case income is around 6.1 percent lower than *CED 2013*, more than in the Northern California planning areas but less than the projected decline in the Los Angeles region.

Table 16: Comparison of *CEDU 2014 and CED 2013* Mid Case Economic and Demographic Drivers for the SDG&E Planning Area Using Average Annual Growth, 2013-2024

Driver	*CED 2013* Mid Energy Demand	*CEDU 2014* High Energy Demand	*CEDU 2014* Mid Energy Demand	*CEDU* 2014 Low Energy Demand
Personal Income	3.53%	3.17%	2.95%	2.66%
Commercial Employment	1.23%	1.30%	1.12%	1.02%
Manufacturing Output	2.61%	5.65%	3.34%	3.20%
Population	0.71%	0.69%	0.68%	0.66%

Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Table 17 shows the effect of updating historical electricity rates on average cost per kWh in the *CEDU 2014* mid case versus *CED 2013*, by major economic sector. Rates in all three sectors were significantly lower in 2013 than had been predicted in the previous forecast. Beyond 2013, rates in the *CEDU 2014* mid case grow at the same rate as *CED 2013*.

Table 17: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SDG&E Planning Area (2013 cents/kWh)

	Residential		Commercial		Industrial	
Year	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand
2013	19.07	16.36	16.54	14.99	15.12	12.30
2016	20.28	17.41	17.62	15.97	16.11	13.11
2020	20.98	18.00	18.22	16.52	16.67	13.56
2024	21.83	18.73	18.96	17.19	17.34	14.11
2025	--	18.92	--	17.36	--	14.25

Source: California Energy Commission, Demand Analysis Office, 2014.

LADWP Planning Area

The 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.

Forecast Results

Table 18 compares *CEDU 2014* high, mid, and low demand scenarios with the *CED 2013* mid demand scenario for electricity consumption and peak demand for selected years. Growth in both consumption (2013-2024) and peak demand (2014-2024) is slower in the *CEDU 2014* mid demand case versus *CED 2013*. As in the statewide forecast and other planning areas, reductions in growth derive from slower growth in personal income, commercial employment, and population. By 2024, consumption and peak demand in the updated mid case are around 4.3 percent and 3.8 percent lower than in *CED 2013* mid, respectively. The relatively large declines relative to *CED 2013* compared to other planning areas reflect more severe adjustments to economic growth projections for the Los Angeles region.

Table 18: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of LADWP Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	23,038	23,038	23,038	23,038
2000	24,018	24,018	24,018	24,018
2013	25,057	24,355	24,355	24,355
2016	25,729	25,298	24,722	24,304
2020	26,772	26,833	25,622	24,737
2024	28,162	28,400	26,942	25,841
2025	--	28,784	27,268	26,119
	Average Annual Growth Rates			
1990-2000	0.42%	0.42%	0.42%	0.42%
2000-2013	0.33%	0.11%	0.11%	0.11%
2013-2016	0.89%	1.27%	0.50%	-0.07%
2013-2024	1.07%	1.41%	0.92%	0.54%
2013-2025	--	1.40%	0.95%	0.58%
Coincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	5,341	5,341	5,341	5,341
2000	5,344	5,344	5,344	5,344
2014*	5,891	5,739	5,739	5,739
2016	6,033	5,905	5,838	5,693
2020	6,279	6,210	6,059	5,799
2024	6,546	6,518	6,299	5,973
2025	--	6,588	6,353	6,009
	Average Annual Growth Rates			
1990-2000	0.01%	0.01%	0.01%	0.01%
2000-2014	0.75%	0.55%	0.55%	0.55%
2014-2016	1.19%	1.44%	0.86%	-0.40%
2014-2024	1.06%	1.28%	0.94%	0.40%
2014-2025	--	1.26%	0.93%	0.42%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 19 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions for the LADWP planning area. Updated stock for 2013 is higher compared to *CED 2013,* and this, combined with pending applications (through mid 2014) for PV systems, keeps the *CEDU 2014* mid case impacts above those in *CED 2013* for both peak demand and energy.

Table 19: Comparison of *CEDU 2014* and *CED 2013* Mid Case LADWP Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	1,458	1,496	1,496	1,496
2014	1,492	1,566	1,568	1,569
2016	1,573	1,684	1,691	1,699
2020	1,635	1,730	1,747	1,767
2024	1,729	1,799	1,837	1,879
2025	--	1,820	1,863	1,912
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	250	270	270	270
2014	253	273	274	274
2016	263	288	289	291
2020	271	294	297	300
2024	287	306	312	320
2025	--	309	317	327

Source: California Energy Commission, Demand Analysis Office, 2014.

Key Inputs

Table 20 compares the average annual growth rate of the key economic and demographic drivers used in *CEDU 2014* with those used in the *CED 2013* mid case for the LADWP planning area. As in most of the other planning areas, growth is down for the adjusted mid case for all variables except manufacturing output compared to *CED 2013*. By 2024, *CEDU 2014* mid case personal income is around 6.8 percent lower than *CED 2013*, the largest difference between the older and newer income projections mid case among the planning areas.

Table 20: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the LADWP Planning Area Using Average Annual Growth, 2013-2024

Driver	*CED 2013* Mid Energy Demand	*CEDU 2014* High Energy Demand	*CEDU 2014* Mid Energy Demand	*CEDU* 2014 Low Energy Demand
Personal Income	3.34%	2.90%	2.69%	2.40%
Commercial Employment	1.18%	1.36%	1.09%	0.99%
Manufacturing Output	2.25%	5.25%	2.95%	2.81%
Population	0.65%	0.63%	0.62%	0.60%

Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Table 21 shows the effect of updating historical electricity rates on average cost per kWh in the *CEDU 2014* mid case versus *CED 2013*, by major economic sector. Estimated historical rates in all three sectors in 2013 are relatively close to what was predicted in the previous forecast. Beyond 2013, rates in the *CEDU 2014* mid case grow at the same rate as *CED 2013*.

Table 21: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the LADWP Planning Area (2013 cents/kWh)

	Residential		Commercial		Industrial	
Year	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand
2013	13.63	13.87	13.96	14.00	12.62	12.38
2016	15.19	15.46	15.61	15.66	14.12	13.85
2020	16.15	16.44	16.59	16.63	15.00	14.71
2024	16.81	17.11	17.26	17.31	15.61	15.31
2025	--	17.28	--	17.48	--	15.47

Source: California Energy Commission, Demand Analysis Office, 2014.

SMUD 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. SMUD control area forecasts are derived by estimating the share of the PG&E forecast that comes from WAPA, Roseville, and Redding. These estimates are then subtracted from the PG&E planning area and added to the SMUD planning area. The results in this chapter are for the SMUD planning area, rather than the SMUD control area.

Forecast Results

Table 22 compares *CEDU 2014* high, mid, and low demand scenarios with the *CED 2013* mid demand scenario for electricity consumption and peak demand for selected years. As in the other planning areas, growth in both consumption (2013-2024) and peak demand (2014-2024) is projected to be slower in the *CEDU 2014* mid demand case versus *CED 2013*. Reductions in growth derive from slower growth in personal income and population. Unlike the Southern California planning areas, commercial employment growth is slightly higher in the updated mid case. By 2024, consumption and peak demand in the updated mid case are around 0.5 percent and 7.0 percent lower than in *CED 2013* mid, respectively. The discrepancy between the consumption and peak outcomes results from a lower starting point for 2014 weather-normalized peak demand compared to that projected in *CED 2013*.

Table 22: Comparison of *CEDU 2014* and *CED 2013* Mid Case Demand Baseline Forecasts of SMUD Electricity Demand

Consumption (GWh)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	8,358	8,358	8,358	8,358
2000	9,550	9,550	9,550	9,550
2013	10,590	10,564	10,564	10,564
2016	10,993	11,202	10,977	10,841
2020	11,639	12,122	11,607	11,242
2024	12,430	13,020	12,364	11,892
2025	--	13,246	12,558	12,064
	Average Annual Growth Rates			
1990-2000	1.34%	1.34%	1.34%	1.34%
2000-2013	0.80%	0.78%	0.78%	0.78%
2013-2016	1.25%	1.97%	1.29%	0.86%
2013-2024	1.47%	1.92%	1.44%	1.08%
2013-2025	--	1.90%	1.45%	1.11%
Coincident Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
1990	2,194	2,194	2,194	2,194
2000	2,687	2,687	2,687	2,687
2014*	3,135	2,950	2,950	2,950
2016	3,223	3,039	3,013	2,958
2020	3,387	3,250	3,161	3,040
2024	3,555	3,453	3,307	3,144
2025	--	3,504	3,344	3,170
	Average Annual Growth Rates			
1990-2000	2.05%	2.05%	2.05%	2.05%
2000-2014	1.19%	0.72%	0.72%	0.72%
2014-2016	1.39%	1.49%	1.06%	0.14%
2014-2024	1.26%	1.59%	1.15%	0.64%
2014-2025	--	1.58%	1.15%	0.65%
Historical values are shaded.				
*Weather normalized: *CEDU 2014* uses a weather-normalized peak value derived from the actual 2014 peak for calculating growth rates during the forecast period.				

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 23 shows the effect of incorporating updated historical distributed generation adoptions and pending adoptions for the SMUD planning area. Updated stock for 2013 is lower compared to *CED 2013,* but pending applications (through mid 2014) for PV systems push the *CEDU 2014* mid case impacts above those in *CED 2013* for both peak demand and energy by the end of the forecast period.

Table 23: Comparison of *CEDU 2014* and *CED 2013* Mid Case SMUD Self-Generation Impacts

Energy (GWH)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	105	98	98	98
2014	117	116	118	120
2016	152	155	163	171
2020	202	189	211	234
2024	309	271	317	385
2025	--	295	350	436
Peak (MW)				
	CED 2013 Mid Energy Demand	***CEDU 2014 High Energy Demand***	***CEDU 2014 Mid Energy Demand***	***CEDU 2014 Low Energy Demand***
2013	26	26	26	26
2014	28	28	28	29
2016	36	36	37	39
2020	47	43	48	53
2024	70	61	71	85
2025	--	66	78	95

Source: California Energy Commission, Demand Analysis Office, 2014.

Key Inputs

Table 24 compares the average annual growth rate of the key economic and demographic drivers used in *CEDU 2014* with those used in the *CED 2013* mid case for the SMUD planning area. Growth is down in the adjusted mid case for personal income and population compared to *CED 2013*. By 2024, *CEDU 2014* mid case income is around 3.0 percent lower than *CED 2013*, a smaller drop than in the other planning areas. This combined with a slight increase in commercial employment growth yields a relatively small reduction in electricity consumption.

Table 24: Comparison of *CEDU 2014* and *CED 2013* Mid Case Economic and Demographic Drivers for the SMUD Planning Area Using Average Annual Growth, 2013-2024

Driver	*CED 2013* Mid Energy Demand	*CEDU 2014* High Energy Demand	*CEDU 2014* Mid Energy Demand	*CEDU* 2014 Low Energy Demand
Personal Income	3.61%	3.53%	3.31%	3.03%
Commercial Employment	1.06%	1.35%	1.17%	1.08%
Manufacturing Output	1.69%	5.43%	3.13%	2.99%
Population	0.93%	0.91%	0.90%	0.88%

Sources: Moody's Analytics and IHS Global Insight, 2013-2014.

Table 25 shows the effect of updating historical electricity rates on average cost per kWh in the *CEDU 2014* mid case versus *CED 2013*, by major economic sector. Estimated historical rates in the commercial and industrial sectors in 2013 in the updated forecast are above those predicted for *CED 2013*, while residential rates are slightly lower. Beyond 2013, rates in the *CEDU 2014* mid case grow at the same rate as *CED 2013*.

Table 25: Comparison of *CEDU 2014* Mid Case and *CED 2013* Mid Case Electricity Rates by Sector for the SMUD Planning Area (2013 cents/kWh)

	Residential		Commercial		Industrial	
Year	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand	*CED 2013* Mid Energy Demand	*CEDU 2014* Mid Energy Demand
2013	12.60	12.49	13.14	14.00	10.10	11.28
2016	13.61	13.49	14.21	15.13	10.92	12.20
2020	14.26	14.13	14.89	15.86	11.45	12.78
2024	14.84	14.70	15.49	16.51	11.91	13.30
2025	--	14.85	--	16.67	--	13.43

Source: California Energy Commission, Demand Analysis Office, 2014.

CHAPTER 3: Managed Forecasts

For *CED 2013*, the Energy Commission, along with the CPUC and Navigant Consulting, developed scenarios for AAEE savings for IOU service territories based on the CPUC's *2013 California Energy Efficiency Potential and Goals Study*.[30] Combinations of the three *CED 2013* baseline demand scenarios and the five AAEE scenarios provided options to be used as managed forecasts for resource planning, combining "business-as-usual" projections with additional efficiency savings deemed likely to occur.

The Energy Commission, together with the CPUC and the California ISO, settled on two combinations of baseline and AAEE forecasts as managed forecasts to be used for planning: the *CED 2013* mid baseline demand case combined with the mid AAEE scenario for systemwide analyses and the mid baseline case combined with the low-mid AAEE scenario for more localized studies.[31] This chapter provides an update for these two managed forecasts, combining the *CEDU 2014* mid baseline scenario with the same mid and low-mid AAEE cases rescaled to be incremental to 2013 for electricity sales and to 2014 for utility peak demand.[32] Savings for 2025 for the two AAEE scenarios were estimated by extrapolating out one year using the growth rates for 2023-2024.[33]

Results

Table 26 and **Table 27** show the rescaled projected savings from AAEE for each IOU service territory and the three IOUs combined for 2014-2025 for the mid and low-mid AAEE scenarios, respectively. These savings are subtracted directly from IOU service territory sales and peak forecasts to provide updated managed forecasts. Impacts of the managed forecasts are reflected in the subregional demand forms (1.1c and 1.5) accompanying this report.[34]

---

30 Available at http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M088/K661/88661468.PDF

31 For a full description of the AAEE scenarios, see Chapter 4 in Kavalec, Chris, Nicholas Fugate, Bryan Alcorn, Mark Ciminelli, Asish Gautam, Kate Sullivan, and Malachi Weng-Gutierrez. 2014. *California Energy Demand 2014-2024 Final Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency.* California Energy Commission, Electricity Supply Analysis Division. Publication Number: CEC-200-2013-004-V1-CMF.

32 Rescaling is necessary since historical consumption and peak demand include any AAEE load impacts that have already occurred.

33 Navigant Consulting compared a simple extrapolation with running its model out one more year for a few efficiency measures, found very little difference in the results, and, therefore, recommended extrapolation.

34 www.energy.ca.gov/2014_energypolicy/documents/index.html#forecastforms

Table 26: AAEE Savings by Utility, Mid AAEE Scenario

Energy Savings (GWH)				
Year	PG&E	SCE	SDG&E	IOUs Combined
2014	167	206	28	400
2015	938	1,152	247	2,337
2016	1,856	2,259	498	4,613
2017	2,746	3,308	735	6,789
2018	3,548	4,159	922	8,628
2019	4,428	5,020	1,134	10,581
2020	5,209	5,794	1,323	12,327
2021	6,043	6,625	1,532	14,200
2022	6,922	7,466	1,754	16,142
2023	7,866	8,386	1,988	18,240
2024	8,809	9,323	2,222	20,354
2025	9,862	10,362	2,483	22,707
Peak Demand Savings* (MW)				
Year	PG&E	SCE	SDG&E	IOUs Combined
2015	200	216	52	468
2016	437	471	113	1,022
2017	664	706	169	1,539
2018	884	929	222	2,035
2019	1,099	1,145	276	2,519
2020	1,303	1,339	324	2,966
2021	1,522	1,550	378	3,450
2022	1,751	1,770	435	3,955
2023	2,001	2,015	497	4,513
2024	2,253	2,265	560	5,078
2025	2,536	2,546	630	5,713

*Includes estimated transmission and distribution losses.

Source: California Energy Commission, Demand Analysis Office, 2014.

Table 27: AAEE Savings by Utility, Low-Mid AAEE Scenario

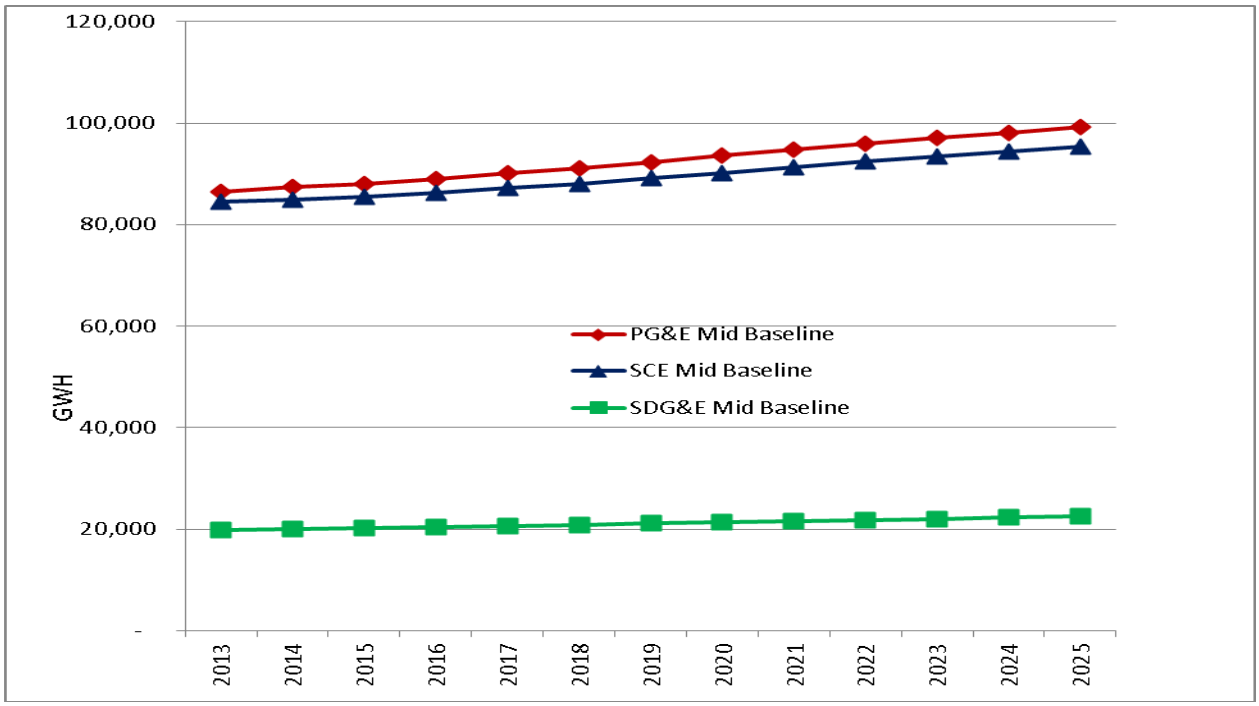
Energy Savings (GWH)				
Year	PG&E	SCE	SDG&E	IOUs Combined
2014	90	126	10	225
2015	650	847	170	1,667
2016	1,213	1,579	331	3,123
2017	1,797	2,318	495	4,611
2018	2,177	2,738	585	5,500
2019	2,692	3,220	714	6,626
2020	3,156	3,684	841	7,681
2021	3,601	4,127	966	8,693
2022	4,076	4,568	1,100	9,743
2023	4,615	5,084	1,248	10,948
2024	5,137	5,596	1,391	12,123
2025	5,715	6,156	1,550	13,421
Peak Demand Savings* (MW)				
Year	PG&E	SCE	SDG&E	IOUs Combined
2015	153	169	39	361
2016	307	339	79	725
2017	464	511	120	1,096
2018	581	635	149	1,365
2019	715	772	185	1,672
2020	839	898	218	1,954
2021	960	1,019	251	2,230
2022	1,085	1,143	287	2,515
2023	1,228	1,290	327	2,845
2024	1,372	1,439	366	3,177
2025	1,532	1,604	410	3,547

*Includes estimated transmission and distribution losses.

Source: California Energy Commission, Demand Analysis Office, 2014.

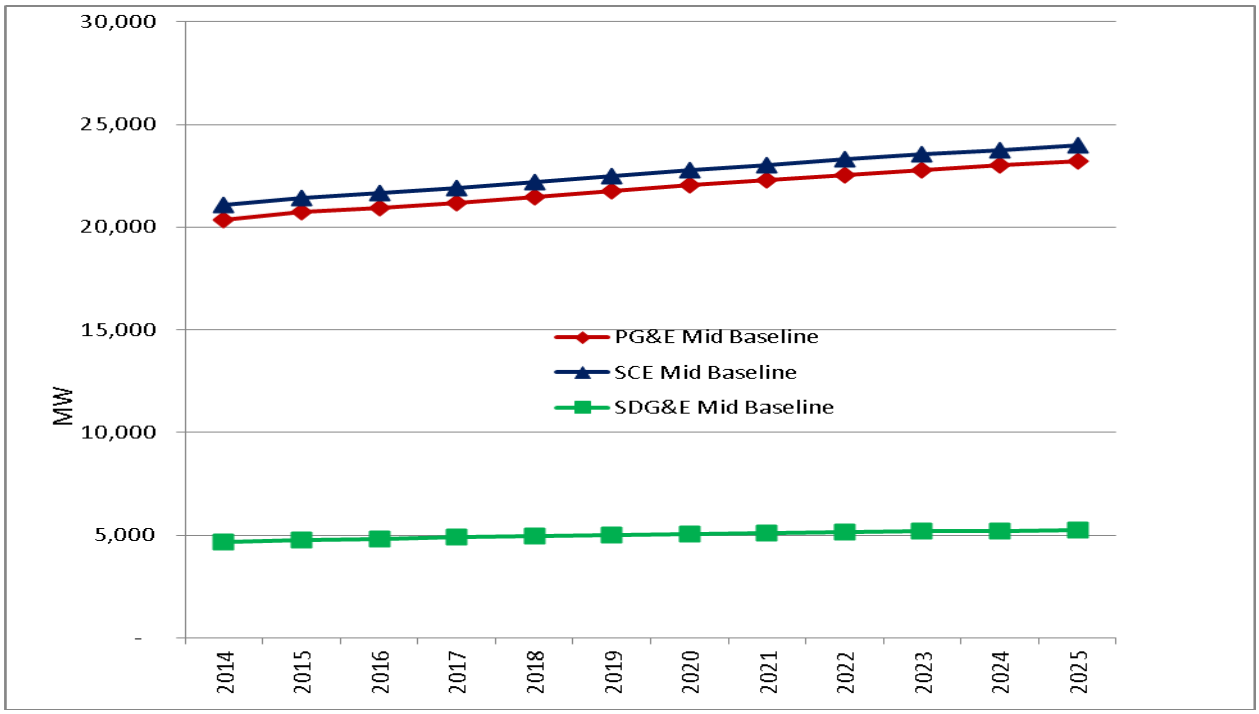
Baseline sales projections for each IOU service territory are developed by applying planning area sales (consumption minus self-generation) growth rates to service territory sales in the last historical year (2013). Baseline peak projections apply planning area growth rates to estimated 2014 weather-normalized service territory peak demand. **Figure 6** and **Figure 7** show projected mid baseline sales and peak demand, respectively, for each IOU service territory. Annual growth in sales for 2013-2025 averages 1.05 percent, 1.02 percent, and 1.03 percent for PG&E, SCE, and SDG&E, respectively. Annual growth in peak demand for 2014-2025 averages 1.19 percent, 1.17 percent, and 1.06 percent for PG&E, SCE, and SDG&E, respectively.

Figure 6: Baseline Electricity Sales by IOU Service Territory, Mid Demand Case



Source: California Energy Commission, Demand Analysis Office, 2014.

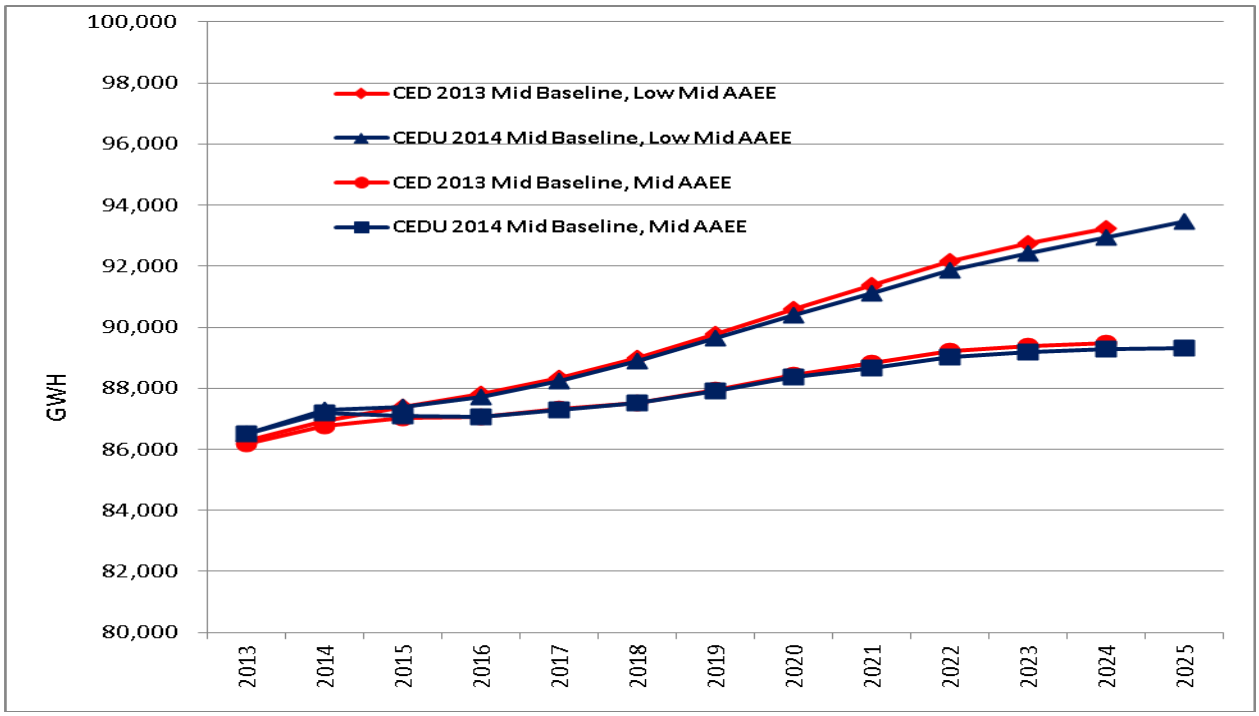
Figure 7: Baseline Peak Demand by IOU Service Territory, Mid Demand Case



Source: California Energy Commission, Demand Analysis Office, 2014.

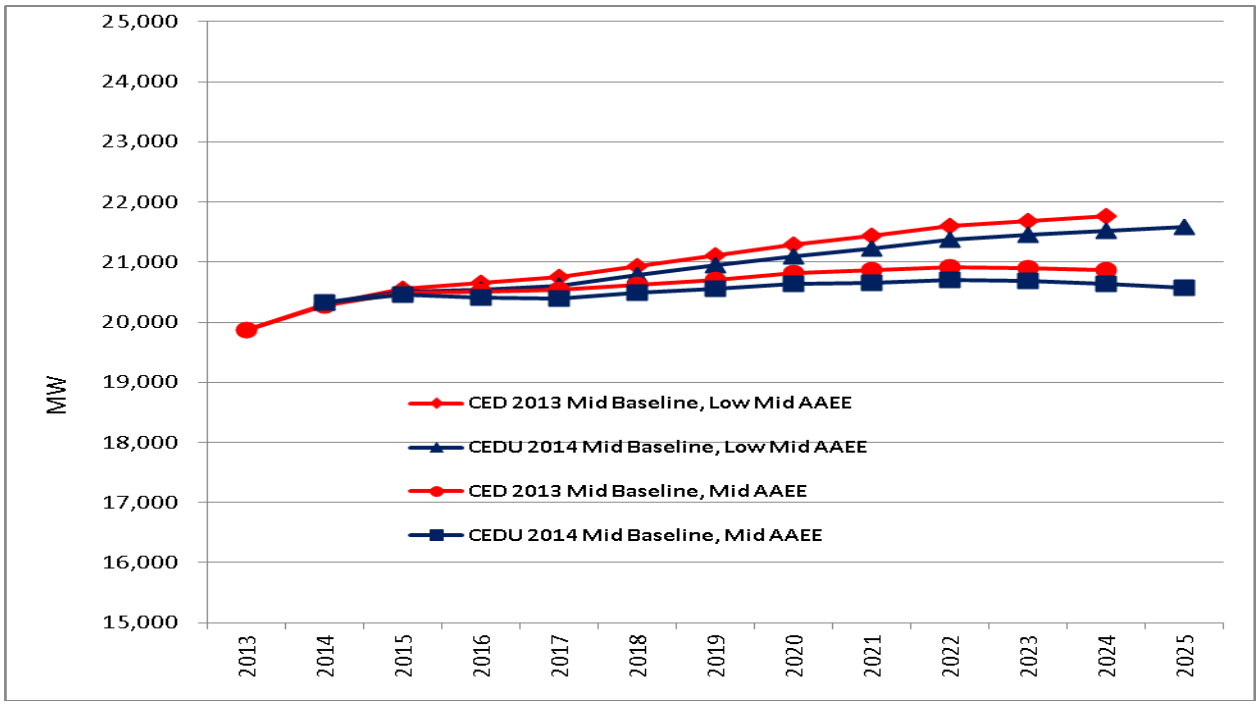
Figure 8 and **Figure 9** compare updated managed forecasts with *CED 2013* for sales and peak demand, respectively, for the PG&E service territory. By 2024, managed sales in the updated forecast are 0.3 percent lower than *CED 2013,* assuming the mid scenario for AAEE, and 0.25 percent applying low-mid AAEE. For managed peak demand, the reductions are around 1.1 percent, assuming either mid or low-mid AAEE.

Figure 8: Managed Forecasts for Sales, PG&E Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

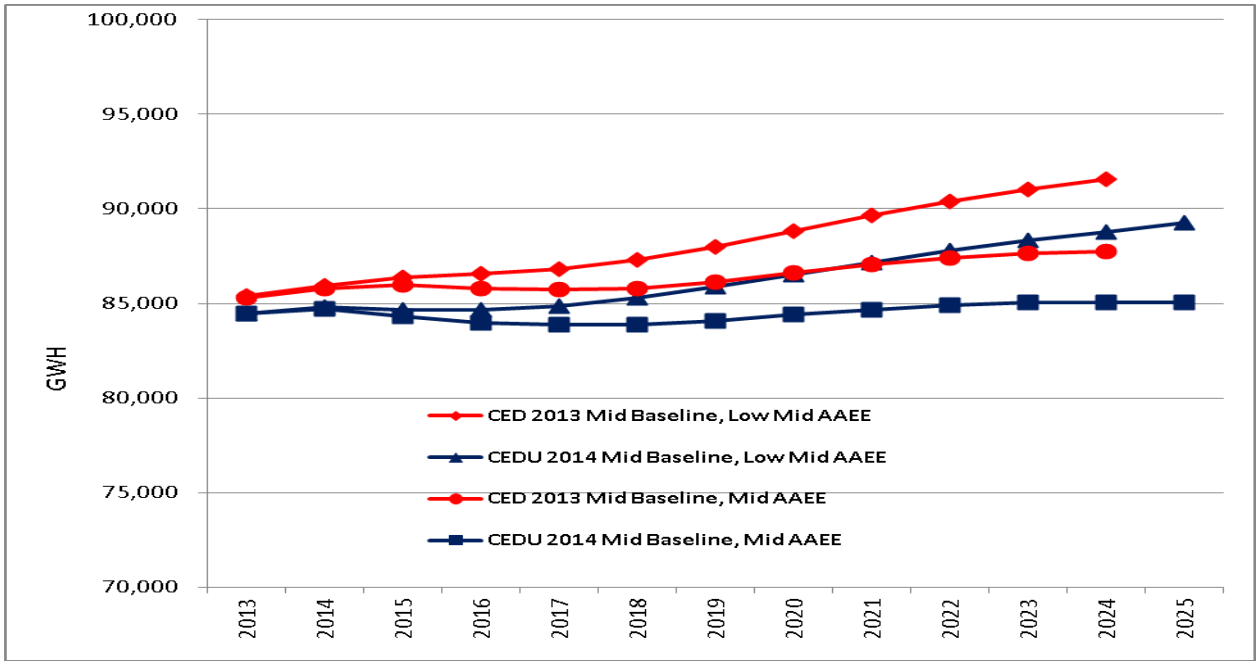
Figure 9: Managed Forecasts for Peak Demand, PG&E Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

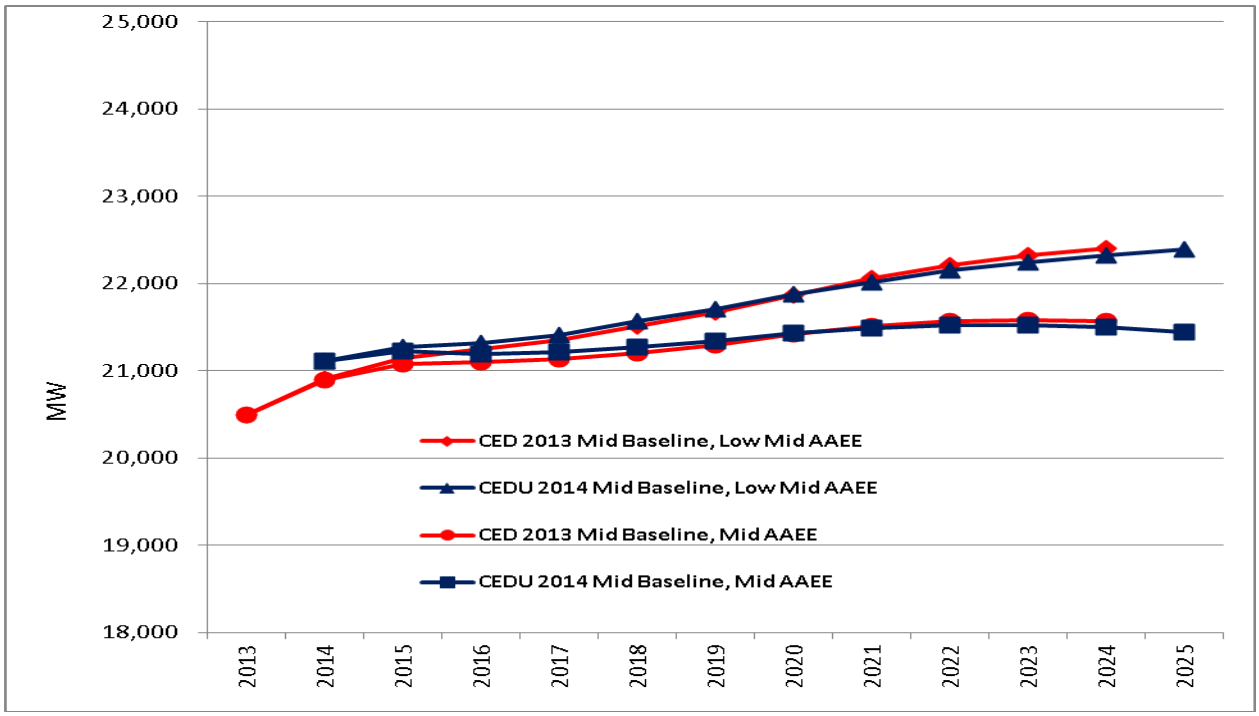
Figure 10 and **Figure 11** compare updated managed forecasts with *CED 2013* for sales and peak demand, respectively, for the SCE service territory. By 2024, managed sales in the updated forecast are around 3.1 percent lower than *CED 2013,* assuming either the mid or low-mid scenario for AAEE. For managed peak demand, the reductions are around 0.4 percent for both mid and low-mid AAEE scenarios. The discrepancy between sales and peak reductions reflects the decrease in sales from 2012-2013 in the SCE service territory.

Figure 10: Managed Forecasts for Sales, SCE Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

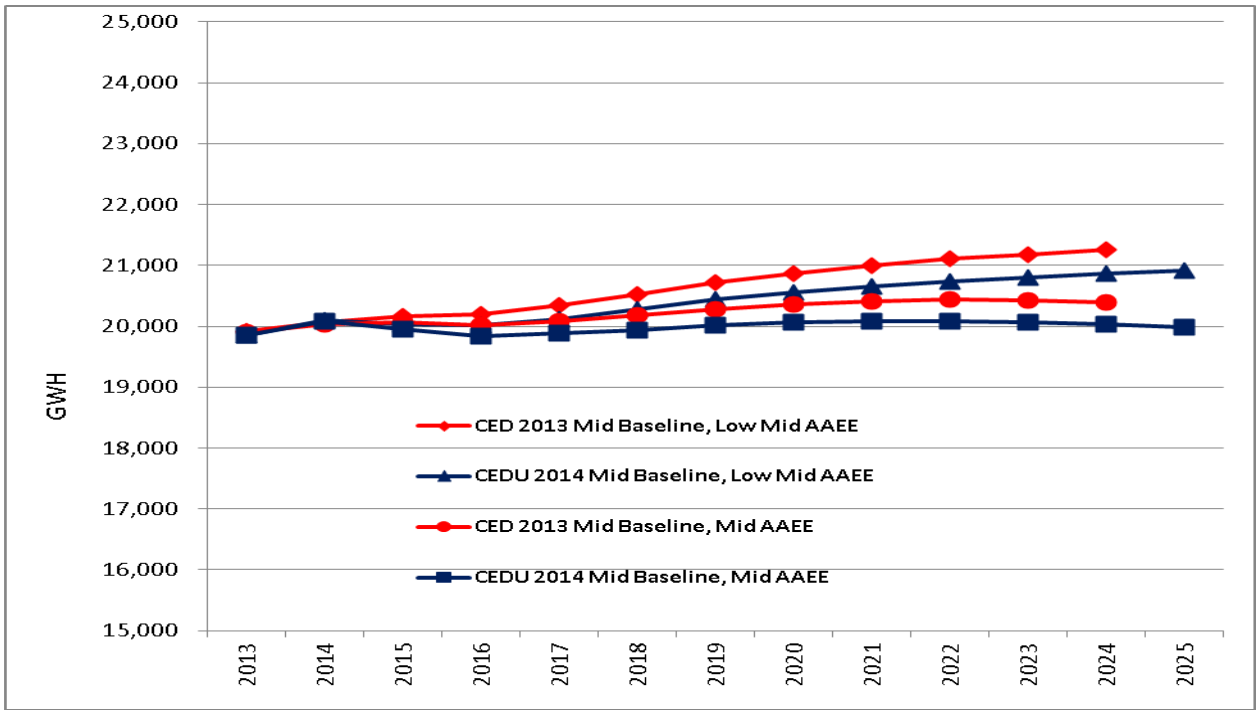
Figure 11: Managed Forecasts for Peak Demand, SCE Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

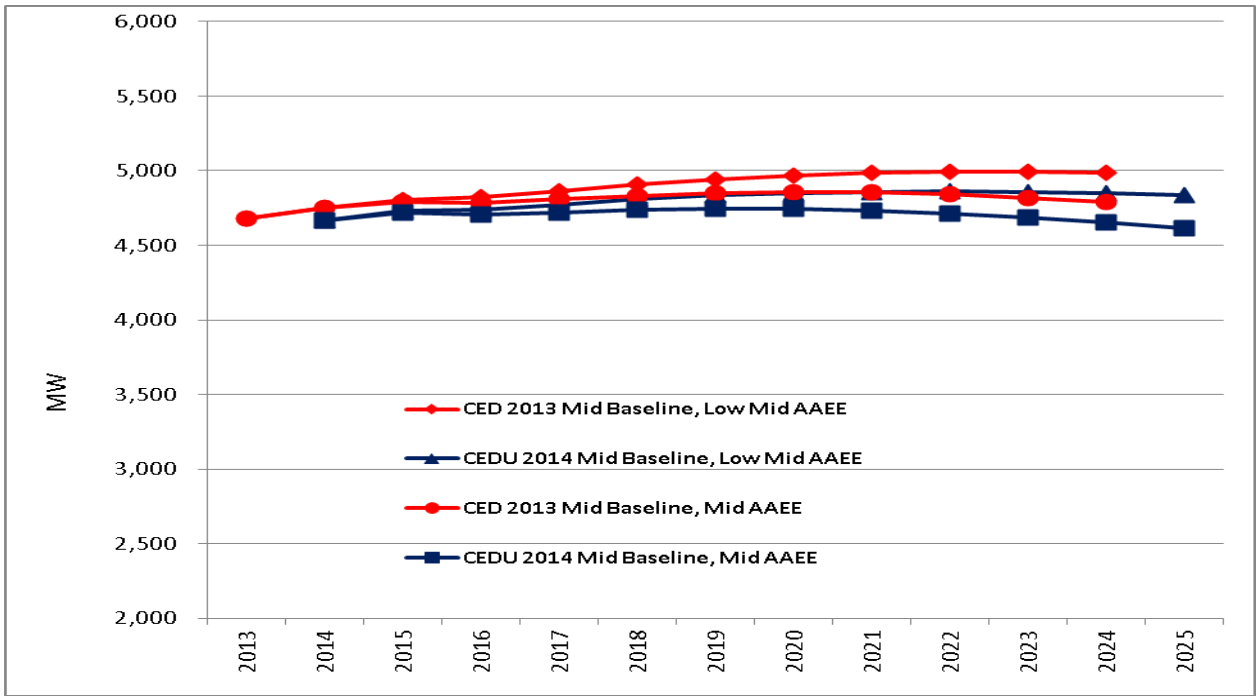
Figure 12 and **Figure 13** compare updated managed forecasts with *CED 2013* for sales and peak demand, respectively, for the SDG&E service territory. By 2024, managed sales in the updated forecast are around 1.8 percent lower than *CED 2013,* assuming either the mid or low-mid scenario for AAEE. For peak demand, the reductions are around 2.8 percent for both mid and low-mid AAEE managed forecasts.

Figure 12: Managed Forecasts for Sales, SDG&E Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

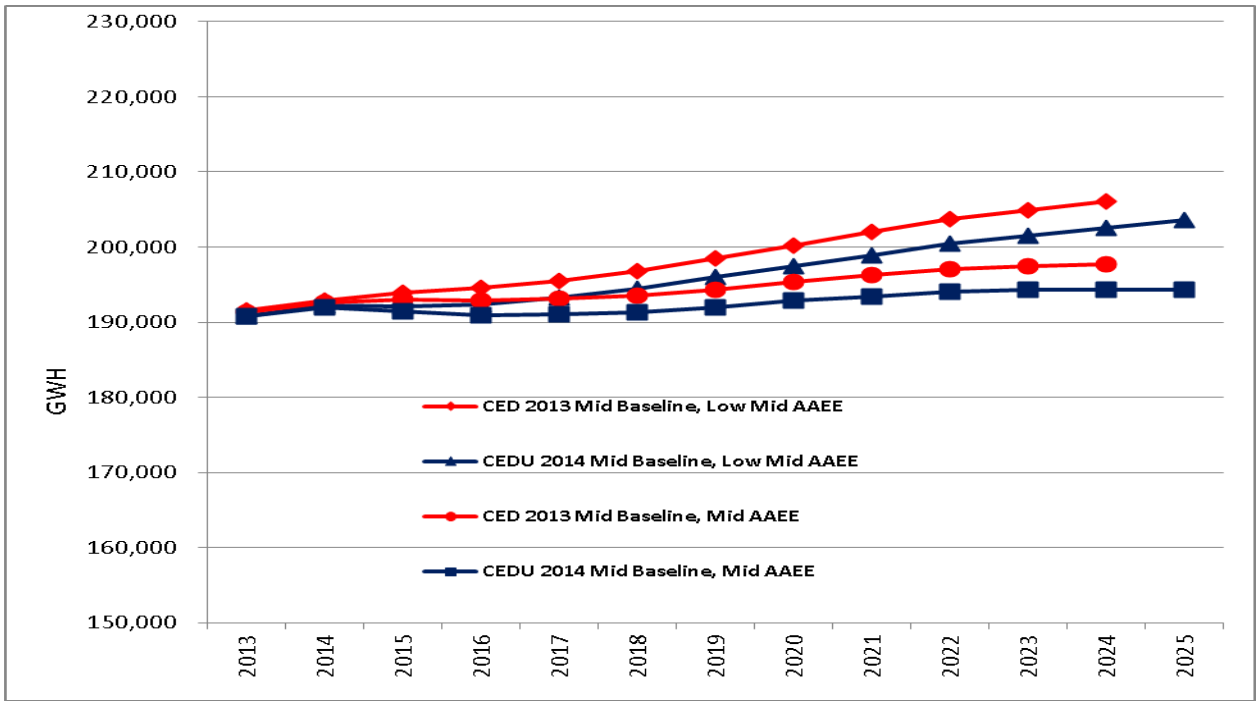
Figure 13: Managed Forecasts for Peak Demand, SDG&E Service Territory



Source: California Energy Commission, Demand Analysis Office, 2014.

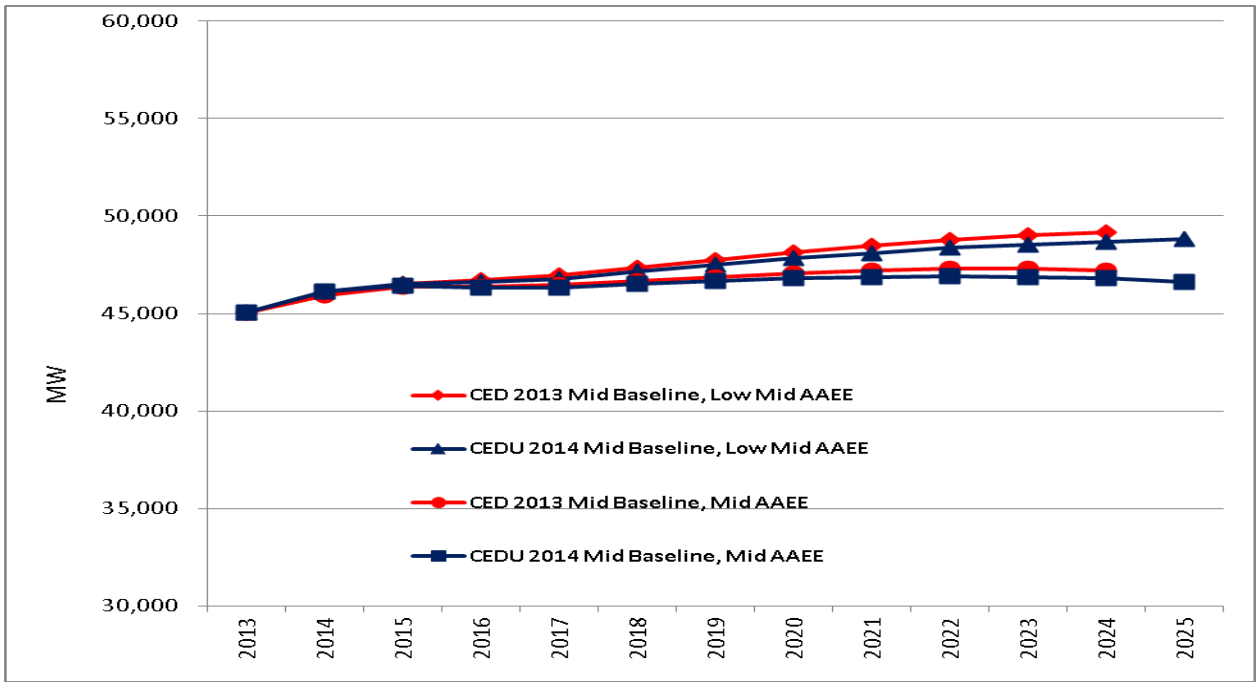
Finally, **Figure 14** and **Figure 15** compare updated managed forecasts with *CED 2013* for sales and peak demand, respectively, for the combined IOUs. By 2024, managed sales in the updated forecast are around 1.7 percent lower than *CED 2013,* assuming either the mid or low-mid scenario for AAEE. For managed peak demand, the reductions are around 0.9 percent for both mid and low-mid AAEE scenarios.

Figure 14: Managed Forecasts for Sales, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2014.

Figure 15: Managed Forecasts for Peak Demand, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2014.

List of Acronyms

Acronym	Definition
AAEE	Additional achievable energy efficiency
California ISO	California Independent System Operator
CED	*California Energy Demand*
CED 2013	*California Energy Demand 2014 – 2024 Final Forecast*
CEDU 2014	*California Energy Demand Updated Forecast, 2015-2025*
CPUC	California Public Utilities Commission
DOF	Department of Finance
Energy Commission	California Energy Commission
EV	Electric vehicle
GW	Gigawatt
GWh	Gigawatt-hour
IEPR	*Integrated Energy Policy Report*
IOU	Investor-owned utility
KWh	Kilowatt-hour
LADWP	Los Angeles Department of Water and Power
LSE	Load-serving entity
LTPP	Long Term Procurement Plan
Moody's	Moody's Analytics
MW	Megawatt
MWh	Megawatt-hour
PG&E	Pacific Gas and Electric Company
POU	Publicly owned utility
PV	Photovoltaic
QFER	Quarterly Fuel Energy Report
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SMUD	Sacramento Municipal Utility District
TPP	Transmission Planning Process

Blank Page

APPENDIX:
Regression Results

This appendix provides estimation results for the econometric models used in the analysis for *CEDU 2014*.

Table A-1: Residential Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Persons per Household	0.3935	0.1142	3.44
Per capita income (2013$)	0.1419	0.0471	3.01
Unemployment Rate	-0.0042	0.0009	-4.57
Residential Electricity Rate (2013¢/kWh)	-0.0870	0.0108	-8.09
Number of Cooling Degree Days (70°)	0.0323	0.0026	12.20
Number of Heating Degree Days (60°)	0.0181	0.0044	4.13
Dummy: 2001	-0.0449	0.0077	-5.87
Dummy: 2002	-0.0372	0.0076	-4.89
Constant: Burbank/Glendale	-0.5528	0.0161	-34.23
Constant: IID	0.1655	0.0265	6.24
Constant: LADWP	-0.5784	0.0154	-37.45
Constant: Pasadena	-0.6617	0.0276	-24.00
Constant: PG&E	-0.3491	0.0136	-25.75
Constant: SCE	-0.4736	0.0180	-26.32
Constant: SDG&E	-0.4528	0.0196	-23.13
Overall Constant	7.1881	0.4645	15.48
Trend Variables			
Time: Burbank/Glendale	0.0085	0.0014	5.89
Time Squared: Burbank/Glendale	-0.0001	0.0000	-2.87
Time: IID	0.0065	0.0007	8.77
Time: LADWP	0.0055	0.0008	6.61
Time: Pasadena	0.0187	0.0032	5.92
Time Squared: Pasadena	-0.0003	0.0001	-2.99
Time: PG&E	0.0011	0.0009	1.21
Time: SCE	0.0038	0.0009	4.02
Time: SDG&E	0.0023	0.0010	2.29
Time: SMUD	-0.0052	0.0017	-3.09
Time Squared: SMUD	0.0001	0.0000	2.12

Adjusted for autocorrelation and cross-sectional correlation.
Wald chi squared = 25,561
Dependent variable = natural log of electricity consumption per household by planning area, 1980-2013
All variables in logged form except time and unemployment rate.

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-2: Commercial Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Commercial Employment	0.8248	0.0119	69.59
Commercial Electricity Rate (2013¢/kWh)	-0.0161	0.0132	-1.23
Number of Cooling Degree Days (65°)	0.0464	0.0082	5.69
Dummy: 2001 (LADWP)	-0.0485	0.0222	-2.18
Dummy: 2001 (PG&E)	-0.0391	0.0152	-2.56
Dummy: 2001 (SDG&E	-0.0682	0.0167	-4.09
Constant: Burbank	-0.2164	0.0303	-7.15
Constant: LADWP	0.1795	0.0230	7.80
Constant: PG&E	0.2388	0.0316	7.55
Constant: SCE	0.2737	0.0278	9.84
Overall Constant	2.6479	0.1052	25.17
Trend Variables			
Time: Burbank	0.0460	0.0037	12.51
Time Squared: Burbank	-0.0009	0.0001	-8.98
Time: IID	0.0321	0.0033	9.62
Time Squared: IID	-0.0006	0.0001	-6.31
Time: LADWP	0.0192	0.0028	6.94
Time Squared: LADWP	-0.0004	0.0001	-5.39
Time: PASD	0.0311	0.0089	3.49
Time Squared: PASD	-0.0004	0.0003	-1.49
Time: PG&E	0.0235	0.0015	15.22
Time Squared: PG&E	-0.0003	0.0000	-8.09
Time: SCE	0.0188	0.0012	15.75
Time Squared: SCE	-0.0002	0.0000	-7.73
Time: SDG&E	0.0211	0.0021	10.01
Time Squared: SDG&E	-0.0003	0.0001	-6.35
Time: SMUD	0.0068	0.0009	7.54
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 278,879			
Dependent variable = natural log of commercial consumption by planning area, 1980-2013.			
All variables in logged form except time.			

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-3: Manufacturing Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Manufacturing Output (million 2013$)	0.4958	0.0548	9.04
Manufacturing Output/Manufacturing Employment	-0.3474	0.0433	-8.02
Output Textiles, Fiber, Printing/Manufacturing	0.6708	0.3113	2.16
Output Chemicals, Energy, Plastic/Manufacturing	-0.3426	0.1173	-2.92
Industrial Electricity Rate (2013¢/kWh)	-0.1092	0.0227	-4.82
Constant: Burbank/Glendale	0.5295	0.1589	3.33
Constant: IID	-0.2932	0.2225	-1.32
Constant: LADWP	1.2849	0.2059	6.24
Constant: PASD	-0.4812	0.1595	-3.02
Constant: PG&E	2.5460	0.2429	10.48
Constant: SCE	2.3752	0.2544	9.34
Constant: SDG&E	0.4814	0.1660	2.90
Overall Constant	3.8803	0.2654	14.62
Trend Variables			
Time: Burbank/Glendale	-0.0430	0.0060	-7.16
Time: IID	-0.0584	0.0172	-3.41
Time Squared: IID	0.0022	0.0005	4.72
Time: Pasadena	-0.0713	0.0153	-4.66
Time Squared: Pasadena	0.0008	0.0004	2.00
Time: PG&E	-0.0044	0.0021	-2.04
Time: SDG&E	0.0376	0.0042	9.01
Time Squared: SDG&E	-0.0010	0.0001	-10.29
Time: SMUD	0.0795	0.0144	5.52
Time Squared: SMUD	-0.0017	0.0004	-4.50
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 36,517			
Dependent variable = natural log of industrial consumption by planning area, 1980-2013.			
All variables in logged form except time, output textiles, fiber, printing/manufacturing output and output chemicals, energy, plastic/manufacturing output.			

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-4: Resource Extraction and Construction Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Output, Resource Extraction (million 2009$)	0.1299	0.0402	3.23
Employment in Construction (thousands)	0.2293	0.0821	2.79
Percent Employment Resource Extraction	2.3129	0.9555	2.42
Industrial Electricity Rate (2013 cents/kWh)	-0.1250	0.0614	-2.04
Dummy: 2002	-0.0661	0.0320	-2.06
Dummy: 1997 SDG&E	-1.0680	0.0881	-12.12
Dummy: 1980 and 1981 PG&E	-1.0468	0.0722	-14.50
Constant: BUGL	-1.2298	0.1564	-7.86
Constant: IID	-1.4130	0.2970	-4.76
Constant: LADWP	1.0914	0.2571	4.25
Constant: PASD	-3.5856	0.3143	-11.41
Constant: PG&E	2.9873	0.3913	7.63
Constant: SCE	2.9109	0.3675	7.92
Overall Constant	2.8931	0.3097	9.34
Trend Variables			
Time: BUGL	0.1148	0.0110	10.40
Time squared: BUGL	-0.0025	0.0003	-9.12
Time: IID	0.1105	0.0307	3.60
Time squared: IID	-0.0015	0.0008	-1.81
Time: PASD	0.3237	0.0351	9.22
Time squared: PASD	-0.0083	0.0010	-8.64
Time: PG&E	-0.0234	0.0148	-1.58
Time squared: PG&E	0.0008	0.0004	1.96
Time: SDG&E	0.1115	0.0282	3.96
Time Squared: SDG&E	-0.0027	0.0008	-3.58
Time: SMUD	0.0698	0.0166	4.22
Time Squared: SMUD	-0.0013	0.0004	-2.92
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 33,042			
Dependent variable = natural log of construction & resource extraction consumption by planning area 1980-2013.			
All variables in logged form except time and percentage employment resource extraction.			

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-5: Agriculture and Water Pumping Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Agricultural Electricity Rate (2013 cents/kWh)	-0.0982	0.0738	-1.33
Number of Cooling Degree Days (65°)	0.0742	0.0677	1.10
Number of Heating Degree Days (65°)	0.1100	0.0551	2.00
Constant: Burbank/Glendale	-1.2075	0.1697	-7.11
Constant: IID	1.9784	0.1151	17.18
Constant: LADWP	-1.1040	0.3094	-3.57
Constant: PG&E	1.8855	0.0838	22.51
Constant: SCE	1.4574	0.0813	17.92
Constant: SDG&E	0.2955	0.1535	1.93
Overall Constant	3.5894	0.7396	4.85
Trend Variables			
Time: IID	0.0175	0.0059	2.98
Time Squared: IID	-0.0006	0.0002	-3.54
Time: LADWP	0.0320	0.0094	3.41
Time: PASD	-0.0361	0.0265	-1.36
Time: PG&E	-0.0374	0.0067	-5.56
Time Squared: PG&E	0.0009	0.0002	4.85
Time: SCE	-0.0085	0.0020	-4.33
Time: SDG&E	-0.0691	0.0159	-4.35
Time Squared: SDG&E	0.0020	0.0004	4.51
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 6,339			
Dependent variable = natural log of agriculture and water pumping electricity consumption per capita by planning area 1980-2013.			
All variables in logged form except time.			

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-6: Transportation, Communications, and Utilities (TCU) Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Commercial Electricity Rate (2013 cents/kWh)	-0.2165	0.0472	-4.58
Per capita income (2013$)	0.0760	0.0483	1.57
Constant: Burbank/Glendale	-1.6606	0.1152	-14.42
Constant: IID	0.9813	0.1584	6.20
Constant: LADWP	-0.3759	0.0536	-7.01
Constant: Pasadena	-1.2221	0.0633	-19.31
Constant: PG&E	-0.1377	0.0442	-3.12
Constant: SCE	-0.4904	0.0397	-12.35
Constant: SDG&E	-0.0801	0.0428	-1.87
Overall Constant	6.1373	0.5083	12.07
Trend Variables			
Time Squared: BUGL	0.0032	0.0004	8.27
Time: IID	-0.0559	0.0102	-5.50
Time: Pasadena	0.0480	0.0135	3.56
Time Squared: PASD	-0.0013	0.0005	-2.42
Time: PG&E	-0.0362	0.0041	-8.84
Time Squared: PG&E	0.0014	0.0001	9.23
Time: SMUD	-0.0438	0.0073	-5.99
Time Squared: SMUD	0.0009	0.0003	2.99
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 2,693			
Dependent variable = natural log of TCU electricity consumption per capita by planning area 1990-2013.			
All variables in logged form except time.			

Source: California Energy Commission, Demand Analysis Office, 2014.

Table A-7: Street Lighting Sector Electricity Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Per Capita Income (2013$)	0.2408	0.0892	2.70
Constant: Burbank/Glendale	-1.0794	0.0723	-14.93
Constant: IID	-2.6927	0.1659	-16.23
Constant: LADWP	1.2344	0.1054	11.72
Constant: Pasadena	-1.2730	0.0501	-25.41
Constant: PG&E	1.7199	0.0453	37.97
Constant: SCE	1.9387	0.0773	25.07
Overall Constant	6.6419	0.9264	7.17
Trend Variables			
Time Squared: BUGL	-0.0003	0.0002	-1.17
Time: IID	0.1080	0.0295	3.66
Time Squared: IID	-0.0028	0.0011	-2.47
Time: LADWP	0.0639	0.0177	3.60
Time Squared: LADWP	-0.0038	0.0007	-5.71
Time: Pasadena	0.0091	0.0030	3.00
Time: PG&E	0.0065	0.0064	1.01
Time Squared: PG&E	-0.0005	0.0002	-2.54
Time: SCE	0.0189	0.0101	1.87
Time Squared: SCE	-0.0011	0.0004	-2.92
Time: SDG&E	0.0233	0.0049	4.78
Time: SMUD	0.0211	0.0056	3.76
Time Squared: SMUD	-0.0007	0.0002	-3.53
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 48,785			
Dependent variable = natural log of street lighting electricity consumption by planning area 1990-2013			
All variables in logged form except time.			

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

Table A-8: Peak Demand Econometric Model

Variable	Estimated Coefficient	Standard Error	t-statistic
Per Capita Income (2013$)	0.1579	0.0340	4.65
Unemployment Rate	-0.0027	0.0011	-2.58
Persons per Household	-0.6911	0.1787	-3.87
Residential Electricity Rate	-0.0252	0.0239	-1.05
Commercial Electricity Rate	-0.0279	0.0169	-1.66
Annual Max *Average631*	1.0633	0.0557	19.11
Residential Consumption per Capita	0.2083	0.0344	6.05
Commercial Consumption per Capita	0.1095	0.0261	4.20
Dummy: 2001	-0.0616	0.0111	-5.57
Constant: IID	0.1902	0.0410	4.64
Constant: LADWP	-0.1696	0.0150	-11.28
Constant: Pasadena	-0.0996	0.0154	-6.48
Constant: PG&E	-0.1671	0.0135	-12.39
Constant: SCE	-0.1246	0.0187	-6.66
Constant: SDG&E	-0.4339	0.0197	-22.03
Overall Constant	-7.4037	0.4035	-18.35
Trend Variables			
Time: Burbank/Glendale	0.0035	0.0007	5.07
Time: Imperial Irrigation District	0.0020	0.0008	2.57
Time: LADWP	0.0048	0.0016	2.95
Time Squared: LADWP	-0.0001	0.0000	-2.85
Time: Pasadena	0.0216	0.0018	11.80
Time Squared: Pasadena	-0.0005	0.0000	-11.09
Time: SCE	0.0038	0.0019	2.00
Time Squared: SCE	-0.0001	0.0000	-1.85
Time: SDG&E	0.0058	0.0007	8.51
Adjusted for autocorrelation and cross-sectional correlation.			
Wald chi squared = 25,433			
Dependent variable = natural log of annual peak per capita by planning area, 1980-2013.			
All variables in logged form except time and unemployment rate.			

Source: California Energy Commission, Demand Analysis Office, 2014.