



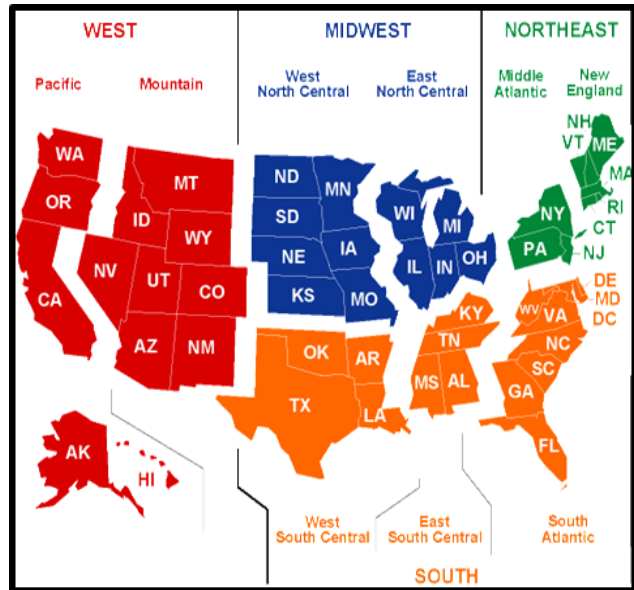
California’s Declining Reliance on Coal – Overview

Reductions in the use of coal-fired electricity generation have played a key role in California’s efforts to decrease greenhouse gas emissions attributable to the electrical sector. This update highlights some of the more important actions taken by California to reduce reliance on coal-fired electrical generation owned or under long-term contract to a California load-serving entity (LSE). Heading the list is California’s Emissions Performance Standard (EPS), established in 2006, which limits long-term investments in baseload generation with high-carbon dioxide (CO₂) emissions, primarily coal-fired generation.

Figure 1 shows that as of 2017, California used less in-state coal-fired electricity generation than most other states. Coal continues to be a predominant source of energy throughout the United States accounting for about 30 percent of the country’s utility-scale generation with some exceptions such as California, Washington, Oregon, Idaho, and the northeastern states.¹

Figure 1: In-State Coal Generation for Calendar Year 2016 – 2017 (GWh)

Census Division and State (GWh)	2016	2017
New England	2,544	1,697
Middle Atlantic	57,757	49,637
East North Central	274,536	277,141
West North Central	182,383	186,067
South Atlantic	238,077	210,561
East South Central	137,590	121,035
West South Central	176,203	190,598
Mountain	161,149	161,723
Pacific Contiguous	6,819	7,508
California	324	302
Oregon	1,898	1,728
Washington	4,602	5,489
Pacific Noncontiguous	2,092	1,934
U.S. Total	1,239,155	1,207,912



Source: U.S. Energy Information, <https://www.eia.gov/electricity/monthly/archive/february2018.pdf>, California Energy Commission, http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html, and U.S. Census Regions and Divisions Map, <https://www.eia.gov/consumption/commercial/maps.php>

California’s in-state coal-fired generation in 2017 dropped from 0.16 percent to 0.14 percent of the state’s electric load. Of the 48 states that use coal for generation, 13 obtained at least

¹ U.S. Energy Information, Electric Power Monthly with Data for December 2017, <https://www.eia.gov/electricity/monthly/archive/february2018.pdf>.



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50 percent of their electricity from coal generation. (Only Rhode Island and Vermont have no in-state coal-fired generation.) Nonetheless, the nation’s coal-fired generation has been dropping. Between 2007 and 2017, coal-fired generation fell about 18 percent.

California’s Emission Performance Standard

Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) established the EPS for California LSEs. The EPS applies to baseload generation owned by or under long-term contract to any California LSE. The EPS defines *baseload power plants* as facilities that run at least 60 percent of the time. The standard is a maximum emissions rate of 1,100 pounds of CO₂ per megawatt-hour (MWh), and “long-term” means five or more years. The EPS also includes restrictions on capital investments that increase generating capacity or extend the life of the power plant.

Progress in Reducing California’s Use of Coal-Fired Generation

The EPS has been a driving force behind California’s utilities ending, or planning to end, affiliations (contracts or ownership or both) with coal-fired generation resources, especially with large out-of-state coal-fired power plants. Coal-fired generation for California fell about 75 percent from 50,011 gigawatt-hours (GWh) in 2007 (when the Energy Commission began to implement the EPS) to 12,075 GWh in 2017. **Figure 2** shows that coal-fired generation’s annual share of all types of generation to serve California electricity demand declined from about 17 percent in 2007 to about 8 percent from 2009 through 2013, to about 6 percent in 2014 and 2015, and to about 4 percent in 2016 and 2017. **Figure 3** shows that the share is expected to drop to about 3 percent by 2019 and to almost zero by the end of 2025.

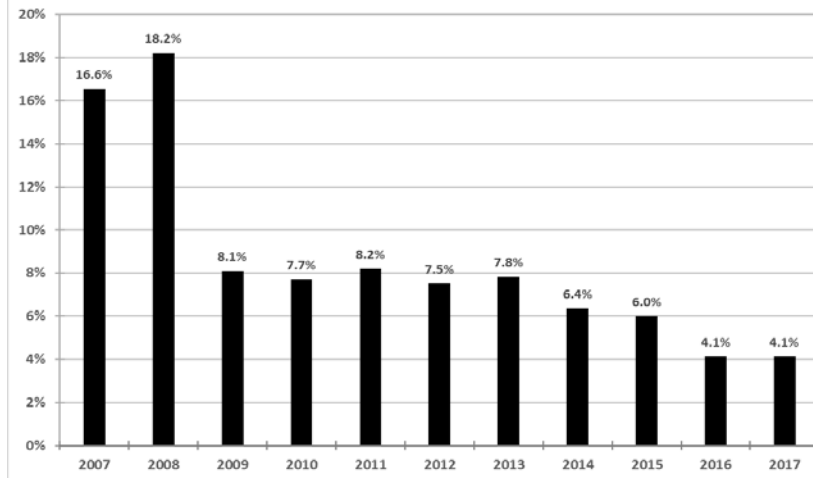
Coal plant, unit, capacity, and generation data, shown in **Table 1** below, also demonstrate reduced reliance on coal-fired generation.² All out-of-state coal-fired generation that is either owned or that has long-term contracts with California LSEs is located in Oregon, Utah, or New Mexico. The Intermountain Power Project (IPP) in Utah is the only out-of-state coal-fired power plant that is within a California balancing authority, by virtue of its direct connection with the Los Angeles Department of Water and Power (LADWP) system.³ Generation from Boardman in Oregon and San Juan Units 3 and 4 in New Mexico comes into California via the western bulk transmission system.

² Some electric generation, including some generation at refineries, comes from plants that are fueled with petroleum coke, which is reported in a separate category.

³ A *balancing authority* maintains the electricity balance between supply and demand within its region by controlling the generation and transmission of electricity throughout its own region and between neighboring balancing authorities. *California balancing authority* refers to a balancing authority located primarily in California with more than 50 percent of its end-use electric load physically located within the political boundaries of California.

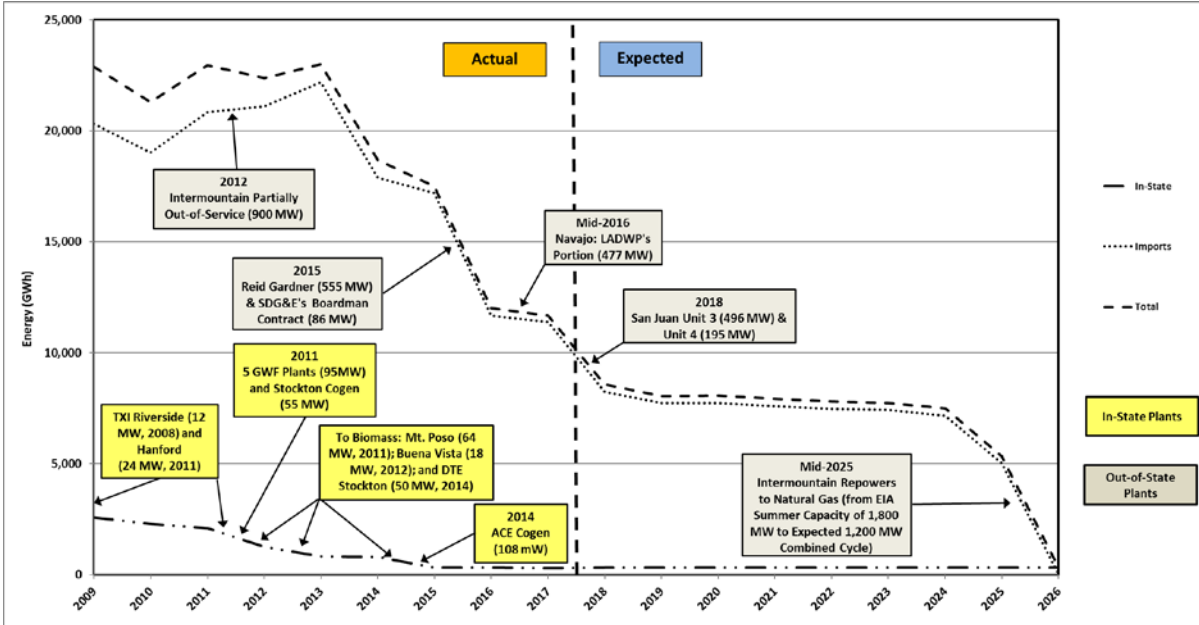


Figure 2: Annual Coal-Fired Generation as a Portion of Total Generation for California (2007-2017)



Source: California Energy Commission, Energy Almanac, *Total System Power*, http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html.

Figure 3: Actual and Expected Reductions of Energy by Coal-Fired Plants Used to Serve California 2009-2026 (GWh)



Sources: 1) Electricity Supply Forms (S-1 and S-2) submitted by LSEs for the California Energy Commission's *Integrated Energy Policy Reports (IEPR)*, http://www.energy.ca.gov/almanac/electricity_data/ (under Utility Plans 2017 and Utility Capacity and Supply Plans for 2011 – 2016); and 2) M-S-R Resolution No. 2015-02, <http://msrpower.org/Portals/0/Public%20Documents/M-S-R%20Public%20Power%20Agency%20Commission%20Agendas/MSRPPACommissionMeeting-July222015.pdf>.



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**Table 1: Coal-Fired Generation Either Contracted or Owned by a California Load-Serving Entity for Select Years
(2017 – 2026 Generation Estimated in GWh)**

	Year	# of Coal-Fired Plants	# of Coal-Fired Units	Total Plant Capacity (MW)	Plant Capacity Contracted or Owned by a California LSE (MW)	Generation for California (GWh)
Reported	2009	22	26	4,625	2,718	22,877
	2011	20	24	4,578	2,795	22,946
	2012	17	21	4,441	2,877	22,369
	2013	10	14	4,272	2,895	22,999
	2014	8	12	3,246	2,675	18,679
	2015	5	9	3,062	2,679	17,508
	2016	5	9	3,062	2,679	12,007
	2017	4	8	2,585	2,193	12,075
Estimated	2019	2	5	1,839	1,773	8,053
	2025	2	5	1,839	585	5,342
	2026	1	3	63	63	324

Sources: Numbers of plants, units, and total plant capacities are from the California Energy Commission's Energy Almanac and U.S. Energy Information Agency EIA-860 data. Contracted or owned plant capacities from 2009 through 2016, and estimated capacities and generation 2017 through 2026 are from the Energy Almanac Utility Plans. Generation from 2009 through 2017 is from the Energy Almanac, Total System Power. The Energy Almanac is available at http://www.energy.ca.gov/almanac/electricity_data/ and the EIA-860 data are available at <https://www.eia.gov/electricity/data/eia860/>.

Note: Total System Power is a source of data for Tables 1 and 2. Total System Power data before 2009 are not included because import data in previous years used simple splits between generation from the Pacific Northwest and Pacific Southwest that overstated imports from the northwest and understated imports from the southwest.

Since 2007, 11 in-state coal-fired plants retired (370 MW), and 3 converted to biomass fuel (132 MW). With the retirement of the 108 MW ACE Cogeneration plant in 2014, the last remaining coal-fired power plant in California is the 63 MW Argus Cogen plant.⁴ Both plants are located in Trona, San Bernardino County.

⁴ The Argus Plant is composed of both the Argus Cogeneration Plant (Argus Cogen Plant) and the Argus Cogeneration Expansion Plant (ACE Cogen Plant). The Argus Cogen Plant consists of a 7.5 MW unit that is used for



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In addition, California’s affiliations with seven out-of-state plants totaling 2,635 MW ended between 2012 and 2016. Energy Commission staff is expecting three more affiliations with out-of-state plants will end by December 30, 2025, totaling 2,226 MW.

Table 2 shows the annual amount of in-state and imported coal-fired generation from 2009 to 2017. The total statewide electricity load served by in-state coal fired generation declined by almost 88 percent and imported coal-fired generation declined about 42 percent from 2009 to 2017.

**Table 2: In-State and Imported Coal-Fired Generation
With First Point of Connection to a California Balancing Authority
(Gigawatt-Hours)**

Year	Total Generation to Serve California Loads	Coal-Fired Generation		
		In-State	Imported	Total
2009	298,310	2,565	20,312	22,877
		0.9%	6.8%	7.7%
2010	290,518	2,290	19,019	21,309
		0.8%	6.5%	7.3%
2011	293,652	2,096	20,850	22,946
		0.7%	7.1%	7.8%
2012	301,966	1,263	21,106	22,369
		0.4%	7.0%	7.4%
2013	296,628	824	22,175	22,999
		0.3%	7.5%	7.8%
2014	297,062	802	17,877	18,679
		0.3%	6.0%	6.3%
2015	295,405	311	17,197	17,508
		0.1%	5.8%	5.9%
2016	290,567	324	11,683	12,007
		0.1%	4.0%	4.1%
2017	292,039	302	11,773	12,075
		0.1%	4.0%	4.1%

Sources: California Energy Commission, California Electricity Data, Facts, & Statistics, Data, Facts, & Statistics, Total System Electric Generation (2017) and Total System Power (prior to 2009 through 2016).

http://www.energy.ca.gov/almanac/electricity_data/

Note: Total may not equal in-state plus imported due to rounding. Also, see note on Table 1.

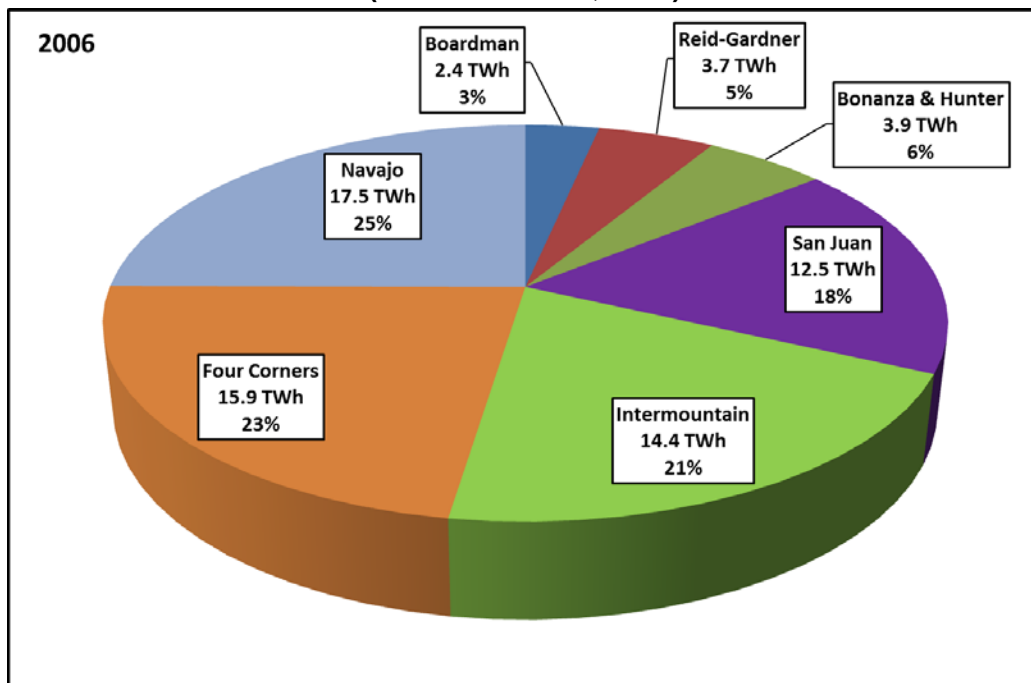
black start and runs on natural gas. Two additional 27.5 MW units run primarily on coal, with natural gas as a secondary fuel. Natural gas accounts for only 2.2 percent of the fuel used for both units. The ACE Cogen Plant is an existing but retired and non-operable coal-fired power plant that ceased operations in October 2014. In October 2016 an equipment failure at the ACE facility led to the use of the on-site diesel generator to maintain the equipment of the retired facility. On November 8, 2017, the Energy Commission approved an order to separate the ACE facility from the landfill portion of the project and to allow for continued use of its on-site diesel generator.



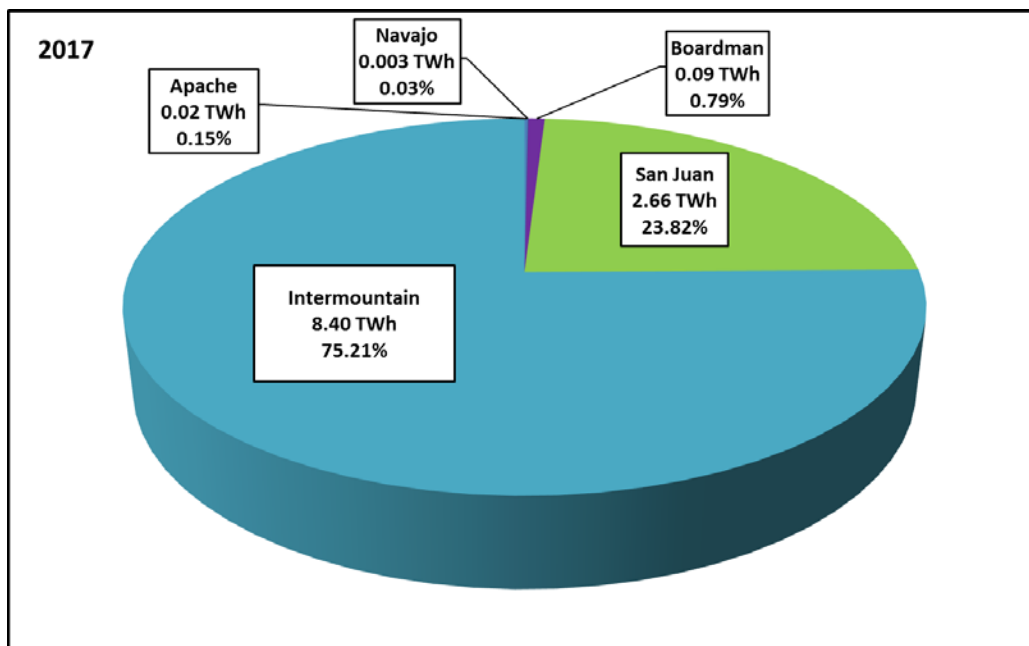
Differences in generation between **Table 1** and **Table 2** are due to differences in reporting sources. **Table 1** data are reported in utility filings under biennial *Integrated Energy Policy Report (IEPR)* requirements. This update is based on filings for the 2017 *IEPR* with data through 2016. The next reporting cycle in 2019 will contain data up through 2018. **Table 2** data are power plant owners/operators reporting under Quarterly Fuel and Energy Report (QFER) requirements. Metering, losses, and other reasons may also contribute to differences.

Figure 4 shows power plant shares of imports for both 2006 and 2017. By 2017, the number of out-of-state coal-fired power plants serving California decreased from seven to five.⁵ The three power plants accounting for the most imports, San Juan, Intermountain Power, and Boardman, were under ownership or a contract with a California LSE. **Table 3** shows that as of October 2018, the number of coal-fired power plants importing power to California under a contractual obligation has declined from three to two because of the early termination of San Juan in December 2017. The other two power plants have no known contract within an LSE in the state and may or may not supply power to California in the future.

**Figure 4: Coal Energy Direct Imports in 2006 and 2017
(Terawatt-Hours, TWh)**



⁵ This is an increase of one from the 2017 update due to an accounting change. In 2017, staff did not include the Apache power plant because it does not have any known contract with an LSE in California and accounts for less than 0.5 percent of the total coal imports. This year, staff has included the Apache power plant for completeness.



Source: Electricity Supply Forms (S-2) submitted by LSEs for the California Energy Commission's Integrated Energy Policy Reports (IEPR) available at http://www.energy.ca.gov/almanac/electricity_data/ (under Utility Plans 2017 and Utility Capacity and Supply Plans for 2011 – 2016) and the California Energy Commissions Power Source Disclosure.

Actions Expected to Further Reduce California's Use of Coal-Fired Generation

The largest coal-fired generation resource serving California is IPP in Utah. Six publicly owned utilities (Anaheim, Burbank, Glendale, Pasadena, Riverside, and LADWP) are purchasing power from IIP. All but Anaheim are planning to purchase power from the combined-cycle natural gas-fired power plant that will replace IPP mid-2025 through mid-2077. The new plant will consist of two combined-cycle units, each 420 MW, for a total of 840 MW. Momentum for converting coal-fired to natural gas-fired generation has been building in recent years, driven primarily by reductions in the price of natural gas, as well as environmental regulations.

At the end of 2017, the shutdown of San Juan coal plant Units 2 and 3 was completed, leaving the plant with Units 1 and 4 operating. Only Units 3 and 4 had ties with the state. The retirement of Unit 3 ended the affiliation with three small LSEs (Azusa, Banning, and Colton). The annual energy provided to these cities averaged approximately 470 GWh per year. At the same time, M-S-R (Modesto Irrigation District, Silicon Valley Power, and Redding Electric) and Anaheim divested their ownership and contracts with San Juan's Unit 4. Anaheim's early termination with San Juan ended a yearly average of 290 GWh supplied by the plant. As of 2018, the plant has no LSE ownership or contract with the state.



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Overall, expectations are a 4 percent decrease from 2017 through 2026, when essentially all specified coal-fired generation used to serve California loads ends. This is several years earlier than anticipated in previous Tracking Progress updates because utilities have accelerated ending their ownership of, or contracts for, coal-fired power generation. California's emission reduction policies, such as California's EPS and Cap-and-Trade Program, are a major impetus behind these changes.

Table 3 provides information on the out-of-state plants that are either owned by, or under long-term contract to a California LSE. Staff expects that by 2019, IPP will be the only operational out-of-state coal-fired power plant that has a long-term contract with a California LSE and no out-of-state coal-fired power plants will be owned by a California LSE. **Table 4** provides information on the retirements of in-state coal-fired power plants over the last decade, and last remaining in-state plant, Argus Cogeneration.



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Table 3: Status of Out-of-State Coal-Fired Generation

Plant Name	State	Nameplate Capacity	Utility and Capacity Under Contract or Owned	Status
Operational				
Boardman	Oregon	460 MW	Turlock, 55 MW	Turlock Irrigation District's contract expires 2018. Portland General Electric, the owner, is expected to retire the plant by the end of 2020.
Intermountain Power Project (IPP)	Utah	1,775 MW	Anaheim 236 MW Burbank 75 MW Glendale 35 MW LADWP 1,198 MW Pasadena 94 MW Riverside 137 MW	In late 2016, the Energy Commission approved EPS compliance filings by LADWP, Glendale, Pasadena, Burbank, and Riverside to replace the existing IPP coal-fired contract with a contract for a new 1,200 MW natural gas-fired combined-cycle power plant by July 1, 2025. This would be two years before the current contract ends. Anaheim will not participate in the replacement project.
Affiliation(s) Ended				
San Juan Units 4	New Mexico	Unit 4, 507 MW	Anaheim 50 MW Modesto 72 MW Redding 22 MW SVP 51 MW	In the end of 2017 both M-S-R (Modesto, SVP, and Redding) and Anaheim divested ownership and terminated their contract early with the plant. The plant itself is expected to retire by 2022. M-S-R had a 28.8 percent ownership of Unit 4.
Navajo	Arizona	2,250 MW	LADWP, 477 MW	LADWP sold its contract share to the Salt River Project in June 2016.
Boardman	Oregon	460 MW	SDG&E, 86 MW	SDG&E's contract expired 2013.
Four Corners Units 4 and 5	New Mexico	2,040 MW total: Unit 4, 745 MW Unit 5, 745 MW	SCE, 720 MW	Arizona Public Service purchased SCE's ownership in Units 4 and 5 in 2013 and closed Units 1, 2, and 3.
Retired				
San Juan Units 3	New Mexico	Unit 3, 496 MW	Azusa 30 MW Banning 19 MW Colton 30 MW Glendale 20 MW IID 102 MW	Unit 3 was permanently closed in December 2017 under a 2015 agreement with the New Mexico Public Regulation Commission and the EPA to comply with federal haze regulation.
Deseret Bonanza & Hunter	Utah	Bonanza, 500 MW Hunter, 1,472 MW	Riverside, 52 MW	Riverside's affiliation ended in 2010.
Mohave	Nevada	1,636 MW 2 x 818 MW	SCE, 916 MW LADWP, 164 MW	Mohave was retired 2005 and dismantled.
Reid Gardner Unit 4	Nevada	557 MW total: Unit 1, 100 MW Unit 2, 100 MW Unit 3, 100 MW Unit 4, 257 MW	California Department of Water Resource (CDWR), 220 MW	CDWR's contract for Unit 4 expired July 25, 2013. Units 1, 2, and 3 retired in 2014. Unit 4 will retire by January 2018.



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2006 Imports	3,789 MW	27,482 GWh	7 plants operational
2016 Imports	2,679 MW	11,683 GWh	4 plants operational.
2017 Imports	Pending IEPR 2019	11,773 GWh	3 plants operational thru the end of 2017.
2026 Estimated Imports	0 MW	0 GWh	Out-of-state coal-fired affiliations are expected to end by 2025.

Source: Quarterly Fuels and Energy Reports submitted to the Energy Commission with updates verified by Energy Commission staff: 1) 2017 Integrated Energy Policy Report electricity supply filings, 2) Emission Performance Standard compliance filings, 3) California Energy Commission, Energy Almanac, Total System Power, http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html, and 4) various news articles. http://www.energy.ca.gov/almanac/electricity_data/web_qfer/source_files/.

Table 4: Status of Coal and Petroleum Coke Plants in California

Plant Name	County	Capacity (MW)	Primary Fuel Type	Status
Operational				
Argus Cogen	San Bernardino	63	Bituminous coal	Expected to remain operational indefinitely. However, the oldest unit, the 7.5 MW TG #5, is 70 years old and the other two units, each 27.5 MW, are almost 40 years old.
Retired				
Hanford LP	Kings	24	Petroleum Coke	Retired 10/18/2011
TXI Riverside	San Bernardino	12	Bituminous Coal	Retired 3/31/2008
Stockton Cogen	San Joaquin	55	Bituminous coal	Retired 3/31/2012
GWF E. Third Street	Contra Costa	19	Petroleum Coke	Retired 4/26/2012
GWF Loveridge Rd	Contra Costa	19	Petroleum Coke	Retired 4/26/2012
GWF Nichols Rd	Contra Costa	19	Petroleum Coke	Retired 4/26/2012
GWF Wilbur East	Contra Costa	19	Petroleum Coke	Retired 4/26/2012
GWF Wilbur West	Contra Costa	19	Petroleum Coke	Retired 4/26/2012
ACE Cogen	San Bernardino	108	Bituminous coal	Ceased operations on 12/1/2014.
Rio Bravo Poso	Kern	38	Bituminous coal	Rio Bravo Jasmin ceased operations on 10/1/2014. The power purchase agreement (PPA) with SCE was terminated on 1/20/2016.
Rio Bravo Jasmin	Kern	38	Bituminous coal	Rio Bravo Jasmin ceased operations on 10/1/2014. The PPA with SCE was terminated on 1/20/2016.
Converted				
Mt. Poso	Kern	64	Converted to biomass	Converted 11/1/2011. Under contract with PG&E through 2/27/2027. CEC ID was C0016.



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DTE Stockton	San Joaquin	50	Converted to biomass	Converted 2/21/2014. New contract end date: 6/30/2038. CEC ID was C0213.
Buena Vista (Jackson Valley)	Amador	18	Converted to biomass	Converted in 2012. Under contract to SMUD through 11/30/2032. CEC ID was C0005.
2007 Totals		593 MW	4,217 GWh	16 plants operational
2017 Totals		63 MW	304 GWh	1 plant operational, 8 retired, 3 ceased operation, 3 converted to biomass

Source: Quarterly Fuels and Energy Reports submitted to the Energy Commission with updates verified by Energy Commission staff.

http://www.energy.ca.gov/almanac/electricity_data/web_qfer/Power_Plant_Statistical_Information.php.

Other Coal-Fired Generation

California LSEs report in their annual Power Source Disclosure filings the generation they purchase from specific out-of-state coal-fired plants. These purchases are not subject to the EPS because they are not long-term contracts of five years or more. In 2017, the total system electric generation for California was 292,039 GWh, with 4 percent of specified coal-fired imports and roughly 0.1 percent of all generation for California.⁶

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⁶ Total System Electric Generation for 2017, California Energy Almanac, http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html.