



California's Installed Electric Power Capacity and Generation

A wide variety of power plants in California and throughout the west provide energy to meet the California's electricity needs. The charts and tables below provide information on the total operational capacity and resulting electric generation of power plants within both publicly owned and investor-owned utility service territories in California. The information presented here should not be used to determine progress toward California's Renewables Portfolio Standard (RPS) as detailed below. Please refer to the Tracking Progress page on Renewable Energy for more information about the state's RPS. The data presented here are termed *total system power* and provide information on California's total fuel mix over several years. The total system power is useful for comparing California's use of various fuels, including natural gas, nuclear energy, large hydropower, and renewables—or for making comparisons over several years.

Why Data Reported Here is Not a Proxy for RPS Compliance

The information presented here is fundamentally different from what is reported for RPS compliance. To begin, the total system power reported here refers to the annual accounting of electricity generated within California and electricity imported into the state from Canada, Mexico, and other regions in the United States. For power plants located within California, the energy is measured at the generating unit as reported by the power plant owner. Electricity from out-of-state energy is measured as it enters California and is received by a California balancing authority. For most power plants, the reported energy does not account for losses through the transmission and distribution systems. Further, *unaccounted for* energy losses (for example, from short circuits, line failures, and transformer losses) prior to reaching the residential, commercial, or industrial end-user are not accounted for here. In total, line losses can exceed 8 percent.

The RPS includes eligibility and accounting requirements that are different from the accounting used to estimate total system power, with highlights described below.

- The Energy Commission certifies if a renewable facility is eligible for the RPS. Some renewable facilities included in the total system power are not eligible for the RPS.
- The RPS is calculated as a percentage of retail sales. Retail sales are typically based on electricity delivered to residential, commercial, industrial, and agricultural customers after line losses. The statute excludes the following electricity consumption from the calculation of retail sales: electricity delivered to federal Department of Energy facilities, military bases, water pumping facilities such as the Central Valley Project and the State Water Project, utility use, electric vehicle charging, and street lighting.
- For the RPS, electricity retail sellers (investor-owned utilities, publicly owned utilities, energy service providers, and community-choice aggregators) use renewable energy credits (RECs) to meet their obligation for multi-year compliance periods. A REC represents 1 megawatt-hour of electricity generation from renewable sources. Renewable generation facilities may be located anywhere within the Western Electricity



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Coordinating Council (WECC) region and sell energy and/or RECs to a California retail seller of electricity to meet its RPS obligation, provided the facility meets all RPS-eligibility criteria established by the Energy Commission. Compliance with California's RPS program is determined by the amount of RECs retired for compliance within three multi-year compliance periods through 2020. Further, the RPS includes various restrictions on the use of RECs that must be factored into an evaluation of RPS-compliance.

In summary, because of the fundamental differences between the annual accounting of electric generation in this total system power analysis and the RPS, this summary should not be used to estimate the state's progress toward its RPS goals.

Installed Capacity

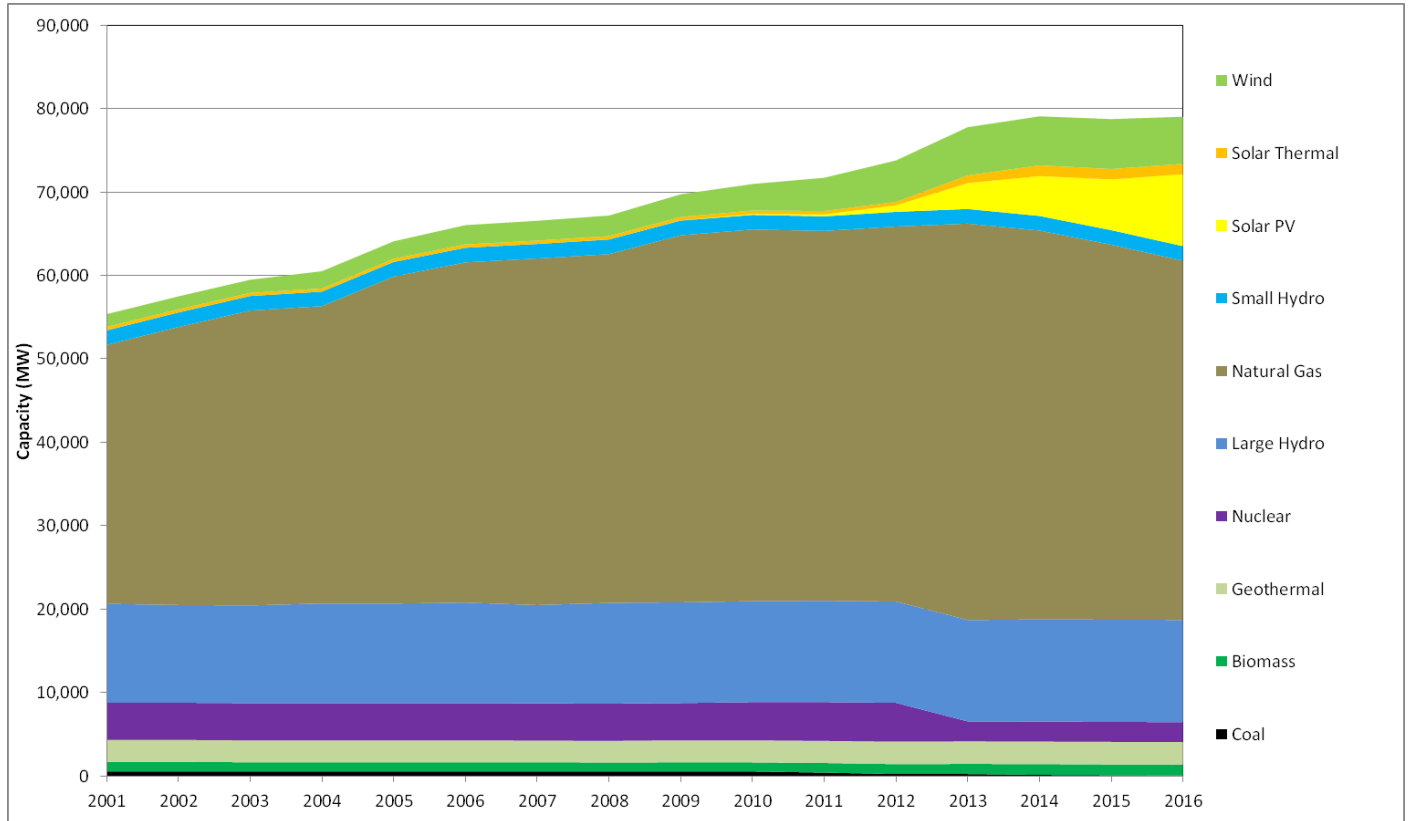
Figure 1 shows on-line capacity by technology for California from 2001 to 2016, as of December 31, 2016. The data are collected under the authority of the California Code of Regulations, Title 20, Division 2, Chapter 3, Section 1304(a) (1)-(2).

Power plants fueled by natural gas provide the largest portion of the in-state installed capacity although it has declined in recent years while solar and wind have increased. The values reported in **Figure 1** reflect nameplate capacity, which is the maximum possible output from a generation facility as designated by the manufacturer.



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Figure 1: Installed In-State Electric Generation Capacity by Fuel Type



Source: California Energy Commission, CEC-1304 Power Plant Data Reporting.

Table 1 provides the data used in **Figure 1**. These data show the nameplate capacity of all power plants 1 megawatt (MW) and larger within California operating as of December 31 of each year. Behind-the-meter or customer-side capacity and generation from facilities smaller than 1 MW are not accounted for in the figures and charts below. Examples include distributed electric generation such as rooftop solar photovoltaic (PV) installations on residential homes and backup generators used for emergency purposes in larger applications such as hospitals and commercial locations. Facilities smaller than 1 MW are not required to report to the Energy Commission under the CEC-1304 regulations.



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Table 1: Installed In-State Electric Generation Capacity by Fuel Type

Nameplate Capacity (MW)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal	567	567	567	567	567	567	567	543	548	553	416	247	247	139	101	63
Biomass	1,144	1,140	1,084	1,075	1,080	1,085	1,093	1,082	1,095	1,084	1,148	1,177	1,207	1,292	1,283	1,314
Geothermal	2,625	2,623	2,623	2,623	2,623	2,641	2,586	2,598	2,648	2,648	2,648	2,703	2,703	2,703	2,716	2,694
Nuclear	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,577	4,647	4,647	2,393	2,393	2,393	2,393
Natural Gas	31,027	33,319	35,351	35,640	39,200	40,781	41,536	41,807	44,003	44,540	44,334	44,950	47,508	46,611	44,942	43,053
Large Hydro	11,848	11,713	11,713	11,962	11,951	12,042	11,793	12,074	12,074	12,105	12,145	12,145	12,155	12,244	12,252	12,252
Small Hydro	1,751	1,744	1,740	1,739	1,743	1,745	1,747	1,749	1,756	1,745	1,744	1,756	1,750	1,749	1,741	1,743
Solar PV	2	2	2	2	2	2	2	7	15	117	228	780	3,102	4,777	6,080	8,618
Solar Thermal	410	378	378	378	378	400	400	400	408	408	408	408	925	1,292	1,249	1,249
Wind	1,534	1,544	1,571	2,064	2,089	2,310	2,373	2,462	2,728	3,183	3,992	4,967	5,785	5,869	5,984	5,644
Grand Total	55,364	57,486	59,485	60,506	64,088	66,029	66,554	67,178	69,731	70,960	71,710	73,781	77,776	79,069	78,742	79,022

Source: California Energy Commission, CEC-1304 Power Plant Data Reporting.

While most of the fuel-type categories had little change over the past year, utility-scale solar PV capacity increased by 2,538 MW to 8,618 MW in 2016. This increase included capacity expansions of approximately 268 MW to existing solar PV plants, as well as 2,270 MW of new solar PV facilities that went on-line in 2016.

Capacity expansions included McCoy Solar (104 MW added) in Riverside County and Desert Stateline Solar (113 MW added) in San Bernardino County.

New solar PV installations for 2016 were most prevalent in Kern County with 855 MW of new capacity from 16 projects. Following Kern County, Los Angeles County added 337 MW from 19 projects while Fresno County followed up in third with 265 MW from two projects. Riverside, Kings, Imperial, and Tulare Counties rounded out the listings of counties with 100 MW or more of new installations with 240 MW, 224 MW, 189 MW, and 109 MW, respectively. Some of the larger installations include:



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- Garland Solar (205 MW), Astoria 1 (100 MW), Astoria 2 (75 MW), and Beacon 3 (60 MW) in Kern County
- Solverde 1 (85 MW), Antelope Big Sky Solar 1 (50 MW), and Elevation Solar (40 MW) in Los Angeles County
- Tranquility Solar (205 MW) and Buford Five Points Solar Park (60 MW) in Fresno County
- Blythe Solar (110 MW), and Blythe Solar II (125 MW) in Riverside County
- Henrietta Solar (102 MW) in Kings County
- Imperial Solar Energy Center West (148 MW) in Imperial County
- Ducor Solar 1, 2, 3 and 4 (75 MW total) in Tulare County

Figure 2 provides an overview of the counties and locations of California's newest solar PV projects.

Figure 2: Significant Solar PV Project Online in 2016



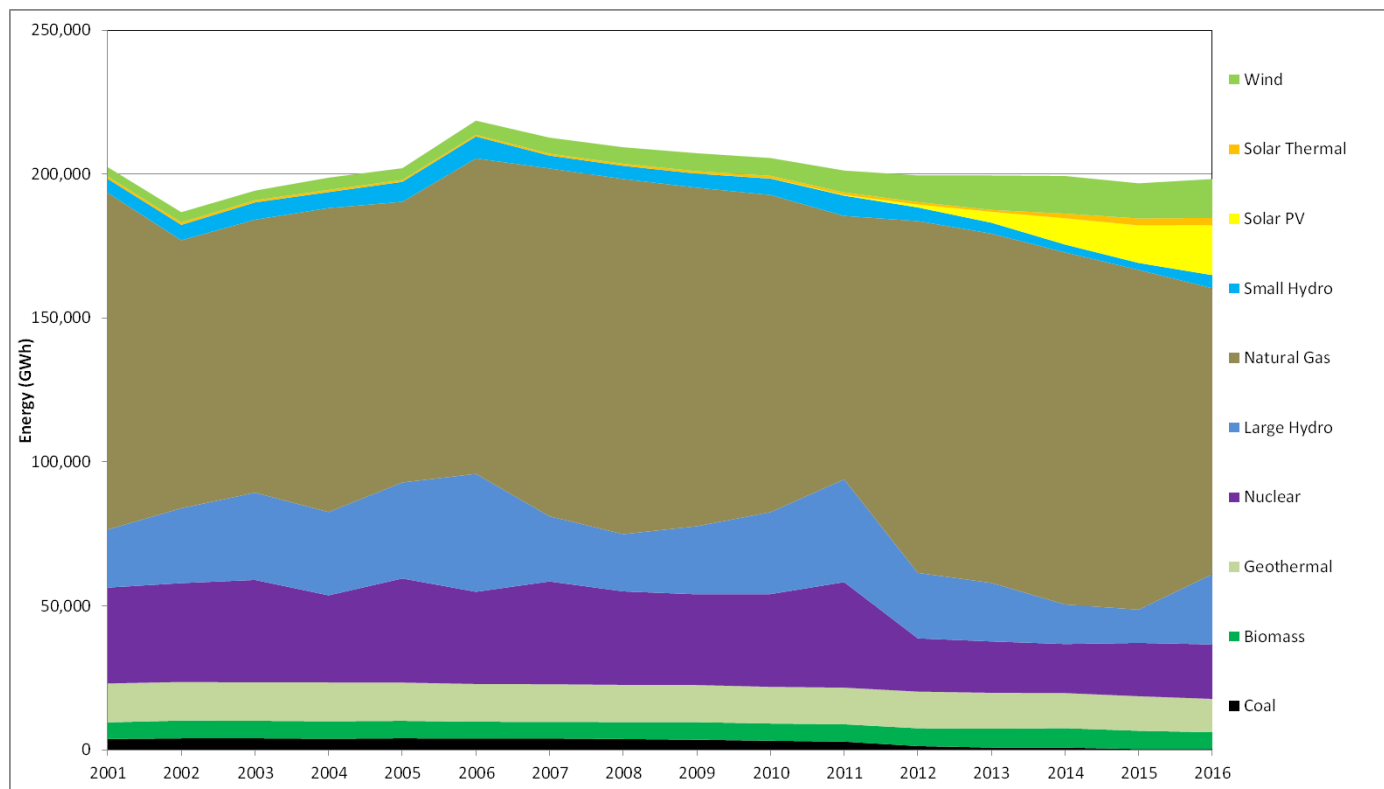
Source: Energy Commission Cartography Office.



Electric Generation

Figure 3 shows the total generation from all California power plants rated at 1 MW and larger for 2016.

Figure 3: In-State Electric Generation by Fuel Type



Source: CEC-1304 Power Plant Data Reporting.

Table 2 shows the 16 years of data used in **Figure 3**. In 2016, in-state power generation was 198,266 gigawatt-hours (GWh), up 0.7 percent from 2015. Renewable generation from wind and solar technologies continued to grow in 2016, accompanied by stronger hydroelectric generation after four years of drought conditions. Solar thermal and solar PV electric generation grew 28 percent to 19,822 GWh in 2016 from 15,479 GWh in 2015. Total in-state wind generation increased by 11 percent to 13,500 GWh in 2016, up 1,324 GWh from 2015. Overall, renewables in California accounted for 27.9 percent of the total in-state electric generation in 2016, an increase of 3.3 percent from 2015.



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Table 2: In-State Electric Generation by Fuel Type

Energy (GWh)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coal	3,817	4,013	4,037	3,876	4,036	3,950	3,985	3,782	3,537	3,193	2,901	1,340	824	802	311	324
Biomass	5,762	6,197	6,094	6,082	6,078	5,863	5,764	5,908	6,111	5,981	6,044	6,199	6,543	6,768	6,351	5,868
Geothermal	13,525	13,396	13,329	13,494	13,292	13,093	13,084	12,907	12,907	12,740	12,685	12,733	12,479	12,186	11,994	11,582
Nuclear	33,294	34,353	35,594	30,241	36,155	32,036	35,698	32,482	31,509	32,214	36,666	18,491	17,860	17,027	18,525	18,931
Natural Gas	116,996	93,079	94,823	105,611	97,508	109,584	120,816	123,363	117,571	110,163	91,530	122,224	121,333	122,309	117,991	99,262
Large Hydro	20,144	26,003	30,325	28,945	33,334	40,952	22,640	19,887	23,659	28,483	35,682	22,737	20,319	13,739	11,569	24,410
Small Hydro	4,844	5,356	5,996	5,545	6,928	7,607	4,466	4,573	4,880	5,706	7,049	4,723	3,778	2,737	2,423	4,567
Solar PV	3	2	2	2	2	2	2	3	17	90	226	1,018	3,775	9,100	13,033	17,274
Solar Thermal	834	848	757	739	658	614	666	730	841	879	889	867	686	1,624	2,446	2,548
Wind	3,242	3,546	3,316	4,258	4,084	4,902	5,570	5,724	6,249	6,172	7,598	9,242	11,964	13,074	12,176	13,500
Grand Total	202,460	186,795	194,270	198,793	202,076	218,601	212,690	209,360	207,282	205,620	201,271	199,574	199,561	199,367	196,819	198,266

Source: CEC-1304 Power Plant Data Reporting

Additional References:

For more information on the Renewables Portfolio Standard, please visit the following pages:

<http://www.energy.ca.gov/portfolio/index.html>.

http://www.cpuc.ca.gov/NR/rdonlyres/2060A18B-CB42-4B4B-A426-E3BDC01BDCA2/0/2012_Q1Q2_RPSReport.pdf.

For a complete profile of California's total generation, please visit the following two sources within the Energy Almanac:

Total System Power

http://energyalmanac.ca.gov/electricity/total_system_power.html.

Electric Generation by Resource Type

http://energyalmanac.ca.gov/electricity/electricity_generation.html.



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