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2014 Total Electricity System Power

2014 Total System Power in Gigawatt Hours

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	California Power Mix (GWh)	Percent California Power Mix
Coal	1,011	0.51%	0	17,877	18,888	6.36%
Large Hydro	13,739	6.90%	160	2,138	16,037	5.40%
Natural Gas	122,005	61.25%	1	10,151	132,157	44.49%
Nuclear	17,027	8.55%	0	8,193	25,220	8.49%
Oil	45	0.02%	0	0	45	0.01%
Other	16	0.01%	0	0	16	0.01%
Renewables	45,350	22.77%	11,423	3,493	60,266	20.29%
Biomass	6,768	3.40%	762	24	7,554	2.54%
Geothermal	12,186	6.12%	150	694	13,030	4.39%
Small Hydro	2,737	1.37%	361	0	3,098	1.04%
Solar	10,585	5.31%	0	2,009	12,594	4.24%
Wind	13,074	6.56%	10,151	766	23,991	8.08%
Unspecified Sources of Power	N/A	N/A	25,676	18,757	44,433	14.96%
Total	199,193	100.0%	37,260	60,609	297,062	100.0%

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Source: [QFER](#) and SB 1305 Reporting Requirements. In-state generation is reported generation from units 1 MW and larger.

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Data as of June 30, 2016

Total system power is defined as the annual total energy requirement for all load serving entities with end-use loads in California, including self-generation supply for combined heat and power, and other non-utility served loads from power plants that are one (1) megawatt and larger in nameplate capacity.

Changes from 2013

In 2014, total system power for California was 293,268 gigawatt-hours (GWh), about 1 percent lower than 2013. California's in-state electricity production remained virtually unchanged from 2013 levels at 198,908 GWh, a difference of less than 1 percent compared to the year before. Growth in annual electricity

consumption was flat or declining in 2014 reflecting continued slow economic growth in California, particularly in Southern California.¹

Temperatures in California were above normal during the entire year. According to the National Climatic Data Center, the western U.S. was warm during the winter season (December 2013-February 2014) with California experiencing its warmest winter on record. Along with Arizona and New Mexico, California also had one of the ten driest winters on record.² Dry conditions and warm temperatures across the Southwest and Southern Plains exacerbated long-term drought conditions. In California, conditions were even drier after the third consecutive winter of below-average precipitation, setting the stage for Governor Edmund G. Brown Jr. officially declaring California to be in a drought in January 2014. The drought would affect all aspects of the state as the majority of California's annual precipitation comes during the winter season. California continued to be much warmer than average with the spring of 2014 ranking as the warmest spring in the past 120 years. Warm temperatures in the summer ranked in the top ten for the state and continued as California had its warmest autumn on record.³

In 2014, California's in-state hydroelectric generation continued its multiyear decline due to ongoing drought conditions, dropping 32 percent (7,619 GWh) from 2013 generation levels and 61 percent since 2011, the last "wet" year in California. These declines were directly due to multi-year dry weather conditions impacting the state, especially snowpack accumulations. With below average annual precipitation for 2014⁴, the precipitation deficits from previous years along with record setting warm weather kept California in serious drought conditions. By the end of 2014, California's annual precipitation ranked as the 44th lowest over the past 120 years, resulting in low hydroelectric availability for 2014.

In years of low hydroelectric availability, natural gas-fired electric generation typically makes up the difference. However, for 2014 in-state natural gas-fired electric generation only increased by approximately one percent (1,054 GWh). The deficit in hydroelectric generation would be made up by renewables, specifically utility-scale solar photovoltaic, solar thermal, and wind generation. Total in-state solar generation, thermal and photovoltaic combined, increased by 6,266 GWh from 2013 levels. However, to put the growth in perspective, since 2010, the year when solar generation started its rapid growth, total solar energy in 2014 was an impressive 10,557 GWh, representing more than 1,000 percent growth from 2010 levels (912 GWh). In-state wind generation added an additional 303 GWh to its already impressive 2013 totals to reach 12,997 GWh in 2014. Combined, wind and solar generation in California now account for approximately 12 percent of total in-state generation or about 23,544 GWh for 2014.

Total imports from the Northwest and Southwest decreased by 2.6 percent from 2013 levels based on reported net power imports by California balancing authorities. Net imports were 94,360 GWh in 2014, down 2,485 GWh from 2013. Some of the reduction was due to an upgrade of the Pacific Direct Current Intertie from the Pacific Northwest that resulted in periods of unavailability. Balancing authorities control power flowing across transmission ties between different regions within the Western Electricity Coordinating Council. The following four California Balancing authorities report their annual net energy imports to the California Energy Commission: Balancing Authority of Northern California, California Independent System Operator, Los Angeles Department of Water and Power, and Imperial Irrigation District.

Net energy imports from the Northwest increased by 1 percent in 2014 to 35,421 GWh, however, specified claims (excluding Renewable Energy Credits (RECs)) by California utilities for renewable energy fell compared to 2013. Net imports from the Southwest dropped by 4.6 percent in 2014 to 58,969 GWh. The reduced non-REC specified claims by California utilities to out-of-state power plants (renewable and non-renewable) resulted in a modest increase in the Unspecified Sources of Power category to 13.95 percent of total system power in 2014 from 12.49 percent in 2013. Unspecified Sources of Power generally includes spot market purchases, wholesale power marketing, purchases from pools of electricity where the original source of fuel is not determined, and "null power". Null power is the generic electricity commodity that remains when the renewable attributes, renewable energy credits, are sold separately. Total system power does not account for REC-only specified claims due to the multiyear staggering of the renewable attribute (the credit) compared to the actual delivery of power across state lines.

Biomass imports by California utilities for 2014 decreased by 48 percent to 786 GWh. This decrease resulted in total biomass accounting for 2.54 percent of total system power, down from 2.67 percent in 2013.

California's in-state electric generation from coal for 2014 is virtually the same as the previous year at 1,011 GWh. One coal-fired plant, ACE Cogeneration (108 MW nameplate capacity), was retired in October 2014, leaving three coal-fired plants in California, Argus Cogeneration (55 MW), Rio Bravo Jasmin (38 MW), and Rio Bravo Poso (38 MW), and one petroleum coke-fired plant, the Los Angeles Refinery Calciner (36 MW).

Nuclear generation from California's remaining facility, PG&E's Diablo Canyon Power Plant (DCPP), was down slightly in 2014 due to scheduled refueling and maintenance outages for both Unit 1 and Unit 2. According to PG&E, in a typical year, at least one of Diablo Canyon's two reactor units undergoes a planned refueling and maintenance outage. However, once every five years both units are refueled in the same year due to their separate operating schedules. Such an occurrence took place in 2014⁵. DCPP generated 17,027 GWh in 2014, down 833 GWh from 2013, due primarily to the scheduled work. Diablo

Canyon made up 8.6 percent of in-state generation and provided 5.8 percent of the California's total electric generation requirement in 2014. Not counting offline periods for scheduled refueling and planned maintenance, DCPD has maintained similar levels of output since 2001, the start of QFER reporting. The shutdown of San Onofre Nuclear Generating Station in 2011 did not impact generation by DCPD, because DCPD is a baseload unit that is usually operating and the two plants serve different areas. Nuclear energy imports from Palo Verde Nuclear Generating Station in Arizona accounted for an additional 8,193 GWh in 2014, bringing the total generation served by nuclear energy to 25,221 GWh, representing 8.6 percent of total system power.

Wind facilities in California increased their generation by 2.4 percent (303 GWh) in 2014 reaching 12,997 GWh. Wind generation capacity increased by 96 MW to 5,896 MW by December 31, 2014. Wind generation imports from the Northwest were at similar levels to 2013 with 10,151 GWh for 2014 along with an additional 766 GWh from the Southwest resulting in a total of 23,914 GWh of wind generation serving the state's need in 2014, about six percent less than 2013.

Solar photovoltaic energy also experienced significant commercial-scale capacity additions in 2014 with more than 2,000 MW added over the year. By the close of 2014, in-state solar capacity was 5,939 MW. Annual in-state energy totals for solar more than doubled to 10,557 GWh from 4,291 GWh in 2013. There were 45 utility-scale solar capacity additions in California during the year. These include, but are not limited to, Mojave Solar Thermal Project in San Bernardino County, Genesis Solar Thermal Project in Riverside County, Centinela Solar PV Project in Imperial County, Regular Solar PV in Kern County, and Western Antelope Blue Sky Ranch in Los Angeles County.

Reporting requirements for total system power are limited to projects rated at one MW and larger. Because most solar PV systems on residential households and businesses are less than one MW, data on these installations is not collected. As more installations of solar PV and other "behind the meter" distributed generation technologies take place, along with continued gains in energy efficiency, displacement of power delivered by utilities as represented within total system power may be impacted. As distributed generation systems become a more significant portion of the state's generation mix, it may be appropriate to reconsider the exclusion of these smaller, behind-the-meter systems from the total system power summary.

¹Source: California Energy Demand Update Forecast, 2015-2025, Page 15, December 2014 CEC-200-2014-009-SF-REV <http://www.energy.ca.gov/2014publications/CEC-200-2014-009/CEC-200-2014-009-SF-REV.pdf>

² NOAA National Centers for Environmental Information, State of the Climate: National Snow & Ice for Annual 2014, published online January 2015, retrieved on July 27, 2015 from. <http://www.ncdc.noaa.gov/sotc/snow/201413>.

^{3,4} NOAA National Centers for Environmental Information, State of the Climate: National Overview for Annual 2014, published online January 2015, retrieved on July 27, 2015 from <http://www.ncdc.noaa.gov/sotc/national/201413>.

⁵ PG&E Press Release, February 10, 2014, "Diablo Canyon Unit 1 Begins Scheduled Refueling and Maintenance Outage", http://www.pge.com/en/safety/systemworks/dcpp/newsmedia/pressrelease/archive/diablo_canyon_unit1_begins_scheduled_refueling_and_maintenance_outage.page

Additional Years - Total System Electric Generation

[Current](#) | [2015](#) | [2014](#) | [2013](#) | [2012](#) | [2011](#) | [2010](#) | [2009](#) | [2008](#) | [2007](#) | [2006](#) | [2005](#) | [2004](#) | [2003](#) | [2002](#) | [2001](#)

Note: 2002 - 2006 called "Gross System Power"

Total System Power: Definition and Calculation Method

The California Code of Regulations (Title 20, Division 2, Chapter 2, Section 1304 (a)(1)-(2)) requires owners of power plants that are 1 megawatt (MW) or larger in California or within a control area with end users inside California to file data on electric generation, fuel use, and environmental attributes. Filings are submitted to the Energy Commission on a quarterly and annual basis. These filings cover all types of electric generation: wind, solar, geothermal, natural gas, hydroelectric, coal generators, and others. The reporting requirement includes facilities that have generation for onsite use, and non-retail generation with reversible turbines used to pump water. (Some of these facilities use electricity to store water in later months, while others pump water at night to generate electricity during subsequent daytime hours). Energy Commission staff collect and verify these reports to compile a statewide accounting of all electric generation serving California.

Balancing Authorities (formerly known as Control Area Operators) are also required to report net amounts of electricity flowing across transmission ties from other Balancing Authority Areas.³ These quarterly reports of electricity imports and exports are at least transparent and do reflect a net import requirement for California.

The net electricity imported from outside California (total imports minus exports) are separated into two geographical regions: the Northwest (NW) and the Southwest (SW) based on the source of the reported import.⁴ This allocation of imports by specific fuel type is determined by utilities reporting under the Power Source Disclosure Program, described more fully below.

"Unspecified power" is the amount of energy that not specifically claimed by a utility under the Power Source Disclosure Program. This category includes spot market purchases, wholesale power marketing, purchases from pools of electricity where the original source of fuel is not determined, and "null power". Null power is the generic electricity commodity that remains when the renewable attributes (Renewable Energy Credits, or RECs) are sold separately.

Total System Power is the sum of all in-state generation plus net electricity imports (by fuel type) plus unspecified power. Total System Power cannot be used to track the state's progress for the Renewable Portfolio Standard (RPS) program due to the intricacies, nuances, and special requirements of the RPS legislation. For more information on the RPS program, please visit the following website address:

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

³ The boundaries of electrical California's Balancing Authority Areas do not correspond precisely with the state's geographic boundaries.

⁴ The Northwest includes Alberta, British Columbia, Idaho, Montana, Oregon, South Dakota, Washington, and Wyoming. The Southwest includes Arizona, Baja California, Colorado, New Mexico, Nevada, Texas, and Utah.

Power Source Disclosure Program

The [Power Source Disclosure](#) provides current and historical information about the program, requiring retail electricity providers report purchase and sales information to the Energy Commission and their retail customers. The Power Source Disclosure Program was authorized by Senate Bill 1305 (Stats. 1997, Chapter 796, Statutes of 1997), and revised in October 2009 by Assembly Bill 162 (Stats. 2009, Chapter 313). Consistent with the original legislation, retail suppliers of electricity are required to disclose to consumers "accurate, reliable, and simple-to-understand information on the sources of energy that are (being) used..."; (Public Utilities Code Section 398.1(b)).

The statutes require electricity suppliers inform their consumers about the types of generation resources used to provide their electricity. Suppliers are required to use a format developed by the Energy Commission called the Power Content Label. The statutes also require utilities to submit a detailed report of their fuel mix to the Energy Commission. These reports are available to the public upon request to the supplier.

Changes made by SBX1-2 (Chapter 1, Statutes of 2011) affecting the eligibility requirements for electricity products considered to be eligible under California's Renewable Portfolio Standard (RPS) also affect procurement claimed on the Power Content Labels. Because of this, revisions to the Power Source Disclosure Program have been delayed until the POU 33% RPS Regulations are further developed. However, changes to the Power Source Disclosure Program, as outlined in AB 162, do not require adoption of the new regulations to become effective. The requirements of AB 162 and the portions of SB 1305 not changed by AB 162 constitute current, effective law.

Power Content Label

[Power content label](#) provides current information on how to report specified and unspecified power generation

Unspecified Power

The term unspecified power is used in the context of allocating fuel types of power generation serving the state of California. California uses a variety of fuel types for power generation including natural gas, hydroelectric, geothermal, and other renewable and non-renewable sources. Unspecified power refers to the situation where the original fuel type of the generator is unknown. This only applies to power imported from out of state.

What is Unspecified Power?

Prior to 2009 there was no category allowed for "unspecified power" in the Net System Power Report - everything had to be allocated under Net System Power. Accordingly, the Electricity Analysis Office (EAO) developed a generation profile mix of the Northwest and Southwest. Essentially, EAO calculated a Total System Power profile for each region. From these profiles, EAO allocated specified claims and then prorated the remainder of the resource mix to the unspecified category. The problem with this methodology was that it treated all unspecified imports as if they were made up of a mix of resources. This method

combined both base load power and marginal power as equal. Obviously this was not a good methodology to follow but at the time it was the only one available.

The averaging methodology applied to the old Net System Power reports was widely recognized as flawed because it overestimated the role of baseload plants in the western spot market. Baseload plants selling to California are/were tied to long-term contracts. Most of the unspecified imports are spot market sales that represent about half of the imports. These sales primarily occur when there is surplus generation on the market that is less expensive than variable costs of some California plants.

System averaging does not reflect rate based utility portfolios, dispatch dynamics and short-term market transactions. Surplus, or marginal generation, is what typically serves the spot market. Hydro and coal used to be the marginal resource through the mid-1990's, but load growth surpassed coal generation capacity. Generally, hydroelectric and natural gas-fired electricity generation are considered the marginal generation sources in the interconnected western electricity system. There may be some surplus coal available during off-peak periods, but California generators are usually at minimum load levels during these periods.

The Total System Power table does not show all long-term coal contracts. Most of these are associated with smaller public owned utilities. However, at most, the volume will push the fractional totals by only a few percentage points. The new Power Source Disclosure regulations are expected to reveal these transactions [draft regulations posted May 5, 2011 in Docket 2010-PSDR-01]. In addition, Air Resources Board's mandatory reporting requirements should already be collecting coal imports.

The Power Source Disclosure Program, modified in 2009, allows for "unspecified" imports. Now, EAO can accurately assess specified claims for imports and leaves the remaining unspecified imports as just that, imports not traceable to source fuel type(s).

Methodology for Determining Unspecified Power within Total System Power

For out of state imports, the Energy Commission collects quarterly electric energy import data from Balancing Authorities (BA) within California. The BAs report both imports and exports (exchanges) from other BAs both within California and those out of state. The difference between imports and exports results in net imports.

The net imports are mapped, based on the originating BA, to either the Northwest or Southwest import categories. The Northwest includes Alberta, British Columbia, Idaho, Montana, Oregon, South Dakota, Washington, and Wyoming. The Southwest includes Arizona, Baja California, Colorado, New Mexico, Nevada, Texas, and Utah.

California utilities make specified claims on imported power that directly match a fuel type to an out of state resource. For example, a California-based utility will make a specified claim for wind generation from the Oregon-Washington border (Northwest). Once all of the utilities' specified claims have been accounted for, any remaining net imported power is classified as unspecified power.

Generally, the unspecified power category would be comprised of short-term market purchases from those power plants that do not have a contract with a California utility. Much of the Pacific Northwest spot market purchases are served by surplus hydro and newer gas-fired power plants. The Southwest spot market purchases would be comprised of new combined cycle power and some coal. Generally, a marginal supply approach for the determination of spot market supply would yield the most accurate assessment of power included in the unspecified power category.

Finally, there is the issue of null power. Null power refers to power that was originally renewable power but from which the renewable energy credits have been unbundled and sold separately. Null power is not attributable to any technology or fuel type.