CALIFORNIA ENERGY COMMISSION
Energy ALMANAC

Total Electricity System Power

2013 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	1,018	0.51%	812	21,363	23,193	7.82%
Large Hydro	20,754	10.39%	96	2,159	23,009	7.76%
Natural Gas	120,863	60.50%	1,241	9,319	131,423	44.31%
Nuclear	17,860	8.94%	0	8,357	26,217	8.84%
Oil	38	0.02%	0	0	38	0.01%
Other	14	0.01%	0	0	14	0.00%
Renewables	39,236	19.64%	13,187	3,256	55,679	18.77%
Biomass	6,423	3.21%	1,485	21	7,929	2.67%
Geothermal	12,485	6.25%	212	495	13,192	4.45%
Small Hydro	3,343	1.67%	470	0	3,813	1.29%
Solar	4,291	2.15%	58	1,040	5,389	1.82%
Wind	12,694	6.35%	10,962	1,700	25,356	8.55%
Unspecified Sources of Power	N/A	N/A	19,750	17,305	37,055	12.49%
Total	199,783	100.00%	35,086	61,759	296,628	100.00%

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 September 25, 2014

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 1 megawatt and larger in nameplate capacity.

Changes from 2012

In 2013, total system power for California was 296,628 gigawatt-hours (GWh), about 2 percent lower than 2012. California's

in-state electricity production remained virtually unchanged from 2012 levels at 199,783 GWh, a difference of less than 1 percent compared to the year before. Growth in annual electricity consumption is flat or declining in 2013 due to fewer cooling degree days compared to 2012 and the successful implementation of new efficiency programs by utilities.[1]

Temperatures in California were above normal during the spring and summer and average for winter and fall. The National Climatic Data Center summarized California's overall temperature and precipitation conditions as follows,

> January-June 2013 was especially dry for California, Nevada, Arizona, and New Mexico, while the focus of dryness for January-August 2013 was California to Idaho. The wet season for California is roughly November to March, which is when most of the precipitation falls in the state. A calendar year typically begins with the last half of one wet season and ends with the first half of the next wet season. California began 2013 with a drier-than-normal wet season and ended it with a drier-than-normal wet season, which gave the state the driest calendar year in the 1895-2013 record. [2]

By January 2014, Governor Edmund G. Brown Jr. officially declared California to be in a drought.

In both 2012 and 2013, hydroelectric generation decreased significantly, down 36 percent in 2012 and another 10 percent in 2013. These declines were directly due to multi-year dry weather conditions, notwithstanding 2011. Where 2011 was characterized by a heavy and late-melting Sierra snowpack, statewide precipitation for winter 2012 was the third driest in 118 years according to the National Climatic Data Center. By the end of 2013, California experienced its driest calendar year in recorded history with only 7.38 inches of precipitation, 15.13 inches below average. These ongoing drought conditions resulted in low hydroelectric availability for 2013. Coupled with the permanent loss of power operations at the San Onofre Nuclear Generation Station (SONGS), in-state natural gas generation increased 36 percent in 2012 and remains at similar levels in 2013, providing 120,863 GWh of energy.

Total imports from the Northwest and Southwest decreased by 6 percent from 2012 levels due to a decrease in net power imports by California balancing authorities. 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.

Energy imports from the Northwest decreased by 11 percent in 2013, however, specified claims by California utilities of renewable wind, biomass, and small hydro generation improved compared to 2012. Net imports from the Southwest dropped by 3 percent in 2013 to 61,759 GWh. Overall specified claims by California utilities showed increases in coal, large hydroelectric, and solar power imports. The result of improved utility claims to specific out-of-state power plants (renewable and non-renewable) helped to reduce the Unspecified Sources of Power category to 12.5 percent of total system power in 2013 from 16.4% in 2012. Unspecified Sources of Power generally include spot market purchases, wholesale power marketing, purchases from pools of electricity where the original source of fuel 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.

Biomass imports by California utilities increased from 2012 levels by 44% to 1,506 GWh for 2013. This increase helped total biomass account for 2.67 percent of total system power, up from 2.3 percent in 2012.

California's in-state electric generation from coal for 2013 is down 1.5 percent from 2012 to 1,018 GWh. The state's remaining coal plants are Ace Cogeneration, Argus Cogeneration, Wilmington Calciner, Rio Bravo Jasmin, and Rio Bravo Poso. Their combined capacity is 275 MW, unchanged from 2012.

Wind facilities in California significantly increased output in 2013 reflecting the continued siting of new projects. Wind energy capacity increased by more than 1,200 MW to 6,205 MW, which helped increase total in-state wind generation by more than 37 percent compared to 2012. Imports from the Pacific Northwest also increased almost 33 percent helping to bring the total annual wind generation to 25,356 GWh, up 32 percent from 2012.

Solar photovoltaic energy also experienced significant commercial-scale capacity additions in 2013, more than doubling total capacity from 2012. By the close of 2013, in-state solar capacity was 4,075 MW, up 254 percent from 2012's 1,150 MW capacity. Annual in-state energy totals for solar rose to 4,291 GWh from 1,834 GWh in 2012. Solar capacity additions continue to occur outside of California in Nevada and Arizona. Recent additions include, but are not limited to, Desert Sunlight in Riverside County, Ivanpah (I, II, and III) in San Bernardino County, Silver Ridge Mount Signal in Imperial County, and Topaz Solar Farms in San Luis Obispo County.

Reporting requirements for total system power are limited to projects rated at 1 MW and larger. Because most solar PV systems on residential households and businesses are less than 1 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, systems from the total system power summary.

[1]Source: California Energy Demand 2014-2024 Revised Forecast, Volume 1: Statewide Electricity Demand, End-User Natural Gas Demand, and Energy Efficiency, Page 15, January 2014 CEC-200-2013-004-V1-CMF http://www.energy.ca.gov/2013publications/CEC-200-2013-004/CEC-200-2013-004-V1-CMF.pdf

[2] NOAA National Climatic Data Center, State of the Climate: National Overview for Annual 2013, published online December 2013, retrieved on August 12, 2014 from http://www.ncdc.noaa.gov/sotc/national/2013/13.

Previous Total System Power (2002 - 2006 called Gross System Power)

2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002

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 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 Program requires 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.

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.