2024 Total System Electric Generation

Contact: Michael Nyberg | QFERGEN@energy.ca.gov | Energy Assessments Division

- 2023 Total System Electric Generation and previous years
- 2009-2024 Total System Electric Generation Spreadsheet

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The Year in Review - 2024

In 2024, total system electric generation (TSEG) for California was 278,338 gigawatt-hours (GWh), down 1 percent (2,802 GWh) from 2023. TSEG is the sum of all utility-scale in-state generation plus net electricity imports from power plants with a nameplate capacity of at least one megawatt (MW). Clean energy resources accounted for 62 percent of California's power mix, a 4 percent increase from 58 percent in 2023. In-state generation was 216,181 GWh in 2024, virtually unchanged from the 2023 value of 216,047 GWh. Imported energy decreased to 62,157 GWh, down 5 percent (3,361 GWh) from 2023.

2024 Total System Electric Generation

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	Total Imports (GWh)	Total Californi Energy Mix (GWh)
Coal	263	0.12%	124	5,775	5,899	6,16
Natural Gas	86,479	40.00%	84	8,091	8,176	94,65
Oil	36	0.02%	-	0	0	3
Other (Waste Heat/Petroleum Coke)	198	0.09%	13	9	22	22
Unspecified	-	0.00%	80	3,971	4,051	4,05
Total Thermal and Unspecified	**86,976**	**40.23%**	**301**	**17,846**	**18,147**	**105,12**
Nuclear	18,379	8.50%	208	9,026	9,234	27,61
Large Hydro	25,222	11.67%	4,479	1,079	5,558	30,78
Biomass	4,754	2.20%	614	26	640	5,39
Geothermal	10,453	4.84%	212	2,139	2,351	12,80
Small Hydro	3,969	1.84%	269	2	270	4,24
Solar	50,666	23.44%	536	8,081	8,616	59,28
Wind	15,761	7.29%	9,195	8,145	17,341	33,10

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	Total Imports (GWh)	Total Californi Energy Mix (GWh)
Total Non-GHG and Renewable Resources	**129,205**	**59.77%**	**15,512**	**28,498**	**44,010**	**173,21**
Total Energy	**216,181**	**100.00%**	**15,813**	**46,344**	**62,157**	**278,33**

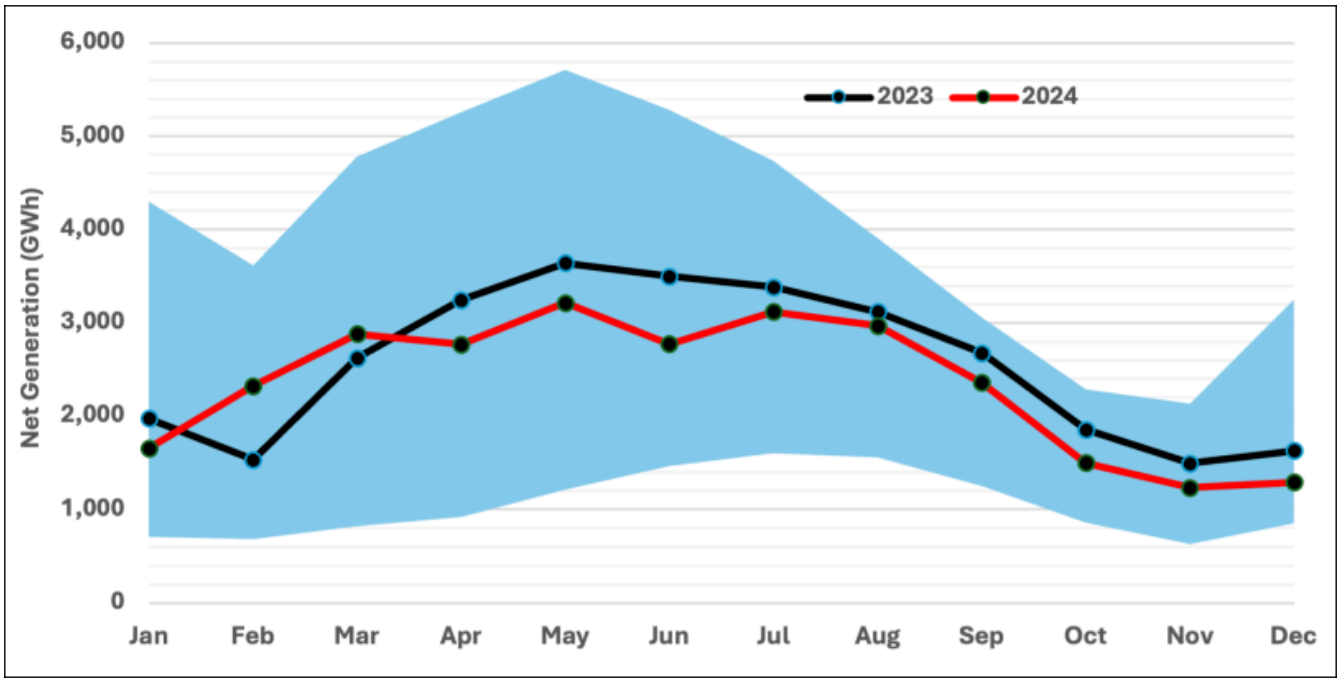
Changing Levels of Imports

Imports are heavily impacted by the availability of hydroelectric generation in the Pacific Northwest and British Columbia. Traditionally, both Bonneville Power Authority (BPA) and BC Hydro send power to California. A significant shift occurred in 2023 when British Columbia began importing power from the Pacific Northwest. Experiencing a record drought throughout 2023 and 2024, BC Hydro imported approximately 20 percent of its load from the Pacific Northwest, some 10,000 GWh annually. As a result of the drought conditions, imports from BC Hydro and BPA were reduced by 70 percent from 2022 levels over the past two years.

Hydroelectric Generation and Snowpack Levels

California's hydroelectric generation in 2024 decreased 8 percent from 2023, ranking as the 11th highest over the past 25 years. The chart below shows the historical minimum and maximum monthly hydroelectric generation levels with generation for 2023 and 2024 depicted. After a very wet 2023, water-year 2024 delivered average precipitation to California along with one of the hottest summers on record. The recent fall heatwave dried the landscape and erased some of the benefits of the past two years.

California Monthly Hydroelectric Generation (2023-2024) with Historical Highs and Lows



Despite average generation output, the outlook for 2025 hydroelectric generation is encouraging. Statewide snowpack peaked on April 4, 2025, at 100 percent for the season. Lake Oroville, the State Water Project's largest reservoir, was measured at 120 percent and 95 percent full. San Luis Reservoir in Merced County, a critical storage space for Southern California water, was at 101 percent of average for April 4, 2025, and 83 percent full. California's official water year runs from October 1 through September 30.

Annual Temperatures

Based on the National Oceanic and Atmospheric Administration's (NOAA) annual climate report, the Western U.S. experienced above normal temperatures throughout the region in 2024. The year started out relatively wet due in part to weather patterns driven by a strong El Niño event that persisted for the first half of the year. The summer was characterized by extreme heat in the Southwest. Death Valley observed a record nine days in July that had a maximum temperature of 125 degrees Fahrenheit or higher, the second highest on record. Dry conditions combined with above normal temperatures during the second half of the year lead to drought development and expansion in portions of southern Nevada, southern California, western Arizona, and much of Montana.

IEPR Demand Forecast

TSEG of 278,338 GWh is consistent with the Integrated Energy Policy Report (IEPR) demand forecast for 2024. Specifically, the IEPR forecast (2024-2040) estimated statewide gross consumption to be 303,907 GWh. Once behind-the-meter (BTM) solar PV estimates of 26,765 GWh are subtracted, the resulting energy-to-serve load estimate (including onsite usage) is 277,142 GWh. This is within 1/2 percent (1,196 GWh) of the total reported generation by power plants serving California.

Behind-the-Meter Solar PV and Battery Energy Storage

In recent years, the development of more than 17,400 MW of BTM solar PV generation capacity has displaced approximately 10 percent of energy supplied by local utilities. Recent growth in battery energy storage has increased the efficiency of these solar PV systems by enabling end-users to capture energy during peak solar irradiance and then utilize the stored energy later in the afternoon when loads are typically higher. In 2024, statewide battery energy storage capacity reached 15,040 MW across all sectors with distributed battery energy storage systems accounting for 2,515 MW of the total.

Data Collection

The California Code of Regulations (Title 20, Division 2, Chapter 2, Section 1304 (a)(1)-(2)) requires owners of power plants that are rated 1 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. Reports are submitted to the Commission on a quarterly and annual basis. These reports cover all forms of electric generation including renewables, hydroelectric, natural gas, and others. The reporting requirement includes cogeneration facilities that generate for onsite usage such as refineries and university campuses.

Additionally, net generation from hydroelectric facilities that are equipped with reversible turbines (a combined pump and turbine generator) is included in the summary. Pumping-generating facilities use electricity to meet water storage, water transfer, and water delivery requirements, while pumped storage facilities use electricity to transfer water from one reservoir to another during off-peak hours to be dispatched to meet peak demand

requirements. Commission staff collect and verify these reports to compile a statewide accounting of all electric generation serving California.

Quarterly reports submitted by balancing authorities are used to determine the net energy imports for California. Imports are tracked in two geographical regions: the Northwest and the Southwest. The allocation of fuel types is based on Power Source Disclosure annual reports from load-serving entities such as investor-owned utilities, publicly owned utilities, and community-choice aggregators.

What is Unspecified Power/Unspecified Energy?

Unspecified power refers to electricity that is not traceable to a specific generating facility, such as electricity traded through open market transactions. Unspecified sources of power are typically a mix of resource types and may include renewables. This category can also include spot market purchases, wholesale energy purchases, and purchases from pools of electricity where the original fuel source can no longer be determined. It can also include energy from a CEC-certified renewable facility that has been sold separately from its renewable energy certificate, or REC. Renewable energy sold without the corresponding REC is sometimes referred to as “null energy.”

Definitions

California Energy Mix: Total in-state electric generation plus Northwest and Southwest energy imports.

California Power Mix: Percentage of specified fuel types derived from the California Energy Mix used on annual Power Content Labels prior to 2024.

In-State Generation: Energy from power plants physically located in the state of California.

Northwest Imports: Energy imports from Alberta, British Columbia, Idaho, Montana, Oregon, South Dakota, Washington, and Wyoming.

Southwest Imports: Energy imports from Arizona, Baja California, Colorado, Mexico, Nevada, New Mexico, Texas, and Utah.

Total System Electric Generation: Used interchangeably with California Energy Mix.

Total System Power: Original terminology used to describe California's annual electric generation.

CONTACT

California Energy Commission
715 P Street
Sacramento, CA 95814

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