Statistics and Graphs for the 37 of 45 Days From March 8-April 21, 2024, Where Wind-Water-Solar (WWS) Supply Exceeded 100% of Demand on California's Main Grid for 0.25-9.25 Hours Per Day

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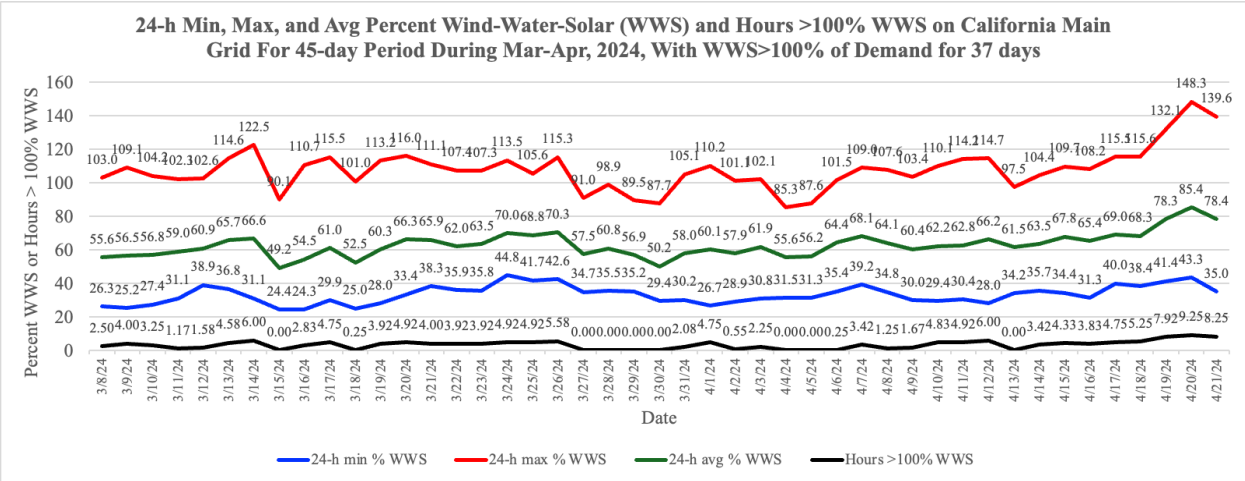
WWS = Wind (onshore here), Water (small and large hydro and geothermal) and Solar (utility PV and CSP).

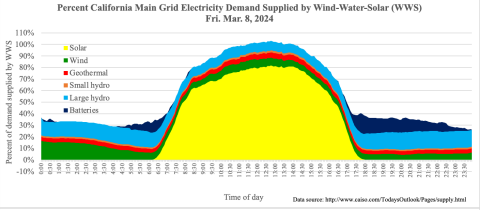
Rooftop PV (which produces ~12% of California's electricity) is not directly included; however, it reduces demand on the grid during the day by powering homes directly, so is reflected in the demand curves.

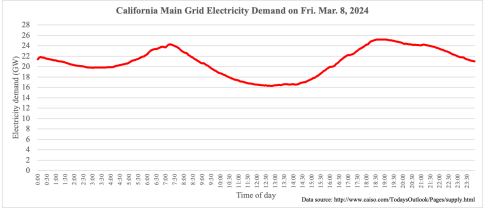
Summary stats: Max WWS relative to demand over 45 days and nights: 148.3%; Min WWS: 24.29%; Avg WWS: 62.8%; Avg/Max hours per day with WWS > 100% of demand: 3.24 h/9.25 h.

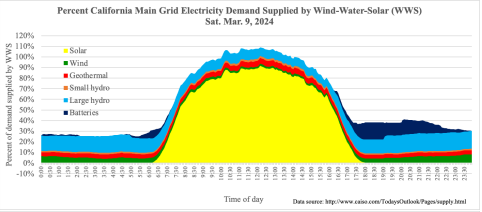
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

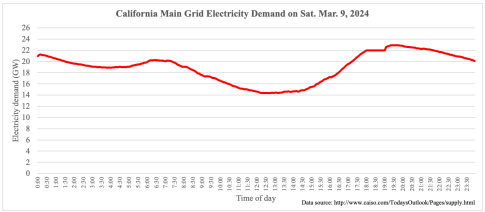
Please see https://web.stanford.edu/group/efmh/jacobson/WWSBook/Countries100Pct.pdf for a rank of countries and U.S. states in terms of their penetration in the annual average on the grid. For states, the table also shows that 5 of the 11 states with the highest WWS penetration are among the 10 states with lowest electricity prices. Ten of the 12 states with the highest WWS penetration are among the 25 states with lowest prices. California prices are high because of high fossil gas prices and costs of wildfires, undergrounding transmission lines, the San Bruno and Aliso Canyon gas disasters, and the need to strengthen gas pipelines. WWS reduces California prices.

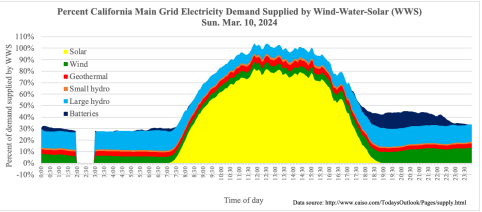

24-h Min, Max, and Avg Percent Wind-Water-Solar (WWS) and Hours >100% WWS on California Main Grid For 45-day Period During Mar-Apr, 2024, With WWS>100% of Demand for 37 days
Percent WWS or Hours > 100% WWS
Date
24-h min % WWS
24-h max % WWS
24-h avg % WWS
Hours >100% WWS

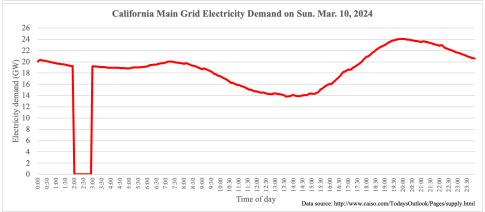

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Fri. Mar. 8, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

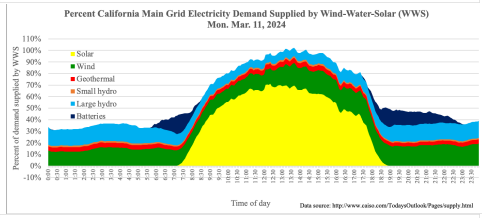

California Main Grid Electricity Demand on Fri. Mar. 8, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

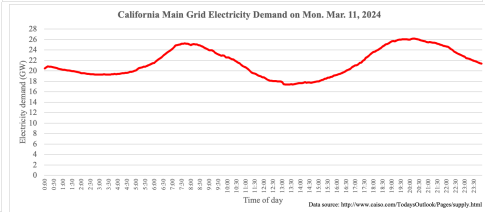

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sat. Mar. 9, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

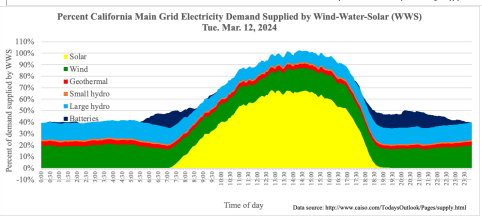

California Main Grid Electricity Demand on Sat. Mar. 9, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

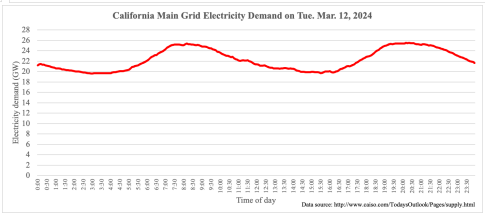

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Mar. 10, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

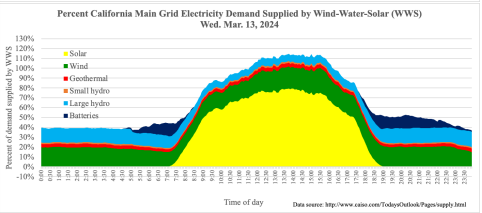

California Main Grid Electricity Demand on Sun. Mar. 10, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

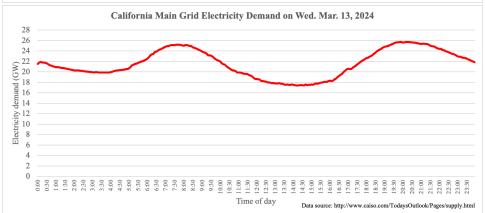

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Mar. 11, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

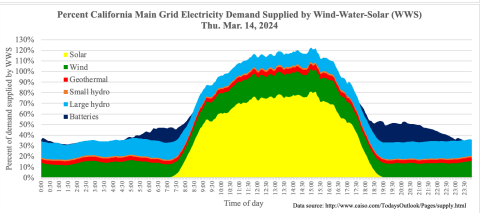

California Main Grid Electricity Demand on Mon. Mar. 11, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

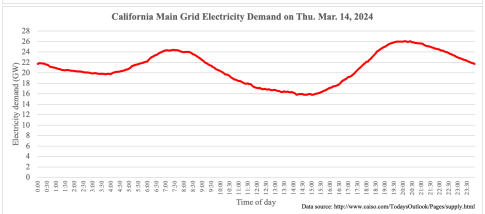

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Mar. 12, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

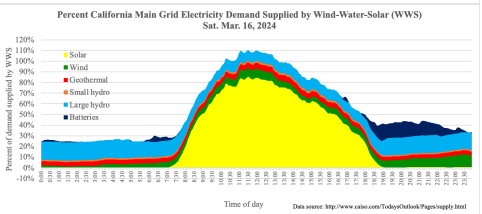

California Main Grid Electricity Demand on Tue. Mar. 12, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

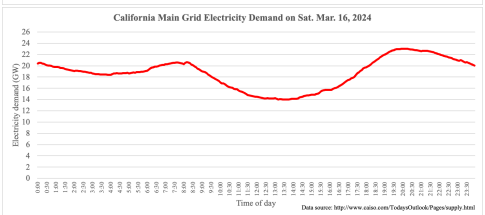

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Wed. Mar. 13, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

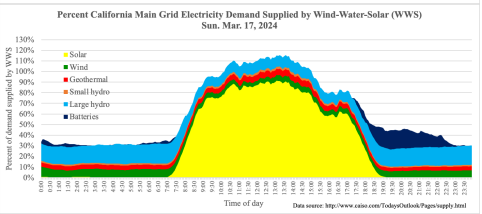

California Main Grid Electricity Demand on Wed. Mar. 13, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

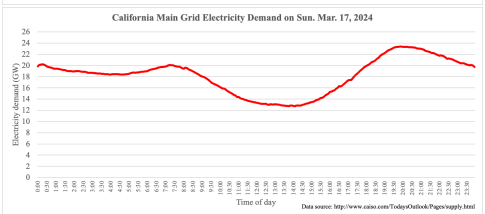

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Thu. Mar. 14, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

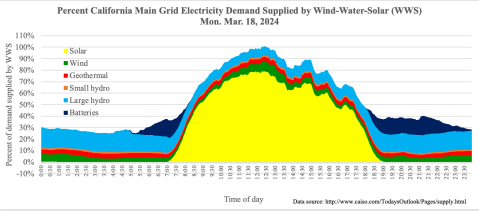

California Main Grid Electricity Demand on Thu. Mar. 14, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

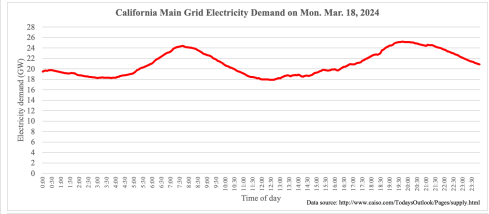

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sat. Mar. 16, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

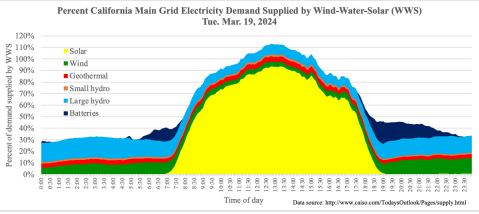

California Main Grid Electricity Demand on Sat. Mar. 16, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

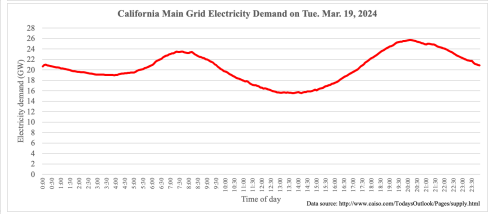

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Mar. 17, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

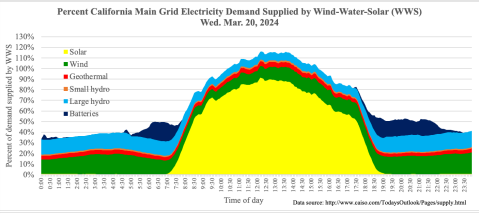

California Main Grid Electricity Demand on Sun. Mar. 17, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

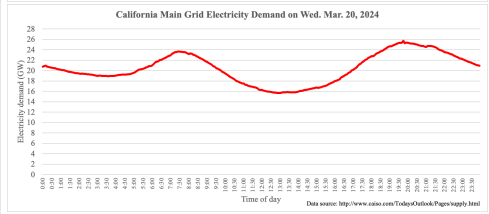

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Mar. 18, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

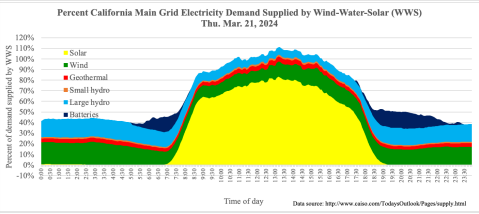

California Main Grid Electricity Demand on Mon. Mar. 18, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

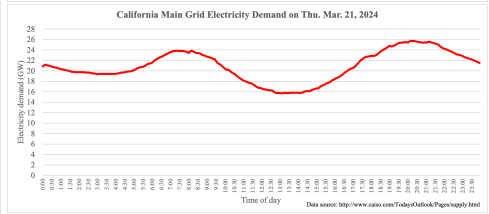

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Mar. 19, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

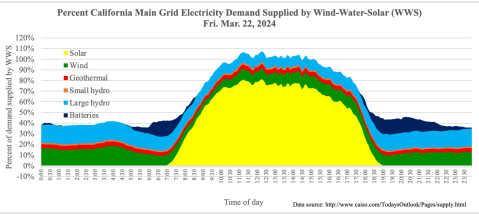

California Main Grid Electricity Demand on Tue. Mar. 19, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

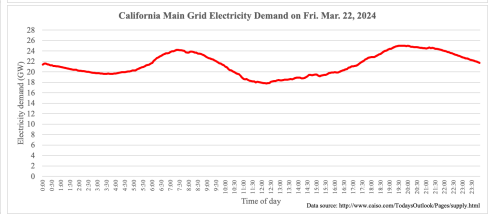

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Wed. Mar. 20, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

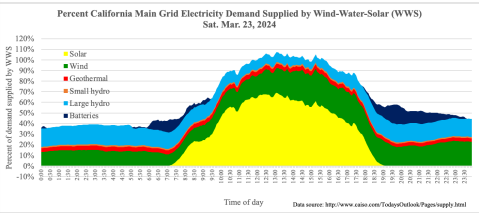

California Main Grid Electricity Demand on Wed. Mar. 20, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

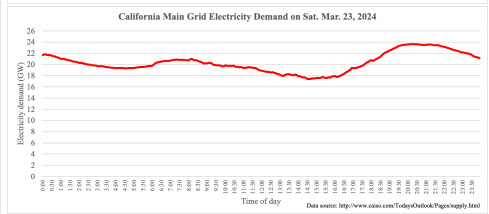

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Thu. Mar. 21, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

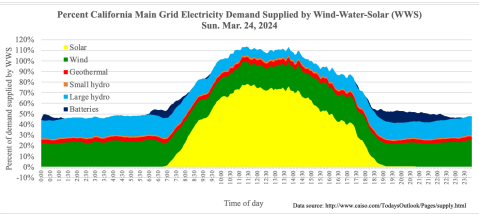

California Main Grid Electricity Demand on Thu. Mar. 21, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

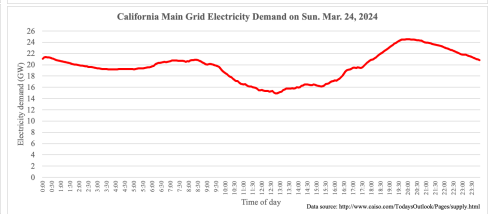

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Fri. Mar. 22, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

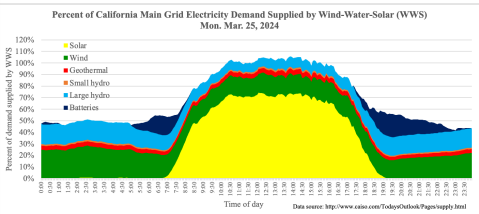

California Main Grid Electricity Demand on Fri. Mar. 22, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

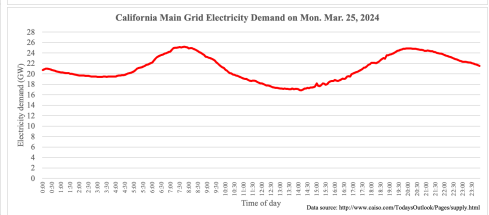

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sat. Mar. 23, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

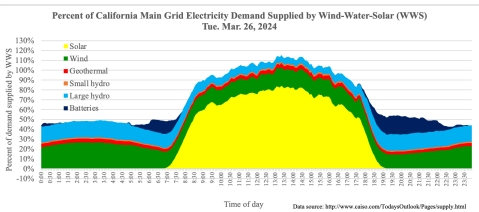

California Main Grid Electricity Demand on Sat. Mar. 23, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

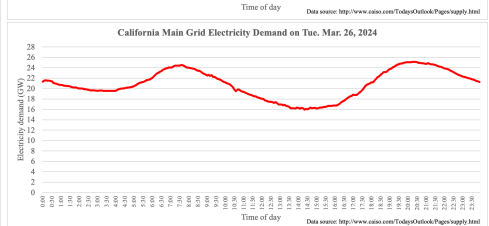

Percent California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Mar. 24, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

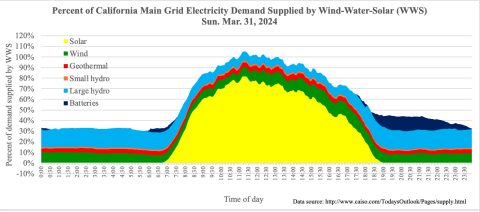

California Main Grid Electricity Demand on Sun. Mar. 24, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

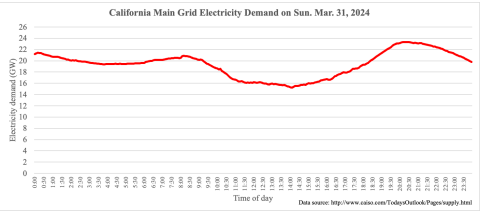

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Mar. 25, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

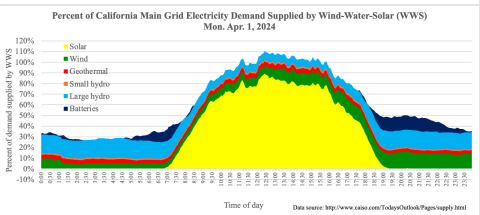

California Main Grid Electricity Demand on Mon. Mar. 25, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

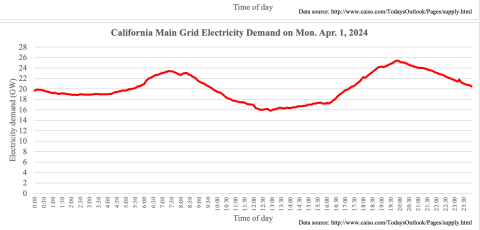

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Mar. 26, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

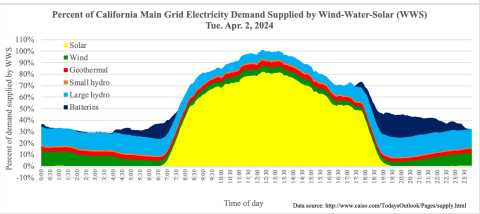

California Main Grid Electricity Demand on Tue. Mar. 26, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

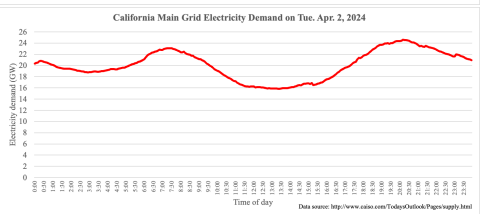

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Mar. 31, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

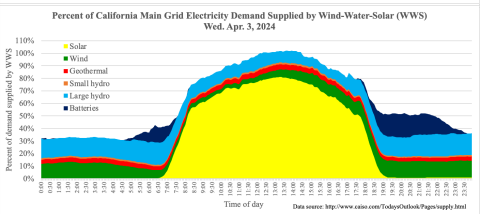

California Main Grid Electricity Demand on Sun. Mar. 31, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

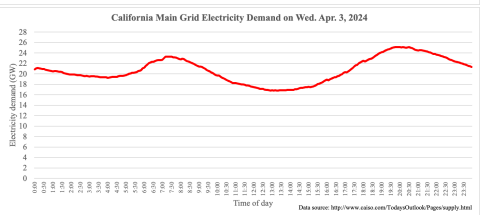

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Apr. 1, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

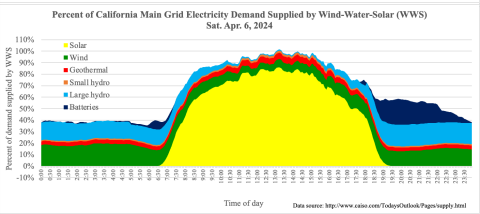

California Main Grid Electricity Demand on Mon. Apr. 1, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

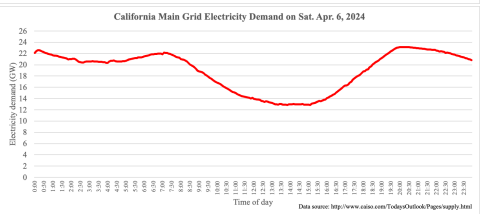

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Apr. 2, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

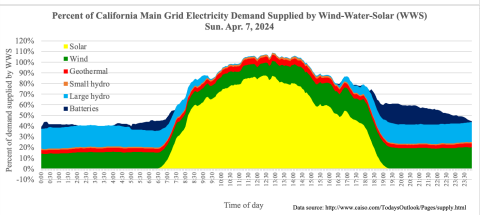

California Main Grid Electricity Demand on Tue. Apr. 2, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

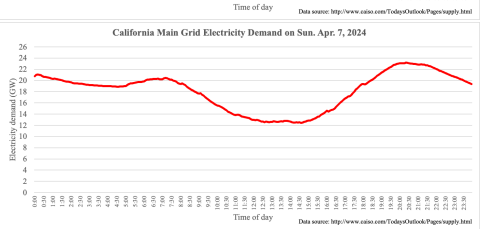

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Wed. Apr. 3, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

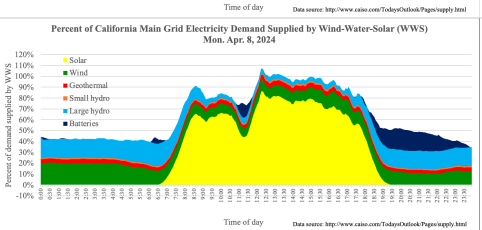

California Main Grid Electricity Demand on Wed. Apr. 3, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

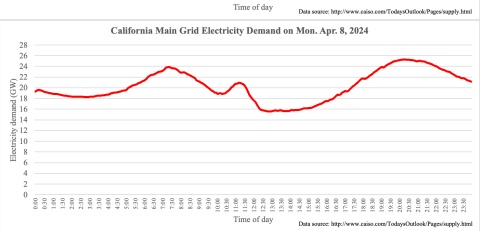

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sat. Apr. 6, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

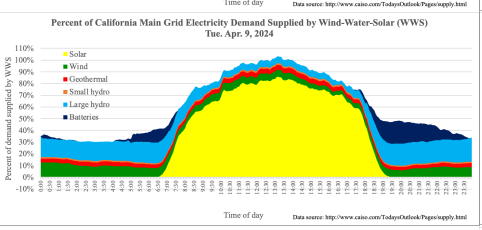

California Main Grid Electricity Demand on Sat. Apr. 6, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

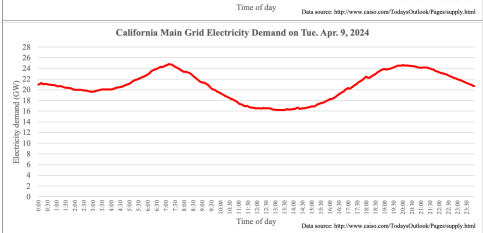

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Apr. 7, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

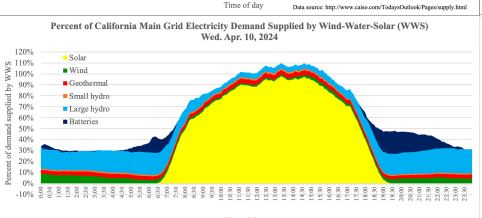

California Main Grid Electricity Demand on Sun. Apr. 7, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

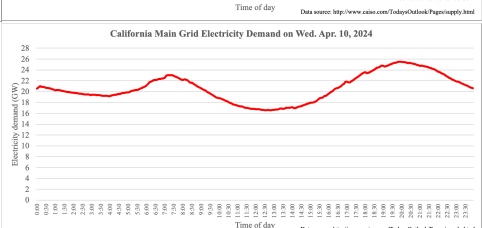

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Apr. 8, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

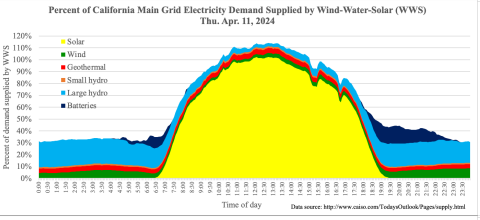

California Main Grid Electricity Demand on Mon. Apr. 8, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

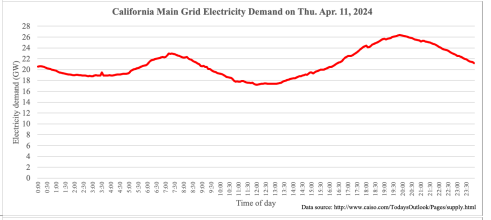

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Apr. 9, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

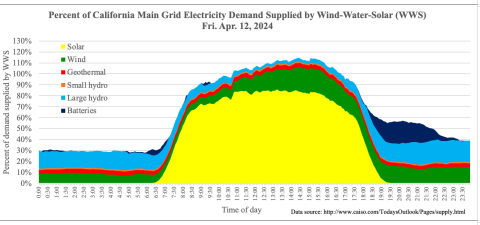

California Main Grid Electricity Demand on Tue. Apr. 9, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

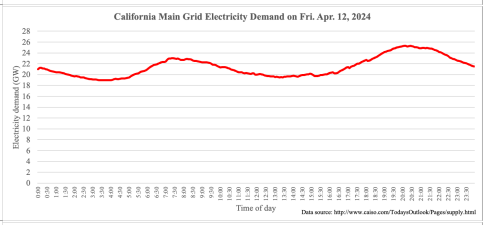

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Wed. Apr. 10, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

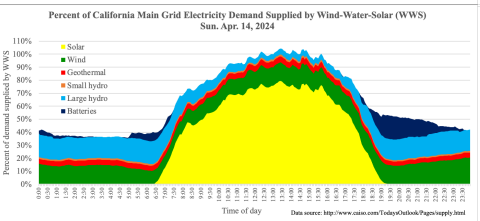

California Main Grid Electricity Demand on Wed. Apr. 10, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

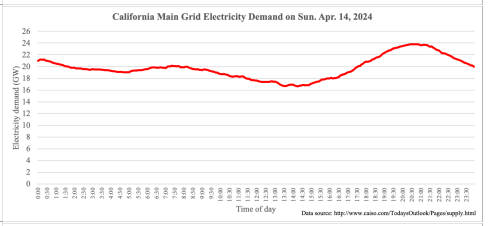

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Thu. Apr. 11, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

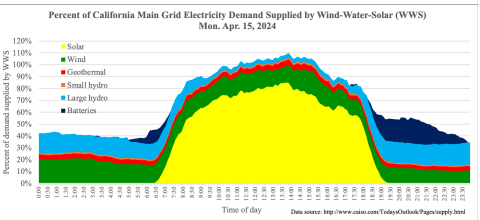

California Main Grid Electricity Demand on Thu. Apr. 11, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

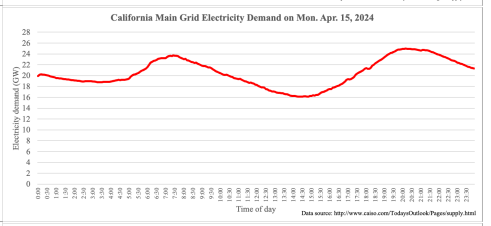

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Fri. Apr. 12, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

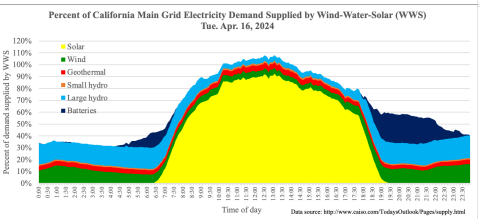

California Main Grid Electricity Demand on Fri. Apr. 12, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

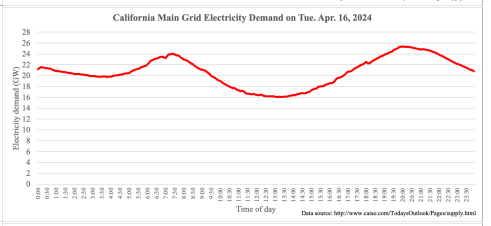

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Apr. 14, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

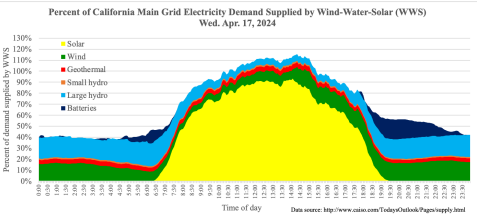

California Main Grid Electricity Demand on Sun. Apr. 14, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

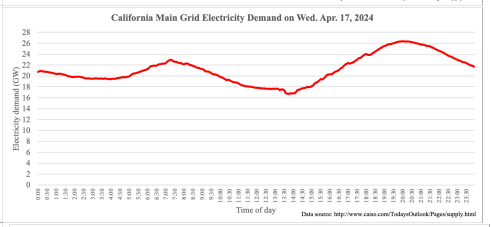

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Mon. Apr. 15, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

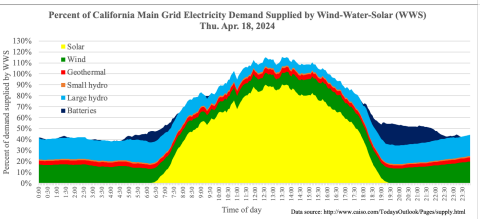

California Main Grid Electricity Demand on Mon. Apr. 15, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

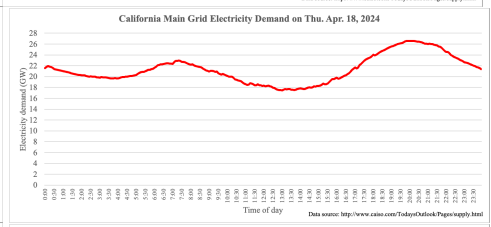

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Tue. Apr. 16, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

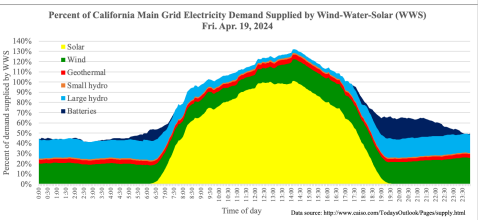

California Main Grid Electricity Demand on Tue. Apr. 16, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

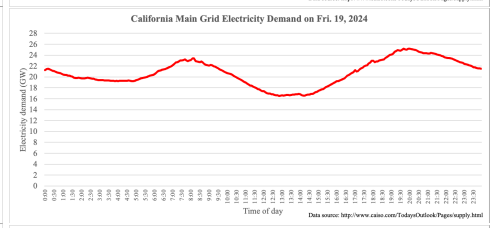

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Wed. Apr. 17, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

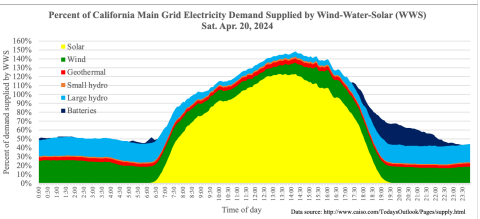

California Main Grid Electricity Demand on Wed. Apr. 17, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

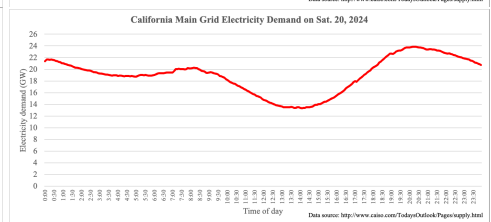

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Thu. Apr. 18, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

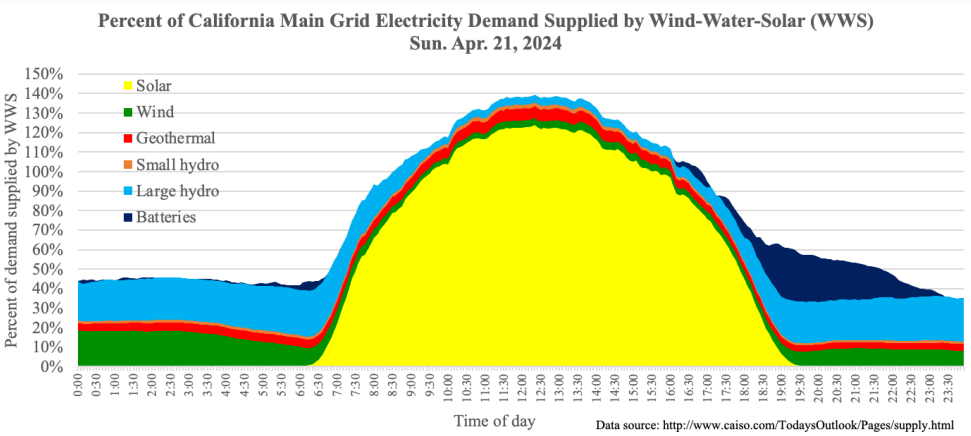

California Main Grid Electricity Demand on Thu. Apr. 18, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html

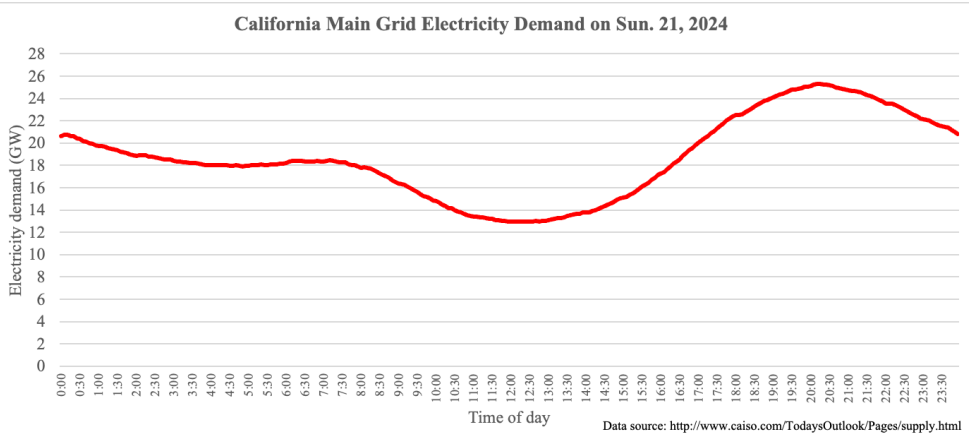

Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Fri. Apr. 19, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html


California Main Grid Electricity Demand on Fri. Apr. 19, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html


Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sat. Apr. 20, 2024
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Percent of demand supplied by WWS
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html


California Main Grid Electricity Demand on Sat. Apr. 20, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html


Percent of California Main Grid Electricity Demand Supplied by Wind-Water-Solar (WWS)
Sun. Apr. 21, 2024
Percent of demand supplied by WWS
Solar
Wind
Geothermal
Small hydro
Large hydro
Batteries
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html


California Main Grid Electricity Demand on Sun. 21, 2024
Electricity demand (GW)
Time of day
Data source: http://www.caiso.com/TodaysOutlook/Pages/supply.html