



California Renewables Curtailments Surge as Coronavirus Cuts Energy Demand

The Golden State's solar output already outpaced demand at times. Then came the coronavirus lockdown.



by Jeff St. John
April 02, 2020

California grid operator CAISO has been curtailing renewable energy at record levels this year, as the state's ever-rising share of solar power during daylight hours increasingly outpaces electricity demand. Adding to its challenges, the grid operator is now contending with falling power demand caused by the coronavirus pandemic.

San Francisco Bay Area counties issued a shelter-in-place order and mandated a halt to all nonessential work on March 17, and Gov. Gavin Newsom extended the order statewide two days later. In the following weeks, CAISO has recorded a significant drop in demand from shuttered businesses, largely centered on the Bay Area and served by Pacific Gas & Electric, and in regions served by utility Southern California Edison.

Since the statewide order, CAISO has seen load reductions from 5 percent to 8 percent on weekdays, and from 1 percent to 4 percent on weekends, with the largest drops in the morning peak hours compared to the same periods last year. Those figures, which have been adjusted for weather differences compared to 2019, are largely “due to a shift from commercial, restaurant and retail hubs to residential consumption,” with the drop in commercial loads outweighing the increase in residential loads from people staying at home, CAISO spokesperson Anne Gonzales wrote in a Wednesday email.

Those load drops are larger than the average 4 to 5 percent declines New York grid operator NYISO reported for last week, although they’re higher in New York City, the epicenter of the state’s COVID-19 outbreak. Grid operator ISO New England reported 3 percent to 5 percent declines in system demand in the previous week.

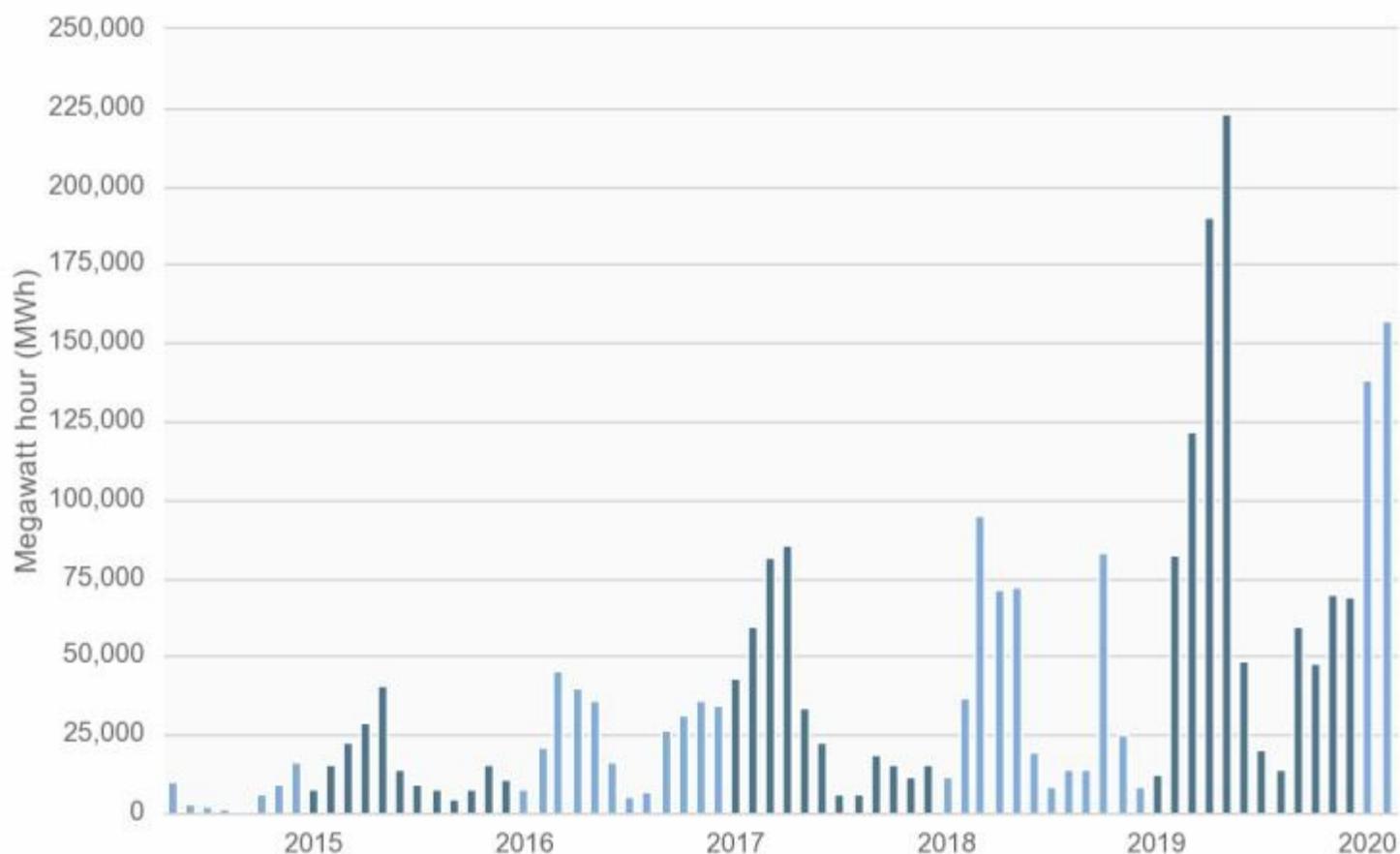
Like other regions, California has also seen more load-forecasting errors due to the lack of historical data on how a pandemic affects power consumption. It’s also dealing with the challenge of balancing a grid that has more solar power than any other state — a challenge that has increasingly led to curtailing that power during spring months when the output can exceed local or statewide demand.

California’s curtailment challenges

CAISO's renewables curtailments were already spiking before the COVID-19 pandemic hit. The grid operator curtailed 138,000 megawatt-hours of wind and solar in January of this year and 157,000 megawatt-hours in February. That compares to 12,700 megawatt-hours curtailed in January 2019 and 82,600 megawatt-hours in February of last year.

To be clear, curtailments have been rising every year, driven by growth in solar power to meet the state’s aggressive clean energy goals. California had more than 27,400 megawatts of solar as of the end of 2019, generating nearly 20 percent of the state’s electricity, according to the Solar Energy Industries Association.

Wind and solar curtailment totals by month



California also has about 6,000 megawatts of wind power, although this resource hasn't grown nearly as quickly over the past decade, and smaller amounts of hydropower, which can't be curtailed and produces most of its power in springtime. As of midmorning Thursday, renewables made up about 63 percent of CAISO's electricity supply.

California's solar power can't always be used when it's generated, however, particularly during sunny but mild spring days when air conditioning isn't spurring electricity demand. This drives CAISO's supply-demand curve downward from late morning to early afternoon, which creates the belly of the state's "duck curve" imbalance between power being generated and consumed.

CAISO has been warning of this imbalance for years and seeking ways to manage it. Options include exporting it to neighboring states and using the state's growing fleet of batteries to absorb it for discharge later in the day — although those only get the grid operator partway to correcting the imbalances on certain days.

Before curtailments begin, CAISO relies on falling energy market prices — which can sometimes drop into negative-price territory — to drive these transfers of power from low-price to high-price areas, or encourage generators that can control their output to ramp down production.

But if this doesn't drive enough reduction, CAISO begins to offer "decremental" bids that pay generators to reduce output. This "economic" curtailment, as CAISO terms it, makes up the vast majority of its needs and accounts for nearly all of the megawatt-hours curtailed so far this year.

If CAISO can't get enough supply reductions that way, it turns to cutting generators' self-

scheduled deliveries to the system. So far this year, CAISO has ordered 10,632 megawatt-hours' worth of self-scheduling cuts. And as a last resort, CAISO can order generators to go offline through what it terms “exceptional dispatch” orders — a step it hasn't yet taken this year, according to data through March 31.

The economic effects of these curtailment efforts on the state's solar fleet are hard to quantify because it depends on multiple factors, such as individual solar farms' contractual obligations for delivering power to utilities or other offtakers.

Some amount of curtailment may well be the more cost-effective choice if the other options are expensive transmission upgrades or energy storage investments to mitigate reductions that only happen during a small portion of the year.