

July 11, 2023

Contact: ISOMedia@caiso.com

New storage milestone reached for the California grid; more than 5,000 MW now available for dispatch

Ten-fold increase since summer of 2020 enhances reliability

FOLSOM, Calif. – An important milestone was reached recently when the California Independent System Operator (ISO) reported more than 5,000 megawatts (MW) of battery storage capacity online and fully integrated into the electrical grid.

Elliot Mainzer, the ISO's president and chief executive officer, said the 5,000 MW benchmark reached in early June reflects visionary leadership from California energy regulators and policy makers as well as hard work by staff at the ISO and storage developers. As of July 1, total battery storage on the grid had increased to 5,600 MW.

“With our state experiencing more frequent climate extremes such as record heat waves and droughts, it is essential to invest in innovative technologies like energy storage to make sure we can continue to reliably power the world’s 4th largest economy,” Mainzer said.

“Just three years ago, we had about 500 MW on the grid and this rapid growth of energy storage in California has significantly improved our ability to manage through challenging grid conditions.”

With one megawatt of electricity providing roughly enough power to meet the demand of 750 homes, 5,000 MW of lithium-ion battery capacity can provide enough electricity to power approximately 3.8 million homes for up to four hours before the batteries need to be recharged.

The batteries being added to the grid are charged during the day, when solar power is abundant, and dispatched primarily in the evening hours when demand is still high and the sun is setting and solar capacity diminishing. Batteries are also increasingly being paired with new or existing solar resources at the same location because such facilities can provide greater operational efficiency and flexibility.

Because batteries are fundamentally different from other resources and generally can only discharge for a few hours a day based on current technology, the ISO has worked closely over the past several years with industry representatives and other stakeholders to design market and pricing protocols that enable grid operators to fully utilize the batteries’ unique capabilities.

Batteries' state-of-charge, for instance, must be constantly monitored and verified to ensure power is available when needed. That requires market rules specifically designed to accommodate the behavior of a resources that was not part of the state's energy portfolio just a few years ago.

Pricing principles for battery storage resources are also fundamentally different, explained Gabe Murtaugh, storage sector manager in the ISO's Market Design group.

"A storage resource owner cares about the difference between the price energy was purchased at and the price energy was sold at, and not the specific price of the resource at either time," said Murtaugh. "In the future, when storage resources may often set prices, energy markets may need to set prices based on this 'spread,' which is very different from how markets function today."

Murtaugh added that "building tools to accommodate storage in our markets required significant modeling and software enhancements, which the ISO teams began work on years before significant storage capacity was built and functioning on the grid. That was challenging because it meant developing a model for a resource that really was not participating on the grid at the time. Our teams have also had to evolve these models as the needs of storage operators have become better defined through actual market participation."

[*From Idea to Reality - Battery Storage Comes of Age on the California Grid*](#), a video produced by the ISO in 2022, tells the story of this rapid influx. Since the summer of 2020, the ISO has seen a ten-fold increase in storage on the grid.

The major driver behind the influx has been a series of storage procurement orders authorized by the California Public Utilities Commission (CPUC) requiring regulated utilities to add storage to their portfolios. These orders also call for significantly more storage in the coming years.

"The CPUC's plans call for a buildout of more than 10,000 MW in aggregate storage capacity on the grid by 2026," Murtaugh explained. "This pace of adoption enhances reliability during the most challenging times of the day and helps ensure that new and existing solar resources are more effective on the grid."

Last summer, when record heat and demand put California's electric grid under an unprecedented amount of strain, batteries played an important role in maintaining reliability during the critical evening hours when solar is not available.

As Murtaugh explained, 5,000 MW of storage can serve roughly ten percent of load during the most stressful conditions on the grid and it can often provide greater than ten percent of load during peak periods.

In coming years, the ISO is expecting to see the emergence of new storage technologies as well as longer-duration storage resources that will be able to provide additional value to the grid.

“The storage fleet has been performing largely as planned,” Murtaugh said. “It has allowed us to dispatch additional power when it is most needed to help keep the grid balanced and the power flowing. We look forward to the further growth and technological diversification of this valuable new resource.”

#

California ISO | 250 Outcropping Way | Folsom, CA 95630 | www.caiso.com



The California Independent System Operator (ISO) is a nonprofit public benefit corporation dedicated, with its partners, to continuous improvement and secure operation of a reliable grid operated for the benefit of consumers.

It provides comprehensive grid planning, open and nondiscriminatory access to one of the largest networks of high-voltage transmission power lines in the world, and operates a \$9 billion competitive electricity market. Recognizing the importance of the global climate challenge, the ISO is at the forefront of integrating renewable power and advanced technologies that will help provide a sustainable energy future efficiently and cleanly.

The Western Energy Imbalance Market (WEIM) is a real-time wholesale energy trading market that enables participants anywhere in the West to buy and sell energy when needed. The WEIM Governing Body is the governing authority designed by regional stakeholders and has shared authority with the ISO Board of Governors to resolve rules specific to participation in the WEIM.