

Flexibility in California: the case for battery storage

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Fereidoon Sioshansi, Founder and President of California-based energy consulting service Menlo Energy Economics, discusses the implications of increased levels of battery storage on the grid in California.

As more variable renewable generation capacity is added to an electricity system, the demand for storage continues to rise. Wood MacKenzie predicts a 13-fold increase in utility-scale storage in the next six years alone. Independent market assessments commissioned by trade group Consortium for Battery Innovation (CBI) have concluded that the demand for batteries for energy storage will grow to 400,000MWhs by 2025. A recent Bloomberg New Energy Finance report, meanwhile, expects global investment in storage to reach \$848bn (£694bn) by 2050.

Not surprisingly, a lot of investment and innovation is taking place to bring new solutions to the market, and fast. The CBI, for example, is promoting collaboration to advance the state-of-the-art in both existing and emerging battery technologies.

Not only is storage critical when integrating large amounts of variable renewable generation but, more importantly, it could potentially replace expensive to operate and highly polluting natural gas peakers – but only if the costs come down substantially, the performance of the technology improves significantly, and preferably both. This idea is being put to test in California not only because of its famous “duck curve” challenge but also because it is trying to find ways to eventually phase out its existing natural gas fleet, which currently provides much of California Independent System Operator’s flexible ramping capability.

In early May, Southern California Edison Company (SCE) signed seven long-term contracts for big battery projects in the 50-230MW range, some with up to four hours of capacity, five of them co-located at utility-scale solar plants. All utilise lithium-ion batteries and are expected to come online in August 2021.

The 5 May issue of *CA Current*, an independent Californian news service, reported that the five hybrid projects use the solar plants’ existing interconnection agreements to the grid – which will merely be amended to reflect the storage

“Duck curve”

The description of a graph of power production over the course of a day, which shows the timing imbalance between peak demand and renewable energy production.

component. This saves time and effort relative to starting from scratch.

All new batteries are expected to do what they do best, namely to store the solar plants’ excess output during the sunny hours of the day while feeding the grid during the evenings’ peak demand hours, which occur after the sun has set. By doing this, the batteries contribute to SCE’s resource adequacy needs. California, which does not have a capacity payment scheme, nor high scarcity prices as in Australia, relies on a regulatory mandated mechanism to maintain adequate capacity.

The two stand-alone batteries with 352 and 288MWh of capacity already have interconnection agreements and can get on the job as soon as they are completed.

According to William Walsh, SCE’s Vice President of Energy Procurement & Management: “These new emissions-free projects will help us ensure the reliability of the grid for our customers and integrate an ever-increasing amount of clean renewable energy over the next decade.”

Last year, the California Public Utilities Commission (CPUC) identified potential reliability issues in the state’s electric supply resulting from:

- The retirement of aging natural gas plants.
- The increasing levels of solar and wind energy that are integrated into the system.
- The rising challenge of meeting the evening peak demand, the neck of the “duck curve”.

To address these issues, the CPUC has authorised the utilities and other load-serving entities to procure additional new clean energy and/or storage resources necessary to meet the state’s ambitious greenhouse gas emissions reduction targets by 2030 and eventual carbon neutrality by 2045.

This article originally appeared in June’s issue of Menlo Energy Economics’ EEnergy Informer publication.