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Energy Storage

Tesla, Greensmith, AES Deploy Aliso Canyon Battery Storage in Record Time

The companies collectively brought on-line more than 70 megawatts of energy storage in less than six months.

by Julia Pyper
January 31, 2017

When the Aliso Canyon natural-gas storage field experienced a catastrophic leak in October 2015, it created severe constraints on the electric grid that threatened to cause power outages across Southern California.

In January 2016, Gov. Jerry Brown declared a state of emergency. In May, the California Public Utilities Commission (CPUC) expedited the approval of around 100 megawatts of energy storage in Southern California Edison and San Diego Gas & Electric territories, in response to the Aliso Canyon blowout.

This week, the emerging energy storage industry proved that it could live up to expectations under challenging circumstances.

Tesla, Greensmith Energy and AES Energy Storage celebrated the completion on Monday of three large-scale lithium-ion battery projects totaling 70 megawatts -- consisting of 20 megawatts, 20 megawatts and 30 megawatts, respectively. The installations were brought on-line to address projected energy shortages from the Aliso Canyon gas leak, just six months since regulators issued the emergency storage tender.

While the gas storage field is primarily used to supply fuel for heating and cooking, a portion of the capacity is used to provide hourly peak electric generation demands, typically during summer. The battery installations are designed to absorb low-cost energy, typically from an

oversupply of solar power in the middle of the day, and feed it back into the grid as energy use spikes in the evening. The batteries can react quickly by providing a burst of power, or supply an even power output over several hours, depending on the California Independent System Operator's needs.

CPUC President Michael Picker said the battery projects were deployed with "unprecedented" speed and cooperation among stakeholders.

"I was stunned at the ability of batteries and the battery industry's ability to meet our needs," said Picker, speaking at the launch event yesterday for Tesla's battery system at SCE's Mira Loma substation in Ontario, California. "This was something I didn't expect to see until 2020. Here it is in 2017, and it's already in the ground."

"Energy storage can be part of the energy mix now"

In California, where renewable energy has become so cheap it's effectively a commodity, battery storage is adding value to the grid beyond addressing energy shortages, said Picker. Not only can storage extend renewable energy generation into the evening, but it can also provide services like load following and voltage support that help reduce the burden of renewables on the grid network.

"Storage is a piece that has been missing on the grid since...the grid was invented," said JB Straubel, chief technology officer for Tesla. "For 100 years, we haven't had a way to buffer electricity," he said, at least not in the way chemical storage allows.

But that's changing.

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SCE selected Tesla to build the Mira Loma Battery Storage Facility in a competitive bid in mid-September with a deadline to bring the project on-line by the end of the year. Tesla delivered, and CAISO commissioned the facility just 88 days after Tesla broke ground.

The 20-megawatt, 80-megawatt-hour installation is capable of powering 15,000 homes for a 4-hour period. The system is made up of two 10-megawatt systems, each containing 198 Tesla Powerpacks and 24 inverters. All of the battery components were engineered by Tesla from scratch, and manufactured at the Tesla Gigafactory in Nevada. “That’s part of how we were able to [construct] this site in such a fast response time,” Straubel said.

Straubel called the Tesla Powerpack a “different breed of battery” that’s built to last for 10 years, perform daily cycles and provide high power all from a single, compact turnkey system. The ability to provide self-contained units -- with the battery, control system, cooling and safety equipment built inside the casings -- is key to enabling the rapid deployment and scalability of energy storage, he said.

The Mira Loma installation is important “because it isn’t a pilot project,” said Kevin Payne, CEO of SCE. “It validates that energy storage can be part of the energy mix now.”

"Everything we've been saying is actually coming true"

The Aliso Canyon emergency tender was also validating for Greensmith Energy, which deployed a 20-megawatt, 80-megawatt-hour lithium-ion battery installation for SCE at the AltaGas Pomona Energy Facility. Greensmith has already installed more than 180 megawatts of energy storage around the country, but the grid-scale storage market is still nascent, said Mallory Sass, Greensmith’s director of marketing.

“For us, this shows that everything we’ve been saying is actually coming true and the grid-scale market is here,” she said. “This is definitely a good proof point for folks who may be a little cautious.”

The AltaGas battery project shows that Greensmith has established a reliable tier-one supply chain, Sass said. It also showcases the value of Greensmith’s software technology. “The software is not just a simple control of charge and discharge -- it’s much more robust than that; it’s about being the conductor to the entire orchestra,” she said.

Greensmith’s advantage lies in planning and operating the system from beginning to end, from how the project is modeled before any hardware is purchased, to monitoring the performance and safety of each individual battery cell, said Sass.

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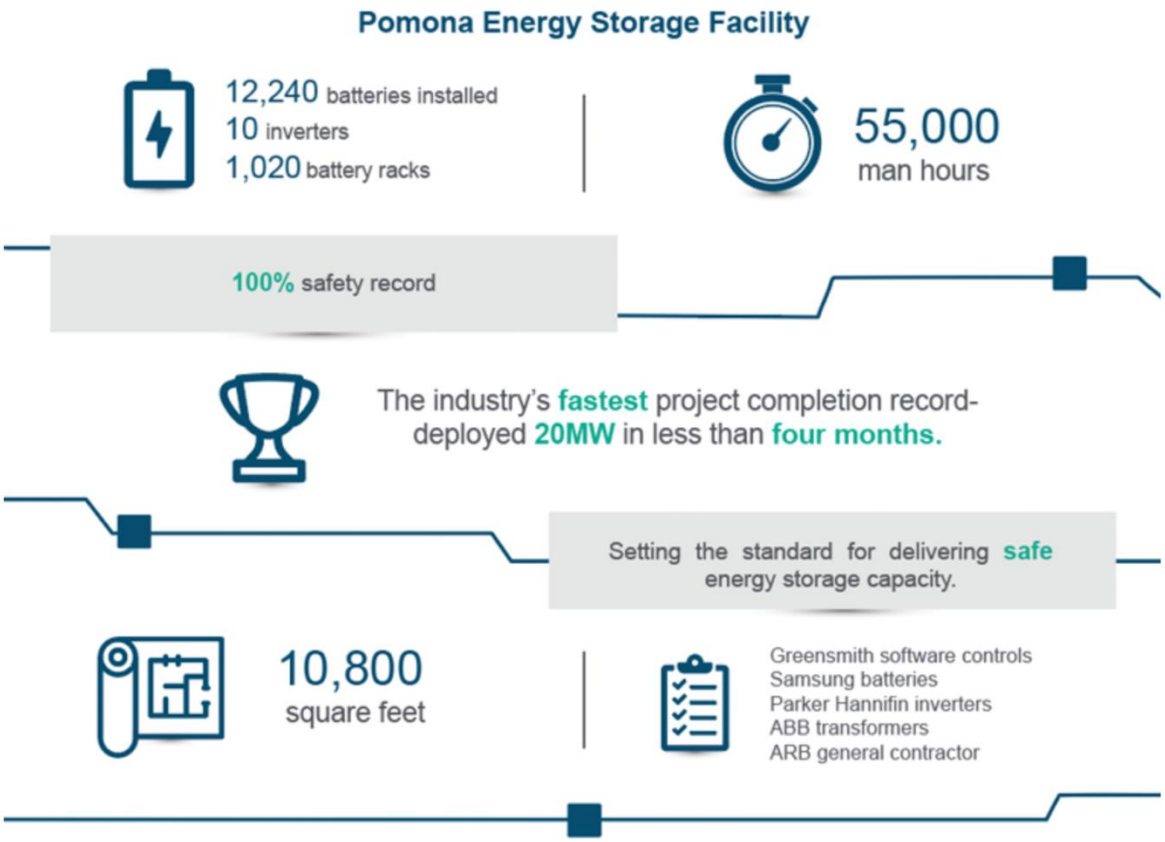

For AES, this week's energy storage announcement not only demonstrated the company's ability to deploy large-scale battery systems in record time, but it also set a new record for battery size. According to developers, the 30-megawatt battery installation at SDG&E's Escondido substation is currently the largest lithium-ion battery project in the world.

The installation is made up of two dozen 640-square-foot trailers packed with enough energy storage capacity to serve approximately 20,000 SDG&E electricity customers for four hours. While large for an energy storage project, the battery's footprint is relatively small. The Escondido project is installed on just one acre of land. For comparison, building 30 megawatts of solar capacity would require roughly 300 acres.

This type of energy storage project addresses the challenge of how to "put power capacity into dense urban areas where we need it, so we can support the kind of safe grid management we've come to expect," said John Zahurancik, president of AES Energy Storage, speaking yesterday at VerdeXchange in downtown Los Angeles.

"No reason we shouldn't double down"

Aliso Canyon sits in a particularly sensitive place on the Southern California electric grid. In 2013, before the gas leak, the CPUC required utilities to purchase up to 1,800 megawatts of energy resource capacity in the Los Angeles basin by 2021 -- including 50 megawatts of energy storage -- in response to the retirement of the San Onofre Nuclear Generating Station. SCE

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ultimately went well above the 50-megawatt target by procuring more than 250 megawatts of front-of-the-meter and behind-the-meter energy storage.

As part of that procurement, SCE awarded AES a contract to build a 100-megawatt energy storage project. When that project comes on-line in 2020, it will beat out the 30-megawatt AES battery brought on-line this week.

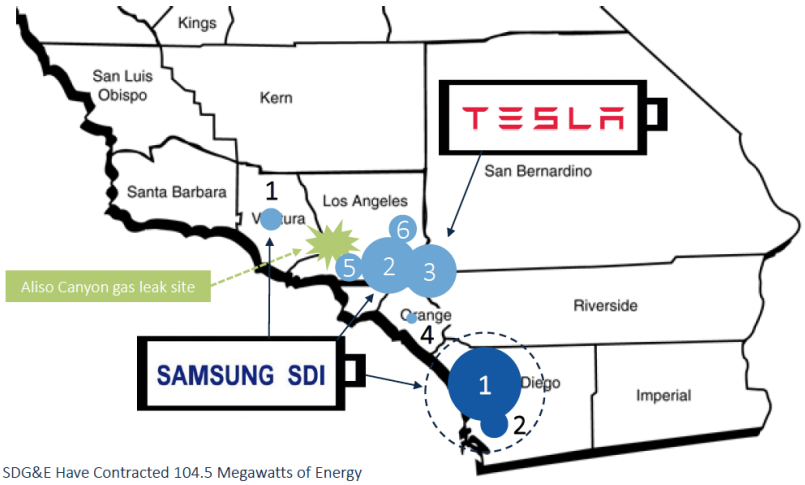
Large-scale battery projects aren't the only symbols of the storage industry's success, however. California utilities are also procuring smaller projects to meet grid needs, and to meet the CPUC's Aliso Canyon storage request. For instance, SCE has procured a 5-megawatt lithium-ion system from Western Grid and a 2-megawatt lithium-ion battery array from Powin Energy. AES has also built a 7.5-megawatt battery system at SDG&E's El Cajon substation.

According to GTM Research, the total Aliso Canyon energy storage procurement will amount to 104.5 megawatts, which is little less than 10 percent of California's overall mandate to build 1.3 gigawatts of energy storage by 2020. Representatives from SCE and SDG&E said yesterday that they have so far deployed 62 megawatts of storage and 37.5 megawatts of storage, respectively.

The Los Angeles Department of Water and Power, which is not governed by the CPUC, has procured 12.5 megawatts of energy storage associated with the Aliso Canyon leak to date.

"These projects have proven to be a successful litmus test for the energy storage industry," said Ravi Manghani, senior analyst at GTM Research. "By coming on-line in a matter of months from a policy resolution, and a matter of few weeks from finalized procurement, the industry has gained tremendous credibility for 'coming to the rescue' of the grid in such a short period."

Aliso Canyon Expedited Energy Storage Procurement Totals 104.5 Megawatts



SCE and SDG&E Have Contracted 104.5 Megawatts of Energy Storage As Part of Aliso Canyon Procurement

CA County Map Source: California Elections Website http://www.sos.ca.gov/elections/map/

Source: GTM Research

SCE Aliso Canyon Awarded Procurements

1. Western Grid Santa Paula, 5 MW/20 MWh
   On-line target Q1 2017
2. AltaGas-Greensmith Pomona, 20 MW/80 MWh
   On-line target Q4 2016
3. Tesla Ontario, 20 MW/80 MWh
   On-line target Q4 2016
4. Powin Energy Irvine, 2 MW/8 MWh
   On-line target Q1 2017
5. GE Center, 10 MW/4.3 MWh
   On-line target Q4 2016
6. GE Grapeland, 10 MW/4.3 MWh
   On-line target Q4 2016

SDG&E Aliso Canyon Awarded Procurements

1. AES Escondido 30 MW/120 MWh
   On-line target Q1 2017
2. AES El Cajon 7.5 MW/30 MWh
   On-line target Q1 2017

SCE Procurement	SDG&E Procurement
47 MW/4-hr. duration, 20 MW/25-min duration	37.5 MW/4-hr. duration
Multiple RFP winners	Single awardee
On-line 2016/2017	On-line 2017
New procurements ordered from CPUC	Procurements expedited from ongoing LCR program

GTM Research Based on SCE and SDG&E announcements and procurement websites

The deployments are also a big win for Samsung SDI, which provided batteries for both the Greensmith and AES projects. Tesla batteries are produced in partnership with Panasonic.

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While significant, the 100 megawatts of energy storage deployed in response to Aliso Canyon "is not a solution to all of the challenges," said Picker.

Last year, a reliability task force made up of California energy stakeholders determined that the Aliso Canyon crisis had directly affected 17 gas-fired power plants in the LA Basin generating roughly 9,800 megawatts, and indirectly affected 48 power plants generating roughly 20,000 megawatts. That represents an enormous challenge for the grid, but also a potentially large opportunity for energy storage.

On Monday, in conjunction with the battery storage celebrations, California Senator Henry Stern announced a legislative proposal to expedite the deployment of another 120 megawatts of energy storage Southern California.

"Last year's buildout of local, clean energy storage projects was completed in record time and under budget. There's no reason we shouldn't double down," said Senator Stern, in a statement. "We must pivot from the Porter Ranch crisis to a cleaner, safer, more affordable energy grid that benefits all Southern California ratepayers."

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