BURNS McDONNELL

CASE STUDY

Texas Trio Battery Energy Storage Facilities Address Grid Stability in West Texas Wind Resource Area

Three battery energy storage facilities in West Texas are helping stabilize the power grid with 60 megawatt-hours (MWh) of total energy capacity that now is available to help system operators manage grid operations in one of the country's most active wind resource areas. Dubbed the Texas Trio, these lithium-ion battery installations were successfully energized after an aggressive five-month construction schedule.

Challenge

As more solar and wind capacity is connected to the power grid in Texas, the need for alternative energy sources is growing in order to counter unstable conditions caused by fluctuations in renewable energy production. Battery energy storage systems (BESS) are becoming one of the primary options grid operators are turning to.

Three stand-alone BESS facilities installed near Odessa, Snyder and Sweetwater, Texas — each adding 9.9 MW and 20 MWh of capacity — were completed in five months during 2021.

Project Stats

Client
SER Capital Partners

Locations
Odessa, Texas
Snyder, Texas
Sweetwater, Texas

3
PROJECT SITES

29.7
MEGAWATTS CAPACITY

60
MEGAWATT-HOURS

23
CONTAINERS FOR THREE SITES

7
PCS INVERTER SKIDS

The project received a notice to proceed in March 2021 but immediately experienced a number of challenges, including maritime port congestion that delayed deliveries of batteries, inverters and other key pieces of equipment. Unseasonably rainy conditions during construction as well as unforeseen construction delays by the utility on the interconnection to the distribution system posed additional challenges for all three sites.

Solution

The BESS sites were picked for their close proximity to substations owned and operated by Oncor — the major regional utility serving the area — in order to optimize efficiencies and manage the costs of interconnecting the battery capacity to the area grid. The project owner, Sustainable Environmental Renewable (SER) Capital Partners had gained approval from the Electric Reliability Council of Texas (ERCOT) to construct the facilities and to utilize the Oncor substations to add the power to the grid. ERCOT is the transmission authority that manages grid operations serving more than 90% of Texas.

SER contracted with Oncor to add the necessary equipment and construct power lines to connect with the BESS facilities at all three locations. An integrated engineer-procure-construct (EPC) team from Burns & McDonnell coordinated all remaining overhead construction, including installation of overhead power lines, transformers and reclosers at the metered interconnection point.

The three BESS facilities utilize LG JH4 and JH3 lithium-ion batteries connected to EPC Power CAB1000 inverters for conversion of the DC power to AC. Automated control systems were provided by Emerson's Ovation platform to enable integrated monitoring and asset control. This open-source platform increases battery operational visibility and simplified overall system management. Project scope included setting the battery containers, inverters and inverter step-up transformers; installing battery protection units; loading battery modules; installing battery busbars and jumpers; interconnecting cables (including DC, 480VAC auxiliary power), communications and 12.47 kV distribution lines; and implementing a site controller.

***Figure 1:** Innovative installation equipment was custom-designed to meet an aggressive schedule for recently completed, large-scale battery energy storage projects in West Texas.*

As it became increasingly apparent that the scheduled in-service date would be challenging to meet, construction and engineering staff met to brainstorm new approaches that could streamline some of the repetitive installation tasks faced by crews in the field. The team came up with an innovative design for a custom battery module installation jig that enabled four modules to be combined and lifted as one unit into the container racks. Once the modules were placed into the jig, the crews used a forklift to lift and insert the modules into the battery rack, allowing bolts to be torqued into place to secure the unit. The jig was fabricated by AZCO, a construction division of Burns & McDonnell. Field construction was self-performed by Burns & McDonnell.

In addition, delays in the schedule for distribution line interconnections were offset when the team rented mobile diesel generators so that backfeed commissioning work could proceed. The auxiliary power provided by the mobile generators allowed cold commissioning of the batteries, control systems and inverters, a step that allowed the systems to connect and begin communicating so that they were working properly before energizing the equipment through the point of interconnect, or energized commissioning work began. Had this step been delayed until the interconnect was completed, the project would have been delayed by one to two months past the contractual deadline.

Results

All challenges were overcome due to innovative planning and new and creative approaches to executing construction in the field. Weather delays were addressed by weekend scheduling that rotated crews for extended periods, all while maintaining a priority of safety and adequate rest periods.

Among other innovations, the custom jig was responsible for saving hundreds of hours of installation time and allowing the team to get the overall project back on schedule.

All three sites were substantially completed only five months after crews were mobilized in March 2021. The key to project success was a fully integrated EPC team that was able to quickly transition to different project phases with the flexibility to pivot and adjust as deliveries were delayed or other phases of the schedule slipped behind. The ability to smoothly adjust schedules allowed the system to be properly transitioned from construction through commissioning so that all project sites were brought online and generating revenue by the promised completion date.

This successful installation at three noncontiguous sites, each with unique challenges for construction crews, illustrates the benefits of a coordinated planning, engineering, procurement, construction and commissioning effort enabled by the EPC delivery framework.

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