Case Study: Utility-scale Storage Developer

Performance Engineering & Reporting Eastern Texas

Location
Eastern Texas

Storage Project Sizes
100 MW / 2 hour

Stem Services
· Performance Engineering
· Performance Reporting

Scope
· State of Charge Balancing
· LFP Block Calibration
· Energy Management System Reevaluations
· ESREDP Recalculations

Wholesale Market
ERCOT

Stem Service Date
2021-2024

Bolstering technical asset management with Stem's Performance Engineering & Reporting Services

The Utility-scale Storage Developer behind a 100 MW / 2-hour storage project in ERCOT was eager to get to the bottom of why their Energy Storage Resource Energy Deployment Performance (ESREDP) calculation was showing more non-compliance than expected. With years of development history and a diversified portfolio including 10 GW in development across 25+ U.S. states and Canadian provinces, this Developer knew it needed a data-based approach to leveraging deeper expertise in technical asset management.

Stem's energy experts played a pivotal role in providing expert solutions and services in the successful completion of this storage project analysis. Using a consultative approach for Performance Engineering & Reporting, Stem investigated key areas before offering critical feedback for the Developer – including the tracked dispatch signals along with additional aggregate dispatch and automatic signals to get an accurate cumulative signal from the qualified scheduling entity. We then aligned dispatch with actual power flow at the point of interconnection to identify any mismatch events. Lastly, we dug down to the unit level to find that some units had reached their state of charge power derate level earlier than expected.

Challenge
The conclusion of Stem's initial data-driven investigation of why their ESREDP calculation showed more non-compliance than expected was due to two main reasons. The unbalanced DC blocks were reporting an incorrect state of charge leading to the rapid derating of discharge power available when unbalanced strings were dropping offline due to low state of charge. Also, the plant was unable to meet the power levels requested by dispatch, which lead to unwanted ERCOT charges and the potential of the plant's derating due to this shortfall. Knowing that rebalancing costs money and induces more cyclic aging, Stem worked with the Developer to identify the best solutions.

Solution
Using Stem's proprietary analytics software, Stem's experts were able to qualify and quantify problems to implement key solutions. First, we reevaluated and upgraded passive and active balancing routines. Second, we confirmed that the calibration for LFP blocks was being performed as intended. Third, we recalculated the actual power available in the energy management system. Fourth, we tracked and tested to ensure balancing and power availability calculations were happening correctly. And fifth, we worked with the EMS provider to optimize the dispatch signals distribution for participating units.

Results
Stem's data-driven approach to our Performance Engineering & Reporting Services resulted in numerous immediate improvements for the Developer including improved ESREDP calculations, improved state of charge balancing, and reduced 'offline' balancing or plant wide catch-up balancing. We acted as the force multiplier to the Developer's asset management team by bolstering more technical expertise for the long-term success of their project. Operational since Summer 2021, the project is currently one of the largest operational standalone lithium-ion battery energy storage projects in Texas and contributes to grid reliability by providing Ancillary Services, ECRS, FFR and energy in the Day-Ahead and Real-Time markets.