ELECTRIC POWER ENGINEERS

INTERCONNECTION STUDIES FOR BESS

EPE's Transmission Planning Empowers BESS Expansion in New England

Background

EPE worked with a large battery energy storage systems (BESS) developer as they sought to expand facilities along the East Coast. The company has developed over 6 GWh of energy storage projects in markets across the country, with many of its projects located in industrial areas or at old power plants. When needing to determine how its BESS projects would interact and impact the ISO-New England (ISO-NE) region, they turned to EPE.

Challenge

EPE was tasked with determining the thermal impact of the proposed BESS projects and their nearby queue projects, which could potentially stress the existing transmission infrastructure. The developer is facing the same congestion and bottlenecks as the rest of the industry, trying to work with a grid that has limited capacity to handle the influx of decentralized renewable energy sources. Having a partner like EPE, with technical expertise, regulatory knowledge, and capabilities to run ISO and interconnection studies, is crucial to designing and integrating into the power grid without undesirable effects on grid operations.

After reviewing the developer's initiatives and plans, EPE set out to conduct a cluster-based transmission analysis, which required a multi-faceted approach.

EPE'S TRANSMISSION PLANNING EMPOWERS BESS EXPANSION IN NEW ENGLAND

Approach

EPE analyzed 20 projects (4 study projects and 16 queue point projects) within the cluster to understand their collective impact on the grid. The team used publicly available data to identify projects based on the following criteria: (1.) Active projects, (2.) projects with ongoing or pending system impact studies, or (3.) projects injecting over 20 MW and located near the study projects. For the analysis, EPE used PowerGem's TARA tool and input files from ISO-NE's 2023 Transmission Planning Library, including files for different subsystems, monitoring, contingencies, and load adjustments.

Base Case Selections: Identify appropriate load flow base cases from the ISO-NE 2023 Transmission Planning Base Case Library.

Load Level Scenarios: Evaluate different load scenarios, specifically peak and shoulder load conditions, to simulate charging and discharging cycles.

Cluster Project Integrations: Include nearby queue projects within a 4-bus vicinity to accurately reflect the cluster's impact on the transmission network.

Thermal Analysis: Perform N-0 and N-1 thermal analyses to identify potential overloads or network deficiencies under normal and contingency conditions.

Mitigation Strategies: Re-dispatch generation resources to mitigate any thermal overloads and ensure network reliability.

Outcome

The comprehensive study delivered critical insights for the developer and identified several overloads that require network upgrades. EPE found multiple significant overloads, non-converged contingencies, and potential voltage stability issues.

EPE's analysis indicated that targeted transmission upgrades were needed to accommodate the developer's projects and used Security Constrained Dispatch to optimize generator outputs and Phase Angle Regulator adjustments, ensuring thermal loadings were within acceptable limits post-cluster integration.

Comprehensive planning and a partner with unmatched expertise in complex transmission analysis are critical to integrating new energy projects into existing transmission networks. By identifying and addressing potential overloads and bolstering network reliability, EPE remains a trusted and supportive partner for the developer as they continue expanding projects within ISO-NE.

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