ELECTRIC POWER ENGINEERS

Maximizing Energy Potential Through EPE's Short Circuit Duty Analysis

Background

A leading renewable energy storage company required a thorough short circuit duty (SCD) analysis to evaluate the impact of multiple renewable energy projects on critical substations within PG&E's service territory. These substations were expected to face increased fault current as Cluster 14 Phase II projects came online, making it essential to understand the effects of this additional load on the grid and circuit breakers. Without proper analysis, the increased short-circuit current could cause equipment like circuit breakers to become overstressed, potentially leading to failures, outages, and costly repairs.

The company enlisted EPE to conduct a comprehensive SCD analysis and deliver actionable insights to help maintain compliance, assess equipment capacity, and prevent potential grid instability.

Challenge

As the Cluster 14 Phase II renewable energy projects moved closer to connecting to the grid, the substations in PG&E's service territory were expected to experience a significant increase in short-circuit current. This posed the risk of overstressing the existing circuit breakers, leading to equipment failure, grid instability, and potential outages.

To understand and help mitigate these potential issues, a detailed analysis was required to determine how much stress each project would place on the system and identify which circuit breakers will be overstressed. Providing these insights was a critical component of the renewable energy company's proactive measures to protect assets, ensure safe operation and maintain a reliable power system.

MAXIMIZING ENERGY POTENTIAL THROUGH EPE'S SHORT CIRCUIT DUTY ANALYSIS

Approach

EPE began the SCD analysis by validating the short-circuit duty models to simulate fault conditions at the substations. Once the models were validated, EPE systematically evaluated each renewable energy project's contribution to the short-circuit duty.

By removing individual projects from the model and recalculating the fault currents, EPE was able to isolate each project's impact on the circuit breakers. This method allowed the team to identify which projects posed the greatest risk of overstressing the system.

In addition, EPE developed a detailed spreadsheet tool that displayed the cumulative impact of all the projects on each substation. The tool allowed the client to conduct further sensitivity analysis, enabling them to explore various scenarios and assess the potential impact of future project withdrawals.

Outcome

The SCD analysis uncovered several circuit breakers were at risk of overstressing. This insight was critical in helping the client take immediate action, prioritizing upgrades for the most vulnerable circuit breakers and ensuring the grid could safely manage the increased demand.

In addition to immediate upgrades, EPE's analysis allowed the client to take a more strategic approach. By pinpointing the projects contributing the most to short-circuit duty, the client was able to mitigate risks more effectively. EPE's customized spreadsheet tool gave the client the power to continuously monitor the impact of future interconnections and plan for expansions with confidence, knowing they could now anticipate potential grid issues.

Ultimately, EPE ensured these renewable energy projects could move forward at a crucial juncture. By providing the technical expertise needed to maintain grid stability and operational compliance, EPE played a key role in advancing the client's renewable energy goals. Their work not only addressed immediate concerns but also contributed to the client's long-term success in integrating renewables into the grid. Through these efforts, EPE is helping drive the energy transition forward, enabling a more resilient and sustainable power grid for the future.

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