ELECTRIC POWER RESEARCH INSTITUTE

Amherst Wind Energy Project Re-Study

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Prepared for:

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1 Executive Summary

This report summarizes a re-study of the Amherst Wind Energy Partners 35 MW wind plant. In the original study[1] the wind plant consisted of twenty-two, 1.65 MW squirrel-cage induction generators, each connected to a 34.5kV collection system. The project developer has since decided upon a different wind plant design, considering twenty-four Acciona 1.5 MW double-fed induction generators, each connected to the grid via a 12 kV collection system. The wind turbines are directly connected at 12 kV, and therefore require no step-up transformer.

Certain aspects of the original system impact study were re-evaluated, including:

- transient stability,
- short circuit, and
- flicker

The previous study did not identify additional thermal or voltage violations due to the wind project that were not pre-existing, and it is deemed unnecessary to re-evaluate the power flow analysis except to review the capability of the new wind turbine generators to meet the reactive power control range requirements of NSPI.

The dynamic analysis does not indicate any instability due to the wind plant operation. For all cases considered, the wind plant remains operational using the low-voltage ride through capability of the wind turbine. The results would indicate that no additional fast compensation (e.g., thyristor-switched capacitor) is required in order for the wind plant to ride-through normal system faults. The critical clearing time for faults at Amherst and Memramcook 138 kV are found to be approximately 30 cycles.

Maximum short-circuit results are provided illustrating the increase in fault currents seen at Memramcook, Maccan, Debert, Springhill, and Onslow due to the additional wind plant. The largest increase in fault current contribution from the wind plant occurs at Maccan during a 3-phase fault, with the wind plant providing an additional 6% fault current.

Normal and worst-case system short-circuit levels are considered when calculating the flicker induced on the system due to wind plant operation. Due to the relative size of the wind plant with respect to the short-circuit level at the 138 kV point of interconnection, the wind plant calculations illustrate negligible impact on system flicker levels (less than 0.04).

2 Stability Analysis

[redacted]

[1] Amherst Wind Energy Project System Impact Study: Final Report, January 11, 2006, EPRI Solutions.

[2] [redacted]