



**System Impact Study Report
Report GIP-IR372-SIS-R2**

**Generator Interconnection Request #372
24 MW Wind Generating Facility
Lunenburg County, NS**

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Transmission Planning
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Executive Summary

This report presents the results of a System Impact Study (SIS) for a proposed 24 MW wind turbine generating facility interconnected to the NS Power transmission system. Network Resource Interconnection Service (NRIS) and Energy Resource Interconnection Service (ERIS) are studied concurrently. The study performed analysis on the impact of the proposed development that would have on the NS Power grid. System studies, including short circuit, power factor, voltage flicker, steady state, stability, Bulk Power System analysis, under-frequency operation, low voltage ride through and loss factor was performed. NS Power and NPCC planning criteria were applied.

This wind facility will be interconnected to the 138 kV line L-6004 approximately 25.5 km from 43V-Canaan Rd. and 47.4 km from 90H-Sackville via a three breaker ring bus and a new 17 km spur line from the Point of Interconnection to the wind farm substation. A circuit switcher at the high side of Interconnection Customer's (IC) power transformer and protection systems acceptable to NS Power are required at the IC's Interconnection Substation. Although IR#372 is related to IR#379, this study only includes the impact of IR#372 on its own. The impact of IR#379 is the subject of a separate System Impact Study.

This study shows that low system short circuit level could be an issue with L-6004 open at 90H-Sackville end concurrent with low Valley generation. It is possible that the Short Circuit Ratio is below the minimum value recommended by the generator vendor for the model proposed. There are a number of uncertainties associated with transformer rating and control setting options to determine if IR#372 will be required to be restricted when the short circuit level is too low at the local Valley area under certain system configurations. The voltage flicker P_{st} for continuous operation under the same system configurations is within NS Power's required limit and IR#372.

It is noted that the transformer rating and impedance data was non-standard and could change the conclusions with respect to Short Circuit Ratio and voltage flicker. These calculations should be checked when transformer data is updated.

As long as the western valley transmission system is operated within historical limits, the addition of IR#372 does not adversely impact the thermal capacity of the NS Power transmission system. This result is different from the Feasibility Study primarily because of the recent significant reduction in system load in the Western Operating Region. The study did not identify any issues in either the steady-state or stability analysis that are attributable to IR#372. It is therefore concluded that the incorporation of the proposed 24 MW facility into the NS Power transmission system at the specified location has no negative impacts on the reliability of the NS Power grid provided the recommendations given in this report are implemented.

IR#372 was not found to cause issues with the stability of the interconnected system. IR#372 is not classified as part of the Bulk Power System, was found to comply with the Low Voltage Ride Through requirements, and remained on-line though simulated under frequency islanding events.

The Acciona AW3000 generators do not have sufficient reactive power capability to meet NS Power's requirements and will require supplementary sources. Based on the transformer data provided, it is estimated that approximately 5 Mvar of switchable capacitor banks are needed on the 34.5 kV bus.

There is no difference between NRIS and ERIS.

The total high level estimated cost for Interconnection Costs and Network Upgrades is \$10,817,500. The Facility Study will provide a more detailed cost estimate. All cost of associated facilities required at the Interconnection Customer's substation and generating facility are in addition to this estimate.