



# **Interconnection System Impact Study Report GIP – IR17**

## **Generator Interconnection Request # 17 100.5 MW Wind Generating Facility Lunenburg (L6004), NS**

Final Report

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Control Centre Operations  
Nova Scotia Power Inc.

## Conclusions and Recommendations

The interconnection customer has proposed to construct a 100.5 MW Generating Facility called South Canoe Lake Generating Facility (SCLGF), which is located at South Canoe, Lunenburg County. The interconnection customer has indicated that the SCLGF substation will tap to 138kV L6004 from 90H-Sackville and 43V-Canaan Rd substations. The SCLGF will consist of 67 wind-turbine driven generators each rated at 1.5 MW.

There are no voltage or thermal loading (include line ratings, line switches, relays, and metering ratings) problems in the NSPI power system near the proposed connection point for the pre-contingency situation with this plant added.

The 138 /69kV T61 and T62 transformers at Canaan Rd, and 51V-T1 transformer at Tremont substation are overloaded without SCLGF under some (N-1) conditions and this overload is increased with SCLGF. SCLGF will be required to be curtailed when the loading on T61 or T62 at Canaan Rd substation and 51V-T1 transformer at Tremont substation exceeds 110% of name plate rating in summer and 120% of name plate rating in winter during (N-1) contingencies.

The fault levels do not exceed the interrupting capabilities of the lowest rated breakers. Voltage flicker will not be a concern for this project.

Transient stability studies show that the main power system and the SCLGF remain stable for all examined fault conditions with acceptable damping. The SCLGF rode through the simulated system faults and recovery, assuming that the standard 'Low Voltage Ride Through' (LVRT) system is installed. The SCLGF will not ride through some normal criteria faults without the LVRT equipment.

There are no projects ahead of IR #17 in the Generation Interconnection Queue that will have a system impact on this project. This system impact study identified the following system additions or modifications required to satisfy NSPI reliability standards for the SCLGF Project:

- Construction of approximately 17 km of 138kV line from the existing 138kV L6004 line, between 90H-Sackville and 43V-Canaan Rd substations. The new line will utilize Dove ACSR conductors with an overall capacity of 174 MVA (summer) and 210 MVA (winter), which is the same as the rating of the existing line L-6004.
- Construction of a new substation at the tap point on L-6004 consisting of three 138kV breakers and associated switches in a ring bus arrangement at the tap point.
- Installation of associated control and protection systems.
- Installation of a communication system required for tele-protection for L-6004 and communication between the POI switching station and NSPI SCADA system and between the customer SCLGF substation and NSPI SCADA system.
- SCLGF will be required to be curtailed to keep transformers loading below 110% in summer or 120% in winter for any (N-1) contingency which results in 43V-T61 or 43V-T62 at Canaan Rd substation and 51V-T1 transformer at Tremont substation exceeding its nameplate rating by more than 110% in summer or 120%

in winter. The amount of curtailment will be a function of the extent of the overload.

The high level non-binding cost estimate for the required addition/changes to NSPI systems as shown above will be \$12,693,000.00 CAN as estimated by NSPI.

The requirements for the new generation to interconnect to the NSPI system are given in APPENDIX B. The wind turbines must have, but not be limited, to the following features:

- Dynamic VAR Control (Voltage and PF control).
- Power Curtailment.
- Expanded Power Capability to provide 0.9 lagging and 0.9 leading power factor at the machine terminals.
- Cold Weather package.
- Frequency trip settings and time delay settings must meet Figure 1 of A-03 NPCC's criteria document.
- At the "point of interconnection", LVRT with 15% voltage for 625msec at the 34kV side will be required.
- The voltage control is required for the Wind Farm as a whole using high speed static excitation systems.