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Final Report prepared for

Nova Scotia Power Inc.

System Impact Study
For
34 MW Pugwash Wind Generation Facility in Cumberland County, Nova Scotia

IR056

H-329425

August 18, 2008

Executive Summary

This report presents the results of a System Impact Study (SIS) for the Pugwash 34 MW wind generation facility generation project (IR056) that is proposed to be connected to the existing L-5058 69 kV line of the Nova Scotia Power Inc. (NSPI) transmission system. The objective of this study was to investigate the potential impacts of the proposed wind generation facility on the NSPI power system.

Accordingly, the SIS was carried out employing load flow, short circuit, transient stability and voltage flicker analyses. The study was performed according to the NSPI's GIP procedures and system planning criteria document.

Based on the study results, it is concluded that the incorporation of the proposed wind generation facility into the NSPI transmission system at the specified location has no serious negative impacts on reliability of the NSPI system. The following is a summary of findings and recommendations:

- The proposed IR056 wind generation facility does not cause any serious overloading for all simulated contingencies under different operating conditions. At the same time, it is noted that for the "Fall Peak max import" load conditions, the IR056 generation facility will cause about 15% overloading of the L-6513A line for the loss of two Lingan Units with the Aulac wind generation facility on-line in New Brunswick. This overload can be corrected through operational measures such as curtailment of IR056 during heavy import.
- No voltage violation occurs for the simulated contingencies. However, the dynamic model provided by Enercon for the plant voltage controller did not provide acceptable performance. Further studies are required when an updated model becomes available.
- The proposed IR056 wind generation facility meets the GIP reactive power requirements of 0.95 power factor (leading and lagging) at the Point of Interconnection. This evaluation is based on the understanding that the proponent will install two 12/16/20 MVA 69/34.5 kV transformers at the interconnecting substation.
- The existing Import SPS will be affected and its arming level needs to be revised. The cross-tripping scheme of the Import SPS should be moved from L-6513 line to the NS-NB border to keep the IR045, IR046 and IR056 generation facilities within the NSPI system in case NSPI and NB Power systems separate, but only if the Enercon units can be demonstrated to survive under-frequency conditions, which was not the case in this study. Further study is required when and updated Enercon model is available.
- The short circuit contribution of the IR056 generation facility will not create a requirement for breaker upgrades at 69 kV and 138 kV voltage levels.
- The system is transiently stable for all the simulated disturbance conditions.
- The proposed wind generation facility meets the Low Voltage Ride Through (LVRT) requirements for faults in the NSPI system.
- The proposed wind generation facility does not instigate any voltage flicker beyond NSPI's power quality requirements.

The preliminary cost estimate for the generation interconnection facilities is about CDN$ 2.66 million.