

Atlantic Wind Power Corporation - Pubnico Point
System Impact Study

Nova Scotia Power Inc.
Control Centre Operations
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1. Summary

This assessment was undertaken to determine the requirements and conditions for the interconnection of a 31MW wind generating facility proposed by Atlantic Wind Power Corporation (AWPC) at Pubnico Point. The proposed development includes seventeen 1.8MW wind turbines interconnected through the 69kV system (NSPI transmission line L5027) via 69 to 25kV dedicated interconnection substation.

The objectives of this report are to determine the impacts of this development on the local system and NSPI transmission system. It is also to define the changes required on both NSPIs system and to AWPCs facilities to permit interconnection and on-going operations

The key findings of this assessment are as follows:

- > NSPI must upgrade existing facilities in order to connect this customer. Protection systems will require upgrading at the 9W-Tusket substation. Transfer trips must be sent from 9W-Tusket substation to AWPC that trip the low voltage (25kV) reclosers in the event of an interruption to L5027. This also requires that communications facilities be added. The above additions are upgrades to NSPI facilities and will be carried out by NSPI but at-cost to AWPC via capital contribution and on an at-cost basis. This is outlined in section 5.2
- > To mitigate the voltage variations (sustained) that NSPI system and connected customers will be subjected to will require that flicker mitigation equipment be added by AWPC and that a different reactive power control strategy be employed than was initially proposed by the wind turbine generator (WTG) manufacturer (Vestas) This is discussed in section 4.1
- > Based on information provided by Vestas, equipment must be installed to control voltage flicker to within acceptable values. AWPC (and Vestas) will install flicker mitigation equipment necessary to meet the required flicker emission guidelines provided by NSPI. Metering of the AWPC facility must include a flicker meter, measuring flicker at the PCC, with real-time output provided to NSPI.. This is discussed in sections 4.1 and 4.3
- > For NSPI to be able to match provincial generation with load, and to facilitate maintenance and restoration of L5027, active-power (MW) control capability must be included in this development. This will be controlled through NSPIs automatic generation control system (AGC) and will be used, although infrequently, during abnormal operating conditions. This is discussed in section 4.4.
- > Without a load-tap changer (LTC), voltage regulation of the 25kV system will be inadequate. This is based on the requirements indicated by Vestas to control voltage at the terminals of the generators within 5% of nominal. The 69kV system will have sustained (steady-state) operation in the range of 105% to 92% of nominal. Without a LTC, AWPC may experience operability problems at times. Therefore a LTC is advised. This is discussed in section 4.2
- > Impacts on inter-provincial and inter-national tie lines were found to be minimal. However, at times that the NS-NB 345kV tie-line (L8001) is out of service, NSPI may curtail AWPC's operation periodically in order to manage flows between NS and NB by utilizing the active power control facility discussed above. This is discussed in section 6.3
- > AWPC will be connected through the 9W-Tusket terminal of L5027 and will not be connected through 30W-Souriquois. Should the connection between AWPC and 9W-Tusket become disconnected then AWPCs operation will be curtailed until the line is repaired. This is discussed in section 2.
- > High-speed generation rejection facilities must also be included to facilitate generation rejection of AWPC by NSPI. This facility will be used to directly trip the low voltage (25kV) or high-voltage (138kV) switchgear. The generation rejection scheme is a requirement of all significant generation facilities and may be placed into service at any time by NSPI to cater to any of number of events to enhance the capability or security of transmission systems. Rejection schemes are currently in service on several generators in Nova Scotia. This is discussed in section 4.4.

- > The off-frequency protective relaying settings provided by the WTG supplier must be adjusted consistent with reliability authority guidelines as discussed in section 6.1
- > Requirements of the interconnection facilities are provided in section 5 This contains a functional specification of the facilities to be added by NSPI and AWPC

2. Local Supply System

