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System Impact Study for MacLaren Energy Inc.'s OASIS No. 310046 – 25 MW, Five Year Transfer on the BCHA × BPAT Path

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Network Performance Planning Department
T&D Engineering

T&D ENGINEERING

Executive Summary

MacLaren Energy Inc. submitted a Completed Application to the BC Hydro Transmission & Distribution Engineering Business Unit (T&D) for Long Term Firm Point-to-Point transmission service under the Wholesale Transmission Service (WTS) tariff to transfer 25 MW on the BCHA × BPAT Path from 1 January 2004 to 31 December 2008.

This System Impact Study (SIS) identifies any system constraints and redispatch options, additional Direct Assignment Facilities or Network Upgrades required to provide the requested service. The base conditions for the study are BC Hydro's native load requirements from 2004 to 2008, and prior commitments, on the BCHA × BPAT Path including the pending WTS applications. Power flow, voltage stability and transient stability studies were performed to examine whether the MacLaren Energy Inc. transmission request can be accomplished in compliance with the BC Hydro, Western Systems Co-ordinating Council (WSCC), and North American Electric Reliability Council (NERC) reliability criteria. This System Impact Study only addresses the capability of the BC Hydro system and does not consider capabilities of adjacent systems.

The SIS concluded that the MacLaren Energy Inc. 25 MW transmission request from 2004 to 2008 can be accomplished in its entirety.

There are no Direct Assignment Facilities associated with this request for Transmission Service as this System Impact Study does not include an Interconnection Study.

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1. Introduction

MacLaren Energy Inc. submitted a Wholesale Transmission Service Application (WTSA) for 25 MW of Long-Term Firm Point-To-Point Transmission Service on the BCHA × BPAT Path for the period 1 January 2004 to 31 December 2008 (OASIS Request No. 310046).

Pursuant to the WTSA, BC Hydro T&D (T&D) determined that a System Impact Study is required for the Application.

Power flow and transient stability studies were performed to examine whether the MacLaren Energy Inc. transmission request can be accomplished in compliance with the BC Hydro, Western Systems Co-ordinating Council (WSCC) and North American Electric Reliability Council (NERC) reliability criteria.

2. Terms of Reference

A summary of the Terms of Reference is provided below.

(a) T&D will use its existing planning and operating criteria, standards and procedures which conform with WSCC Reliability Criteria, to determine necessary transmission system reinforcements and re-dispatch requirements.

(b) Specifically, the following studies will be done under this Study Agreement:
- Thermal, transient and voltage stability studies to determine the system capability to permit the 25 MW export.
- Identify system transmission constraints and any network upgrades.
- Analyze load shedding, generator shedding and re-dispatch options, tie-line transfer limit and network curtailment remedial action schemes required for the reliable operation of the inter-connected system.

(c) The study will assess the generation reserve issues as required by the WSCC.

(d) The above technical studies will be done for the following system conditions:
- The system configuration will be based on the resource allocations from the 10 year Recommended Resource Plan, network loads, and reserved and pending Long-Term Firm Point-to-Point Transmission service for the term of this request.
- High stress system conditions, including but not restricted to the freshet and winter peak load cases.
- If the transmission system is not capable of providing for the requested transmission service, then lower stress system conditions will be required to determine the present capability of the transmission system.

(e) The studies will not identify any constraints on neighbouring systems as it is the Transmission Customer's responsibility to ensure that any neighbouring utility limitations are addressed.

3. System Study Conditions

The base conditions for the study are the BC Hydro native load requirements and prior firm export and transfer commitments, including the pending WTS applications, on the BCHA × BPAT Path.

3.1. Resources for Transmission Request

The Point-of-Receipt (POR) on the BC Hydro transmission system is the BC Hydro Cheekeye Substation's 60 kV bus (CKY). The resource for the import is a new Independent Power Producer (IPP), which will be connected to CKY with a 10 km 60 kV line.

3.2. Transmission System Assumptions for Transmission Request

Transmission System assumptions for this Transmission Service request are contained in Appendix A.

4. System Requirements for Transmission Request

Planning studies were performed as per T&D's Transmission System Planning Criteria and Study Methodology.

No portions of BC Hydro's transmission system were adversely affected by this transmission request.

5. Conclusions

The System Impact Study concluded that, with the existing transmission system and committed transfers, the MacLaren Energy Inc. transmission request can be accomplished in its entirety.

There are no Direct Assignment Facilities associated with this request for Transmission Service as this System Impact Study does not include an Interconnection Study.

Appendix A.

Transmission System Assumptions for Transmission Request

A.1 Prior Uncompleted Firm Point-to-Point Requests

The prior uncompleted Firm Point-to-Point requests for Transmission Service during the period of this request are Transmission Requests # 254221, 273602, 291566, 293825, 299499, 309156 and 310037.

A.2 Modifications to the Power-Flow Base Cases

The following were included in the power-flow base cases:

- All existing Transmission Service reservations were included. However, since Counter-Flow Scheduling on a bi-directional path will not increase the amount of Firm Transfer Capability on the path, transfers have been set to zero with the following exceptions.
- The transfers for Transmission Requests # 72623, 254221, 291566, 293825, 299499, 309156, and 310037 are included.
- The Direct Assignment Facilities and Network Upgrades associated with the Transmission Request in Appendix A.1 was included.
- Resources added as per Resources for Transmission Request.
- The requested transfer is assumed to be on 5L51 and 5L52 only.

Appendix B.

System Requirements for Transmission Request

B.1 CKY to BCHA × BPAT Path

Several studies were conducted to

- Assess reactive requirements at light loads using load flow simulations.
- Assess the IPP response to fault located at the closest bus to the IPP.

B.1.1 Reactive Requirements

The first study used load flow simulations to ensure that the WSCC criteria for single contingency and the BC Hydro reactive power planning criteria are met. The reactive requirement restriction protects the high voltage cables in Metro area and the submarine cables to Vancouver Island from over-voltages after losing the intertie with the BPA.

Load flow simulations were performed after applying the most severe contingency, the loss of 5L51 & 5L52 which was followed by generation shedding, application of the Eastern RAS, and a complete separation from the BPA.

Voltages at the main buses were tabulated and verified against equipment ratings and criteria. The results met the criteria; however it highlighted the criticality of the reactors at the Cheekeye and Dunsmuir stations. Maintenance would have to be constrained to the winter because if reactors are not available voltages can get higher.

Additional studies have also shown that the system will continue to meet criteria if there is a reduction in the previous pending WTS requests and a corresponding reduction in Network Upgrades.

B.1.2 Transient Stability

Transient stability studies were performed to assess the generator response to faults. The generator was assumed to be connected to CKY 60 kV bus.

A 10 cycle, 3-phase fault was applied at the generator 60 kV bus. The fault was cleared and voltages, speed, angles and power were monitored at the generator.

The results, with a Power System Stabilizer, showed that oscillations were damped after 2 seconds.