BC Hydro

Open Access Transmission Tariff Effective: 09 December 2010 OATT Attachment G Page 1

ATTACHMENT G

Network Operating Agreement

This Network Operating Agreement (the Agreement), is made and entered into this _____ day of _____, 2__, by and between <u>(Customer)</u> (hereinafter referred to as the Transmission Customer) and BC Hydro. The Transmission Customer and BC Hydro hereinafter are sometimes referred to individually as "Party" and collectively as "Parties", as the context suggests below.

In consideration of the promises and mutual covenants and agreements herein contained, the Parties do agree as follows:

1. <u>Definitions</u>

Unless otherwise specified herein, capitalized terms shall refer to terms defined in the Transmission Provider's OATT (the Tariff). When the terms Load Responsibility, Regulating Margin, Most Severe Single Contingency (MSSC), Supplemental Reserves, Operating Reserves, and Spinning Reserves are used in this Agreement, the WECC definitions of those terms apply.

2. Purpose of Agreement

BC Hydro and the Transmission Customer agree that the provisions of this Agreement and the Network Service Agreement for Network Integration Service govern BC Hydro's provision of Transmission Service to the Network Customer. This Agreement requires the Parties to:

- 2.1 Operate and maintain equipment necessary for incorporating the Transmission Customer within BC Hydro's Transmission System (including, but not limited to, remote terminal units, metering, communications equipment and relaying equipment);
- 2.2 Transfer data (including but not limited to, heat rates, fuel costs, and operational characteristics of Network Resources, generation schedules for Network Resources, interchange schedules, unit outputs for redispatch required under Part III of the Tariff, voltage schedules, flows of real and reactive power, loss factors, switch status, breaker status, MW/MVAR flow on lines, bus voltages, transformer taps and other SCADA and real time data) between their respective control centers;
- 2.3 Use software programs required for data links and constraint dispatching;
- 2.4 Exchange data on forecasted load and resources necessary for planning and operation; and

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- 2.5 Address any other technical and operational considerations required for implementation of Part III of the Tariff, including scheduling protocol.
- 3. Integration and Control Area Requirements

The Transmission Customer shall:

- Provide all Ancillary Services itself, including those necessary to operate as a control area under applicable guidelines of the North American-Electric Reliability Council (NERC), the Western Electricity Coordinating Council (WECC) and the Northwest Power Pool (NWPP); or
- (b) Satisfy its control area requirements, including all Ancillary Services, by contracting with BC Hydro; or
- (c) Satisfy its control area requirements, including all Ancillary Services, by contracting with another entity which can satisfy those requirements in a manner that is consistent with Good Utility Practice and satisfies NERC, WECC and NWPP standards.

The Transmission Customer shall plan, construct, operate and maintain its facilities and system in accordance with Good Utility Practice, which shall include, but not be limited to, all applicable reliability standards as approved by the BCUC, all applicable guidelines of NERC, WECC and NWPP, as they may be modified from time to time, and any generally accepted practices in the region. This Agreement will be revised as necessary to incorporate changes to BC Hydro Control Area requirements.

- 4. Network Operating Committee
- 4.1 Membership The Network Operating Committee shall be composed of representatives from the Transmission Customers taking service under Part III of the Tariff and BC Hydro, or their Designated Agents.
- 4.2 Responsibilities The Network Operating Committee shall:
 - Adopt rules and procedures consistent with this Agreement and the Tariff governing operating and technical requirements necessary for implementation of the Tariff;
 - (b) Review Network Resources and Network Loads on an annual basis in order to assess the adequacy of the transmission network; and
 - (c) Obtain from BC Hydro its operating policies, procedures and guidelines for network interconnection and operation.

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5. Regulation and Frequency Response

The Transmission Customer shall meet its proportional share of Regulating Margin by either:

- (a) Purchasing Regulation and Frequency Response Services from BC Hydro pursuant to its Rate Schedule 05; or
- (b) Contributing or arranging to have a third party contribute generating resources to meet the Regulating Margin requirement for the current year as follows:

Regulating Margin Requirement = Transmission Customer's maximum Network Load in the previous year x 2%

A Transmission Customer that meets its proportional share of Regulating Margin by alternative (b) above shall also meet the requirements of Section 16 below.

6. Operating Reserve

- 6.1 The Transmission Customer shall meet its share of the Control Area's Operating Reserve requirements by either:
 - (a) Purchasing Operating Reserve Services from BC Hydro pursuant to Rate Schedules 07 and 08 or
 - (b) Providing or arranging to have a third party provide the Operating Reserve requirement.

A Transmission Customer that meets its share of the Control Area's Operating Reserve requirement by alternative (b) above shall also meet the requirements of Section 16 below. The Operating Reserve requirement is as specified by the applicable reliability standards as approved by the BCUC, and implemented by BC Hydro. In as much as BC Hydro is obligated to meet WECC's and NWPP's requirements, as they may be modified from time to time including the applicable BCUC approved Mandatory Reliability Standards, the Transmission Customer recognizes and agrees that its proportional share of the Operating Reserve requirement may change to reflect WECC and NWPP modifications.

6.2 In order to facilitate the use of Operating Reserve, the Transmission Customer that meets its share of the Control Area's Operating Reserve requirement by alternative 6.1(b) shall have available unloaded reserved firm transmission capacity at least equal to that Operating Reserve amount. Such transmission may be loaded with interruptible energy so that, upon interruption of the energy, Transmission Service is available to replace such energy from the Operating Reserve.

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In addition, the Transmission Customer shall restore Operating Reserve to the required level as promptly as practicable, but shall not exceed sixty (60) minutes from the time of the event necessitating the loading of the reserve.

7. Redispatch To Manage Transmission System Constraints

If BC Hydro determines that the redispatch of Network Resources (including reductions in purchases from outside of BC Hydro Control Area) to relieve an existing or potential Transmission System constraint is the most effective way to ensure the reliable operation of the Transmission System, BC Hydro will redispatch its and the Transmission Customer's Network Resources on a least-cost basis, without regard to the ownership of such resources. BC Hydro will apprise the Transmission Customer of its redispatch practices and procedures, as they may be modified from time to time.

The Transmission Customer will submit verifiable incremental and decremental cost data for its Network Resources, which estimates the cost to the Transmission Customer of changing the generation output of each of its Network Resources, to BC Hydro when submitting its preschedules. These costs will be used, along with similar data for any other Network Customers' resources, as the basis for least-cost redispatch for the next day's operations (or the next day's operations if the preschedule is submitted on a Friday or the day before a holiday). BC Hydro will keep these data confidential. If the Transmission Customer experiences changes to its costs during the following day, the Transmission Customer must submit those changes to BC Hydro's control centre. BC Hydro will implement least-cost redispatch consistent with its existing contractual obligations and its current practices and procedures for its own resources. The Transmission Customer is obligated to respond immediately to requests for redispatch from BC Hydro's control centre. The Transmission Customer may audit particular redispatch events at its own expense, during normal business hours following reasonable notice to BC Hydro. If such audit shows that Transmission Customer's resources have been redispatched in preference to lower cost alternatives for other than emergency reasons, the cost of the audit shall be borne by BC Hydro. Either the Transmission Customer or BC Hydro may request an audit of the other Party's cost data by an independent agent at the requester's cost.

8. Curtailability

BC Hydro reserves the right to curtail all or part of Transmission Service due to conditions which physically cause a reduction in the transmission path(s). Such conditions include, but are not limited to, forced outages of one or more elements of the transmission path, nomogram restrictions, and unscheduled loop flows.

Whenever possible and consistent with Good Utility Practice, loads will be curtailed based on load ratio share. When such conditions no longer restrict the capability of the transmission path, Network Integration Transmission Service will be resumed.

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9. <u>Maintenance of Facilities</u>

- 9.1 The Network Operating Committee shall establish procedures to coordinate the maintenance schedules of the generating resources and transmission and substation facilities, to the greatest extent practical, to ensure sufficient transmission resources are available to maintain system reliability and reliability of service. By 1 December of each year, the Transmission Customer shall provide to BC Hydro the maintenance schedules and planned outages of each Network Resource for the next year and update the information at least thirty (30) days in advance of the date specified for the forecasted maintenance outage. Such information shall include, but not be limited to, the expected time the unit will be separated from the system and the time at which the unit is available for:
 - (a) Synchronizing parallel operation;
 - (b) Loading; and
 - (c) If applicable, to be put on automatic generation control.
- 9.2 The Transmission Customer shall obtain:
 - (a) Concurrence from BC Hydro, at least seventy-two (72) hours before beginning any scheduled maintenance of its facilities; and
 - (b) Clearance from BC Hydro when the Transmission Customer is ready to begin maintenance on a Network Resource, transmission line, or substation (operated at 60 kilovolt and above).

The Transmission Customer shall immediately notify BC Hydro at the time when unscheduled or forced outages end. The Transmission Customer shall notify and coordinate with BC Hydro prior to reparalleling the Network Resource, transmission line, or substation.

- 9.3 Maintenance schedules will be posted on an electronic bulletin board.
- 10. Load Shedding
- 10.1 The Parties shall implement load shedding programs to maintain the reliability and integrity of the Control Area, as provided in Section 29 of the Tariff. Load shedding shall include:
 - (a) Automatic load shedding;
 - (b) Manual load shedding; and
 - (c) Rotating interruption of customer load.

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BC Hydro will order load shedding to maintain the relative sizes of load served, unless otherwise required by circumstances beyond the control of BC Hydro or the Transmission Customer. Automatic load shedding devices will operate without notice. When manual load shedding or rotating interruptions are necessary, BC Hydro shall notify the Transmission Customer's dispatchers or schedulers of the required action and the Transmission Customer shall comply immediately.

- 10.2 The Transmission Customer shall, at its own expense, provide, operate and maintain in service high-speed digital under frequency load-shedding equipment. The Transmission Customer's equipment shall be:
 - (a) Compatible and coordinated with the Transmission System load shedding equipment; and
 - (b) Set for the amount of load to be shed with frequency trips and tripping time consistent with BC Hydro requirements.

In the event BC Hydro modifies the load-shedding system, the Transmission Customer shall, at its expense, make changes to the equipment and setting of such equipment, as required. The Transmission Customer shall test and inspect the load-shedding equipment within 90 days of taking Long Term Service under the Tariff and at least once each year thereafter and provide a written report to BC Hydro. BC Hydro may request a test of the load-shedding equipment with reasonable notice.

- 11. Recognition of Power and Energy Flow
- 11.1 The Parties recognize that:
 - (a) BC Hydro's Transmission System is, and will be, directly or indirectly interconnected with Transmission Systems owned or operated by others;
 - (b) The flow of power and energy between such systems will be controlled by the physical and electrical characteristics of the facilities involved and the manner in which they are operated; and
 - (c) Part of the power and energy being delivered under this Agreement may flow through such other systems rather than through the facilities of BC Hydro.

The Network Operating Committee shall, from time to time as necessary, determine methods and take reasonably appropriate action to assure maximum delivery of power and energy at the points of receipt and delivery and at such additional or alternate points of receipt and delivery as may be established by the Parties.

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- 11.2 Each Party will at all times cooperate with other interconnected systems in establishing arrangements or mitigation measures to minimize operational impacts on each other's systems.
- 11.3 Each Party recognizes that a Party's proposed new interconnection or modification of an existing interconnection between that Party's system and the system of a third party, may cause adverse anticipated effects on the system of the other Party. The Party making such interconnection or modification shall minimize, or otherwise compensate for, adverse operational effects to the other Party's system.

12. Service Conditions

The Parties recognize that operating and technical problems may arise in the control of the frequency and in the flow of real and reactive power over the interconnected Transmission Systems. The Network Operating Committee may adopt operating rules and procedures as necessary to assure that, as completely as practical, the delivery and receipt of real and reactive power and energy hereunder shall be accomplished in a manner that causes the least interference with such interconnected systems.

A Transmission Customer interconnecting with BC Hydro's Transmission System is obligated to follow the same practices and procedures for interconnection and operation that BC Hydro uses for other Network Customer load and resources.

Where the Transmission Customer purchases Ancillary Services from third parties, the Transmission Customer shall have the responsibility to secure contractual arrangements with such third parties that are consistent with the Tariff, this Agreement and any applicable rules and procedures of the Network Operating Committee.

13. Data, Information and Reports

- 13.1 The Transmission Customer shall, upon request, provide BC Hydro with such reports and information concerning its network operation as are reasonably necessary to enable BC Hydro to operate its Transmission System adequately.
- 13.2 Scheduling hourly transactions from outside of BC Hydro Control Area, in whole megawatts, are prescheduled by voice or fax or electronically. Schedules can be changed no later than 20 minutes (or a reasonable time that is generally accepted

in the region and is consistently adhered to by the Transmission Provider) before the schedules go into effect.

The Transmission Customer shall notify BC Hydro of intended imports into the Control Area for the next normal business day(s) by voice or electronically no later than 10:00 a.m. (or a reasonable time that is generally accepted in the region and is consistently adhered to by the Transmission Provider) on the day prior. No later than

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2:00 p.m. (or a reasonable time that is generally accepted in the region and is consistently adhered to by the Transmission Provider) of each normal business day, the Transmission Customer shall finalize import preschedules by voice or fax or electronically. Such preschedules and forecasts shall include, as applicable:

- (a) Each import into or export out of the Control Area;
- (b) Each power purchase and sale from within the Control Area;
- (c) Losses;
- (d) Generation from each Network Resource;
- (e) Network Load at each point designated in Section 4 of the Specifications For Network Integration Transmission Service attached to the Service Agreement;
- (f) Regulation and Frequency Response requirement;
- (g) Spinning or Supplemental Reserve from each Network Resource;
- (h) Spinning or Supplemental Reserve purchase from BC Hydro or each third party;
- (i) The Transmission Customer's MSSC;
- (j) Available capacity from each Network Resource;
- (k) Transmission Service associated with each preschedule and forecast;
- (I) Incremental and decremental cost data for Network Resources; and
- (m) Other information, as required by BC Hydro.
- 13.3 Annual Forecast By 15 September of each year, the Transmission Customer shall update its load and resource forecast by providing BC Hydro with a non-binding forecast in a format specified by BC Hydro.
- 13.4 Monthly Forecast Five (5) days before the end of the month, the Transmission Customer shall update the forecast for the following month specifying purchase, generation, maximum demand, total monthly energy and Operating Reserve Services from BC Hydro or a third party.
- 13.5 The Transmission Customer shall telemeter to BC Hydro information including but not limited to watts, vars, generator status, generator breaker status, generator terminal voltage and high side transformer voltage, unless otherwise agreed.

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13.6 The Transmission Customer shall provide generating resource characteristics to BC Hydro as necessary to implement redispatch and constraint and reserve management.

14. Metering

- 14.1 Unless otherwise agreed the Transmission Customer shall be responsible for the cost of installing and maintaining revenue meters and communication equipment compatible with BC Hydro's meter reading system and facility standards. Revenue quality metering equipment and meters shall be installed at the high voltage bus at each point of interconnection between the Transmission Customer's facility and BC Hydro's system. The meters shall measure and record both real power (watts) and reactive power (vars) flow and line losses, if applicable, in both directions. Meters not installed at the high voltage bus or at the point of interconnection shall be adjusted for losses.
- 14.2 BC Hydro shall read or retrieve meter data on the first work day after the end of each billing cycle or such other date as may be required to carry out the provision of this Tariff. BC Hydro shall process the meter data and determine energy imbalances, accounting and billing using such meter data.
- 14.3 The meter owner shall test revenue meters for power deliveries made at 60kV and above at least once a year and within 10 business days after a request by the other Party. The other Party will be afforded the opportunity to be present during the meter test. For meters owned by BC Hydro, the Transmission Customer may request a meter test by calling the designated customer account representative of BC Hydro and shall pay for the cost of the requested test if the meter has been tested within the previous 12 months. The Parties present at the meter test shall estimate the amount of capacity and energy created during the meter test. The meter owner shall immediately repair, adjust or replace any meter or associated equipment found to be defective or inaccurate. An inaccurate meter is a meter that exceeds 2% of the calibrated standards.
- 14.4 BC Hydro shall adjust the recorded data to compensate for the effect of an inaccurate meter. Such adjustment shall be made for a maximum period of 30 days prior to the date of the test or to the period during which such inaccuracy may be determined to have existed, whichever period is shorter. No adjustment prior to the beginning of the next preceding month shall be made except by agreement of the Parties. Should any meter fail to register, BC Hydro shall estimate, from the best information available, the demand created, energy flow and var flows during the period of the failure. BC Hydro shall, as soon as possible, correct the Transmission Customer's bills affected by the inaccurate meter. That correction, when made, shall constitute full adjustment of any claim arising out of the inaccurate meter for the period of the correction.

15. <u>Communications</u>

15.1 The Transmission Customer shall, at its own expense, install and maintain a voice communication link for scheduling.

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15.2 A Transmission Customer contributing to Regulation and Frequency Response requirement and Operating Reserve requirements or securing the requirements from a third party shall, at its own expense, install and maintain telemetry equipment communicating between the generating resource and BC Hydro.

Requirements to Contribute to System Regulation and Operating Reserve 16.

The Transmission Customer who is not purchasing Regulation and Frequency Response and Operating Reserve Services from BC Hydro shall operate its generating resources in a manner similar to that of BC Hydro including following voltage schedules, free governor response, meeting power factor requirements at the point of interconnection with BC Hydro's system, and such other criteria as may be developed by BC Hydro or the Network Operating Committee. The Transmission Customer shall pay the cost of modification of BC Hydro's computer hardware and software to accommodate the Transmission Customer's contribution to Regulation and Frequency Response requirement and Operating Reserve. Any resources used by the Transmission Customer to meet its proportional share, whether the Transmission Customer's Network Resources or a third party's generating resources, shall meet the same requirements as BC Hydro's generating resources used to meet the Regulation and Frequency Response requirement and Operating Reserve requirements, including but not limited to, automatic generation control capability, ramp rate, and governor response, and are subjected to random testing, and if applicable, a monthly start-up test.

17. Assignment

This Agreement shall inure to the benefit of and be binding upon the Parties hereto and their respective successors and assigns, but shall not be assigned by either Party, except to successors to all or substantially all of the electric properties and assets of such Party, without the written consent of the other Party.

18. Notice

Any notice or request made to or by either Party regarding this Agreement shall be made to the representative of the other Party as indicated in the Network Service Agreement. This agreement is attached thereto as Appendix C.

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IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective authorized officials.

BC HYDRO

(TRANSMISSION CUSTOMER)

Ву:		Ву:	
Title:	Sec.	Title:	
Date:		Date:	

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