TRANSCANADA ALBERTA TO THE PACIFIC NORTHWEST TRANSMISSION PROJECT

WECC Phase 1 Rating Study

Study Plan

DRAFT

February 11, 2008

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1. Objective

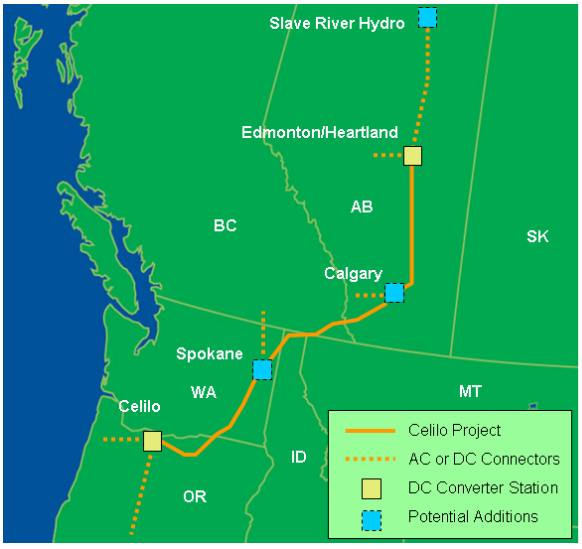
Perform the WECC Phase 1 Rating Study for TransCanada's Alberta to Pacific Northwest Project ("the Project") as follows:

- Identify a preliminary plan of service for the construction of a transmission path from Alberta to the Pacific Northwest with a potential capability of transmitting up to 2000 MW of resources between the two markets.
- Determine preliminary bi-directional non-simultaneous ratings for the Project.
- Coordinate with other proposed transmission projects in the Pacific Northwest, Canada and Northern California.
- Submit a comprehensive progress report for the Project to the WECC PCC and TSS committees for approval.

2. Background

The Project proposes to provide a High Voltage Direct Current ("HVDC") transmission path from Alberta to the Pacific Northwest. By interconnecting energy markets, the Project would enable development of clean forms of energy including hydro, nuclear, wind, dark fuel gasification with CO_2 sequestration and co-generation. This interconnection would link markets that are currently effectively isolated from each other and provide the opportunity for economic energy interchanges and mutual emergency (or low water year) support. The project would also provide incentives to develop large scale energy projects by providing access to adjacent markets for surplus energy. A map of the proposed project is shown in Figure 1.

Figure 1 – NorthernLights Project



The Project has been in development for approximately 5 years by TransCanada. Much of this activity has been focused on commercial discussions and technical feasibility/routing. The Regional Planning process was officially initiated, as per WECC process, with a letter, dated July 11, 2006, sent to all Planning Coordinating Committee ("PCC") and Technical Studies Subcommittee ("TSS") members. In response to this invitation a Regional Planning Review Group was formed and a meeting held on Sept. 22, 2006 in Portland, Oregon. Formal completion of this process is anticipated in February 2008. The Project is scheduled to be in service in Q4 2014.

Fort McMurray was originally chosen as the northern point of the Project due to the potential for significant co-generation development associated with expansion of the heavy-oil extraction and bitumen upgrading activities in the area. Recently, forecasts foresee that the upgrading activities are shifting from Fort McMurray to the Heartland area northeast of Edmonton. Planned expansions between Heartland and the Edmonton area also provide the means for generation in other regions of Alberta to access the Project. Based on these current market conditions, the northern terminal has been moved to the Heartland area with future connections to Fort McMurray, or further north, contemplated as required.

The proposed southern terminal will be in the area of BPA's Celilo converter station in northwest Oregon. From this point energy can enter the Pacific Northwest, be transferred further south to California, across the Cascades to the west coast of Washington and Oregon, or to the Mid Columbia trading hub. Intermediate converter stations could be located in southern Alberta and the area from Spokane to Selkirk to provide transmission service.

3. Subregional Study Coordination

The proposed Project will interconnect with two subregions within the Western Interconnection, namely Alberta and the Pacific Northwest.

TransCanada will conduct studies to address the system impacts and conditions for delivering 2000 MW of renewable resources dispersed throughout Alberta for delivery to Celilo, or importing up to 2000 MW from the Pacific Northwest to Alberta. The system impacts of interconnecting the Project within Alberta and the Pacific Northwest will be addressed by this Phase 1 Rating Study. Various stakeholders from Alberta and the Pacific Northwest will be consulted to determine which contingencies and study scenarios need to be considered in order to determine the system impacts of interconnecting the Project at various locations.

This Phase 1 Rating Study will also study the interaction between this Project and other proposed regional projects that intersect in the Lower Columbia region in the 2010-2015 timeframe. These coordinated studies will help define the proposed Project's plan of service, including the location of the northern and southern terminus of the Project.

4. Study Assumptions

- The expected in-service date of the Project is Q4 2014.
- The load and resource scenarios will be developed in collaboration with other stakeholders in Canada and the Pacific Northwest in order to achieve the desired transmission path flows over each section of the Project.
- The generation scenario for Alberta will be Scenario 2 from the Alberta Electric System Operators Long-Term Transmission System Planning outlook dated November 16, 2007. See Attachment 2.
- This study will take into account all WECC transmission reliability projects in the area that have WECC Phase II approval and that are scheduled to be operational by June 2014.
- Major path flows within the study area will be kept near their pre-project levels in the starting base cases as appropriate.
- A list of series compensation assumptions for the major EHV lines will be provided as necessary.
- Voltage criteria will be applied in accordance with the existing policies of the respective interconnected utilities or operating agents.
- The Project HVDC terminals at Heartland and Celilo will be rated for 2000 MW while the Calgary area converter will be rated for +/- 1000 MW normal capability (HVDC overload capability TBD). The HVDC lines will be rated for 3000 MW at extreme weather conditions.

5. Study Base Cases

Three base cases from the WECC Library compiled in 2007 will be used as the starting base cases for the Phase 1 Rating Study:

- **2015 Heavy Summer Base Case (2015HS1SA):**

  This base case will be used to model summer peak conditions with high north-to-south flows.

- **2017 Heavy Winter Base Case (2017HW1A):**

  This base case will model winter peak conditions with high south-to-north flows.

- **2011 Light Spring Base Case (2011LSP1SA):**

  This sensitivity base case will model spring off-peak conditions with high hydro generation and high north-to-south flows.

The major path flows in the three starting base cases are tabulated below:

Path	2015 Summer Peak	2017 Winter Peak	2011 Light Spring
Path 3 Northwest - Canada	2300 MW (n2s)	1000 MW (s2n)	500 MW (s2n)
Path 15 Midway - Los Banos	1923 MW (s2n)	3400 MW (s2n)	1069 MW (s2n)
Path17 Borah West	931 MW (e2w)	1522 MW (e2w)	1609 MW e2w)
Path 26 Midway - Vincent	509 MW (n2s)	1154 MW (s2n)	382 MW (n2s)
Path 65 PDCI	2000 MW (n2s)	962 MW (s2n)	1800 MW (n2s)
Path 66 Oregon - Northern California	3758 MW (n2s)	1915 MW (s2n)	2330 MW (n2s)
Path 73 North of John Day	6601 MW (n2s)	927 MW (n2s)	3155 MW (n2s)
Path 75 Midpoint – Summer Lake	294 MW (e2w)	531 MW (e2w)	1064 MW (e2w)
Path 76 Alturas Project	268 MW (n2s)	202 MW (n2s)	57 MW (n2s)

The Project model will be inserted into the starting base cases and resources, loads, and interchanges adjusted to achieve the desired Project path flow while maintaining existing paths in the study area near their levels in the starting WECC base cases.

Please note that the Alberta model portions of the above cases may need to be updated from those included in the WECC Library cases. TransCanada will work with the AESO to update and provide these models as required.

6. Study Scope

The following studies will be performed in order to determine the proposed plan of service and demonstrate the non-simultaneous rating of the Project.

6.1 Evaluation of HVDC Converter Station Locations

A high level analysis will be performed to determine the suitability of the locations chosen on the AC network to locate the HVDC converter stations. The proposed locations of the HVDC converter stations are Heartland (Alberta), Milo (Alberta southeast of Calgary) and Celilo (Oregon). The strength of the AC network and its capability to support HVDC converter stations at these locations will be evaluated, as well as the HVDC inverters' susceptibility to commutation failure during the transient period following the occurrence of faults on the AC network.

6.2 Power flow Study

Power Flow or Governor Power flow analysis will be performed for select transmission contingencies with the Project modeled at its proposed non-simultaneous rating in each of the three study base cases. Any impacts of the Project will be determined for the following conditions:

1. Category "A" - Normal operating conditions.

2. Category "B" - Select single facility outages of the existing system and various segments of the proposed Project.

3. Category "C" - Select multiple facility outages of the existing system and various segments of the proposed Project.

6.3 Dynamic Stability Analysis

Dynamic stability studies will be conducted with the Project modeled at its proposed non-simultaneous rating in each of the three study base cases to ensure that the transmission system remains in operating equilibrium through abnormal operating conditions after the Project is in operation. Disturbance simulations will be performed for a study period of up to 20 seconds to determine whether the Project would create any system instability during and following the selected contingencies. Select Category B and C (single and multiple) contingencies of the existing transmission system or of the Project itself will be evaluated.

6.4 Reactive Margin Analysis

A reactive margin analysis of the transmission system with the Project in service will be conducted in order to identify any reactive power deficiency or voltage instability due to the addition of the Project. Select Category "B" and "C" contingencies of the existing transmission system or of the Project itself will be evaluated for both dynamic and post transient voltage stability.

All power flow, dynamic stability, and reactive margin studies will be performed in accordance with applicable NERC/WECC Planning Standards and Reliability Criteria. Sensitivity studies will also be performed with other proposed regional transmission projects modeled in the Northwest and Canada in addition to the Alberta to the Pacific Northwest Project in the study base cases.

6.5 Plan of Service Alternatives and Sensitivities

Alberta Generation scenario to be used is Scenario #2 as outlined in the AESO Generation Scenarios. Details behind the scenario development can be found in Appendix 2 and at the link below.

http://www.aeso.ca/downloads/Nov_16_Long_Term_Transmission_Stakeholder_Presentation-_for_posting.pdf

The list of primary system configuration alternatives and sensitivity cases to be studied is as follows:

1. ***Heavy Summer #1:*** +/- 500 kV DCTL between Heartland, Milo and Celilo with HVDC converter station at Heartland, Milo and Celilo of 2000MW, 1000 MW and 2000 MW respectively. Alberta generation per AESO Scenario #2 with the 1800 MW Slave River Hydro project added. Scheduled flows to be studies include:

    a. Heartland importing or exporting 2000 MW from Celilo with zero interchange at Milo

    b. Heartland exporting 1000 MW and Milo exporting 1000 MW

    c. Heartland exporting 2000 MW and Milo importing 1000 MW with 1000 MW delivered to Celilo

2. ***Heavy Winter #1:*** Same physical configuration, resources and flows as #1 above.

3. ***Light Spring #1:*** Same physical and resource configuration as #1 above coincident with high hydro generation in northern California. The flow of 2000 MW from Celilo to Alberta with 2000 MW imported at Heartland or 1000 MW each imported at Heartland and Milo.

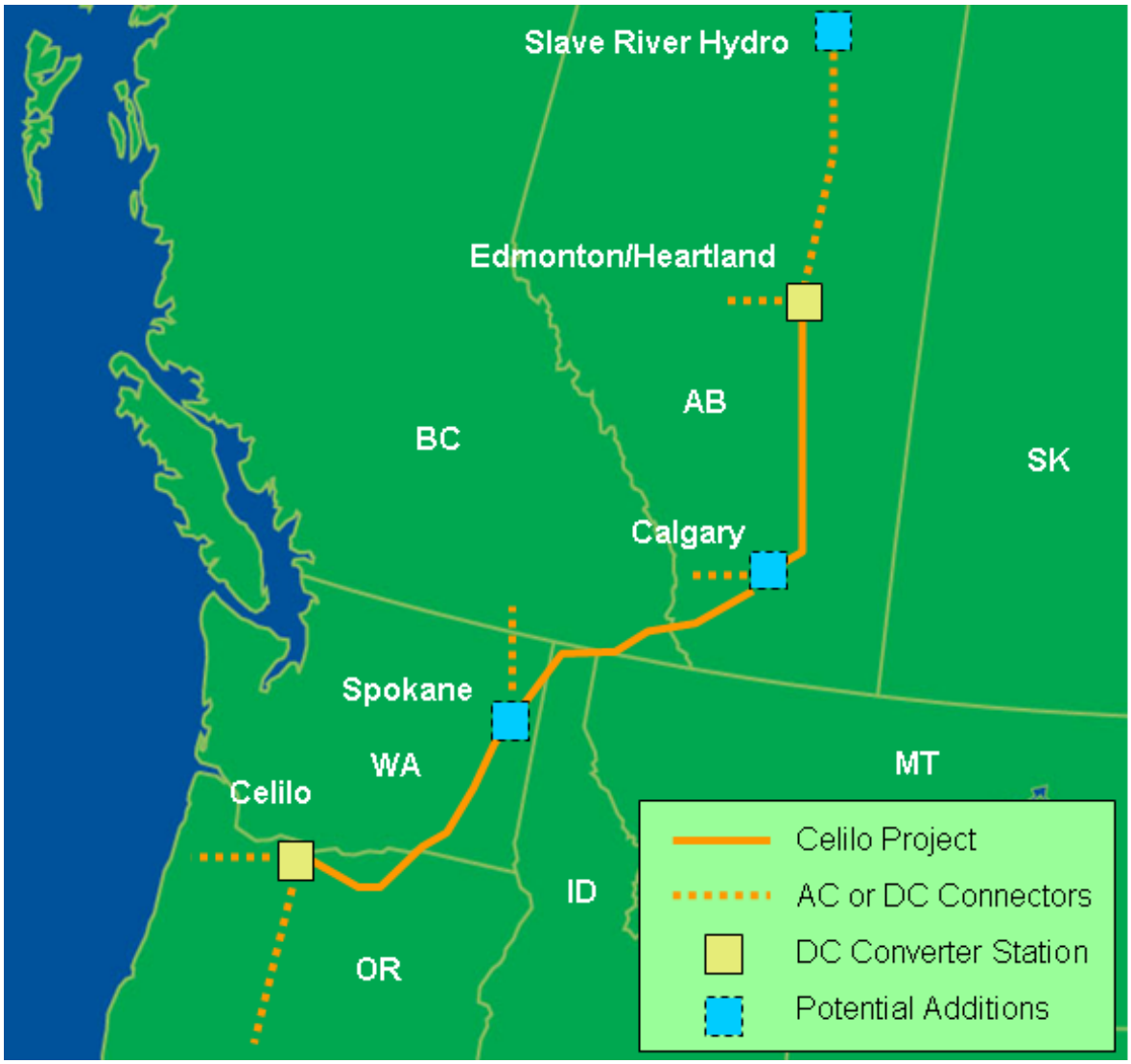
7. Study Schedule

	Activity	Complete By
1	Announce WECC Phase 1 and Form Study Teams	November-December 2007
2	Joint Big Tent Meeting (NW Projects)	January 24, 2008
3	Prepare and Finalize Study Plan	December 2007-January 2008
4	Prepare Base Cases	December 2007-February 2008
5	Pre-Project Case	March 2008

6	Technical Studies (Monthly Work Group Conference calls/Meetings)	April June 2008
7	Joint Big Tent Meeting(NW Projects)	June 2008
8	Draft Study Reports	July 2008
9	Comprehensive Progress Report (CPR)	July-August 2008
10	Joint Big Tent Meeting(NW Projects)	August 2008
11	Submit to (CPR) to PCC and TSS	August 2008

Attachment 1

Conceptual Project Plan



Attachment 2

AESO Long Term Transmission System Planning Presentation

(Including Generation Scenarios Development)

The following Table is from page 42 of the presentation. Scenario 2 will be used in this study.

Scenario	1	2	3	4	5
Genesee 4	450	450	450	450	
Keephills 4	450	450	450		450
HR Milner Expansion	450				
ENMAX 1200 MW			600	1,200	1,200
Cogeneration	1,760	2,260	1,760	1,760	1,760
Simple Cycle	600	600	400	300	
Wind (Installed) Effective	(1,600) 320	(1,600) 320	(1,600) 320	(1,600) 320	(3,400) 680
Major Additions	**4,030**	**4,080**	**3,980**	**4,030**	**4,090**
Common Additions	950	950	950	950	950
Total Additions	**4,980**	**5,030**	**4,930**	**4,980**	**5,040**