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September 9, 2021

Mr. Patrick Wruck
Commission Secretary and Manager
Regulatory Support
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

RE: British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Open Access Transmission Tariff (OATT)
Attachment C Amendments Application –
Methodology to Assess Available Transfer Capability

BC Hydro writes pursuant to sections 59 through 61 of the *Utilities Commission Act*, and in its capacity as Transmission Provider under the OATT, to seek the BCUC's approval to amend OATT Attachment C (**Attachment C**) - Methodology to Assess Available Transfer Capability (**ATC**). ATC determines the amount of transmission capacity that can be made available to OATT customers for purchase and use under the terms and conditions of the OATT.

The proposed amendments to Attachment C would:

- Address an OATT customer request that certain types of firm counterflows be included in the calculation of firm ATC for an ATC path. While this is currently contemplated in the BCUC approved mathematical algorithm for calculating firm ATC under Attachment C, BC Hydro's business practice has been that firm counterflows only add capacity to the calculation of non-firm ATC. Therefore, BC Hydro seeks an amendment to remove a potentially contradictory statement from Attachment C that is based on this business practice.
- BC Hydro also seeks further housekeeping amendments to Attachment C: (i) to include additional definitions that are part of the algorithm for firm ATC; (ii) to remove duplicated definitions; (iii) to remove the current Process Flow Diagram Illustrating ATC and ATC Calculation, and replace it with a reference pointer to the ATC methodology webpage that will have the latest updated process flow diagram; (iv) and to conform the language of Attachment C for consistency with the BCUC approved mandatory reliability standard MOD-029-2a.

The enclosed BC Hydro OATT Attachment C tariff pages would replace the current Attachment C in its entirety. A Draft Order for the adoption of the revised tariff pages relating to Attachment C is enclosed as Appendix A.

In keeping with the regulatory practice related to the OATT, BC Hydro confirms that it is seeking BCUC approval of amendments to the tariff provisions of OATT Attachment C only and is not also seeking approval of changes to its business practices or implementation documents. Changes to this documentation will be undertaken to provide detail regarding the inclusion of certain types of firm counterflows in the calculation of firm ATC for an ATC path, but do not require BCUC approval.

For further information, please contact Anthea Jubb at 604-623-3545 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,

Chris Sandve
Chief Regulatory Officer

df/ma

Enclosure

BC Hydro
Power smart

Open Access Transmission Tariff (OATT) Attachment C Amendments Application Methodology to Assess Available Transfer Capability (ATC)

September 9, 2021

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List of Appendices

1 Introduction and Background

1.1 Introduction and Structure of the Application

British Columbia Hydro and Power Authority (**BC Hydro**) files the Open Access Transmission Tariff Application (the **Application**) pursuant to sections 58 to 61 of the *Utilities Commission Act*, R.S.B.C. 1996, c. 473 (**UCA**) to seek approval from the British Columbia Utilities Commission (**BCUC** or **Commission**) to amend Attachment C; Methodology to Assess Available Transfer Capability (**ATC**)[1] of BC Hydro's Open Access Transmission Tariff[2] (**OATT or Tariff**).

BC Hydro proposes amendments to:

1. Enable Firm Counterflow schedules, as defined and discussed in more detail below, to create Firm ATC for sale under BC Hydro's OATT if certain conditions are met; and
2. Address additional housekeeping items in Attachment C.

Following this introduction section, the remainder of section 1 summarizes the British Columbia Power Supply (**BCPS**) request of BC Hydro to amend Attachment C of the OATT. Section 2 outlines the amendments to Attachment C of the OATT that BC Hydro seeks approval of in this application. Section 3 summarizes BC Hydro's jurisdictional review of the practices of other transmission providers regarding the calculation of ATC as impacted by Counterflows. Section 4 discusses BC Hydro's consultation efforts and Section 5 outlines the anticipated implementation costs and timing of system enhancements needed to implement the customer request

[1] Available Transfer Capability (**ATC**) is defined in the NERC Glossary of Terms (as approved in British Columbia) as follows: A measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses. It is defined as Total Transfer Capability (**TTC**) less Existing Transmission Commitments (**ETC**), less a Capacity Benefit Margin, less a Transmission Reliability Margin, plus Postbacks, and plus Counterflows.

[2] BC Hydro's OATT is available at: http://www.bchydro.com/about/planning_regulatory/tariff_filings/oatt.html.

discussed in section 1.3 below. BC Hydro also is providing the following appendices to this application:

- Appendix A is the proposed Draft Order;
- Appendix B is a "black-lined" version of Attachment C, showing the specific changes being sought, and a "clean" version of Attachment C, showing a complete version as amended;
- Appendix C provides four transmission bulletins that BC Hydro has posted regarding the proposed change to BC Hydro's practices in regard to enabling firm Counterflows to create additional ATC; and
- Confidential Appendix D includes excerpts from other transmission providers' ATC Implementation Document (**ATCID**)[3] that show their practices where Counterflows impact ATC. BC Hydro is filing Appendix D in confidence with the BCUC only due to its contents (ATCID excerpts of four utilities) as these documents are restricted behind the OASIS[4] firewall and can only be accessed by organizations that have an OASIS security certificate. The contents are not made publicly available by these utilities on their official websites.

[3] BC Hydro Transmission Scheduling Business Practices: https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-scheduling/business-practices.html.

[4] Open Access Same-time Information System (**OASIS**), a technology that enables registered users to purchase transmission service.

1.2 Available Transfer Capability allows BC Hydro to Commercialize Transmission Capacity under the OATT

ATC specifies the amount of capacity the BC Hydro Transmission System has on a particular ATC path[5] for sale to Transmission Customers under the OATT. More specifically, the ATC for any given ATC path (i.e., between the two endpoints of that path) shows the maximum incremental megawatts (**MW**) of transfer available to be contracted by transmission customers on that ATC path without violating specified reliability limits. ATC is made available to Transmission Customers, including BC Hydro, on OASIS for purchase and use under the terms and conditions of the OATT.

Attachment C sets out the mathematical algorithms used for the determination of ATC for an ATC path. These mathematical algorithms are dictated by the MOD-029-2a mandatory reliability standard (**MOD-029 Standard**) approved and in effect in B.C. ATC is the amount of transfer capability remaining in the transmission network available over and above committed uses. It is mathematically defined as the Total Transfer Capability less the Transmission Reliability Margin, less the Capacity Benefit Margin and less the sum of existing transmission commitments.

Section 2 of Attachment C sets out the mathematical algorithm used to determine ATC that is sold on a firm basis under the OATT (referred to herein as "**Firm ATC**"). This mathematical algorithm allows for "Firm Counterflows" to be included in the calculation of Firm ATC. More specifically when ATC is determined on a transmission path in a certain direction, such as North to South, energy scheduled in the opposite direction (referred to as "**Counterflows**"), such as South to North, creates additional ATC on the transmission path in the North to South direction on

[5] An ATC path is any combination of Point(s) of Receipt to Point(s) of Delivery for which ATC is calculated. BC Hydro currently has six ATC paths as set out in its Total Transfer Capability/Available Transfer Capability Business Practice for which calculations of available transmission capacities in both directions of flow between B.C.-U.S., B.C.-Alberta and B.C.-FortisBC are undertaken.

the transmission system. For illustration, assume the path from B.C. to U.S. has 1,000 megawatts (**MW**) of ATC for sale on OASIS for Hour Ending (**HE**) 01 (the time period starting from midnight and ending at 1:00 am). Then, if 200 MW of energy is scheduled for HE 01 on the U.S. to B.C. path, Counterflow in the amount of 200 MW is created in the opposite direction, on the B.C. to U.S. path, for total ATC of 1,200 MW.

BC Hydro notes that Counterflows are not expected to create additional Firm ATC between B.C. and the Alberta Electric System Operator as Firm Transmission on this path is limited to 480 MW as per Attachment C section 5 and BCUC Order No. G-102-09.

While the mathematical algorithm specified in the MOD-029 Standard, as further specified in Attachment C, allows for a transmission provider to include Counterflows in the calculation of its ATC for a particular path, it is up to a transmission provider to determine whether to do so.

While Attachment C provides the high-level mathematical algorithms to be used by transmission providers, transmission providers use Business Practices for more granular details of how the algorithms will be implemented for the various transmission service classes.

Section 4.5.1 of Attachment C currently provides that *"Firm Counter-flows will add capacity to the calculation of non-firm ATC in the Scheduling Horizon."* which means that Counterflows arising from energy scheduled on firm transmission will give rise to incremental ATC that is sold on a non-firm basis under the OATT ("**Non-Firm ATC**"). BC Hydro is changing this practice to now have certain Firm Counterflows give rise to incremental Firm ATC. BC Hydro proposes to delete this sentence (and not to

amend it) as this is more appropriately defined in its TTC[6]/ATC Business Practice (**ATC BP**) and BC Hydro's ATC Implementation Document (**ATCID**) as it is a more granular detail of how BC Hydro implements the algorithms in Attachment C. As discussed below, BC Hydro intends to make these amendments to its ATC BP and the ATCID once the amendments being requested herein are approved.

For clarity, BC Hydro confirms that it is not seeking approval of the changes to its Business Practices or implementation documents from the BCUC in this application, consistent with past practice. Further, the only change BC Hydro is seeking to enable Firm Counterflows to create additional Firm ATC is the deletion of the one sentence in section 4.5.1 of Attachment C as noted above. The other changes in Attachment C are housekeeping in nature and unrelated to this Business Practice change.

1.3 Background on BC Hydro's Counterflow Change

On April 30, 2021, BC Hydro, as Transmission Provider under the OATT, received a request from BC Hydro Power Supply (**BCPS** – a Transmission Customer under the OATT) to change the ATC BP and the ATCID to allow for firm energy schedules of the Canadian Entitlement on the U.S. to B.C. path to create Firm ATC on the B.C. to U.S. path (i.e., firm Counterflows) based on the fact that the Canadian Entitlement is viewed as "assured".[7] The BCPS proposal requested that the Transmission Provider consider the nature of the Canadian Entitlement and its deliveries of prescheduled energy as assured (i.e., that deliveries are from a firm generating resource on firm

[6] Total Transfer Capability (**TTC**) as defined in the NERC Glossary of Terms as approved in B.C.: The amount of electric power that can be moved or transferred reliably from one area to another area of the interconnected transmission systems by way of all transmission lines (or paths) between those areas under specified system conditions.

[7] The Canadian Entitlement refers to various articles of the Columbia River Treaty that set-out the downstream power benefits to which Canada is entitled. The Canadian Entitlement is a firm generation resource and the U.S. Entity is obligated to return the Canadian Entitlement to the U.S. border with Canada at prescribed points. BC Hydro is the Canadian Entity under the Columbia River Treaty.

transmission service from source to sink with full visibility to the Transmission Provider) and therefore can be relied upon as a firm Counterflow for the purpose of the Firm ATC calculation. A copy of the April 30, 2021 bulletin posting this request for comment is provided in Appendix C to this application.

BC Hydro, as Transmission Provider, requested feedback from other OATT customers on the proposal. BC Hydro received feedback from four customers – i.e., TransAlta Energy Marketing Corp, Capital Power, Powerex Corp. (**Powerex**) and Brookfield Renewable (Evolugen).[8] Powerex expressed support for the proposal, Brookfield Renewable (Evolugen) expressed general support of the proposal and sought further information; TransAlta Energy Marketing Corp submitted preliminary views and requested for clarification, and Capital Power opposed the proposal.

Specifically, Capital Power's concerns are related to the: (i) consistency of the proposal with other jurisdictions, (ii) potential service impacts to existing and prospective BC Hydro transmission customers arising from the sale of increased ATC and the potential for increased curtailments, and (iii) the potential lack of visibility leading to curtailment of Firm ATC and that may harm BC Hydro transmission customers as well as competition for this capacity.

BC Hydro published its response to customers in its July 30, 2021 bulletin in which it specifically addressed the concerns raised by Capital Power, among other things. BC Hydro has also provided a copy of that bulletin in Appendix C to this application. After considering the customer feedback, BC Hydro determined that it would proceed to take those steps necessary to enable Firm Counterflows that are "assured" to create Firm ATC, including amending Attachment C as discussed

[8] Copies of the customers' feedback is accessible as part of our July 30, 2021 Bulletin "Proposed Change to Counterflow – Decision": https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-scheduling/bulletins/2021/may-august.html#July30.

herein. However, to ensure comparable treatment under the OATT, this practice would not be limited to just Firm Counterflows of the Canadian Entitlement, as requested by BCPS. BC Hydro proposes that energy schedules will be "assured" so long as the deliveries meet the eligibility criteria to be defined in BC Hydro's Business Practices. Accordingly, BC Hydro has modified the ATC BP to implement this change and has posted it for customer comment on August 10, 2021, a copy of which is included in Appendix C to this application. BC Hydro will evaluate each request for Firm Counterflow to create additional Firm ATC on a case-by-case basis before additional Firm ATC is released to the market on OASIS. If the amendment to Attachment C is approved, BC Hydro will post its final amendment to the ATC BP (subject to customer comments received) and revise the ATCID to reflect and implement the change.

BC Hydro's proposal to allow for Firm Counterflows to create Firm ATC is consistent with the mathematical algorithms specified by the MOD-029 Standard as set out in Attachment C.

BC Hydro received positive feedback on our revised ATC BP from BCPS and Powerex, and received joint comments expressing some concerns from Capital Power, Evolugen (Brookfield Renewable), Heartland Generation Ltd., and TransAlta on BC Hydro's ATC BP.[9] BC Hydro addressed those specific concerns in our bulletin of September 7, 2021, which has also been included in Appendix C to this application.

[9] https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-scheduling/bulletins/2021/september-december.html#Sept7.1.

1.4 MOD-029 Alignment

In this application, BC Hydro is also seeking approval of a number of housekeeping changes in Attachment C to align it with the MOD-029 Standard.

In May 2011, BC Hydro applied to the BCUC to amend its OATT Attachment C to be consistent with the MOD-001-1a, MOD-004-1, MOD-008-1, MOD-028-1, MOD-029-1a. and MOD-030-02 mandatory reliability standards. Specifically, BC Hydro adopted the ATC methodology under the MOD-29-1a Rated System Path Methodology mandatory reliability standard in effect at that time. BC Hydro received BCUC approval of the amendments to OATT Attachment C on November 10, 2011, under Order No. G-185-11.

On October 1, 2017, MOD-029-1a was replaced by the MOD-029 Standard in B.C. by BCUC Order No. R-39-17. BC Hydro's additional proposed amendments to Attachment C are of a non-material, housekeeping nature. They are intended to align Attachment C precisely with the language and terminology as approved in the MOD-029 Standard, as more particularly described below.

1.5 Order Sought

In this application, BC Hydro is seeking an order pursuant to sections 58 to 61 of the UCA approving its proposed changes to the OATT Attachment C as described in the Application and reflected in the revised Tariff pages attached in Appendix B.

Clean and black-lined versions of the affected Tariff pages are included in Appendix B.

A draft form of the order sought by BC Hydro is included in Appendix A.

1.6 BC Hydro Maintains the OATT to be Comparable to FERC *pro forma* OATT

For BC Hydro's subsidiary, Powerex, to engage in wholesale electricity sales in the U.S. at market-based rates, Powerex is required by the U.S. Federal Energy Regulatory Commission (**FERC**) to demonstrate that its affiliated transmission provider (i.e., BC Hydro) has adopted and is implementing an OATT that is consistent with or superior to FERC's *pro forma* OATT, or otherwise is offering comparable, non-discriminatory access to its transmission facilities. The current BCUC approved Attachment C has been included in Powerex's prior filings to FERC regarding its market-based rate authorization.

BC Hydro is continuing to implement the ATC mathematical algorithms in the form and manner set out in the MOD-029 Standard. Since the proposed amendments align with the MOD-029 Standard, BC Hydro also confirms that its revised Attachment C, with the ATC BP and ATCID, is comparable or superior to the FERC *pro forma* OATT Attachment C requirements. The proposed amendment to delete the sentence in section 4.5.1 does not affect the comparability or superiority of Attachment C, because the sentence itself is not part of the FERC pro forma. Rather, as discussed in section 1.2 of this application specific detail and/or clarification on the implementation of the tariff is more appropriately accomplished through the business practices. As a result, BC Hydro submits that the proposed amendments to Attachment C are fair, just, and not unduly discriminatory.

1.7 Proposed Regulatory Process

BC Hydro requires approval of these proposed amendments by February 2022 to meet the customer's requested timelines. As a result, BC Hydro proposes the process for review of the Application include one round of information requests from both the BCUC and any registered interveners.

Table 1 Proposed Regulatory Review Process for the Application

Process	Date
Application Filed	September 9, 2021
BCUC and Intervener Information Request to BC Hydro	October 4, 2021
BC Hydro responds to BCUC and Intervener Information Request	October 28, 2021
BC Hydro Final Argument	November 12, 2021
Intervener Final Arguments	November 26, 2021
BC Hydro Reply Argument	December 3, 2021
BCUC Decision	February 18, 2022

In BC Hydro's view, the above regulatory review process will provide the BCUC and interested parties with the time required to review the Application.

2 OATT Attachment C – Amendments Sought

BC Hydro is proposing the following amendments to OATT Attachment C:

Section 1 (Definitions)

As part of the housekeeping amendments, BC Hydro is amending the Definition section of Attachment C to:

1. Remove duplicate definitions already defined in sections 2 and 4;
2. Amend duplicated definitions already defined in the North American Electric Reliability Corporation (**NERC**) Glossary of Terms as approved by the BCUC and adopted in B.C. BC Hydro proposes to create a pointer to the approved definitions to avoid duplicity. This approach will allow for effective definition management and avoid future changes to Attachment C when there are changes to the NERC Glossary of Terms that are adopted in B.C.; and

3. Remove definitions that are not used or referenced in Attachment C.

Section 2 (Description of Mathematical Algorithm Used to Calculate Firm and Non-Firm ATC)

BC Hydro has added the definitions for $Postbacks_F$ and $Counterflows_F$ under the Firm ATC formula that were missed in the 2011 amendments of Attachment C. Under the MOD-029 Standard, the Firm ATC formula includes definitions for $Postbacks_F$ and $Counterflows_F$. BC Hydro will now include those missing definitions under section 2 - Firm ATC formula and indicate that Postbacks and Counterflows are defined or specified in BC Hydro's Business Practices and ATCID, as shown below:

> $Postbacks_F$ are changes to firm Available Transfer Capability due to a change in the use of firm Transmission Service for that period, as defined in Business Practices.
>
> $Counterflows_F$ are adjustments to firm Available Transfer Capability as determined by the Transmission Service Provider and specified in their Available Transfer Capability Implementation Document (**ATCID**).

BC Hydro has also made a number of changes to the definitions in section 2 of Attachment C to align them with the MOD-029 Standard.

Section 3 (Process Flow Diagram Illustrating ATC and ATC Calculation)

BC Hydro proposes to modify the process flow diagram to:

- Ensure that the illustrative ATC formulas align with the formulas in Attachment C – section 2 and BC Hydro's ATC BP; and
- Ensure that the current business process is accurately reflected in the various steps through which ATC is calculated under various circumstances.

BC Hydro also proposes to remove the diagram from section 3 of Attachment C and to replace it with a hyperlink to BC Hydro's ATC Methodology web page with the latest updated process flow diagram, to ensure the most current version of the diagram is always presented.

Section 4 (Description of How Each ATC Component is Calculated for the Operating and Planning Horizons)

BC Hydro has made several minor housekeeping amendments to this section to align the formulas and definitions with the MOD-29 Standard and has also made the following amendments:

Section 4.2.2

Amending the algorithm used to calculate firm ETC (**ETC_F**) by adding Native Load Forecast (**NL_F**)[10] commitments to the calculation. NL_F is the firm capacity set aside to serve peak Native Load forecast commitments for the time period being calculated, to include losses, and Native Load growth, not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin. These amendments align with MOD-029 Standard, which is discussed in section 1.4.

Section 4.5.1

Remove the following sentence from Attachment C.

> ~~*Firm Counter-flows will add capacity to the calculation of non-firm A-TC in the Scheduling Horizon.*~~ *Counterflows are further described in the ATC Implementation Document posted on the Transmission Service Provider's website located at:*

[10] The load forecast for end-use customers that the Load-Serving Entity is obligated to serve.

https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/atc-methodology.html.

As discussed above, BC Hydro proposes removing the above sentence to allow for BC Hydro to specify how Counterflows will impact ATC in its Business Practices. BC Hydro intends to specify that Firm Counterflows can result in incremental Firm ATC per its ATC BP (further to eligibility requirements) and ATCID.

3 Jurisdictional Review

The ATCIDs of other Transmission Providers were reviewed to inform BC Hydro's consideration of this proposal. The review found that jurisdictions do and do not allow Firm Counterflows to create additional Firm ATC. For reference, excerpts of the ATCIDs of four jurisdictions that allow firm Counterflows to create additional Firm ATC are attached in Appendix D of this application. Note that these jurisdictions each have their own unique calculation and implementation approaches that reflect their circumstances. As such, these examples support BC Hydro's position that each transmission provider may determine how to best incorporate Counterflows into their calculation of ATC.

BC Hydro is filing Appendix D in confidence with the BCUC because its contents (ATCID excerpts of four utilities) are restricted behind the OASIS firewall and can only be accessed by organizations with an OASIS security certificate. The contents are not made available by these utilities on their public facing websites.

4 Consultation

BC Hydro consulted customers in response to the BCPS proposal as described above. As a result, and after considering the customer feedback provided, BC Hydro determined that it wished to take those actions necessary to enable all "assured" Firm Counterflows (i.e., and not just those Firm Counterflows arising from the scheduling of the Canadian Entitlement) to create additional Firm ATC for sale to customers under the OATT. BC Hydro also addressed all other customer concerns and questions raised and believes its proposed path forward reflects customer feedback.

While BC Hydro did not consult on the amendment to section 4.5.1 of Attachment C specifically, this specific change to Attachment C supports the broader amendments to enable the BCPS proposal. As a result, BC Hydro believes the implications of the amendment to section 4.5.1 of Attachment C was considered during our consultation.

The rest of the changes in Attachment C are housekeeping in nature and align Attachment C with the MOD-029 Standard. As a result, BC Hydro has not consulted on these amendments to Attachment C specifically; however, we have advised customers that this application is forthcoming.

5 Implementation, Costs, and Timing

The implementation cost consists of programming enhancements to our third-party business software to allow for Firm Counterflows to be included in the calculation of Firm ATC. This cost is estimated to be less than $50,000 USD, and these enhancements are expected to take approximately three months to implement.

6 Conclusion

Accordingly, BC Hydro believes that its proposed amendments to Attachment C are fair, just and not unduly discriminatory and are in accordance with the MOD-029 Standard and the FERC pro forma OATT. As a result, BC Hydro submits that its amendments to Attachment C be approved as filed in accordance with Sections 58 to 61 of the UCA.

7 Communications

All communications regarding this proceeding are to be addressed to:

Chris Sandve
Chief Regulatory Officer

BC Hydro
16th Floor
333 Dunsmuir Street
Vancouver, BC V6B 5R3

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e-mail: bchydroregulatorygroup@bchydro.com

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Open Access Transmission Tariff (OATT) Attachment C Amendments Application Methodology to Assess Available Transfer Capability (ATC)

Appendix A

Draft Order

bcuc
British Columbia
Utilities Commission

Suite 410, 900 Howe Street
Vancouver, BC Canada V6Z 2N3
P: 604.660.4700
TF: 1.800.663.1385
F: 604.660.1102

ORDER NUMBER
G-xx-xx

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

British Columbia Hydro and Power Authority (BC Hydro)
Open Access Transmission Tariff (OATT)
Attachment C Amendments Application –
Methodology to Assess Available Transfer Capability

BEFORE:
Commissioner
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

A. On September 9, 2021, BC Hydro, in its capacity as Transmission Provider under the OATT, submitted its OATT Attachment C Amendments Application (Application) pursuant to sections 58 to 61 of the *Utilities Commission Act*, seeking approval of amendments to Attachment C as follows:

   (i) To delete one sentence in section 4.5.1 of Attachment C to enable BC Hydro to address its amended practice to allow firm counterflow schedules to create firm available transmission capability (ATC) for sale under BC Hydro's OATT if certain conditions are met; and

   (ii) To address additional housekeeping items in Attachment C.

B. On May 30, 2011, BC Hydro, pursuant to sections 58 to 61 of the Act and in compliance with Order No. G-102-09 and the accompanying Decision, submitted an application to the Commission to amend Attachment C of the OATT to be consistent with the ATC methodology under the then approved MOD-029-1a Rated System Path Methodology;

C. On November 10, 2011, the Commission approved the amendments to OATT Attachment C under Order No. G-185-11;

D. On October 1, 2017, the Commission approved reliability-standard MOD-029-2a under Order No. R-39-17, which replaced MOD-029-1a;

E. On April 30, 2021, BC Hydro, as Transmission Provider under the OATT, received a request from BC Hydro Power Supply (BCPS), as a customer under the OATT, to change its TTC/ATC Business Practice and the ATC

Implementation Document to allow for firm schedules of the Canadian Entitlement to create additional firm ATC for sale to transmission customers under the OATT;

F. BC Hydro consulted with its Transmission Customers and determined that it would amend its business practice to allow any Transmission Customer to request that their firm transmission and associated energy schedules be considered assured deliveries such that their counterflow schedules will create firm ATC provided that they meet eligibility requirements defined in BC Hydro's business practice;

G. In order to effect this change, BC Hydro proposes to amend Attachment C of its OATT to remove the provision regarding the management of counterflows and to address its counterflow practices in a business practice

H. BC Hydro also proposes to amend Attachment C to make certain housekeeping amendments that are appropriate to align the provisions of Attachment C with the terms set out in the approved MOD-029-2a;

I. The Commission has reviewed the Application to amend Attachment C of the OATT and finds the amendments are warranted.

NOW THEREFORE pursuant to sections 58-61 of the *Utilities Commission Act*, the Commission orders as follows:

1. BC Hydro's proposed amendments to Attachment C of the OATT are approved and are effective as of the date of this Order;

2. BC Hydro will submit the amended OATT tariff pages for endorsement within 30 days of the date of this Order;

3. BC Hydro will publish a bulletin on its transmission website notifying customers of this decision within 15 days of the date of this Order;

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

Attachment Options

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Open Access Transmission Tariff (OATT) Attachment C Amendments Application Methodology to Assess Available Transfer Capability (ATC)

Appendix B

OATT Attachment C
Black-lined and Clean

Attachment C

Methodology to Assess Available Transfer Capability

This Attachment C outlines the Transmission Service Provider's methodology for determining Available Transfer Capability.

1. Definitions

~~**1.1 Available Transfer Capability (ATC)** – The amount of transfer capability remaining in the transmission network available over and above committed uses. Mathematically, ATC is defined as the Total Transfer Capability less the Transmission Reliability Margin, less the Capacity Benefit Margin and less the sum of existing transmission commitments.~~

1.1 Available Transfer Capability (ATC) – As defined under the Commission approved NERC Glossary of Terms[1].

1.2 Capacity Benefit Margin (CBM) – ~~The amount of transmission transfer capability reserved by load serving entities to ensure access to generation from interconnected systems to meet generation reliability requirements~~As defined under the Commission approved NERC Glossary of Terms.

~~**1.3 Counter-flows –** The scheduled energy values utilizing either a firm or non-firm transmission service on the opposite path for which ATC is being calculated.~~

~~**1.4 Existing Transmission Commitments (ETC) –** Committed uses of the Transmission Service Provider's transmission system when determining ATC.~~

~~**1.5 Firm Existing Transmission Commitments (ETC_F) –** As defined in section 4.2.2 of this Attachment C.~~

[1] NERC Glossary of Terms available under *Compliance Information* at Mandatory Reliability Standards | British Columbia Utilities Commission (bcuc.com).

~~**1.6 Non-Firm Existing Transmission Commitments (ETC_{NE}) –** As defined in section 4.2.3 of this Attachment C.~~

1.3 Native Load - As defined under the Commission approved NERC Glossary of Terms.

~~**1.7**~~**1.4 Operating Horizon –** The period of time that begins at the end of the Scheduling Horizon and extends through 168 hours.

~~**1.8**~~**1.5 Planning Horizon –** The period of time that begins at the end of the Operating Horizon and extends through the end of the posting period~~.~~ (current month plus 12 months).

~~**1.9 Postbacks –** Changes to firm ATC due to a change in the use of transmission service for that period.~~

~~**1.10**~~**1.6 Scheduling Horizon –** The period of time that begins with the current hour and extends out one hour.

~~**1.11 Total Transfer Capability (TTC) –** The amount of electric power that can be transferred over the interconnected transmission network in a reliable manner while meeting all of a specific set of pre-~~As defined ~~pre- and post-contingency system conditions.~~

~~**1.12**~~**1.7 ~~Transmission Reliability Margin (TRM) –~~** ~~The amount of Total Transfer Capability necessary to ensure that the interconnected transmission network is secure~~ under ~~a possible range of uncertainties in system conditions.~~the Commission approved NERC Glossary of Terms.

ACCEPTED: _____

ORDER NO. _____

_____
~~ACTING~~ COMMISSION SECRETARY

~~**1.13 Transmission Service Provider –** BC Hydro as the entity that administers the OATT and provides transmission service to transmission customers under applicable transmission service agreements.~~

~~**1.14 Transmission Service Request (TSR) –** a request for transmission service submitted pursuant to the Transmission Service Provider's OATT.~~

2. Description of Mathematical Algorithm Used to Calculate Firm and Non-Firm ATC

The Transmission Service Provider uses the Rated System Path Methodology as prescribed in the North American Electric Reliability Corporation (**NERC**) mandatory reliability standard MOD-029-2a - Rated System Path Methodology, as approved by the Commission in British Columbia (or any approved successor standard) (**MOD-029 Standard**) , in the assessment of firm and non-firm ATC for all ATC ~~Paths~~paths in the Scheduling Horizon, Planning Horizon, and Operating Horizon. ATC is calculated using software which uses variable parameter settings and calculation adjustments to establish formulas for the various firm and non-firm ATCs consistent with the mathematical algorithms used by the Transmission Service Provider.

The mathematical algorithms for firm and non-firm ATC consist of the following ~~general~~ formulas:

For Firm ATC (ATC_F)

$ATC_F = TTC – ETC_F – CBM – TRM + Postbacks_F +$ ~~Counter-flows~~ $_F$ Counterflows$_F$

Where:

ATC_F is the firm Available Transfer Capability for the ATC ~~Path~~path for that period.

TTC is the Total Transfer Capability of the ATC ~~Path~~path for that period.

ETC_F is the sum of existing firm ~~Transmission~~ commitments for the ATC ~~Path~~path during that period.

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CBM is the Capacity Benefit Margin for the ATC ~~Path~~path during that period.

TRM is the Transmission Reliability Margin. It is the amount of transmission transfer capability necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the ~~ATC Path during~~inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change as per the Commission approved NERC Glossary of Terms.

Postbacks$_F$ are changes to firm Available Transfer Capability due to a change in the use of firm Transmission Service for that period~~.~~, as defined in Business Practices.

Counterflows$_F$ are adjustments to firm Available Transfer Capability as determined by the Transmission Service Provider and specified in their Available Transfer Capability Implementation Document (**ATCID**).[2]

Non-Firm ATC (ATC$_{NF}$)

$ATC_{NF} = TTC – ETC_F – ETC_{NF} – CBM_S – TRM_U + Postbacks_{NF} +$
~~Counter-flows$_{NF}$~~ Counterflows$_{NF}$

Where:

ATC$_{NF}$ is the non-firm Available Transfer Capability for the ATC ~~Path~~path for that period.

TTC is the Total Transfer Capability of the ATC ~~Path~~path for that period.

ETC$_F$ is the sum of existing firm ~~Transmission~~ commitments for the ATC ~~Path~~path during that period.

ETC$_{NF}$ is the sum of existing non-firm ~~Transmission~~ commitments for the ATC ~~Path~~path during that period.

[2] ATCID available at: https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/atc-methodology.html.

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CBM$_S$ is the Capacity Benefit Margin for the ATC ~~Path~~path that has been scheduled during that period.

TRM$_U$ is the Transmission Reliability Margin for the ATC ~~Path~~path that has not been released for sale (unreleased) as non-firm capacity by the Transmission Service Provider during that period~~.~~

Postbacks$_{NF}$ are changes to non-firm ~~ATC~~Available Transfer Capability due to a change in the use of Transmission Service for that period, as defined in ~~the Transmission Service Provider's ATCID.~~ Business Practices.

Counterflows$_{NF}$ are adjustments to non-firm ~~ATC~~Available Transfer Capability ATC as determined by the Transmission Service Provider and specified in ~~the Transmission Service Provider's~~its ATCID.

The components of the above formulas are further described in detail in this Attachment C. The specific mathematical algorithms are further described in the Transmission Service Provider's ATCID, Transmission Reliability Margin Implementation Document (**TRMID**)[3] and the TTC/ATC Business Practice webpages posted on ~~the Transmission Service Provider's website at: http://transmission.bchydro.com/transmission_scheduling/business_practices/.~~bchydro.com.

[3] TRMID available at: https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/atc-methodology.html.

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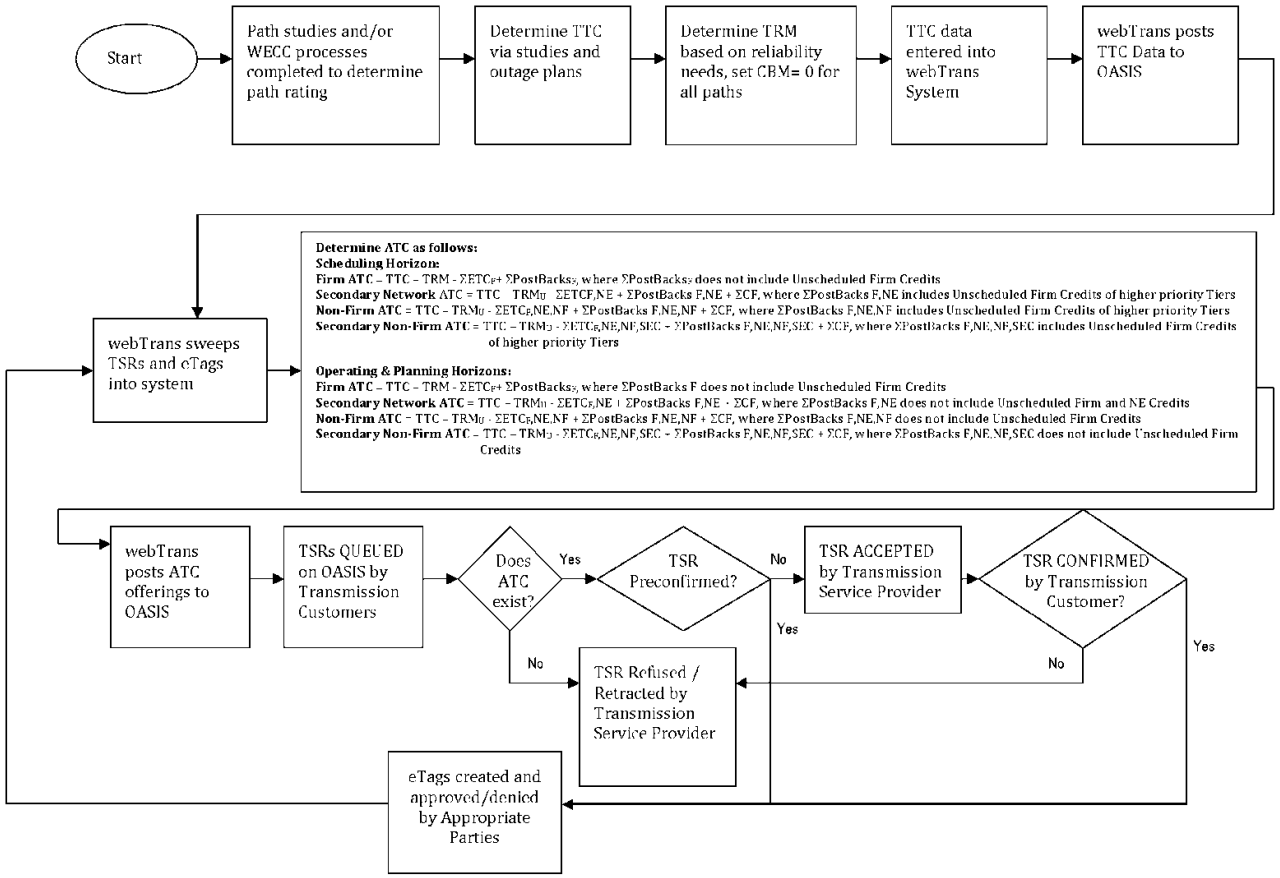
3. Process Flow Diagram Illustrating ATC and ATC Calculation



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ATC calculation is specified in BC Hydro's ATCID. The flow diagram is located at BC Hydro's ATC Methodology webpage on bchydro.com.

4. Description of How Each ATC Component is Calculated for the Operating and Planning Horizons

4.1. Total Transfer Capability (TTC)

4.1.1. Calculation Methodology

When performing the technical studies to determine the TTC for those ATC ~~Paths~~paths, the Transmission Service Provider will follow the MOD-029 ~~– Rated System Path Methodology.~~Standard :

a. Power system simulation software is used to model the transmission system, adjust the generation pattern and load levels to determine the TTC (either a maximum flow or reliability limit) that can be simulated on each ATC path while satisfying all ~~NERC/WECC~~mandatory reliability standards in effect in British Columbia (**B.C.**) and BC Hydro planning criteria.

b. TTC will be determined either prior to a new transmission element being brought into service or when a modification to a transmission element would affect the TTC.

c. Once the TTC determination is made, it remains fixed and changes only if there is a physical or operational change to the transmission system or a transmission component which requires a change to TTC.

d. When either transmission facilities are either jointly owned, or capacity on the ATC ~~Path~~path is limited by contract, the TTC will be set at the lesser of the maximum allowable limit based upon the capacity allocated by contract or pursuant to joint ownership arrangements and the reliability limit.

Additional information regarding determination of TTC for special conditions for specific paths may be posted and updated from time to time on the Transmission Service Provider's OASIS.

4.1.2. Databases Used in TTC Assessments

The Transmission Service Provider uses the transmission system model database from the up to date system base cases that are developed annually by WECC for its member use in planning and operating studies. WECC base cases include:

- All contiguous transmission systems within the WECC regional interconnection.
- Initial condition models of system elements are modeled as in service as consistent for the time period and conditions being studied.
- All generation and control system parameters (either a single generator or multiple generators) greater than 20 MVA at the point of interconnection are represented.
- Load is allocated to appropriate buses based on load forecasts developed by the balancing authorities for time period and conditions being studied.
- Transmission and generation facility additions and retirements are represented consistent with the time period represented. Series compensation is modeled at the expected operating level.
- Facility ratings are modeled as provided by the transmission and generator owners for the time period being studied.
- Phase shifters are modeled with automatic controls disabled.
- Special protection systems and/or remedial action schemes are modeled, as appropriate, if they are currently in place or are projected to be implemented with in the studied time horizon.

4.1.3. Assumptions Used in TTC Assessments

When performing technical studies to determine the TTC for ATC ~~Paths~~paths, the Transmission Service Provider will use data and assumptions consistent with the requirements ~~for NERC reliability standard~~of the MOD-029 Standard. The assumptions used in the studies are further described as follows:

4.1.3.1. Load Levels

TTC is based upon initial system conditions where all transmission elements are modeled as in service consistent for the time period being studied. System conditions affecting TTC, including load levels typical for the posting period (e.g., heavy summer period) determine the starting point for study conditions.

4.1.3.2. Generation Dispatch

Generation resources internal and external to the Transmission Service Provider's service territory are adjusted (within their capabilities) to provide a maximum TTC.

4.1.3.3. Modeling of Planned and Contingency Outages

Values for TTC on all ATC ~~Paths~~paths are the same for both the Planning and Operating Horizons.

- Power transfers into the BC Hydro service territory are increased until a maximum transfer limit is reached or until a critical contingency with a limiting element is identified that limits the TTC. System planning performance requirements are defined in Table 1 – Steady State & Stability Performance Planning Events in NERC standard TPL-001-4~~Contingencies for screening are defined as Category B and C contingencies in NERC/WECC reliability standards.~~. System performance for outages must meet the ~~NERC/WECC~~mandatory reliability standards in effect in B.C. and BC Hydro reliability criteria.

- ~~Planned outages are screened using contingencies defined as Category B and Category C contingencies in the NERC/WECC reliability standards.~~ In addition, system~~System~~ performance for planned outages must meet the requirements as outlined in the ~~NERC/WECC~~mandatory reliability standards in effect in B.C. and BC Hydro reliability criteria. Any significant reductions in ATC ~~Path~~path capability from the system normal TTC are posted on OASIS as necessary.

4.2. Existing Transmission Capacity

4.2.1. Determination Methodology

Existing transmission commitments can be separated into two categories: firm or non-firm transmission commitments. This distinction defines their impacts on the calculation of firm or non-firm ATC.

4.2.2. Firm Existing Transmission Commitments

The following algorithm is used when calculating firm ETC (**ETC_F**) for all time horizons:

$ETC_F = NL_F + NITS_F + GF_F + PTP_F + ROR_F + OS_F$

Where:

NL_F is the firm capacity set aside to serve peak Native Load forecast commitments for the time period being calculated, to include losses, and Native Load growth, not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

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NITS$_F$ is the firm capacity reserved for ~~network integration transmission service for~~Network Integration Transmission Service[4] servicing load, to include losses, and load growth, not otherwise ~~not~~ included in TRM and CBM.

GF$_F$ is the firm capacity set aside for grandfathered ~~transmission service~~Transmission Service and ~~energy~~ contracts for energy and/or ~~transmission service agreements~~Transmission Service, where executed prior to the effective date of the Transmission Service Provider's ~~OATT.~~Open Access Transmission Tariff or "safe harbor tariff".

PTP$_F$ is the firm capacity reserved for confirmed ~~point-to-point transmission service~~Point-to-Point Transmission Service.

ROR$_F$ is the firm capacity reserved for roll-over rights for ~~transmission service agreements~~contracts granting ~~transmission customers~~Transmission Customers[5] the right of first refusal to take or continue to take ~~transmission services~~Transmission Service when ~~a transmission service agreement~~the Transmission Customer's Transmission Service contract expires or is eligible for renewal.

OS$_F$ is the firm capacity reserved ~~from~~for any other service(s), ~~energy contracts, or transmission service agreements~~contract(s), or agreement(s) not specified above using ~~transmission service~~Firm Transmission Service as specified in the ATCID.

[4] Network Integration Transmission Service (NITS) - Service that allows an electric transmission customer to integrate, plan, economically dispatch and regulate its network reserves in a manner comparable to that in which the Transmission Owner serves Native Load customers.
[5] Transmission Customers - 1. Any eligible customer (or its designated agent) that can or does execute a Transmission Service agreement or can or does receive Transmission Service. 2. Any of the following entities: Generator Owner, Load-Serving Entity, or Purchasing-Selling Entity.

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4.2.3. Non-Firm Existing Transmission Commitments

$ETC_{NF} = NITS_{NF} + GF_{NF} + PTP_{NF} + OS_{NF}$

Where:

$NITS_{NF}$ is the non-firm capacity set aside for the ~~network integration transmission service~~Network Integration Transmission Service serving load (i.e., secondary service), to include losses, and load growth otherwise not included in TRM and CBM.

GF_{NF} is the non-firm capacity set aside for grandfathered ~~transmission service~~ Transmission Service and ~~energy~~ contracts for energy and/or ~~transmission service agreements~~Transmission Service, where executed prior to the effective date of the Transmission Service Provider's ~~OATT.~~Open Access Transmission Tariff or "safe harbor tariff".

PTP_{NF} is the non-firm capacity reserved for confirmed ~~point~~Point-to-~~point transmission service~~Point Transmission Service[6].

OS_{NF} is the non-firm capacity reserved from any other service(s), ~~contracts,~~contract(s), or ~~agreements~~agreement(s) not specified above using non-firm transmission service as specified in the Transmission Service Provider's ATCID.

4.3. Transmission Reliability Margin

4.3.1. Calculation Methodology

The Transmission Service Provider sets aside certain transmission capacity amounts for ~~Transmission Reliability Margin (**TRM**)~~the TRM to account for the components of uncertainty of aggregate load forecast, variations in generation dispatch and inertial response and frequency bias, and transmission system topology uncertainty for each ATC ~~Path~~path.

[6] Point-to-Point Transmission Service - The reservation and transmission of capacity and energy on either a firm or non-firm basis from the Point(s) of Receipt to the Point(s) of Delivery.

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The capacity amount set aside to account for the components of uncertainty of aggregate load forecast, variations in generation dispatch and inertial response and frequency bias have been established based on operating experience; they have proven sufficient and effective.

For calculating ATC_F, the Transmission Service Provider may set aside additional capacity amount to account for transmission system topology uncertainty due to unplanned and forced outages and maintenance outages. The capacity amount required for this component of uncertainty is determined based on applicable system operating orders. For more information, refer to the Transmission Service Provider's TRMID posted on bchydro.com.

~~For more information, refer to the Transmission Service Provider's TRM implementation document posted on the Transmission Service Provider's website located at: http://transmission.bchydro.com/transmission_system/reliability/.~~

4.4. Capacity Benefit Margin

4.4.1. Practice

~~BC Hydro does not set aside CBM and therefore has established a CBM of zero for calculation purposes on all transmission paths.~~

~~4.5. Counter-flows~~

For information, refer to the Transmission Service Provider's ATCID posted on bchydro.com.

4.5. Counterflows

4.5.1. Practice

~~Firm Counter-flows will add capacity to the calculation of non-firm ATC~~Counterflows are determined in the ~~Scheduling Horizon. Counter-flows are further~~manner described in the ~~ATC implementation document posted on the~~ Transmission Service Provider's ~~website located at: http://transmission.bchydro.com/transmission_system/reliability/.~~ATCID posted on bchydro.com.

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5. Firm Transmission Service on BCHA – AESO Path

Notwithstanding any other provision in this Tariff, the Transmission Service Provider shall limit sales of firm transmission service on the BCHA - AESO path to 480 MW.

Attachment C

Methodology to Assess Available Transfer Capability

This Attachment C outlines the Transmission Service Provider's methodology for determining Available Transfer Capability.

1. Definitions

1.1 Available Transfer Capability *(ATC)* – As defined under the Commission approved NERC Glossary of Terms[1].

1.2 Capacity Benefit Margin (CBM) – As defined under the Commission approved NERC Glossary of Terms.

1.3 Native Load - As defined under the Commission approved NERC Glossary of Terms.

1.4 Operating Horizon – The period of time that begins at the end of the Scheduling Horizon and extends through 168 hours.

1.5 Planning Horizon – The period of time that begins at the end of the Operating Horizon and extends through the end of the posting period (current month plus 12 months).

1.6 Scheduling Horizon – The period of time that begins with the current hour and extends out one hour.

1.7 Total Transfer Capability (TTC) – As defined under the Commission approved NERC Glossary of Terms.

[1] NERC Glossary of Terms available under *Compliance Information* at Mandatory Reliability Standards | British Columbia Utilities Commission (bcuc.com).

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2. Description of Mathematical Algorithm Used to Calculate Firm and Non-Firm ATC

The Transmission Service Provider uses the Rated System Path Methodology as prescribed in the North American Electric Reliability Corporation (**NERC**) mandatory reliability standard MOD-029-2a - Rated System Path Methodology, as approved by the Commission in British Columbia (or any approved successor standard) (**MOD-029 Standard**) , in the assessment of firm and non-firm ATC for all ATC paths in the Scheduling Horizon, Planning Horizon, and Operating Horizon. ATC is calculated using software which uses variable parameter settings and calculation adjustments to establish formulas for the various firm and non-firm ATCs consistent with the mathematical algorithms used by the Transmission Service Provider.

The mathematical algorithms for firm and non-firm ATC consist of the following formulas:

For Firm ATC (ATC_F)

$ATC_F = TTC – ETC_F – CBM – TRM + Postbacks_F + Counterflows_F$

Where:

ATC_F is the firm Available Transfer Capability for the ATC path for that period.

TTC is the Total Transfer Capability of the ATC path for that period.

ETC_F is the sum of existing firm commitments for the ATC path during that period.

CBM is the Capacity Benefit Margin for the ATC path during that period.

TRM is the Transmission Reliability Margin. It is the amount of transmission transfer capability necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change as per the Commission approved NERC Glossary of Terms.

Postbacks$_F$ are changes to firm Available Transfer Capability due to a change in the use of firm Transmission Service for that period, as defined in Business Practices.

Counterflows$_F$ are adjustments to firm Available Transfer Capability as determined by the Transmission Service Provider and specified in their Available Transfer Capability Implementation Document (**ATCID**).[2]

Non-Firm ATC (ATC_{NF})

$ATC_{NF} = TTC – ETC_F – ETC_{NF} – CBM_S – TRM_U + Postbacks_{NF} + Counterflows_{NF}$

Where:

ATC_{NF} is the non-firm Available Transfer Capability for the ATC path for that period.

TTC is the Total Transfer Capability of the ATC path for that period.

ETC_F is the sum of existing firm commitments for the ATC path during that period.

ETC_{NF} is the sum of existing non-firm commitments for the ATC path during that period.

CBM_S is the Capacity Benefit Margin for the ATC path that has been scheduled during that period.

TRM_U is the Transmission Reliability Margin for the ATC path that has not been released for sale (unreleased) as non-firm capacity by the Transmission Service Provider during that period

Postbacks$_{NF}$ are changes to non-firm Available Transfer Capability due to a change in the use of Transmission Service for that period, as defined in Business Practices.

[2] ATCID available at: https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/atc-methodology.html.

Counterflows$_{NF}$ are adjustments to non-firm Available Transfer Capability ATC as determined by the Transmission Service Provider and specified in its ATCID.

The components of the above formulas are further described in detail in this Attachment C. The specific mathematical algorithms are further described in the Transmission Service Provider's ATCID, Transmission Reliability Margin Implementation Document (**TRMID**)[3] and the TTC/ATC Business Practice webpages posted on bchydro.com.

3. Process Flow Diagram Illustrating ATC and ATC Calculation

ATC calculation is specified in BC Hydro's ATCID. The flow diagram is located at BC Hydro's ATC Methodology webpage on bchydro.com.

4. Description of How Each ATC Component is Calculated for the Operating and Planning Horizons

4.1. Total Transfer Capability (TTC)

4.1.1. Calculation Methodology

When performing the technical studies to determine the TTC for those ATC paths, the Transmission Service Provider will follow the MOD-029 Standard :

a. Power system simulation software is used to model the transmission system, adjust the generation pattern and load levels to determine the TTC (either a maximum flow or reliability limit) that can be simulated on each ATC path while satisfying all mandatory reliability standards in effect in British Columbia (**B.C.**) and BC Hydro planning criteria.

b. TTC will be determined either prior to a new transmission element being brought into service or when a modification to a transmission element would affect the TTC.

[3] TRMID available at: https://www.bchydro.com/energy-in-bc/operations/transmission/transmission-system/atc-methodology.html.

c. Once the TTC determination is made, it remains fixed and changes only if there is a physical or operational change to the transmission system or a transmission component which requires a change to TTC.

d. When either transmission facilities are either jointly owned, or capacity on the ATC path is limited by contract, the TTC will be set at the lesser of the maximum allowable limit based upon the capacity allocated by contract or pursuant to joint ownership arrangements and the reliability limit.

Additional information regarding determination of TTC for special conditions for specific paths may be posted and updated from time to time on the Transmission Service Provider's OASIS.

4.1.2. Databases Used in TTC Assessments

The Transmission Service Provider uses the transmission system model database from the up to date system base cases that are developed annually by WECC for its member use in planning and operating studies. WECC base cases include:

- All contiguous transmission systems within the WECC regional interconnection.
- Initial condition models of system elements are modeled as in service as consistent for the time period and conditions being studied.
- All generation and control system parameters (either a single generator or multiple generators) greater than 20 MVA at the point of interconnection are represented.
- Load is allocated to appropriate buses based on load forecasts developed by the balancing authorities for time period and conditions being studied.
- Transmission and generation facility additions and retirements are represented consistent with the time period represented. Series compensation is modeled at the expected operating level.

- Facility ratings are modeled as provided by the transmission and generator owners for the time period being studied.
- Phase shifters are modeled with automatic controls disabled.
- Special protection systems and/or remedial action schemes are modeled, as appropriate, if they are currently in place or are projected to be implemented within the studied time horizon.

4.1.3. Assumptions Used in TTC Assessments

When performing technical studies to determine the TTC for ATC paths, the Transmission Service Provider will use data and assumptions consistent with the requirements of the MOD-029 Standard. The assumptions used in the studies are further described as follows:

4.1.3.1. Load Levels

TTC is based upon initial system conditions where all transmission elements are modeled as in service consistent for the time period being studied. System conditions affecting TTC, including load levels typical for the posting period (e.g., heavy summer period) determine the starting point for study conditions.

4.1.3.2. Generation Dispatch

Generation resources internal and external to the Transmission Service Provider's service territory are adjusted (within their capabilities) to provide a maximum TTC.

4.1.3.3. Modeling of Planned and Contingency Outages

Values for TTC on all ATC paths are the same for both the Planning and Operating Horizons.

- Power transfers into the BC Hydro service territory are increased until a maximum transfer limit is reached or until a critical contingency with a limiting element is identified

that limits the TTC. System planning performance requirements are defined in Table 1 – Steady State & Stability Performance Planning Events in NERC standard TPL-001-4. System performance for outages must meet the mandatory reliability standards in effect in B.C. and BC Hydro reliability criteria.

- . In addition, system performance for planned outages must meet the requirements as outlined in the mandatory reliability standards in effect in B.C. and BC Hydro reliability criteria. Any significant reductions in ATC path capability from the system normal TTC are posted on OASIS as necessary.

4.2. Existing Transmission Capacity

4.2.1. Determination Methodology

Existing transmission commitments can be separated into two categories: firm or non-firm transmission commitments. This distinction defines their impacts on the calculation of firm or non-firm ATC.

4.2.2. Firm Existing Transmission Commitments

The following algorithm is used when calculating firm ETC (**ETC_F**) for all time horizons:

$ETC_F = NL_F + NITS_F + GF_F + PTP_F + ROR_F + OS_F$

Where:

NL_F is the firm capacity set aside to serve peak Native Load forecast commitments for the time period being calculated, to include losses, and Native Load growth, not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

$NITS_F$ is the firm capacity reserved for Network Integration Transmission Service[4] servicing load, to include losses, and load growth, not otherwise included in TRM and CBM.

GF_F is the firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, where executed prior to the effective date of the Transmission Service Provider's Open Access Transmission Tariff or "safe harbor tariff".

PTP_F is the firm capacity reserved for confirmed Point-to-Point Transmission Service.

ROR_F is the firm capacity reserved for roll-over rights for contracts granting Transmission Customers[5] the right of first refusal to take or continue to take Transmission Service when the Transmission Customer's Transmission Service contract expires or is eligible for renewal.

OS_F is the firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using Firm Transmission Service as specified in the ATCID.

4.2.3. Non-Firm Existing Transmission Commitments

$$ETC_{NF} = NITS_{NF} + GF_{NF} + PTP_{NF} + OS_{NF}$$

Where:

$NITS_{NF}$ is the non-firm capacity set aside for the Network Integration Transmission Service serving load (i.e., secondary service), to include losses, and load growth otherwise not included in TRM and CBM.

[4] Network Integration Transmission Service (**NITS**) - Service that allows an electric transmission customer to integrate, plan, economically dispatch and regulate its network reserves in a manner comparable to that in which the Transmission Owner serves Native Load customers.

[5] Transmission Customers - 1. Any eligible customer (or its designated agent) that can or does execute a Transmission Service agreement or can or does receive Transmission Service. 2. Any of the following entities: Generator Owner, Load-Serving Entity, or Purchasing-Selling Entity.

GF_{NF} is the non-firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, where executed prior to the effective date of the Transmission Service Provider's Open Access Transmission Tariff or "safe harbor tariff".

PTP_{NF} is the non-firm capacity reserved for confirmed Point-to-Point Transmission Service[6].

OS_{NF} is the non-firm capacity reserved from any other service(s), contract(s), or agreement(s) not specified above using non-firm transmission service as specified in the Transmission Service Provider's ATCID.

4.3. Transmission Reliability Margin

4.3.1. Calculation Methodology

The Transmission Service Provider sets aside certain transmission capacity amounts for the TRM to account for the components of uncertainty of aggregate load forecast, variations in generation dispatch and inertial response and frequency bias, and transmission system topology uncertainty for each ATC path.

The capacity amount set aside to account for the components of uncertainty of aggregate load forecast, variations in generation dispatch and inertial response and frequency bias have been established based on operating experience; they have proven sufficient and effective.

[6] Point-to-Point Transmission Service - The reservation and transmission of capacity and energy on either a firm or non-firm basis from the Point(s) of Receipt to the Point(s) of Delivery.

For calculating ATC_F, the Transmission Service Provider may set aside additional capacity amount to account for transmission system topology uncertainty due to unplanned and forced outages and maintenance outages. The capacity amount required for this component of uncertainty is determined based on applicable system operating orders. For more information, refer to the Transmission Service Provider's TRMID posted on bchydro.com.

4.4. Capacity Benefit Margin

4.4.1. Practice

For information, refer to the Transmission Service Provider's ATCID posted on bchydro.com.

4.5. Counterflows

4.5.1. Practice

Counterflows are determined in the manner described in the Transmission Service Provider's ATCID posted on bchydro.com.

5. Firm Transmission Service on BCHA – AESO Path

Notwithstanding any other provision in this Tariff, the Transmission Service Provider shall limit sales of firm transmission service on the BCHA - AESO path to 480 MW.

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Open Access Transmission Tariff (OATT) Attachment C Amendments Application Methodology to Assess Available Transfer Capability (ATC)

Appendix C

Transmission Bulletins

Propsed Change to Counterflow

Posted on April 30, 9:40 a.m.

Overview

BC Hydro Transmission Provider received a request from BC Hydro Power Supply (BCPS) to make changes to the TTC/ATC Business Practice and the ATC Implementation Document. BCPS' proposal is as follows in this bulletin. **Please provide your feedback on the proposed change, and why you do or do not support it to Brenda Ambrosi by end of business day on May 17. BC Hydro Transmission Provider may post the verbatim comments received by stakeholders.**

CUSTOMER PROPOSAL

BC Hydro Power Supply (BCPS) requests that BC Hydro Grid Operations (Transmission Provider) modify BC Hydro's ATC Implementation Document (ATCID) and associated TTC/ATC Business Practice to allow for firm counter-flow scheduling from BC to the U.S. based on the assured deliveries of the Canadian Entitlement.

Background:

The Canadian Entitlement is a firm generation resource that is delivered to BC Hydro from the U.S. using firm transmission under the Columbia River Treaty. BC Hydro, as the Canadian Entity for the Columbia River Treaty, has knowledge and visibility of the Canadian Entitlement, including the timing and volumes of the assured deliveries.

BCPS has a firm import transmission reservation on the Transmission System associated with the Canadian Entitlement under OASIS AREF # 80049172. This transmission reservation allows for the scheduling of the Canadian Entitlement from the US to BC Hydro.

Under BC Hydro's TTC/ATC Business Practice, Section 5.2, BCPS notifies the Transmission Provider in the preschedule horizon of the required transmission for the next-day Canadian Entitlement deliveries. The release of any unscheduled transmission capacity is incorporated into BC Hydro's Firm ATC formulas in Section 3.0 of the

TTC/ATC Business Practice. In addition, the TTC/ATC Business Practice allows for counter- flows to be added to the ATC calculation, but only on a non-firm basis, including for Canadian Entitlement counter-flows.

Proposal:

BCPS proposes that the Transmission Provider take into consideration the nature of the Canadian Entitlement and its assured deliveries of prescheduled energy, and incorporate those schedules as counter-flows into the determination of firm ATC on the export path to the US Border.

Currently, the ATCID (Section 5.1.4) and TTC/ATC Business Practice (Section 4) do not consider firm deliveries for counter-flow purposes on a firm basis. However, Attachment C of the Open Access Transmission Tariff (section 2) expressly allows for the Transmission Provider to incorporate firm counter-flows as part of its Firm ATC formula. Counter-flows should only be considered firm if there is an assured delivery of a firm generating resource on firm transmission from source to sink with full visibility to the Transmission Provider. BCPS believes the Canadian Entitlement deliveries meet these criteria.

Accordingly, BCPS requests that the Transmission Provider recognize Canadian Entitlement deliveries as firm counter-flows, and modify the TTC/ATC Business Practice and ATCID documentation to allow Canadian Entitlement counter-flow deliveries to increase firm ATC on the export path to the U.S. border.

BCPS does not expect that this change would negatively affect other Transmission Customers.

Proposed Change to Counterflow - Customer Feedback

Posted on May 28, 2:40 p.m.

Further to the bulletin posted on April 30 soliciting feedback from customers, BC Hydro Transmission Provider received comments from Capital Power, Powerex, and TransAlta Energy Marketing Corp. Please refer to the April 30 bulletin for details regarding the proposed change to counterflow. BC Hydro Transmission Provider is considering these comments and will post another bulletin in the near future.

Proposed Change to Counterflow - Decision

Posted on July 30, 1:10 p.m

On April 30, 2021 BC Hydro posted a proposal from BC Hydro Power Supply (BCPS), requesting that BC Hydro, as the Transmission Provider, consider modifying BC Hydro's ATC Implementation Document (ATCID) and associated TTC/ATC Business Practice to allow for firm counterflow scheduling from BC to the U.S. based on the assured deliveries of the Canadian Entitlement.

BC Hydro posted a bulletin on May 28, 2021, which shared comments from three customers TransAlta Energy Marketing Corp., Capital Power, and Powerex regarding the BCPS proposal. Since then, BC Hydro received late comments from Brookfield Renewable (Evolugen). The feedback can be summarized as follows:

a) Powerex supported the proposal;

b) Evolugen expressed general support of the proposal provided customers have fair and equal notice of, and access to, the transmission capacity created by the firm counterflows and sought further information on the Canadian Entitlement;

c) TransAlta provided preliminary views and sought further information with respect to whether transmission capacity arising from firm counterflows will be made available in a non-discriminatory manner and whether BC Hydro agrees with the BCPS determination that the Canadian Entitlement is sufficiently assured to make this change; and

d) Capital Power opposed the proposal and raised a number of specific concerns relating to the consistency of the proposal with other jurisdictions and potential reliability and existing service impacts arising from increased ATC.

BC Hydro has considered the feedback and offers the following response:

a) Each Transmission Service Provider (TSP) has the flexibility to implement the ATC formulas in its service territory or area as it deems appropriate. Each TSP's ATCID is unique in: 1) how it is applied to its service territory (i.e. different paths may have different formulas), and 2) the flexibility it provides within the ATCID to choose whether or not to incorporate certain elements (e.g. Postbacks or Counterflows) that are contemplated in the MOD-029-2a mandatory reliability standard. This explicit flexibility is provided with the expectation that different approaches may be appropriate for differently situated TSPs. As a result, alignment in approach with the Bonneville Power Administration is not required as suggested by Capital Power.

b) On May 2011, BC Hydro submitted an application to BCUC to amend its OATT Attachment C to be consistent with a suite of then applicable mandatory reliability standards and, specifically, to adopt the ATC methodology under approved MOD-029-1a Rated System Path Methodology. BC Hydro received BCUC approval of the amendments to OATT Attachment C on Nov 10, 2011 under BCUC Order No. G-185-11. On October 1, 2017, MOD-029-1a was replaced by MOD-029-2a by way of BCUC Order R-39-17. Capital Power notes that MOD-029-2a does not compel a Transmission Service Provider to allow for firm counterflows to create firm ATC. In response, BC Hydro clarifies that the applicable mandatory reliability standards allow for a Transmission Service Provider (TSP) to choose to implement firm counterflow as specified in the TSP's ATCID.

c) Capital Power also suggested that allowing for the possibility of ATC values exceeding TTC path ratings may result in adverse impacts. BC Hydro clarifies that its current Business Practices and operating procedures do allow for the total transmission sold in addition to the ATC to potentially

be greater than TTC. Specifically, TTC can be exceeded by the amount of transmission sales in a particular direction as long as those sales are balanced by the counterflow schedules across the intertie. BC Hydro's Curtailment of Transmission and Energy Business Practice indicates that curtailments are based on BC Hydro's established Scheduling Limit (not TTC) which takes into account counterflows before curtailments are initiated. As a result, BC Hydro's current business practices do not lead to unnecessary curtailments or have adverse impact to the transmission system's reliability.

d) BC Hydro's TTC, ATC, TRM, and Existing Transmission Commitments are all posted on OASIS. BC Hydro notes that its TTC/ATC Business Practice currently allows for a release of non-firm counterflow as ATC at the time an energy tag (eTag) is scheduled and confirmed. BC Hydro intends to release firm counterflow as ATC in the same manner as is currently done with the non-firm counterflow. As with all counterflows, any adjustment to the ATC is posted on OASIS and will be available for purchase by any Transmission Customer. As described above, all customers will continue to have equal access to this information, which was a concern raised by both TransAlta and Capital Power.

e) In response to Evolugen's question regarding how the Canadian Entitlement rights are released to market, BC Hydro notes that that the release of the unscheduled firm transmission from the Canadian Entitlement is managed in the preschedule horizon in accordance with Section 5 of the TTC/ATC Business Practice.

After careful consideration of the BCPS proposal and the corresponding customer comments, BC Hydro has decided to take those actions necessary to allow for firm counterflows to create additional ATC when there is energy scheduled that constitutes assured deliveries on firm transmission from source to sink. The appropriate business practice(s) will be modified to allow any Transmission Customer to request their firm transmission and associated energy schedules to be considered assured deliveries such that they would create ATC from the firm counterflows provided that the eligibility requirements are met. BC Hydro will be developing those eligibility requirements and posting the redline of the business practice(s) for customer review and comment. BC Hydro's objective is to develop the eligibility requirements that will allow BC Hydro to validate the assuredness of the deliveries and minimize impacts to Transmission Customers if those deliveries do not materialize. By providing this additional provision to all Transmission Customers, BC Hydro's decision aligns with open access and non-discriminatory principles consistent with the OATT.

Furthermore, BC Hydro discovered during its review of the business practices, ATCID and Attachment C, that a minor amendment is required to facilitate this change. Consequently, BC Hydro will be submitting an application to the BCUC to amend Attachment C. In its application, BC Hydro may include additional proposed amendments of a non-material nature to align Attachment C with the language of MOD-29-2a as approved by the BCUC.

Proposed Change to Counterflow - Business Practice Amendment

Posted on Aug 10, 1:05 p.m.

Further to the bulletin posted on July 30, BC Hydro .Transmission Provider has modified its TTC/ATC Business Practice to provide further detail with respect to how BC Hydro Transmission Provider will implement the change to allow ATC to be created from firm counterflows and to make other required housekeeping amendments. BC Hydro Transmission Provider invites customers to review the redlined business practice and provide comments to Brenda Ambrosi by August 25. BC Hydro Transmission Provider will be applying in the near term, to the British Columbia Utilities Commission, to amend its OATT Attachment C as noted in previous bulletins. A bulletin will be posted referencing the decision in that proceeding and a timeline for implementation, including the implementation of the changes to this Business Practice, once complete and if applicable.

Proposed Change to Counterflow Business Practice – Response to Customer Feedback

Posted on September 7, 4:05 p.m.

On August 10, BC Hydro Transmission Provider posted modifications to its TTC/ATC Business Practice to provide further detail with respect to implementation of how ATC can be created from firm counterflows. Customers were invited to provide comments by August 25. BC Hydro Transmission Provider received two comments of support from BC Hydro Power Supply (BCPS) and Powerex Corp. On August 30, BC Hydro Transmission Provider received joint comments expressing a few concerns from Capital Power, Evolugen (Brookfield Renewable), Heartland Generation Ltd., and TransAlta.

BC Hydro Transmission Provider has considered the joint comments and offers the following responses:

Issue 1 – Access:

Access to ATC will still be the same as it is today, which is consistent with the Open Access Transmission Tariff (OATT) and standard industry practices. Counterflow schedules of the Canadian Entitlement currently get released to the wholesale market as Non-Firm ATC. The proposed amendments do not create new barriers for customers to purchase ATC nor do they create new access issues; they simply change the form of ATC that is being created. Further, the proposed change to BC Hydro's practice does not reduce the amount of Firm ATC that is currently made available under the OATT, but can result in incremental Firm ATC relative to current practices. There will continue to be multiple opportunities for Firm and Non-Firm ATC to be competed for and purchased in accordance with the OATT.

Counterflow is only one method that BC Hydro Transmission Provider has used, and will continue to use, to increase ATC for its OATT customers, as set out in section 5.0 of the TTC/ATC Business Practice. BC Hydro Transmission Provider also releases firm ATC from grandfathered agreements during the week through postbacks, as set out in section 5.0 of the TTC/ATC Business Practice. At the top of the hour, one hour before the start of the next delivery hour, unscheduled firm Point-to-Point transmission capacity, including ATC from Redirects is released and posted on OASIS, as set out in section 4.1 of the Posting of Transmission Service Offerings Business Practice. In summary, in addition to the initial release of ATC, BC Hydro Transmission Provider employs methods to release more ATC through counterflow, postbacks, unscheduled transmission capacity, and Redirect mechanisms. The release of this additional firm ATC provides all OATT customers with more opportunity to access firm transmission while still promoting utilization of the transmission system.

Every energy schedule creates counterflow in the opposite direction, which will increase ATC on OASIS. The timing and process for how counterflow is released to the wholesale marketplace that BC Hydro Transmission Provider uses is the industry standard.

While customers have knowledge of their energy schedule and therefore may know that their schedule will create ATC, the queue is still processed in order. The customer does not have 100% certainty when the release of the additional ATC, from counterflow, will be made available and who will be in the queue at that specific time purchasing ATC. Furthermore, depending on the service increment (hourly, daily, weekly, monthly) purchased by the customer, the capacity may still be in a conditional period, as set out in section 3.0 in the Submitting a Short Term Transmission Service Request Business Practice. If the TSR is in a conditional time period and there is limited ATC a competition may be triggered, as set out in section 6.0 of the Processing of Short Term Transmission Service Request Business Practice. Hence, all OATT customers have, and will continue to have, the same access to ATC as has been the case under our current practices.

The suggestion to use a simultaneous submission window (SSW) as it relates to the release of ATC arising from counterflows is not an industry standard nor is it a practical use of the procedure or a feasible solution. BC Hydro Transmission Provider is not aware of any other Transmission Provider that uses the SSW process for this purpose nor does the current scheduling functionality provided by OATI (BC Hydro's software vendor) have the capability to enable this. Finally, this suggestion is not a feasible solution because the SSW procedure is utilized during fixed time window competitions. For example, BC Hydro Transmission Provider currently provides a 5 Minute SSW (for midnight bidding) from 00:00:00 to 00:05:00 PPT for firm and non-firm TSRs with an earliest time at which requests may be submitted, as set out in Submitting a Short Term Transmission Service Request Business Practice. However, due to the "floating" aspect of scheduling, the functionality and the mechanism of what is being proposed for a new SSW is very different from the specific time-based competition processes that BC Hydro Transmission Provider employs on a daily basis. If an SSW were concurrently held every time an eTag (energy schedule) is approved, 5 minute windows could potentially open every minute or many times within the hour and within a day in which multiple windows could overlap causing unnecessary system issues and process issues.

Issue 2 – Eligibility:

BC Hydro Transmission Provider clarifies that if an assured firm Transmission Customer adjusts or terminates their energy schedule for non-reliability reasons, the assured energy delivery of the eligibility requirement would not be met and therefore the firm counterflow provision may be suspended in accordance with the proposed changes to the TTC/ATC Business Practice. For greater clarity, this provision applies to any type of transaction such as importing or exporting. The specific references to exceptions are for reliability events and transmission outages, as specified in the TTC/ATC Business Practice.

Issue 3 – Reliability Curtailments:

BC Hydro Transmission Provider is aware of the concern regarding increased curtailments, and only curtails for reliability reasons. However, there is typically more than BC Hydro Transmission Provider on any one eTag (energy schedule) and/or TSR with respect to the approving entities who can curtail an eTag and/or TSR. Just because an eTag is curtailed does not mean the restriction arose on the BC Hydro transmission system. A customer can access their eTag through webSmartTag or their TSR webSmartOASIS to see which entity initiated the curtailment.

Further, the same amount of counterflow (more or less) that is being made today will continue to be made tomorrow whether it's non-firm ATC that is being increased or firm ATC that is being increased. The only difference in the proposed counterflow provision is in the allocation of ATC to non-firm and firm ATC depending on whether a schedule is determined to be "assured". In other words, currently counterflow is being allocated only to non-firm ATC. In the proposal, counterflow will be allocated to non-firm (for non-assured firm schedules) and firm ATC (for assured firm schedules), accordingly. As noted in Issue 2 above and in prior responses, BC Hydro is setting a higher threshold for the release of Firm ATC associated with firm counterflow so as to minimize the likelihood that curtailments will impact the use of firm transmission.

BC Hydro Transmission Provider also wishes to respond to the statement that ATC can exceed TTC and the concern that the proposal may exacerbate curtailments. As noted above, the proposal doesn't change the totality of ATC, just the allocation between non-firm and firm ATC.

Issue 4 –Workshop:

In light of the above responses, BC Hydro Transmission Provider does not believe a workshop is needed.

BC Hydro
Power smart

Open Access Transmission Tariff (OATT)
Attachment C Amendments Application
Methodology to Assess Available Transfer Capability (ATC)

Appendix D

External Review of Transmission Providers ATC Implementation Document (ATCID)

PUBLIC

CONFIDENTIAL ATTACHMENT

FILED WITH BCUC ONLY

Open Access Transmission Tariff (OATT)
Attachment C Amendments Application
Methodology to Assess Available Transfer Capability (ATC)