ATTACHMENT C

Methodology to Assess Available Transmission Capability

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

1. **Definitions**

1.1. Available Transfer Capability (ATC) - The measure of the transfer capability remaining in the physical transmission network for the further commercial activity over and above already committed uses. It is defined as the Total Transfer Capability less the Existing Transmission Commitments (including retail service), less a Capacity Benefit Margin, less a Transmission Reliability Margin, plus Postbacks, plus counterflows.

1.2. Capacity Benefit Margin (CBM) - As defined in Section 4.4.1 of this Attachment C.

1.3. Counterflows – As defined in Section 4.6.1 of this Attachment C.

1.4. Existing Transmission Commitments (ETC) - As defined in Section 4.2.1 of this Attachment C.

1.5. Firm Existing Transmission Commitments (ETC_F) – As defined in Section 4.2.2.1 of this Attachment C.

1.6. Non-Firm Existing Transmission Commitments (ETC_{NF}) – As defined in Section 4.2.2.2 of this Attachment C.

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1.7. Operating Horizon - The period of time that begins at end of the Scheduling Horizon and extends through the end of the last day that has been or is being prescheduled.

1.8. Planning Horizon - The period of time that begins at the end of the Operating Horizon and extends through the end of the posting period, as required by applicable regulations.

1.9. Postbacks – As defined in Section 4.5.1 of this Attachment C.

1.10. Scheduling Horizon - The period of time that begins with the current hour and extends out ten hours.

1.11. Total Transfer Capability (TTC) - As defined in Section 4.1.1 of this Attachment C.

1.12. Transmission Reliability Margin (TRM) - As defined in Section 4.3.1 of this Attachment C.

1.13. Transmission Service Provider – The entity that administers the transmission Tariff 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 Transmission Provider's Open Access Transmission Tariff.

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

The Transmission Provider uses the Rated System Path Methodology in the assessment of firm and non-firm ATC for all posted paths in the Planning, Operating and Scheduling Horizons. This ATC methodology is as prescribed in NERC Standard MOD-029-1, Rated System Path Methodology. The process of calculating ATC is performed in a third party software product that utilizes 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 Provider.

The mathematical algorithms for firm and non-firm ATC in the Scheduling, Operating and Planning Horizons consist of the following general formulas:

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

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

The components of these general formulas are described in further detail in this Attachment C. The specific mathematical algorithms are posted on the Transmission Provider's OASIS website at:

http://www.oatioasis.com/PGE/PGEdocs/ATC_Algorithms.pdf

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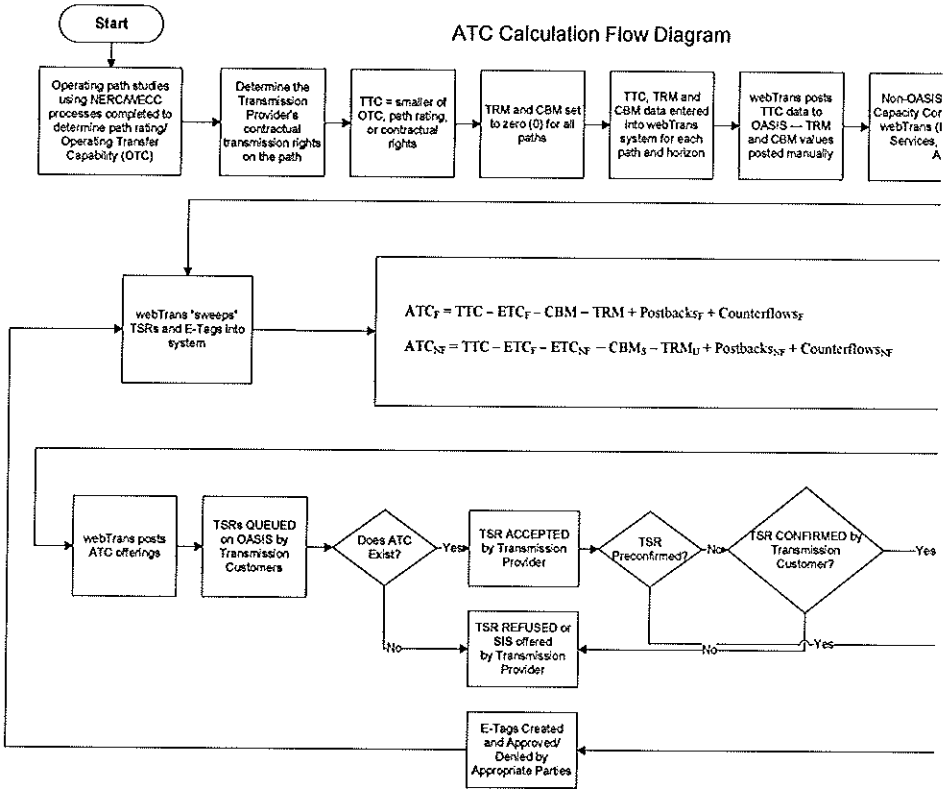
3. **Process Flow Diagram Illustrating Various Steps Through Which ATC is Calculated**



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

4.1 Total Transfer Capability (TTC)

4.1.1 Definition

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 (paths) between those areas under specified system conditions.

4.1.2 Calculation Methodology

When performing the technical studies to determine the TTC for those Posted Paths in which the Transmission Provider is also the Transmission Operator, the Transmission Provider will follow MOD-029-1a — Rated System Path Methodology.

(a) Power system simulation software is used to model the transmission system, adjust the generation and load levels to determine the TTC (either a maximum flow or reliability limit) that can be simulated on each Posted Path while satisfying all NERC /WECC Planning Criteria.

(b) Where it is not possible to actually simulate a reliability-limited flow on a Posted Path in a direction counter to prevailing flow, the TTC for the non-prevailing direction will be set equal to the TTC in the prevailing direction, without the use of a Special Protection Scheme.

(c) 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.

(d) 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.

(e) When either transmission facilities are jointly owned, or capacity on the Posted 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 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.

4.1.3 Databases Used in TTC Assessments

The Transmission 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 or out of 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 enabled.
- 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.

4.1.4 Assumptions Used in TTC Assessments

When performing technical studies to determine the TTC for those Posted Paths in which the Transmission Provider is also the Transmission Operator, the Transmission Provider will utilize data and assumptions consistent with the requirements of NERC Reliability Standard MOD-029-1a.

The assumptions used in the studies are further described as follows:

4.1.4.1 Load Levels

TTC is based upon initial system conditions where all transmission elements are modeled as in or out of 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.

4.1.4.2 Generation Dispatch

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

4.1.4.3 Modeling of Planned and Contingency Outages

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

- Power transfers into the 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. Contingencies for screening are defined as Category B and C contingencies in NERC/WECC Reliability Criteria. System performance for outages must meet the NERC/WECC Reliability Criteria.

- Planned outages are screened using contingencies defined as Category B and C contingencies in the NERC/WECC Reliability Criteria. System

performance for outages must meet the requirements as outlined in the NERC/WECC Reliability Criteria. Any significant reductions in Posted path capability from the system normal TTC are posted on OASIS as necessary.

4.2 Existing Transmission Commitments (ETC)

4.2.1 Definition

Existing Transmission Commitments (ETC) – Committed uses of a Transmission Service Provider's Transmission System considered when determining ATC

4.2.2 Determination Methodology

Existing Transmission Commitments (ETCs) are divided into two categories dependent upon whether the use is defined as being either for a firm or non-firm transmission use and its subsequent impact on the calculation of firm or non-firm ATC.

4.2.3 Firm Existing Transmission Commitments (ETC_F)

The following algorithm will be used when calculating 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 commitments for the time period being calculated, to include losses and Native Load growth, not otherwise included in TRM or CBM. Native Load growth is determined from the PGE Short Term Forecast Model. Load values from

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- $NITS_F$ is the firm capacity reserved for the Network Integration Transmission Service serving load, to include losses and load growth, not otherwise included in TRM or CBM.
- GF_F is the firm capacity set aside for the grandfathered firm transmission service and contracts for energy and/or Transmission Service, where executed prior to the effective date of a Transmission Service Provider's Open Access Transmission 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 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 agreements not specified above using Firm Transmission Service as specified in the Available Transfer Capability Implementation Document (ATCID) posted on the Transmission Provider's OASIS website at: **http://www.oatioasis.com/PGE/PGEdocs/PGE_ATCID.pdf**

4.2.4 Non-Firm Existing Transmission Commitments (ETC_{NF})

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the capacity MW value set aside on a Dynamic Schedule or Pseudo-Tie transaction type E-tag in the Operating Horizon¶
the energy MW value of an E-Tag utilizing a Firm reservation in the Operating Horizon ¶
the estimated MW value of an energy schedule not yet identified in a committed firm tag in the Operating Horizon¶
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The impact of maintaining rollover rights for eligible Firm Point-to-Point Transmission Service Agreements in the Planning Horizon

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The following algorithm will be used when calculating ETC_{NF} for all time horizons:

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

Where:

- NITSNF is the non-firm capacity reserved for Network Integration Transmission Service (i.e. secondary service), to include losses and load growth not otherwise included in TRM and CBM.
- 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 a Transmission Service Provider's Open Access Transmission Tariff. Transmission Service Provider has no non-firm grandfathered Transmission Service contracts.
- PTP_{NF} is the non-firm capacity reserved for confirmed Point-To-Point Transmission Service.
- OS_{NF} – is the non-firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using non-firm transmission service as specified in the ATCID posted on the Transmission Provider's OASIS website at: **http://www.oatioasis.com/PGE/PGEdocs/PGE_ATCID.pdf**

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4.3. Transmission Reliability Margin (TRM)

4.3.1 Definition

That amount of transmission transfer capability necessary to provide a reasonable assurance that the interconnected transmission network will be secure, TRM

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accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.

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4.3.2 Calculation Methodology

Methodologies used in the Northwest to calculate path TTC limits include a reliability component that has the same characteristics as TRM. Studies to determine path TTC limits are based on the NERC/WECC Planning and Operating Criteria for maintaining reliability. As such, for purposes of calculating Firm and Non-Firm ATC, TRM is set to zero for all posted paths.

4.3.3 Databases Used in TRM Assessments

The Transmission Provider does not use any databases in its TRM assessments.

4.4 Capacity Benefit Margin (CBM)

4.4.1 Definition

Capacity Benefit Margin (CBM) is that amount of firm transmission transfer capability preserved by the transmission provider for Load-Serving Entities (LSEs), whose loads are located on that Transmission Service Provider's system, to enable access by the LSEs to generation from interconnected systems to meet generation reliability requirements. Preservation of CBM for an LSE allows that entity to reduce its installed generating capacity below that which may otherwise have been necessary without interconnections to meet its generation reliability requirements.

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The transmission transfer capability preserved as CBM is intended to be used by the LSE only in times of emergency generation deficiencies.

4.4.2 Practice

The Transmission Provider does not set aside transfer capability for CBM in its ATC calculation methodology. CBM is set to zero (0) for ATC calculations in all timing horizons. Because the Transmission Provider does not set aside transfer capability for CBM in its ATC calculation methodology, it does not have any procedures related to a resource adequacy assessment. There is no current regional methodology for generation reliability assessments that sets aside transmission capacity for the use of CBM. Should the Transmission Provider determine that it is necessary to use an amount other than zero for CBM, the Transmission Provider will post the required information on its OASIS including any required reasons and or methodology used in determining CBM and location. This posting will be to its Capacity Benefit Margin Implementation Document (CBMID) located at:

http://www.oatioasis.com/PGE/PGEdocs/PGE_CBMID.pdf

4.4.3 Databases Used in CBM Assessments

Because the Transmission Provider does not set aside transfer capability for CBM in its ATC calculation methodology, no databases are currently used in assessing CBM.

4.4.4. Calculation Methodology

It is the transmission provider's practice to not set aside transfer capability as CBM and as such CBM is set to zero (0) for all posted paths. CBM will be reevaluated on at least a yearly basis to determine if continuation of the transmission provider's current practice should be continued or what, if any, changes may be warranted.

4.4.5 No-Double Counting of Contingency Outages when Performing CBM, TTC, and TRM Calculations

Because the Transmission Provider does not set aside transfer capability for CBM in its ATC calculation methodology and therefore sets CBM to zero (0) for all posted paths, there is no double counting of contingency outages when performing CBM calculations.

4.4.6 Procedures for Use of CBM during Emergencies

Because the Transmission Provider does not set aside transfer capability for CBM in its ATC calculation methodology, the Transmission Provider does not allow the use of CBM during emergencies.

4.5 Postbacks

4.5.1 Definition

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Postbacks are positive adjustments to ATC as defined in the Current Postback Methodology Document

4.5.2 Practice

Firm Postbacks ($Postbacks_F$) will include the capacity values of Recalls, Redirects and Annulled Firm Reservations. Non-Firm Postbacks ($Postbacks_{NF}$) will include all Firm Postbacks plus the unscheduled firm capacity of confirmed Transmission Service. The use of Postbacks will be described in detail in the Current Postback Methodology document posted on the Transmission Service Providers OASIS located at:

http://www.oatioasis.com/PGE/PGEdocs/PGE_Postback_Methodology.pdf

4.6 Counterflows

4.6.1 Definition

Counterflows are the scheduled energy values of transactions utilizing either a Firm or Non-firm Transmission Service on the opposite path for which an ATC is being calculated, i.e. for the purposes of ATC counterflows are counter schedules.

4.6.2 Practice

Firm counter schedules will add capacity to the calculation of Non-Firm ATC in the Scheduling Horizon. The use of counter schedules will be described in detail in the Available Transfer Capability Implementation Document posted in the Transmission Service Provider's OASIS website located at:

http://www.oatioasis.com/PGE/PGEdocs/PGE_ATCID.pdf

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