



Path Task Force Report

Path Task Force

January 31, 2023

Executive Summary

For decades, WECC Paths have been a cornerstone for planning and operations in the Western Interconnection. Historically, Transfer Capability for WECC Paths was determined in the planning horizon, reevaluated in the operations horizon, and ultimately used as operating limits in real time. Planning and operations were well-aligned in the role and relevance of WECC Paths, WECC Path Ratings, WECC Path Total Transfer Capabilities (TTC), and WECC Path System Operating Limits (SOL).

However, over the last decade, events related to the operations horizon have caused a shift from a path-centric operational paradigm to a non-path-centric one. Because of these changes, the role and relevance of WECC Paths in the operations horizon have diminished significantly. These changes include:

1. NERC's letter to WECC about the 2011 Southwestern Blackout Event, suggesting that WECC reevaluate the role of Path Operators and the use of Path Ratings in real-time operations and instead rely on tools like Real-time Contingency Analysis (RTCA) to assess real-time operations reliability.
2. The Path Operator Task Force (POTF) recommendations to decouple SOLs from TTCs and the subsequent actions taken to implement those changes operationally.
3. The retirement of TOP-007-WECC-1a, which required operation within WECC Path SOLs.
4. The major revision of Peak Reliability's SOL Methodology for the operations horizon, which clarified that WECC Path Ratings and WECC Path TTCs are not regarded as SOLs.
5. Changes in the NERC Reliability Standards in 2017 resulting from NERC Project 2014-03—Revisions to Transmission Operator (TOP) and Interconnection Reliability Operations (IRO) and Coordination Standards, which required TOPs and Reliability Coordinators (RC) to perform Operational Planning Analyses (OPA) and Real-time Assessments (RTA) to determine SOL exceedances in the pre- and post-Contingency state and to implement Operating Plans to address identified SOL exceedances.
6. Changes in the NERC Reliability Standards resulting from NERC Project 2015-09—Establish and Communicate System Operating Limits, which revised the definition of SOL in the Glossary of Terms Used in NERC Reliability Standards (NERC Glossary)¹ and revised associated FAC standards consistent with that new definition.
7. The retirement of the "MOD A" NERC Reliability Standards that require calculation of TTC and Available Transfer Capability (ATC) and the transition of the relevant portions of these

¹ https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf.



standards into North American Energy Standards Board (NAESB) Wholesale Electric Quadrant (WEQ) Business Practice Standard WEQ-023.

8. The transition of some entities from the Rated System Path Methodology to a flow-based methodology does not calculate TTC on Rated Paths, but instead calculates Total Flowgate Capability (TFC) on pre-determined Flowgates.

Role of Paths in the Operations Horizon

These changes have culminated in today's operating paradigm that focuses less on WECC Paths, WECC Path Ratings, and WECC Path TTCs for operations reliability, and more on OPAs, RTAs, and the development and implementation of Operating Plans consistent with the NERC Reliability Standards.

While WECC Paths, Path Ratings, and WECC Path TTCs may have a significant role in business practices associated with ATC postings on the Open Access Same-Time Information System (OASIS), the Path Task Force (PTF) determined that the reliability role of WECC Paths, TTCs, and Path Ratings in the operations horizon is primarily to assist in situational awareness. TTC and Path Ratings can serve as a heads-up to operators for potential SOL exceedance.

Because path-centric operations have largely become an outdated concept in the West, the PTF recommends the following regarding the term "Path Operator":

- Recommendation #1: The PTF recommends abandoning the term "Path Operator" in discourse and written documents and replacing it with NERC functional entity terms such as TOP, Balancing Authority (BA), and RC, and appropriate terms from the NERC and NAESB glossaries. The terms "Path Operator" or "Path Manager" could exist in individual company contracts. The PTF is not recommending changing these contracts; however, the PTF recommends that the term not be used in any future contracts to avoid confusion, if practicable.

Historically, TOPs have limited their maximum TTC for WECC Paths to the WECC Path Rating value. There are no rules to enforce this approach; however, it is a practice consistently adopted across the Western Interconnection. Given the decreased role and relevance of TTC in operations reliability and the transition of TTC standards from the NERC Reliability Standards to the NAESB business practices, the PTF recommends the following:

- Recommendation #2: The PTF clarifies that a WECC Path Rating is not required to serve as a maximum TTC value for the operations horizon; however, entities may continue this practice if they choose. A TOP is not required to limit its maximum TTC by the WECC Path Rating value shown in the WECC Path Rating Catalog, provided the TOP has studies demonstrating no SOL exceedance (thermal, voltage, or stability) occurs at the higher TTC value.

Role of Paths in the NERC Reliability Standards

The PTF performed a comprehensive evaluation of the body of NERC Reliability Standards for references to “Major WECC Transfer Paths” or “major transfer path within the Western Interconnection” and determined that these references exist in the following standards:

1. The NERC Glossary definition of Bulk Electric System;
2. FAC-003-4 and future effective FAC-003-5;
3. FAC-501-WECC-2; and
4. PRC-023-4 and future effective PRC-023-5.

With the changes that have occurred over the last decade, the PTF determined that there is no reliability need to single out “Major WECC Paths” in the body of NERC Reliability Standards:

- PTF Recommendation #3: The PTF recommends the initiation of a SAR to remove references to “Major WECC Paths” in the NERC Reliability Standards and the NERC Glossary. The PTF determined that there is no clear reliability basis for the applicability of these paths in the body of Reliability Standards and the NERC Glossary.

Role of WECC Paths in the Planning Horizon

Though the role and relevance of WECC Paths in the operations horizon have undergone significant changes over the last decade, the role and relevance of paths in the planning horizon have remained relatively the same. Paths have had, and continue to have, an important role in the planning horizon in the Western Interconnection.

While no NERC Reliability Standards require the calculation of Transfer Capability or TTC in the planning horizon, WECC Path Ratings (which can be considered a long-term TTC value based on the study assumptions used) are calculated for the planning horizon through participation in WECC’s Path Rating Process. The Path Rating Process is contained in the broader Project Coordination, Path Rating, and Progress Report Process² document, which is a widely practiced, voluntary process approved by the Reliability Assessment Committee (RAC) that provides coordination, information sharing, data, and modeling for WECC base cases, open and transparent peer review on planning studies, and investment protection.

A goal of the WECC Path Rating process is for each successive project to have sufficient facilities to support its anticipated power transfer levels before it is placed in service. The amount of power that a WECC Path with an “Accepted Rating” can transfer is protected from being diminished due to

²https://www.wecc.org/_layouts/15/WopiFrame.aspx?sourcedoc=/Reliability/Project%20Coordination%20Path%20Rating%20and%20Progress%20Report%20Processes_Approved.pdf&action=default&DefaultItemOpen=1

subsequent projects³, i.e., if the capability of a path is diminished due to new or modified Transmission or Generation projects, this constitutes an "impact" to a protected rating that requires mitigation from the sponsor of the subsequent project. This Accepted Rating provides some degree of protection to entities that have made investments in the transmission system.

The PTF determined that this protection is predicated on the existence and use of WECC Paths and Accepted Ratings, which does not accommodate a non-path approach. Some entities have stopped or are considering not using paths and are choosing a flow-based Transfer Capability method for the operations horizon. Additionally, significant market developments are occurring in the West, and legislation is underway in some areas that may require future participation in a Regional Transmission Organization (RTO). It is reasonable to consider that these future developments in the West may not use a path-based approach but might rely on a flow-based approach.

The PTF determined that the WECC Path Ratings Process implicitly incentivizes entities in the Western Interconnection to adhere to a path-centric approach if they want to protect their ability to make the most of transmission investments using the WECC process. Therefore, the PTF recommends the following:

- PTF Recommendation #4: The PTF recommends that the WECC Path Rating Process be reviewed and updated, replaced, or supplemented with a new process to ensure that entities who no longer use paths (or historical "path" concepts) or intend to move away from using paths in the planning horizon have a WECC process that gives them similar benefits. This recommendation should be addressed in the next two years to allow enough time to systematically address approaches that are not path-centric.
- PTF Recommendation #5: Open and transparent coordination of Transfer Capabilities for the planning horizon in the Western Interconnection is primarily accomplished through participation in the WECC Path Rating Process. If this process is ever updated, replaced, or supplemented, any future process(es) should help coordinate Transfer Capabilities across the Western Interconnection and should maintain the open and transparent nature of the WECC Path Rating Process.

³ For example, a subsequent project could result in system configuration changes that cause an SOL exceedance to occur when the WECC Path is transferring power at its "Accepted Rating".

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I. WECC Path Background

In the Western Interconnection, the term “WECC Path” refers to one or more transmission lines associated with a Path Rating. WECC Paths and Path Ratings can be related to a single transmission line or a group of parallel transmission lines between Balancing Authorities (BA), within a BA, or both. The complete list of WECC Paths can be found in the WECC Path Rating Catalog⁴, a document maintained by WECC staff.

The term “Major WECC Path” is used to designate a subset of WECC Paths. In the late ‘90s and early 2000s, the term was used to identify the subset of WECC Paths monitored in operations for reliability. According to the 2003 Reliability Management System (RMS) agreement, Major WECC Paths were monitored by the Reliability Coordinators who were obligated to meet the Operating Transfer Capability (OTC) criteria for compliance and associated sanctions. These paths were tied to daily reporting requirements and specific inspection and maintenance requirements. The OTC criteria and requirements in the RMS agreement were developed for reliability measures in the Western Interconnection before developing the NERC mandatory Reliability Standards. These criteria and requirements were written into the mandatory Reliability Standards, including the regional standard TOP-007-WECC-1a—System Operating Limits (now retired) and the NERC standard MOD-029-2a—Rated System Path Methodology.

Historic Role of WECC Paths in the Planning Horizon

WECC Paths played a significant role in the planning horizon before the WECC Path Rating Process was established in 1996. It is a voluntary process that invites interested subject matter experts to participate in a peer review of the system impact of proposed transmission improvement or expansion projects on an existing WECC Path, or to establish the Path Rating for a new WECC Path. WECC Path Ratings are determined through voluntary participation in the WECC Path Rating Process. Over time, three separate project coordination and information sharing processes were combined into a single document called the Project Coordination, Path Rating, and Progress Report Process.

While no definition for a WECC Path Rating exists, it is understood to be a coordinated and agreed-upon maximum amount of power that can be reliably transferred across the WECC Path in a specified direction under specified system conditions. A WECC Path Rating specifies the Transfer Capability of the WECC Path and can be considered a long-term Total Transfer Capability (TTC) value based on the study assumptions used. Path Ratings protect an entity’s ability to use transmission investments while preserving reliability. The amount of power that a rated Path can transfer is protected from being diminished due to subsequent projects, i.e., if the capability of a path is diminished due to new or

⁴https://www.wecc.org/_layouts/15/WopiFrame.aspx?sourcedoc=/Reliability/2022%20Path%20Rating%20Catalog%20Public.pdf&action=default&DefaultItemOpen=1

modified Transmission or Generation projects, this constitutes an unacceptable "impact" on a protected rating that will require mitigation. The project sponsor is then responsible for implementing such mitigations. The project sponsor can then negotiate agreements (e.g., on cost allocations) with the affected parties. This negotiation is outside WECC's purview.

While there have been several changes to reliability standards and specific planning practices since the WECC Path Rating Process was first established, the role and relevance of WECC Paths and WECC Path Ratings in the planning horizon have remained largely unchanged.

Historic Role of WECC Paths in Operations Horizon

WECC Paths have served a prominent role in the reliable operation of the Western Interconnection. Long before there were real-time tools and network applications to continually assess pre- and post-Contingency system reliability, monitoring flows on Major WECC Paths was used as a primary mechanism to preserve pre- and post-Contingency reliability (by avoiding OTC criteria violations) in operations planning and real-time operations.

Operational Transfer Capability and WECC Path System Operating Limits

The RMS agreement contained requirements to operate within established OTC values. When the NERC Reliability Standards were created, these requirements were written into WECC regional standard TOP-STD-007-0.⁵ This standard defines OTC as follows:

The OTC is the maximum amount of actual power that can be transferred over direct or parallel transmission elements comprising:

- An interconnection from one Transmission Operator area to another Transmission Operator area; or
- A transfer path within a Transmission Operator area.

In practice, Path Operators calculated an OTC value for the WECC Path and treated it as a real-time operating limit. This was expected to render acceptable reliability performance in the pre- and post-Contingency states.

This standard was eventually replaced by TOP-007-WECC-1, which replaced "OTC" in TOP-STD-007-0 with the term "System Operating Limit" (SOL) found in the Glossary of Terms Used in NERC Reliability Standards (NERC Glossary). When TOP-007-WECC-1 was being developed, there were discussions about whether to replace OTC with SOL or to replace OTC with TTC, also found in the NERC Glossary. The decision to replace OTC with SOL in TOP-007-WECC-1 was made to preserve the operating practices widely used across the Western Interconnection, although WECC Path SOLs also

⁵ <https://www.nerc.com/pa/Stand/Reliability%20Standards/TOP-STD-007-0.pdf>

served as the TTC for the path. Under TOP-007-WECC-1a⁶, Transmission Operators (TOP) were required to operate and schedule within Major WECC Path SOLs and mitigate exceedance of those SOLs within 30 minutes.

The Path Operator

This path-centric approach to operations called for an entity to study the WECC Path, determine the path SOL or TTC, write operating procedures, monitor the WECC Path in real-time operations, and mitigate when the WECC Path exceeded the path SOL in real time. This entity has been historically known as the Path Operator. The Path Operator was also responsible for allocating the WECC Path TTC among the owners of the Path facilities for Available Transfer Capability (ATC) calculation purposes. While the definition and responsibilities of the Path Operator vary across the Western Interconnection, this description generally captures the responsibilities of the historical Path Operator. While the Path Operator has been a long-established function in the Western Interconnection in its relationship to path-centric operations, the NERC Reliability Standards do not use the term Path Operator. Rather, the NERC Reliability Standards use terms in the NERC Functional Model such as TOP, BA, and RC.

II. The Transition Away from Path-Centric Operations

Key events have occurred in the Western Interconnection since 2011, pushing the West from a path-centric operational paradigm to a non-path-centric one. Because of these changes, the role and relevance of WECC Paths in the operations horizon have significantly diminished. These changes include:

1. NERC's suggestions about the role of Path Operators and WECC Path Ratings in response to the 2011 Southwestern Blackout Event;
2. Path Operator Task Force (POTF) Findings and Recommendations;
3. Retirement of TOP-007-WECC-1a;
4. Major revision of Peak Reliability's SOL Methodology for the operations horizon;
5. Changes in the NERC Reliability Standards resulting from NERC Project 2014-03—Revisions to TOP and Interconnection Reliability Operations (IRO) Standards;
6. Changes in the NERC Reliability Standards resulting from NERC Project 2015-09—Establish and Communicate System Operating Limits;
7. Retirement of "MOD A" NERC Reliability Standards; and
8. Transition away from the Rated System Path Methodology.

⁶ <https://www.nerc.com/pa/Stand/Reliability%20Standards/TOP-007-WECC-1a.pdf>



NERC's Suggestions Related to the 2011 Southwestern Blackout Event

In his September 13, 2012, letter to WECC⁷, Gerry Cauley, CEO of NERC at that time, speaking about the WECC initiative "Role of Path Operators (ORG3)," stated:

NERC is pleased to see that WECC is holding additional discussions to clarify the role of Path Operators, including the potential to implement contractual relationships and make use of RTCA and other tools to improve the accuracy of system operating limits. As these discussions continue, NERC suggests that you also review the concept of Path Ratings and whether, as the Western Interconnection has become more highly interconnected, the Path Rating and Path Operator concept, along with the use of nomograms, still has merit for real-time operations. Other Interconnections do determine Flowgate limits for purposes of interchange scheduling, but rely more fully on RTCA for real-time operating reliability.

This letter led to the formation of the POTF to examine the effectiveness of path-centric operations in the Western Interconnection.

POTF Findings and Recommendations

The POTF report⁸ was approved by the WECC Operating Committee on October 8, 2014, and contained the following recommendations:

1. SOLs and TTCs are separate and distinct, but they work together to ensure that reliability is achieved in real-time operations.
2. The Path Operator concept is eliminated, but the roles and responsibilities of the Path Operator are distributed among the TOPs and the RC.
3. A SAR will be established to retire TOP-007-WECC-1.
4. Paths that are not associated with transient or voltage stability limits will not have uniquely monitored SOLs; however, they will continue to have TTCs.
5. Consistent with the RC SOL Methodology, SOLs are the Facility Ratings, voltage limits, and stability limits that are observed pre- and post-Contingency.
6. TTC is the measure of maximum power transfer across a WECC Path that respects these SOLs, pre- and post-Contingency. TTCs will still need to be determined through transfer analysis and prior studies.
7. Nomograms can be used to determine TTCs and can provide guidance to operators as part of operating plans, but the nomogram itself may not be an SOL.

⁷[https://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/Maher letter NERC Comments on WECC Prelim report 09132012.pdf](https://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/Maher%20letter%20NERC%20Comments%20on%20WECC%20Prelim%20report%2009132012.pdf)

⁸https://www.wecc.org/_layouts/15/WopiFrame.aspx?sourcedoc=/Reliability/POTF%20Whitepaper%20FINAL%200099514%20clean.docx&action=default&DefaultItemOpen=1



8. The WECC Path Rating Catalog will continue, and the WECC Path Rating Process remains unchanged; however, the resulting Path Rating will serve as a maximum TTC value—not as an SOL.

The disbandment of the POTF was followed by the formation of the Path Operator Implementation Task Force (POITF) to implement the POTF recommendations. To achieve this objective, the POITF:

1. Initiated the SAR for retiring TOP-007-WECC-1; and
2. Worked with Peak Reliability (the Reliability Coordinator (RC) for the Western Interconnection, less Alberta, at the time) to revise the RC's SOL Methodology to better align with the POTF concept.

Retirement of TOP-007-WECC-1a

TOP-007-WECC-1a codified path-centric operations in the Western Interconnection. The purpose of this standard was to ensure that when actual flows on Major WECC Transfer Paths exceed their SOL, their associated schedules and actual flows are not exceeded for longer than a specified time. Before this standard was retired on April 1, 2017, the prominent mindset in the West was that the NERC Glossary term “SOL” was associated with WECC Paths. However, the retirement of this standard and other vital changes that became effective on the same date⁹ represented a significant change for operations in the Western Interconnection.

Major Revision of Peak Reliability's SOL Methodology for the Operations Horizon

Peak Reliability published a major revision of its SOL Methodology for the operations horizon to reflect the concepts in the POTF recommendations. This significant revision became effective on April 1, 2017. A few important excerpts include:

1. “This SOL Methodology does not recognize WECC Path Ratings as SOLs.”
2. “Nomograms may be used to provide operators with helpful guidance as part of an Operating Plan; however, they are not considered to be SOLs unless the nomogram represents a region of stability (i.e., the nomogram defines a stability limit).”
3. “Similarly, TTC is not an SOL, and thus it is not an operating parameter. However, if a TOP so chooses, the TOP may utilize TTC (and Transfer Capability concepts) as part of an Operating Plan as a means by which to achieve acceptable pre- or post-Contingency performance and thus to prevent SOL exceedances.”
4. “Note that exceeding a TTC value in real-time operations does not constitute SOL exceedance.”

⁹ Other changes on April 1, 2017, include the effective date of Peak Reliability's SOL Methodology for the Operations Horizon and the revised TOP and IRO Reliability Standards resulting from NERC Project 2014-03—Revisions to TOP and IRO Standards.

5. “While TTCs and nomograms may serve as valuable mechanisms to prevent and/or mitigate SOL exceedances as part of an Operating Plan, these mechanisms are not a substitute for performing RTAs and do not absolve the TOP or the RC of its obligation to perform RTAs to identify SOL exceedance per the TOP and IRO Reliability Standards.”
6. “While Peak will continue to monitor WECC Path flow relative to WECC Path TTC values for situational awareness purposes, Peak will not acknowledge the TTC as an SOL and will not require operation within TTC values or WECC Path Ratings.”

Peak Reliability ceased operation as an RC in December 2019 and was replaced by three RCs. Each RC’s SOL Methodology for the operations horizon has maintained the principles, concepts, and even some of the same language found in Peak Reliability’s SOL Methodology.

Changes in the NERC Reliability Standards resulting from NERC Project 2014-03

NERC Project 2014-03—Revisions to TOP and IRO Standards resulted in significant changes to IRO and TOP standards that further contributed to the abandonment of path-centric operations in the Western Interconnection. Changes brought about by this project include:

1. Revision of the NERC Glossary term “Operational Planning Analysis” to include an evaluation of projected system conditions that includes an assessment of pre- and post-Contingency conditions for next-day operations.
2. Revision of the NERC Glossary term “Real-time Assessment” to include an evaluation of real-time system conditions that includes an assessment of pre- and post-Contingency conditions at least once every 30 minutes.
3. Several essential TOP and IRO standards requiring TOPs and RCs to perform OPAs and RTAs, and to develop and implement Operating Plans to address SOL exceedances identified in those assessments.
4. Publication of supporting SOL white paper that clarified SOL concepts, described SOL exceedance, described the different types of SOLs, distinguished SOLs from mechanisms to prevent SOL exceedances (the WECC Path SOL concept is an example of such a mechanism), and showed how Operating Plans are used to prevent or mitigate SOL exceedances.

The revised TOP and IRO NERC Reliability Standards and associated revisions to the NERC Glossary became effective on April 1, 2017, along with the retirement of TOP-007-WECC-1a and Peak Reliability’s major revision of its SOL Methodology for the operations horizon.

Changes in the NERC Reliability Standards resulting from NERC Project 2015-09

NERC Project 2015-09—Establish and Communicate System Operating Limits resulted in significant changes to the FAC standards related to SOLs and Interconnection Reliability Operating Limits (IROL). The resulting changes in the FAC standards and associated changes in key NERC terms have further



codified many of the concepts in the POTF recommendations and may cement the abandonment of path-centric operations in the Western Interconnection. Changes brought about by this project include:

1. Revision of the NERC Glossary definition of “System Operating Limit” to be “All Facility Ratings, System Voltage Limits, and stability limits, applicable to specified System configurations, used in Bulk Electric System (BES) operations for monitoring and assessing pre- and post-Contingency operating states.”
2. A new NERC Glossary term, “System Voltage Limit,” defined as “The maximum and minimum steady-state voltage limits (both normal and emergency) that provide for acceptable System performance.”
3. Significant revision of FAC-011-3 and FAC-014-2, which contain requirements aligned with the revised definition of SOL.
4. Retirement of FAC-010-3, which requires Planning Coordinators to have an SOL Methodology document for the planning horizon.
5. A revision of the SOL white paper¹⁰ to reflect the changes in the FAC standards and the revised terms in the NERC Glossary.

The revised FAC Reliability Standards and associated revisions to the NERC Glossary become effective on April 1, 2024.

Retirement of MOD A NERC Reliability Standards

In its petition¹¹ on June 7, 2019, NERC proposed to retire the MOD A set of Reliability Standards and to revise North American Energy Standards Board (NAESB) Wholesale Electric Quadrant (WEQ) Business Practice Standards to include commercially relevant requirements from the existing MOD A Reliability Standards being proposed for retirement. The MOD A standards are the standards that address ATC/TTC and Available Flowgate Capabilities (AFC)/ Total Flowgate Capability (TFC) and include the following:

- MOD-001-1a— Available Transmission System Capability
- MOD-004-1 — Capacity Benefit Margin
- MOD-008-1 — Transmission Reliability Margin Calculation Methodology
- MOD-028-2 — Area Interchange Methodology
- MOD-029-2a— Rated System Path Methodology
- MOD-030-3— Flowgate Methodology

¹⁰<https://www.nerc.com/pa/Stand/Project%20201509%20Establish%20and%20Communicate%20System%20Op/SOL%20White%20Paper%20-%20Clean.pdf>

¹¹[https://www.nerc.com/FilingsOrders/us/NERC%20Filings%20to%20FERC%20DL/Final%20Petition%20for%20Approval%20of%20SER%20Retirements%20\(INT,%20FAC,%20PRC,%20and%20MOD\).pdf](https://www.nerc.com/FilingsOrders/us/NERC%20Filings%20to%20FERC%20DL/Final%20Petition%20for%20Approval%20of%20SER%20Retirements%20(INT,%20FAC,%20PRC,%20and%20MOD).pdf)



In its petition, NERC stated,

The existing MOD A Reliability Standards provide little, if any, benefit to the reliable operation of the [Bulk Power System] BPS. ATC and AFC, as well as e-Tags, are commercially-focused elements, facilitating interchange and balancing of interchange. System Operators are ambivalent to these commercial arrangements. System Operators monitor Real-time flows to maintain reliability of the BPS according to System Operating Limits and Interconnection Reliability Operating Limits. If a scheduled interchange would violate either of these limits, the System Operators must disregard the scheduled interchange and operate the System within its actual reliability limits.¹²

The relevant portions of the MOD A Reliability Standards were written into NAESB WEQ Business Practice Standard WEQ-023 Version 003.3, which FERC approved via FERC Order 676-J, effective August 2, 2021. As of this publication, FERC has not yet issued an order retiring the MOD A NERC Reliability Standards.

The transfer of the MOD A standards from the NERC Reliability Standards to the NAESB WEQ Business Practice Standards is significant because it supports the notion that TTC in the operations horizon is more centric to commercial and business practices than it is to operations reliability. This aligns well with the retirement of TOP-007-WECC-1a and further solidifies the concepts found in the RCs' SOL Methodologies, namely, that TTC values on WECC Paths are not operational quantities to be used as SOLs for operations reliability, but are values relevant to commercial business practices.

Transition Away from the Rated System Path Methodology

Historically, TOPs in the Western Interconnection have adopted the Rated System Path Methodology described in NERC Reliability Standard MOD-029-2a for calculating TTC. This methodology was originally written to reflect the path-centric approach that was common in the Western Interconnection.

Recently, some TOPs have stopped using the Rated System Path Methodology and adopted the Flowgate Methodology described in MOD-030-3. This flow-based approach does not calculate TTC on Rated Paths. Rather, it determines TFC on pre-determined Flowgates, translating the TFC value to an ATC value for each ATC Path posted on the Open Access Same-Time Information System (OASIS).

This signals a movement away from using WECC Paths and path concepts, held to be a nearly homogenous and foundational norm in the Western Interconnection for decades.

¹² Page 21 of the petition.



III. WECC Paths, Path Ratings, SOLs, and TTC in the Operations Horizon

Before 2011, WECC Paths and Path Ratings served a prominent role in the operations horizon; however, because of these changes, the role and relevance of WECC Paths and WECC Path Ratings in the operations horizon have significantly decreased.

WECC Paths, Path Ratings, and SOLs

Historically, when real-time flow was observed to be above a WECC Path's SOL, it was automatically considered an SOL exceedance because TOP-007-WECC-1a required operation within WECC Path SOLs for the applicable list of "Major WECC Transfer Paths." This concept was also applied to all WECC Paths, regardless of whether the WECC Path was considered a WECC Major Transfer Path applicable to TOP-007-WECC-1a. With the retirement of this standard and the changes resulting from the POTF, POITF, and RC Methodology revision, the "WECC Path SOL" concept was retired. Today, there are no WECC Path SOLs; however, a stability limit might coincide with facilities comprising a WECC Path. The definition of SOL and the meaning of SOL exceedance is captured in the revised definition of SOL and the revised FAC-011-4 standards that become effective on April 1, 2024.

TOPs and RCs have many methods available to manage SOL and IROL exceedances. The existence or non-existence of WECC Paths may or may not have a bearing on how a TOP or RC chooses to manage SOL or IROL exceedance. A TOP or RC may use flow on a WECC Path or any other collection of facilities to manage or prevent SOL or IROL exceedances.

As described in the WECC Path Background, the old path-centric operations approach called for an entity responsible for studying the WECC Path, determining the SOL/TTC, writing operating procedures, monitoring the WECC Path in real-time, and mitigating when it exceeded the path SOL. Path-centric operations have become an archaic concept, and the term "Path Operator" and the function it describes, have inconsistent meaning across the Western Interconnection that neither NERC nor FERC recognizes.

PTF Recommendation #1: The PTF recommends abandoning the term "Path Operator" in discourse and written documents and replacing it with NERC functional entity terms such as Transmission Operator, Balancing Authority, and Reliability Coordinator, and appropriate terms from the NERC and NAESB glossaries. The terms "Path Operator" or "Path Manager" could exist in individual company contracts. The PTF is not recommending changing these contracts; however, the PTF recommends that the term not be used in any future contracts to avoid confusion, if practicable.

WECC Paths, Path Ratings, and TTC

The NERC Glossary defines TTC as:



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.

TTC is not an SOL, despite it being previously used that way for WECC Paths. Instead, TTC is an objective function where TOPs try to maximize the amount of electric power transfer from one area to another, given the reliability constraints. Standards that require TTC calculations are not related to operations within SOLs and IROLs, as TTC isn't used in standards related to operations. However, some TOPs rely on TTC as a trigger point for operator action in Operating Plans. For these TOPs, TTC becomes more relevant for operations since it is used alongside RTAs as a mechanism to support operations reliability.

TOPs are ultimately responsible for calculating or delegating the calculation of TTC. Currently, under MOD-028 and MOD-029, a TOP is responsible for establishing TTC for ATC paths. TTC and TFC effectively limit the amount of commercial scheduling for a certain period (e.g., for upcoming seasons, next month, next week, and next day). As previously stated, the NERC Reliability Standards governing TTC and ATC calculations are being retired and moved to the NAESB Business Practice Standards.

Historically, TOPs have limited their maximum TTC for WECC Paths to the WECC Path Rating value. There are no rules to enforce this approach; however, it is a practice consistently adopted across the Western Interconnection.

PTF Recommendation #2: The PTF clarifies that a WECC Path Rating is not required to serve as a maximum TTC value for the operations horizon; however, entities may continue this practice if they choose. A TOP is not required to limit its maximum TTC by the WECC Path Rating value shown in the WECC Path Rating Catalog, provided the TOP has studies demonstrating no SOL exceedance (thermal, voltage, or stability) occurs at the higher TTC value.

WECC Paths and Operations Horizon Business Practices

The TOP and Transmission Service Provider (TSP) try to maximize the amount of electric power transfer from one area to another area given the reliability constraints using MOD-029-2a—Rated System Path Methodology, MOD-028-2—Area Interchange Methodology, or MOD-030-3—Flowgate Methodology to calculate TTCs or AFCs and ATCs for ATC Paths.

The NERC Glossary defines Available Transfer Capability (ATC) as:

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 less Existing Transmission Commitments (including retail customer service), less a

Capacity Benefit Margin, less a Transmission Reliability Margin, plus Postbacks, plus counterflows.

NAESB defines an ATC Path as “Any combination of [points of receipt (POR)] to [points of delivery (POD)] for which ATC is calculated as defined by the TO or the TSP.”¹³

At any time, a Purchasing Selling Entity (PSE)¹⁴, also known as a Transmission Customer, may request a TSP to post a path on OASIS. Requesting a Posted Path¹⁵ is a common practice. A Posted Path is considered an ATC Path since all Posted Paths have a combination of POR(s) to POD(s) for which ATC or AFC are calculated. Once ATC or AFC are posted on OASIS, the PSE can reserve transmission and schedule energy on the Scheduling Path¹⁶.

WECC Paths can be a Scheduling Path (term interchangeably used for ATC Path) or be comprised of several different Scheduling Paths, which Transmission Customers use for reserving transmission.

There is either a one-to-one or one-to-many mapping between a WECC Path and an ATC Path. For example, Path 1, the Alberta to British Columbia Interconnection, is also an ATC Path in which ATC is calculated and posted for sale as one path despite the path comprising three transmission lines. This is an example of a one-to-one mapping between a WECC Path and an ATC Path.

Path 66 is more complicated because, although it comprises three transmission lines, like Path 1, it is operated by three different TOPs, one of which is delegated to manage the TTC and allocate it among the three TOPs. Again, this WECC Path is treated as one ATC Path in which each TSP posts the same ATC Path, POR, and POD on their OASIS. This is another example of a one-to-one mapping between a WECC Path and an ATC Path, albeit slightly different concerning ownership.

¹³ NAESB Business Practice Standards, Abbreviations, Acronyms, and Definition of Terms, March 30, 2020 v 003.3.

¹⁴ Both NAESB WEQ-000 Version 003.3 dated March 30, 2020, and [NERC Glossary, updated March 29, 2022](#), defines the PSE as “The entity that purchases or sells, and takes title to, energy, capacity, and Interconnection Operations Services. PSEs may be affiliated or unaffiliated merchants and may or may not own generating facilities.”

¹⁵ NAESB WEQ-000 Version 003.3 dated March 30, 2020, states that a Posted Path “Shall mean any Control Area to Control Area interconnection; any path for which service is denied, curtailed or interrupted for more than 24 hours in the past 12 months; and any path for which a Transmission Customer requests to have ATC or TTC posted. For this last category, the posting must continue for 180 days and thereafter until 180 days have elapsed from the most recent request for service over the requested path. For purposes of this definition, an hour includes any part of an hour during which service was denied, curtailed or interrupted.”

¹⁶ The [NERC Glossary, updated March 29, 2022](#), defines Scheduling Path as “The Transmission Service arrangements reserved by the Purchasing-Selling Entity for a Transaction.”



Path 14 is an example of one WECC Path that maps to many ATC Paths. Although all the paths identified in this specific map contribute to Path 14, each contributing path is posted as distinct ATC Paths, such as Hemingway-Summer Lake and North Powder-LaGrande.

To summarize, a WECC Path may or may not be an ATC Path. The terms ATC Path, Posted Path, and Scheduling Path are used interchangeably. Regardless of which ATC Methodology is used to determine TTC for a WECC Path or ATC Path/Posted Path/Scheduling Path, the common theme is that TOPs and TSPs adhere to an Open Access Transmission Tariff (OATT) and post TTCs for their ATC Paths on OASIS. This adherence ensures that ATC can be calculated for the class (firm or non-firm) and service increment (hourly, daily, weekly, monthly, yearly) for transmission service offered for sale to Transmission Customers. Likewise, those TSPs that have or are transitioning to a Flowgate Methodology must also post AFC on OASIS.

WECC Paths, SOLs, TTCs, and WECC Path Ratings in the Operations Horizon

In the operations horizon, WECC Paths are no longer associated with uniquely monitored SOLs unless there is a stability limit and the monitored facilities for that stability limit coincide with the WECC Path facilities. For WECC Paths that are also considered ATC Paths, TTCs on those WECC Paths are critical in determining ATC as described above. The standards governing TTC/ATC calculations (the MOD A standards) were written into NAESB WEQ Business Practice Standard WEQ-023 Version 003.3 and were approved by FERC Order 676-J. It is understood that FERC will approve the retirement of the MOD A standards from the NERC Reliability Standards.

Given these changes and others mentioned above, the PTF determined that the reliability (non-business practice) role of WECC Paths, TTCs, and WECC Path Ratings in the operations horizon is to assist in situational awareness. TTC and WECC Path Ratings can serve as a heads-up to operators for potential SOL exceedance. As real-time flow approaches the TTC and WECC Path Rating value, operators can examine the area more carefully for SOL exceedances as indicated through RTAs. This situational awareness is enhanced if the limiting Contingency and monitored element pair underlying the TTC and WECC Path Rating value is known and communicated. Operations planning functions could benefit from being aware of the TTC and WECC Path Rating and the type of limitation (thermal, voltage, stability) associated with the TTC or WECC Path Rating when performing operations horizon studies. If this awareness is considered in the operations planning time horizon, the importance of TTC and WECC Path Rating awareness in real-time operations diminishes.

The PTF concluded that, although TTC and WECC Path Ratings could potentially assist with situational awareness for operations planning and real-time operations, it is not essential for ensuring situational awareness. If the TOPs have determined the limitations associated with dynamic and voltage stability, the critical component for situational awareness is provided by reliability tools such as Supervisory Control and Data Acquisition (SCADA), alarming, state estimation, and RTCA, which are used to perform RTAs as required by the NERC Reliability Standards. Some TOPs rely on TTC as a



trigger point for operator action in Operating Plans. For these TOPs, TTC becomes more important since it is used with RTAs as a mechanism for operations.

The reliability role of TTCs and WECC Path Ratings remains the same regardless of a TOP's chosen ATC Methodology. If a TOP chooses, it may use TTCs to provide situational awareness when performing its operations planning and RTAs. Such reliability assessments are required for TOPs and RCs regardless of a TOP's chosen ATC Methodology.

IV. WECC Paths and the NERC Reliability Standards

The PTF comprehensively evaluated the body of NERC Reliability Standards¹⁷ for references to “Major WECC Transfer Paths,” or “major transfer path within the Western Interconnection” and determined that these references exist in:

1. The NERC Glossary definition of Bulk Electric System;
2. FAC-003-4 and future effective FAC-003-5”;
3. FAC-501-WECC-2; and
4. PRC-023-4 and future effective PRC-023-5.

NERC Glossary Definition of Bulk Electric System

The NERC Glossary definition of Bulk Electric System contains three sections—a “bright line” definition, specific inclusions to the bright line definition, and specific exclusions to the bright line definition. Exclusion three (E3) addresses the exclusion of local networks (LN) from the bright line definition. Part “c” of E3 describes the following characteristic of local networks:

[A local network is] Not part of a Flowgate or transfer path: The LN does not contain any part of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection, or a comparable monitored Facility in the ERCOT or Quebec Interconnections, and is not a monitored Facility included in an Interconnection Reliability Operating Limit (IROL).

FAC-003-4—Transmission Vegetation Management

FAC-003-4—Transmission Vegetation Management and future effective FAC-003-5 references “Major WECC Transfer Path[s]” in the Applicability and Requirements and Measures sections. The Applicability section states that, “Each overhead transmission line operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC” applies to the standard.

¹⁷ <https://www.nerc.com/pa/Stand/Pages/USRelStand.aspx>



Requirement R1 of FAC-003-4 states:

Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s), which are either an element of an IROL, or an element of a Major WECC Transfer Path; operating within their Rating and all Rated Electrical Operating Conditions of the types shown below [Violation Risk Factor: High] [Time Horizon: Real-time]

Requirement R2 states:

Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are not either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below [Violation Risk Factor: High] [Time Horizon: Real-time]

FAC-003-5 will become effective on April 1, 2024. In this revision, requirements R1 and R2 no longer reference Major WECC Transfer Paths; however, the Applicability section references them in the same way that FAC-003-4 does.

FAC-501-WECC-2—Transmission Maintenance

FAC-501-WECC-2 references “Major WECC Transfer Paths” in the Purpose and Applicability sections via its reference to Attachment B.

The Purpose section of FAC-501-WECC-2 states:

To ensure the Transmission Owner of a transmission path identified in Attachment B, Major WECC Transfer Paths in the Bulk Electric System, including associated facilities has a Transmission Maintenance and Inspection Plan (TMIP); and performs and documents maintenance and inspection activities in accordance with the TMIP.

The Applicability section states, “Transmission Owners that maintain the transmission paths in Attachment B.”

Attachment B contains the list of “Major WECC Paths in the Bulk Electric System” and is referenced throughout the standard.

FAC-501-WECC-2 is undergoing revision under WECC Project WECC-0149, Major WECC Transfer Paths in the Bulk Electric System—Path List Revision Process.

PRC-023-4—Transmission Relay Loadability

PRC-023-4 and future effective standard PRC-023-5 reference “a major transfer path within the Western Interconnection” (Attachment B, item B1). Requirement R6 and its subparts reference Attachment B.



Attachment B states:

If any of the following criteria apply to a circuit, the applicable entity must comply with the standard for that circuit:

B1. The circuit is a monitored Facility of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection as defined by the Regional Entity, or a comparable monitored Facility in the Québec Interconnection, that has been included to address reliability concerns for loading of that circuit, as confirmed by the applicable Planning Coordinator.

Conclusions and Recommendations

The Table of Major WECC Transfer Paths was developed in the late 1990s as part of the WSCC Reliability Management System (RMS). There were never any assessments or studies that identified the facilities in the paths as critical. There was a need to identify certain facilities that would apply to several RMS requirements. There was no desire to make the identified requirements applicable to all facilities in the Western Interconnection. In the Definitions section, the RMS agreement identifies the Major WECC Transfer Paths as those transfer paths monitored by the WECC Regional Reliability Coordinators. There is no other mention of the criticality of these paths. FAC-501-WECC-2 is a remaining translation of one of the RMS requirements.

While developing several NERC Reliability Standards, the drafting teams sought a way to identify critical elements in the BES. Including lines that were an element of an IROL was identified as one way of doing so. However, during the initial drafting of the NERC Reliability Standards, WECC maintained that there were no IROLs in the Western Interconnection due to how the system was rated. It was determined that a reference to the Table of Major WECC Transfer Paths could be used for the Western Interconnection, since it was referenced in several WECC Regional Reliability Standards for determining applicability. Because WECC now acknowledges that there are IROLs in the Western Interconnection, and the Reliability Coordinators and Planning Coordinators have identified IROLs and continue to conduct assessments to identify additional IROLs, the reference to the Major WECC Paths is unnecessary. The reference to IROLs would address the reliability need.

PTF Recommendation #3: The PTF recommends the initiation of a SAR to remove references to “Major WECC Paths” in the NERC Reliability Standards and the NERC Glossary. The PTF determined that there is no clear reliability basis for the applicability of these paths in the body of Reliability Standards and the NERC Glossary.

V. WECC Path Ratings and TTC in the Planning Horizon

Though the role and relevance of WECC Paths in the operations horizon have undergone significant changes over the last decade, the role and relevance of paths in the planning horizon have remained relatively the same. Paths have had, and continue to have, an important role in the planning horizon in the Western Interconnection.

Given that WECC Path Ratings are not actively used for assessing system reliability in the operations horizon, it is important to explore why WECC Path Ratings are still considered relevant and important in the planning horizon. Participation in WECC's Path Rating Process encourages planning coordination between different entities and provides investment protection or documentation that could be used for legal purposes.

WECC Path Ratings and the NERC Reliability Standards for the Planning Horizon

NERC Reliability Standard TPL-001 plays a significant role in the reliable planning of the BES. This standard sets forth system performance requirements under the different events specified in Table 1 of the TPL-001. System performance requirements for each event address Facility Ratings, Transient Stability Criteria, Voltage Stability Criteria, and steady-state voltage limits. While this standard is not directly related to WECC Path Ratings, the performance criteria and events in Table 1 of TPL-001 are used when determining WECC Path Ratings in the planning horizon per the Path Rating process described in the WECC Project Coordination, Path Rating, and Progress Report Process.

However, no NERC Reliability Standards require the calculation of Transfer Capability or TTC in the planning horizon. NERC (and soon, NAESB) only requires the calculation of TTC/ATC in the operations horizon, commonly understood to be from real-time through 13 months out.

The Project Coordination, Path Rating, and Progress Report Process

The Project Coordination, Path Rating, and Progress Report Process is a widely practiced, voluntary, process approved by the Reliability Assessment Committee (RAC) that provides coordination, information sharing, data, modeling for WECC base cases, and open, transparent peer review on related studies.

The Project Coordination, Path Rating, and Progress Report Process document contains three processes:

1. **Project Coordination Process**—Helps inform others of the opportunity to participate in or review a project and solicits participation. It is intended to avoid redundant project(s) and to allow a new project to integrate the needs of other WECC member(s) by mutual agreement.
2. **Path Rating Process**—Gives new projects being integrated into the system a Path Rating while recognizing protected ratings of WECC Paths with “Existing” or “Accepted Ratings.” This process also allows for potential rerating of Existing or Accepted Ratings of existing paths due to changes of applied reliability criteria.



3. **Progress Reports Policies and Procedures**—Requires reports from project sponsors about significant additions or changes to the Western Interconnection. WECC members are given the opportunity to review and comment on these additions or changes.

While these processes function separately, in significant projects, they are interrelated and support each other. Taken together, the Project Coordination, Path Rating, and Progress Report Process:

1. Provides procedures for WECC members and others to report on planned projects and to work together to expand the capacity of the Western Interconnection according to member and stakeholder needs.
2. Provides an opportunity to be informed of regional transmission planning conducted by the Transmission Planning Regions and others.
3. Provides project sponsors with an industry-agreed-upon procedure that, when completed, could be used to help demonstrate that coordinated planning has been performed for proposed projects, as may be required to obtain required regulatory approvals.
4. Provides the policies and procedures for notification and reliability assessment requirements related to projects proposed and planned within the Western Interconnection.
5. Provides agreed-upon methods applicable to the transfer capability of transmission facilities (e.g., path flow ratings).
6. Promotes the reliable and coordinated integration of existing and new projects so the use of the system is maximized for all participants.

WECC members are invited to participate in the process. Though WECC members can choose whether to participate in each project review group, the level of participation and collaborative technical discussion in this process has traditionally been high. WECC's Study Subcommittee (StS) maintains the process document and executes the process, and WECC's Reliability Assessment Committee (RAC) is responsible for overseeing and reviewing the process.

In the absence of the Project Coordination, Path Rating, Progress Report processes, it will be more difficult for WECC entities to be informed of new projects, fully participate in relevant planning studies, or require that project sponsors address potential impacts on the respective systems. Adverse interactions that the planning horizon misses could negatively affect the operating horizon and result in stranded assets, underused transmission assets, increased curtailments, operational costs, and potential load shedding. Currently, many of these interactions are uncovered through this process. For a more detailed description of the Project Coordination, Path Rating, and Progress Report Process, see Appendix I.

Protection Provided by the WECC Path Rating Process

A goal of the WECC Path Rating process is for each successive project to have sufficient facilities to support its anticipated power transfer levels before it is placed in service. To facilitate this goal, the



project sponsor and stakeholders identify potential simultaneous interactions with existing Rated Paths, explore potential mitigation options, and obtain a commitment from the project sponsor to implement the agreed-upon mitigation option. If a protected Path Rating exists, there is an expectation that the Path Rating is achievable, based on its Plan of Service, in favorable system conditions in transmission planning studies. Protection for a WECC Path Rating is granted by obtaining an Accepted Rating¹⁸ or by having an Existing Rating¹⁹. The amount of power that a rated Path can transfer is protected from being diminished due to subsequent projects²⁰. That is, if the capability of a path is diminished due to new or modified Transmission or Generation projects, this constitutes an "impact" on a protected rating that requires mitigation. The sponsor of the subsequent project is then responsible for any measures (including costs) associated with those mitigations.

An Accepted Rating granted through participation in the WECC Path Rating Process protects the Transfer Capability (or flow level) associated with the path facilities and the ability to use (sell) the path facility's transmission up to that Transfer Capability level. This protection applies primarily to the owner of the path facilities; however, it may also extend to other associated parties. This Accepted Rating provides some degree of protection to entities that have invested in the transmission system.

The PTF determined that this protection is predicated on the existence and use of WECC Paths and Accepted Ratings, which does not accommodate a non-path approach. Some entities have stopped using (or are considering not using) paths and are choosing a flow-based Transfer Capability methodology for the operations horizon. Entities that adopt a flow-based approach for the operations horizon may follow suit and adopt a similar approach for the planning horizon (or vice versa) and effectively abandon the use of paths altogether. The WECC Path Rating Process is the primary mechanism in the West for protecting entities' ability to use their transfer capability enabled by their transmission investments. As such, the WECC Path Ratings Process implicitly incentivizes WECC entities to adhere to a path-centric paradigm if they want to protect their ability to make the most of investments using the WECC process.

It is also recognized that significant market developments—both regulatory-driven and evolutionary (beyond the Energy Imbalance Market)—are underway in the West. Legislation is underway in some areas that may require future participation in a Regional Transmission Organization (RTO). It is

¹⁸ The 2022 WECC Path Rating Catalog defines an Accepted Rating as A project rating that has been reviewed and accepted by WECC members. This rating is granted by WECC after reviewed planning studies and will be the rating of the project when it is put into service if it is built to specifications. This is a comprehensive rating including both the simultaneous and non-simultaneous transfer capabilities.

¹⁹ The 2022 WECC Path Rating Catalog defines an Existing Rating as Transmission Path Ratings that were known and used in operation as of January 1, 1994.

²⁰ For example, a subsequent project could result in system configuration changes that cause an SOL exceedance to occur when the WECC Path is transferring power at its "Accepted Rating".



reasonable to consider that these future developments in the West may not use a path-based approach but might rely on a flow-based approach.

PTF Recommendation #4: The PTF recommends that the WECC Path Rating Process be reviewed and updated, replaced, or supplemented with a new process to ensure that entities who no longer use paths (or historical “path” concepts) or intend to move away from using paths in the planning horizon have a WECC process that gives them similar benefits. This recommendation should be addressed in the next two years to allow enough time to systematically address approaches that are not path-centric.

PTF Recommendation #5: Open and transparent coordination of Transfer Capabilities for the planning horizon in the Western Interconnection is primarily accomplished through participation in the WECC Path Rating Process. If this process is ever updated, replaced, or supplemented, any future process(es) should facilitate the coordination of Transfer Capabilities across the Western Interconnection and should maintain the open and transparent nature of the present WECC Path Rating Process.

VI. Conclusions and Summary Recommendations

For decades, WECC Paths and WECC Path Ratings have been cornerstones for planning and operations in the Western Interconnection. Historically, WECC Paths were central to operations horizon activities (real-time operations reliability, operations scheduling, TTC allocation, operations planning), and planning horizon activities (determining WECC Path Ratings, planning coordination, reliability assurance, and investment protection).

Over the last decade, several significant changes took place that resulted in a shift in the role and relevance of WECC Paths and WECC Paths Ratings in the operations horizon from a path-centric operational paradigm to a non-path-centric one. Because of these changes, the role and relevance of WECC paths and WECC Path Ratings in the operations horizon have significantly diminished. Today, while WECC Paths have a role in business practices associated with TTC calculation and allocation among WECC Path owners, the reliability role of WECC Paths (and associated TTC and WECC Path Ratings) is primarily to assist with situational awareness in the operations horizon, though it is not essential to ensure situational awareness. If the TOPs have determined the limits associated with transient and voltage stability, the critical component for situational awareness is provided by reliability tools such as SCADA, alarming, state estimation, and RTCA. These changes in the operations horizon have resulted in significant improvements in operations reliability and are aligned with NERC’s recommendation in response to WECC initiative ORG3 in NERC’s letter to WECC related to the September 11, 2011, event.



While the role and relevance of WECC Paths and Path Ratings in the operations horizon have decreased significantly, WECC Paths and Path Ratings play a prominent role in the planning horizon. This is reflected in WECC's voluntary Project Coordination, Path Rating, and Progress Report Process, which has proven beneficial to WECC stakeholders for awareness, coordination, reliability, and investment protection.

The Western Interconnection is changing, and the pace of change is becoming more challenging. Significant market developments are occurring in the West, and legislation is underway in some areas that may require future participation in a Regional Transmission Organization (RTO). These future developments in the West may not use a path-based approach but might rely on a flow-based approach. Some entities are already making this transition. Though the future of ATC methodologies, markets, and RTOs in the West is unknown, it is important that entities take proactive steps to prepare for changes and challenges that could arise. The five recommendations outlined below can help prepare entities now and in the future by better positioning the interconnection to adapt to potential changes more quickly and seamlessly.

Recommendations Summary

PTF Recommendation #1: The PTF recommends abandoning the term “Path Operator” in discourse and written documents and replacing it with NERC functional entity terms such as Transmission Operator, Balancing Authority, and Reliability Coordinator, and appropriate terms from the NERC and NAESB glossaries. The term “Path Operator” or “Path Manager” could exist in individual company contracts. The PTF is not recommending changing these contracts; however, the PTF recommends that the term not be used in any future contracts to avoid confusion, if practicable.

PTF Recommendation #2: The PTF clarifies that a WECC Path Rating is not required to serve as a maximum TTC value for the operations horizon; however, entities may continue this practice if they choose. A TOP is not required to limit its maximum TTC by the WECC Path Rating value shown in the WECC Path Rating Catalog, provided the TOP has studies demonstrating no SOL exceedance (thermal, voltage, or stability) occurs at the higher TTC value.

PTF Recommendation #3: The PTF recommends the initiation of a SAR to remove references to “Major WECC Paths” in the NERC Reliability Standards and the NERC Glossary. The PTF determined that there is no clear reliability basis for the applicability of these paths in the body of Reliability Standards and the NERC Glossary.



PTF Recommendation #4: The PTF recommends that the WECC Path Rating Process be reviewed and updated, replaced, or supplemented with a new process to ensure that entities who no longer use paths (or historical “path” concepts) or intend to move away from using paths in the planning horizon have a WECC process that gives them similar benefits. This recommendation should be addressed in the next two years to allow enough time to systematically address approaches that are not path-centric.

PTF Recommendation #5: Open and transparent coordination of Transfer Capabilities for the planning horizon in the Western Interconnection is primarily accomplished through participation in the WECC Path Rating Process. If this process is ever updated, replaced, or supplemented, any future process(es) should facilitate the coordination of Transfer Capabilities across the Western Interconnection and should maintain the open and transparent nature of the present WECC Path Rating Process.

VII. Appendix I

The Project Coordination, Path Rating, and Progress Report processes promote open and transparent transmission planning for significant projects.²¹ The Path Rating Process also promotes future system reliability by identifying the facilities each successive planned project must bring with it to support its requested level of transfer capability. The Project Coordination, Path Rating, and Progress Report processes are applicable when developing a significant transmission project, and:

- a. Provides procedures for WECC members and others to report on planned projects and to work together to expand the capacity of the Western Interconnection according to member and stakeholder needs.
- b. Provides an opportunity to be informed of regional transmission planning conducted by the Transmission Planning Regions and others.
- c. Provides project sponsors with an industry-agreed upon procedure that, when completed, could be used to help demonstrate that coordinated planning has been performed for proposed projects, as may be required to obtain the needed regulatory approvals.
- d. Provides the policies and procedures for notification and reliability assessment requirements related to projects proposed and planned within the Western Interconnection.
- e. Provides agreed upon methods applicable to the transfer capability of transmission facilities (e.g., path flow ratings).
- f. Promotes the reliable and coordinated integration of existing and new projects so the use of the system is maximized for all participants.

I. Project Coordination Process

It helps inform others of the opportunity to participate in or review a project and solicits participation. It is intended to avoid redundant project(s) and to allow a new project to integrate the needs of other WECC member(s) by mutual agreement. Through this process, WECC members cooperate to identify transmission expansion projects that may benefit the region. By following this process, project sponsors might also address specific issues related to regulatory approval of their projects.

- Project sponsor(s) submit a project description to the WECC RAC and StS members.

²¹ Pages 7-8 of the Project Coordination, Path Rating, and Progress Report Process states:

“Projects subject to these policies and procedures include:

1. Generation projects 200 MW or greater connected to the transmission system through step-up transformers;
2. All new and upgraded transmission facilities with voltage levels over 200 kV; and
3. Any facilities that may have a significant impact on the reliability of the Western Interconnection.”



- WECC members can decide for themselves whether they want to participate in a Project Coordination Review Group (PCRG) as the notices are sent to all RAC and StS members and primary member representatives.
- Project sponsor can request a “Waiver of Significant Impact Status” by submitting a project description and supporting documentation to the RAC and StS members.
- If a Waiver is **not** granted, the project sponsor will form the PCRG and submit the Project Coordination Report according to the Project Coordination Process. The project sponsor will also submit Progress Reports in accordance with the Progress Report Process outline in the section entitled “Progress Report Process.”

II. Path Rating Process

The Three-phase Path Rating process is voluntary and invites interested subject matter experts to participate in a review of proposed projects. Its major strengths include:

- All WECC members are invited to participate—it is the choice of each WECC member to opt in or out of a Project Review Group (PRG);
- A fundamental goal of the review process is identifying potential simultaneous interactions with existing Rated Paths, then exploring potential mitigation options;
- The level of collaborative technical discussion has been very high, and factual reports are produced.

The objectives of the Path Rating Process are to:

- Promote the development of an efficient, reliable electric transmission system;
- Balance the competing interests of protecting the Accepted Ratings and Existing Ratings of existing paths;
- Balance the competing interests of potential changes to the Accepted Ratings or Existing Ratings of existing and new paths due to changes in reliability criteria used for the previous Path Rating study process; and
- Encourage the economic, reliable, and environmentally sound expansion of the electric transmission system.

If the project sponsor requests an Accepted Path Rating for the project, the steps are as follows:

- **Phase 1:** Starts with project sponsor formally notifying the RAC and StS. The project sponsor conducts sufficient studies to demonstrate that the proposed non-simultaneous rating of the path associated with the project is achievable. The project sponsor prepares a Comprehensive Progress Report (CPR) documenting study results and describing project details, including a preliminary Plan of Service. At the end of this phase, the proposed project receives a Planned Rating.



- **Phase 2:** Starts with a process to determine the other planned projects that must be included in the pre-project base cases to form the baseline topology assumptions. Project sponsor forms a PRG to review and approve the base cases, review the project's Plan of Service, validate the Planned Rating, and assess the simultaneous Transfer Capability effects and the impacts of the project on neighboring systems based on the base cases. The project sponsor and the PRG document all the studies and findings in the PRG Phase 2 Rating Report. Phase 2 is complete when the Phase 2 Rating Report is accepted by the RAC and the project is granted an Accepted Rating.
- **Phase 3:** A monitoring phase where the project progress is monitored and major changes in assumptions and conditions are evaluated to ensure the Accepted Rating is maintained. Phase 3 is complete when the project is placed into service.

III. Progress Report Process

The WECC Progress Report Policies and Procedures provide comprehensive direction about requirements for notification and reliability assessment related to projects planned in the Western Interconnection. This document gives direction for all generation and transmission projects that may have a significant impact on reliability. StS will review the Progress Reports submitted.

If a "Waiver of Significant Impact" status is **not** granted or not sought, the project sponsor will perform studies and submit Progress Reports in accordance with the Progress Report Process. These reports should contain enough meaningful data to stimulate constructive discussion with the intent to share information and experience with WECC members. Three types of Progress Reports are required:

Initial Progress Report

Soon after a project is made public, the project sponsor or interconnecting utility will submit the Initial Progress Report to WECC staff and StS members. The content of the Initial Progress Report will depend on the design status of the system upgrade, addition, or project, but at a minimum should include:

- A brief physical description of the project, including points of interconnection, equipment capacities and voltages, and expected ratings;
- The planned operating date;
- The project status, including where the project is situated in the planning process and a tentative schedule for completion; and
- The facility owner name and a contact person (including title or position, address, telephone number, and email address) who can answer questions and comments or direct them to people who can respond.

Comprehensive Progress Report

The purpose of the Comprehensive Progress Report is for the project sponsor to demonstrate that the project sponsor has met the obligations to be compliant with the NERC Reliability Standards and WECC Criteria. The content of the Comprehensive Progress Report should include the following, with numbers one through five being mandatory:

1. The requirements specified under the Initial Progress Report.
2. A one-line and geographic diagram of the project showing points of interconnection, metering points, adjacent path locations, and control area boundaries.
3. Models and data that can be used by transmission planning software programs. This may include a block diagram, transfer functions, equations, and complete descriptions of the software modeling needed to study the new facility using transmission planning software programs.
4. A project milestone schedule that covers the current period through initial operation of the project. This schedule should be sufficiently detailed to allow for monitoring by the StS members.
5. A summary of transmission studies performed, or information on where the transmission studies can be located. Specific list of WECC contingencies must be evaluated for impacts on other systems.

If the sponsor is planning to go through the Path Rating Process, then the Comprehensive Progress Report must also include the following (six through 11):

6. A statement describing the Transfer Capability associated with the project, including the impact on other systems, the impact on existing transfer path ratings, and the project sponsor's compliance with the NERC Reliability Standards and WECC Criteria. This statement should include a declaration that indicates whether the project will require obtaining an accepted Transmission Path Rating or rerating.
7. A description of the interconnected system conditions and or requirements on which the proposed Transfer Capability rating is based or required by the project.
8. The operating conditions including flows on key transmission lines and paths, load levels, and generation status that allow the project to operate within the guidelines defined in the NERC Reliability Standards and WECC Criteria.
9. The potential impacts on transmission facilities including non-simultaneous ratings and simultaneous path interactions.
10. A representative list of power flow and stability cases run that demonstrate the project sponsor's compliance with NERC Reliability Standards and WECC Criteria.
11. Representative power flow outage results and stability plots that demonstrate the project sponsor's compliance with NERC Reliability Standards and WECC Criteria.



Annual Progress Reports

The project sponsor or interconnecting utility will submit the Progress Report to WECC staff and the StS chair every year in which an Initial Progress Report or Comprehensive Progress Report is not submitted. These reports will be filed annually for projects where there have been no significant changes in Plan of Service, capacity, or in-service dates since the Comprehensive Progress Report was filed. These reports must also include non-significant additions or revisions to the projects. The Annual Progress Reports, at a minimum, will include:

- The requirements specified under Initial Progress Report and any additions or changes related to these requirements; and
- Changes to any or all items specified under the previously submitted Comprehensive Progress Report.



Approving Committee, Entity, or Person	Approval Date
Joint Guidance Committee	April 7, 2023

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