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Technical Session The Interregional Transfer Capability Study December 10, 2024

Background

In June 2023, Congress passed the <u>Fiscal Responsibility Act of 2023</u>, which included a provision for NERC to perform a study "*in consultation with each Regional Entity and each transmitting utility … to perform an Inter-regional Transfer Capability Study*" (ITCS), to be delivered to FERC by December 2, 2024, with a public comment period to follow. After the end of FERC public comment period, FERC will have one year to submit a report on its conclusions to Congress including any recommendations for statutory changes. The legislation identifies three study elements:

- 1. Current total transfer capability between each pair of neighboring transmission planning regions;
- 2. A recommendation of prudent additions to the total transfer capability between each pair of neighboring transmission planning regions that would demonstrably strengthen reliability within and among such neighboring transmission planning regions; and
- 3. Recommendations to meet and maintain total transfer capability together with such recommended prudent additions to total transfer capability between each pair of neighboring transmission planning regions.

Since that time, NERC has worked closely with the Regional Entities, stakeholders, and consultants to scope the project, collect necessary data and information, perform the analysis, and assess the results. These results have been developed and shared with stakeholders through a series of reports addressing each element of the study (these reports can be found on the NERC ITCS <u>webpage</u>).

For this technical session, Saad Malik, NERC manager of Transmission Assessments, and Vic Howell, WECC director of Reliability Modeling and Assessments, will discuss the ITCS and address questions such as:

- How is this assessment different from other transmission planning studies being performed in the West?
- What Western assumptions and parameters were used in the ITCS?
- What are the key takeaways from the ITCS that will be useful to transmission planners? To state and federal regulators?
- How should the ITCS findings and recommendations be interpreted and used?
- What is next for the ITCS?
- What did we learn from the process that we will want to carry forward as part of our reliability assessment work?

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Strengthening Reliability through the Energy Transformation: NERC ITCS

Saad Malik, Manager Transmission Assessments (NERC) Vic Howell, Director Reliability Assessments and Modeling WECC Board Technical Session, December 2024



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Long-Term Challenges Emerge



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FRA of 2023: Required Study Elements

Fiscal Responsibility Act (FRA), Section 322

In consultation with the Regional Entities and transmitting utilities, NERC shall conduct a study containing three elements:

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- **1.** Current total transfer capability, between each pair of neighboring transmission planning regions.
- 2. A recommendation of **prudent additions to total transfer capability** between each pair of neighboring transmission planning regions that would demonstrably strengthen reliability within and among such neighboring transmission planning regions.
- 3. Recommendations on **how to meet and maintain the identified total transfer capability**, together with the prudent recommended additions in #2.

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ITCS Timeline Overview

The following is a timeline of key activities:



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ITCS Study Overview

Inside Scope

- Common modeling approach and coordinated results with industry
- Assessed adequacy of North American interregional transmission system under extreme weather
- Identifies areas that may suffer energy deficiencies under extreme weather and will benefit from additional transfer capability
- Reliability focus
- Sets the stage for more in-depth studies in future

Outside Scope

- Alternative modeling approaches used by planning areas – ITCS results may differ from other analyses
- Does not prescribe specific projects
- Does not evaluate market-based dispatch, operational mitigations, economics or policy
- Is not the final step in the process (FERC will request public comments)
- Quantified impacts of planned projects
- Capacity expansion planning



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Transfer Capability Observations and Findings

	Varies Widely	 Current total transfer capability changes (TTC) as percentage of peak load = 1% to 92% between transmission planning regions, varying greatly depending on season and online generation dispatch
食	Transmission May Not Always be a Solution	 New transmission may not always increase transfer capability Voltage and dynamic stability limitations may determine how much power can be transferred
	Resource Evaluation Cannot be Overlooked	 Many planning areas do not have sufficient committed generation to meet demand under extreme conditions (2034) Canadian system critical to this evaluation
	Higher TTCs Will Require Significant Planning and System-Wide Reinforcements	 TTC additions will require more granular stability studies once specific projects are evaluated Meaningful TTC additions may not be completed by 2034 without regulatory/legislative changes
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What are Technically Prudent Additions to Transfer Capability?



FERC precedent provides that "prudence" means a determination of whether a reasonable entity would have made the <u>same decision</u> in <u>good</u> <u>faith</u> under the <u>same</u> <u>circumstances</u>, and at the <u>relevant point in time</u>.

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Part 2: Pipe and Bubble Model









Six-Step Prudent Addition Process



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Part 2 Key Findings

North American system is vulnerable to extreme weather One-size fit all transfer capability requirement may be ineffective

Increased interregional transmission could mitigate energy deficiencies

Resource assumptions are critical

Transmission upgrades alone will not address all risks



Prudent Addition Recommendations



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Prudent Addition Recommendations

Table ES.1: Recommended Prudent Additions Detail						
Transmission Planning Region	Weather Years (WY) / Events	Resource Deficiency Hours	Maximum Deficiency (MW)	Additional Transfer Capability (MW)	Interface Additions (MW)	
ERCOT	Winter Storm Uri (WY2021) and nine other events	135	18,926	14,100	Front Range (5,700) MISO-S (4,300) SPP-S (4,100)	
MISO-E	WY2020 Heat Wave and two other events	58	5,715	3,000	MISO-W (2,000) PJM-W (1,000)	
New York	WY2023 Heat Wave and seven other events	52	3,729	3,700	PJM-E (1,800) Québec (1,900)	
SPP-S	Winter Storm Uri (WY2021)	34	4,137	3,700	Front Range (1,200) ERCOT (800) MISO-W (1,700)	
PJM-S	Winter Storm Elliott (WY2022)	20	4,147	2,800	PJM-E (2,800)	
California North	WY2022 Heat Wave	17	3,211	1,100	Wasatch Front (1,100)	
SERC-E	Winter Storm Elliott (WY2022)	9	5,849	4,100	SERC-C (300) SERC-SE (2,200) PJM-W (1,600)	
SERC-Florida	Summer WY2009 and Winter WY2010	6	1,152	1,200	SERC-SE (1,200)	
New England	WY2012 Heat Wave and two other events	5	984	700	Québec (400) Maritimes (300)	
MISO-S	WY2009 and WY2011 summer events	4	629	600	ERCOT (300) SERC-SE (300)	
TOTAL				35,000		

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Recommendations to Meet and Maintain Transfer Capability

Meet Transfer Capability

- Upgrade transmission
- Resources
- Remedial Action Schemes (RAS)
- Dynamic Line Ratings (DLR)
- Advanced conductors
- Power flow control devices

Maintain Transfer Capability

- Planning studies
- Coordination with neighbors
- Regulatory/policy mechanisms or NERC standards

Grid Enhancing Technologies



Multiple Options to Address Prudent Addition Recommendations

- Internal resources
- Transmission enhancements to neighbors
 - Resource evaluations
 - Siting and permitting
 - Cost-allocation
- Demand-side management
 - Demand shifting
 - Energy efficiency
 - Demand response
 - Storage

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How to Use the Report?

- Understand analysis limitations
- Identify existing projects
- Recommendations are directional
- Prioritize high-risk areas
- Consider implementation barriers
 - Lack of a process and forum to consider large multiregional transmission opportunities

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- Cost allocation and recovery
- Seams issues
- Siting and permitting
- Consider each Region's unique circumstances
- Consider a combination of multiple strategies

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Western Interconnection Focus

Foundational principle - consistent approach and assumptions

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- Each area has "their way"
- Western Interconnection generally views Transfer Capability through the lens of WECC Paths
 - The ITCS provides another perspective on transfer analysis





Area Interchange vs. WECC Paths



Existing Paths

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Area Interchange vs. WECC Paths

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	Area Interchange	WECC Paths
Approach	Examines source/sink area transfers and their impacts on transmission	Examines WECC Path facility transfers and their impacts on transmission
Flexibility	Source/sink areas are user defined	WECC Paths are composed of specific facilities
ATC Calculation	Used in Area Interchange Methodology and Flowgate Methodology	Used in Rated System Path methodology
Financial	No connection to transmission investments	WECC Paths have "ratings," which protect transmission investments

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What did we learn, and what's next?

We learned

- New approaches, methods, and tools
- Significance of source/sink area definition

What's next

 Integrate transmission assessment into Long-term Reliability Assessments and Western Assessment of Resource Adequacy

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• 2025 Scorecard item: *"Improve resource adequacy assessments (RA) by expanding energy assessment capabilities and using results from transfer capability analysis to better model transmission constraints."*

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Questions and Answers

