

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Establishing Interregional Transfer Capability
Transmission Planning and Cost Allocation
Requirements

Docket No. AD23-3-000

**EASTERN INTERCONNECTION PLANNING COLLABORATIVE (EIPC)
RESPONSE TO POST-WORKSHOP QUESTIONS**

Post-Workshop Questions for Comment

For purposes of this discussion, we continue to use the following terms as defined in the Supplemental Notices:¹

- The definition of Interregional Transfer Capability is consistent with total transfer capability as defined in the Commission’s regulations: “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, or such definition as contained in Commission-approved Reliability Standards.” 18 C.F.R. § 37.6(b)(1)(vi) (2021). In the context of Interregional Transfer Capability, an “area” in the above definition would be a transmission planning region composed of public utility transmission providers.
- Transfer Transmission Facility is defined as a transmission facility that increases the amount of electric power that can be moved or transferred reliably from one transmission planning region to another by way of all transmission lines (or paths) between those transmission planning regions. For purposes of geographic location, a Transfer Transmission Facility may be located entirely within a single transmission planning region (i.e., either a local transmission facility or a regional transmission facility), or it may span two or more transmission planning regions (i.e., an interregional transmission facility).

¹ Supplemental Notices, *supra* note 1.

Valuing Interregional Transfer Capability

1. To what extent can Interregional Transfer Capability mitigate risks that may occur across a wide geographic area (e.g., the shedding of load, correlated generation outages, or transmission outages due to the same extreme weather event, fuel disruptions, cyber-attacks, or physical security events)?
 - a. Could evaluating how Interregional Transfer Capability can mitigate such risks serve as a useful framework for determining whether, and at what minimum amount, Interregional Transfer Capability is necessary to ensure reliability and just and reasonable rates? If so, how could this framework help to inform an analysis of the appropriate amount of Interregional Transfer Capability?
 - b. Would such a framework be useful in determining the benefits of a Transfer Transmission Facility as well?

EIPC Response: The transmission system enables the delivery of economic transfers, firm capacity and emergency power purchases. A robust transmission system helps maintain reliability between regions during extreme events, when reliable power is needed the most. Maintaining sufficient Interregional transfer capability will become more important to preserve reliability during more frequent frigid winters and extreme hot summer peak loads, and in response to potential catastrophic loss of infrastructure that impacts a wide portion of the Interconnection. Understanding and planning to the appropriate level of Interregional transfer capability will lead to enhanced reliability, enabling the continuous delivery of electric power to customers during extreme weather, fuel supply disruptions and physical or cyber-attacks. [*EIPC Testimony, Section III, Page 4*]

2. During the workshop, participants identified several metrics that could be used to evaluate the need for and benefit of a minimum amount of Interregional Transfer Capability. Participants mentioned metrics including loss of load expectation, expected unserved energy, planning reserve margin, value of lost load, grid stress, First Contingency Incremental Transfer Capability,² and avoided transmission costs, among others.

² NERC *Transmission Transfer Capability*, reference document (May 1995), available at <https://www.nerc.com/pa/Stand/MOD%20V0%20Revision%20RF%20DL/atctdt-1105cca.pdf>.

- a. What metrics should be used to evaluate the *need* for a minimum amount of Interregional Transfer Capability, and why?
- b. What metrics should be used to evaluate the *benefit* of a minimum amount of Interregional Transfer Capability, and why?

EIPC Response: EIPC agrees that metrics should be developed and used to determine the need for and benefit of a minimum Interregional transfer capability. As outlined in the testimony provided at the December 22 Workshop, EIPC would need DOE and NOAA support to help define “Extreme Weather” and understand its impact on load, generation performance and transmission performance. Specifically, EIPC would need assistance in the following tasks identified as part of a 3-step approach discussed at the workshop.

Step 1 – Metric Development:

- Work with the industry, the United States Department of Energy (“DOE”) National Laboratories and Technology Centers (“National Labs”), and the National Oceanic and Atmospheric Administration (“NOAA”) to help develop a metric to quantify the necessary interregional transfer capability for extreme events covering a wide area.
 - Engage NOAA and National Labs experts to help identify extreme weather patterns that have an impact on the Eastern Interconnection (EI) and assess the impact on load and generation performance. The focus should be on extreme events that require the exchange of significant volumes of interregional power transfer, such as extreme temperatures. [*EIPC Testimony, Section III, Page 5*]
- c. Should a common set of these metrics be used consistently across transmission planning regions to evaluate the need for and benefits of a minimum amount of Interregional Transfer Capability? Why or why not? If so, which metrics should be included in that common set?

EIPC Response: The EIPC believes that once a common set of metrics is determined, it should be applied consistently across the regions. As stated in its testimony, the EIPC is in a unique position to assist in the development of metrics and a methodology that would be informative to transmission planners to facilitate their determination of the appropriate range of interregional transfer capability (used interchangeably with minimum interregional transfer criteria) between regions under extreme conditions. The resultant range would be informative to help ensure adequate transfer capability between regions, enhancing both reliability and resilience as the nation faces more extreme weather and other transmission-related challenges.

While the EIPC would be focusing its validation analysis on the EI, ultimately the minimum interregional transfer criteria effort could result in a transmission driver used by transmission planners across the country to develop the necessary transmission

EIPC Response: The existing system has proven to be reliable. [See Response to Q. 3.a above] One such example is the February 21 Winter Storm Uri, where over 15,000 MW was transferred from the North East to the South/South West/Western portions of the EI.

This effort to establish a minimum requirement for Interregional Transfer Capability is a forward-looking analysis in an effort to recognize the impact of extreme events on a power system with many more intermittent resources. [EIPC Verbal testimony on December 5th]

Developing an Interregional Transfer Capability Requirement

A requirement for a minimum amount of Interregional Transfer Capability would apply to public utility transmission providers. As you consider the following questions, please describe how developing a minimum Interregional Transfer Capability requirement may differ depending on whether it applies to a Regional Transmission Organization or Independent System Operator (RTO/ISO) or those public utility transmission providers in a non-RTO/ISO transmission planning region, as applicable.

EIPC Response: The technical transmission planning analysis to ensure reliability is the same regardless of the structure of the Planning Coordinator. To determine a minimum interregional transfer capability and identify any necessary system enhancements a common methodology across all regions is needed.

4. What are the advantages and disadvantages of the following approaches to establishing a minimum amount of Interregional Transfer Capability, and determining who should identify that minimum amount? Could these different approaches be combined? If so, how? Do your responses change based on whether or not non-public utility transmission providers are considered in the development of an Interregional Transfer Capability requirement?
 - a. A set of principles developed by the Commission. These principles would inform the processes that public utility transmission providers would need to implement to determine what minimum amount of Interregional Transfer Capability is needed.

EIPC Response: The Commission should recognize the value of consistent analytics and metrics across an Interconnection, while also respecting regional differences as to transfers between neighboring regions. EIPC proposes to address this by developing common analytics and metrics in recognition of the fact that the Eastern Interconnection is one large, interconnected machine and that consistency in the analysis and metrics is provided to address reliability concerns across the Interconnection. By contrast, a panoply of different

analyses and metrics would inevitably lead to one region potentially leaning on its neighbors or causing unaccounted for flows on other systems. [*EIPC Testimony, Section IV, Page 6*]

- b.** An economic analysis that compares the incremental benefits and costs of increasing Interregional Transfer Capability between transmission planning regions and determines the minimum amount of Interregional Transfer Capability based on the comparison of benefits and costs. This analysis could be conducted by public utility transmission providers in neighboring transmission planning regions, in two or more transmission planning regions within an interconnection, or in each interconnection.

EIPC Response: The primary purpose of establishing a minimum Interregional Transfer Capability requirement is to enable the appropriate level of interregional transfers for maintaining system reliability under extreme weather, physical and/or cyber events.

- c.** A standardized minimum amount of Interregional Transfer Capability based on a single characteristic of the transmission planning region(s), like a percentage of peak load or the single largest contingency. Do your responses change based on whether or not non-public utility transmission providers are considered?

EIPC Response: EIPC believes that the Metric Development Stage 1 initiative would result in a range of transfer capabilities needed to offset the impacts of extreme temperatures. It is unlikely that a common “minimum” requirement would be practical given that Planning and Balancing Authority size, topology, and extreme weather exposure (winter vs. summer) vary significantly across the country. A “range” would be more appropriate since it could reflect these regional differences. [*EIPC “Talking Points” for 3/2/23 FERC Meeting*]

- d.** A standardized formula to determine a minimum Interregional Transfer Capability requirement based on identified characteristics of the transmission planning region(s), such as peak load, ramping needs, generation outages, and variability of generation and load. Do your responses change based on whether or not non-public utility transmission providers are considered?

EIPC Response: See Response to Q.4.a above.

- e.** A transmission planning study that assesses unconstrained power flows between transmission planning regions to optimize the economic and reliability benefits of Interregional Transfer Capability. This approach would determine the minimum amount of Interregional Transfer Capability based on the level of interregional power flows during normal and emergency

conditions. The goal of this effort should not be to optimize the economics of transfer capability. The focus should remain on emergency transfer capability under extreme events.

EIPC Response: See Response to Q.2.a above & EIPC’s Three Step Approach. [*EIPC Testimony, Section III, Page 5*]

5. Some participants in the workshop recommended a transmission planning study to determine a minimum amount of Interregional Transfer Capability. What is the appropriate geographic scope of a transmission planning study for Interregional Transfer Capability?

EIPC Response: EIPC proposes to address this by developing common analytics and metrics in recognition of the fact that the Eastern Interconnection is one large, interconnected machine and that consistency in the analysis and metrics is provided to address reliability and resource adequacy concerns across the Interconnection. [*EIPC Testimony, Section IV, Page 6*]

While the EIPC would be focusing its validation analysis on the Eastern Interconnection, ultimately the minimum interregional transfer criteria effort could result in a transmission driver used by transmission planners across the country to develop the necessary transmission reinforcements needed to maintain the appropriate level of interregional transfer capability. [*EIPC Testimony, Section III, Pages 4-5*]

- a. What are the benefits and drawbacks of a transmission planning study between neighboring transmission planning regions to determine the minimum amount of Interregional Transfer Capability between those regions?
- b. What are the benefits and drawbacks of an interconnection-wide study to determine the minimum amount of Interregional Transfer Capability for a transmission planning region with its neighboring transmission planning regions?
- c. To what extent could existing interregional organizations (e.g., Eastern Interconnection Planning Collaborative and Western Electricity Coordinating Council) support an interconnection-wide transmission planning study for Interregional Transfer Capability?

EIPC Response: EIPC has proposed such a study for the Eastern Interconnection. [*EIPC Testimony, Section III, Pages 4-5*]

- d. What type of analysis should an Interregional Transfer Capability planning study include? For example, would a study consider the “single largest contingency” or “common mode failures”?

EIPC Response: The type of analysis envisioned is described in Steps 2 and 3 of the Three Step process proposed by EIPC:

- Step 2 – Scenario Analysis:
 - EIPC would work with National Labs and NOAA experts to develop probable extreme weather patterns in order to establish source/sink combinations.
 - EIPC would develop a future Eastern Interconnection Base Case (5 -10-year) reflecting the changing resource mix. This process would begin with updating the most recent MMWG Series Planning Models.
 - EIPC would develop the contingency list (standard plus extreme event contingencies) in accordance with current NERC reliability standards.
 - EIPC would perform analysis to assess transmission adequacy by iteratively raising source generation and sink load, applying contingencies and identifying violations.
- Step 3 – Results Validation (Comparison of Scenario Analysis Results to Metric):
 - EIPC would identify the transfer levels at which violations are identified, including an initial value.
 - EIPC would perform analysis to trend violations that are common across scenarios.
 - EIPC would compare scenario analysis results to historical NERC Transmission Loading Relief issuance, market congestion, and applicable emergency procedures.
 - Transmission reinforcements may be needed when violations appear at transfer levels below a minimum interregional transfer level metric.

[EIPC Testimony, Section III, Page 5]

- e. Should a transmission planning study for Interregional Transfer Capability require that neighboring transmission planning regions consider Transfer Transmission Facilities that would cross between the interconnections?

EIPC Response: The EIPC proposes that each Interconnection should first focus on the development of common Minimum Interregional Transfer Metrics and Methodology within each Interconnection. A separate Phase 2 initiative can then be undertaken to evaluate the Interregional Transfer capability between Interconnections. The initial work within each Interconnection can be used to inform the Phase 2 initiative to evaluate Interregional Transfers between Interconnections.

6. Ahead of developing a transmission planning study, as suggested in question 5, some workshop participants raised the idea of the Commission, or public utility transmission providers in each transmission planning region, establishing an easily quantifiable minimum Interregional Transfer Capability requirement (e.g., a region-specific default amount, based on criteria such as a percentage of peak load or the single largest contingency) that could later be revised up or down to reflect the region-specific transmission needs or the additional benefits of Interregional

Transfer Capability after a more detailed interconnection-wide Interregional Transfer Capability study is completed.

EIPC Response: EIPC does not support requiring transmission planning regions to use a simplistic “easily quantifiable” minimum Interregional Transfer Capability requirement that cannot demonstrate a true need, and which may not stand up to a prudency review during state CPCN proceedings. The development of a range of appropriate transfer capabilities that respects regional differences would be more defensible. EIPC supports engaging experts to work with the industry to determine the appropriate metrics to quantify the appropriate range of Interregional Transfer Capability requirements as follows:

Step 1 – Metric Development:

- Work with the industry, the United States Department of Energy (“DOE”) National Laboratories and Technology Centers (“National Labs”), and the National Oceanic and Atmospheric Administration (“NOAA”) to help develop a metric to quantify the necessary interregional transfer capability for extreme events covering a wide area. *[EIPC Testimony, Section III, Page 5]*

- a. How would the Commission, or public utility transmission providers within a transmission planning region, define region-specific default minimum Interregional Transfer Capability requirements, which could be revised after an interconnection-wide Interregional Transfer Capability study is completed?

- b. What are important considerations for defining a metric, like those in question 2 above, used to evaluate the need for and benefits of region-specific default Interregional Transfer Capability requirements?

- c. What are important considerations for an interconnection-wide Interregional Transfer Capability study for revising region-specific default Interregional Transfer Capability requirements?
 - i. How would you measure and use the benefits of mitigating risk through Interregional Transfer Capability to revise up or down region-specific default Interregional Transfer Capability requirements?

 - ii. How would you use benefits in addition to reliability and resilience risk-mitigating benefits to revise up or down region-specific default Interregional Transfer Capability requirements?

- iii. What region-specific transmission needs could be used to revise up or down region-specific default Interregional Transfer Capability requirements?
7. Should the need for Interregional Transfer Capability be considered within existing regional transmission planning and interregional transmission coordination processes or in a new, separate transmission planning process? Are there other ways to consider Interregional Transfer Capability given the existing processes already underway?

EIPC Response: The EIPC and its member regions stand ready to assist the Commission in the development of a methodology for the identification of the appropriate amount of incremental interregional transfer capability that would be available to address multi-regional, if not interconnection-wide extreme events. Such events could include widespread physical or cyber-attacks on critical infrastructure such as natural gas pipelines serving multiple regions within the Interconnection or extreme weather events that impact a wide area within the Interconnection. We view this challenge as an extension of the interregional planning coordination currently performed by our members individually, and collectively through EIPC. [*EIPC Testimony, Section I, Pages 3-4*]

Today, transmission planners perform analyses to review their respective Balancing Authorities connections to other Balancing Authorities in order to determine and plan for an appropriate level of transmission transfer capability. This transfer capability is utilized to address system reliability concerns, enable firm or economic transfers and allow for emergency purchases. Moving forward, the goal of minimum interregional transfer criteria would be to develop a metric and methodology that would be informative to transmission planners to facilitate their determination of the incremental increase in interregional transfer capability that would help address reliability concerns in those situations where there is a widespread impact within the Interconnection (or multiple regions of the Interconnection) of an extreme event (such as extreme weather, cyber and/or physical events threatening electric system reliability) and the changing resource mix. [*EIPC Testimony, Section II, Page 4*]

- a. Could a metric be defined and used to capture the benefits of Interregional Transfer Capability in maintaining reliability during extreme events in existing regional transmission planning and interregional transmission coordination processes? Would the use of a such a metric in existing regional transmission planning and interregional transmission coordination processes sufficiently consider the benefits of Interregional Transfer Capability?

EIPC Response: Yes. [See EIPC Testimony, Section III, Step 1, Page 5]

- b.** Should potential common mode failures and correlated outages be incorporated into studies for identifying Transfer Transmission Facilities in an Interregional Transfer Capability transmission planning process? If so, how?

EIPC Response: See Response to Q.5.d above.

8. To what extent, if any, should the following be considered when establishing a minimum Interregional Transfer Capability requirement; if so, how and why?
 - a.** Historical or projected extreme events (e.g., extreme weather, loss of fuel supply, etc.).
 - b.** Load and resource diversity across a wide geographic area.
 - c.** Anticipated changes in the resource mix and demand.
 - d.** Improved reliability.
 - e.** Avoided production costs.
 - f.** Geographic zones with the potential for large amounts of new generation.
 - g.** The option value of Transfer Transmission Facilities, as determined by the increased access to supplemental capacity during emergency operating conditions.
 - h.** Increased operator flexibility.
 - i.** Impact of correlated generator outages and common mode failures.
 - j.** Power system stability.
 - k.** Other factors?

EIPC Response: The purpose of establishing a minimum Interregional Transfer Capability requirement is to enable the appropriate level of interregional transfers for the purpose of maintaining system reliability under extreme weather, physical and/or cyber events; it is not focused on economic transfers or production cost savings. The EIPC recommends developing a common metric and methodology that would be informative to transmission planners to facilitate their determination of the incremental increase in interregional transfer capability that would help address reliability concerns in those situations where there is a widespread impact within the Interconnection (or multiple regions of the Interconnection) of an extreme event (such as extreme weather, cyber and/or physical events threatening electric system reliability) and the changing resource mix. The effort would be forward looking in nature, with a key work effort developing

an understanding of “extreme weather” or “extreme events”, using historical precedent to inform/verify metric determination. The forward-looking effort would capture the changing resource mix (resource type, magnitude and location) as part of the base case. Metric development and source/sink determination would address a number of the bullet points above. Power System stability would be evaluated as necessary.

Weather Data

9. In the context of establishing an Interregional Transfer Capability requirement, what challenges exist to modeling the impact of extreme weather events on generation, load, and transmission system performance in forward-looking transmission planning studies? What data, tools, and information sharing can help to mitigate these challenges?

EIPC Response: See Response to Q.2.b above.

10. To what extent do transmission planners rely on normalized weather data in transmission planning models? Are there drawbacks to using normalized weather data in determining the need for and benefits of Interregional Transfer Capability?
11. In determining an Interregional Transfer Capability requirement, should public utility transmission providers use data on generation, load, and transmission system performance during past extreme weather events and other hours of reported transmission system stress (i.e., during normal conditions) in forward-looking transmission planning studies? Is such data sufficient to capture the possible impacts of future extreme weather events? Why or why not?

EIPC Response: EIPC would need DOE and NOAA support to help define “Extreme Weather” and understand its impact on load, generation performance and transmission performance.

Possible Approaches to Metric Development include:

- Analysis to determine incremental transfer capability needed to offset the impact of extreme temperatures on load (i.e., 90/10 or higher vs. 50/50 load forecast), unit performance, and the impact of potential loss of transmission path(s).
- Analysis of historical interchange and unit performance during extreme weather events (extremely low VERs output, no fuel, forced generator outages).
- Analysis of predominant fuel type performance.

EIPC would compare scenario analysis results to historical NERC Transmission Loading Relief issuance, market congestion, and applicable emergency procedures. [*EIPC Testimony, Section III, Step 3, Page 5*]

Cost Allocation

12. Should the Commission require an *ex ante* cost allocation method, an *ex post* cost allocation method, or some combination for Transfer Transmission Facilities? What are the advantages or disadvantages of each approach? If an *ex ante* cost allocation method, are there factors that would make changing the *ex ante* cost allocation method appropriate? If so, what are those factors?
13. How would one design an *ex ante* cost allocation method for Transfer Transmission Facilities that relies on identified benefits? Which benefits should be considered when determining how to allocate the costs of Transfer Transmission Facilities in a manner that is at least roughly commensurate with the benefits and why?
14. Should the Commission establish a defined set of benefits for Transfer Transmission Facilities or require the public utility transmission providers in a pair (or more) of neighboring transmission planning regions to determine the set of benefits considered for purposes of cost allocation? What are the advantages and disadvantages of each approach?
15. How should a single cost allocation method be determined for Transfer Transmission Facilities? Should the relevant public utility transmission providers be tasked with jointly proposing a cost allocation method for Transfer Transmission Facilities in the first instance? Should there be a process in place for the Commission to establish a cost allocation method for Transfer Transmission Facilities if the public utility transmission providers cannot agree on one?
16. What role, if any, could merchant transmission facilities play in meeting a minimum Interregional Transfer Capability requirement?

EIPC Response: EIPC is a reliability-focused organization which is comprised of a diverse collaborative of transmission planning entities each of which have varied regulatory and stakeholder views on cost allocation. Accordingly, EIPC as an organization provides no comments on the cost allocation questions posed by the Commission in this docket.

Operations

17. Are existing market-to-market operational protocols and congestion management tools sufficient to manage flows across Transfer Transmission Facilities effectively during extreme events? Are there modifications to the Transmission Loading Relief process that would more effectively manage congestion across seams between regions than the current Transmission Loading Relief process?

EIPC Response: Transmission Planning and Operations/Markets are inherently linked. Improvements in transmission are only beneficial if they can be effectively used in operations, and additional operational changes could increase the effectiveness of existing transmission infrastructure. As additional changes in transmission planning are contemplated, it is important to ensure the operational rules and practices keep pace as we collectively look toward the future of increased interregional transfers. EIPC as a planning collaborative has offered suggestions on how to improve planning, and while we don't have any specific comments on operational changes. We do acknowledge that changes to operations protocols may be required as part of this effort.

EIPC Comment on Next Steps

The EIPC stands ready to work with the Commission and stakeholders on this endeavor and looks forward to Commission guidance and support for this initiative going forward. Given the complexity of this task and the resources which will need to be dedicated to its development, the EIPC believes it important that the Commission indicate support for the three-step approach proposed by the EIPC.

Respectfully submitted,

/s/ Zachary G. Smith

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*On behalf of the Eastern Interconnection
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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding in accordance with the requirements of Rule 2010 of the Rules of Practice and Procedure, 18 C.F.R. §385.2010.

Dated at Rensselaer, NY this 15th day of May 2023.

/s/ Stephanie Amann

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