UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Interregional Transfer Capability Study: Strengthening Reliability Through the Energy Transformation	)))	Docket No. AD25-4-000

COMMENTS OF GRID UNITED LLC

Grid United LLC ("Grid United") appreciates the opportunity to provide comments to the Federal Energy Regulatory Commission ("FERC" or "Commission") in response to its Notice of Request for Comments on the "Interregional Transfer Capability Study: Strengthening Reliability Through the Energy Transformation."

The Interregional Transfer Capability Study (the "ITCS")[1] was completed by the North American Reliability Corporation (NERC) in November 2024 pursuant to section 322 of the Fiscal Responsibility Act of 2023 (the "Act") passed by Congress[2] in June 2023. As required by the Act, NERC in Part 1 of the ITCS determined the current total transfer capability between each pair of neighboring transmission planning regions in the United States. Next in Part 2 of the ITCS, NERC recommended 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. Lastly in Part 3 of the ITCS, NERC made recommendations to meet and maintain current transfer capability as well as the recommended additions.

[1] NERC, *Interregional Transfer Capability Study (ITCS) Final Report*, https://www.nerc.com/FilingsOrders/us/NERC%20Filings%20to%20FERC%20DL/ITCS_Filing_Fall2024_signed.pdf.
[2] *Fiscal Responsibility Act*, H.R. 3746 (2023), Section 322.

Grid United was founded by a group of energy industry veterans who share the vision of building infrastructure projects that will help modernize the U.S. electric grid. We seek to accomplish what our name implies—unite the U.S. electric grid by building new long-distance interregional transmission lines to ensure that Americans have access to low-cost power when and where it is needed. Grid United is focused on accelerating the much-needed expansion and modernization of America's electric power infrastructure to build a more reliable grid, create good-paying jobs, and deliver low cost, domestically-produced energy to businesses and homeowners across the country. Needless to say, our company dedicates enormous time and energy to the study of the value, viability, and benefits of interregional transmission lines. We welcome the opportunity to participate in this important discussion.

Overall, the ITCS reinforces our belief in the importance of Grid United's goals in building interregional lines for a reliable and resilient grid, but as stated in the ITCS report, the "study's recommendations should be considered as a starting point."[3] With that sentiment to build upon the ITCS and in the spirit of continuous improvement, Grid United provides these comments to the ITCS in the requested format based on the correlated headings in the Request for Comments (as requested, only headings with comments from Grid United are listed):

A. Chapter 1: The Reliability Value of Transfer Capability

Grid United is appreciative of NERC's description of the reliability benefits of interregional transmission during extreme weather events, but reliability and resilience benefits are much more wide-ranging than described in this short two-page Chapter 1.

[3] ITCS at xix.

For example, Grid United's 400-mile North Plains Connector (NPC) High Voltage Direct Current (HVDC) tie will bi-directionally be able to flow 3,000 MW from WECC in Montana to MISO-W and SPP-N (see Figure 1) in North Dakota and provides significant reliability benefits.

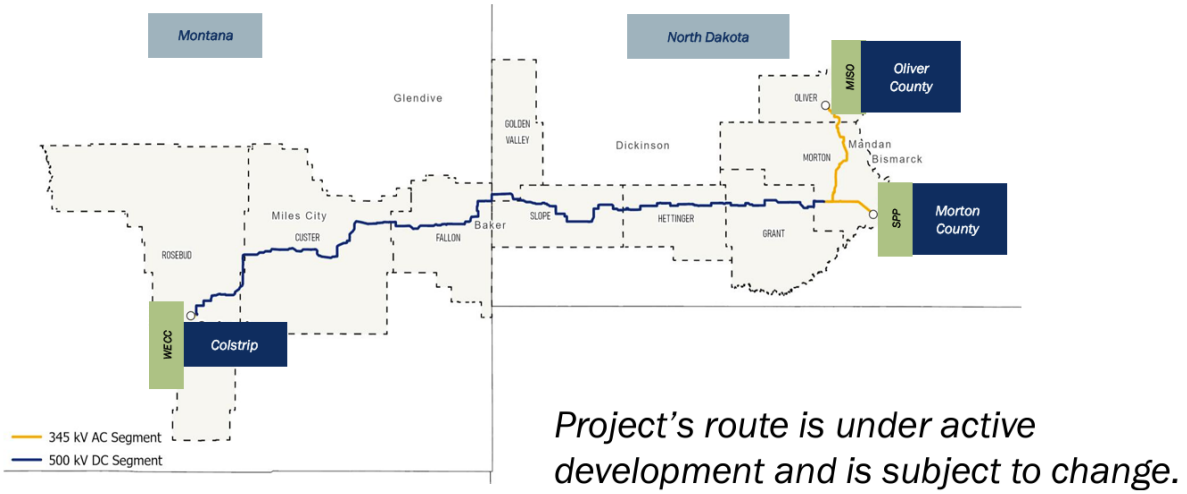

Figure 1: *Geographical representation of Grid United's North Plains Connector (NPC) HVDC tie*

A study performed by Astrapé Consulting[4] demonstrates the project's ability to reduce Loss of Load Expectation (LOLE)[5] from roughly 1 day in every ten years down to 0.2 days (**a 5X improvement to reliability of the grid**).

This type of reliability improvement was also seen in an Astrapé Consulting study of Grid United's Three Corners Connector (3CC) project, which is a 1,800 MW HVDC tie between the Public Service Company of Colorado (PSCo) in the WECC and the Southwestern Public Service Company (SPS) in SPP.

[4] https://www.gridunited.com/wp-content/uploads/2024/06/North-Plains-Connector-Evaluation_Final-Report_Astrape-Reviewed_FINAL.pdf.

[5] LOLE is a measure of power grid reliability and equals the expected number of loss-of-load days with events, regardless of event length, in a given year. An LOLE of 0.1 equates to "1 day with an event in 10 years."

Adding 3CC to the base case model **fully eliminates** LOLE in PSCo and SPS, while 3CC's ability to move power from areas of surplus to those experiencing scarcity allows it to halve LOLE in SPP system-wide:

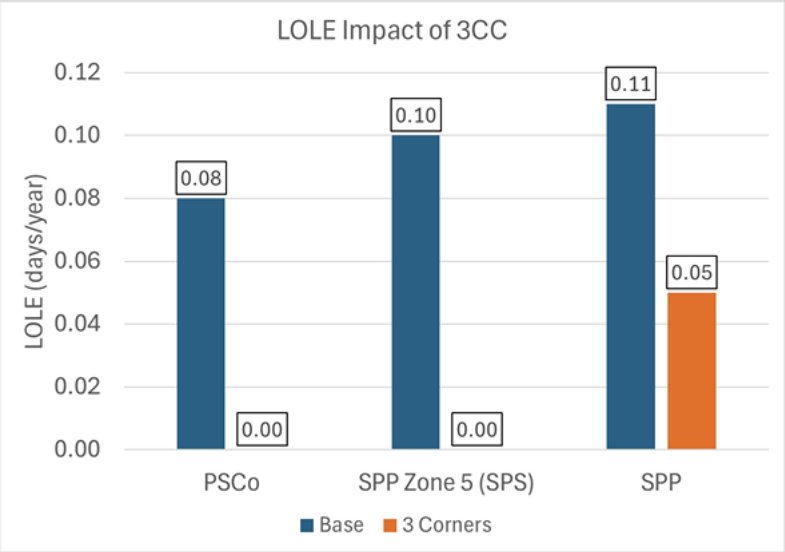

Figure 2: *Three Corners Connector (3CC) LOLE benefits to PSCo and SPP*

These quantified overall reliability benefits are not addressed in Chapter 1 of the ITCS and need to be accounted for in future study work.

Additionally, FERC should provide a framework for evaluating reliability benefits specifically for interregional lines. In Order 1920, FERC lays out the benefits that should be considered for new transmission but does not provide a framework to evaluate interregional projects, which provide the same benefits, but are more difficult to evaluate because they are interjurisdictional.

FERC should create a 1920 framework for evaluating interregional lines that specifically addresses reliability because this is a major driver of value that isn't taken into account right now. Additionally, many regions count this value operationally, but none that Grid United can find puts value on it proactively or for new lines. This takes a big value off the table when evaluating new interregional transmission lines and makes it more difficult for a participant-funded

transmission line to get built. These benefits need to be assessed accordingly to drive the completion of critical infrastructure in the U.S. needed for grid reliability, resiliency and national security.

B. Chapter 2: Overview of ITC Study Scope and Terminology

1. ITC Study Scope

Congress directed NERC to solely focus on electric reliability in recommending prudent expansion of interregional transmission. As a result of this directive, the ITCS greatly understates the optimal level of transmission expansion needed to more comprehensively meet future needs.

Because Congress' mandate to NERC was to recommend "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," NERC did not account for transmission's other benefits when assessing the need for expansion. In Order 1920, FERC identified seven categories of transmission benefits that should be accounted for in multi-value transmission planning,[6] but the ITCS only accounts for Benefit #2, which covers "(a) Reduced Loss of Load Probability or (b) Reduced Planning Reserve Margin."

Interregional transmission lines connect areas with non-coincident peaks, reducing loss of load probability and the need for generous planning reserves. However, there are many other benefits that are not addressed in the ITCS due to the tightly mandated scope of NERC's study. The ITCS accurately caveats that:

> Economic analysis, cost-benefit evaluation, or financial modeling were not factors in determining prudent recommendations. The focus was strictly on improving energy adequacy.[7]

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[6] FERC, *Explainer on the Transmission Planning and Cost Allocation Final Rule*, https://www.ferc.gov/explainer-transmission-planning-and-cost-allocation-final-rule.
[7] ITCS at viii.

A study with a more comprehensive scope would have accounted for the multiple benefits of transmission, as well as their cost. Such a comprehensive scope is critical in identifying economically optimal interregional connections.

The Department of Energy's (DOE's) National Transmission Planning Study[8] released in October 2024 had a more comprehensive scope. The DOE Study found that the lowest-cost U.S. electricity system portfolios that met future demand growth and reliability requirements include substantial expansion in transmission with a total transmission system of the contiguous United States expanding by 2.1 to 2.6 times the size of the 2020 system by 2050 and **interregional transmission growing 1.9 to 3.5 times**.

The ITCS falls well short to meet this future forecasted level of interregional transmission need, as the ITCS only recommends 35 GWs of prudent additions to transfer capability in the 2033 future system. Utilizing the Total Import Interface Results in "Chapter 4: Transfer Capability (Part 1) Study Results" of the ITCS and adding up the total import capability of all 22 U.S. regions, it can be conservatively estimated that total U.S. import interfaces for the 2024 Summer case is over 150 GW. Therefore, at least 285 to 525 GWs of interregional transmission would need to be added to the system to meet the forecast need from the National Transmission Planning Study in comparison to the 35 GW of interregional capability identified in the ITCS.

2. Stakeholder Participation

No Comments.

3. General Comments on ITC Study Scope and Terminology

No Comments.

[8] DOE, *National Transmission Planning Study*, https://www.energy.gov/gdo/national-transmission-planning-study.

C. Transfer Capability Analysis (Part 1)

No Comments.

1. Chapter 3: Transfer Capability (Part 1) Study Process

No Comments.

2. Chapter 4 Transfer Capability (Part 1) Study Results

No Comments.

3. Other Comments on the Transfer Capability Analysis (Part 1)

No Comments.

D. Recommendations for Prudent Additions To Transfer Capability (Part 2) and Recommendations To Meet and Maintain Transfer Capability (Part 3)

1. Chapter 5: Prudent Additions (Part 2) Inputs

No Comments.

2. Chapter 6: Prudent Additions (Part 2) Process, Including Energy Margin Analysis Results

No Comments.

3. Chapter 7: Prudent Additions (Part 2) Recommendations

Grid United commends NERC and their consultant Telos Energy for performing the work to extrapolate 12 weather years of data to a future 2033 system and recommending prudent additions to the grid based solely on reliability and that snapshot based on a multitude of assumptions. The study's recommendations for prudent transmission expansion provides useful evidence confirming the value of interregional transmission for strengthening electric reliability. The recommended expansion identifies new interregional transmission that will be necessary to keep the lights on based on extrapolation to a future 2033 system, but does not represent optimal transmission expansion to more comprehensively meet future needs. The full benefits of

interregional transmission including production cost savings, reduced congestion and capacity value need to be accounted for before any prudent additions to the grid are decided on.

- **"Pronounced Benefits of Transfer Capability Across Interconnections" Section**

In Chapter 7 of the ITCS, in addition to the recommended prudent additions, NERC includes a Section titled "Other Insights" filled with other important conclusions drawn from Part 2. In the Section titled "Pronounced Benefits of the Transfer Capability Across Interconnections" the following is stated:

> The study highlighted the significant benefits of transfer capability across Interconnections, where geographic diversity in resource availability and load proved advantageous. For example, the ties between SPP and the Western Interconnection demonstrated substantial benefits during extreme weather events. Similarly, transfer capability between ERCOT and both the Western and Eastern Interconnections provided crucial support, as does increasing transfer capability from Québec to New York and New England. Neighboring Planning Coordinators and Transmission Planners across Interconnections should continue to work toward a wider area planning approach.[9]

Grid United requests that NERC provide more details on this section specifically quantifying the "significant benefits of transfer capability across Interconnections" and how these benefits are being measured.

These significant benefits of connections across asynchronous seams should be accounted for when comparing and recommending any prudent additions to the system. Future recommendations will need to consider more fully the benefits of connections across the asynchronous grids in the US and Canada vs. interregional lines within synchronous systems.

[9] ITCS at 103.

From just a cursory glance at the ITCS Calculated Transfer Capabilities Map[10] from Part 1 of the ITCS in Figure 3 below, it should be glaring that a very small amount of transfer capability exists in the middle of the U.S. The map below shows only white circles representing only 0.1 to 1.9 GWs of transfer capability between SPP-N, SPP-S, Wasatch Front and Front Range.

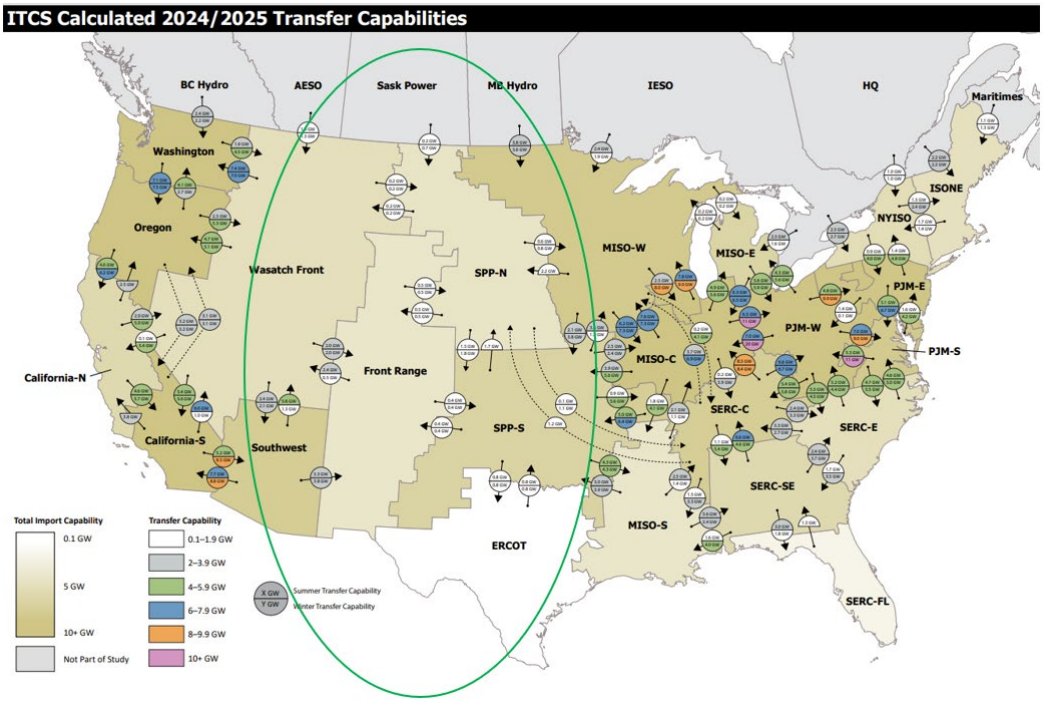

Figure 3: ITCS Calculated 2024/2025 Transfer Capabilities

These transfer capabilities are between the asynchronous Eastern and Western Interconnections in the U.S. and represent the seven back-to-back HVDC facilities enabling only 1,320 megawatts (MW) of electricity to flow between the Eastern and Western Interconnection in the U.S. These back-to-back facilities are located strategically at the "seam" where the East meets the West as indicated by the yellow-green line as shown below:

[10] https://www.nerc.com/pa/RAPA/Documents/ITCS_CTC_Map.pdf.

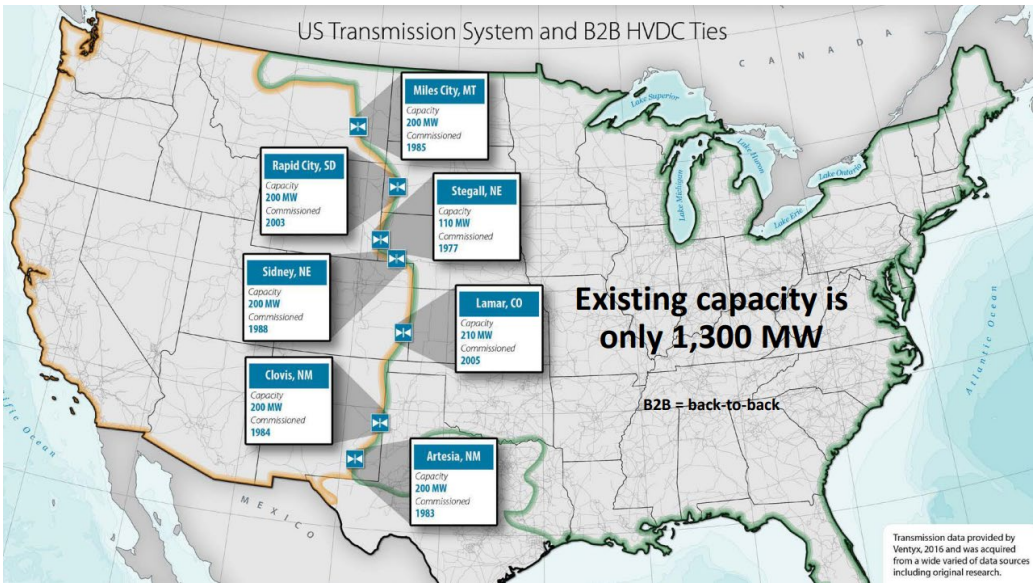

Figure 4: *Map of the seven back-to-back HVDC converters providing the only transfer capability between the Eastern and Western Interconnections of the U.S.* [11]

This transfer capability between the interconnections is very small compared to the networks they connect—the larger Eastern Interconnection has 700 GW of generating capacity, and the Western Interconnection has roughly 250 GW.[12]

At the same time, these facilities are aging, as they were built in 1977, 1983, 1984, 1985, and 1988. Five of the seven back-to-backs are 36 to 47 years old and this equipment using older style Line Commutated Converter (LCC) HVDC technology is outdated and becoming obsolete. The back-to-back converters will continue to require additional investment to keep in service.

Three of Grid United's projects address this need to connect the U.S. to be able to share all domestically-produced energy to businesses and homeowners across the whole country. Adding up the capacity of our aforementioned North Plains Connector HVDC tie at 3,000 MW, Three Corners Connector HVDC tie at 1,800 MW and also our Wyoming Intertie at 1,800 MW equals a total of 5,600 MW being added to transfer capability between the East and West. That's more than

[11] https://www.nrel.gov/docs/fy21osti/78161.pdf.
[12] "The Value of Increased HVDC Capacity Between Eastern and Western U.S. Grids: The Interconnections Seam Study" Aaron Bloom, Josh Novacheck, Greg Brinkman, et. al., May 2022 https://doi.org/10.1109/TPWRS.2021.3115092.

a **400% increase** in transfer capability that is greatly needed during extreme weather events, possible cyber-attacks and throughout the year to move power when and where it's needed most.

Additionally, all of Grid United's projects interconnecting the asynchronous grids will use state-of-the-art HVDC Voltage-Source Converter (VSC) technology. There have been significant advancements in HVDC technology over the last two decades and the older-style LCC technology used in the existing back-to-back converters across the seam cannot provide the reliability benefits that VSC can exhibit. The emergence of VSC technology has led HVDC to become a proven cost-effective solution for many bulk-power transmission needs globally. However, the United States has fallen behind in the adoption of this innovative energy technology:

- Approximately 50 GW of VSC-based HVDC transmission projects are in operation today;
- Approximately 130 GW are planned or under development through the end of the decade; and
- Of these, North America accounts for **only 3%** of all VSC-based HVDC systems in operation worldwide.[13]

This lag behind mostly China and Europe in adopting this innovative technology is despite the urgent need to expand the nation's transmission capacity. HVDC makes more efficient use of conductor material and can utilize a reduced right-of-way compared to Alternating Current (AC) solutions, which is the predominant voltage type on the existing grid today. The absence of reactive power and stability limits on transfer capacity make HVDC a more suitable technology for long-distance bulk transmission. HVDC VSC deployment will help meet growing energy demands,

[13] "The Operational and Market Benefits of HVDC to System Operators" prepared by The Brattle Group Johannes P. Pfeifenberger, et. al and DNV, Cornelis A. Plet, Chandra M. Sonnathi, September 2023 https://www.brattle.com/wp-content/uploads/2023/09/The-Operational-and-Market-Benefits-of-HVDC-to-System-Operators-Full-Report.pdf.

ensure grid reliability, and efficiently transport low-cost electricity over long distances while maintaining grid integrity.

With the availability of HVDC VSC at lower costs across longer distances than AC transmission lines, future transmission planning should utilize multi-value planning mechanisms to account for the full range of benefits that HVDC VSC can provide.

- **"Neighbor's Neighbor" Transfer Capability Could Provide Additional Benefits**

The NERC ITCS did not look beyond a region's immediate neighbors when identifying opportunities for transmission expansion. This shortcoming was compounded by the fact that the study divided the country into relatively small regions, so potentially valuable transmission expansion pathways were not evaluated.

For example, transmission expansion from Texas to the Southeast or Southwest was not evaluated because the study map did not place those regions directly next to each other, even though other studies have found those paths to be highly valuable.[14]

The study identified regions with expected generation shortfalls, and then expanded transmission to that region's immediate neighbors to access load and resource diversity to help meet that shortfall. However, in nearly all regions this left an unmet need for generation, as shown below. Building transmission beyond immediate neighbors likely could have met that remaining need, which would have resulted in a much larger transmission expansion than NERC's recommendation. If the 13,500 MW of remaining generation need were met by adding 13,500 MW of transmission to the immediate neighbor and an additional 13,500 MW of transmission to that

[14] For example, see Lawrence Berkeley National Laboratory, *Transmission Value in 2023,* https://emp.lbl.gov/news/transmission-value-2023-market-data-shows-value-transmission-remained-high-certain and Energy Systems Integration Group, *Multi-Value Transmission Planning for a Clean Energy Future*, https://www.esig.energy/wp-content/uploads/2022/06/ESIG-Multi-Value-Transmission-Planning-report-2022.pdf at x.

neighbor's neighbor, that would have increased the total recommended transmission additions to around 62,000 MW, 77% larger than NERC's recommendation of 35,000 MW:

Region	Resource Deficiency (MW)	Prudent Additions (MW)	Unmet need for imports (MW)
ERCOT	18,926	14,100	4,826
MISO E (MI)	5,715	3,000	2,715
NY	3,729	3,700	29
SPP S	4,137	3,700	437
PJM S (Dominion)	4,147	2,800	1,347
California N	3,211	1,100	2,111
SERC E (Carolinas)	5,849	4,100	1,749
SERC FL	1,152	1,200	-48
New England	984	700	284
MISO S	629	600	29
Total	**48,479**	**35,000**	**13,527**

***Figure 5**: Resource Deficiencies identified and Prudent Additions Identified in the ITCS vs. the Unmet need for imports*

An example of a project that would show great benefits by including a neighbor's neighbor in the analysis is Grid United's NPC HVDC tie between the WECC, the SPP and the MISO. Using the ITCS regions, no benefits would be accounted for NPC from MISO-W to the Wasatch Front. NPC will bi-directionally be able to flow 1,500 MW to MISO-W to the Wasatch Front and provides significant benefits, as was discussed previously in these comments.

4. Chapter 8: Prudent Additions (Part 2) Sensitivity Analysis

NERC's study included a sensitivity analysis that assumed regions must have 6% extra generating capacity to cover operating reserve needs and other uncertainties, instead of the 3% operating reserve assumption used to arrive at the 35,000 MW of recommended transmission additions in the base case results shown in the table above.

In the 6% sensitivity recommended transmission additions increased to around 58,000 MW,[15] with significant increases in all regions except Texas. A 6% operating reserve margin is

[15] ITCS at 105-106.

consistent with the level of contingency reserves often held in the Western U.S.,[16] and may better approximate the level of operating reserves held by other relatively small grid operators. If the 6% sensitivity were combined with the 77% larger neighbor-of-neighbor transmission expansion discussed above, the study's total recommended transmission expansion could have exceeded 100,000 MW.

5. Chapter 9: Prudent Additions (Part 2) Transmission Planning Region-Specific Results

No Comments.

6. Chapter 10: Meeting and Maintaining Transfer Capability (Part 3)

No Comments.

7. Other Comments on Prudent Additions (Part 2)

No Comments.

8. Other Comments on Meeting and Maintaining Transfer Capability (Part 3)

No Comments.

E. Future Work

As the ITCS states it should be considered as a starting point. Grid United would like to provide its expertise in interregional planning to any future study work. Our stakeholder-first approach continues to incorporate any and all feedback into our transmission planning and interconnection processes. Grid United appreciates the opportunity to work with NERC, FERC, the RTOs and ISOs, utilities and other stakeholders to build infrastructure projects that will help modernize the U.S. electric grid including interregional lines that need to be fully evaluated for all their benefits.

[16] NERC, *WECC Standard BAL-002-WECC-2a — Contingency Reserve*, https://www.nerc.com/pa/Stand/Reliability%20Standards/BAL-002-WECC-2a.pdf, at 1.

F. ITC Study Appendices (A–J)

No Comments.

G. Additional Comments Outside the Specific Report Sections

No Comments.