UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

North American Electric Reliability Corporation	**)** **)**	**Docket No. RM25-3-000**

REPLY COMMENTS OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

The North American Electric Reliability Corporation ("NERC") respectfully submits the following limited reply comments in response to certain concerns raised by industry stakeholders[1] following the Federal Energy Regulatory Commission's ("FERC" or "Commission") Notice of Proposed Rulemaking ("NOPR"),[2] which proposes to approve proposed Reliability Standards PRC-024-4 (Frequency and Voltage Protection Settings for Synchronous Generators, Type 1 and Type 2 Wind Resources, and Synchronous Condensers) and PRC-029-1 (Frequency and Voltage Ride-through Requirements for Inverter-Based Resources), and the proposed definition of the term "Ride-through". NERC filed timely comments, which were due on March 24, 2025. NERC respectfully submits the following reply to clarify for the record that proposed Reliability Standards PRC-024-4 and PRC-029-1 and the proposed definition of the term "Ride-through" are just, reasonable, and not unduly discriminatory, and are consistent with and responsive to the Commission's directives in Order No. 901[3] to address Ride-through performance requirements for

[1] Comments were submitted by New York Independent System Operator, New York State Energy Research and Development Authority, Louisiana Public Service Commission, Edison Electric Institute, Elevate Energy Consulting, Arizona Public Service Company, Joint RTO/ISOs (CAISO, SPP, ISO-NE, PJM, MISO), Union of Concerned Scientists, DNV-GL, Orsted Wind Power North America LLC, Long Island Power Authority, Invenergy Renewables LLC, American Clean Power Association, Solar Energy Industries Association, Dominion Energy Services, New York State Reliability Council, Tesla, and Western Interconnection Regional Advisory Body in Docket No. RM25-3-000.

[2] *Reliability Standards for Frequency and Voltage Protection Settings and Ride-Through for Inverter-Based Resources*, Notice of Proposed Rulemaking, 189 FERC ¶ 61,212 (2024) [hereinafter NOPR].

[3] *Reliability Standards to Address Inverter-Based Resources*, Order No. 901, 185 FERC ¶ 61,042 (2023) [hereinafter Order No. 901].

Inverter-Based Resources ("IBRs"). NERC requests that the Commission accept this reply to enhance and clarify the record.

I. EXECUTIVE SUMMARY

NERC strongly supports the Commission's NOPR proposing to approve Reliability Standards PRC-024-4 and PRC-029-1 and the proposed definition of the term "Ride-through" as they address the directives set forth in Order No. 901 and benefit reliability by addressing abnormal tripping, interruption of current injection, and reduced power output, which lead to the unexpected loss of widespread generating resources. In Order No. 901, the Commission references multiple NERC disturbance reports[4] that demonstrate a risk to the reliability of the Bulk-Power System ("BPS") when IBRs have failed to Ride-through system disturbances. A number of NOPR commenters recognized these risks and expressed general support for the reliability goals that proposed Reliability Standard PRC-029-1 aims to address with frequency and voltage Ride-through requirements for IBRs.[5]

As discussed in detail herein, NERC is providing additional clarity on several concerns raised by commenters in response to the NOPR. First, as a threshold matter, NERC reiterates that proposed Reliability Standard PRC-029-1 was developed in full accordance with Section 215 of the Federal Power Act ("FPA"),[6] in an open and fair manner and in accordance with the Commission-approved Reliability Standard development process[7] that included multiple public

[4] *See* Event Reports involving IBRs entering into momentary cessation or tripping in the aggregate: (1) the Blue Cut Fire (August 16, 2016); (2) the Canyon 2 Fire (October 9, 2017); (3) Angeles Forest (April 20, 2018); (4) Palmdale Roost (May 11, 2018); (5) San Fernando (July 7, 2020); (6) the first Odessa, Texas event (May 9, 2021); (7) the second Odessa, Texas event (June 26, 2021); (8) Victorville (June 24, 2021); (9) Tumbleweed (July 4, 2021); (10) Windhub (July 28, 2021); (11) Lytle Creek (August 26, 2021), and (12) Panhandle Wind Disturbance (March 22, 2022), https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx.

[5] *See* Comments of Joint RTO/ISOs (CAISO, SPP, ISO-NE, PJM, MISO), NYISO, Louisiana PSC, EEI, Elevate Energy, Arizona Public Service Company, Union of Concerned Scientists.

[6] 16 U.S.C. § 824o(d)(5).

[7] *Rules Concerning Certification of the Elec. Reliability Org. & Procs. for the Establishment, Approval, & Enf't. of Elec. Reliability Standards*, Order No. 672, 114 FERC ¶ 61,104 (2006) at P 334, *order on reh'g*, Order No. 672-A, 114 FERC ¶ 61,328 (2006).

comment and ballot periods in which it received the required weighted segment approval of the ballot body during its last ballot period.[8]

Second, the exemptions from voltage or frequency Ride-through performance requirements that are included in proposed Reliability Standard PRC-029-1 are limited to existing IBRs that are unable to meet the performance requirements due to hardware limitations on legacy equipment consistent with the directives in Order No. 901.[9] Third, the limited exemptions do not address specific Voltage Source Converter HVDC equipment limitations because they were developed to be technology neutral; specific to addressing the reliability needs set forth in Order No. 901, including mitigating the impact of any exemptions; and based upon the technical justifications set forth in the record. Fourth, NERC clarifies why proposed Reliability Standard PRC-029-1 is not intended to fully technically align with IEEE 2800, as they are crafted by different organizations for different purposes. Finally, NERC explains how the IBR Ride-through requirements account for the technical differences between IBRs and synchronous generators and are narrowly tailored to not cause undue negative effect on competition beyond what is necessary to address the reliability gaps identified in Order No. 901.[10]

NERC respectfully submits these comments to support a clear and complete record supporting Commission approval of the proposed Reliability Standards and the proposed definition of the term "Ride-through".

II. REPLY COMMENTS

a. NERC developed proposed Reliability Standard PRC-029-1 through a fair and open Commission-approved stakeholder process

[8] *See Petition of the N. Am. Elec. Reliability Corp. for Approval of Proposed Reliability Standards PRC-029-1 and PRC-024-4*, Docket No. RM25-3-000 (Nov. 4, 2024) [hereinafter Ride-through Petition] at Exhibit G.

[9] *See* Order No. 901, *supra*, at PP 190, 193, 199, 208, and 209; NOPR, *supra*, at P 32.

[10] *See* Order No. 672, *supra*, at P 332.

In developing proposed Reliability Standard PRC-029-1, NERC followed and fully adhered to its Commission-approved standards development process.[11] Some commenters raise concerns that NERC's standards development process did not allow full stakeholder engagement or provide an opportunity for comments made from the technical conference initiated under Section 321 of the NERC Rules of Procedure to be addressed.[12] NERC rejects these assertions that stakeholder engagement or comments were limited or not integral in the development of proposed Reliability Standard PRC-029-1. As discussed below, NERC provided reasonable notice and opportunity for public comment, due process, openness, and balancing of interests in developing proposed Reliability Standard PRC-029-1, as required by its Commission-approved rules and FPA section 215.[13]

In its ERO Certification Order, the Commission found that NERC's proposed rules provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards and thus satisfies certain criteria for approving Reliability Standards.[14] The development process for proposed Reliability Standard PRC-029-1 included multiple formal public comment and ballot periods.[15] Following the failure of the third

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[11] *Id.* at P 334.

[12] *See e.g.,* Comments of American Clean Power Association and Solar Energy Industries Association at p. 8 ("major aspects of the standard, including the discussion of the evidence required for demonstrating a hardware exemption, were added or significantly revised in September 2024, following NERC's Ride-through Technical Conference. However, NERC provided no opportunity for incorporating revisions to address stakeholder comments on those key changes."); Comments of Orsted Wind Power America at p. 23 ("As previously discussed, the NERC standards development process did not seek to align the proposed standard with global standards and practices, and stakeholder engagement was limited, perhaps in part due to the compressed standards development timeline."); Comments of Western Interconnection Regional Advisory Body at p. 11 ("The process did not facilitate full stakeholder engagement which would have been beneficial in the context of urgent standards development projects, such as those mandated from FERC Order 901.").

[13] 16 U.S.C. § 824o(c)(2)(D).

[14] The Commission certified NERC as the electric reliability organization ("ERO") in accordance with Section 215 of the FPA on July 20, 2006. *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006), *order on reh'g & compliance*, 117 FERC ¶ 61,126 (2006), *aff'd sub nom. Alcoa, Inc. v. FERC*, 564 F.3d 1342 (D.C. Cir. 2009); NERC Rules of Procedure, https://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx.

[15] Ride-through Petition, *supra*, at Exhibit G, Comment periods for PRC-029-1 were: 1) March 27, 2024 through April 22, 2024, 2) June 18, 2024 through July 8, 2024, and 3) July 22, 2024 through August 12, 2024.

ballot for proposed Reliability Standard PRC-029-1, the NERC Board of Trustees took action at its August 15, 2024 meeting to invoke its special authority under Section 321 of the NERC Rules of Procedure ("Rule 321") in order to meet the regulatory deadline.[16]

Rule 321 is a Commission approved process, initially developed in response to a Commission directive,[17] that allows the NERC Board of Trustees to take special actions when a ballot pool has failed to approve a proposed Reliability Standard that addresses a FERC directive. Under the special process described in Sections 321.2 – 321.4 of the NERC Rules of Procedure, the NERC Board of Trustees directed the NERC Standards Committee to work with NERC staff to convene a technical conference to gather input from industry to address the outstanding issues raised in the previous comment periods.[18] NERC Standards Committee representatives and NERC staff prepared a memorandum[19] that summarized the issues, what stakeholder input from the technical conference was used to revise the proposed Reliability Standard, and an analysis of alternatives solutions that were discussed and considered at the technical conference. Consistent with Rule 321, proposed Reliability Standard PRC-029-1 was revised based on the stakeholder input from the technical conference and posted, along with the memorandum, and re-balloted in accordance with Rule 321.2.1. Proposed Reliability Standard PRC-029-1 received 77.88 percent

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[16] NERC, *Board of Trustees Meeting Minutes* (Aug. 15, 2024), https://www.nerc.com/gov/bot/Agenda%20highlights%20and%20Mintues%202013/Minutes%20-%20BOT%20Open%20-August%2015%202024.pdf.

[17] *See Order Directing NERC to Propose Modification of Electric Reliability Organization Rules of Procedure*, 130 FERC ¶ 61,203 (2010), *order denying reh'g*, 132 FERC ¶ 61,218 (2010), *order on compliance*, 134 FERC ¶ 61,216 (2011) (approving NERC's proposed Rules of Procedure Section 321). The Commission approved the current version of Section 321 of the NERC Rules of Procedure in 2023. *Order Approving Revisions to the N. Am. Reliability Corp. Rules of Procedure Regarding Reliability Standards Development*, 185 FERC ¶ 61,146 (2023).

[18] NERC, *Board of Trustees Meeting Minutes* (Aug. 15, 2024), https://www.nerc.com/gov/bot/Agenda%20highlights%20and%20Mintues%202013/Minutes%20-%20BOT%20Open%20-August%2015%202024.pdf.

[19] *See* Ride-through Petition, *supra*, at Exhibit H Summary of Issues and Alternatives Considered Memo, https://www.nerc.com/pa/Stand/Documents/Memo_Summary%20of%20Issues%20and%20Alternatives%20Considered_Proposed%20Reliability%20Standard%20PRC-029-1.pdf.

approval with an 89.51 percent quorum of the required weighted segment of the ballot body during this re-ballot period from September 24 through October 4, 2024. Based on this approval rating, the standard was deemed "approved," and no further stakeholder proceedings were required.[20]

The NERC Board of Trustees considered the development record, which included minority issues raised during the Rule 321 process. The minority issues that were considered by the NERC Board of Trustees included the ability of entities' IBR equipment to meet the voltage and frequency Ride-through performance requirements in proposed Reliability Standard PRC-029-1 without significant cost expenditures as well as about clarity and compliance guidance for demonstrating IBR "design" capability, "hardware limitations", and identifying which equipment would cause the hardware limitations.[21] Following consideration of the development record, the NERC Board of Trustees adopted proposed Reliability Standard PRC-029-1 on October 8, 2024.[22]

b. <u>The voltage and frequency Ride-through hardware exemptions are limited to existing IBRs that are unable to meet the performance requirements due to hardware limitations on legacy equipment consistent with Order No. 901</u>

In accordance with Order No. 901, NERC developed limited and documented exemptions from voltage and frequency Ride-through criteria for existing IBRs and equipment in proposed Reliability Standard PRC-029-1.[23] Some commenters suggest the exemptions in Requirement R4 of proposed Reliability Standard PRC-029-1 are too narrow and limited and should be expanded

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[20] *See* NERC Rules of Procedure 321.3 ("If the re-balloted proposed Reliability Standard achieves at least an affirmative two-thirds majority vote of the weighted Segment votes cast, with a quorum established, then the proposed Reliability Standard shall be deemed approved by the ballot pool and shall be considered by the Board of Trustees for approval.")

[21] NERC, *Board of Trustees Agenda Package* (Oct. 8, 2024), https://www.nerc.com/gov/bot/Agenda%20highlights%20and%20Mintues%202013/Board%20of%20Trustees%20Open%20Meeting%20Agenda%20Package%20October%208%202024%20Attendees.pdf.

[22] NERC, *Board of Trustees Meeting Minutes* (Oct. 8, 2024), https://www.nerc.com/gov/bot/Agenda%20highlights%20and%20Mintues%202013/Minutes%20%20Board%20Open%20October%208%202024.pdf.

[23] Order No. 901, *supra*, at P 193.

to include IBRs that have signed generator interconnection agreements or have the primary construction or procurement agreements at the time proposed PRC-029-1 goes into effect.[24] By contrast, another commenter argues that the timeline for exemptions is too long and impermissibly favors legacy IBR owners; this commenter is concerned that transmission owners and operators are expected to mitigate an event consisting of an unknown number of IBRs disconnecting at any time in the future, in an unanticipated manner.[25]

In Order No. 901, the Commission directed NERC to consider whether the proposed Reliability Standard should contain exemptions to the Ride-through performance requirements for those legacy IBRs that are currently in operation and unable to meet the requirements.[26] FERC explained that:

> [a]ny such exemption should be only for voltage ride-through performance for those existing IBRs that are unable to modify their coordinated protection and control settings to meet the requirements without physical modification of the IBRs' equipment. Further, we direct NERC to ensure that any such exemption would be applicable for only existing equipment that is unable to meet voltage ride-through performance. When such existing equipment is replaced, the exemption would no longer apply, and the new equipment must comply with the appropriate IBR performance requirements specified in the Reliability Standards (e.g., voltage and frequency ride through, phase lock loop, ramp rates, etc.).[27]

Order No. 901 also directed NERC to mitigate the reliability impact to the BPS of any exemptions from Ride-through requirements.[28]

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[24] *See, e.g.*, Comments of Orsted Wind Power North America at p. 2, Long Island Power Authority at pp. 5-6, Arizona Public Service Company at p. 2, New York State Energy Research and Development Authority at pp. 2-3, New York Independent System Operator at pp. 2-3, American Clean Energy Association and Solar Energy Industries Association at pp. 10-17, Edison Electric Institute at pp. 2-3, Elevate Energy Consulting at p. 2, Invenergy Renewables at pp. 19-23, and Dominion Energy Services at pp. 4-7.

[25] Comments of Louisiana PSC at p. 7.

[26] Order No. 901, *supra*, at P 193.

[27] *Id*.

[28] *Id.* at P 199.

NERC, through its fair and open stakeholder process,[29] determined that limited and documented exemptions for certain existing IBRs from voltage or frequency Ride-through performance requirements would be appropriate because of the hardware limitations associated with those facilities. NERC further determined that frequency exemptions were needed to address significant original equipment manufacturers ("OEM") design capability limits regarding frequency thresholds.[30] Voltage and frequency exemptions were found to be necessary because, without them, proposed Reliability Standard PRC-029-1 would require entities to take units offline to retrofit or risk noncompliance. Thus, entities could elect to retire units instead of retrofitting them based on economic considerations.[31] This could result in less generation being available to

[29] NERC specifically solicited comments from industry as well as OEMs. In particular, any information on hardware-based limitations that would prevent IBR from meeting the proposed frequency criteria within PRC-029-1 was requested. Twenty-one individual comments were received including six (6) from different original equipment manufacturers of IBR. NERC and the Standards Committee reviewed the submitted material and better solidified that a significant percentage of IBRs have been designed by original equipment manufacturers to be able to meet those voltage and frequency ride-through curves established in IEEE 2800-2022. "As Draft 3 of PRC-029-1 proposed frequency criteria were beyond those established in IEEE 2800-2022, there was a concern that IBR would not be able to meet those proposed frequency criteria as IBR capability limits were hardware-based and inherent to a manufacturer's design. While many comments received during the formal comment periods stressed a desire to align PRC-029-1 with IEEE 2800-2022, there was little differentiation between comments that sought to leverage other industry volunteer guidelines that have been significantly adopted with those comments that sought exemptions due to the fact that manufacturers have significantly designed IBR capabilities to the IEEE 2800- 2022 values. Moreover, comments submitted by manufacturers provided a better understanding and approximation of what percentage of the installed fleets of IBR would be unable to meet PRC-029-1 frequency criteria. While additional information is still sought by NERC, from the information provided, a significant percentage of IBR – specifically wind turbine facilities – would need to retrofit to avoid noncompliance with PRC-029-1 as proposed in Draft 3. Following the technical conference, NERC staff, Standards Committee representatives, some members of the drafting team, and FERC staff met to discuss the discussions during the conference as well as previously reviewed material. Based on the more clearly understood hardware-based capability limitation established due to manufacture design for a significant amount of installed IBR, there was a reliability concern to proceed with no potential for hardware-based limitations for frequency criteria as that same amount of IBR could necessitate disconnection and retrofitting in order to comply. The Standards Committee, in agreement with NERC, identified that this potential disconnection of a large amount of installed IBR capacity overwhelmingly indicated a reliability need to allow for a documented, and limited set of exemptions for IBR from either voltage or frequency ride-through criteria." Summary of Issues and Alternatives Considered Memo at 9.

[30] Ride-through Petition at p. 44 & Exhibit H Summary of Issues and Alternatives Considered Memo at p. 8.

[31] Ride-through Petition at pp. 38-39.

serve the grid when resource shortfalls have been predicted in peak conditions for many areas resulting in a substantial negative impact to BPS reliability.[32]

The narrowly tailored exemptions in proposed Reliability Standard PRC-029-1, which include certain IBRs and equipment in-service as of the effective date,[33] is consistent with Order No. 901 in which the Commission provided NERC with flexibility, if NERC deemed it appropriate, to implement limited and documented exemptions for existing IBRs and existing equipment. Order No. 901 expressly limited NERC's discretion to "voltage ride-through performance for those *existing IBRs* that are unable to modify their coordinated protection and control settings to meet the requirements without physical modification of the IBRs' equipment . . . only *existing equipment* that is unable to meet voltage ride-through performance."[34] Thus, Requirement R4 of proposed Reliability Standard PRC-029-1 was developed to balance the reliability needs of the BPS against stakeholder feedback regarding existing IBR limitations by allowing documented and limited exemptions from frequency Ride-through criteria for existing IBRs and equipment, consistent with Order No. 901.

Under the proposed exemptions, any Generator Owner seeking an exemption for its IBR units must identify the specific equipment and explain the characteristic(s) of the equipment that prevents the IBR from meeting the Ride-through criteria.[35] In addition to identifying the equipment that prevents the IBR from meeting Ride-through criteria, the Generator Owner must describe the aspect(s) of the Ride-through criteria that cannot be met and provide information regarding what

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[32] Ride-through Petition, *supra*, at pp. 38-39; NERC, *2024 Long-Term Reliability Assessment* (Dec. 2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf.

[33] The proposed effective date is 12 months after the effective date of a Commission order approving the standard. *See* proposed Implementation Plan at p. 4.

[34] Order No. 901, *supra*, at P 193 (emphasis added).

[35] Ride-through Petition at pp. 39-40; Exhibit E-2 Technical Rationale for Reliability Standard PRC-029-1.

the IBR is capable of despite the limitation.[36] Further, the IBR must perform in accordance with the capability of the plant while accounting for the limitation, in order to mitigate the reliability impacts the exemption has on the BPS.[37]

Commenters raise concerns that identifying compliance issues for older legacy IBRs to the level of detail required in proposed PRC-029-1 may prove difficult or in some cases impossible, as OEMs may be out of business, no longer supporting the equipment, or no longer under a service contract.[38] These concerns were considered during development with respect to ensuring that the standard requirements are clear and measurable and that the exemptions are limited and documented, consistent with Order No. 901. The concept of demonstrating operational limitations for interconnected generation is neither new nor novel, as dynamic model capability requirements have been in place for generators since the first version of mandatory and enforceable Reliability Standards. Moreover, there are different ways for identifying these types of issues, for example Reliability Standards MOD-026-1 and MOD-027-1 include provisions to test the facility, which can find relays or equipment that may cause the unit to trip or otherwise find a hardware limitation.

For these reasons, consistent with Order No. 901, proposed Reliability Standard PRC-029-1 contains narrowly tailored exemptions from Ride-through requirements for IBRs in-service when proposed Reliability Standard PRC-029-1 becomes effective. These limited and documented exemptions are consistent with the directives in Order No. 901, were approved by the ballot body, and appropriately balance concerns about undue burden while mitigating the reliability impact to the BPS of any exemptions from Ride-through requirements.

c. <u>The limited exemptions do not carve out Voltage Source Converter</u>

[36] Ride-through Petition at p. 39.
[37] Ride-through Petition at p. 40.
[38] Comments of Edison Electric Institute at p. 4; Invenergy Renewables at p. 24.

HVDC equipment limitations because they were developed to be technology neutral; specific to addressing the reliability needs set forth in Order No. 901, including mitigating the impact of any exemptions; and based upon the technical justifications set forth in the record

Several commenters suggest that proposed Reliability Standard PRC-029-1 should allow specific Ride-through exemptions to account for Voltage Source Converter HVDC equipment limitations.[39] Proposed Reliability Standard PRC-029-1 was drafted in accordance with NERC's processes to address the BPS reliability needs identified in Order No. 901, consistent with the limited discretion provided to NERC in Order No. 901 to include exemptions. These exemptions were based upon the record and balanced Order No. 901's directive that NERC mitigate the reliability impact on the BPS of any exemptions from Ride-through requirements that it deemed necessary.

In Order No. 901, the Commission directed NERC to address the reliability concerns associated with the inability of IBRs to Ride-through system disturbances.[40] In doing so, the Commission directed NERC to consider whether any exemptions were appropriate for voltage ride-through performance for *existing* IBRs that are unable to modify their coordinated protection and control settings to meet the requirements without physical modification of the IBRs' equipment and for existing equipment that is unable to meet voltage ride-through performance.[41] FERC further required NERC to mitigate the reliability impact on the BPS of any exemptions from Ride-through requirements NERC determined were necessary.[42]

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39 *See, e.g.*, Comments of Long Island Power Association at pp. 4-5, American Clean Power Association and Solar Energy Industries at pp. 23-25, Invenergy Renewables at pp. 32-36, Elevate Energy Consulting at pp. 3-4.

40 Order No. 901, *supra*, at P 1.

41 *Id.* at P 193.

42 *Id.* at P 199.

Following the NERC Board of Trustees invocation of Rule 321, NERC received limited comments relating to specific hardware limitations with Voltage Source Converter HVDC equipment. NERC and Standards Committee representatives considered these concerns when determining whether exemptions were needed for reliability. NERC staff and the Standards Committee representatives found that there was insufficient data available to evaluate potential impacts of allowing an additional and unknown amount of IBR, with a dedicated Voltage Source Converter HVDC connection that would be in-service after the effective date of PRC-029-1, to seek exemptions from the Ride-through criteria.[43] Thus, to address the Commission's Order No. 901 directive to mitigate the reliability impact on the BPS of any exemptions, NERC staff and the Standards Committee representatives crafted the exemptions to be technology neutral to ensure fairness across all IBR technologies; limited in scope to existing resources and equipment, as required by Order No. 901; and specific to addressing the reliability needs set forth in Order No. 901.

NERC is aware that more extensive comments seeking technology specific and expansive exemptions for Voltage Source Converter HVDC equipment limitations have been submitted in the instant rulemaking proceeding. NERC believes that such exemptions exceed the discretion that was granted to NERC in Order No. 901. Should the Commission determine that the comments submitted in the instant rulemaking may warrant an exemption, NERC asks that the Commission be as specific as possible regarding the technology included and the timeframe that should be considered for any such exemption.

d. <u>Proposed Reliability Standard PRC-029-1 is a mandatory standard to enhance BPS reliability and is not intended to fully technically align with</u>

[43] NERC, *Board of Trustees Agenda Package* (Oct. 8, 2024), https://www.nerc.com/gov/bot/Agenda%20highlights%20and%20Mintues%202013/Board%20of%20Trustees%20Open%20Meeting%20Agenda%20Package%20October%208%202024%20Attendees.pdf.

IEEE 2800

Several commenters suggest that proposed Reliability Standard PRC-029-1 should technically align with IEEE 2800.[44] NERC disagrees. In Order No. 901, the Commission recognized that IEEE 2800 may not fully address its concerns, stating, "the record in this proceeding provides no basis to conclude that the performance requirements of IEEE 2800-2022 are preferable to NERC's or would adequately address the reliability concerns discussed in this final rule, we decline to direct NERC to specifically reference IEEE standards in its new or modified Reliability Standards."[45] The Commission further explained that "NERC has the discretion to consider during its standards development process whether and how to reference IEEE standards in the new or modified Reliability Standards."[46]

NERC has exercised the discretion provided by the Commission in Order No. 901 and determined that proposed Reliability Standard PRC-029-1 should not fully align with IEEE 2800. NERC and IEEE are separate standards development organizations with different missions and objectives. IEEE's core purpose is "to foster technological innovation and excellence for the benefit of humanity."[47] IEEE standards require consensus of volunteer technical stakeholders to develop a standard that is applicable for a variety of different equipment and organizational structures encompassing international applications.[48] According to IEEE, these standards are adopted voluntarily, contain guidance, and are applied for their own business benefit.[49] NERC

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[44] *See, e.g.*, Comments of Orsted Wind Power North America at pp. 16-21, Union of Concerned Scientists at pp. 3-4, Elevate Energy Consulting at pp. 3-7, New York State Reliability Council at pp. 4-5, and Western Interconnection Regional Advisory Body at pp. 8-9.

[45] Order No. 901, *supra*, at P 195.

[46] *Id.*

[47] IEEE, *Mission & Vision*, https://www.ieee.org/about/vision-mission.html#:~:text=IEEE's%20core%20purpose%20is%20to,for%20the%20benefit%20of%20humanity.

[48] IEEE, *Developing Standards: Mobilizing the Working Group*, https://standards.ieee.org/develop/mobilizing-working-group/.

[49] IEEE, *Developing Standards: Gaining the Final Approval*, https://standards.ieee.org/develop/gaining-final-approval/.

understands that IEEE looks to generally advance technology, not to exclusively address risks to the reliability of the BPS, nor develop and enforce mandatory standards. By contrast, NERC has the statutory responsibility, under Section 215 of the FPA,[50] for producing and enforcing mandatory Reliability Standards, which are filed with the applicable governmental authorities, to assure the effective and efficient reduction of risks to the reliability and security of the BPS. In this case, proposed Reliability Standard PRC-029-1 was developed to achieve specific reliability objectives in response to the directives from FERC in Order No. 901.

NERC developed proposed Reliability Standard PRC-029-1 in accordance with Section 300 of its Rules of Procedure and the NERC Standard Processes Manual.[51] During development, the drafting team considered the ride through tables and terms set forth in IEEE-2800 when developing the voltage and frequency Ride-through criteria set forth in proposed Reliability Standard PRC-029-1 Attachments 1 and 2. However, due to the nature of NERC Reliability Standards, adoption of the IEEE 2800 standard wholesale was not found to be appropriate for several reasons. First, clauses within IEEE 2800 were not drafted in a manner that is enforceable within the current structure of NERC's Compliance Monitoring and Enforcement Program.[52] Second, in contrast to NERC Reliability Standards that are made available free to the public, IEEE 2800 is not a publicly available standard, thus restricting access to it for responsible entities. Finally, unlike IEEE 2800, proposed Reliability Standard PRC-029-1 was developed specifically to address the Commission's directives set forth in Order No. 901. In furtherance of addressing the Order No. 901 directives, proposed Reliability Standard PRC-029-1 is more stringent than

[50] 16 U.S.C. § 824o.

[51] The NERC Rules of Procedure, including Appendix 3A, NERC Standard Processes Manual, are available at http://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx.

[52] *See* NERC Rules of Procedure, including Appendix 4C, Compliance Monitoring and Enforcement Program.

IEEE 2800. As a result of proposed Reliability Standard PRC-029-1 being more stringent, NERC does not believe there is a conflict with IEEE 2800.

e. <u>IBRs subject to Reliability Standard PRC-029-1 need more stringent requirements than synchronous generators subject to Reliability Standard PRC-024-4 to ensure reliability due to IBRs inability to Ride-through System Disturbances</u>

Commenters assert that synchronous generators and IBRs are similarly situated, and that proposed Reliability Standard PRC-029-1 will lead to undue discrimination against IBRs relative to the treatment of synchronous generators under proposed Reliability Standard PRC-024-4.[53] To support this assertation, commenters mischaracterize proposed Reliability standard PRC-024-4 by claiming that "PRC-024-4 explicitly allows a plant to trip if protection systems trip auxiliary plant equipment, per section 4.2.3."[54] NERC disagrees with these assertations. For the reasons described below and in further detail in the Ride-through Petition and Technical Rationale,[55] proposed Reliability Standards PRC-024-4 and PRC-029-1 were carefully developed to address the reliability gaps identified in Order No. 901 while accounting for the technical differences between IBRs and synchronous generators. The proposed Reliability Standards are narrowly tailored to not cause undue negative effects on competition beyond what is necessary for reliability[56] and reflect

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53 Comments of American Clean Power Association and Solar Energy Industries Association at p. 8 ("Synchronous resources and IBRs are similarly situated with regard to demonstrating a need for exemptions, so differential treatment of these resources would be textbook undue discrimination—treating similarly situated resources differently.")

54 *Id.* at p. 3.

55 Ride-through petition at pp. 49-50 & Exhibit E-1 Technical Rationale PRC-024-4.

56 *See* Order No. 672., *supra*, at P 332 ("As directed by section 215 of the FPA, the Commission itself will give special attention to the effect of a proposed Reliability Standard on competition. The ERO should attempt to develop a proposed Reliability Standard that has no undue negative effect on competition. Among other possible considerations, a proposed Reliability Standard should not unreasonably restrict available transmission capability on the Bulk-Power System beyond any restriction necessary for reliability and should not limit use of the Bulk-Power System in an unduly preferential manner. It should not create an undue advantage for one competitor over another.").

consideration of the different natures of synchronous generators and IBRs, e.g., their risks, performance, and equipment capabilities.

In Order No. 901, the Commission directed NERC to develop proposed Reliability Standards that "account for the technical differences between registered IBRs and synchronous generation resources, such as registered IBRs' faster control capability to ramp power output down or up when capacity is available."[57] FERC explained that the current suite of Reliability Standards "may not account for the material technological differences between the response of synchronous generation resources and the response of IBRs to the same disturbances on the Bulk-Power System."[58] Thus, the Commission expressly recognized that synchronous generators and IBRs do not require the same Ride-through performance requirements because the root cause of the Ride-through issues impacting BPS reliability are inherently different based on the technology used by synchronous generators and IBRs.

In Order No. 901 the Commission further directed NERC to "develop new or modified Reliability Standards addressing reliability gaps pertaining to IBRs."[59] The Commission cited the various NERC disturbance reports[60] that explained the tripping of IBRs during grid fault conditions as a basis for their order to require IBRs to ride through such instances. FERC explained that its actions were needed to ensure reliability in response to these documented events that led to the unexpected widespread loss of IBR generating resources across multiple events.[61] As stated in Order No. 901, NERC's Reliability Standards "must ensure that registered IBRs will provide frequency and voltage support during frequency and voltage excursions in a manner necessary to

57 Order No. 901, *supra*, at P 208.
58 *Id.* at P 3.
59 *Id.* at P 1.
60 *See, e.g.*, Order No. 901, *supra*, at PP 26-30; Event Reports, *supra*, note 4.
61 *See* Order No. 901, *supra*, at PP 24-36.

contribute toward the overall system needs for essential reliability services."[62] The Commission further noted that the current Reliability Standards "do not contain performance requirements that are unique to IBRs and are necessary to ensure that IBRs operate in a predictable and reliable manner."[63]

In response to Order No. 901, NERC developed proposed Reliability Standard PRC-024-4 as a continuation of a protection-based[64] standard with applicability to only synchronous generators, synchronous condensers, and type 1 and type 2 wind generation; these resources do not require performance-based[65] requirements to address Ride-through disturbances. By contrast, proposed Reliability Standard PRC-029-1 was developed as a separate, standalone, performance-based standard to establish voltage and frequency Ride-through criteria for Generator Owners of IBRs to continue to inject current and perform voltage support during a BPS disturbance and prohibit momentary cessation in the no-trip zone during disturbances to address the reliability gaps identified by the Commission and directives set forth in Order No. 901. This approach to create a new standard for IBRs recognizes the inherent differences between synchronous generators and IBRs and addresses IBR Ride-through deficiencies that threaten reliability.

The decision to make proposed Reliability Standard PRC-024-4 applicable to synchronous generators, synchronous condensers, and type 1 and type 2 wind generation considered that the behavior of rotating synchronous generators during faults and other disturbances on the transmission system is well established and understood, as opposed to IBR generation with its fast-acting electronics. Although the Ride-through behavior of synchronous generators may be affected

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62 *Id.* at P 5.

63 *Id.* at P 4.

64 Protection-based requirements refer to setting ranges resources have in place to operate reliably.

65 Performance-based requirements refer to the specific criteria resources should operate within to operate reliably.

to some degree by excitation and governing; due to progressive improvement, standardization, and level of maturity, excitation and governing controls are rarely a cause of unnecessary tripping during disturbances. For these reasons, proposed Reliability Standard PRC-024-4 was not revised to be a performance-based standard for synchronous generator Ride-through as it would provide negligible benefit to the reliability of the BPS and would be neither proportional nor reasonable.

NERC disagrees with the assertion that proposed Reliability Standard PRC-024-4 allows synchronous generator plants to trip.[66] The exemption cited by commenters in proposed Reliability Standard PRC-024-4 Applicability Section 4.2.3 is related to a generation plant's auxiliary equipment being allowed to trip during voltage and frequency excursions while preventing the tripping and loss of the entire generation plant. As noted in Applicability Section 4.2.1 in proposed Reliability Standard PRC-024-4, generators are responsible for relaying, which includes "Frequency, voltage, and volts per hertz protection (whether provided by relaying or functions within associated control systems) in response to electrical signals and (i) directly trip the generating resource(s); or (ii) provide signals to the generating resource(s) to trip." Thus, the requirements apply to generating resources and not the auxiliary equipment. Specifically, the generating resource and auxiliary equipment are designed to allow the generating resource to operate even with the loss of the auxiliary equipment. Therefore, the exemption allows the auxiliary equipment in the plant to trip, while requiring relay settings and coordination to protect the equipment that is critical to the generator's ability to Ride-through, thus preventing the entire plant from tripping. NERC further notes that NERC Reliability Standards PRC-025-2 "Generator

[66] Comments of American Clean Power Association and Solar Energy Industries Association at p. 3.

Relay Loadability" and PRC-026-2 "Relay Performance During Stable Power Swings" prevent unnecessary tripping of synchronous generators during a system disturbance.

III. CONCLUSION

NERC appreciates the opportunity to provide these clarifying comments and respectfully requests that the Commission accept these reply comments to support a clear and complete record and approve the proposed Reliability Standards PRC-024-4 and PRC-029-1 and the proposed definition of the term "Ride-through" as proposed in the NOPR.

Respectfully submitted,

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