(l) Related Information

For more information about this AD, contact Julie Linn, Aviation Safety Engineer, FAA, 2200 South 216th Street, Des Moines, WA 98198; phone 206–231–3584; email *Julie.Linn@faa.gov*.

(m) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the material listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this material as applicable to do the actions required by this AD, unless this AD specifies otherwise.

(3) The following material was approved for IBR on March 19, 2025 (90 FR 9382, February 12, 2025).

(i) Boeing Special Attention Service Bulletin 747–25–3644, Revision 2, dated January 27, 2023.

(ii) Boeing Special Attention Service Bulletin 747–25–3653, Revision 2, dated January 27, 2023.

(4) For Boeing material identified in this AD, contact Boeing Commercial Airplanes, Attention: Contractual & Data Services (C&DS), 2600 Westminster Boulevard, MC 110–SK57, Seal Beach, CA 90740–5600; phone 562–797–1717; website *myboeingfleet.com*.

(5) You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195.

(6) You may view this material at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations* or email *fr.inspection@nara.gov*.

Issued on July 25, 2025.

Peter A. White,

Deputy Director, Integrated Certificate Management Division, Aircraft Certification Service.

[FR Doc. 2025–14354 Filed 7–28–25; 8:45 am]

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DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

18 CFR Part 40

[Docket No. RM25–3–000; Order No. 909]

Reliability Standards for Frequency and Voltage Protection Settings and Ride-Through for Inverter-Based Resources

AGENCY: Federal Energy Regulatory Commission.

ACTION: Final rule.

SUMMARY: The Federal Energy Regulatory Commission (Commission) approves proposed Reliability Standard PRC–024–4 (Frequency and Voltage Protection Settings for Synchronous Generators, Type 1 and Type 2 Wind Resources, and Synchronous Condensers), Reliability Standard PRC–029–1 (Frequency and Voltage Ride-through Requirements for Inverter-Based Resources), and a definition of ''Ride-through,'' which the North American Electric Reliability Corporation (NERC) submitted in response to a Commission directive. In addition, the Commission directs NERC to clarify documentation requirements for legacy equipment needed to support an exemption request pursuant to Reliability Standard PRC–029–1; to consider whether, and if so how, to address a total of two exception- and exemption-related issues raised by commenters; and to submit an informational filing that assesses the reliability impact of the exemptions to Reliability Standard PRC–029–1.

DATES: This rule is effective August 28, 2025.

FOR FURTHER INFORMATION CONTACT:

Syed Ahmad (Technical Information), Office of Electric Reliability, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426, (202) 502–8718, *Syed.Ahmad@ferc.gov*

Boris Voynik (Technical Information), Office of Electric Reliability, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426, (202) 502–8902, *Boris.Voynik@ferc.gov*

Hampden T. Macbeth (Legal Information), Office of General Counsel, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426, (202) 502–8957, *Hampden.Macbeth@ferc.gov*

Felicia West (Legal Information), Office of General Counsel, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426, (202) 502–8948, *Felicia.West@ferc.gov*

SUPPLEMENTARY INFORMATION:

1. Pursuant to section 215(d)(2) of the Federal Power Act (FPA),[1] the Commission approves the proposed Protection and Control (PRC) Reliability Standard PRC–024–4 (Frequency and Voltage Protection Settings for Synchronous Generators, Type 1 and Type 2 Wind Resources, and Synchronous Condensers), Reliability Standard PRC–029–1 (Frequency and Voltage Ride-through Requirements for Inverter-Based Resources), and the proposed definition of the term Ride-through, which the North American Electric Reliability Corporation (NERC) submitted in response to Commission directives in Order No. 901.[2] We also approve the associated violation risk factors and violation severity levels, implementation plan, and effective date, as well as the retirement of currently effective Reliability Standard PRC–024–3. We approve the proposed Reliability Standards and proposed definition because they improve the reliability of the Bulk-Power System by establishing Ride-through performance requirements that mitigate inverter-based resource (IBR) tripping and momentary cessation.[3]

2. While the final rule largely adopts the Notice of Proposed Rulemaking's[4] (NOPR) proposals, some commenters raise a concern that additional specificity is needed regarding the acceptable documentation to support an exemption for legacy IBRs pursuant to Requirement 4 of Reliability Standard PRC–029–1. As discussed below, we agree that entities would benefit from greater clarity on documentation obligations and direct that NERC, within 12 months of the effective date of this final rule, submit a responsive modification to the Reliability Standard, for example, by expanding the non-exhaustive list for IBR generator owners of acceptable types of evidence of a hardware limitation that prevents the IBR from meeting the ride-through[5] criteria in proposed Requirements R1 through R3. We also direct NERC to submit, to the Commission, an informational filing 18 months after the conclusion of the exemption request period in proposed Reliability Standard PRC–029–1, Requirement R4 that assesses the reliability impact of the exemptions to the Standard.

3. In Order No. 901, the Commission stressed the need for comprehensive and timely Reliability Standards to address the well-documented reliability impacts of IBRs.[6] With that frame of reference, the Commission in Order No. 901 allowed NERC to craft ''a limited and documented'' exemption to ride-

[1] 16 U.S.C. 824o(d)(2).

[2] *Reliability Standards to Address Inverter-Based Res.*, Order No. 901, 88 FR 74250 (Oct. 30, 2023), 185 FERC ¶ 61,042 (2023).

[3] *See id.* PP 50–52.

[4] *Reliability Standards for Frequency & Voltage Protection Settings & Ride-Through for Inverter-Based Res.*, Notice of Proposed Rulemaking, 90 FR 6845 (Jan. 21, 2025), 189 FERC ¶ 61,212 (2025) (NOPR).

[5] This final rule uses the phrase ''Ride-through'' to refer to the proposed definition of the term ''Ride-through'' and uses the phrase ''ride-through'' to refer to the act of an IBR staying connected to the Bulk-Power System through a voltage or frequency system disturbance.

[6] Order No. 901, 185 FERC ¶ 61,042 at PP 5, 190, 226 (''[W]e emphasize that industry has been aware of and alerted to the need to address the impacts of IBRs . . . since at least 2016.'').

through performance requirements ''for existing IBRs with equipment limitations.'' [7] NERC's proposed Reliability Standard hews close to the Commission's expectations. Some commenters responding to the NOPR seek modifications to the ride-through provisions to address two concerns. First, according to commenters, certain High-Voltage Direct Current (HVDC)-connected IBRs cannot meet the entire ride-through criteria in Requirement R1 without risking thermal damage to equipment and therefore should receive an exception. Second, while the ride-through exemption [8] in Reliability Standard PRC–029–1, Requirement 4 is limited to existing IBRs (*i.e.,* ''an IBR that is in-service by the effective date of PRC–029–1'') some commenters advocate that the exemption provision should accommodate long-lead time projects, meaning IBR facilities that are currently under development but will not be in-service on the effective date of PRC–029–1. Commenters adjure that without changes to the exemption provision to accommodate these concerns, existing IBR projects may be forced into early retirement and planned IBR projects under construction may be cancelled before reaching operation, thereby removing generation resources from the grid.

4. As discussed in detail below, it appears that commenters have articulated colorable concerns that were not raised in comments to prior Commission orders in this proceeding. We believe that these matters deserve a more complete vetting in the NERC standards development process given the lack of discussion in the record. Accordingly, we direct NERC through its standard development process to determine whether, and if so how, to account for these concerns. If NERC deems appropriate, NERC may develop appropriate solutions for the two issues raised by commenters beyond the narrow parameter set forth in Order No. 901 for exceptions or exemptions from ride-through requirements. Within 12 months of the effective date of this final rule, we direct NERC to submit to the Commission its determination and, if it deems appropriate, any proposed modifications to Reliability Standard PRC–029–1.

5. While providing latitude to address these two concerns raised by commenters, NERC and industry should be mindful of the Commission's overarching concerns expressed in Order No. 901 that a comprehensive and timely resolution is needed so that IBR performance no longer poses a threat to the reliable operation of the Bulk-Power System. With that in mind, to the extent that NERC develops modifications pertaining to long-lead time projects, this final rule should serve as notice that future IBR projects must fully satisfy the ride-through performance requirements (and not later dates as suggested by some commenters).

I. Background

A. Section 215 and Mandatory Reliability Standards

6. Section 215 of the FPA provides that the Commission may certify an Electric Reliability Organization (ERO), the purpose of which is to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval.[9] Reliability Standards may be enforced by the ERO, subject to Commission oversight, or by the Commission independently.[10] Pursuant to section 215 of the FPA, the Commission established a process to select and certify an ERO,[11] and subsequently certified NERC.[12]

B. Order No. 901

7. In Order No. 901, the Commission explained, among other things, that the majority of installed IBRs use grid-following inverters, which can track grid state parameters (*e.g.,* voltage angle) in milliseconds and react nearly instantaneously to changing grid conditions.[13] The Commission then explained that, as found by multiple NERC reports,[14] some IBRs ''are not configured or programmed to support grid voltage and frequency in the event of a system disturbance, and, as a result, will reduce power output, exhibit momentary cessation, or trip in response to variations in system voltage or frequency.'' [15]

8. Therefore, the Commission directed NERC to develop new or modified Reliability Standards pertaining to IBRs in four areas: (1) data sharing; (2) model validation; (3) planning and operational studies; and (4) performance requirements.[16] The Commission required NERC to submit, by November 4, 2024, new or modified Reliability Standards that require registered IBR generator owners and operators to use appropriate settings ''to ride through frequency and voltage system disturbances.'' [17]

9. The Commission mandated that the new or modified ride-through Reliability Standards must require registered IBRs to continue to inject current within an established no trip-zone and perform frequency support during Bulk-Power System disturbances. The Commission directed that the new or modified Reliability Standards must establish requirements for post-disturbance ramp rates and phase lock loop synchronization, and other known causes of IBR tripping or momentary cessation.[18]

10. In response to commenters on the NOPR preceding the issuance of Order No. 901, the Commission declined to direct NERC to specifically reference Institute of Electrical and Electronics Engineers (IEEE) standards in new or modified Reliability Standards developed in response to the Order. The Commission concluded that the record in the proceeding provided no support for the conclusion that the performance requirements of IEEE standard 2800–2022 (IEEE 2800–2022) [19] are preferable to NERC's Reliability Standards or would adequately address the reliability concerns identified in Order No. 901. Instead, the Commission provided NERC the discretion to consider whether and how to reference IEEE standards, including IEEE 2800–2022, in the new or modified Reliability Standards.[20]

11. The Commission also recognized that some older IBRs may have equipment limitations such that IBR owners would have to physically replace their hardware and may have settings and configurations that IBR owners could not modify through software updates, and in such

[7] *Id.* P 193 (noting that the exemption would apply to ''typically older IBR technology with hardware that needs to be physically replaced . . .'').

[8] An exemption under Requirement R4 means that an IBR is exempted in perpetuity or until the hardware is replaced from meeting portions of the voltage and frequency ride-through criteria of Requirements R1 through R3 that the hardware was not designed to meet.

[9] 16 U.S.C. 824o(c).

[10] *Id.* 824o(e).

[11] *Rules Concerning Certification of the Elec. Reliability Org.; & Procs. for the Establishment, Approval, & Enf't of Elec. Reliability Standards,* Order No. 672, 71 FR 8662 (Feb. 17, 2006), 114 FERC ¶ 61,104, *order on reh'g,* Order No. 672–A, 71 FR 19814 (Apr. 18,2006), 114 FERC ¶ 61,328 (2006); *see also* 18 CFR 39.4(b).

[12] *N. Am. Elec. Reliability Corp.,* 116 FERC ¶ 61,062, *order on reh'g and compliance,* 117 FERC ¶ 61,126 (2006), *aff'd sub nom. Alcoa, Inc.* v. *FERC,* 564 F.3d 1342 (D.C. Cir. 2009) (Certification Order).

[13] Order No. 901, 185 FERC ¶ 61,042 at P 12.

[14] *Id.* P 26 n.53 (listing 12 NERC reports describing IBR behavior during disturbances).

[15] *Id.* P 12 (footnotes omitted).

[16] *E.g., id.* PP 1, 5, 53.

[17] *Id.* P 190.

[18] *Id.* P 5.

[19] IEEE 2800–2022 is a voluntary industry standard for transmission connected IBRs that is intended to enhance the operating performance and control capabilities of IBRs. *Id.* P 36.

[20] *Id.* P 195.

circumstances, could not implement voltage ride-through performance requirements. Thus, the Commission directed NERC to ''determine whether the new or modified Reliability Standards should provide for a limited and documented exemption for certain registered IBRs from voltage ride through performance requirements.'' [21] The Commission added that if NERC determined that an exemption is appropriate, the new or modified Reliability Standards should mitigate the reliability impacts to the Bulk-Power System of such an exemption.[22] The Commission also directed NERC to ensure exemptions would only be 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.'' [23]

C. NERC Petition

12. On November 4, 2024, in response to Order No. 901, NERC submitted for Commission approval the proposed definition of the term Ride-through for the NERC Glossary of Terms Used in Reliability Standards (Glossary of Terms), proposed Reliability Standards PRC–024–4 and PRC–029–1, the associated violation risk factors and violation severity levels, implementation plans and effective dates for Reliability Standards PRC–024–4 and PRC–029–1, and the retirement of currently effective Reliability Standard PRC–024–3. NERC asserted that proposed Reliability Standards PRC–024–4 and PRC–029–1 would ensure that applicable Bulk-Power System-connected resources ride-through system disturbances.[24]

1. Addition of Defined Term Ride-Through to NERC Glossary of Terms

13. NERC stated that proposed Reliability Standard PRC–029–1 uses the term Ride-through, which NERC proposed to include in the NERC Glossary of Terms. NERC explained that the term Ride-through would mean that ''the plant/facility remains connected and continues to operate through voltage or frequency system disturbances.'' [25]

2. Proposed Reliability Standard PRC–024–4

14. NERC explained that proposed Reliability Standard PRC–024–4 removes language relating to IBR functionality in Requirements R1 through R4 because IBR performance requirements are included in proposed Reliability Standard PRC–029–1. Instead, proposed Reliability Standard PRC–024–4 would maintain capability-based requirements for synchronous generators, synchronous condensers, and type 1 and type 2 wind resources.[26] Moreover, NERC explained that, because synchronous units do not require performance-based requirements to ride-through system disturbances, proposed Reliability Standard PRC–024–4 would continue to address ride-through compatible frequency and voltage protection setting ranges for synchronous generators, synchronous condensers, and type 1 and type 2 wind resources.[27]

3. Proposed Reliability Standard PRC–029–1

15. NERC explained that proposed Reliability Standard PRC–029–1 would address directives in Order No. 901 by establishing frequency and voltage ride-through performance requirements for generator owners of IBRs.

a. Proposed Requirement R1

16. Under proposed Requirement R1, each generator owner of a NERC-registered IBR must ''ensure the design and operation is such that each IBR meets or exceeds Ride-through requirements, in accordance with the 'must Ride-through zone' as specified in Attachment 1'' of proposed Reliability Standard PRC–029–1, except in four conditions to protect hardware from incurring damage, as specified by the Standard.[28]

17. NERC explained that it adopted the IEEE 2800–2022's terminology for ''must ride-through zones,'' which are defined in terms of voltage and frequency magnitude and time duration.[29] NERC explained that it considered, but ultimately rejected, ride-through criteria more stringent than set forth in IEEE 2800–2022 due to industry comments raised during the IBR technical conference conveyed by NERC (September 2024 Technical Conference).[30]

18. NERC asserted that proposed Requirement R1 is responsive to the directive that NERC develop performance-based Reliability Standards that require IBRs to ride-through voltage system disturbances and require post-disturbance ramp rates to return to pre-disturbance levels.[31] Additionally, NERC asserted that the provision in proposed Requirement R1 requiring IBRs to meet or exceed ride-through requirements in Attachment 1 of proposed Reliability Standard PRC–029–1 that restricts the use of momentary cessation satisfies the directive to prohibit momentary cessation in the no-trip zone during disturbances.[32]

19. In addition, Attachment 1, Tables 1 and 2 (the Tables) establish performance voltage ride-through criteria, which include minimum ride-through time requirements for voltage per unit by operation region.[33] Points 7 through 9 of Attachment 1 establish a minimum ride-through time of up to four deviations [34] of the applicable system voltage over a cumulative 10 second measurement window, which covers the 10 second period from the first voltage deviation and up to the fourth voltage deviation.[35] During the

[21] *Id.* P 193.

[22] *Id.* P 199.

[23] *Id.* P 193.

[24] NERC Petition at 1, 19–20.

[25] *Id.* at 23.

[26] *Id.* at 15. NERC explained that consistent with the then-proposed definition for IBRs in the NERC Glossary of Terms, type 1 and type 2 wind resources are not considered IBRs. On February 20, 2025, the Commission approved NERC's proposed definition for IBRs as: ''A plant/facility consisting of individual devices that are capable of exporting Real Power through a power electronic interface(s) such as an inverter or converter, and that are operated together as a single resource at a common point of interconnection to the electric system.'' Examples of IBRs include, but are not limited to, plants/facilities with solar photovoltaic (PV), Type 3 and Type 4 wind, battery energy storage system (BESS), and fuel cell devices. *N. Am. Elec. Reliability Corp.,* 190 FERC ¶ 61,098, at PP 3 n.9, 12 (2025) (delegated order) (Milestone 2 Delegated Order).

[27] NERC Petition at 49.

[28] *Id.* at 25, 29.

[29] *Id.* at 26.

[30] *Id.* at 27. Following the failure of the third ballot on proposed Reliability Standard PRC–024–4 and proposed Reliability Standard PRC–029–1, NERC convened the September 2024 Technical Conference under section 321 of the NERC Rules of Procedure to discuss issues surrounding the Order No. 901 directives. *Id.* at 22. Section 321 of the NERC Rules of Procedure allows the NERC Board of Trustees to take special actions when a ballot pool has ''failed to approve a proposed Reliability Standard that contains a provision to adequately address a specific matter identified in a directive issued'' by the Commission. NERC, *Rules of Procedure,* Sec. 321 (Nov. 28, 2023), *https://www.nerc.com/AboutNERC/pages/rules-of-procedure.aspx.*

[31] NERC Petition at 42.

[32] *Id.* at 42–43.

[33] *Id.,* Ex. A–3 (PRC–029–1), attach. 1.

[34] A deviation means a change in the applicable system voltage.

[35] Point 7 clarifies the voltage ride-through minimum time duration for two system conditions, as specified in the Tables. First, point 7 clarifies the minimum time duration per system voltage, as specified in the Tables' values during a disturbance. Second, point 7 clarifies the minimum time duration when the system voltage is continuously varying during a disturbance. Point 8 clarifies that the required voltage ride-through time in the mandatory and permissive operation regions, as specified in the Tables, is calculated over a 10 second measurement window for one or more system disturbances. Point 9 explains further that an IBR may trip when there are more than four voltage deviations within any cumulative 10 second

Continued

cumulative 10 second measurement window, the IBR must ride-through up to four deviations.[36]

b. Proposed Requirement R2

20. Under proposed Requirement R2, each generator owner of a NERC-registered IBR must adhere to voltage ride-through performance criteria during system disturbances, unless a documented hardware limitation exists in accordance with Requirement R4.[37] NERC asserted that proposed Requirement R2 satisfies the following directives: (1) that NERC develop performance-based Reliability Standards that require IBRs to ride-through voltage system disturbances; and (2) that IBRs inject current and perform frequency support during a disturbance by requiring IBRs remain connected and fulfill control and regulation functions to qualify as riding-through a system disturbance.[38] Proposed Requirement R2 defines specific ride-through performance requirements that an IBR must satisfy when voltage is within the regions specified in Attachment 1.

c. Proposed Requirement R3

21. Under proposed Requirement R3, each generator owner of a NERC-registered IBR must ensure that its IBR adheres to ride-through requirements during frequency excursion events by continuing to exchange current and remain electrically connected in accordance with the ''must ride-through zone,'' as specified in the proposed Reliability Standard's Attachment 2, and while the ''absolute rate of change of frequency (RoCoF) magnitude is less than or equal to 5 [hertz]/second, unless a documented hardware limitation exists in accordance with Requirement R4.'' [39]

22. NERC asserted that proposed Requirement R3 is responsive to the directive that NERC develop performance-based Reliability Standards that require IBRs to ride-through frequency system disturbances. Additionally, NERC contended that proposed Requirement R3 satisfies the directive that IBRs inject current and perform frequency support during a disturbance by requiring that IBRs remain connected and fulfill control and regulation functions to qualify as riding-through a system disturbance.[40]

d. Proposed Requirement R4

23. Proposed Requirement R4 would allow each generator owner of an existing legacy IBR to obtain an exemption to the ride-through requirements of Requirements R1 through R3. Specifically, Requirement R4 provides that ''[e]ach Generator Owner identifying an IBR that is in-service by the effective date of PRC–029–1, has known hardware limitations that prevent the IBR from meeting Ride-through criteria as detailed in Requirements R1–R3, and requires an exemption from specific Ride-through criteria shall . . . [d]ocument information supporting the identified hardware limitation.'' [41]

24. Each generator owner of an IBR must provide the information supporting the identified hardware limitation (unless it is considered proprietary by the original equipment manufacturer) to each planning coordinator, transmission planner, transmission operator, and reliability coordinator in the footprint in which the legacy IBR is located.[42] Moreover, the generator owner must submit documentation to the relevant Compliance Enforcement Authority—typically a Regional Entity—that ''must accept that all aspects of the documentation specified in proposed Requirement R4 have been provided by the Generator Owner before an exemption can [be] granted.'' [43]

25. NERC explained that it determined that an exemption process for generator owners of legacy IBRs for voltage and frequency performance requirements is necessary. In its petition, NERC stated the standard drafting team determined the ''anticipated difficulty of Generator Owners having to wholesale retrofit and redesign legacy facilities currently in operation would be unreasonable and unduly burdensome, and it could lead to undesirable impacts on reliability.'' [44] Further, NERC explained that the exemptions must be specific and limited to the voltage or frequency bands and associated duration that cannot be satisfied or to the number of cumulative voltage deviations within a 10 second measurement window that the equipment can ride-through if it is less than four deviations within any 10 second measurement window.[45]

26. NERC asserted that proposed Requirement R4 meets the directive that NERC determine whether the new or modified Reliability Standards should provide a limited and documented exemption from the voltage ride-through requirements for existing IBRs and equipment.[46] NERC determined that a frequency exemption was also necessary and appropriate because of hardware-based capability limitations for a significant number of installed IBRs, a concern that was raised during the September 2024 Technical Conference.[47]

27. Regarding the Commission directive to NERC to develop new or modified Reliability Standards to mitigate the reliability impacts to the Bulk-Power System of approved exemptions, NERC claimed that the reliability impacts of voltage and frequency ride-through exemptions are mitigated by existing Reliability Standards that address the responsibilities of transmission planners, planning coordinators, reliability coordinators, and transmission operators.[48] Moreover, under Milestone 4 of the Order No. 901 Work Plan,[49] NERC indicated that it will develop Reliability Standards that will help mitigate the reliability impact of the exemptions.[50]

D. Notice of Proposed Rulemaking

28. On December 19, 2024, the Commission issued a NOPR proposing to approve proposed Reliability Standards PRC–024–4 and PRC–029–1 and the proposed definition of the term Ride-through.[51]

29. The Commission also proposed to find that NERC reasonably determined it was appropriate to provide an

measurement window. NERC Petition, Ex. A–3, attach. 1.

[36] *Id.*

[37] *Id.* at 29.

[38] *Id.* at 42.

[39] *Id.* at 33.

[40] *Id.* at 42.

[41] *Id.* at 36–37.

[42] *Id.* at 37.

[43] *Id.* at 40.

[44] *Id.* at 38.

[45] *Id.* at 39–40.

[46] *Id.* at 44.

[47] *Id.* at 38–39.

[48] *Id.* at 46. *See also id.* n.67 (providing as examples existing Reliability Standards IRO–002–7 (Reliability Coordination—Monitoring and Analysis), IRO–008–3 (Reliability Coordinator Operational Analyses and Real-time Assessments), TOP–002–4 (Operations Planning), and TPL–001–5.1 (Transmission System Planning Performance Requirements)).

[49] Following the issuance of Order No. 901, NERC submitted an informational filing that included its Order No. 901 Work Plan with four key milestones for meeting the directives of Order No. 901. Milestone 1: submit Work Plan (completed Jan. 17, 2024). Milestone 2: submit new or modified Reliability Standards to address performance requirements and post-event performance validation for registered IBRs (completed with NERC's filing of the instant petition and two others on Nov. 4, 2024). Milestone 3: submit new or modified Reliability Standards to address data sharing and model validation by Nov. 4, 2025. Milestone 4: submit new or modified Reliability Standards to address planning and operational studies requirements for all IBRs by Nov. 4, 2026. NERC, Informational Filing Regarding the Development of Reliability Standards Responsive to Order No. 901, Docket No. RM22–12–000, at 6 (filed Jan. 17, 2024).

[50] NERC Petition at 46.

[51] NOPR, 189 FERC ¶ 61,212 at P 1.

exemption process for voltage and frequency ride-through requirements.[52] In the NOPR, the Commission proposed to direct that NERC submit two informational filings 12 months and 24 months after the conclusion of NERC's proposed 12-month exemption request period for existing IBRs to ''understand the volume of exemptions, the circumstances in which entities have invoked the exemption provision, and ultimately to understand what if any effect the exemption provision has on the efficacy of Reliability Standard PRC–029–1.'' [53]

30. In response to the NOPR, the Commission received 20 sets of comments.[54] A list of commenters appears in Appendix A.

31. Commenters generally support the NOPR proposal to approve the proposed definition of the term Ride-through [55] and proposed Reliability Standard PRC–024–4 as maintaining a protection-based standard for synchronous resources, as well as the removal of references to IBRs.[56] Although many commenters supported approving proposed Reliability Standard PRC–029–1,[57] several raised concerns with the exception and exemption provisions therein.[58]

II. Discussion

32. Pursuant to section 215(d)(2) of the FPA, we adopt the NOPR proposal and approve proposed Reliability Standards PRC–024–4 and PRC–029–1 and the proposed definition of Ride-through as just, reasonable, not unduly discriminatory or preferential, and in the public interest. Below, we discuss the following matters: (A) addition of the defined term Ride-through to the NERC Glossary of Terms; (B) proposed Reliability Standard PRC–024–4; (C) proposed Reliability Standard PRC–029–1; and (D) the Commission directive that NERC submit an informational filing.

A. Addition of Defined Term Ride-Through to NERC Glossary of Terms

33. As mentioned above, in the NOPR, the Commission proposed to approve NERC's proposal to define the term Ride-through as ''the plant/facility remains connected and continues to operate through voltage or frequency system disturbances.'' [59]

1. Comments

34. Commenters generally support the proposed definition of the term Ride-through.[60] For example, aligned ISOs/RTOs explain that requiring IBRs to ride-through disturbances necessitates documenting an agreed-upon definition of the term Ride-through in the NERC Glossary of Terms.[61] NERC explains in its comments that the definition establishes ''a clear understanding of what it means for a generator to Ride-through a disturbance'' by addressing ''abnormal tripping, interruption of current injection, and reduced power output, which lead to the unexpected loss of widespread generating resources.'' [62]

2. Commission Determination

35. Pursuant to section 215(d)(2) of the FPA, we adopt the NOPR proposal to approve the addition of the term Ride-through to the NERC Glossary of Terms. We find that the addition of the term will provide a clear and consistent understanding of the term when used in Reliability Standards. Further, the defined term Ride-through, when considered with proposed Reliability Standard PRC–029–1, is responsive to the directives in Order No. 901 to develop Reliability Standards that establish performance ride-through requirements for IBRs.[63]

B. Proposed Reliability Standard PRC–024–4

36. In the NOPR, the Commission proposed to approve proposed Reliability Standard PRC–024–4 as just, reasonable, not unduly discriminatory or preferential, and in the public interest and as consistent with applicable directives in Order No. 901.[64]

1. Comments

37. Commenters generally support, or do not oppose, the approval of proposed Reliability Standard PRC–024–4.[65] For example, aligned ISOs/RTOs support the approval of proposed Reliability Standard PRC–024–4 as consistent with the performance requirement directives of Order No. 901, explaining that it is a protection-based standard applicable only to synchronous generators, synchronous condensers, and type 1 and type 2 wind units. Aligned ISOs/RTOs also support removing references to IBRs in proposed Reliability Standard PRC–024–4 because IBRs will be subject to ride-through requirements in proposed Reliability Standard PRC–029–1.[66]

2. Commission Determination

38. Pursuant to section 215(d)(2) of the FPA, we adopt the NOPR proposal to approve proposed Reliability Standard PRC–024–4 as just, reasonable, not unduly discriminatory or preferential, and in the public interest. We find that removal of references to IBRs in proposed Reliability Standard PRC–024–4 because IBRs will be subject to ride-through performance requirements under proposed Reliability Standard PRC–029–1 is consistent with Order No. 901. In Order No. 901, the Commission provided NERC the discretion to modify PRC–024–3 or to develop a comprehensive Reliability Standard to satisfy the IBR ride-through performance requirement directives of Order No. 901.[67] NERC adopted the latter approach in developing Reliability Standard PRC–029–1, which necessitated the removal of references to IBRs in Reliability Standard PRC–024–4.

C. Proposed Reliability Standard PRC–029–1

39. In the NOPR, the Commission proposed to approve proposed

[52] *Id.* PP 29, 31, 32.

[53] *Id.* P 5.

[54] Unfrack FERC Coalition's comments fall outside the scope of this proceeding, and thus are not considered.

[55] *See* aligned ISOs/RTOs Comments at 4; EEI Initial Comments at 1; APS Comments at 2 (stating its support for EEI's comments); NERC Initial Comments at 2–4.

[56] *See* aligned ISOs/RTOs Comments at 4–5; Dominion Comments at 2; EEI Initial Comments at 1; APS Comments at 2 (stating its support for EEI's comments); LA PSC Comments at 1; NYISO Comments at 1. No comments were received in opposition to the proposed Standard.

[57] Aligned ISOs/RTOs Comments at 3; Elevate Comments at 12; LA PSC Comments at 1; NERC Initial Comments at 2–4; NYISO Comments at 1; NYSRC Comments at 8; Tesla Comments at 1. UCS does not explicitly support approving proposed Reliability Standard PRC–029–1; but states that it is ''generally in favor of ride-through requirements for all generation including IBRs.'' UCS Comments at 3.

[58] Clean Energy Associations Initial Comments at 10–17, 23–25; Deriva Comments at 5; Dominion Comments at 3–7; DNV Comments at 1–4; EEI Initial Comments at 2–3; Elevate Comments at 3–4, 9–10; Invenergy Initial Comments at 19–23, 32–36; LIPA Comments at 4–6; NYISO Comments at 2–3; NYSERDA Comments at 2–5; Ørsted Comments at 7–21; WIRAB Comments at 8.

[59] NERC Petition at 23.

[60] Aligned ISOs/RTOs Comments at 4; EEI Initial Comments at 1; APS Comments at 2 (stating its support for EEI's comments). No comments were received in opposition to the proposed definition.

[61] Aligned ISOs/RTOs Comments at 4.

[62] NERC Initial Comments at 2–3.

[63] Order No. 901, 185 FERC ¶ 61,042 at P 190.

[64] NOPR, 189 FERC ¶ 61,212 at PP 4, 31.

[65] *See* aligned ISOs/RTOs Comments at 4–5; Dominion Comments at 2; EEI Initial Comments at 1; APS Comments at 2 (stating its support for EEI's comments); LA PSC Comments at 1; NYISO Comments at 1. No comments were received in opposition to the proposed Standard.

[66] Aligned ISOs/RTOs Comments at 3–5. Aligned ISOs/RTOs also explain that if IBRs were not subject to proposed Reliability Standard PRC–029–1, it would be unjust and unreasonable and inconsistent with the public interest to remove the references to IBRs in proposed Reliability Standard PRC–024–4. *Id.* at 5 n.17.

[67] Order No. 901, 185 FERC ¶ 61,042 at P 210.

Reliability Standard PRC–029–1 as just, reasonable, not unduly discriminatory or preferential, and in the public interest.[68] The Commission preliminarily found that the proposed Reliability Standard is consistent with the ride-through performance requirement directives of Order No. 901, as generator owners of NERC-registered IBRs would need to comply with the performance requirements unless exempted under that Standard. The Commission deferred its determination of whether NERC met the Order No. 901 directives to develop new or modified Reliability Standards to mitigate the reliability impacts to the Bulk-Power System of exemptions from Reliability Standard PRC–029–1, until after NERC files its final tranche of IBR Reliability Standards with the Commission, due by November 4, 2026.[69]

40. While the Commission sought comment on all aspects of the proposed approval, the Commission expressed a particular interest in comments (as well as supporting materials where applicable) on: (1) the IBR performance requirement in Requirement R1; (2) the absolute rate of change of frequency in Requirement R3; [70] and (3) the adequacy of NERC's proposed exemption provision in Requirement R4.

41. In response to the NOPR, the Commission received comments about the proposed Standard on the following topics, discussed below: (1) approving the proposed Reliability Standard; (2) requests for a new exception under Requirement R1 for certain HVDC-connected IBRs and a new exemption under Requirement R4 for long-lead time projects; and (3) requests for clarity regarding the documentation necessary to secure exemptions.

1. Approving Proposed Reliability Standard PRC–029–1

a. General Comments

42. Many commenters generally support the Commission's proposal to approve proposed Reliability Standard PRC–029–1,[71] although one commenter opposes approval and asks that the Commission remand the standard.[72]

43. Among commenters supporting approval of Reliability Standard PRC–029–1, aligned ISOs/RTOs appreciate that the terms ''must ride-through zones'' and ''operation regions'' in Requirement R1 are drafted in a manner that ensures consistency with IEEE 2800–2022 and reduces confusion.[73] NERC explains that proposed Reliability Standard PRC–029–1 advances the reliability of the Bulk-Power System by establishing voltage and frequency ride-through criteria for IBRs to prevent unnecessary tripping and momentary cessation and ensuring that post-disturbance ramp rates are unrestricted and return to pre-disturbance power output levels.[74]

44. Ørsted asserts that proposed Reliability Standard PRC–029–1 is not just and reasonable or in the public interest because its requirements could cause project delays or cancellations, contributing to resource adequacy risks.[75] Ørsted proposes that the Commission remand proposed Reliability Standard PRC–029–1 because the proposed Standard does not satisfy several factors that the Commission must consider in determining whether a Reliability Standard is just, reasonable, not unduly discriminatory or preferential, and in the public interest under Order No. 672.[76] Ørsted and LA PSC assert that the proposed Standard impermissibly violates an Order No. 672 factor—albeit for opposing reasons. Whereas Ørsted asserts that developing projects may be abandoned, decreasing generation when reserve margins are already tight and creating new system reliability and resource adequacy risks, violating the Order No. 672 factor that a Reliability Standard cannot have an undue negative effect on competition,[77] LA PSC avers that the Standard favors legacy IBR owners over ''other players in the energy market,'' which is a ''compromise that threatens the reliability of the Bulk-Power System.'' [78]

45. Certain commenters express concerns about individual provisions in proposed Reliability Standard PRC–029–1, discussed in more detail below.[79] For example, Elevate and Tesla note the lack of a requirement for grid strength and grid-forming capabilities in the proposed Standard, and call for future revisions to consider these issues.[80]

46. Other commenters raise concerns generally with the Standards drafting process.[81] For example, WIRAB recommends reviewing the standards development process to more efficiently incorporate industry feedback.[82] Some commenters also assert that concerns about the exemption [83] process in proposed Requirement R4 were unaddressed in the standard development process. Ørsted and Dominion claim the exemption process in proposed Requirement R4 ignores extensive comments during the standard development process that raised the concern that the exemption process does not account for projects that are in active development with contracted equipment not technically capable of satisfying the ride-through requirements of Requirements R1 through R3.[84]

47. In its reply comments, NERC explains that it provided for a fair and open stakeholder process by following its rules for providing notice and opportunity for public comment, due process, openness, and a balance of interests in developing the Standard through multiple ballot periods. Further, NERC avers it followed its Rule 321 procedure for the NERC Board of Trustees to act when a ballot pool has failed to approve a proposed Reliability Standard in response to a Commission directive; on the fourth ballot the Standard was approved.[85]

48. NERC disputes the assertion that proposed Reliability Standard PRC–029–1 will result in undue discrimination against IBRs relative to synchronous generators under proposed Reliability Standard PRC–024–4, disagreeing with commenter's assertions

[68] NOPR, 189 FERC ¶ 61,212 at P 27.

[69] *Id.* P 33.

[70] No commenters provided a response to the proposed approval of the absolute rate of change of frequency in Requirement R3.

[71] Aligned ISOs/RTOs Comments at 3; Elevate Comments at 12; LA PSC Comments at 1; NERC Initial Comments at 2–4; NYISO Comments at 1; NYSRC Comments at 8; Tesla Comments at 1.

[72] Ørsted Comments at 2–3.

[73] Aligned ISOs/RTOs Comments at 6.

[74] NERC Initial Comments at 3.

[75] Ørsted Comments at 2–3.

[76] *Id.* at 22–25.

[77] *Id.* at 23 (citing Order No. 672, 114 FERC ¶ 61,104 at P 332).

[78] While LA PSC maintains the Standard ''compromises'' reliability, it stops short of opposing the Standard; instead, it only ''questions the exemption's potential to undermine reliability'' and ''urges the expeditious approval and enforcement of Reliability Standards governing IBRs.'' LA PSC Comments at 7.

[79] *See e.g.,* APS, Clean Energy Associations, DNV, EEI, Elevate, Invenergy, LA PSC, LIPA, NYISO, NYSERDA, Tesla, and WIRAB.

[80] Elevate Comments at 7–8; Tesla Comments at 1.

[81] Ørsted Comments at 23; WIRAB Comments at 11–12.

[82] WIRAB Comments at 11–12.

[83] We note that commenters often use the word ''exception'' interchangeably with the word ''exemption,'' although ''exceptions'' are restricted to Requirement R1 when IBRs cannot ride-through disturbances in certain circumstances, and ''exemptions,'' under Requirement R4, are for legacy IBRs that cannot meet the ride-through requirements of Requirements R1 through R3 due to hardware limitations. Indeed, in Order No. 706, the Commission noted that an ''exemption'' is normally understood as a release from a responsibility, while an exception is ''an alternative obligation.'' *Mandatory Reliability Standards for Critical Infrastructure Protection,* Order No. 706, 73 FR 7368 (Feb. 7, 2008), 122 FERC ¶ 61,040, at P 184, *order on reh'g & clarification,* Order No. 706–A, 123 FERC ¶ 61,174 (2008). In summarizing comments, this final rule uses ''exception'' and ''exemption'' per commenters' use verbatim.

[84] Ørsted Comments at 12–14; Dominion Comments at 4.

[85] NERC Reply Comments at 3–6.

that synchronous generators and IBRs are similarly situated. NERC explains that in Order No. 901, the Commission directed NERC to develop proposed Reliability Standards that account for the technical differences between IBRs and synchronous generators because the currently effective Reliability Standards ''may not account for the material technological differences'' in responding to disturbances. NERC states that the Commission recognized that synchronous generators and IBRs do not require the same ride-through performance requirements because the cause of the ride-through issues impacting reliability for IBRs is different than that for synchronous generators. NERC states that in response, it developed proposed Reliability Standard PRC–024–4 as a protection-based standard applicable to synchronous generators, and proposed Reliability Standard PRC–029–1 as a performance-based standard applicable to IBRs.[86]

49. Additionally, NERC explains that the proposed Standard was narrowly developed to avoid undue negative effects on competition beyond what is necessary for reliability and to reflect consideration of the ''different natures of synchronous generators and IBRs.'' [87]

b. IEEE 2800–2022 Comments

50. Ørsted asserts that the proposed Reliability Standard did not consider ''other appropriate factors'' under Order No. 672 because NERC's petition did not discuss why exceptions due to hardware limitations in IEEE 2800–2022, such as are applicable to HVDC technology, could not be incorporated into the proposed Standard.[88] Ørsted also claims that ''a number of grid operators have adopted components of IEEE 2800[–2022], creating a conflict with the proposed Standard''.

51. In its petition and reply comments, NERC explains that it adopted IEEE 2800–2022 terminology for ''must ride-through zones'' and ''operation regions;'' but that it considered and rejected ride-through criteria more stringent than set forth in IEEE 2800–2022 due to industry comments raised during the September 2024 Technical Conference.[89]

52. Elevate, NYSRC, UCS, and WIRAB filed comments noting inconsistencies between proposed Reliability Standard PRC–029–1 and IEEE 2800–2022 and pointing to IEEE 2800–2022 as the preferred option for ride-through standards to address the Commission's concerns and directives in Order No. 901.[90] WIRAB is concerned that there may be conflicts between entities already adopting IEEE 2800–2022 and then needing to follow Reliability Standards with different requirements—recommending that this be resolved by indicating in the Standard that if an entity fully adopts IEEE 2800–2022, it would be compliant with proposed Reliability Standard PRC–029–1.[91]

53. Elevate avers that proposed Reliability Standard PRC–029–1 lacks many of the technical ''details, clarifications, and equipment considerations'' that are contained in IEEE 2800–2022.[92] Elevate and WIRAB point to several examples where they assert the language of IEEE 2800–2022 is more detailed, such as the explicit reference in IEEE 2800–2022 to 500 kilovolt (kV) systems that have equipment rated up to 550 kV,[93] and the lack of certain IEEE–2800–2022 terminology, such as ''active or reactive power priority modes.'' [94] Further, Elevate requests that the exceptions in IEEE 2800–2022 for self-protection of IBR equipment and for ride-through requirements during severe and sustained voltage unbalance conditions be added to the proposed Standard.[95] WIRAB requests that the lack of an exception for self-protection when negative-sequence voltage is greater than a specified duration and threshold in the proposed Standard be addressed.[96]

54. NERC replies that the Commission gave it discretion to consider ''whether and how to reference IEEE standards'' in Order No. 901.[97] NERC explains that there were several reasons that it found that full adoption of IEEE 2800–2022 was not appropriate, including that proposed Reliability Standard PRC–029–1 was developed to address the Commission's directives in Order No. 901, is more stringent than IEEE 2800–2022, and does not conflict with IEEE 2800–2022.[98]

c. Clarification of Terms and Provisions Comments

55. NYSRC requests that the Commission remand proposed Reliability Standard PRC–029–1 to NERC for revisions to address a series of ''ambiguities, impractical requirements, or contradictions with the apparent intent'' of the Standard that makes it difficult to meet the requirements as written.[99] For example, NYSRC requests that the Commission direct modifications to the Standard to provide that compliance enforcement authorities must apply their own judgment of reasonableness in interpreting the Standard because there is no exemption from meeting frequency ride-through requirements when voltage ride-through is not required. NYSRC avers that, if taken literally, the omission requires IBRs to ride-through any voltage magnitude, including a voltage level of zero, for an unlimited duration.[100]

56. Ørsted, Elevate, and NYSRC seek clarification on several terms and provisions in proposed Reliability Standard PRC–029–1. Ørsted claims that the undefined term in-service has neither a clear nor objective criteria to ensure it will be enforced in a consistent and non-preferential manner.[101] Elevate requests that the terms high voltage thresholds and time durations in proposed Requirement R2.4 and the term restore in proposed Requirement R2.5 be defined.[102] NYSRC requests that the reactive power limit in proposed Requirement R2.1.2 be defined and that the limit should be voltage dependent.[103]

57. Elevate contends that the language of proposed Requirements R2.1.1 and R2.1.3 conflict because Requirement R2.1.3 specifies performance only when the voltage is less than 0.95 per unit and is within the continuous operating range whereas Requirement R2.1.1 speaks to general performance in the continuous operating range and does not specify voltage criteria.[104] Elevate contends

[86] *Id.* at 15–17.

[87] *Id.* at 15–16.

[88] *Id.* at 24 (referring to an Order No. 672 factor that a Reliability Standard consider ''other appropriate factors'').

[89] NERC Petition at 26–27.

[90] *See generally* Elevate Comments at 3–7; NYSRC Comments at 4–7; UCS Comments at 4; WIRAB Comments at 7–10.

[91] WIRAB Comments at 10.

[92] Elevate Comments at 3.

[93] *Id.* at 3–7; WIRAB Comments at 9.

[94] Elevate Comments at 6.

[95] *Id.* at 4.

[96] WIRAB Comments at 9.

[97] NERC Reply Comments at 13 (citing Order No. 901, 185 FERC ¶ 61,042 at P 195).

[98] *Id.* at 14–15.

[99] NYSRC Comments at 3–4.

[100] *Id.* at 4.

[101] Ørsted Comments at 9 n.17 (describing the in-service date as ''arbitrary''), 23 (referring to an Order No. 672 factor that there be a clear and objective measurement of compliance for enforcement purposes); *see also* Invenergy Initial Comments at 19–20.

[102] Elevate Comments at 9.

[103] NYSRC Comments at 7.

[104] Requirement R2.1.1 requires that when the voltage at the high-side of the main power transformer remains within the continuous operation region in Attachment 1, each IBR shall continue to deliver the pre-disturbance level of Real Power or available Real Power, whichever is less. While Requirement R2.1.3 requires each IBR, when the voltage at the high-side of the main power

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that, as a result, satisfying proposed Requirement R2.1.1 can potentially result in a violation of proposed Requirement R2.1.3 and vice versa, and requests that the conflict be addressed in an updated version of the proposed Standard.[105] NYSRC also requests that the specification in Attachment 1, point 5 that the applicable voltage for the Tables is at the ''high-side of the main power transformer'' be modified to apply, consistent with the intent of the proposed Standard, at the transmission side of the transformer.[106]

58. LA PSC is concerned that IBRs that satisfy the design element to ride-through grid disturbances may not have their equipment set to meet the ride-through requirements and requests that generator owners be required to provide documentation that the IBR is programmed or set to meet ride-through requirements.[107]

d. Commission Determination

59. Pursuant to section 215(d)(2) of the FPA, we adopt the NOPR proposal to approve proposed Reliability Standard PRC–029–1 as just, reasonable, not unduly discriminatory or preferential, and in the public interest. Proposed Reliability Standard PRC–029–1 fulfills the IBR performance requirement directives of Order No. 901. We find that Requirements R1 through R3 will strengthen the reliability of the Bulk-Power System by addressing abnormal tripping, interruption of current injection, and reduced power output. Further, we conclude that NERC developed a reasonable process in Requirement R4 for generator owners to seek an exemption to Requirements R1 through R3 for hardware limitations.

60. We disagree with commenters' arguments that the proposed Reliability Standard does not satisfy multiple Order No. 672 factors or reflects issues with NERC's standards development process itself. In particular, we are not persuaded by Ørsted's claim that the exemption process in proposed Requirement R4 fails to provide clear and objective criteria for compliance because the phrase ''in-service date'' is undefined.[108] In-service date is a commonly used term and, while not controlling in Reliability Standards, is used in Commission orders in different contexts.[109] Further, NERC adhered to its Commission-approved [110] standards development process in developing the proposed Standard.[111]

61. Regarding the divergence of proposed Reliability Standard PRC–029–1 from IEEE 2800–2022, in Order No. 901 the Commission responded to commenters' suggestion of the need to align with or reference directly IEEE 2800–2022 ''in accordance with good utility practice as examples of technical minimum requirements.'' [112] As the Commission stated, NERC is best positioned through its standard development process to determine necessary technical requirements to ensure frequency and voltage ride-through.[113] Further, the Commission ''decline[d] to direct NERC to specifically reference IEEE standards in its new or modified Reliability Standards,'' noting that NERC has the discretion to consider whether and how to reference IEEE standards.[114] As the comments of Elevate and WIRAB point to provisions where proposed Reliability Standard PRC–029–1 diverge from IEEE 2800–2022 and ask them to align without explanation of what has changed from Order No. 901,[115] and do not provide an explanation of why NERC's proposed Standard is deficient in ensuring the reliable operation of the Bulk-Power System, we maintain the prior finding from Order No. 901.[116] Moreover, we find that Ørsted's argument that there is a conflict between grid operators that have adopted components of IEEE 2800–2022 and the proposed Standard is vague and fails to cite to a Commission-approved provision that supports the conclusion that there is such a conflict.

62. We decline to adopt Tesla's recommendation that the Commission direct NERC to add a requirement that new IBRs ''have grid-forming capabilities where technically and economically feasible.'' [117] We clarify that NERC continues to have discretion to consider new or modified standards regarding grid strengthening and grid-forming inverters, and we encourage NERC to remain proactive in using its standards development authority to ensure that IBR capabilities are leveraged appropriately.

63. We decline to direct NERC to revise the Standard to make additional clarifications or define terms as requested by some commenters. We find the Standard sufficiently clear and unambiguous regarding what is required of generator owners. However, we encourage NERC to consider the potential need for incremental changes to the Standard to address concerns, such as NYSRC's concern the Standard's reference to the ''high side'' could lead to noncompliance with the language of the Standard, or the possibility that IBRs may be noncompliant with the Standard if they fail to ride-through any voltage magnitude. We encourage NERC and its Regional Entities to use their available tools—appropriate enforcement discretion, targeted oversight activities, compliance and enforcement guidance, and the compliance feedback loop to standards development—to ensure consistency, reasonably address noncompliance that does not impact reliability, and to identify, assess, and implement any need for additional improvements to the Standard through its approved processes.

2. Exceptions and Exemptions to the Requirements of the Reliability Standard

64. In the NOPR, the Commission, in proposing to approve Reliability Standard PRC–029–1, also proposed to

transformer remains within the continuous operation region in Attachment 1, to prioritize Real Power or Reactive Power when the voltage is less than 0.95 per unit, the voltage is within the continuous operating region, and the IBR cannot deliver both Real Power and Reactive Power due to a current limit or Reactive Power limit. NERC Petition at 29.

[105] Elevate Comments at 8–9.

[106] NYSRC Comments at 7–8.

[107] LA PSC Comments at 3–4.

[108] *See, e.g.,* Ørsted Comments at 23.

[109] *See, e.g., Improvements to Generator Interconnection Procs. & Agreements,* Order No. 2023, 88 FR 61014 (Sept. 6, 2023), 184 FERC ¶ 61,054, at Appendix C, § 7 (2023) (defining in-service date as ''the date upon which the Interconnection Customer reasonably expects it will be ready to begin use of the Transmission Provider's Interconnection Facilities to obtain back feed power''). *See also Mandatory Reliability Standards for the Bulk-Power Sys.,* Order No. 693, 72 FR 16416 (Apr. 4, 2007), 118 FERC ¶ 61,218, at PP 275–276, *order on reh'g,* Order No. 693–A, 120 FERC ¶ 61,053 (2007) (discussing appropriate level of detail and precision in Reliability Standards with regard to compliance and enforceability).

[110] Certification Order, 116 FERC ¶ 61,062 at P 250 (finding that NERC's proposed rules of procedure ''provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards'').

[111] *See* NERC Petition, Ex. G (Summary of Development and Complete Record of Development); NERC Reply Comments at 3–6.

[112] *See e.g.* Order No. 901, 185 FERC ¶ 61,042 at P 184 (citing Electric Power Research Institute Initial NOPR Comments at 5).

[113] *Id.* P 192.

[114] *Id.* P 195.

[115] Absent new or changed circumstances, ''it is contrary to sound administrative practice and a waste of resources to relitigate issues in succeeding cases once those issues have been finally determined.'' *Alamito Co.,* 41 FERC ¶ 61,312, at 61,829 (1987), *order on reh'g,* 43 FERC ¶ 61,274 (1988) (citing *Cent. Kan. Power Co.,* 5 FERC ¶ 61,291, at 61,621 (1978)); *see also Pac. Gas & Elec. Co.,* 121 FERC ¶ 61,065, at PP 42–43 (2007) (explaining that the preclusive effect of collateral estoppel ends when a party presents new evidence, and finding in that case that there was no new evidence or significantly changed circumstances that would warrant re-litigation of the decided issue).

[116] Order No. 901, 185 FERC ¶ 61,042 at P 195 (finding 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'').

[117] Tesla Comments at 1.

find ''that NERC reasonably determined that an exemption process for generator owners of legacy IBRs for voltage and frequency performance requirements'' in Requirement R4 of the Standard is appropriate.[118] The Commission sought comments on ''the adequacy of NERC's proposed exemption provision in Requirement R4 as it pertains to both projects in[-]service and those under contract, but not yet in-service as of the effective date of Reliability Standard PRC–029–1.'' [119] Further, the Commission requested that comments discussing whether the exemption provision is too broad or too narrow should address the risks and benefits for enlarging or narrowing the scope of the exemption provision with ''detailed, quantified, and fact-based support.'' [120]

a. General Comments

65. With one exception, commenters generally support the exemption request process in the proposed Standard. Clean Energy Associations support the availability of an exemption from frequency ride-through requirements in the proposed Standard because a large percentage of IBR fleets could not comply with the frequency ride-through requirements, imperiling resource adequacy.[121] EEI also supports maintaining the exemption for legacy IBRs in proposed Reliability Standard PRC–029–1.[122] Deriva, in expressing support for the exemption process in proposed Requirement R4, explains that legacy IBRs will not be able to comply with the proposed Standard; newer compliant equipment cannot fit within existing legacy IBRs; and applicable zoning and regulations will not accommodate compliant equipment. Consequently, Derivia requests that the Commission, in approving the proposed Standard, ''incorporate and emphasize'' NERC's statement that generator owners' legacy IBRs unable to meet full compliance with PRC–029–1 without a wholesale retrofit or redesign would not be obligated to undertake the wholesale retrofit or redesign.[123]

66. Aligned ISOs/RTOs, while supporting proposed Reliability Standard PRC–029–1 as ''a broadly-applicable standard that is applied in a manner that limits exemptions to limited and rare circumstances,'' [124] add that they ''would not support . . . broader exemptions or exemptions driven by cost of non-hardware limitations (e.g., control systems and software).'' [125] Aligned ISOs/RTOs note that the exemption process in proposed Requirement R4 does not contemplate that exemption requests will also be submitted to system operators, such as ISOs and RTOs. Aligned ISOs/RTOs support the standard as written based on the common understanding that nothing in the proposed Standard prohibits ISOs and RTOs from seeking information or submittals regarding exemption requests pursuant to their existing tariff authority.[126]

67. LA PSC argues that the exemption process as written in proposed Requirement R4 favors legacy IBR owners at the expense of Bulk-Power System reliability and that there is no way to determine the impact of the exemptions until 2028 or 2029 when the Standard is fully implemented.[127] Further, LA PSC asserts that NERC's mitigation of these exemptions through future Reliability Standards does not address the need for transmission owners and transmission operators to plan and respond for an ''unknown number of IBRs disconnecting at any time in the future, in an unanticipated manner.'' [128] Thus, LA PSC recommends shortening the period for entities to request exemptions and considering additional mitigation measures to protect the Bulk-Power System.[129]

68. Multiple commenters note their understanding that the exemption ''only applies to the limited portion of the frequency or voltage ride-through zone for which the pre-existing hardware was not designed to meet.'' [130] Clean Energy Associations note that an IBR that receives an exemption is still required to make settings changes and software updates that would permit it to satisfy the rest of the ride-through curves in the proposed Standard.[131] Clean Energy Associations and Invenergy explain that exempted IBRs would be able to ride-through the types of disturbances that led the Commission to issue Order No. 901.[132] WIRAB recommends IBRs with exemptions still ride through to their full capability.[133]

69. In its reply comments, NERC explains that the exemption for legacy IBRs in proposed Requirement R4, including the 12-month timeframe to request an exemption, is consistent with the directive in Order No. 901 to determine whether to provide a limited and documented exemption to existing IBRs and equipment. NERC also notes that an IBR that receives an exemption must perform per the capability of the plant while accounting for the limitation to mitigate the reliability impact of the exemption. NERC claims that it found that exemptions were necessary because otherwise the proposed Standard would require entities to take units offline to retrofit or risk noncompliance.[134]

b. HVDC-Connected IBRs With Choppers Comments

70. Several commenters, including Invenergy, Ørsted and Clean Energy Associations seek an additional exemption for HVDC-connected IBRs with choppers.[135] Commenters explain that voltage source converter-HVDC transmission technology is commonly used in modern offshore wind projects and typically relies on equipment known as choppers to protect the converter during fault conditions by dissipating excess power during grid faults that cause low voltage at the point of interconnection.[136] Invenergy notes

[118] NOPR, 189 FERC ¶ 61,212 at P 33.

[119] *Id.* P 34.

[120] *Id.*

[121] Clean Energy Associations Initial Comments at 25–33.

[122] EEI Reply Comments at 3.

[123] Deriva Comments at 2–3, 5.

[124] Aligned ISOs/RTOs Comments at 5.

[125] *Id.* at 7 n.22.

[126] *Id.* at 7.

[127] LA PSC Comments at 6.

[128] *Id.* at 7.

[129] *Id.* at 6.

[130] Clean Energy Associations Reply Comments at 2; Invenergy Reply Comments at 2. *See also* EEI Reply Comments at 2 (stating that the exemption process is ''already designed to be narrow'' and requires generator owners to be specific to the portion of the ride-through criteria that the IBR cannot meet).

[131] Clean Energy Associations Reply Comments at 2.

[132] Clean Energy Associations Initial Comments at 7; Invenergy Initial Comments at 9.

[133] WIRAB Comments at 6.

[134] NERC Reply Comments at 6–10.

[135] An IBR that is connected to the Bulk-Power System using a voltage source converter-HVDC system with a chopper circuit is referred to in this final rule as a HVDC-connected IBR with choppers. A voltage source converter-HVDC system consists of a high-voltage DC line with two converters (rectifier and inverter) at both ends of the DC line. The voltage source converter-HVDC system is capable of mimicking synchronous generation by producing an almost perfect sinusoidal voltage on the AC side of the converter. European Network of Transmission Sys. Operators for Elec., *HVDC Links in System Operations* 13 (2019), *https://eepublicdownloads.entsoe.eu/clean-documents/SOC%20documents/20191203_HVDC%20links%20in%20system%20operations.pdf.* A chopper circuit is a component of the voltage source converter-HVDC system and is typically used to dissipate excess power during faults. It can be placed in the DC system of a voltage source converter-HVDC-connected offshore wind project to absorb excess energy and maintain DC voltage at an acceptable level during a fault to allow voltage source converter-HVDC-connected IBRs to ride-through voltage disturbances.

[136] HVDC-connected IBRs with choppers should be able to ride-through individual voltage deviations. However, the voltage ride-through capability of HVDC-connected IBRs with choppers are limited by the energy absorption capability and thermal design of the DC chopper. Once activated to absorb energy, the DC chopper needs time to cool down before it can be activated again to absorb energy. Therefore, the HVDC-connected IBR with

Continued

that a chopper circuit has a thermal limit that is designed to trip the HVDC system if the duration of the energy dissipation exceeds two seconds.[137] Commenters explain that during system faults, voltage dips and the power cannot be transferred and therefore must be dissipated.[138] Ørsted further indicates that the HVDC chopper cool down period is a function of the technology and could take 30 minutes to five hours.[139] Thus, commenters aver that HVDC-connected IBRs with choppers lack the capability to meet the cumulative 10 second measurement ride-through window set forth in Attachment 1 of proposed Reliability Standard PRC–029–1 because a chopper's thermal limit requires tripping the HVDC system to prevent overheating and thermal damage beyond two seconds.[140]

71. Commenters also explain that designing HVDC-connected IBRs with choppers that can comply with the ride-through requirements of Attachment 1 cannot be done in a cost-effective and timely manner. Clean Energy Associations explain that there is no cost-effective option yet available to meet the full ride-through requirements, and manufacturers may not be able to meet compliance deadlines for the proposed Standard.[141] Ørsted explains that original equipment manufacturers will need at least seven years to produce HVDC-connected IBRs with choppers that can comply with the ride-through requirement ''given global demand and supply chain issues (the current wait time for [voltage source converter]-HVDC is approximately seven years).'' [142]

72. Commenters assert that the 10 second cumulative duration requirement in Attachment 1 could contribute to resource adequacy issues in certain parts of the country as new HVDC-connected IBRs with choppers would not be able to come online. Similarly, LIPA contends that the ''infeasible requirements'' of proposed Reliability Standard PRC–029–1 ''will delay or impede resources critical to maintaining adequate generation capacity to meet future system needs.'' [143] Likewise, Clean Energy Associations indicate 3.7 GW of HVDC-connected offshore wind projects with choppers could be impacted by Requirement R1.[144]

73. Ørsted claims that the Standard was not developed in an open and fair manner, as required by an Order No. 672 factor. First, it avers this is because the process did not align the Standard with ''global standards and practices'' [145] (*i.e.,* the Standard, unlike the global IEEE 2800–2022 standard, does not recognize HVDC-connected IBRs with choppers' thermal limitation).[146] Second, Ørsted also asserts that stakeholder engagement was limited, ''perhaps in part due to the compressed standards development time.'' [147]

74. Commenters advance a range of proposals in response to the concerns they identify with HVDC-connected IBRs with choppers complying with proposed Attachment 1. Clean Energy Associations request that the Commission direct NERC to revise proposed Reliability Standard PRC–029–1 to include a provision that recognizes the thermal limit of HVDC-connected IBRs with choppers as in IEEE 2800–2022.[148] Invenergy and LIPA propose that the proposed Reliability Standard PRC–029–1 be modified to provide HVDC-connected IBRs with choppers an exception to the ride-through requirements of Requirement R1.[149] Clean Energy Associations also suggest either amending the PRC–029–1 implementation plan or issuing a compliance guidance document to clarify the HVDC issues.[150]

75. In its reply comments, NERC explains that the proposed Standard was drafted consistent with the limited discretion provided to NERC in Order No. 901 to include exemptions for existing IBRs.[151] NERC explains that Order No. 901 directed NERC, in developing IBR performance ride-through Reliability Standards, to determine whether any exemptions were appropriate for voltage ride-through requirements for existing IBRs and equipment and required NERC to mitigate the reliability impact on the Bulk-Power System of any exemptions deemed necessary. NERC states after the September 2024 Technical Conference, its staff and the Standards Committee concluded that there was insufficient data available to evaluate potential impacts of allowing an unknown amount of HVDC-connected IBRs with choppers to seek an exemption. Thus, to address the directive in Order No. 901 to mitigate the reliability impact of exemptions, NERC crafted the exemptions to be technology neutral to ensure fairness across all IBR technologies and limited the exemption to existing IBRs and equipment.[152]

76. NERC believes an exemption for HVDC-connected IBRs with choppers exceeds the discretion provided to NERC in Order No. 901. However, NERC requests that should the Commission determine that HVDC-connected IBRs with choppers warrant an exemption, that it ''be as specific as possible regarding the technology included and the timeframe that should be considered for any such exemption.'' [153]

77. In response to NERC's reply comments, Invenergy answers that unlike the exemption process in Requirement R4 that only applies to existing legacy IBRs, consistent with the exemption directives in Order No. 901, the relief it seeks for HVDC-connected IBRs with choppers would apply to existing and future equipment. Invenergy also avers that a modification to proposed Reliability Standard PRC–029–1 to avoid damage to chopper equipment is consistent with Order No. 901's language ''that permit IBR tripping only to protect the IBR equipment.'' [154]

c. Long-Lead Time Projects Comments

78. Several commenters express concern that limiting exemptions under

choppers' ability to ride-through consecutive voltage deviations is not clear, as it is a function of the energy absorption capability and thermal design of the DC chopper.

[137] Invenergy Initial Comments at 5–6.

[138] *Id.* at 5–6; Ørsted Comments at 18–19, attach. B (Affidavit of Ewgenij Starschich), at 5 n.1, attach. B–1 (Email from Eugen Starschich to Jamie Calderon et al.), at 2.

[139] Ørsted Comments, Att. B–1, at 2.

[140] Invenergy Initial Comments at 33; NYSERDA Comments at 4; *see* Ørsted Comments at 19.

[141] *See, e.g.,* Clean Energy Associations Initial Comments at 23, 25. *See also* DNV Comments at 2 (explaining that designing choppers compliant with the ride-through requirements of Attachment 1 will require larger chopper designs, unreasonably increasing the cost of HVDC-connected IBRs with choppers); Invenergy Initial Comments at 35 (noting the ''unavailability of a cost-effective design option for [HVDC-connected IBRs with choppers] to ride through more than 2 seconds of voltage disturbances (while absorbing rate power)'').

[142] Ørsted Comments at 21.

[143] LIPA Comments at 5.

[144] *See* Clean Energy Associations Initial Comments at 14–15 (counting 1.6 GW, 900 MW, and 1,200 MW of members' long-lead time offshore wind projects as HVDC-connected IBRs with choppers because offshore wind projects in the United States exclusively use choppers).

[145] Ørsted Comments at 23 (referring to an Order No. 672 factor that a Reliability Standard be developed in an open and fair manner).

[146] *See id.,* Att. B, at 10 (stating that proposed Reliability Standard PRC–029–1 is misaligned with ''global needs and standards'' and then mentioning the ''energy capability limitation'' recognized in IEEE 2800–2022).

[147] *Id.* at 23.

[148] Clean Energy Associations Initial Comments at 24. *See also* DNV Comments at 2 (''PRC–029–1 and IEEE 2800–2022 should be aligned regarding the technical design requirements of choppers.''); Elevate Comments at 3–4; NYSERDA Comments at 5; Ørsted Comments at 2, 25.

[149] Invenergy Initial Comments at 35; LIPA Comments at 5.

[150] Clean Energy Associations Initial Comments at 25.

[151] NERC Reply Comments at 9, 11.

[152] *Id.* at 12.

[153] *Id.*

[154] Invenergy Answer at 2–4.

requirement R4 to legacy IBRs that are in-service as of the effective date of Reliability Standard PRC–029–1 fails to account for the long-lead time between adopting IBR design specifications and placing the IBR in-service. EEI requests that the exemption process be expanded to accommodate long-lead time projects.[155] Clean Energy Associations note that officials from original equipment manufacturers indicated at the September 2024 Technical Conference that the product design and development timeline for IBRs is at least five years.[156] Thus, Clean Energy Associations aver that it is ''unworkable'' to base exemptions on the in-service date for projects already in development but which will not be in service when the Standard becomes effective.[157] Invenergy claims that conditioning exemption eligibility on the in-service date presents ''an unacceptable compliance gamble that is unjust and unreasonable'' because a long-developed IBR that is not in-service on the date the proposed Standard becomes effective will not be able to use the exemption process.[158]

79. Several commenters raise concerns about the economic and financial impact of providing an exemption only to legacy IBRs. Ørsted explains that for IBR projects that have already made non-refundable financial commitments, it can make projects uneconomical and result in delays to change the design, acquire new real estate, obtain new permits, or procure new equipment, as would be necessitated by the exemption process in Requirement R4.[159] Clean Energy Associations provide an example of a 600 megawatt (MW) wind facility in Oklahoma that has procured a model of wind turbines that will face a delay of up to two years and incur an additional $551 million in replacement and retrofit costs to comply with the Standard as written.[160] Dominion asserts that the current exemption process in proposed Requirement R4 could put ''billions of dollars of investment'' at risk.[161]

80. Commenters also raise the concern that failing to account for long-lead time projects could contribute to resource adequacy constraints. Clean Energy Associations claim to have identified 22.1 gigawatts (GW) of resources from members that have executed interconnection agreements or procured equipment that are not yet in-service and cannot fully comply with the requirements of the Standard. Clean Energy Associations assert that this quantity of resources is large enough that failing to accommodate these resources will ''affect resource adequacy and reliability by preventing their timely completion'' and reduce electric reliability on net by delaying the interconnection of IBR facilities.[162]

81. Ørsted and Dominion claim the exemption process in proposed Requirement R4 ignores extensive comments during the standard development process that raised the concern that the exemption process does not account for projects that are in active development with contracted equipment not technically capable of satisfying the ride-through requirements of Requirements R1 through R3.[163]

82. Clean Energy Associations claim that the ability for resources with executed contracts to secure an exemption is more consistent with the ability of any resource—new, existing, or planned—''to obtain exemptions under PRC–024.'' [164] Clean Energy Associations aver that synchronous resources, subject to Reliability Standard PRC–024, and IBRs are similarly situated with regard to the need for exemptions, so differential treatment of the resources if the exemption process in Requirement R4 is left as is, would represent undue discrimination.[165]

83. Commenters offer proposals for how to incorporate long-lead time projects into the exemption process in proposed Requirement R4. Most proposals center around providing exemptions to IBR projects that have executed generator interconnection agreements and executed design, procurement, and/or construction agreements by the effective date of Reliability Standard PRC–029–1.[166]

84. In comparison, Dominion repeatedly describes the 12-month period to seek an exemption under Requirement R4 as ''arbitrary,'' [167] while Clean Energy Associations appear to request that generator owners of legacy IBRs have up to 36 months—instead of 12—to request an exemption.[168]

85. NERC rejects the assertion that, because synchronous generators and IBRs are allegedly similarly situated, proposed Reliability Standard PRC–029–1 will result in undue discrimination against IBRs relative to synchronous generators under proposed Reliability Standard PRC–024–4. NERC explains that in Order No. 901, the Commission directed NERC to develop proposed Reliability Standards that account for the technical differences between IBRs and synchronous generators because the currently effective Reliability Standards ''may not account for the material technological differences'' in responding to

[155] EEI Reply Comments at 3.

[156] Clean Energy Associations Initial Comments at 11. *See also* EEI Initial Comments at 3; Ørsted Comments at 9 (''long-lead time technology, procurement contracts are entered into 3–5 years before construction begins'').

[157] Clean Energy Associations Initial Comments at 10; *see also* LIPA Comments at 5–6 (''It is infeasible for IBR projects that are already in the advanced stages of development, after the interconnection agreement is signed and long lead-time equipment has been ordered, to modify the design and specifications of the IBR plant and its equipment to comply with PRC–029–1.'').

[158] Invenergy Initial Comments at 19–20. Invenergy also avers that it is unjust and unreasonable to condition exemption eligibility on the in-service date because generator owners cannot control commercial operations timing due to transmission owner and network upgrade supply chain delays. *Id.* at 20–21. *See also* Ørsted Comments at 9 n.17.

[159] Ørsted Comments at 8. *See also* Dominion Comments at 5–6 (indicating that replacing non-compliant hardware for one of its smaller IBRs for nearly $7 million could make the project non-economical).

[160] Clean Energy Associations Initial Comments at 13–14. Clean Energy Associations also provide an example of a 250 MW solar facility in Ohio that has already procured inverters and could face a delay of up to two years and incur an additional $19 million in costs to comply with proposed Reliability Standard PRC–029–1. *Id.* at 14.

[161] Dominion Comments at 5. *See also* Clean Energy Associations Initial Comments at 28 (explaining that developers that operate the 270 GW IBR fleet, which represents an investment of hundreds of billions of dollars, have no viable path to compliance with proposed Reliability Standard PRC–029–1 as written); EEI Initial Comments at 3.

[162] Clean Energy Associations Initial Comments at 11. *See also* Dominion Comments at 5; Invenergy Initial Comments at 18 (resource adequacy threatened if 2 GW of capacity with executed interconnection and procurement agreements is unable to come online because it is not eligible for an exemption); LIPA Comments at 6 (declining to extend the exception for legacy IBRs to long-lead time projects may contribute to ''extensive IBR project delays or even cancellations,'' which may lead to an ''inability for the power system to meet future resource adequacy requirements''); NYSERDA Comments at 3.

[163] Ørsted Comments at 12–14; Dominion Comments at 3.

[164] Proposed Reliability Standard PRC–024–4, Requirement R3 allows for an exception to Requirements R1 or R2 for known regulatory or equipment limitations that prevents the generator or condenser from meeting the protection setting criteria.

[165] Clean Energy Associations Initial Comments at 17.

[166] *See, e.g.,* Clean Energy Associations Initial Comments at 13; Elevate Comments at 9; Invenergy Initial Comments at 22; LIPA Comments at 5–6; NYSERDA Comments at 3; Ørsted Comments at 2.

[167] For example, Dominion says ''the exemption process should properly account for projects that are well into the development cycle but may not be commissioned and in- service prior to the arbitrary 12-month timeframe currently contained in Requirement R4.'' Dominion Comments at 4.

[168] Clean Energy Associations requests the addition of the following sentence to the Implementation plan: ''Entities shall comply with the portion of Requirements R1, R2, and R3 relating to the *design* of their BES IBRs to meet the requirements by 36 months after the effective date of the standard.'' Clean Energy Associations Initial Comments at 17.

disturbances. NERC offers that synchronous generators and IBRs do not require the same ride-through performance requirements because the technological cause of the issues impacting reliability for IBRs is different than that for synchronous generators. Accordingly, NERC claims it developed proposed Reliability Standard PRC–024–4 as a protection-based standard applicable to synchronous generators, while developing proposed Reliability Standard PRC–029–1 as a performance-based standard applicable to IBRs.[169]

d. Commission Determination

i. Requests for Additional Exceptions and Exemptions

86. We appreciate commenters' concerns that the equipment limitations of HVDC-connected IBRs with choppers that may physically prevent them from fully complying with the ride-through provisions of Reliability Standard PRC–029–1 and their request for exemptions for long-lead time projects that have executed interconnection agreements and executed design, procurement, and/or construction agreements.[170] However, having found proposed Reliability Standard PRC–029–1 and the proposed exceptions and exemptions just, reasonable, not unduly discriminatory or preferential, and in the public interest, we decline to direct a modification to mandate additional exceptions or exemptions based on the comments in this proceeding. The record in this proceeding is not sufficient for us to determine whether additional exceptions or exemptions are warranted. The standard drafting team did not consider the possibility of additional exceptions or exemptions as NERC believed that doing so would exceed the discretion granted NERC in Order No. 901 to limit exemptions to existing IBRs and equipment [171] and this highly technical matter was not addressed in the NERC standards development process. We believe that attempts to address these concerns would benefit from the opportunity to fully vet, in NERC's standards development process, the need for and parameters of an exception for HVDC-connected IBRs with choppers and an exemption for long-lead time projects that have executed interconnection agreements and executed design, procurement, and/or construction agreements.[172] Vetting will allow NERC to appropriately consider stakeholders' concerns and decide whether modification of the standard, or a different approach, is warranted.

87. Accordingly, we direct NERC, through its standard development process, to determine whether, and if so how, to account for: (1) the equipment limitations of HVDC-connected IBRs with choppers which may physically prevent them from fully complying with the ride-through provisions of Reliability Standard PRC–029–1; [173] and (2) the long-lead time between adopting IBR design specifications and placing the IBR in-service. NERC may develop appropriate solutions for these two issues beyond the narrow parameter set forth in Order No. 901 for exceptions or exemptions from ride-through requirements. Within 12 months of the effective date of this final rule, we direct NERC to submit to the Commission its determination and, if it deems appropriate, any proposed modifications to Reliability Standard PRC–029–1. In response to NERC's concern that Order No. 901 precludes NERC from considering additional exceptions and exemptions, we clarify that while the Commission is concerned about the proliferation of exceptions and exemptions to the performance requirements set forth in Reliability Standard PRC–029–1, we state now that NERC has the discretion to develop exceptions and exemptions as it deems appropriate to address these narrow technical issues.

88. If NERC determines that extension of the exemption to long-lead time projects is warranted, we suggest that it consider including unequivocal provisions regarding the necessary showing to qualify for the exemption, *e.g.,* proof of executed interconnection agreements and executed design, procurement, and/or construction agreements, and a clearly stated cut-off date for application to long-lead time projects.[174] Further, we believe that the issuance of this final rule should provide notice that, going forward, entities should design IBR facilities to meet the ride-through obligations set forth in Reliability Standard PRC–029–1.

89. As the Commission explained in the NOPR in this proceeding, ''if too many generators are exempt from the frequency and/or voltage Ride-through requirements, proposed Reliability Standard PRC–029–1 may fail to address the reliability gaps associated with IBRs tripping or entering momentary cessation in aggregate that it is intended to address.'' [175] Thus, the NERC standards development process should balance the competing considerations and discuss the balance struck in any future filing with the Commission. If NERC chooses to modify the proposed Standard, NERC should include a sunset provision to ensure exceptions and exemptions are not indefinite when new technology allowing ride-through for the entire criteria of the Standard is available.

ii. Other Issues

90. We decline the requests of LA PSC, Clean Energy Associations, and Dominion to adjust the exemption request process under proposed Requirement R4 and do not find the 12-month time frame to request an exemption arbitrary. Consistent with the directive in Order No. 901 to provide only a limited and documented exemption, the 12-month request period ensures there is a limited, but reasonable, amount of time in which a generator owner of a legacy IBR can request an exemption.

91. We adopt the NOPR proposal to defer determination of whether the new or modified Reliability Standards mitigate the reliability impacts to the Bulk-Power System of exemptions until after NERC files Milestone 4 Reliability Standards with the Commission by November 4, 2026.[176] We disagree with LA PSC that, because transmission owners and operators are allegedly expected to mitigate the reliability impact of exemptions without knowledge of the number of IBRs disconnecting and in what manner until Milestone 4 Reliability Standards become effective, the proposed Standard impermissibly favors generator owners of legacy IBRs and is a ''lowest common denominator'' [177] Reliability Standard. Instead, we find the exemption process adequately protects Bulk-Power System reliability until Milestone 4 Reliability Standards become effective by requiring that transmission operators be provided

[169] NERC Reply Comments at 15–17.

[170] Clean Energy Associations Initial Comments at 13; Dominion Comments at 5; Elevate Comments at 9; Invenergy Initial Comments at 22, LIPA Comments at 5–6; NYSERDA Comments at 3; Ørsted Comments at 2.

[171] *See, e.g.,* NERC Reply Comments at 12 (describing comments in support of providing relief to HVDC-connected IBRs with choppers as a request for an exemption, which NERC believes exceeds NERC's discretion under Order No. 901).

[172] Order No. 693, 118 FERC ¶ 61,218 at P 188.

[173] We note that standards, such as IEEE 2800–2022, may include certain exceptions that may inform NERC's process as relevant to HVDC-connected IBRs with choppers.

[174] Commenters have suggested varying time frames for project completion. *See, e.g.,* Clean Energy Associations Initial Comments at 11; EEI Initial Comments at 3; Ørsted Comments at 9.

[175] NOPR, 189 FERC ¶ 61,212 at P 35.

[176] The Commission will review any Corrective Action Plans that are filed along with Milestone 4 Reliability Standards.

[177] Order No. 672, 114 FERC ¶ 61,104 at P 329.

the information needed to mitigate the reliability impact of exemptions.[178]

92. We decline to adopt Clean Energy Associations' position that IBRs and synchronous resources are similarly situated with regard to demonstrating a need for exemptions. IBRs and synchronous resources are not similarly situated due to differences in physical limitations and capabilities and in inherent responses to changing system conditions, which necessitate different approaches for promoting reliability under proposed Reliability Standards PRC–024–4 and PRC–029–1.[179]

93. We decline to adopt WIRAB's recommendation that the Commission direct NERC to explore the concept of IBR ride-through maximization because it is unnecessary. As explained by multiple commenters, the generator owner of the IBR must ride-through all parts of the voltage and frequency ride-through curves for which it does not receive an exemption.[180]

94. We are unpersuaded by Ørsted's argument that the Standard was not developed in an open and fair manner. Ørsted provides no evidence that the process NERC employed was defective besides claiming it did not seek to align with ''global standards and practices.'' [181] Further, Ørsted also provides no support for its claim that stakeholder engagement in the standard development process was limited; instead, as explained above, NERC adhered to its Commission-approved standards development process in developing the proposed Standard, which provides for stakeholder engagement.

3. Documentation of Hardware Limitation

95. Proposed Requirement R4 of PRC–029–1 includes a process for generator owners of legacy IBRs to provide documentation to the compliance enforcement authority to secure an exemption. Proposed Requirement R4.1.3 requires that the documentation shall include: ''[i]dentification of the specific piece(s) of hardware causing the limitation.'' [182] Proposed Requirement 4.1.4 requires the documentation shall include: ''[t]echnical documentation verifying the limitation is due to hardware that would need to be physically replaced to meet all Ride-through criteria, and that the limitation cannot be remedied by software updates or setting changes.'' [183] Measure M4 provides further details: ''[a]cceptable types of evidence for a hardware limitation may include, but is not limited to damage curves provided by the original equipment manufacturer.'' [184]

a. Comments

96. EEI, Clean Energy Associations, and Invenergy claim it may not be possible for older legacy IBRs to identify specific pieces of hardware for which an exemption is necessary, as required by Requirement R4, because original equipment manufacturers, among other things: could be out of business; no longer support the IBR equipment in a legacy resource; or otherwise, are unable to, provide the requested documentation.[185]

97. EEI avers that even where original equipment manufacturers provide support, IBR generator owners may need the support of third-party engineering consultants to support a conclusion that there is a hardware limitation that prevents compliance with proposed Reliability Standard PRC–029–1.[186]

98. Clean Energy Associations argue that a detailed identification of ''specific piece(s) of hardware'' would require new testing of legacy equipment, which could take multiple years to complete and be excessively costly outside of the laboratory, or may be impossible for resources that have been operating in the field for many years.[187]

99. Commenters raise a series of concerns about the difficulty generator owners may experience in providing the documentation necessary to secure an exemption. Clean Energy Associations state that a generator owner could be subject to uncapped sanctions of up to $1.6 million per day due to an inability to identify the hardware limitation, at least with any greater specificity than naming the inverter or turbine in question.[188]

Additionally, Clean Energy Associations and Invenergy aver that the phrase ''but is not limited to'' in Measure M4 is sufficiently vague that it would leave the decision about what types of evidence beyond ''damage curves provided by'' the original equipment manufacturer is acceptable to the subjective interpretation of the compliance enforcement authority, which could result in evidence requirements varying by region or over time.[189] Clean Energy Associations claim that six ACP members indicate more than 26.2 GW of currently operating IBR projects would need limited exemptions to the proposed Standard, which could be susceptible to retirements—raising resource adequacy concerns—if its proposed documentation fix is not adopted.[190] Clean Energy Associations request: ''The Commission . . . direct NERC to clarify the evidence required for legacy resources to demonstrate a hardware limitation to obtain an exemption from PRC–029–1.'' [191]

100. Commenters offer a wide range of potential modifications to the documentation requirement of proposed Requirement R4. Clean Energy Associations suggest that documentation requirements in proposed Measure M4 should match the language from Requirement R3 of proposed Reliability Standard PRC–024–4 to prevent undue discrimination against IBRs that are similarly situated as synchronous generators with regards

[178] Proposed Requirement R4.2 requires generator owners to provide a copy of the evidence supporting an exemption to transmission operators, allowing transmission operators to know the number of IBRs disconnecting and in what manner. NERC Petition at 37. LA PSC mistakenly indicates transmission owners will be responsible for mitigating the reliability impact of exemptions. LA PSC Comments at 7. However, proposed Reliability Standard PRC–029–1 does not require transmission owners to mitigate the reliability impact of IBRs under Requirement R4. NERC Petition at 36–37.

[179] *See* Order No. 901, 185 FERC ¶ 61,042 at P 208 (directing NERC to develop Reliability Standards that account for the ''technical differences'' between IBRs and synchronous resources).

[180] *See* NERC Petition at 39 (explaining that exemptions must be specific and limited to the voltage or frequency band(s) and associated duration(s) that cannot be met).

[181] Ørsted Comments at 23. We note that while the proposed Standard did not fully align with ''global standards and practices''—*i.e.,* IEEE 2800–2022—in a number of places it did align its requirements with IEEE 2800–2022 provisions. NERC Petition at 26–27.

[182] NERC Petition at 37.

[183] *Id.*

[184] *Id.,* Ex. A–3, at 8.

[185] EEI Initial Comments at 4; Clean Energy Associations Initial Comments at 19; Invenergy Initial Comments at 24. Original equipment manufacturers could also lack a service contract that requires them to provide hardware limitation information to a generator owner; cannot identify the specific piece of equipment within the 12-month timeline in Requirement R4 or cannot validate a combination of factors causing the limitation at all; and be under no regulatory obligation to provide support for older legacy IBRs. EEI Initial Comments at 4; Invenergy Initial Comments at 24.

[186] EEI Initial Comments at 4–5.

[187] Clean Energy Association Initial Comments at 18.

[188] *Id.*

[189] *Id.* at 19; Invenergy Initial Comments at 25–26 (''Although the phrase 'but is not limited to' appears to provide leeway for other types of evidence to be deemed acceptable, the vagueness in this language leaves the decision about what type of evidence is acceptable to the subjective judgment and interpretation of the Compliance Enforcement Authority, which could result in evidence requirements varying by region or over time.'').

[190] Clean Energy Associations Initial Comments at 22.

[191] *Id.* at 17.

to demonstrating a need for exemptions.[192]

101. Invenergy explains that including examples of additional types of documentation would ensure that IBRs are treated in a similar manner to synchronous generators under proposed Reliability Standard PRC–024–4, which allows demonstration of an equipment limitation in the form of a dated email or letter that contains such demonstration.[193]

EEI recommends that generator owners be allowed to submit an internal engineering analysis for older legacy IBRs.[194]

102. UCS requests that proposed Requirement R4.1 be modified to require generator owners to submit a ''preliminary non-binding estimate of the cost and time required to replace or retrofit the affected hardware, and an estimate of how long the IBR would need to be offline to implement the change, if applicable.'' UCS believes this information would allow the relevant authority to understand anticipated impacts to the grid of the exemption process in Requirement R4.[195]

103. UCS also requests that the final rule be updated to include the NOPR's citation to the footnote in proposed Requirement R4.2 that states to ''the extent the original equipment manufacturer considers any material to be proprietary, the Generator Owner is required to share this proprietary material only with the [compliance enforcement authority].'' [196] UCS asserts that the citation will communicate that the Commission expects the compliance enforcement authority will ''collect such information and use it in preparation of the reports and filings of the Milestone 4 Reliability Standards to be required to be filed with the Commission by November 4, 2026.'' [197]

104. In its reply comments, NERC states that it considered the concern that legacy IBRs may face difficulty providing documentation sufficient to secure an exemption in developing the Standard. NERC continues: ''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.'' NERC further explains that hardware limitations can be found through testing of facilities that can find relays or equipment that may cause the unit to trip, as in Reliability Standards MOD–026–1 and MOD–027–1.[198]

105. Both Elevate and WIRAB recommend updating proposed Requirement R4.2 [199] to more clearly define the details of what should be communicated between the entity seeking an exemption for a hardware limitation and its planning coordinators, transmission planners, and reliability coordinators under Requirement R4.2. Specifically, both commenters state that details should include ''timeframes for communication[s], file formats, an explanation of the reason(s) the equipment cannot meet the requirements, and other general information to ensure a thoroughly adequate transfer of information for the equipment limitation requests.'' [200]

106. NYISO states that Requirement R4 suggests that the compliance enforcement authority will make the final determination as to whether an exemption is accepted, but it does not establish a specific role for the registered entity receiving information concerning the exemption and hardware limitations under Requirement R4.2. NYISO supports giving the registered entity the opportunity to provide feedback to the compliance enforcement authority if warranted and believes that this is the intention of receiving and having the right to request additional information described in Requirement R4. NYISO requests that either the Commission or NERC confirm that intention.[201]

b. Commission Determination

107. We are persuaded that it may not be possible for generator owners of legacy IBRs to provide identification of the ''specific piece(s) of hardware causing the limitation.'' [202] As EEI, Clean Energy Associations, and other commenters explain, generator owners of legacy IBRs may not be able to secure the necessary documentation from original equipment manufacturers due to circumstances outside of their control (*i.e.,* the original equipment manufacturer could be out of business, no longer supports the IBR equipment in a legacy resource, etc.). We agree with commenters that entities would benefit from greater clarity on documentation obligations.

108. Therefore, pursuant to section 215(d)(5) of the FPA, we direct NERC, within 12 months of the effective date of this final rule, to address the concern by developing responsive modifications to proposed Reliability Standard PRC–029–1. NERC could satisfy the directive by modifying Requirement R4 or the corresponding Measure to expand the non-exhaustive list for IBR generator owners of acceptable types of evidence of a hardware limitation that prevents the IBR from meeting the ride-through criteria in proposed Requirements R1 through R3. For example, an expanded non-exhaustive list could consist of damage curves provided by the original equipment manufacturer, internal engineering analyses, analysis by third-party consultants, study results, experience from an event, manufacturer's advice, and design data.

109. We decline to adopt Invenergy's position that IBRs and synchronous generators should be treated similarly as it relates to documenting an equipment limitation. We note that IBRs and synchronous generators are not similarly situated when it comes to responses to the same disturbances on the Bulk-Power System.[203] Given this, we believe that there may be circumstances in which it may be necessary to have different exemption documentation requirements for IBRs and synchronous generators as they respond differently to similar disturbances on the Bulk-Power System, as documented in NERC IBR disturbance reports,[204] as explained in Order No. 901,[205] and as explained in NERC's petition.[206]

110. We decline UCS's request to modify Requirement R4.1 to require

[192] *Id.* at 20.

[193] Invenergy Initial Comments at 26–27; *see also* Elevate Comments at 10 (stating documentation in Measure M4 should match the language used in proposed Standard PRC–024–4 for consistency).

[194] EEI Initial Comments at 5.

[195] UCS Comments at 7.

[196] NERC Petition, Ex. A–3, at 7 n.11.

[197] UCS Comments at 8.

[198] NERC Reply Comments at 10.

[199] Elevate indicates that it has concerns with Requirement R6. Elevate Comments at 10. However, there is no Requirement R6 in proposed Reliability Standard PRC–029–1. *See* NERC Petition. We believe, based on Elevate's description of Requirement R6 as detailing communication between the entity seeking an exemption for a hardware limitation and its planning coordinators, transmission planners, and reliability coordinators, that Elevate's comments are discussing Requirement R4.2, which requires that a generator owner of a legacy IBR seeking an exemption provide a copy of the documentation supporting the hardware limitation to associated planning coordinators, transmission planners, and reliability coordinators, among others.

[200] Elevate Comments at 10; WIRAB Comments at 7.

[201] NYISO Comments at 3–4.

[202] NERC Petition at 37.

[203] Order No. 901, 185 FERC ¶ 61,042 at P 3 (stating that there are ''material technological differences between the response of synchronous generation resources and the response of IBRs to the same disturbances on the Bulk-Power System'').

[204] *Id.* PP 26–29.

[205] *See id.* PP 11–13, 15.

[206] NERC's Petition, Ex. E–2 (Technical Rationale PRC–029–1), at 1 (explaining the Standard's ''proposal is a consequence of . . . the different natures of synchronous and inverter-based generation resources'' during faults and other disturbances and as a result of several recent events exhibiting IBRs ride-through deficiencies).

generator owners to submit preliminary information about the cost and delay impacts of replacing or retrofitting hardware. NERC, in proposing an exemption process in Requirement R4, and the Commission, in approving the Standard, have already recognized that it would be unreasonable and unduly burdensome for generator owners of legacy IBRs to have to retrofit and redesign legacy facilities. Thus, we find that helping NERC and the Commission better understand the impact of exemptions on Bulk-Power System reliability would in no way influence the availability of an exemption for generator owners of legacy IBRs that can demonstrate a hardware limitation that prevents the IBR from meeting the ride-through requirements of Requirements R1 through R3. We believe that the Commission can obtain the information to understand the reliability impacts of the exemption from the informational filing we are directing NERC to file with the Commission 18 months after the conclusion of the 12-month exemption request period in section II.D.

111. We decline to adopt the recommendations of Elevate and WIRAB to more clearly define the details of what should be provided by an entity seeking a hardware exemption to its planning coordinators, transmission planners, and reliability coordinators in proposed Requirement R4.2, as it is unnecessary. We find that proposed Requirement R4.2.1 gives these entities the capability to request additional, necessary information.[207] Further, proposed Requirement R4.2.2 requires the generator owner to provide a copy of the compliance enforcement authority's acceptance of the hardware limitation to these entities, thus ensuring all involved parties are informed of the reason for granting an exemption.[208]

112. We decline to direct NERC to include the footnote in proposed Requirement R4.2 into the body of the Requirement because it is unnecessary; we are approving proposed Requirement R4.2 and the associated footnote.

113. We find it unnecessary to confirm that the intention of providing exemption information under proposed Requirement R4.2 to registered entities is for the purpose of providing feedback to the compliance enforcement authority, as requested by NYISO. We believe it best to leave it to NERC's discretion to decide whether it wishes to explain the purpose of proposed Requirement R4.2.

D. Informational Filing

114. In the NOPR, the Commission proposed to direct NERC, pursuant to 18 CFR 39.2(d), to develop and submit two informational filings pertaining to requests for exemptions by generator owners of legacy IBRs from the ride-through requirements of Requirements R1 through R3. The Commission proposed directing that 12 and 24 months after the conclusion of the 12-month period for requesting an exemption, NERC submit an informational filing with specified data related to the reliability impact of the exemptions for (1) each Interconnection and (2) each reliability coordinator area (within that Interconnection) within the United States. The Commission also proposed directing NERC to include in each informational filing an analysis of the reasons that responsible entities provide for exemptions.[209]

1. Comments

115. NERC strongly recommends that the Commission only require a single informational filing due 18 months after the conclusion of the exemption request period. NERC explains that the 12-month filing requirement may be too soon for it to review and issue determinations for all exemption requests and to provide an analysis of the capacity exempted. Similarly, NERC asserts that the 24-month filing will not assist in providing the Commission with timely information and may also include redundant information contained in the first filing. NERC argues that a single informational filing 18 months after the conclusion of the exemption request period will produce a filing quicker than the 24-month filing timeline and will be more comprehensive than the 12-month filing.[210]

116. Aligned ISOs/RTOs indicate their support for the proposed informational filings to allow parties to assess the impact of any exemptions granted.[211] Other commenters request modifications to the proposed informational filings or suggest other information to include. For example, EEI suggests NERC include the number and net MW capacity of IBRs that can meet ride-through requirements in addition to those that cannot.[212] Invenergy suggests NERC could determine what proportion of total ride-through performance and what portions of the ride-through curves the exemptions impact.[213]

117. WIRAB believes that the Commission will not have all the information to accurately evaluate the necessity of hardware exemptions for legacy IBRs and potential risks to the Bulk-Power System without additional information. WIRAB recommends that the informational filings include analyses of the reason(s) entities requested exemptions and the existing ride-through capabilities of legacy IBRs that received an exemption, as well as a risk assessment study for each Interconnection of how the exemptions may contribute to reliability risk on the Bulk-Power System.[214]

118. LA PSC requests that the deadlines for NERC to submit informational filings should be shortened from 12 and 24 months to 6 and 12 months, respectively, to reflect its request that the exemption request timeline be shortened from 12 months to 6 months.[215]

119. UCS states that the Commission should require and review informational filings on the impact of exemptions and any Corrective Action Plans that NERC files with the Commission as part of its Milestone 4 Reliability Standards due by November 4, 2026.[216]

2. Commission Determination

120. We modify the NOPR proposal and, pursuant to 18 CFR 39.2(d), we direct NERC to develop and submit a single informational filing, to the Commission, 18 months after the conclusion of the exemption request period in proposed Requirement R4 to assess the reliability impacts of the exemptions in a timely and comprehensive manner. We are persuaded by NERC's comments that a single filing at 18 months will provide the Commission with more comprehensive information than would be received in a filing at 12 months, and more timely information than would be received in a filing at 24 months. We find that it will likely take NERC more than 12 months to compile the data requested in the first filing, and a filing at 24 months will not be timely and may include redundant information.

121. We direct NERC to include in its informational filing an assessment of the reliability impacts of the exemptions with the following data for (1) each Interconnection and (2) each reliability coordinator area (within that

[207] *Id.* at 37.

[208] *Id.*

[209] NOPR, 189 FERC ¶ 61,212 at P 35.

[210] NERC Initial Comments at 4–6.

[211] Aligned ISOs/RTOs at 7.

[212] EEI Initial Comments at 9.

[213] Invenergy Initial Comments at 32.

[214] WIRAB Comments at 5.

[215] LA PSC Comments at 6.

[216] UCS Comments at 5.

Interconnection) within the United States:

- Total number of IBRs for which NERC-registered generator owners will be subject to compliance with Reliability Standard PRC–029–1;
- Aggregated MW capacity of IBRs for which NERC-registered generator owners will be subject to compliance with Reliability Standard PRC–029–1;
- Total number of IBRs for which NERC-registered generator owners requested exemptions;
- Aggregated MW capacity of IBRs for which NERC-registered generator owners requested exemptions;
- Total number of IBRs for which NERC-registered generator owners were granted exemptions;
- Aggregated MW capacity of IBRs for which NERC-registered generator owners were granted exemptions;
- Total number of granted exemptions by exemption type (voltage and/or frequency);
- Aggregated MW capacity of granted exemptions by exemption type (voltage and/or frequency);
- Total number of granted exemptions by IBR type (wind, solar PV, BESS, fuel cell); and
- Aggregated MW capacity of granted exemptions by IBR type (wind, solar PV, BESS, fuel cell).

122. The informational filing must also include an analysis of the reasons that entities provided for exemptions (both granted and denied),[217] an evaluation of the efficacy of the exemption process, and any recommendations to modify either the substance or procedural aspects of the exemption process.

III. Information Collection Statement

123. The FERC–725G information collection requirements are subject to review by the Office of Management and Budget (OMB) under section 3507(d) of the Paperwork Reduction Act of 1995. OMB's regulations require approval of certain information collection requirements imposed by agency rules. Upon approval of a collection of information, OMB will assign an OMB control number and expiration date. Respondents subject to the filing requirements will not be penalized for failing to respond to these collections of information unless the collections of information display a valid OMB control number. The Commission solicits comments on the need for this information, whether the information will have practical utility, the accuracy of the burden estimates, ways to enhance the quality, utility, and clarity of the information to be collected or retained, and any suggested methods for minimizing respondents' burden, including the use of automated information techniques.

124. The Commission bases its paperwork burden estimates on the additional paperwork burden presented by Reliability Standards PRC–024–4 and PRC–029–1, as modified, and new Reliability Standards, respectively, and the directive for NERC to submit one informational filing related to ride-through exemption requests.[218] Reliability Standards are objective-based and allow entities to choose compliance approaches best tailored to their systems. The NERC Compliance Registry, as of September 2024, identifies the following unique U.S. entities that are subject to mandatory compliance with Reliability Standard PRC–024–4: 1,294 generator owners will have an additional compliance burden. It is estimated that there will be no additional compliance burden for transmission owners that have synchronous condensers, as that data is not included in the NERC Compliance Registry, and transmission owners are already subject to Reliability Standard PRC–024–3. The estimated unique U.S. entities subject to Reliability Standard PRC–029–1 compliance are based on numbers supplied by NERC, with 591 registered generator owners that own bulk electric system (BES) battery, solar, and wind facilities and 781 generator owners that own non-BES facilities.[219] Based on these assumptions, we estimate the following reporting burden:

PROPOSED CHANGES IN BURDEN PRC–024–4 DOCKET NO. RM25–3–000

Reliability standard	Type and number of entity[220]	Number of annual responses per entity	Total number of responses	Average number of burden hours per response[221]	Total burden hours
	(1)	(2)	(1) * (2) = (3)	(4)	(3) * (4) = (5)
Annual Collection PRC–024–4 FERC–725G					
Annual review and record retention	1,294 (GO)	1	1,294	20 hrs. $63.52/hr	25,880 hrs. $1,643,897.60.
Total for PRC–024–4			1,294	20 hrs. $63.52/hr	25,880 hrs. $1,643,897.60.

[217] NERC Petition at 40 (explaining that under Requirement R4.2.2, NERC will work with regional entities to evaluate exemption submissions in a fair and consistent manner across the ERO Enterprise, and NERC will monitor the disposition of requests as the proposed standard is implemented).

[218] *See supra* P 121.

[219] NERC estimates that 591 BES IBRs and 781 non-BES IBRs will be subject to proposed Reliability Standard PRC–029–1 and the other Milestone 2 Reliability Standards that were filed in Docket Nos. RD25–2–000 and RD25–3–000. *See* NERC, Petition For Approval of Proposed Distribution Monitoring Reliability Standards PRC–028–1 and PRC–002–5, Docket No. RD25–2–000, at 41 n.60 (filed Nov. 4, 2024) (description of NERC estimate of BES IBRs that would be subject to compliance with proposed Reliability Standard PRC–028–1); NERC, Inverter-Based Resources Work Plan Progress Update, Docket No. RD22–4–001, at 3 (filed May 6, 2025) (description of NERC estimate of non-BES IBRs).

[220] The ''Number of Entity'' data is compiled from the May 13, 2025, edition of the NERC Compliance Registry.

[221] The estimated hourly cost (salary plus benefits) is a combination of the following categories from the Bureau of Labor Statistics (BLS) website, *http://www.bls.gov/oes/current/naics2_22.htm:* 75% of the average of an Electrical Engineer (17–2071) $71.19/hr., 79.31 × .75 = 53.3925 ($53.39-rounded) ($53.39/hour); and 25% of an Information and Record Clerk (43–4199) $40.51/hr., $40.51 × .25% = 10.1275 ($10.13 rounded) ($10.13/hour), for a total ($53.39 + $10.13 = $63.52/hour).

ANNUAL CHANGES PROPOSED IN THE FINAL RULE APPROVING RELIABILITY STANDARD PRC–029–1 IN DOCKET NO. RM25–3–000

Reliability standard	Type and number of entity[222]	Number of annual responses per entity	Total number of responses	Average number of burden hours per response[223]	Total burden hours
	(1)	(2)	(1) * (2) = (3)	(4)	(3) * (4) = (5)
Annual Collection PRC–029–1 FERC–725G					
Annual review and record retention	591 (BES IBR GO) 781 (Non-BES IBR GO)	1 1	591 781	40 hrs. $63.52/hr 80 hrs. $63.52/hr	23,640 hrs. $1,501,612.80. 62,480 hrs. $3,968,729.60.
Total for PRC–029–1			1,372		86,120 hrs. $5,470,342.40.

125. The responses and burden hours for Years 1–3 will total respectively as follows:

- *Year 1–3 each:* for Reliability Standard PRC–024–4 will be 1,294 responses; 25,880 hours; and
- *Year 1–3 each:* for Reliability Standard PRC–029–1 will be 1,372 responses; 86,120 hours.
- The annual cost burden for each year One to Three is $1,643,897.60 for Reliability Standard PRC–024–4; and $5,470,342.40 for Reliability Standard PRC–029–1.

126. *Title:* Mandatory Reliability Standards, Revised Protection and Control Reliability Standards.

Action: Revision to FERC–725G information collection.

OMB Control No.: 1902–0252.

Respondents: Businesses or other for-profit institutions; not-for-profit institutions.

Frequency of Responses: On Occasion.

Necessity of the Information: This final rule approves the requested modifications to Reliability Standards pertaining to the protection and control of the Bulk-Power System. As discussed above, the Commission approves proposed Reliability Standards PRC–024–4 and PRC–029–1 pursuant to section 215(d)(2) of the FPA because it establishes frequency and voltage ride-through requirements for IBRs. Additionally, the Commission directs NERC to file one informational filing with the Commission on ride-through exemption requests.

Internal Review: The Commission has reviewed the proposed Reliability Standards and made a determination that its action is necessary to implement section 215 of the FPA.

127. Interested persons may obtain information on the reporting requirements by contacting the following: Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426 [Attention: Kayla Williams, Office of the Executive Director, email: *DataClearance@ferc.gov,* phone: (202) 502–8663, fax: (202) 273–0873].

128. For submitting comments concerning the collection(s) of information and the associated burden estimate(s), please send your comments to the Commission, and to the Office of Management and Budget, Office of Information and Regulatory Affairs, Washington, DC 20503 [Attention: Desk Officer for the Federal Energy Regulatory Commission, phone: (202) 395–4638, fax: (202) 395–7285]. For security reasons, comments to OMB should be submitted by email to: *oira_submission@omb.eop.gov.* Comments submitted to OMB should include Docket Number RM25–3–000 and OMB Control Number 1902–0252.

IV. Environmental Analysis

129. The Commission is required to prepare an Environmental Assessment or an Environmental Impact Statement for any action that may have a significant adverse effect on the human environment.[224] The Commission has categorically excluded certain actions from this requirement as not having a significant effect on the human environment. Included in the exclusion are rules that are clarifying, corrective, or procedural or that do not substantially change the effect of the regulations being amended.[225] The actions proposed herein falls within this categorical exclusion in the Commission's regulations.

V. Regulatory Flexibility Act

130. The Regulatory Flexibility Act of 1980 (RFA)[226] generally requires a description and analysis of final rules that will have significant economic impact on a substantial number of small entities. The Small Business Administration's (SBA) Office of Size Standards develops the numerical definition of a small business.[227] The SBA revised its size standard for electric utilities (effective March 17, 2023) to a standard based on the number of employees, including affiliates (from the prior standard based on megawatt hour sales).[228]

131. Proposed Reliability Standard PRC–024–4 (included in FERC–725G) will apply to approximately 1,294 generator owners, and proposed Reliability Standard PRC–029–1 (included in FERC–725G) will apply to approximately combined 1,372 BES IBR generator owners and non-BES IBR generator owners in the United States.[229] Pursuant to SBA regulations, the employment threshold for generator owners is 950 employees. We estimate that the percentage of employees that are considered small to be 71.68% based on the North American Industry Classification System 221121 code (Electric Bulk Power Generation) and that the annual cost for each entity will be $1,270.40 for each generator owner and $2,540.80 for each BES IBR

[222] The ''Number of Entity'' data is compiled from NERC's petition for approval of proposed Reliability Standard PRC–028–1 in Docket No. RD25–2–000 and NERC's May 2025 Inverter-Based Resources Work Plan Progress Update in Docket No. RD22–4–001. NERC, Petition for Approval of Proposed Distribution Monitoring Reliability Standards PRC–028–1 and PRC–002–5, Docket No. RD25–2–000, at 41 n.60 (filed Nov. 4, 2024); NERC, Inverter-Based Resources Work Plan Progress Update, Docket No. RD22–4–001, at 3 (filed May 6, 2025).

[223] The estimated hourly cost (salary plus benefits) is a combination of the following categories from the Bureau of Labor Statistics (BLS) website, *http://www.bls.gov/oes/current/naics2_22.htm:* 75% of the average of an Electrical Engineer (17–2071) $71.19/hr., 79.31 × .75 = 53.3925 ($53.39-rounded) ($53.39/hour); and 25% of an Information and Record Clerk (43–4199) $40.51/hr., $40.51 × .25% = 10.1275 ($10.13 rounded) ($10.13/hour), for a total ($53.39 + $10.13 = $63.52/hour).

[224] *Reguls. Implementing the Nat'l Env't Pol'y Act,* Order No. 486, 52 FR 47897 (Dec. 17, 1987), FERC Stats. & Regs. Preambles 1986–1990 ¶ 30,783 (1987) (cross-referenced at 41 FERC ¶ 61,284).

[225] 18 CFR 380.4(a)(2)(ii).

[226] 5 U.S.C. 601–612.

[227] 13 CFR 121.101.

[228] 13 CFR 121.201, Subsector 221 (Utilities).

[229] Many respondents serve multiple roles in the NERC Compliance Registry, so there is likely double counting in the estimates.

generator owner and $5,081.50 for each non-BES IBR generator owner.[230]

132. We view this as a minimal economic impact for each entity. Accordingly, we certify that the proposed Reliability Standards PRC–024–4 and PRC–029–1 will not have a significant economic impact on a substantial number of small entities. Thus, no regulatory flexibility analysis is required.

VI. Document Availability

133. In addition to publishing the full text of this document in the **Federal Register**, the Commission provides all interested persons an opportunity to view and/or print the contents of this document via the internet through the Commission's Home Page (*http://www.ferc.gov*).

134. From the Commission's Home Page on the internet, this information is available on eLibrary. The full text of this document is available on eLibrary in PDF and Microsoft Word format for viewing, printing, and/or downloading. To access this document in eLibrary, type the docket number excluding the last three digits of this document in the docket number field.

135. User assistance is available for eLibrary and the Commission's website during normal business hours from FERC Online Support at 202–502–6652 (toll free at 1–866–208–3676) or email at *ferconlinesupport@ferc.gov,* or the Public Reference Room at (202) 502–8371, TTY (202) 502–8659. Email the Public Reference Room at *public.referenceroom@ferc.gov.*

VII. Regulatory Planning and Review

136. Executive Orders 12866 and 13563 direct agencies to assess the costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). Executive Order 13563 emphasizes the importance of quantifying both costs and benefits, of reducing costs, of harmonizing rules, and of promoting flexibility. The Office of Information and Regulatory Affairs (OIRA) has determined this regulatory action is not a ''significant regulatory action,'' under section 3(f) of Executive Order 12866, as amended. Accordingly, OIRA has not reviewed this regulatory action for compliance with the analytical requirements of Executive Order 12866.

[230] The annual cost is the hours assigned for generator owners, BES IBR generator owners, and non-BES IBR generator owners in the Annual Collection PRC–024–4 FERC–725G and Annual Collection PRC–029–1 FERC–725G tables multiplied by $63.52/hour. *See* n.221, 223.

VIII. Effective Date and Congressional Notification

137. This final rule is effective August 28, 2025. The Commission has determined, with the concurrence of OIRA, that this rule is not a ''major rule'' as defined in section 351 of the Small Business Regulatory Enforcement Fairness Act of 1996.

By the Commission.

Issued: July 24, 2025.

Carlos D. Clay,

Deputy Secretary.

Note: The following appendix will not appear in the Code of Federal Regulations.

Appendix A

The following entities filed comments:

- Arizona Public Service Company (APS);
- California Independent System Operator Corporation, ISO New England Inc., Midcontinent Independent System Operator, Inc., PJM Interconnection, L.L.C., and Southwest Power Pool, Inc. (collectively, aligned ISOs/RTOs);
- Solar Energy Industries Association (SEIA) and American Clean Power Association (ACP) (collectively, Clean Energy Associations);
- Det Norske Veritas (DNV);
- Dominion Energy Services Inc. (Dominion);
- Edison Electric Institute (EEI);
- Elevate Energy Consulting (Elevate);
- Invenergy Renewables LLC (Invenergy);
- Long Island Power Authority (LIPA);
- Louisiana Public Service Commission (LA PSC);
- NERC;
- New York Independent System Operator, Inc. (NYISO);
- New York State Energy Research and Development Authority (NYSERDA);
- New York State Reliability Council (NYSRC);
- Ørsted Wind Power North America LLC (Ørsted);
- Tesla;
- Unfrack FERC Coalition;
- Union of Concerned Scientists (UCS); and
- Western Interconnection Regional Advisory Body (WIRAB)

The following entity filed a motion for leave to comment out of time:

- Deriva Energy (Deriva)

The following entities filed reply comments:

- Clean Energy Associations;
- EEI;
- Invenergy; and
- NERC

The following entity filed an answer:

- Invenergy

The following entities filed motions to intervene:

- ACP;
- Dominion;
- Eversource Energy Service Company;
- Independent Market Monitor for PJM;
- Indiana Utility Regulatory Commission;
- Kentucky Attorney General;
- NYSERDA;
- North Carolina Electric Membership Corporation;
- Ørsted;
- SEIA;
- Sunflower Electric Power Corporation; and
- UCS

The following entity filed a motion to intervene out of time:

- American Electric Power Service Corporation

[FR Doc. 2025–14304 Filed 7–28–25; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 100

[Docket No. USCG–2025–0648]

Special Local Regulation; Olympia Harbor Days Tugboat Races, Budd Inlet, WA

AGENCY: Coast Guard, DHS.

ACTION: Notification of enforcement of regulation.

SUMMARY: The Coast Guard will enforce a special local regulation for the Olympia Harbor Days Tugboat Races from 10 a.m. until 5 p.m. on August 31, 2025, to ensure the safety of life on the navigable waters of Budd Inlet during the event. During the enforcement period, entry into the regulated area is prohibited without permission from the Patrol Commander or any Official Patrol displaying a Coast Guard ensign.

DATES: The regulations in 33 CFR 100.1309 will be enforced from 10 a.m. until 5 p.m. on August 31, 2025.

FOR FURTHER INFORMATION CONTACT: If you have questions about this notification of enforcement, call or email Lieutenant Anthony Pinto, Waterways Management Division, U.S. Coast Guard Sector Puget Sound; telephone 206–217–6051, email *SectorPugetSoundWWM@uscg.mil.*

SUPPLEMENTARY INFORMATION: The Coast Guard will enforce special local regulations in 33 CFR 100.1309 for the Olympia Harbor Days Tugboat Races in Budd Inlet, WA, from 10 a.m. until 5 p.m. on August 31, 2025. This action is necessary to ensure the safety of life on the navigable waterways of Budd Inlet during this event. Our regulation for the marine events within the Northwest District, § 100.1309(a), specifies the location of the regulated area for the