NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Implementation Plan

Project 2020-02 Modifications to PRC-024 (Generator Ride-through) Reliability Standards PRC-024-4 and PRC-029-1

Applicable Standard(s)

- PRC-024-4 – Frequency and Voltage Protection Settings for Synchronous Generators, Type 1 and Type 2 Wind Resources, and Synchronous Condensers
- PRC-029-1 – Frequency and Voltage Ride-through Requirements for Inverter-based Generating Resources

Requested Retirement(s)

- PRC-024-3 Frequency and Voltage Protection Settings for Generating Resources

Prerequisite Standard(s)

- None

Applicable Entities

- See subject Reliability Standards.

New Terms in the NERC Glossary of Terms

This section includes all newly defined, revised, or retired terms used or eliminated in the NERC Reliability Standard. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Proposed New Definition(s):

Ride-through: The plant/facility remains connected and continues to operate through voltage or frequency system disturbances.

Background

The purpose of Project 2020-02 is to modify Reliability Standard PRC-024-3 or replace it with a performance-based Ride-through standard that ensures generators remain connected to the Bulk Power System (BPS) during system disturbances. Specifically, the project focuses on using disturbance monitoring data to substantiate inverter-based resource (IBR) ride-through performance during grid disturbances. The project also ensures associated generators that fail to Ride-through system events are addressed with a corrective action plan (if possible) and reported to necessary entities for situational awareness.

The purpose for this project is based on the culmination of multiple analyses conducted by the ERO Enterprise regarding widespread IBR tripping events. Furthermore, the NERC Inverter-Based Resource Performance Subcommittee[1] has developed comprehensive recommendations for improved performance of IBRs, including the recommendation to develop comprehensive ride-through requirements.

In October 2023, FERC issued Order No. 901[2] which directs the development of new or modified Reliability Standards that include new requirements for disturbance monitoring, data sharing, post-event performance validation, and correction of IBR performance. In January 2024, NERC submitted a filing to FERC outlining a comprehensive work plan to address the directives within Order No. 901.[3] Within the work plan, NERC identified three active Standards Development projects that would need to be filed for regulatory approval with FERC by November 4, 2024. These projects include **2020-02 Modifications to PRC-024 (Generator Ride-through)**[4], **2021-04 Modifications to PRC-002-2**[5], and **2023-02 Analysis and Mitigation of BES Inverter-based Resource Performance Issues**[6].

Project 2020-02

Proposed Reliability Standard PRC-029-1 is a new Reliability Standard that includes Ride-through requirements and performance requirements for IBRs. The scope of this project was adjusted to align with associated regulatory directives from FERC Order No. 901 and the scope of the other projects related to "Milestone 2" of the NERC work plan. The components of this project's Standard Authorization Request (SAR) that related to the inclusions of new data recording requirements are covered in Project 2021-04 and the proposed new PRC-028-1 Reliability Standard. Components of this project's SAR that relate to analytics and corrective actions plans are covered in Project 2023-02 and the proposed new PRC-030-1 Reliability Standard.

PRC-029-1 includes requirements for Generator Owner IBR to continue to inject current and perform voltage support during a BPS disturbance. The standard also specifically requires Generator Owner IBR to prohibit momentary cessation in the no-trip zone during disturbances.

PRC-024-4 includes modifications to revise applicable facility types to remove IBR, retain type 1 and type 2 wind, and to include synchronous condensers.

[1] See documents at the NERC IRPS website: https://www.nerc.com/comm/RSTC/Pages/IRPS.aspx and the previous Inverter-Based Resource Performance Working Group website https://www.nerc.com/comm/RSTC/Pages/IRPWG.aspx
[2] See FERC Order 901, Docket No. RM22-12-000; https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20231019-3157&optimized=false; October 19, 2023
[3] See INFORMATIONAL FILING OF THE NORTH AMERICAN RELIABILITY CORPORATION REGARDING THE DEVELOPMENT OF RELIABILITY STANDARDS RESPONSIVE TO ORDER NO. 901 https://www.nerc.com/FilingsOrders/us/NERC%20Filings%20to%20FERC%20DL/NERC%20Compliance%20Filing%20Order%20No%20901%20Work%20Plan_packaged%20-%20public%20label.pdf; January 17, 2024
[4] See NERC Standards Development Project page for Project 2002-02; https://www.nerc.com/pa/Stand/Pages/Project_2020-02_Transmission-connected_Resources.aspx
[5] See NERC Standards Development Project page for Project 2021-04; https://www.nerc.com/pa/Stand/Pages/Project-2021-04-Modifications-to-PRC-002-2.aspx
[6] See NERC Standards Development Project page for Project 2023-02; https://www.nerc.com/pa/Stand/Pages/Project-2023-02-Performance-of-IBRs.aspx

General Considerations

This implementation plan recognizes the urgent need for Reliability Standards to address IBR ride through performance, as demonstrated by multiple event reports of the last decade, while providing a reasonable period of time for entities to develop the necessary procedures and change their protection and control settings to meet the new requirements. The ERO Enterprise acknowledges that there are IBRs currently in operation and unable to meet voltage Ride-through requirements due to their inability to modify their coordinated protection and control settings. Consistent with FERC Order No. 901, a limited and documented exemption process for those IBR is appropriate and included within this Implementation Plan. Other NERC Standards Development projects will be pursued to address ongoing identification and mitigation of any potential reliability impacts to the BPS for such exemptions.

This implementation plan also recognizes that certain requirements (Requirements R1, R2, and R3) call for entities to "ensure the design and operation" of their IBR units meets certain criteria. Design elements may be implemented more expeditiously than operation requirements; the latter of which will require entities to show compliance through use of actual disturbance monitoring data. Therefore, this implementation plan provides staggered timeframes by which entities shall first ensure the design of their IBR units meets the criteria (12 months following regulatory approval). Subsequent compliance with the "operation" elements of these requirements shall become due as entities install disturbance monitoring equipment on each applicable IBR in accordance with the implementation plan for proposed Reliability Standard PRC-028-1 Disturbance Monitoring and Reporting Requirements for Inverter-based Resources.

The ERO Enterprise acknowledges that Generator Owners and Generator Operators owning or operating Bulk Power System connected IBRs that do not meet NERC's current definition of Bulk Electric System ("BES") will be registered no later than May 2026 in accordance with the IBR Registration proceeding in FERC Docket No. RR24-2. To ensure an orderly registration and compliance process for these entities, as well as fairness and consistency in the standard's application among similar asset types, this implementation plan provides additional time for both new and existing registered entities to come into compliance with Reliability Standard PRC-029-1's requirements for their applicable IBRs not meeting the BES definition. In so doing, this implementation plan advances an orderly process for new registrants while allowing existing entities to focus their immediate efforts on their assets posing the highest risk to the reliable operation of the Bulk Power System.

Effective Date and Phased-in Compliance Dates

The effective dates for the proposed Reliability Standards are provided below. Where the standard drafting team identified the need for a longer implementation period for compliance with a particular section of a proposed Reliability Standard (i.e., an entire Requirement or a portion thereof), the additional time for compliance with that section is specified below. The phased-in compliance dates for those particular sections represent the date that entities must begin to comply with that particular section of the Reliability Standard, even where the Reliability Standard goes into effect at an earlier date.

PRC-024-4

Where approval by an applicable governmental authority is required, Reliability Standard PRC-024-4 shall become effective on the first day of the first calendar quarter that is twelve months after the effective date of the applicable governmental authority's order approving the standard, or as otherwise provided for by the applicable governmental authority.

Where approval by an applicable governmental authority is not required, the Reliability Standard PRC-024-4 shall become effective on the first day of the first calendar quarter that is twelve months after the date the standard is adopted by the NERC Board of Trustees, or as otherwise provided for in that jurisdiction.

PRC-029-1 and definition of Ride-through

Where approval by an applicable governmental authority is required, Reliability Standard PRC-029-1 and the definition of Ride-through shall become effective on the first day of the first calendar quarter that is twelve months after the effective date of the applicable governmental authority's order approving the standard, or as otherwise provided for by the applicable governmental authority.

Where approval by an applicable governmental authority is not required, the Reliability Standard PRC-029-1 and the definition of Ride-through shall become effective on the first day of the first calendar quarter that is twelve months after the date the standard is adopted by the NERC Board of Trustees, or as otherwise provided for in that jurisdiction.

PRC-029-1 Phased-in Compliance Dates

Requirements R1, R2, and R3

Capability-Based Elements

Bulk Electric System IBRs

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 the effective date of the standard.

Applicable Non-BES IBRs[7]

Entities shall not be required to comply with Requirements R1, R2, and R3 relating to the **design** of their applicable non-BES IBRs until the later of: (1) January 1, 2027; or (2) the effective date of the standard.

Performance-Based Elements (all applicable IBRs)

Entities shall not be required to comply with the portion of Requirements R1, R2, and R3 relating to the **operation** of IBRs to meet the requirements until the entity has established the required

[7] The standard defines such as IBRs as "Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV."

disturbance monitoring equipment capabilities for those IBRs in accordance with the implementation plan for Reliability Standard PRC-028-1.

Requirement R4

Bulk Electric System IBRs
Entities shall comply with Requirement R4 for their BES IBRs by the effective date of the standard.

Applicable Non-BES IBRs
Entities shall not be required to comply with Requirement R4 or their non-BES IBRs until the later of: (1) January 1, 2027; or (2) the effective date of the standard.

Retirement Date

PRC-024-3

Reliability Standard PRC-024-3 shall be retired immediately prior to the effective date of Reliability Standards PRC-024-4 and PRC-029-1 in the particular jurisdiction in which the revised standard is becoming effective.

Equipment Limitations and Process for Requirement R4

Consistent with FERC Order No. 901, a limited and documented exemption for some legacy IBR with certain documented equipment limitations are acceptable. Per the Order, these IBRs are

> "…typically older IBR technology with hardware that needs to be physically replaced and whose settings and configurations cannot be modified using software updates – may be unable to implement the voltage ride though performance requirements."[8]

To ensure compliance with Requirement R4 and alignment with FERC Order No. 901, only those IBR that are in operation as of the effective date of PRC-029-1 may be considered for potential exemption. Further, only those IBR that are unable to meet ~~voltage~~ ride-through requirements due to their inability to modify their coordinated protection and control settings may be considered for potential exemption.

[8] Order No. 901 at p. 193.