

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

**Reliability Standards to Address
Inverter-Based Resources**

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Docket No. RM22-12-000

COMMENTS OF THE ISO/RTO COUNCIL

Pursuant to the Federal Energy Regulatory Commission’s (“FERC” or the “Commission”) November 17, 2022 Notice of Proposed Rulemaking,¹ the ISO/RTO Council (“IRC”)² hereby submits these comments for the Commission’s consideration.

I. COMMENTS

In the NOPR, the Commission proposes to direct the North American Electric Reliability Corporation (“NERC”) to develop new or modified Reliability Standards that address Commission-identified reliability “gaps” related to inverter-based resources (“IBR”): (i) data sharing; (ii) model validation; (iii) planning and operational studies; and (iv) performance requirements.³ The Commission also proposes to direct NERC to submit to the Commission a compliance filing within 90 days of the effective date of the final rule that includes a “detailed, comprehensive standards development and implementation plan explaining how NERC will prioritize the development and implementation of new or modified Reliability Standards.”⁴

¹ *Reliability Standards to Address Inverter-Based Resources*, 181 FERC ¶ 61,125 (2022) (hereafter, the “NOPR”). See also 87 FR 74541 (“Comments are due February 6, 2023 and reply Comments are due March 6, 2023.”)

² The IRC comprises the following independent system operators (“ISOs”) and regional transmission organization (“RTOs”): Alberta Electric System Operator (“AESO”); California Independent System Operator (“CAISO”); Electric Reliability Council of Texas, Inc. (“ERCOT”); the Independent Electricity System Operator of Ontario, Inc. (“IESO”); ISO New England Inc. (“ISO-NE”); Midcontinent Independent System Operator, Inc. (“MISO”); New York Independent System Operator, Inc. (“NYISO”); PJM Interconnection, L.L.C. (“PJM”); and Southwest Power Pool, Inc. (“SPP”). AESO and IESO are not subject to the Commission’s jurisdiction, but join in this filing.

³ NOPR at P 1

⁴ *Id.* at P 7.

In conjunction with the NOPR, the Commission also on November 17, 2022 directed NERC to submit a work plan within 90 days describing, in detail, how NERC plans to identify and register owners and operators of IBRs that are connected to the Bulk-Power System, but are not currently required to register with NERC under the Bulk Electric System (“BES”) definition, that have an “aggregate, material impact” on the reliable operation of the Bulk-Power System.⁵

The IRC’s comments first address each of the four reliability “gaps” identified in the NOPR in I(B) – I(E), below, then notes some additional reliability factors beyond the four identified gaps, ending with jurisdictional considerations.

A. Inverter Based Resources and their Reliability Implications

IBRs have the potential to affect system reliability regardless of: (1) the size of the individual IBR plants constituting the aggregate IBR fleet; (2) the level of the system (e.g., transmission or distribution) at which the IBRs are interfaced with the grid; or (3) their NERC registration status. NERC presented evidence of this during the System Planning Impacts from Distributed Energy Resources Working Group’s meeting on August 2, 2022, noting that DER impacts cannot be ignored.⁶

B. Data Sharing

The IRC supports Reliability Standards that facilitate the provision of IBR-related data from registered entities to Reliability Coordinators, Planning Coordinators, and other registered entities responsible for the safe and reliable operation of the Bulk-Power System. Though the ability to obtain IBR data varies among IRC members, without the ability to obtain such data, IRC

⁵ *Registration of Inverter-Based Resources*, 181 FERC ¶ 61,124 (2022) (hereafter, the “IBR Registration NOPR”).

⁶ “Evidence has shown that there are resource loss effects and voltage recovery effects from bus faults that impact bulk system recover[y]. NERC, Presentations from System Planning Impacts from Distributed Energy Resources Working Group’s (SPIDERWG) August 2nd meeting, slide 33. Available at: https://www.nerc.com/comm/RSTC/SPIDERWG/August_Presentations_updated.pdf

Members must rely on publicly available industry documents and analysis of IBR responses post-event which may not reflect the actual performance of installed IBRs and would be difficult to verify. This, in turn, may impact reliability under certain contingencies, particularly as IBRs proliferate in the coming years. Indeed, NERC itself recently presented to the System Planning Impacts from DER Working Group a study indicating that excluding DER from models could result in reliability impacts.⁷

The IRC also encourages NERC to develop Reliability Standards that are technology- and vendor-neutral, so as not to exclude any specific kind of IBR or tool. Moreover, the IRC respectfully requests that the Final Rule make clear that the new or modified Reliability Standards specify that the data to be submitted by all types of IBRs (i.e., registered IBRs, unregistered IBRs, and IBR-DERs) and transmission devices using similar technologies should not be limited to typical data required today in standards used for traditional synchronous machine-based studies, but also include data for other electromagnetic transient (EMT) tools to study IBR dynamic behavior when appropriate.

Overall, all IBRs should be required to submit modeling data that allows a full analysis of both their individual and aggregate impacts (potentially, DER-IBRs should be required to provide data that is more granular than the data submitted by other DERs so that their individual impact can be analyzed). The NERC Project 2022-02 has the potential to address this and the IRC would hope this dovetails with the Commission's proposed rulemaking and any cooperative federalism necessary to address the underlying reliability issues.

⁷ Available here (starting on Slide 7): https://www.nerc.com/on%20a%20study%20indicating%20that%20excluding%20DER%20from%20models%20could%20result%20in%20reliability%20impacts.comm/RSTC/SPIDERWG/August_Presentations_updated.pdf

C. Model Validation

The IRC supports new or revised Reliability Standards that require registered entities that directly interface with IBR data to provide *validated* models to Reliability Coordinators and Planning Coordinators. The new or revised Reliability Standards should also require that model validation include equipment testing and field tests that show that the models accurately represent the equipment as installed in the field. Recent events, such as the Odessa disturbances in Texas, have emphasized the need for such validation.⁸ In addition, requirements should be included to model and study IBR installations to capture certain adverse control interactions that would be unseen by asset owner modeling efforts but would still create reliability issues seen by the Reliability Coordinators, Transmission Planners, or Planning Authorities.

In recent NERC reliability standard projects, the IRC has noticed that many asset owners endorse requirements that limit their implementation and compliance exposure. As such, resulting standards may not be the most effective in mitigating the targeted risk. It is imperative that complementary standard requirements are placed on asset owners as well as planning and operating entities because both impact BPS risk mitigation. Therefore, we ask that the Final Rule make clear that the reliability standards to be developed by NERC place appropriate obligations on all responsible entities.

D. Planning and Operational Studies

Currently, NERC reliability standards do not give IRC Members explicit authority to require sufficient IBR-related data for purposes of facilitating accurate planning and operational studies. Given the importance of this data to operational and short, medium, and long-term

⁸ See NERC Odessa materials at: [https://www.nerc.com/comm/RSTC_Reliability_Guidelines/NERC_2022_Odessa_Disturbance_Report%20\(1\).pdf](https://www.nerc.com/comm/RSTC_Reliability_Guidelines/NERC_2022_Odessa_Disturbance_Report%20(1).pdf); https://www.nerc.com/pa/rrm/ea/Documents/Odessa_Disturbance_Report.pdf

planning, the IRC supports new or revised Standards that incorporate IBR data to assess the overall reliability of the BPS.

E. Performance Requirements

The IRC acknowledges that seven NERC major event analysis reports from 2016 to 2022 have highlighted significant IBR performance issues and encourages the Commission to require new performance requirements as part of its final rule in this proceeding.⁹ All IBRs should be required to support the grid during disturbances using available, standard functions. And indeed NERC has already put out guidance in this area.¹⁰ Broadly speaking, the IRC views the ability of IBRs to stay connected (ride through) various types of voltage and frequency disturbances as crucial to ensuring continued BPS reliability as IBR penetration increases. Simply staying connected during grid disturbances and IBRs' active participation in grid support (*e.g.*, dynamic reactive current injection, primary frequency response) during disturbances will be needed as the resource mix changes. The IRC supports performance requirement improvements across the areas identified in the NOPR.¹¹

⁹ <https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx>

¹⁰ NERC, Reliability Guideline, Bulk Power System Reliability Perspectives on the Adoption of IEEE 1547-2018. March 2020. Available at: https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Guideline_IEEE_1547-2018_BPS_Perspectives.pdf

¹¹ The IRC notes that, given that the new or revised standards would only apply to registered IBRs, in some areas of the country (such as New England) the vast majority of IBR capacity would not be subject to the requirements. The IRC recognizes that the Commission has directed NERC to submit a work plan describing, in detail how it plans to identify and register owners and operators of IBRs that are connected to the Bulk-Power System, but are not currently required to register with NERC under the Bulk Electric System (BES) definition. Registering these IBRS should at least decrease the number of resources that would not be subject to the new or revised Reliability Standards' requirements.

F. Additional Comments

1. Additional Devices

The IRC respectfully requests that, in the Final Rule, the Commission make clear that inverter-based transmission devices will also be subject to the data sharing, model validation, planning and operational studies, and performance requirements of the new or modified Reliability Standards.¹² Adding more of these devices to either integrate or support the interconnection of new IBRs will cause the required level of modeling (and model validation) to exceed past needs because of the potential for control interaction between the IBR and these inverter-based transmission devices creating a higher potential for widespread impacts from unstudied control interaction. In addition, in the Final Rule, the Commission should make clear that, once the new or revised Reliability Standards become effective, they will apply to both new and existing IBRs. At a minimum, any existing legacy, non-conforming IBRs should be documented and the reporting, modeling, and data requirements should apply equally to all IBRs, particularly non-standard IBRs, so that their behavior can be better predicted.

2. IBR DERs

Industry is already acting to address IBR-DER reliability modeling needs through NERC Project 2022-02 which, based on findings, states that “[a]s the penetration of DERs continues to increase across the North American bulk power system (BPS), it is necessary to account for the potential impacts of DERs on reliability in the planning, operation, and design of the BES.”¹³ The

¹² Such devices include, but may not be limited to, High Voltage Direct Current, Static Synchronous Compensators and Static VAR Compensators.

¹³ NERC, Project 2022-02 Modifications to TPL-001-5.1 and MOD-032-1. Information available at: <https://www.nerc.com/pa/Stand/Project202202ModificationstoTPL00151andMOD0321DL/Project%202022-02%20MOD-032-1%20Standard%20Authorization%20Request%20SPIDERWG%20-%20Clean.pdf>

Project aims to modify modeling data collection and planning standards to better account for potential DER reliability impacts.

Further, while DER-IBRs are not always included or able to be included in post-disturbance event analysis, it is worth noting that DER tripping was found in the NERC Disturbance Report on incidents in California dating back to 2018.¹⁴ The demonstrable potential for DER-IBR tripping in response to BPS events, coupled with increasing levels of DER penetration across the nation, drives a technical need to consider DER-IBR reliability impacts.¹⁵

G. Jurisdictional Considerations

Section 215 of the Federal Power Act provides that “the Commission shall have jurisdiction, within the United States, over . . . all users, owners and operators of the bulk-power system . . . for purposes of approving reliability standards established under this section and enforcing compliance with this section.”¹⁶ Section 215 also provides that “[a]ll users, owners and operators of the bulk-power system shall comply with reliability standards that take effect under this section,”¹⁷ but that the term ‘bulk-power system’ “does not include facilities used in the local distribution of electric energy.”¹⁸

¹⁴ NERC has identified aggregate DER tripping in multiple BPS fault events, such as the Palmdale Roost and Angeles Forest disturbances: <https://www.nerc.com/pa/rrm/ea/Pages/April-May-2018-Fault-Induced-Solar-PV-Resource-Interruption-Disturbances-Report.aspx>

¹⁵ Recognizing a need to contemplate potential DER impacts faster than NERC standards would otherwise dictate, some RTOs have already set out to develop studies of DER affected systems studies. For instance, MISO set out in early 2022 to develop DER Affected Systems Study practices as a framework to DER impacts on the Transmission System, with some Transmission Owners submitting information to MISO on expected backflow from DERs on distribution onto the Transmission System for MISO to evaluate. See DRAFT MISO Distributed Energy Resources Affected System Studies Business Practices v2. Available at: https://cdn.misoenergy.org/20230131%20IPWG%20Item%2003d%20MISO%20DER%20Affected%20Systems%20Study%20Business%20Practices%20Whitepaper%20Rev%202_clean627531.pdf

¹⁶ 16 U.S.C. § 824o(b)(1) (emphasis added).

¹⁷ *Id.*

¹⁸ *Id.* at § 824o(a)(1)(b).

Since the codification of FPA section 215, the Commission has struck a careful balance between implementing its obligations to ensure reliability under the statute *and* simultaneously respecting the authorities of state and local jurisdictions via the statutory exclusion of local distribution facilities.¹⁹ The IRC encourages the Commission to continue this approach in adopting a final rule in this proceeding.

To the extent that certain categories of owners and operators of IBRs have, in the aggregate, a material impact on the reliable operation of the Bulk-Power System, yet are not currently required to be registered for compliance with mandatory reliability standards, the IRC is supportive of registration of such entities, either through amendments to the BES definition, the addition of a new functional registration categories, or other modifications to the NERC Rules of Procedure. In keeping with the framework of cooperative federalism envisioned by FPA section 215, the IRC is also supportive of the Commission's proposed approach of focusing any new registrations on owners and operators of IBRs that substantially impact the Bulk-Power System.²⁰

Regarding the Commission's proposal in the NOPR to develop new or modified Reliability Standards that address the four categories of Commission-identified reliability "gaps" related to IBRs, the Commission can here too operate within the framework of cooperative federalism envisioned by FPA section 215. Specifically, the IRC encourages the Commission to require clear, specific obligations on distribution-level entities (e.g., Distribution Providers) to provide IBR-related data to Reliability Coordinators, Planning Coordinators, and other registered entities

¹⁹ See, e.g., *Revision to Electric Reliability Organization Definition of Bulk Electric System*, 134 FERC ¶ 61,210 (2011) ("Order No. 773-A") ("In Order No. 743, the Commission acknowledged that "Congress has specifically exempted 'facilities used in the local distribution of electric energy'" from the Bulk-Power System definition. Since such facilities are exempted from the Bulk-Power System, they also are excluded from the bulk electric system. Therefore, the Commission agrees with Western Petitioners and others that facilities used in the local distribution of energy should be excluded from the revised bulk electric system definition.").

²⁰ See IBR Registration Order at n. 1 ("This order does not address IBRs connected to the distribution system.").

responsible for safe and reliable operation of the Bulk-Power System. However, given the diversity of state and local jurisdictions and rules that may be implicated by the *collection* of IBR-related data *in the first instance*, the Commission should require NERC to provide flexibility regarding the specific means by which distribution-level entities can collect IBR-related data.

II. CONCLUSION

In accordance with the foregoing, the IRC respectfully requests that the Commission accept these comments into the record and consider them in its disposition of this proceeding.

Respectfully submitted,

/s/ Margo Caley

Maria Gulluni
Vice President & General Counsel
Margo Caley
Chief Regulatory Compliance Counsel
ISO New England Inc.
One Sullivan Road
Holyoke, Massachusetts 01040
mcaley@iso-ne.com

/s/ Thomas DeVita

Craig Glazer
Vice President-Federal Government Policy
Thomas DeVita
Assistant General Counsel
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403
Ph: (610) 666-8248
Fax: (610) 666-8211
thomas.devita@pjm.com

/s/ Andrew Ulmer

Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel, Regulatory
Andrew Ulmer
Assistant General Counsel
California Independent System Operator Corporation
250 Outcropping Way
Folsom, California 95630
aulmer@caiso.com

/s/ Raymond Stalter

Robert E. Fernandez
Executive Vice President and General Counsel
Raymond Stalter
Director of Regulatory Affairs
Christopher R. Sharp
Senior Compliance Attorney
New York Independent System Operator, Inc.
10 Krey Boulevard
Rensselaer, NY 12144
rstalter@nyiso.com

/s/ Aaron Fate

Aaron Fate
Assistant General Counsel
**Midcontinent Independent System
Operator, Inc.**
720 City Center Drive
Carmel, Indiana 46032
Telephone: (317) 249-5400
Fax: (317) 249-5912
afate@misoenergy.org

/s/ Chad V. Seely

Chad V. Seely
Vice President & General Counsel
Nathan Bigbee
Deputy General Counsel
Electric Reliability Council of Texas, Inc.
8000 Metropolis Drive, Bldg. E, Suite 100
Austin, Texas 78744
chad.seely@ercot.com

/s/ Beverly Nollert

Beverly Nollert
Senior Manager, Regulatory Affairs
Independent Electricity System Operator
1600-120 Adelaide Street West
Toronto, Ontario M5H 1T1
beverly.nollert@ieso.ca

/s/ Paul Suskie

Paul Suskie
Executive Vice President & General Counsel
Southwest Power Pool, Inc.
201 Worthen Drive
Little Rock, Arkansas 72223-4936
psuskie@spp.org

/s/ Diana Wilson

Diana Wilson
Director Enterprise Risk Management and
Compliance
Alberta Electric System Operator
#2500, 330 - 5 Avenue SW
Calgary, Alberta T2P 0L4
diana.wilson@aeso.ca