NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Inverter-Based Resource Performance Subcommittee (IRPS)

Scope Document
Updated: September 2022

Purpose

The purpose of the Inverter-Based Resource Performance Subcommittee (IRPS) is to explore the performance characteristics of bulk power system (BPS)-connected inverter-based resources.[1] The IRPS will provide technical support to any analyses of BPS disturbances involving BPS-connected inverter-based resources. The IRPS will also focus on developing technical documents to support BPS planning and operations under increasing penetrations of BPS-connected inverter-based resources. The technical materials are intended to help transmission and generation entities understand the performance aspects, modeling, and system studies of BPS-connected inverter-based resources.

Activities

The IRPS will focus on the following activities:

1. Monitor, review, and document characteristics of BPS-connected inverter-based resources, as identified by events analyses, dynamic simulations, performance analyses, and discussions within the IRPWG to provide guidance to industry for recommended performance of inverter-based resources
2. Provide technical support, guidance, and industry leadership to the development and interconnection of BPS-connected inverter-based resources; ensure new technologies such as battery energy storage and hybrid plants are reliably interconnected to the BPS
3. Provide recommendations and technical materials related to changing essential reliability services and grid dynamics when faced with increasing penetrations of inverter-based resources. This includes concepts associated with low short circuit strength systems, fast frequency response, low inertia systems, introduction of grid forming IBRs and other related concepts
4. Ensure there are no potential gaps or areas for improvements related to BPS-connected inverter-based resources in the NERC Reliability Standards as new grid events occur and as new technologies evolve
5. Coordinate and support any data collection activities and interconnection-wide analyses related to inverter-based resource performance or modeling
6. Develop guidance on steady-state, dynamic, electromagnetic transient, harmonics and short-circuit modeling and studies related to BPS-connected inverter-based resources

[1] Inverter-based resources generally include solar photovoltaic (PV), wind power resources, battery energy storage, high voltage dc (HVDC) systems, and flexible ac transmission system (FACTS) devices.

7. Perform system studies, as needed, to provide technical basis to recommendations or to study the potential impacts of emerging reliability issues
8. Conduct industry technical workshops and webinars to share key findings, lessons learned, and best practices
9. Coordinate with FERC, IEEE, UL, NFPA, and state jurisdictions to ensure unified solutions to any identified potential reliability issue; coordinate with and monitor IEEE 2800 - 2022 and P2800.2 Working Group activities to ensure they align with BPS reliability needs
10. Regularly update existing NERC Reliability Guidelines and other relevant documents previously developed by this group
11. Proactively analyze and study any emerging reliability issues that may be identified and that may have an impact on the North American BPS
12. Coordinate with system protection groups such as NERC System Protection and Controls Subcommittee (SPCS) to study the impacts that increasing penetrations of inverter-based resources may have on BPS protection systems
13. Other activities as directed by the NERC Reliability and Security Technical Committee
14. Assess technical capabilities of inverter-based resources and recommend changes to system planning and operations to utilize those capabilities to enhance system reliability and resilience

Deliverables

The IRPWG may develop the following deliverables based on the aforementioned activities:

1. Reliability guidelines, technical reference documents, or white papers related to emerging topics for BPS-connected inverter-based resource performance, modeling, studies, technology, and security
2. Assessments of the modeling, modeling practices, and studies being performed across North America involving BPS-connected inverter-based resources
3. Detailed interconnection-wide studies of any potential reliability risks under high penetration of inverter-based resources (particularly solar PV and battery energy storage)
4. Revised or updated Reliability Guidelines previously developed by the group, as deemed necessary

Membership

As IRPS activities are entirely public, the IRPS is open to all industry members with expertise in any of the following areas:

- Understanding of converter design, controls, and manufacturing for inverter-based resources
- Plant-level controls and the relationship between these controls and individual IBR unit controls
- Inverter-based resource performance characteristics, particularly performance during faults and abnormal voltage and frequency conditions, phase angles changes, phase locked loop dynamics, etc.

- Performing transient stability simulations and modeling of inverter-based resources, including modeling and model parameters for these resources
- Performing model verification testing for inverter-based resources
- BPS angular, frequency, and voltage stability, particularly under high penetration of inverter-based resources

The IRPS consists of a chair and vice chair nominated by the group and approved by the RSTC. The group will also be assigned an RSTC Sponsor to support its activities. NERC staff will be assigned as staff coordinator(s). Subcommittee decisions will be consensus-based, led by the Chair and Vice Chair and staff coordinators. Any minority views will be included in an addendum.

Reporting and Duration

The IRPS jointly reports to the NERC RSTC, and will regularly submit a work plan for approval of tasks. The IRPS will review its scope and work plan regularly.

Meetings

The IRPS will have two to three meetings (remote or in-person), supplemented with conference calls to continue workload throughout the year.

Activities Completed To-Date

A list of current and completed activities can be found on the IRPS work plan.[2]

[2] https://www.nerc.com/comm/RSTC/IRPS/IRPS%20Work%20Plan.pdf