

# Manual 14H - Inverter Based Resource Interconnection Requirements

Awais Ghayas

Interconnection Analysis

Markets & Reliability Committee

July 28, 2026

*Disclaimer: While materials are current at the time of publishing, applicable requirements may change. PJM Governing Documents control.*

- FERC issued order 901 directing NERC to develop new or modified reliability standards to address reliability gaps related to inverter-based resources
- NERC publishes PRC-029 (effective date 10-1-2026) to ensure that IBRs Ride-through to support the Bulk Power System during and after defined frequency and voltage excursions.
- PJM is proposing manual 14H revision to adopt IEEE 2800 requirements
  - Phase I: General definitions, ride-through (voltage & frequency), associated ride-through protection requirements, primary frequency response

- PJM is proposing manual 14H revisions to utilize a Detailed Reference approach for adopting IEEE 2800-2022, citing exceptions
- Manual 14H sections identified for updates as part of Phase 1 of IEEE-2800 adoption effort:
  - Section 9: Generator Interconnection Requirements, Rights and Obligations
  - New Attachment K: Interconnection Requirements for Inverter-Based Resources (“IBR Interconnection Requirements”)

- 9.15 Requirements for Inverter-Based Resources
  - Provides an overview of the types of new service requests these requirements would apply to and the applicable date (June 22, 2027)
  - Definition of an Inverter-Based Resource
    - Specifies that the requirements shall apply to voltage source converter high-voltage direct current (VSC-HVDC) transmission facility
  - Specifies that the requirements shall apply to IBR's interconnecting with the transmission and sub-transmission systems

- Provides the scope of the IBR requirements
- Provides background on the development of IEEE-2800-2022 standard
- PJM Tariff/IEEE-2800 Definition Cross Reference
- Applicable Technical Requirements and Standards
  - Lists each sub-section from IEEE-2800 that will be adopted by PJM during Phase 1
- Application Notes
  - Lists PJM specifications or exceptions to certain requirements in IEEE-2800

- IEEE-2800 Section 4.1.2
  - Project Developer or Surplus Project Developer shall submit an “Ambient Air Ticket” to PJM to request IBR short term rating (ISR) greater than the IBR continuous rating (ICR).
- IEEE-2800 Section 4.10
  - PJM does not utilize “Permit Service” flag. Project Developer or Surplus Project Developer shall notify PJM before entering service based on requirements listed in PJM Manual 14D.
  - The enter service criteria shall use the default values for applicable voltages and applicable frequency specified in the table below

| Enter service criteria              | Default setting |
|-------------------------------------|-----------------|
| Applicable voltage, minimum value   | 0.9 p.u.        |
| Applicable voltage, maximum value   | 1.05 p.u.       |
| Applicable frequency, minimum value | 58.8 Hz         |
| Applicable frequency, maximum value | 60.12 Hz        |

- Parameters for Primary Frequency Response for *IBR plant*

| Parameter                 | Units | Default value           | Ranges of available settings |                        |
|---------------------------|-------|-------------------------|------------------------------|------------------------|
|                           |       |                         | Minimum                      | Maximum                |
| dbOF                      | Hz    | $0.06\% \times f_{nom}$ | $0.025\% \times f_{nom}$     | $1.6\% \times f_{nom}$ |
| dbUF                      | Hz    | $0.06\% \times f_{nom}$ | $0.025\% \times f_{nom}$     | $1.6\% \times f_{nom}$ |
| Droop for under-frequency |       | 5%                      | 2%                           | 5%                     |
| Droop for over-frequency  |       | 5%                      | 2%                           | 5%                     |

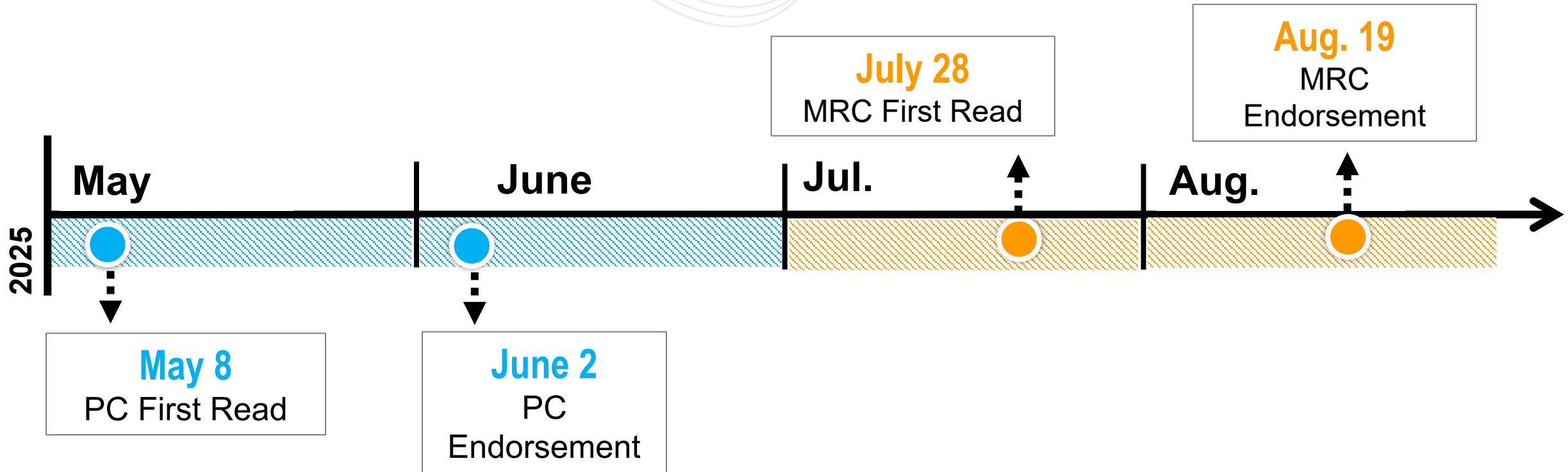
- Voltage ride-through capability for plants **without** auxiliary load limitations

| Applicable voltage (p.u.) | Minimum ride-through time (s) | Operation Mode               |
|---------------------------|-------------------------------|------------------------------|
| $V > 1.20$                | NA                            | May ride-through or may trip |
| $1.20 \geq V > 1.10$      | 1                             | Mandatory                    |
| $1.10 \geq V > 1.05$      | 1800                          | Continuous                   |
| $1.05 \geq V \geq 0.90$   | $\infty$                      | Continuous                   |
| $0.90 > V \geq 0.70$      | 6                             | Mandatory                    |
| $0.70 > V \geq 0.50$      | 3                             | Mandatory                    |
| $0.50 > V \geq 0.25$      | 1.2                           | Mandatory                    |
| $0.25 > V \geq 0.10$      | 0.32                          | Mandatory                    |
| $V < 0.10$                | 0.32                          | Permissive                   |

- Voltage ride-through capability for plants **with** auxiliary load limitations

| Applicable voltage (p.u.) | Minimum ride-through time (s) | Operation Mode               |
|---------------------------|-------------------------------|------------------------------|
| $V > 1.20$                | NA                            | May ride-through or may trip |
| $1.20 \geq V > 1.10$      | 1                             | Mandatory                    |
| $1.10 \geq V > 1.05$      | 1800                          | Continuous                   |
| $1.05 \geq V \geq 0.90$   | $\infty$                      | Continuous                   |
| $0.90 > V \geq 0.70$      | 3.00                          | Mandatory                    |
| $0.70 > V \geq 0.50$      | 2.50                          | Mandatory                    |
| $0.50 > V \geq 0.25$      | 1.2                           | Mandatory                    |
| $0.25 > V \geq 0.10$      | 0.16                          | Mandatory                    |
| $V < 0.10$                | 0.16                          | Permissive                   |

- Frequency disturbance ride-through requirements.  
(Application Note 6)
  - Subclause 7.3.2.1: The IBR *plant* shall meet the requirements for frequency disturbance ride-through requirements as defined in Clause 7.3.2.1 (General requirements and exceptions) **with the exception to any reference of section 6.2 (fast frequency response)** of the IEEE-2800 standard.
  - Subclause 7.3.2.3: The IBR *plant* shall meet the requirements for frequency disturbance ride-through requirements as defined in Clause 7.3.2.3 (Frequency disturbances within the mandatory operation region) **with the exception to any reference of section 6.2 (fast frequency response)** of the IEEE-2800 standard.



Presenter:  
Awais Ghayas,  
[Awais.Ghayas@pjm.com](mailto:Awais.Ghayas@pjm.com)



### Member Hotline

(610) 666 – 8980

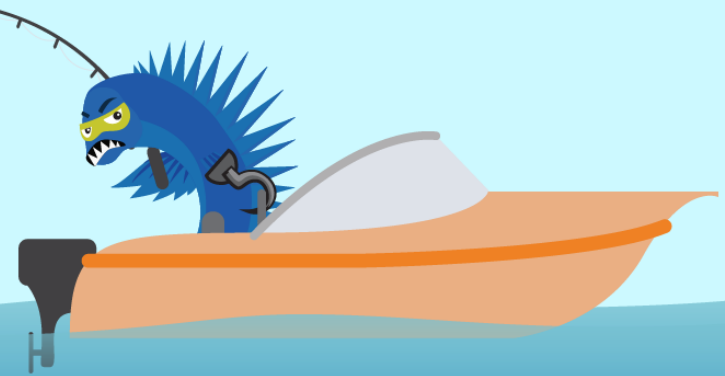
(866) 400 – 8980

[custsvc@pjm.com](mailto:custsvc@pjm.com)

**PROTECT THE  
POWER GRID**  
**THINK BEFORE  
YOU CLICK!**



**BE ALERT TO  
MALICIOUS PHISHING  
EMAILS**



**Report suspicious email activity to PJM.**  
Call (610) 666-2244 or email [it\\_ops\\_ctr\\_shift@pjm.com](mailto:it_ops_ctr_shift@pjm.com)