Do not use this form for submitting comments. Use the Standards Balloting and Commenting System (SBS) to submit comments on PRC-024-3 – Generator Voltage and Frequency Protection. Comments must be submitted by 8 p.m. Eastern, Friday, May 31, 2019.

Additional information is available on the project page. If you have questions, contact Standards Developer, Mat Bunch (via email), or at (404) 446-9785.

Background Information
On November 27, 2018, the NERC Operating Committee (OC) and Planning Committee (PC) submitted a Standard Authorization Request (SAR) prepared by the Inverter-Based Resource Performance Task Force (IRPTF), which reports to the OC and PC.

Based off the analyses of the Blue Cut Fire and Canyon 2 Fire disturbances in southern California along with the development of the PRC-024-2 Gaps Whitepaper, the IRPTF identified potential modifications to PRC-024-2 to ensure that inverter-based generator owners, operators, developers, and equipment manufacturers understand the intent of the standard in order for their plants to respond to grid disturbances in a manner that contributes to the reliable operation of the BPS. In order to address the issues in the SAR, the standard drafting team developed the proposed modifications in PRC-024-3.

PRC-024-3 – Summary of Key Changes
Momentary Cessation
• Requirements R1 and R2 modified to specify a generating resource may neither trip NOR enter momentary cessation inside the No Trip Zone

No Trip Zone
• To clarify confusion regarding tripping or entering momentary cessation outside the No Trip Zone, the area outside the boundary is now labeled as a “May Trip Zone”

Applicability Section
• Facilities Section added that explicitly lists protective functions for specific equipment
  o Plant Auxiliary Equipment is not included as an applicable facility
  o Specifies that voltage and frequency protection should be applied to both generator step-up (GSU) and collector transformers
  o Addresses a potential reliability gap identified by the standard drafting team
- Some Transmission Owners (TOs) own GSU or collector transformers, yet not currently in the scope PRC-024

**Inclusion of Some TOs as Functional Entities**

- *Not all TOs are applicable*
- Only those specific TOs that own a GSU or collector transformer and apply protection listed in the facilities section are now in scope of PRC-024

**Point of Interconnection (POI)**

- To address ambiguity concerns, removed the term altogether and replaced with precise language for this standard:
  - “at the high side of the GSU or collector transformer”

**Figures and Tables**

- Clarified areas of confusion as specified by the Standard Authorization Request
- General “clean up” work throughout

**Variance - Quebec Interconnection**

- Variance to Requirement R2 with more stringent under/over voltage boundaries

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1 Requirements R1 and R2 in the currently enforceable PRC-024-2 standard, via footnotes 2 and 4, include all frequency and voltage protective relays from the individual generating resource to the high side of the main power transformer for dispersed power producing resources. There was also an identified potential reliability gap when frequency and voltage protection, specifically volts per hertz, are applied to conventional generator GSUs. To alleviate this potential reliability gap, and to achieve parity for all resources, the SDT added a facilities section to specify the facilities that are subject to the Standard, if those facilities have frequency and voltage protection enabled. The facilities section now clarifies that the GSU or collector transformer is an applicable facility.
Questions

1. The standards drafting team (SDT) replaced “protective relays” to “protection” throughout the standard to include relays, settings in applicable control systems, as well as other types of voltage and frequency protection devices. Do you agree with these modifications? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation, explanation, and proposed modification.

☐ Yes
☒ No

Comments:
The scope of “protection” should be defined within the standard regarding protective relay settings and settings in applicable control systems. If “other” types of voltage and frequency protection devices need to be included, then we suggest explaining the scope.

2. To address confusion regarding “at the point of interconnection,” the team replaced it with the phrase, “at the high side of the generator step-up or collector transformer.” Do you agree with this clarifying change? If not, please provide an alternative suggestion.

☒ Yes
☐ No

Comments:
The Standard Drafting team should clarify which Transformer a GO should consider when they have multiple Step Up or Collector transformers on line (multiple stages of step up to reach Interconnecting voltage)

3. The SDT modified Requirements R1 and R2 to not allow momentary cessation, in addition to tripping, in the “no trip zone.” Do you agree that momentary cessation should not be allowed in the no trip zone? If not, please provide your rationale.

☒ Yes
☐ No

Comments:

4. Do you agree that “momentary cessation” – like “tripping” – is well understood by industry? If not, please provide your rationale.

☐ Yes
☒ No

Comments:
We suggest that the term “momentary cessation” be defined within the standard to avoid misunderstanding.

5. The SDT was apprised that, in some instances, the TO may own the GSU or collector transformers. As such, TOs were added to the applicable entity for cases where they may own a GSU or collector transformers with frequency and voltage protection enabled. Do you agree with the addition of TOs who own a GSU or collector transformer to the applicable entities? If not, please provide your rationale.

☐ Yes
☒ No

Comments:
The focus of the standard should be on the Generator Owner’s protective devices. We believe that it is not necessary to add Transmission Owners to the applicability of the standard simply because some Transmission Owners may own Elements that are being tripped by the Generator Owner’s protective devices.

6. Another intent of the facilities section was to clarify that voltage and frequency protection applied to plant auxiliary equipment is not applicable to the standard. Do you agree it is clear that plant aux equipment is out of scope of PRC-024? If not, please provide your rationale and a proposal.

☐ Yes
☒ No

Comments:
Having auxiliaries trip too early on voltage or frequency which cause output to change is by definition an interaction between the plant and the power system. If the tripping auxiliaries do not affect P,Q, or Vt of the units at the plant, then they do not need to be considered.

We suggest an explicit statement be added to the Applicability section of the standard that auxiliary equipment is not applicable to the standard. We also suggest that auxiliary equipment be defined within the standard or examples of auxiliary equipment be provided within the standard.

7. The SDT made several clarifying changes to the figures and tables (outlined in the SAR) to improve readability and eliminate confusion addressed in the SAR, including: (i) labeling the area outside the “No Trip Zone” as the “May Trip Zone;” (ii) removal of “ride-through” language; (iii) addition of “Minimum Time;” (iv) replacement of “instantaneous” with “0.10” seconds; and (v) clarifying
modifications to the Voltage Boundary Clarifications. Do you agree with these modifications? If not, please recommend alternative solution(s).

☐ Yes  ☒ No

Comments:

Most power system analysis is done using a positive-sequence representation on the network. By updating the standard to specify the use of positive sequence voltage will make the standard more practical.

We propose that the RMS signal should be clarified that it pertains to positive-sequence. We propose that Item 5 in the section “Voltage Boundary Clarifications – Eastern, Western, and ERCOT Interconnections, Boundary Details [page 21 of 25] be consistent with that for the Quebec Interconnection and be replaced with:

5. *Voltages in the boundaries assume positive-sequence values.*

instead of the proposed “Voltages in the boundaries assume RMS fundamental frequency phase-to-ground or phase-to-phase voltage”

8. The SDT added Quebec Interconnection-wide Variance to Requirement R2 with more stringent voltage boundaries for the No Trip Zone. Do you agree with this proposed Quebec Variance? If not, please provide your rationale.

☒ Yes  ☐ No

Comments:

9. Do you agree with the proposed Implementation Plan? If not, please provide your rationale.

☒ Yes  ☐ No

Comments:

10. Do you agree that the proposed modifications provide a cost-effective means of addressing issues in the SAR? If not, please provide an alternative, more cost-effective manner in which to achieve at least an equivalent level of reliability.

☒ Yes  ☐ No

Comments:
11. If you have any additional comments on themes that have NOT already been addressed in the proceeding questions on this comment form, please provide them here.

Comments:

We congratulate the SDT on making practical improvements, like replacing POI with the high side of the main output transformers, to this standard.

The Facilities section can be consolidated. There are currently redundancies in section 4.2.1. The following Facilities can be struck:

4.2.1.2 BES GSU transformer(s). This is part of the BES Generating resource so it is captured in 4.2.1.1.
4.2.1.4. Individual dispersed power producing resources identified in the BES Definition, Inclusion I4. This is a BES generating resource so it is captured in 4.2.1.1.
4.2.1.6 Collector transformer of resources identified in the BES Definition, Inclusion I4. This is part of the BES generating resource in Inclusion I4, so for the same reasons as striking, 4.2.1.2 and 4.2.1.4., it is captured in 4.2.1.1

We suggest that the Facilities section could be simplified. We do not believe that it is necessary to include the BES applicability language within the standard, since the standard should only be applicable to the BES.

We suggest adding the NPCC Region’s Frequency No Trip Boundary “Thresholds for Setting Underfrequency Trip Protection for Generators” to the Supplemental Material section of the standard. Please see PRC-006-NPCC for reference.