

## Consideration of Comments

**Project Name:** 2023-02 Performance of IBRs | SAR

**Comment Period Start Date:** 2/22/2023

**Comment Period End Date:** 3/23/2023

**Associated Ballot(s):**

There were 41 sets of responses, including comments from approximately 130 different people from approximately 91 companies representing 10 of the Industry Segments as shown in the table on the following pages.

All comments submitted can be reviewed in their original format on the [project page](#).

If you feel that your comment has been overlooked, let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel there has been an error or omission, contact Director, Standards Development [Latrice Harkness](#) (via email) or at (404) 858-8088.

## Questions

1. [Do you agree with the proposed scope as described in the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope, please provide your recommendation and explanation.](#)
2. [Provide any additional comments for the SAR drafting team to consider, if desired.](#)

## The Industry Segments are:

- 1 — Transmission Owners
- 2 — RTOs, ISOs
- 3 — Load-serving Entities
- 4 — Transmission-dependent Utilities
- 5 — Electric Generators
- 6 — Electricity Brokers, Aggregators, and Marketers
- 7 — Large Electricity End Users
- 8 — Small Electricity End Users
- 9 — Federal, State, Provincial Regulatory or other Government Entities
- 10 — Regional Reliability Organizations, Regional Entities

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
BC Hydro and Power Authority	Adrian Andreoiu	1,3,5	WECC	BC Hydro	Hootan Jarollahi	BC Hydro and Power Authority	3	WECC
					Helen Hamilton Harding	BC Hydro and Power Authority	5	WECC
					Adrian Andreoiu	BC Hydro and Power Authority	1	WECC
Southwest Power Pool, Inc. (RTO)	Charles Yeung	2	MRO,SPP RE,WECC	SRC 2023	Charles Yeung	SPP	2	MRO
					Ali Miremadi	CAISO	1	WECC
					Helen Lainis	IESO	1	NPCC
					Matt Goldberg	ISONE	1	NPCC
					Bobbi Welch	Midcontinent ISO, Inc.	2	MRO
					Greg Campoli	NYISO	1	NPCC
					Elizabeth Davis	PJM	2	RF
Kennedy Meier	Electric Reliability Council of Texas, Inc.	2	Texas RE					

WEC Energy Group, Inc.	Christine Kane	3,4,5,6		WEC Energy Group	Christine Kane	WEC Energy Group	3	RF
					Matthew Beilfuss	WEC Energy Group, Inc.	4	RF
					Clarice Zellmer	WEC Energy Group, Inc.	5	RF
					David Boeshaar	WEC Energy Group, Inc.	6	RF
Tacoma Public Utilities (Tacoma, WA)	Jennie Wike	1,3,4,5,6	WECC	Tacoma Power	Jennie Wike	Tacoma Public Utilities	1,3,4,5,6	WECC
					John Merrell	Tacoma Public Utilities (Tacoma, WA)	1	WECC
					Marc Donaldson	Tacoma Public Utilities (Tacoma, WA)	3	WECC
					Hien Ho	Tacoma Public Utilities (Tacoma, WA)	4	WECC
					Terry Gifford	Tacoma Public Utilities (Tacoma, WA)	6	WECC
					Ozan Ferrin	Tacoma Public Utilities (Tacoma, WA)	5	WECC
MRO	Jou Yang	1,2,3,4,5,6	MRO	MRO NSRF	Bobbi Welch	Midcontinent ISO, Inc.	2	MRO

Chris Bills	City of Independence, Power and Light Department	5	MRO
Fred Meyer	Algonquin Power Co.	3	MRO
Christopher Bills	City of Independence Power & Light	3,5	MRO
Larry Heckert	Alliant Energy Corporation Services, Inc.	4	MRO
Marc Gomez	Southwestern Power Administration	1	MRO
Matthew Harward	Southwest Power Pool, Inc. (RTO)	2	MRO
Bryan Sherrow	Board of Public Utilities	1	MRO
Terry Harbour	Berkshire Hathaway Energy - MidAmerican Energy Co.	1	MRO

					Terry Harbour	MidAmerican Energy Company	1,3	MRO
					Jamison Cawley	Nebraska Public Power District	1,3,5	MRO
					Seth Shoemaker	Muscatine Power & Water	1,3,5,6	MRO
					Michael Brytowski	Great River Energy	1,3,5,6	MRO
					Shonda McCain	Omaha Public Power District	6	MRO
					George E Brown	Pattern Operators LP	5	MRO
					George Brown	Acciona Energy USA	5	MRO
					Jaimin Patel	Saskatchewan Power Cooperation	1	MRO
					Kimberly Bentley	Western Area Power Administration	1,6	MRO
					Jay Sethi	Manitoba Hydro	1,3,5,6	MRO
					Michael Ayotte	ITC Holdings	1	MRO

DTE Energy - Detroit Edison Company	Karie Barczak	3,5		DTE Energy - DTE Electric	Adrian Raducea	DTE Energy - Detroit Edison Company	5	RF
					Patricia Ireland	DTE Energy - DTE Electric	4	RF
					Karie Barczak	DTE Energy - DTE Electric	3	RF
FirstEnergy - FirstEnergy Corporation	Mark Garza	1,3,4,5,6		FE Voter	Julie Severino	FirstEnergy - FirstEnergy Corporation	1	RF
					Aaron Ghodooshim	FirstEnergy - FirstEnergy Corporation	3	RF
					Robert Loy	FirstEnergy - FirstEnergy Solutions	5	RF
					Mark Garza	FirstEnergy-FirstEnergy	1,3,4,5,6	RF
					Stacey Sheehan	FirstEnergy - FirstEnergy Corporation	6	RF
Pacific Gas and Electric Company	Michael Johnson	1,3,5	WECC	PG&E All Segments	Marco Rios	Pacific Gas and Electric Company	1	WECC
					Sandra Ellis	Pacific Gas and Electric Company	3	WECC

					Frank Lee	Pacific Gas and Electric Company	5	WECC
Southern Company - Southern Company Services, Inc.	Pamela Hunter	1,3,5,6	SERC	Southern Company	Matt Carden	Southern Company - Southern Company Services, Inc.	1	SERC
					Joel Dembowski	Southern Company - Alabama Power Company	3	SERC
					Jim Howell, Jr.	Southern Company - Southern Company Generation	5	SERC
					Ron Carlsen	Southern Company - Southern Company Generation	6	SERC
Northeast Power Coordinating Council	Ruida Shu	1,2,3,4,5,6,7,8,9,10	NPCC	NPCC RSC	Gerry Dunbar	Northeast Power Coordinating Council	10	NPCC
					Sheraz Majid	Hydro One Networks, Inc.	1	NPCC



Deidre Altobell	Con Edison	1	NPCC
Jeffrey Streifling	NB Power Corporation	1	NPCC
Michele Tondalo	United Illuminating Co.	1	NPCC
Chantal Mazza	Hydro Quebec	1	NPCC
Stephanie Ullah-Mazzuca	Orange and Rockland	1	NPCC
Quintin Lee	Eversource Energy	1	NPCC
Michael Ridolfino	Central Hudson Gas & Electric Corp.	1	NPCC
Dan Kopin	Vermont Electric Power Company	1	NPCC
James Grant	NYISO	2	NPCC
John Pearson	ISO New England, Inc.	2	NPCC
Harishkumar Subramani Vijay Kumar	Independent Electricity System Operator	2	NPCC
Nicolas Turcotte	Hydro-Quebec TransEnergie	1	NPCC

Randy MacDonald	New Brunswick Power Corporation	2	NPCC
Dermot Smyth	Con Ed - Consolidated Edison Co. of New York	1	NPCC
David Burke	Orange and Rockland	3	NPCC
Peter Yost	Con Ed - Consolidated Edison Co. of New York	3	NPCC
Salvatore Spagnolo	New York Power Authority	1	NPCC
Sean Bodkin	Dominion - Dominion Resources, Inc.	6	NPCC
David Kwan	Ontario Power Generation	4	NPCC
Silvia Mitchell	NextEra Energy - Florida Power and Light Co.	1	NPCC

					Glen Smith	Entergy Services	4	NPCC
					Sean Cavote	PSEG	4	NPCC
					Jason Chandler	Con Edison	5	NPCC
					Tracy MacNicoll	Utility Services	5	NPCC
					Shivaz Chopra	New York Power Authority	6	NPCC
					Vijay Puran	New York State Department of Public Service	6	NPCC
					ALAN ADAMSON	New York State Reliability Council	10	NPCC
					David Kiguel	Independent	7	NPCC
					Joel Charlebois	AESI	7	NPCC
Southwest Power Pool, Inc. (RTO)	Shannon Mickens	2	MRO,SPP RE,WECC	SPP RTO	Shannon Mickens	Southwest Power Pool Inc.	2	MRO
					Bryan Wood	Southwest Power Pool Inc	2	MRO

					Brian Strickland	Southwest Power Pool Inc	2	MRO
					Derek Hawkins	Southwest Power Pool Inc.	2	MRO
					Margaret Quispe	Southwest Power Pool Inc.	2	MRO
					Mia Wilson	Southwest Power Pool Inc.	2	MRO

**1. Do you agree with the proposed scope as described in the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope, please provide your recommendation and explanation.**

**Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF**

**Answer** No

**Document Name**

**Comment**

The MRO NSRF provides the following comments:

1. Need to eliminate references to trip, tripping, and Protection System in this SAR – those parts of IBRs are already covered sufficiently (included and subject to the standard) by the existing PRC-004.
2. A new standard is definitely better to address the control system performance evaluation.
3. The BA, TOP, and RC should play a part in determining what disturbances are significant and justifiably warrant analysis. Further, an analysis and report by the GO/GOP to the BA, TOP, and RC can be specified in the existing TOP-003 and IRO-010 standards, rendering that part of the SAR unneeded. Those standards give authority already. A GO alone developed criterion may result in analysis of very insignificant (single facility) events.
4. Thoughts on legacy equipment:  
 Some recognition of the limitations of existing equipment needs to be addressed in the proposed scope to eliminate all performance issues through mitigation plans. This could be done by adding “where possible” to the phrase “...identify, analyze, and mitigate performance issues where possible.

Use of unwarranted – there are times where the performance (cease conduction) is very much warranted – some at NERC do not seem to understand this – (e.g., loss of synchronizing signal – no alternate control modes – processor speed limitations – control algorithm limitations)

The repeated characterization all inverter performance behavior as “unexpected”, “abnormal”, “unwarranted”, “anomalous” does not correctly represent the behavior of controls that were neither designed nor built to be able to ride-thru the system disturbances to which they are being subjected. Through the repeated evaluation of events and multiple control parameter setting changes performed over the past five (5) years, the behavior observed is as expected, deemed normal, and completely warranted depending upon the legacy and capabilities of the particular inverter.

A distinction between “operating as they are programmed” and “operating within the design characteristics of the control system” needs to be recognized and respected. Certain legacy equipment has constraints and cannot be made to be able to ride through all system disturbances. There is little value in this standard requiring repeated identification, analysis, and possible mitigation evaluation for plants that have adjusted all possible parametric options for the desensitization to system conditions and for the fastest possible recovery time.

5. “Abnormal performance” must be defined both in the SAR and then officially in the Glossary of Terms Used in NERC Reliability Standards. Without a definition the SAR and subsequent draft standard will fail to achieve the need of the project. The MRO suggests the SAR drafting team develop a list of ‘abnormal performance’ issues, which will focus the scope of the SAR and provide a starting point for the Standards Drafting Team.

Likes	0	
Dislikes	0	

**Response**

1. The team will consider the areas of the existing PRC-004 and be cognizant of potential overlap.
2. The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.
3. The team has representatives that fit in all four registration categories. The team will be considering all members’ point of view. The team will consider the tradeoffs related to the size of events for analysis.

4. The team acknowledges the concepts outlined in the response as ones that deserve consideration and deliberation. The team will contemplate all components to this comment during the drafting process. The SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."
5. The SAR scope already appropriately considers "the possibility of adding new or modifying existing NERC Glossary Terms, as the drafting team determines necessary, to ensure clarity in the standard."

**Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF**

**Answer** No

**Document Name**

**Comment**

The NAGF does not agree with the proposed scope and submits the following comments for consideration:

a) The NAGF notes that the existing Reliability Standard PRC-004-06: Protection System Misoperation Identification and Correction already addresses BES IBR protection systems/components. Therefore, the NAGF recommends to remove references to "protections" in the Project Scope section.

b) The NAGF recommends the first sentence of the Project Scope section be modified as follows:

"...and unreliable manner to identify, analyze, and mitigate performance issues *to the extent possible* that occur within the facility."

c) All BES IBR battery energy storage resources, whether they as considered generator or transmission resources, should be applicable to this standard. Therefore, the NAGF recommends removing or amending the sentence regarding battery energy storage resources.

Likes 0

Dislikes 0

**Response**

- a. The intent of the SAR is to analyze and mitigate unexpected or unwarranted protection and control operations from inverter-based resources following the identification of such a performance issue. The team will consider the areas of the existing PRC-004 and be cognizant of potential overlap.
- b. The team believes that all IBR performance issues must be identified, analyzed, and mitigated. Regarding legacy facilities, the SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."
- c. The team agrees with this comment and has made changes in the SAR to reflect these changes.

**Donna Wood - Tri-State G and T Association, Inc. - 1,3,5**

**Answer**

No

**Document Name**

**Comment**

Tri-State mostly agrees with the SAR, however recommends that references to updating the existing PRC-004 (or other standards) be removed from the SAR. A new standard should be created for Inverter Based Resources.

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Kimberly Turco - Constellation - 5,6**

**Answer**

No

**Document Name**

**Comment**



Constellation Generation feels the creation of a new standard to address only IBR's is unnecessary and overly burdensome when existing standards could address IBR's and in many cases already do. The SAR mentions "current cessation" and other limited capabilities that could be addressed in existing standards such as PRC-019 and PRC-024, rather than creation of a new and duplicative standard.

Kimberly Turco on behalf of Constellation Segements 5 and 6

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Alison MacKellar - Constellation - 5,6**

**Answer**

No

**Document Name**

**Comment**

Constellation Generation feels the creation of a new standard to address only IBR's is unnecessary and overly burdensome when existing standards could address IBR's and in many cases already do. The SAR mentions "current cessation" and other limited capabilities that could be addressed in existing standards such as PRC-019 and PRC-024, rather than creation of a new and duplicative standard.

Alison Mackellar on behalf of Constellation Segments 5 and 6

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Christine Kane - WEC Energy Group, Inc. - 3,4,5,6, Group Name WEC Energy Group**

**Answer** No

**Document Name**

**Comment**

WEC Energy Group supports the MRO NSRFs comments.

Likes 0

Dislikes 0

**Response**

Thank you for the comment, please see response to MRO NSRFs' comment.

**Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023**

**Answer** No

**Document Name**

**Comment**

The ISO/RTO Council (IRC) Standards Review Committee (SRC) agrees with the general scope of the project, but has recommendations to help ensure these requirements are effective and non-duplicative with other IBR projects currently underway. Our response to Question 2 provides recommendations.

Likes 0

Dislikes 0

<b>Response</b>	
Thank you for the comment, the team agrees and will be coordinating with the other active IBR drafting teams.	
<b>Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2</b>	
<b>Answer</b>	No
<b>Document Name</b>	
<b>Comment</b>	
ERCOT joins the comments submitted by the ISO/RTO Council Standards Review Committee (SRC).	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment please review ISO/RTO Council SRC.	
<b>Jennie Wike - Tacoma Public Utilities (Tacoma, WA) - 1,3,4,5,6 - WECC, Group Name Tacoma Power</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Tacoma Power has no comments.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment.	
<b>Pamela Frazier - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - MRO,WECC,Texas RE,SERC,RF</b>	

<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Response Created in error- please delete	
Likes 0	
Dislikes 0	
<b>Response</b>	
<p>The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both. The team has representatives that fit in all four registration categories. The team will be considering all members point of view.</p> <p>The SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."</p>	
<b>Michelle Amarantos - APS - Arizona Public Service Co. - 1,3,5,6</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
AZPS supports the proposed SAR and agrees with the IRPS that a new Reliability Standard should be developed to specifically address IBR performance.	
Likes 0	
Dislikes 0	
<b>Response</b>	

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.	
<b>Nazra Gladu - Manitoba Hydro - 1,3,5,6</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Currently, Manitoba Hydro does not have any IBRs, but likley will in the future.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment.	
<b>Adrian Andreoiu - BC Hydro and Power Authority - 1,3,5, Group Name BC Hydro</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
BC Hydro agrees with IRPS that a new Reliability Standard specific to IBRs performance should be developed.	
Likes	0
Dislikes	0
<b>Response</b>	
The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.	
<b>Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter</b>	

<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
FirstEnergy agrees with the scope of the SAR.	
Likes 0	
Dislikes 0	
<b>Response</b>	
Thank you for the comment.	
<b>Lori Frisk - Allete - Minnesota Power, Inc. - 1</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Minnesota Power supports EEI's comments.	
Likes 0	
Dislikes 0	
<b>Response</b>	
Thank you for the comment, please see response to EEI's comment.	
<b>Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	

None.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment	
<b>Thomas Foltz - AEP - 3,5,6</b>	
Answer	Yes
Document Name	
<b>Comment</b>	
<p>AEP agrees with the perceived reliability need expressed in this SAR and agree with the authors that it would be inadvisable to revise PRC-004, as among other reasons, the scope of PRC-004 would need to be expanded to cover ride-through issues that may not be classifiable as protection misoperation. We also agree that an entirely new standard would be the preferred means to meet the objectives of the SAR. In addition, we suggest that consideration also be given to perhaps sharing this SAR with the Project 2020-02 drafting team for it to possibly augment their efforts rather than having the “Analysis and Mitigation of BES Inverter-Based Resource Performance Issues” SAR have its own distinct project (2023-02). If a new standard were to be written under 2023-02, it could end up a parallel effort to Project 2020-02 (PRC-024) which is now under revision by a project that specifically aims to convert it from a relay setting standard into a true ride-through standard. Identification, analysis, and mitigation of abnormal, unexpected, and unwarranted IBR behaviors affecting ride-through performance, which is what this SAR proposes to require, are actions that would necessarily be subsumed into any ride-through requirements. In any event, care needs to be taken to ensure that no efforts are duplicative across projects and/or standards.</p>	
Likes	0
Dislikes	0
<b>Response</b>	

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both. The team agrees with the recommendation to coordinate with PRC-024 (project 2020-02).

**Wesley Yeomans - New York State Reliability Council - 10**

**Answer** Yes

**Document Name**

**Comment**

The Scope requires IBRs to "identify, analyze, and mitigate performance issues that occur within the facility". Elsewhere, it notes that "identification of possible performance issues should be initiated by either the IBR facility owner/operator (i.e., the GO/GOP) or by the transmission entities with a wide-area view (i.e., the TOP, RC, or BA). However, the onus of analysis and development of mitigating actions should be on the asset owner to eliminate the possible risk of repeated abnormal performance issues".

It is suggested that the scope clarify the distinction between performance issues within the plant and system performance issues. Presumably, responsibility to "identify, analyze, and mitigate performance issues" within the plant is with the GO/GOP, while responsibility for system performance analysis is with the TOP, RC or BA.

Likes 0

Dislikes 0

**Response**

The team believes the SAR already appropriately allows for the consideration outlined in the comment by stating, "This includes any types of protections or controls that result in abnormal performance issues within the plant, including abnormal performance resulting in anomalous behavior of active power output from the facility during events."

**Nicolas Turcotte - Hydro-Quebec TransEnergie - 1**

**Answer** Yes

**Document Name**



**Comment**

HQT supports NPCC- RSC comments

Likes 0

Dislikes 0

**Response**

Thank you for the comment. Please see responses to these two comments.

**Michael Johnson - Pacific Gas and Electric Company - 1,3,5 - WECC, Group Name PG&E All Segments**

**Answer**

Yes

**Document Name**

**Comment**

PG&E agrees with the proposed scope of the SAR.

PG&E agrees that a new Reliability Standard should be created that is specific to IBRs to avoid any confusion with the current devices covered by PRC-004. PRC-004 addresses Misoperations caused by “Protection Systems” components (a NERC Glossary term). Inverters/controllers are not defined as Protection Systems components which indicates a new Standard should be created to address the performance requirements for IBRs. A new Standard will also allow it to fit within the current work NERC has started to address the potential new registration type for Distributed Energy Resources (DER) using Inverter-Based Resources (IBR).

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable**

**Answer** Yes

**Document Name**

**Comment**

EI supports the proposed SAR scope. Additionally, EI agrees with the IRPS that a new Reliability Standard that specifically address IBR performance is needed.

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Alain Mukama - Hydro One Networks, Inc. - 1,3**

**Answer** Yes

**Document Name**

**Comment**

Hydro One has not identified any objections to NERC creating a NEW standard to address the issues related to IBRs, but we would oppose to changing existing PRC-004 as the scope of proposed work for IBR does not align with existing PRC-004.

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Rachel Coyne - Texas Reliability Entity, Inc. - 10**

**Answer**

Yes

**Document Name**

**Comment**

In light of recent IBR events, including the two Odessa events, Texas RE appreciates and supports this project to analyze and mitigate unexpected or unwarranted protection and control operations from inverter-based resources. Texas RE seeks clarification on the following statement: “the SAR is proposing that the BA and RC have the ability and authority to voluntarily initiate analysis of the abnormal performance issues by the asset owner (i.e., the GO)”. Texas RE understands this language to mean that the BA and RC can begin their independent analyses of system disturbances. Texas RE recommends, however, that the language is clear that the BA and RC have the authority to require analysis for issues they notice for which a GO has not yet initiated a review.

Additionally, Texas RE recommends clarifying that legacy equipment refers to equipment that is no longer made or supported by the manufacturer.

Likes 0

Dislikes 0

**Response**

The SAR already appropriately considers the clarifying language "Therefore, it is important that the BA or RC have the authority to identify abnormal performance issues which should then initiate analysis and mitigations by the GO. To be clear, the SAR is not proposing that the BA or RC is responsible for identifying these events; rather, the SAR is proposing that the BA and RC have the ability and authority to voluntarily initiate analysis of the abnormal performance issues by

the asset owner (i.e., the GO). It is important that the GO is accountable for analyzing these events, has necessary monitoring equipment installed, and cooperates with the BA/RC by providing operational data and analytical results."

To the legacy comment, the SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."

Further, the SAR already appropriately considers "the possibility of adding new or modifying existing NERC Glossary Terms, as the drafting team determines necessary, to ensure clarity in the standard."

**Gail Elliott - International Transmission Company Holdings Corporation - NA - Not Applicable - MRO,RF**

<b>Answer</b>	Yes
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<b>Document Name</b>	
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**Comment**

We agree with this effort but the SAR should specifically avoid modifying PRC-004 for all the reasons the SAR stated it recommends a new standard instead.

Likes	0
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Dislikes	0
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**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**David Jendras Sr - Ameren - Ameren Services - 1,3,6**

<b>Answer</b>	Yes
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<b>Document Name</b>	
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**Comment**

Ameren believes that the forensic analysis and post event setting adjustment may have to be done at the Planning level.	
Likes	0
Dislikes	0
<b>Response</b>	
From the commentary, the team believes that any setting adjustment needs to be coordinated with both the planning model and operating model.	
<b>Rajesh Geevarghese - Exelon - 1,3 - RF</b>	
Answer	Yes
Document Name	
<b>Comment</b>	
Exelon supports the EEI comments.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment, please see response to EEI's comment.	
<b>Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company</b>	
Answer	Yes
Document Name	
<b>Comment</b>	

The SAR proposes requirements for analysis and mitigation of IBR performance issues following a disturbance. Such requirements may be useful when assessing events for root causes. The SAR makes an important distinction between control system and Protection System operations. Southern believes a new standard to solely address control system evaluation would be helpful. Also, we believe that the existing PRC-004 standard adequately addresses the Protection System operation evaluation and possible corrective actions for events involving the tripping of generation.

The proposed SAR holds that the BA or RC should have certain authorities to identify and address abnormal performance issues. In this regard, Southern believes the SAR should recognize existing authorities granted by the TOP-003 and IRO-010 standards. Also, because NERC and industry are under increasing pressure to prioritize resources, standards developed within this SAR should address the BA, TOP, and RC's role in determining what disturbances are significant and justifiably warrant analysis.

The standard drafting team should use its discretion when considering how to address the unique challenges of legacy equipment including whether their performance is expected or otherwise considered normal behavior under certain conditions and because of technical limitations.

Likes	0
Dislikes	0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both. The team has representatives that fit in all four registration categories. The team will be considering all members point of view.

The SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."

**Lindsey Mannion - ReliabilityFirst - 10**

<b>Answer</b>	Yes
<b>Document Name</b>	

**Comment**

RF supports this project and prefers the SDT to create a new standard to address analysis and mitigation of undesired performance by inverter-based resources during grid faults.

The SAR includes the language *“Rather than complicate the existing PRC-004 focused on Protection Systems, IRPS believes that a new standard should be developed specific to IBRs to ensure that any unexpected ceasing of current injection (partial or full) is analyzed by the applicable Generator Owner and mitigated to the extent possible.”* RF concurs with this statement.

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Cain Braveheart - Bonneville Power Administration - 1,3,5,6 - WECC**

**Answer**

Yes

**Document Name**

**Comment**

Rather than modifying PRC-004, BPA agrees with the IRPS recommendation that a new NERC Reliability Standard be developed specific to Inverter-based Resources.

Likes 0

Dislikes 0

**Response**

The team believe that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

**Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name NPCC RSC**

**Answer** Yes

**Document Name**

**Comment**

We agree with the proposed scope as dscribed in the SAR.

Likes 0

Dislikes 0

**Response**

Thank you for the comment and support.

**Stephen Stafford - Georgia Transmission Corporation - NA - Not Applicable - SERC**

**Answer** Yes

**Document Name**

**Comment**

Likes 0

Dislikes 0

**Response**

Thank you for the comment.

**Karie Barczak - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy - DTE Electric**

**Answer** Yes



<b>Document Name</b>	
<b>Comment</b>	
Likes 0	
Dislikes 0	
<b>Response</b>	
Thank you for the support.	
<b>Harishkumar Subramani Vijay Kumar - Independent Electricity System Operator - 2</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Likes 0	
Dislikes 0	
<b>Response</b>	
Thank you for the support.	
<b>Carl Pineault - Hydro-Quebec Production - 1,5</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Likes 0	
Dislikes 0	

<b>Response</b>	
Thank you for the support.	
<b>James Baldwin - Lower Colorado River Authority - 1,5</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the support.	
<b>Brian Lindsey - Entergy - 1,3,6</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	
<b>Comment</b>	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the support.	
<b>Teresa Krabe - Lower Colorado River Authority - 1,5</b>	
<b>Answer</b>	Yes
<b>Document Name</b>	

<b>Comment</b>	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the support.	
<b>Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO</b>	
Answer	Yes
Document Name	
<b>Comment</b>	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the support.	
<b>Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC</b>	
Answer	Yes
Document Name	
<b>Comment</b>	
Likes	0
Dislikes	0
<b>Response</b>	

<b>Michael Goggin - Grid Strategies, consultant to SEIA and ACP - 6 - NA - Not Applicable</b>	
<b>Answer</b>	
<b>Document Name</b>	<a href="#">2023-02_Performance_of_IBRs_SAR, Goggin.docx</a>
<b>Comment</b>	
While the proposed scope is generally reasonable and I do not want to delay this important work, I offer the attached redline edits and comments on the proposed scope.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the support, the team has reviewed and taken the edits into consideration.	

**2. Provide any additional comments for the SAR drafting team to consider, if desired.**

**Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2**

**Answer**

**Document Name**

**Comment**

ERCOT joins the comments submitted by the SRC.

In addition, if the identification of the monitoring data referenced in the SRC comments is performed in this project, ERCOT believes the resulting Standard should require a level of detail similar to or better than the level of detail required by PRC-006. The data resolution and duration must also be sufficient to support the necessary analysis. For example, fault recording data should extend 1 – 5 seconds after the fault clears and should record multiple samples per cycle to capture dynamic response. This high resolution is necessary to identify failure modes like instantaneous frequency, voltage, or current trips. As another example, the fault recording triggers should be aligned with triggers for FRT/VRT modes so that smaller disturbances that cause performance failures will still be captured.

DDRs should all have continuous recording capabilities similar to phasor measurement units (PMUs) to provide consistency and the ability to capture data on longer duration issues (e.g., active power recovery ramp rate limitations). PMU data and other monitoring data should be stored long enough to allow event identification and data retrieval to occur before the data is overwritten or deleted (e.g., a 10-30 calendar days retention requirement). Having consistent and specific data will aid in event analysis, ensure data availability and accuracy, and enable the calculation of other parameters such as negative sequence current. Because the Point of Interconnection (POI) system frequency and voltage may differ from what is observed at the unit terminals, inverter level oscillography may also be needed to identify individual inverter level issues that may not be observable at the POI.

Likes 0

Dislikes 0

**Response**

Thank you for the comments and these will be considered by the team during drafting of the standard. Additionally the team notes that it will coordinate as appropriate with other concurrent NERC drafting efforts including PRC-028 which addresses the comments raised here.

**Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023**

**Answer**

**Document Name**

**Comment**

**Leverage the existing PRC-004 standard to the greatest extent possible.**

The existing PRC-004 does not currently contain many technology specific provisions that are limited to synchronous machine resources. If PRC-004 is modified to include IBR-specific provisions, there are terms that could use clarification such as BES interrupting device, and Composite Protection System, along with others that may need to be modified to account for how newer IBR protection systems are designed. In addition, although the conditions triggering the need for analysis may be different, the analysis and process to develop and implement the Corrective Action Plan would be the same. Therefore, we recommend the drafting team proceed first with modifying the existing PRC-004 standard and assess whether IBR specific provisions can be accommodated.

Unlike when PRC-023 was revised to account for momentary cessation of IBR protection systems, here the SDT is likely to encounter limited “overlap” of monitoring of protection systems that could cause confusion between synchronous and IBR protections. The SRC is aware that there are IBR specific actions that can cause actions and misoperations of IBR protection devices that do not apply to protection systems for synchronous generation resources. Unless the reporting requirements become confusing between the two technologies, a single standard for Misoperation Identification and Correction is preferable for the following reasons:

(1) It will likely expedite the time needed to develop the necessary requirements as opposed to starting from scratch. Considering that we are addressing a high risk reliability issue, the amount of time needed to develop a standard is an important consideration.

(2) It will avoid the need for a future standards development project to consolidate the two back into one. Case in point, industry requests to consolidate data specification standards, IRO-010 and TOP-003, into a single standard.

**Legacy issues should be taken into consideration; however, not limit facilities ability to operate in a reliable manner.**

The SRC supports the language on page 3 of the SAR:

*“Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted.”*

However, the SAR should require the SDT to identify the level of reliability impact when legacy facilities need to be mitigated. To the extent, the root cause of multiple events can be shown to be tied to legacy design, consideration should be given to at what point might modifications or changes to protection and control equipment become necessary for continued operation, particularly if not aligned with interconnection requirements as detailed in the SAR on page 4.

*“IRPS would also like to point out that the NERC reports have highlighted that the protection/controls that “operate as they are programmed” does not necessarily mean correct operation as per interconnection requirements. When a plant trips off-line for an external fault for reasons that are not expected (or allowed per interconnection requirements) nor are likely modeled appropriately in planning assessments, these types of abnormal reductions (tripping, controls, or controller interactions) should be analyzed and mitigated by the GO/GOP in a timely manner.”*

**Coordinate the work of IBR Drafting Teams to ensure alignment and compatibility and minimize duplication.**

On page 5, there is a question: ***Are there any related standards or SARs that should be assessed for impact as a result of this proposed project? If so, which standard(s) or project number(s)?***

The response is currently listed as: *“N/A.”*

The SRC requests the SAR be revised to reflect that there are at least two existing projects which are associated with misoperations of protection systems:

{C}o {C}Project 2023-01 EOP-004 IBR Event Reporting

{C}o {C}Project 2021-04 Modifications to PRC-002 - Phase II (i.e. disturbance monitoring data for IBRs)

In order to ensure the success of all three projects in an expeditious manner, and to make efficient use of SME resources, the SRC recommends that these three project teams work closely in coordination with each other. This includes coordinating IBR-related requirements among the three projects to avoid gaps and overlaps among the affected Reliability Standards, along with coordination of the schedules for posting the Standards for comments and balloting.

We strongly support the following text from the SAR (page 2):

“To be clear, the SAR is not proposing that the BA or RC is responsible for identifying these events; rather, the SAR is proposing that the BA and RC have the ability and authority to voluntarily initiate analysis of the abnormal performance issues by the asset owner (i.e., the GO). It is important that the GO is accountable for analyzing these events, has necessary monitoring equipment installed, and cooperates with the BA/RC by providing operational data and analytical results.”

The EOP-004 Event Reporting requirements should be limited to information that RCs and BAs have immediate to access to. Therefore PRC-004 should require more specific data from GOs and TOs which are not readily available to RCs and BAs for analysis. While this project is focused on the need to investigate and analyze events in which IBRs perform abnormally, effectively coordinating these three projects requires clear identification of the monitoring data needed to perform the requisite event analysis. The needed monitoring data has not been clearly identified thus far, and this SAR scope should be amended to require clear identification of the necessary data.



In addition, the work of PRC-002 Phase II project, although well ahead of Project 2023-01 and 2023-02 may need to be paused until it is clear the proposed IBR data requirements are sufficient for IBR Event analysis requirements and protection system misoperations requirements. The data needed for fulfilling requirements to meet the reliability objectives of PRC-004 must be complemented by the requirements specified in PRC-002. In lieu of a pause, the PRC-002 Phase II team should consult with the other two teams to ensure the proposed PRC-002 revisions are sufficiently comprehensive. Determining whether to pause the PRC-002 Phase II project and coordinating the PRC-002 revisions with the revisions proposed by the other two projects should also account for the implementation plan timeframes needed to ensure that affected entities have adequate lead time to procure and install the necessary monitoring equipment.

Likes 0

Dislikes 0

**Response**

The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

The team agrees with the recommendation to coordinate with other active projects.

The team acknowledges the concepts outlined in the response as ones that deserve consideration and deliberation. The team will contemplate all components to this comment during the drafting process. The SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."

The team agrees with adding the current project teams with potentially related scopes. We will amend the SAR to reflect those teams.

**Elizabeth Davis - PJM Interconnection, L.L.C. - 2 - RF**

<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
<p>PJM supports the ISO/RTO Council Standards Review Committee (IRC SRC) comments and is providing the following additional comments:</p> <ul style="list-style-type: none"> <li>• PJM requests the need for “PMU-like” data recorded and stored when an IBR trips so that appropriate root cause can occur. Requiring this data to be made available will allow coordination between event data captured, event analyses, and lead to post-event protection setting adjustments, if required. Requiring recorded data to be made available for MOD-033 assessments could also be very helpful in identifying and preventing system events and improve modeling data. And any changes to settings that impact the dynamic response also need to be coordinated with MOD-026/027.</li> <li>• PJM requests the use of criteria as defined in PRC-024-3. That is, if a unit ceases output within the no-trip zones, it can be considered a misoperation.</li> </ul>	
Likes	0
Dislikes	0
<b>Response</b>	
<p>The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.</p> <p>The team agrees with the recommendation to coordinate with other active projects</p>	
<b>Christine Kane - WEC Energy Group, Inc. - 3,4,5,6, Group Name WEC Energy Group</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	

No additional comments.	
Likes	0
Dislikes	0
<b>Response</b>	
Thank you for the comment.	
<b>Lindsey Mannion - ReliabilityFirst - 10</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
<p>RF appreciates the efforts of the IRPS and supports a project to create a new standard to address analysis and mitigation of undesired performance by inverter-based resources during grid faults.</p> <p>Additionally, it appears this SAR intends Project 2023-02 to work within the existing BES definition and registration criteria. However, coordination may be required between any Project 2023-02 Standard Drafting Team and the Electric Reliability Organization’s efforts in response to FERC’s Order under Docket RD22-4-000, which directed NERC to develop a work plan to identify and register owners and operators of IBRs connected to the BPS that are not currently included in the BES definition but have an aggregate, material impact on the reliability operation of the BPS.</p>	
Likes	0
Dislikes	0
<b>Response</b>	
<p>The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.</p> <p>The team agrees with the recommendation to evaluate active FERC order during the drafting process.</p>	

<b>Alison MacKellar - Constellation - 5,6</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
<p>Constellation further suggests that the data the SAR is looking to obtain is of less value to improving the reliability of the BES than that proposed in the modification of PRC-002 underway.</p> <p>Alison MacKellar on behalf of Constellation Segments 5 and 6</p>	
Likes	0
Dislikes	0
<b>Response</b>	
<p>The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.</p> <p>The team agrees with the recommendation to coordinate with PRC-002/ PRC-028 (project 2021-04).</p>	
<b>Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
<p>SPP RTO recommends that the <b>Project 2023-02</b> Standard Drafting Team (SDT) takes into consideration working with the <b>Project 2020-02 Modifications to PRC-024</b> SDT to ensure that the appropriate performance standard can be structured to address IBR ride-through as well as provide service during a system disturbance. From our perspective, the future <b>Project 2023-02</b> SDT will not be able to accomplish their goals without the <b>coordination of the PRC-024</b> SDT. For clarity, NERC has already identified that PRC-024-3 doesn't address the needs pertaining to IBR ride-through during a system disturbance as well as provide quality service. At this point, NERC feels that they need to develop a quality</p>	

performance-based standard to address those concerns. Moreover, it doesn't seem efficient nor logical to start work on this type of project when the ride-through concerns haven't been addressed. However, if the **Project 2023-02** SDT determines that there is a need to move forward with this project, this coordination will would be highly recommend to help ensure success for this project.

Furthermore, we noticed that the SAR mentioned the inclusion of Battery Storage (ESRs). We recommend that the **Project 2023-02** SDT takes into consideration of working with the System Planning Impacts from DER Working Group (SPIDERWG-Project 2022-02 MOD-032-1) to ensure that Distributed Energy Resources (DERs) are included in their efforts. In our opinion, this coordination will help ensure all IBR, DER and ESR ride-through issues are addressed at one time instead of continuously reopening standards to address various resources on an individual basis.

From our perspective, this project can't be a success until appropriate data collection issues are addressed in reference to IBRs, DERs and ESRs. Also, the data collection efforts will contribute to appropriate model builds to ensure appropriate analysis of the grid. In addition, the model build efforts will help in the efficiency of developing a quality performance standard to address ride-through concerns applicable to the various generation resources (IBRs, DERs and ESRs).

Finally, we recommend that **Project 2023-02** SDT takes into consideration if any revisions or new definition changes made to the Glossary of Terms should be made applicable to the Rules of Procedure (RoP) as well. This effort would ensure that both documents are properly aligned when it comes to definitions. For the record, **Project 2015-04 Alignment of Terms** addresses these type efforts.

Likes	0
Dislikes	0
<b>Response</b>	
The team agrees with the comments and will coordinate with all concurrent and relevant NERC drafting teams including the team working on Project 2020-02, Modifications to PRC-024 to the extent required.	
<b>Brian Lindsey - Entergy - 1,3,6</b>	
<b>Answer</b>	
<b>Document Name</b>	

Comment	
No comment	
Likes	0
Dislikes	0
Response	
Thank you for the response.	
<b>Alain Mukama - Hydro One Networks, Inc. - 1,3</b>	
Answer	
Document Name	
Comment	
None	
Likes	0
Dislikes	0
Response	
Thank you for the response.	
<b>Kimberly Turco - Constellation - 5,6</b>	
Answer	
Document Name	
Comment	

Constellation further suggests that the data the SAR is looking to obtain is of less value to improving the reliability of the BES than that proposed in the modification of PRC-002 underway.

Kimberly Turco on behalf of Constellation Segements 5 and 6

Likes 0

Dislikes 0

**Response**

The team believes this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

The team agrees with the recommendation to coordinate with other active projects.

**Donna Wood - Tri-State G and T Association, Inc. - 1,3,5**

**Answer**

**Document Name**

**Comment**

N/A

Likes 0

Dislikes 0

**Response**

Thank you for the response.

**Michael Johnson - Pacific Gas and Electric Company - 1,3,5 - WECC, Group Name PG&E All Segments**

**Answer**

**Document Name**

**Comment**

While PG&E supports the intent of the SAR and the proposed changes, PG&E recommends caution when discussing the BA and RC involvement in Misoperation analysis. The explanation and justification for the SAR indicate that "...the BA or RC have the authority to identify abnormal performance issues which should then initiate analysis and mitigations by the GO". If not carefully defined, provisions in the proposed Reliability Standard(s) could create excessive work for the participating GOs, introducing convoluted work cycles, impose unreasonable time constraints on event analysis and cause confusion about share responsibilities.

PG&E recommends complete authority and responsibility to identify and perform analyses should remain with the GO, unless a large-area Disturbance or significant event occurs.

Likes 0

Dislikes 0

**Response**

The team has representatives that fit in all four registration categories. The team will be considering all members point of view.

The SAR scope already appropriately considers "the possibility of adding new or modifying existing NERC Glossary Terms, as the drafting team determines necessary, to ensure clarity in the standard."

**Harishkumar Subramani Vijay Kumar - Independent Electricity System Operator - 2**

**Answer**

**Document Name**

**Comment**

- We propose a separate standard for IBRs given that IBRs have different technologies. Proposed requirements may need to be articulated specifically to take into account these new technologies. A separate standard will also raise more awareness amongst IBR owners.



- Given that there are at least two current projects which are associated with misoperations of protection systems (Project 2023-01 EOP-004 for IBR Event Reporting and 2021-04 for PRC-002 Phase II Disturbance monitoring data for IBRs), we recommend that these three projects work closely in coordination.

Likes 0

Dislikes 0

**Response**

1. The team agrees that the intent of the SAR can be effectively accomplished by the creation of a new standard and any modifications to an existing Standard(s) as may be needed.

2. The team agrees and will coordinate with other concurrent NERC projects as required.

**Wayne Sippery - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF**

**Answer**

**Document Name**

**Comment**

The NAGF provides the following additional comments for consideration:

a) General Comments:

i. The NAGF supports the NERC IRPS recommendation that a new standard be developed that requires analysis and mitigation (to the extent possible) of unexpected or unwarranted control operations from BES inverter-based resources.

ii. The NAGF recommends that the references to “protection and control operations” be revised to state “control system performance” throughout the draft SAR document.

iii. The NAGF agrees that legacy IBR equipment may not be able to mitigate certain performance issues. Once this is confirmed and communicated, there should be no need to perform repeat root cause analysis and identification of

possible mitigations for such IBR facilities. Requiring GOs to do such does not provide value and is not an effective/efficient use of GO resources.

iv. The NAGF recommends that the SAR drafting team review existing active NERC Projects such as Projects 2020-02 and 2023-01 to ensure there is no overlap with Project 2023-02.

v. The NAGF recommends that the draft SAR include provisions for a Phase 2 to address reporting of newly registered IBR assets in response to the FERC Order E-1-RD22-4000: Registration of Inverter-Based Resources.

b. Industry Need Section:

i. The NAGF believes that the statement “NERC has also highlighted that many Generator Owners are not aware of these trips” is misleading, is of no value, and does not belong in the draft SAR. The use of the term “trip” is not appropriate to describe an IBR current injection cessation event. Furthermore, due to the speed of IBR electronic controls (milli seconds or less), appropriate data recording equipment would need to be in place to record such events. If such equipment is not in place, GOs would not be aware of current cessation events unless they were long-duration events.

ii. The NAGF agrees that the BA or RC should play a part in defining/determining what disturbances are significant and justifiably warrant an analysis. A GO defined criterion may result in analysis of very insignificant events. In addition, recommend that the draft SAR tie in with Project 2023-01 (EOP-004) to ensure consistency with disturbances requiring analysis.

c. Purpose and Goal Section:

i. Page 2, second paragraph, second sentence – the NAGF requests clarification regarding the statement “...result in widespread reduction of power output...”. Is this a reduction on both real and reactive power?

d. Detailed Description Section:

i. Page 3, second paragraph, second sentence – recommend removing “ The past few NERC disturbance reports have highlighted limited awareness and understanding by facility owners that abnormal performance has even occurred and therefore” for the reasons described in b.i. above.

ii. Page 4, first paragraph – recommend removing language after “IRPS believes that all BES IBR generation facilities should be applicable to this standard”. Remaining language is not in scope for this project.

iii. Page 4, second paragraph, first sentence – the NAGF notes that the draft language “for any reason” is too broad and conflicts with other sections of the draft SAR that specifically identify the event types to be addressed.

e. Cost Impact Assessment Section:

i. The NAGF notes that the costs of adding additional monitoring equipment, engineering/analytical capabilities, and coordination with equipment manufacturers is significant and not adequately addressed in this section. NAGF members have provided the following information:

\$50K for monitoring equipment to be installed per inverter. For a 160MW solar facility, there are approximately 64 inverters.  $\$50K \times 64 = \$3.2 \text{ M}$ .

ii. The NAGF recommends that the second sentence starting with “This type of activity...” be removed as it does not provide value for describing the potential cost impacts.

Likes	0
Dislikes	0

**Response**

a)

i. The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.

ii. The team believes abnormal performance can contain both protection mis operation and control system failures. Limiting the scope of the SAR to include only control system performance at this early stage may lead to the SAR not meeting the intended reliability objectives.

iii. The SAR project scope includes this consideration with the language, "Considerations may be needed for legacy facilities, but the root cause analysis of the abnormal performance and determination of any mitigating measures should be conducted."

iv. The team agrees with the recommendation to coordinate with other active projects.

v. The team believes that the SAR, as it is written, adequately considers this.

B.

i. The SDT believes that the language adds value to the SAR the GO often is unaware of the performance of the IBR. The BA and RC needs authority to point out events and require analysis of unit performance, whether it be a turbine or inverter trip or momentary cessation.

ii. The team has representatives that fit in all four registration categories. The team will be considering all members point of view. The team agrees with the recommendation to coordinate with other active projects.

C.

The team has modified the SAR to reflect this comment.

D.

i. The language adds value to the SAR by identifying the current interdependencies. This is needed thorough communication between all applicable registration functions.

ii. Thank you for comment, the team agrees with the suggestion /edits to the SAR. The second portion of the first sentence was retained to help clarify why facility size is a concern. The team has updated and redlined the SAR to reflect these changes.

iii. The team believes that the definition of abnormal or unexpected performance for events that require analysis. The team has modified the SAR to reflect these changes in the redline.

E.

i. This team will coordinate with other active projects and costs will be balanced with the monitoring need. The team will coordinate with relevant NERC drafting teams, including the team working on Modifications to PRC-002/ PRC-028, to the extent required.

ii. Thank you for the comment, this sentence is reinforcing the first to the sentence. The team did not feel had enough reasoning necessary to remove. Thank you for the suggestion.

**Wesley Yeomans - New York State Reliability Council - 10**

**Answer**

**Document Name**

**Comment**

The requirement in the SAR is written in such a way that an unreliable event first takes place prior to any action on the part of the GO/GOP. It is suggested that the GO/GOP should be required to analyze its IBR and reach out to inverter and plant controller manufactures to determine and attest to its ride-through characteristics before a disturbance occurs.

Likes 0

Dislikes 0

**Response**

The team agrees with the comment, this is being addressed in existing standards and standards under modifications that pertain performance standards. One example is 2020-02 Modifications to PRC-024 Ride Through. A NERC alert was issued in March regarding this topic, R-2023-03-14-01 Inverter-Based Resource Performance Issues.

**Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF**

**Answer**

<b>Document Name</b>	
<b>Comment</b>	
<p>Duke Energy suggests:</p> <ol style="list-style-type: none"> <li>1. The development of a new NERC Reliability Standard to specifically address IBR issues. In addition to IBRs, Duke Energy would encourage other renewable resources be part of the SAR or an additional SAR proposed for other sources (e.g. synchronous condensers and wind generators).</li> <li>2. Adding an IBR and related definition(s) to the new NERC Reliability Standard and NERC Glossary of Terms.</li> <li>3. The new NERC Reliability Standard not be limited to BES definition component minimum threshold limits (e.g., connected at a voltage of 100 kV or above) for power producing resources.</li> <li>4. Clarifying if the term “performance” is only related to tripping and misoperation or whether it means any type of general operational performance.</li> </ol> <p>(Note: Some references in the SAR indicate ‘events’ and others ‘loss events’; a loss event is much more discernable and definable than the broad range of occurrences included by the general reference, ‘event’. The discussion in the Scope section seems to use this general type of ‘performance’, which could be difficult to define).</p> <p>If both types of performance are included for trips and failures to meet expected performance, it may be worth considering separating these categories into two SARs. Trips seem to be the most critical at the moment (and may be the focus of this SAR) and tends to align philosophically with PRC-004 which uses terms like ‘misoperations’ and “interrupting device operation” rather than ‘performance.’</p> <ol style="list-style-type: none"> <li>5. This SAR coordinate with the work contemplating changes to the 75 MVA reporting limit.</li> <li>6. SAR proposes the BA and RC have a voluntary role in initiating analysis of abnormal performance. Duke Energy believes the the BA and RC role should be mandatory.</li> </ol>	
Likes	0

Dislikes	0
<b>Response</b>	
<p>1. The team agrees that the intent of the SAR can be effectively accomplished by the creation of a new standard and any modifications to an existing Standard(s) as may be needed. The SAR and associated standard will cover all IBRs including specific wind generator types as appropriate. However, the team believes that elements such as synchronous condensers are outside the scope of this SAR/standard and may be better addressed at the individual facility functional specification level.</p> <p>2. The SAR scope already appropriately considers "the possibility of adding new or modifying existing NERC Glossary Terms, as the drafting team determines necessary, to ensure clarity in the standard.</p> <p>3. The team agrees and believes that this will be addressed under the NERC GO-IBR initiative. The team will review this comment appropriately while drafting the standard to ensure that there are no gaps.</p> <p>4. The team believes that the scope of the SAR is broad enough to capture any unexpected, unwarranted, or unreliable operational performance. The team has representatives that fit in all four registration categories. The team will be considering all members point of view. The team will consider the tradeoffs related to the size of events for analysis.</p>	
<b>Karie Barczak - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy - DTE Electric</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
Nothing futher at this time.	
Likes	0
Dislikes	0
<b>Response</b>	

Thank you for the comment.	
<b>Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
FirstEnergy believes a new Reliability Standard that specifically addresses IBR performance would be the best approach.	
Likes 0	
Dislikes 0	
<b>Response</b>	
The team believes that the modification of the standards outside of PRC-004 may be needed. We believe this can be accomplished by the creation of a new standard, modification to an existing Standard(s) or some combination of both.	
<b>Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF</b>	
<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
No additional comments.	
Likes 0	
Dislikes 0	
<b>Response</b>	
Thank you for the comment.	
<b>Michelle Amarantos - APS - Arizona Public Service Co. - 1,3,5,6</b>	



<b>Answer</b>	
<b>Document Name</b>	
<b>Comment</b>	
AZPS recommends that references to updating the existing PRC-004 (or other standards) be removed from the SAR.	
Likes 0	
Dislikes 0	
<b>Response</b>	
The team believes that the modification of standards outside of PRC-004 may be needed. We believe that this can be accomplished by the creation of a new standard, modification to existing standard(s), or some combination of both.	

**End of Report**