NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project Name:	2021-04 Modifications to PRC-002 – Phase II | Draft 1
Comment Period Start Date:	8/1/2023
Comment Period End Date:	9/14/2023
Associated Ballot(s):	2021-04 Modifications to PRC-002 – Phase II Implementation Plan IN 1 OT 2021-04 Modifications to PRC-002 – Phase II PRC-002-5 | Non-Binding Poll IN 1 NB 2021-04 Modifications to PRC-002 – Phase II PRC-002-5 IN 1 ST 2021-04 Modifications to PRC-002 – Phase II PRC-028-1 | Non-Binding Poll IN 1 NB 2021-04 Modifications to PRC-002 – Phase II PRC-028-1 IN 1 ST

There were 71 sets of responses, including comments from approximately 182 different people from approximately 121 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 Vice President of Engineering and Standards, Soo Jin Kim (via email) or at (404) 446-9742.

Questions

1. **Do you agree with the modification in "Applicability, Section 4.2. Facilities" in PRC-002-5?**

2. **Do you agree with the need of creating a new Standard (PRC-028-1) to address gaps the Inverter-Based Resource Performance Task Force (IRPTF) identified within the PRC-002?**

3. **Do you agree the modifications made in PRC-002-5 and new Standard PRC-028-1 are cost effective?**

4. **Do you agree with the Implementation Plan for revised PRC-002-5 and new Standard PRC-028-1?**

5. **Provide any additional comments for the standard 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	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		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
Jennie Wike	Jennie Wike		WECC	Tacoma Power	Jennie Wike	Tacoma Public Utilities	1,3,4,5,6	WECC
					John Merrell	Tacoma Public Utilities (Tacoma, WA)	1	WECC
					John Nierenberg	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
ACES Power Marketing	Jodirah Green	1,3,4,5,6	MRO,RF,SERC,Texas RE,WECC	ACES Collaborators	Bob Soloman	Hoosier Energy Electric Cooperative	1	RF
					Scott Brame	North Carolina Electric Membership Corporation	1,3,4,5	SERC
					Jason Procuniar	Buckeye Power, Inc.	4	RF
					Andy Fuhrman	Minnkota Power Cooperative, Inc.	1	MRO
					Amber Skillern	East Kentucky Power Cooperative	1	SERC
					Andrew Anderson	Wolverine Power Supply Cooperative, Inc.	1	RF
					Kris Carper	Arizona Electric Power Cooperative, Inc.	1	WECC

					Jolly Hayden	East Texas Electric Cooperative, Inc.	NA - Not Applicable	Texas RE
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
FirstEnergy - FirstEnergy Corporation	Mark Garza	4		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
Michael Johnson	Michael Johnson		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
					Alain Mukama	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
Stephanie Ullah-Mazzuca	Orange and Rockland	1	NPCC
Michael Ridolfino	Central Hudson Gas & Electric Corp.	1	NPCC
Randy Buswell	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
Randy MacDonald	New Brunswick Power Corporation	2	NPCC
Dermot Smyth	Con Ed - Consolidated	1	NPCC

	Edison Co. of New York		
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
					Joshua London	Eversource Energy	1	NPCC
Stephen Whaite	Stephen Whaite			ReliabilityFirst Ballot Body Member and Proxies	Lindsey Mannion	ReliabilityFirst	10	RF
					Stephen Whaite	ReliabilityFirst	10	RF
Western Electricity Coordinating Council	Steven Rueckert	10		WECC Entity Monitoring	Steve Rueckert	WECC	10	WECC
					Phil O'Donnell	WECC	10	WECC

Tim Kelley	Tim Kelley		WECC	SMUD and BANC	Nicole Looney	Sacramento Municipal Utility District	3	WECC
					Charles Norton	Sacramento Municipal Utility District	6	WECC
					Wei Shao	Sacramento Municipal Utility District	1	WECC
					Foung Mua	Sacramento Municipal Utility District	4	WECC
					Nicole Goi	Sacramento Municipal Utility District	5	WECC
					Kevin Smith	Balancing Authority of Northern California	1	WECC
Associated Electric Cooperative, Inc.	Todd Bennett	3		AECI	Michael Bax	Central Electric Power Cooperative (Missouri)	1	SERC
					Adam Weber	Central Electric Power Cooperative (Missouri)	3	SERC

Stephen Pogue	M and A Electric Power Cooperative	3	SERC
William Price	M and A Electric Power Cooperative	1	SERC
Peter Dawson	Sho-Me Power Electric Cooperative	1	SERC
Mark Ramsey	N.W. Electric Power Cooperative, Inc.	1	NPCC
John Stickley	NW Electric Power Cooperative, Inc.	3	SERC
Tony Gott	KAMO Electric Cooperative	3	SERC
Micah Breedlove	KAMO Electric Cooperative	1	SERC
Kevin White	Northeast Missouri Electric Power Cooperative	1	SERC
Skyler Wiegmann	Northeast Missouri	3	SERC

						Electric Power Cooperative		
					Ryan Ziegler	Associated Electric Cooperative, Inc.	1	SERC
					Brian Ackermann	Associated Electric Cooperative, Inc.	6	SERC
					Brad Haralson	Associated Electric Cooperative, Inc.	5	SERC

1. Do you agree with the modification in "Applicability, Section 4.2. Facilities" in PRC-002-5?	
Robert Follini - Avista - Avista Corporation - 3	
Answer	No
Document Name	
Comment	
Do not agree with modification. Modification implies that inverter-based resources are to be included in the BES definition Inclusion I2. This interpretation doesn't conform with the current version of the BES definition.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Glen Farmer - Avista - Avista Corporation - 5	
Answer	No
Document Name	
Comment	
At some utilities we record wicket gate opening % by recording the 4-2 mA gate position in series with plant instrumentation.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The submitted comment is not applicable to standards addressed by this SDT.	

Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	
Please clarify that the requirements for reporting only pertain to entities covered by the NERC standard. This can be accomplished by deleting footnote 1 and replacing the phrase “IBR generation loss” with “GO-IBR”.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The reliability standard PRC-028 applies to facilities meeting the Inclusion I4 of the BES definition. As such, those Facilities are excluded from the Reliability Standard PRC-002. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.	
Donald Lock - Talen Generation, LLC - 5	
Answer	No
Document Name	
Comment	
Talen supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. Please see response to the NAGF comments.	
Mike Magruder - Avista - Avista Corporation - 1	
Answer	No
Document Name	
Comment	
Do not agree with modification. Modification implies that inverter-based resources are to be included in the BES definition Inclusion I2. This interpretation doesn't conform with the current version of the BES definition.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	No
Document Name	
Comment	
FirstEnergy supports EEI's comments which state: EEI does not agree with the modifications to the Applicability Section of Section 4.2 because it implies that inverter-based resources are to be included in BES Definition, Inclusion I2. This interpretation does not conform to the approved version of the Bulk Electric System Reference Document, Version 3, dated August 2018. If NERC believes that this interpretation is no longer appropriate, or otherwise invalid, they should work with the industry to modify the BES definition and associated support documents. EEI further notes that this project was not approved to Add, Modify or Retire a Glossary Term.	
Likes 0	

Dislikes 0	
Response	
Thanks for your comment. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Wendy Kalidass - U.S. Bureau of Reclamation - 5	
Answer	No
Document Name	
Comment	
Reclamation recommends that section 4.2 be removed as justification for limiting the inclusions from the BES Definition in the glossary of terms is not provided, limiting the scope of Disturbance Reporting.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Your concern is noted. Please refer to technical rationale documents for PRC-002 and PRC-028.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Josh Combs, Black Hills Corporation, 5, 6, 1, 3; - Rachel Schuldt	
Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. Please see response to NAGF's comments.	
Micah Runner - Black Hills Corporation - 1	
Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see response to NAGF's comments.	
Sheila Suurmeier - Black Hills Corporation - 5	
Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see response to NAGF's comments.	
Claudine Bates - Black Hills Corporation - 6	
Answer	No

Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see response to NAGF's comments.	
Marty Hostler - Northern California Power Agency - 4	
Answer	No
Document Name	
Comment	
NO, NCPA supports various other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see responses to other comments.	
Dennis Sismaet - Northern California Power Agency - 6	
Answer	No
Document Name	
Comment	
1. NCPA supports other opposing comments that have been submitted.	

Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see responses to other comments.	
Michael Whitney - Northern California Power Agency - 3	
Answer	No
Document Name	
Comment	
NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see responses to other comments.	
Mark Fowler - Mark Fowler On Behalf of: David Jendras Sr, Ameren - Ameren Services, 3, 6, 1; - Mark Fowler	
Answer	No
Document Name	
Comment	
Ameren supports EEI's comments on this question.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. See response to EEI's comment.	
Marcus Bortman - APS - Arizona Public Service Co. - 6	
Answer	No
Document Name	
Comment	
AZPS supports the following comments submitted by EEI on behalf of their members: EEI does not agree with the modifications to the Applicability Section of Section 4.2 because it implies that inverter-based resources are to be included in BES Definition, Inclusion I2. This interpretation does not conform to the approved version of the Bulk Electric System Reference Document, Version 3, dated August 2018. If the interpretation is no longer appropriate, or otherwise invalid, the BES definition and associated support documents should be revised. EEI further notes that this project was not approved to Add, Modify or Retire a Glossary Term.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	No
Document Name	
Comment	
SMUD and BANC support the comments submitted by EEI.	

Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comment.	
Michael Johnson - Michael Johnson On Behalf of: Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	No
Document Name	
Comment	
PG&E supports the input provided by the NAGF related to cost and EEI related to the implied inclusion of Inverter-Based Resources (IBR) as part of the BES Definition.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Please see response to NAGF and EEI comments.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6	
Answer	No
Document Name	
Comment	
Dominion Energy supports EEI comments.	
Likes 0	
Dislikes 0	

Response	
Thanks for your comment. See response to EEI's comment.	
Daniel Gacek - Exelon - 1	
Answer	No
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comment.	
Kinte Whitehead - Exelon - 3	
Answer	No
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comment.	

Alan Kloster - Alan Kloster On Behalf of: Jennifer Flandermeyer, Evergy, 3, 6, 5, 1; Jeremy Harris, Evergy, 3, 6, 5, 1; Kevin Frick, Evergy, 3, 6, 5, 1; Marcus Moor, Evergy, 3, 6, 5, 1; - Alan Kloster	
Answer	No
Document Name	
Comment	
Evergy supports and incorporates by reference the comments of the Edison Electric Institute for question #1.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comment.	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	
Comment	
EEI does not agree with the modifications to the Applicability Section of Section 4.2 because it implies that inverter-based resources are to be included in BES Definition, Inclusion I2. This interpretation does not conform to the approved version of the Bulk Electric System Reference Document, Version 3, dated August 2018. If the interpretation is no longer appropriate, or otherwise invalid, the BES definition and associated support documents should be revised. EEI further notes that this project was not approved to Add, Modify or Retire a Glossary Term.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comments. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Alison MacKellar - Constellation - 5	
Answer	No
Document Name	
Comment	
The BES Reference Document, Version 3, August 2018, verbiage and clarifying illustrations indicate that I4 was created for IBRs, and that IBRs are included within scope only by I4 and not I2. Suggest either removing references to I2 in the proposed Applicability Section 4.2, or stating without specific inclusions, e.g., "... excluding inverter-based portions of generating plants/Facilities included in the BES by meeting the BES definition." Alison Mackellar on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	No
Document Name	
Comment	
The SRC agrees with the modification in Section 4.2 of the Applicability section in PRC-002-5; however, consistent with the recommended modification to the Applicability section of PRC-028-1 detailed in the SRC's response to question 5 below, the SRC recommends that Section 4.2 of the PRC-002-5 Applicability section be revised to refer to the entirety of Inclusion I2 instead of only referring to I2, Part (b).	

Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Considering other received comments, the Inclusion I2 of the BES definition is removed from the Applicability Section.	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	No
Document Name	
Comment	
PNMR is in support of the EEI comment.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comment.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	No
Document Name	
Comment	
ERCOT joins the comments submitted by the ISO/RTO Council (IRC) Standards Review Committee (SRC) for this question and adopts them as its own.	
Likes 0	
Dislikes 0	

Response	
Thanks for your comment. See response to IRC SRC's comment.	
Kimberly Turco - Constellation - 6	
Answer	No
Document Name	
Comment	
The BES Reference Document, Version 3, August 2018, verbiage and clarifying illustrations indicate that I4 was created for IBRs, and that IBRs are included within scope only by I4 and not I2. Suggest either removing references to I2 in the proposed Applicability Section 4.2, or stating without specific inclusions, e.g., "... excluding inverter-based portions of generating plants/Facilities included in the BES by meeting the BES definition." Kimberly Turco on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The Inclusion I2 of the BES definition is removed from the Applicability Section.	
Jeremy Lawson - Northern California Power Agency - 5	
Answer	No
Document Name	
Comment	
Likes 0	

Dislikes 0	
Response	
Thanks for taking time to review proposed revisions to reliability standard PRC-002 and new reliability standard PRC-028.	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	Yes
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	Yes
Document Name	
Comment	
The changes make it clear that PRC-002 does not apply to IBR facilities.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	Yes
Document Name	
Comment	
The changes make it clear that PRC-002 does not apply to IBR facilities. The MRO NSRF would like to note the word “portions” in Applicability Section 4.2 may add confusion, consider if it can be removed or if other wording can be used.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Considering other received comments, the Inclusion I2 of the BES definition is removed from the Applicability Section. As a result, work “portions” is no longer used in the Applicability Section 4.2.	
Leslie Hamby - Southern Indiana Gas and Electric Co. - 3,5,6 - RF	
Answer	Yes
Document Name	
Comment	
Southern Indiana Gas & Electric Company (SIGE) agrees with the modification and understands the intent of the Standard Drafting Team (SDT); however, SIGE encourages the SDT to clarify the effects of the proposed changes to the NERC Glossary Definition and BES Reference Document.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support. The Inclusion I2 of the BES definition is removed from the Applicability Section.	

Andy Fuhrman - Minnkota Power Cooperative Inc. - 1,5 - MRO	
Answer	Yes
Document Name	
Comment	
MPC supports comments submitted by the MRO NERC Standards Review Forum (NSRF).	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to MRO NSRF's comments.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ruchi Shah - AES - AES Corporation - 5	
Answer	Yes
Document Name	

Comment	
The changes make it clear that PRC-002 does not apply to IBR facilities.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	Yes
Document Name	
Comment	
OPG supports the NPCC RSC's comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Wendy Devries - CMS Energy - Consumers Energy Company - 1,2 - RF	
Answer	Yes
Document Name	
Comment	
Likes 0	

Dislikes 0	
Response	
Thanks for your support.	
David Vickers - David Vickers On Behalf of: Daniel Roethemeyer, Vistra Energy, 5; - David Vickers	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Thomas Foltz - AEP - 5	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Todd Bennett - Associated Electric Cooperative, Inc. - 3, Group Name AECI	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Jessica Cordero - Unisource - Tucson Electric Power Co. - 1 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andrea Jessup - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kevin Conway - Public Utility District No. 1 of Pend Oreille County - 1,3,5,6	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Jennie Wike - Jennie Wike On Behalf of: Hien Ho, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; John Merrell, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Ozan Ferrin, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Terry Gifford, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; - Jennie Wike, Group Name Tacoma Power	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC Entity Monitoring	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Martin Sidor - NRG - NRG Energy, Inc. - 5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Allie Gavin - Allie Gavin On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Allie Gavin	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Matt Lewis - Lower Colorado River Authority - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Brad Harris - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Steven Taddeucci - NiSource - Northern Indiana Public Service Co. - 3	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Stephen Whaite - Stephen Whaite On Behalf of: Lindsey Mannion, ReliabilityFirst , 10; - Stephen Whaite, Group Name ReliabilityFirst Ballot Body Member and Proxies	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
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	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Denise Sanchez - Denise Sanchez On Behalf of: Diana Torres, Imperial Irrigation District, 1, 6, 5, 3; Jesus Sammy Alcaraz, Imperial Irrigation District, 1, 6, 5, 3; Tino Zaragoza, Imperial Irrigation District, 1, 6, 5, 3; - Denise Sanchez	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Hillary Creurer - Allete - Minnesota Power, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Michiko Sell - Pine Gate Renewables - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kacie Fischer - Kacie Fischer On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Kacie Fischer	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ijad Dewan - Ijad Dewan On Behalf of: Alain Mukama, Hydro One Networks, Inc., 1, 3; - Ijad Dewan	
Answer	
Document Name	
Comment	
No comments	
Likes 0	
Dislikes 0	

Response
Thanks for your support.

2. Do you agree with the need of creating a new Standard (PRC-028-1) to address gaps the Inverter-Based Resource Performance Task Force (IRPTF) identified within the PRC-002?	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	No
Document Name	
Comment	
PNMR supports EEI's comment related to not being in agreement of installing disturbance monitoring equipment at all IBR locations that conform to the BES definition is necessary, nor do we agree that the SAR authorized such an expansive scope.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	

The NAGF supports creating the new Standard PRC-028 focused on inverter-based resource disturbance monitoring and reporting requirements, but does not agree that all IBR facilities need DME at the substation and on each feeder circuit. Please consider the effectiveness of the application of DME only at the substation/collector bus for IBR facilities rather than on each feeder, and of limiting the facilities to which the addition of DME is required as determined by the process outlined in Question 5 below. *There is already some ability, without the addition of DME at all IBR locations, to determine the causes of inverter reactions to HV system disturbances as demonstrated in the various disturbance reports which list the various type of responses that have been published.*	
Likes 0	
Dislikes 0	
Response	
Thanks for supporting creation of the new Reliability Standard PRC-028. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. However, the SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Andy Fuhrman - Minnkota Power Cooperative Inc. - 1,5 - MRO	
Answer	No
Document Name	

Comment	
MPC supports comments submitted by the MRO NERC Standards Review Forum (NSRF).	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to MRO NSRF's comment.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	No
Document Name	
Comment	
WEC Energy Group supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comment.	
Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	No
Document Name	
Comment	

The long list of possible causes of the reactions found in the multiple disturbance reports from the past 5 years indicate that sufficient data is already available to determine what is occurring at the inverter level. From the multiple disturbance evaluation reports that have been written in the past 5 years, it appears that the reaction of the inverters to system disturbances has become well understood. It is not apparent that every IBR plant will needs to have the added ability to evaluate the required data collected by the newly required monitoring specified. PRC-002-4 recognized that certain facilities are more significant to the reliability of the BES as indicated by the TO evaluation and TP evaluation included in Requirement R1 and R5 of that version. Extending this standard's requirements to all IBR facilities seems to be a bit of an over-reaction.	
Likes 1	JEA, 1, McClung Joseph
Dislikes 0	
Response	
Thanks for your comments. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Michael Whitney - Northern California Power Agency - 3	
Answer	No
Document Name	
Comment	
NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	

Response	
Thanks for your comment. See responses to other opposing comments.	
Dennis Sismaet - Northern California Power Agency - 6	
Answer	No
Document Name	
Comment	
1. NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See responses to other opposing comments.	
Marty Hostler - Northern California Power Agency - 4	
Answer	No
Document Name	
Comment	
NO, NCPA supports various other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See responses to other opposing comments.	
Jennie Wike - Jennie Wike On Behalf of: Hien Ho, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; John Merrell, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Ozan Ferrin, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Terry Gifford, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; - Jennie Wike, Group Name Tacoma Power	

Answer	No
Document Name	
Comment	
Tacoma Power supports the MRO NSRF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to MRO NSRF's comment.	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	
The implementation timeframe should be 24 months or the NERC GO-IBR registration deadlines, whichever is greater.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The standard applies to facilities meeting the Inclusion I4 of the BES definition. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard also applies to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.	
Jeremy Lawson - Northern California Power Agency - 5	
Answer	No

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for taking time to review the proposed reliability standard PRC-028. Many changes have been made considering received comments with a first posting.	
Kimberly Turco - Constellation - 6	
Answer	Yes
Document Name	
Comment	
Constellation recommends that the Standard Drafting Team consider a similar approach for PRC-028 as in PRC-002, requiring the TO and RC to identify areas within their regions that are susceptible to disturbances (or high concentration of IBRs) that would benefit from monitoring and recording capabilities. As opposed to a blanket requirement for ALL IRB facilities to install SER, FR, and DDR equipment. Kimberly Turco on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their	

buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	Yes
Document Name	
Comment	
OPG supports the NPCC RSC's comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NPCC RSC's comments.	
Alison MacKellar - Constellation - 5	
Answer	Yes
Document Name	
Comment	
Constellation recommends that the Standard Drafting Team consider a similar approach for PRC-028 as in PRC-002, requiring the TO and RC to identify areas within their regions that are susceptible to disturbances (or high concentration of IBRs) that would benefit from monitoring and recording capabilities. As opposed to a blanket requirement for ALL IRB facilities to install SER, FR, and DDR equipment. Alison Mackellar on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	

Response
The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.

Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	Yes
Document Name	
Comment	
EEI supports the development of a new Reliability Standard to address gaps in disturbance monitoring of IBRs, however, we do not agree that installing disturbance monitoring equipment at all IBR locations that conform to the BES definition is necessary, nor do we agree that the SAR authorized such an expansive scope.	
Likes 0	
Dislikes 0	

Response
Thanks for supporting development of a new Reliability Standard to address gaps in disturbance monitoring of IBRs. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.

Ruchi Shah - AES - AES Corporation - 5

Answer	Yes
Document Name	
Comment	
AES Clean Energy supports the creation of PRC-028 to address gaps identified by the IRPTF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Alan Kloster - Alan Kloster On Behalf of: Jennifer Flandermeyer, Evergy, 3, 6, 5, 1; Jeremy Harris, Evergy, 3, 6, 5, 1; Kevin Frick, Evergy, 3, 6, 5, 1; Marcus Moor, Evergy, 3, 6, 5, 1; - Alan Kloster	
Answer	Yes
Document Name	

Comment	
Evergy supports and incorporates by reference the comments of the Edison Electric Institute for question #2.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comment.	
Kinte Whitehead - Exelon - 3	
Answer	Yes
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comment.	
Daniel Gacek - Exelon - 1	
Answer	Yes
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	

Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comment.	
Michael Johnson - Michael Johnson On Behalf of: Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	Yes
Document Name	
Comment	
PG&E supports the SDT decision to separate the Inverter-Based Resource requirements to avoid making PRC-002 overly complicated by trying to address both synchronous and IBRs in a single standard.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Marcus Bortman - APS - Arizona Public Service Co. - 6	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Mark Fowler - Mark Fowler On Behalf of: David Jendras Sr, Ameren - Ameren Services, 3, 6, 1; - Mark Fowler	
Answer	Yes
Document Name	
Comment	
Ameren supports EEI's comments on this question.	
Likes 0	
Dislikes 0	

Response	
Thanks for your comments. See response to EEI’s comment.	
Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	Yes
Document Name	
Comment	

The long list of possible causes of the reactions found in the multiple disturbance reports from the past 5 years indicate that sufficient data is already available to determine what is occurring at the inverter level. From the multiple disturbance evaluation reports that have been written in the past 5 years, it appears that the reaction of the inverters to system disturbances has become well understood.

It is not apparent that every IBR plant needs to have the added ability to evaluate the required data collected by the newly required monitoring. PRC-002-4 recognized that certain facilities are more significant to the reliability of the BES as indicated by the TO evaluation and TP evaluation included in Requirement R1 and R5 of that version. Extending this standard’s requirements to ALL IBR facilities seems to be a bit of an over-reaction.

Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Claudine Bates - Black Hills Corporation - 6	
Answer	Yes
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Sheila Suurmeier - Black Hills Corporation - 5	
Answer	Yes
Document Name	
Comment	

Black Hills Corporation agrees with NAGF comments	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Micah Runner - Black Hills Corporation - 1	
Answer	Yes
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Josh Combs, Black Hills Corporation, 5, 6, 1, 3; - Rachel Schuldt	
Answer	Yes
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	

Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	Yes
Document Name	
Comment	
FirstEnergy supports EEI's comments which state: EEI supports the development of a new Reliability Standard to address gaps in disturbance monitoring of IBRs, however, we do not agree that installing disturbance monitoring equipment at all IBR locations that conform to the BES definition is necessary, nor do we agree that the SAR authorized such an expansive scope.	
Likes 0	
Dislikes 0	
Response	
Thanks for supporting development of a new Reliability Standard to address gaps in disturbance monitoring of IBRs. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Mike Magruder - Avista - Avista Corporation - 1	
Answer	Yes

Document Name	
Comment	
PRC-028 to include requirements for adequate monitoring of IBRs as shown necessary by operational experience. PRC-002 to remain in effect for synchronous based generation for a large-scale view of system reliability.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	Yes
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Glen Farmer - Avista - Avista Corporation - 5	
Answer	Yes
Document Name	
Comment	

PRC-028 to include requirements for adequate monitoring of IBRs as shown necessary by operational experience. PRC-002 to remain in effect for synchronous based generation for a large-scale view of system reliability.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Robert Follini - Avista - Avista Corporation - 3	
Answer	Yes
Document Name	
Comment	
PRC-028 to include requirements for adequate monitoring of IBRs as shown necessary by operational experience. PRC-002 to remain in effect for synchronous based generation for a large-scale view of system reliability.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Thomas Foltz - AEP - 5	
Answer	Yes
Document Name	
Comment	

While AEP has no objections to creating a new standard specifically for IBRs, we are concerned by the content itself which we express in our response to Question 5.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Wendy Devries - CMS Energy - Consumers Energy Company - 1,2 - RF	
Answer	Yes
Document Name	
Comment	
To the extent of monitoring only those IBRs that are connected directly to the BES.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support. The standard would apply to resources applicable to Inclusion I4 of the BES definition only. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kacie Fischer - Kacie Fischer On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Kacie Fischer	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Michiko Sell - Pine Gate Renewables - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Hillary Creurer - Allete - Minnesota Power, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Denise Sanchez - Denise Sanchez On Behalf of: Diana Torres, Imperial Irrigation District, 1, 6, 5, 3; Jesus Sammy Alcaraz, Imperial Irrigation District, 1, 6, 5, 3; Tino Zaragoza, Imperial Irrigation District, 1, 6, 5, 3; - Denise Sanchez	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
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	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Stephen Whaite - Stephen Whaite On Behalf of: Lindsey Mannion, ReliabilityFirst , 10; - Stephen Whaite, Group Name ReliabilityFirst Ballot Body Member and Proxies	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Steven Taddeucci - NiSource - Northern Indiana Public Service Co. - 3	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Brad Harris - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Matt Lewis - Lower Colorado River Authority - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Allie Gavin - Allie Gavin On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Allie Gavin	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Leslie Hamby - Southern Indiana Gas and Electric Co. - 3,5,6 - RF	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Martin Sidor - NRG - NRG Energy, Inc. - 5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC Entity Monitoring	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Wendy Kalidass - U.S. Bureau of Reclamation - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kevin Conway - Public Utility District No. 1 of Pend Oreille County - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andrea Jessup - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jessica Cordero - Unisource - Tucson Electric Power Co. - 1 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Donald Lock - Talen Generation, LLC - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Todd Bennett - Associated Electric Cooperative, Inc. - 3, Group Name AECI	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
David Vickers - David Vickers On Behalf of: Daniel Roethemeyer, Vistra Energy, 5; - David Vickers	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ijad Dewan - Ijad Dewan On Behalf of: Alain Mukama, Hydro One Networks, Inc., 1, 3; - Ijad Dewan	
Answer	
Document Name	
Comment	
Not applicable	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.

3. Do you agree the modifications made in PRC-002-5 and new Standard PRC-028-1 are cost effective?	
Wendy Devries - CMS Energy - Consumers Energy Company - 1,2 - RF	
Answer	No
Document Name	
Comment	
I agree that PRC-002 -5 changes are cost effective. The new PRC-028-1 standard will increase costs significantly for those utilities that have installed IBRs prior to the standards effective date.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
David Vickers - David Vickers On Behalf of: Daniel Roethemeyer, Vistra Energy, 5; - David Vickers	
Answer	No
Document Name	
Comment	
The following unnecessary equipment requirements will lead to increased project cost.	

Section 2.2

2.1 PRC-002 does not require real and reactive power for FR data, the same should apply for PRC-028

2.2 There is limited value with FR data for IBRs and this requirement should be removed.

2.3 There is limited value with FR data for shunt or reactive devices and this requirement should be removed.

-This section should also exclude IBRs that were installed prior to the approved standard. Only DDR or continuous data should be required on IBRs that were installed prior approval.

Section 3 - The sample rate and record length requirements are not consistent with the requirements in PRC-002. The 128 samples per cycle recording rate and 2 second record length may not be supported by installed or available technology, especially for IBRs. Note- Vistra has been evaluating various technologies that we could use for IBRs and there are not many cost effective options for IBRs.

Section 5 The output sampling rated of 60 times per second is not consistent with the 30 times per second requirement in PRC-002

Section 7 The time period for storing events is 30 days vs the 10 days in PRC-002. Not all equipment can store DDR or continuous data for 30 days.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

The real and reactive power can be calculated using recorded voltages and currents, which is allowed. In PRC-028, the FR data is focused on IBR generating facilities and real/reactive power data will be useful for event analysis.

The FR data from IBR generating facility, including response from any dynamic reactive device, will be helpful in evaluating performance of IBR during a system a disturbance.

Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. Considering all received comments, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Thomas Foltz - AEP - 5	
Answer	No
Document Name	
Comment	
It has been recognized in past Technical Rationale documents for PRC-002, by members of their SDT, that requiring more than 10 days of granular data retention would be expensive and unnecessary. Requiring 30 days of data retention and provision would obviously be even more expensive than ten, making the proposed revisions unreasonable and not “cost effective.” In addition, AEP has several other concerns with the cost impact of the new Standard PRC-028-1. * AEP does not consider the inclusion of “at least one IBR unit connected to last 10% of each collector feeder length” in PRC-028 4.2.5 as cost effective. AEP questions the reliability benefit data these BES Elements will provide when considering the proposed changes to PRC-024 to a performance-based ride-through standard that ensures generators remain connected to the BPS during system disturbances and the requirements of PRC-004, Protection System Misoperation and Correction. * PRC-028 does not currently limit the applicability of required data, while PRC-002 provides criteria which limits the BES Elements that are required to have dynamic Disturbance recording data. Similar limitations should be placed on PRC-028 as well. * PRC-004 excludes Protection Systems of individual dispersed power producing resources identified under Inclusion I4 of the BES definition where the Misoperations affected an aggregate nameplate rating of less than or equal to 75 MVA of BES Facilities. PRC-028 should be developed in alignment with PRC-004 by retaining these exclusions in PRC-028 in its present state, as well as in its future state.	
Likes 0	

Dislikes 0	
Response	
Thank you for your comments.	
Glen Farmer - Avista - Avista Corporation - 5	
Answer	No
Document Name	
Comment	
Cost effectiveness cannot be known at this time.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	

The modifications made to PRC-002 are a zero-cost item. The costs associated with PRC-028 are substantial. Some IBR facilities have a single feeder into the 34.5kv collector bus while other sites may have 12 or more feeder circuits. Requiring monitoring on each feeder is excessive. Requiring monitoring on wind facilities is not warranted as most of the disturbance events that have been studied have revealed that solar facilities are the most susceptible to reacting to system disturbances.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days. The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Donald Lock - Talen Generation, LLC - 5	
Answer	No
Document Name	
Comment	

Talen supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comment.	
Mike Magruder - Avista - Avista Corporation - 1	
Answer	No
Document Name	
Comment	
Cost effectiveness cannot be known at this time.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	No
Document Name	

Comment
Until FE understands the definition intent of inverter-based resources under these standards, we cannot determine the cost effectiveness of this project. In addition, FE supports EEI's comments which state: EEI is concerned that proposed PRC-028-1 does not align with the approved SAR scope and if approved would place unreasonable costs on registered entities without adequately balancing costs as required by the SAR. We further note that the SAR Scope states that "it is important that some of these resources and nearby BES elements are monitored with DDR devices to ensure adequate coverage for disturbance analysis while balancing cost impacts." The SAR does not intend that all IBR facilities need to have the level of monitoring proposed. To address this concern, the SDT should develop criteria that allows entities to select a representative number of sites in order to ensure adequate analysis of IBR performance.

Likes 0	
Dislikes 0	

Response
Thanks for your comment. See response to EEI's comment.

Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro	
Answer	No
Document Name	

Comment
BC Hydro thanks the drafting team for their efforts and appreciates the opportunity to comment. PRC-028-1 Requirements are generally more stringent than PRC-002 requirements, particularly, fault recording (FR) sampling, FR triggering, FR length, CLK accuracy, and retrieval period requirements. Entities will have to assess if current PRC-002 monitoring solutions are capable of

meeting technical requirements in PRC-028-1 as currently drafted, and may have to develop new monitoring systems if currently implemented solutions are unable to meet the increased requirements. While the technical justification cites IEEE 2800-2022 as a basis for the requirements, it does not appear to identify instances where Disturbance Monitoring Equipment records meeting PRC-002 requirements would have been insufficient for event or disturbance analysis, which could justify increased technical requirements in PRC-028-1 Draft 1. Requirement R3 asks for more data and it applies to all in scope IBR facilities, regardless of installation date whereas R1 and R2 have specific exemption criteria for existing units. Requirements R4, R5 specify DDR requirements similar to PRC-002; however as drafted these Requirements will be applicable to all in scope IBR facilities unlike Requirements R1 and R2. BC Hydro suggests that technical requirements for PRC-028 be specified in line with PRC-002 requirements for IBRs installed prior to the effective date of the standard. This will still constitute an improvement over the status quo for availability and quality of records, while improving cost effectiveness of the proposed changes in PRC-028. PRC-028-1 Requirements R1 and R2 provide an exemption to IBR units “installed” prior to the effective date of the Standard. Please provide clarity on the meaning of the term “install”.

Likes 0	
Dislikes 0	

Response
Thanks for your comment. Considering comments received with the initial posting, many revisions are made. The Requirements in PRC-028 are different from same in PRC-002, recognizing that IBRs react very fast to system disturbances and advances in recording technology. Exception in Requirement R1 is for IBR units placed in commercial operation before the effective date of the standard. There is no need for such an exception in R3 and R4 as these requirements are for FR and DDR data for the IBR plant. The term “installed” is replaced with “commercial operation.”

Wendy Kalidass - U.S. Bureau of Reclamation - 5	
Answer	No

Document Name	
Comment	
Reclamation agrees with the PRC-002-5 cost but inverter base does not apply to Reclamation.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Josh Combs, Black Hills Corporation, 5, 6, 1, 3; - Rachel Schuldt	
Answer	No
Document Name	
Comment	
Black Hills Corporation will not comment on cost effectiveness.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Micah Runner - Black Hills Corporation - 1	
Answer	No
Document Name	
Comment	

Black Hills Corporation will not comment on cost effectiveness.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Sheila Suurmeier - Black Hills Corporation - 5	
Answer	No
Document Name	
Comment	
Black Hills Corporation will not comment on cost effectiveness.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Claudine Bates - Black Hills Corporation - 6	
Answer	No
Document Name	
Comment	
Black Hills Corporation will not comment on cost effectiveness.	
Likes 0	

Dislikes 0	
Response	
Thanks for your comment.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	No
Document Name	
Comment	
AEPC has signed on to ACES comments: It is ACES' opinion that the proposed changes to PRC-002 are minimal and therefore should have little to no cost to implement. As for the proposed PRC-028-1, we agree with the approach taken by the SDT to create a new Standard to specifically address IBR facilities; however, we strongly disagree with making this new standard inclusive of all IBR facilities regardless of risk to the BES. It is our recommendation that PRC-028 take a similar approach as PRC-002-5 and allow the TO and RC to evaluate which IBR Facilities need SER, FR, and/or DDR capabilities installed. It is our opinion that a blanket approach is cost-prohibitive whereas a risk-based approach provides a reasonable level of information and is much more cost-effective.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for	

analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Jennie Wike - Jennie Wike On Behalf of: Hien Ho, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; John Merrell, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Ozan Ferrin, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Terry Gifford, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; - Jennie Wike, Group Name Tacoma Power	
Answer	No
Document Name	
Comment	
Tacoma Power supports the MRO NSRF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support. See response to MRO NSRF's comments.	
Marty Hostler - Northern California Power Agency - 4	
Answer	No
Document Name	
Comment	

NO. The proposals will result in more time and $$ spent on unproductive activities. SDTs should be required to provide cost/benefit analysis and prove the reliability benefits of their proposals.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Dennis Sismaet - Northern California Power Agency - 6	
Answer	No
Document Name	
Comment	
The proposals will result in more time and $$ spent on unproductive activities. SDTs should be required to provide cost/benefit analysis and prove the reliability benefits of their proposals. NO, NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data	

from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Jeremy Lawson - Northern California Power Agency - 5	
Answer	No
Document Name	
Comment	
The proposals will result in more time and $$ spent on unproductive activities. SDTs should be required to provide cost/benefit analysis and prove the reliability benefits of their proposals.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Michael Whitney - Northern California Power Agency - 3	
Answer	No
Document Name	
Comment	

The proposals will result in more time and $$ spent on unproductive activities. SDTs should be required to provide cost/benefit analysis and prove the reliability benefits of their proposals. NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Recent NERC disturbance reports have identified that plant-level high resolution oscillography data and unit level sequence of events recording, and oscillography data are not available in most cases for event analysis. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	No
Document Name	
Comment	
PRC-028 -The data sampling rates seem excessive and are a significant increase from the requirements in PRC-002. These sampling rates will prevent the use of protective relaying to satisfy the standard, which will increase cost burden.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. The IBRs are fast acting devices and hence, high sampling rate compared to one specified in PRC-002 is required. However, considering comments submitted by the industry, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle.	
Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	No
Document Name	
Comment	
The modifications made to PRC-002 are a zero-cost item. The costs associated with PRC-028 are substantial. Some IBR facilities have a single feeder into the 34.5kv collector bus while other sites may have 12 or more feeder circuits. Requiring monitoring on each feeder is excessive. Requiring monitoring on wind facilities is not warranted as most of the disturbance events that have been studied have revealed that solar facilities are the most susceptible to reacting to system disturbances.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	No
Document Name	

Comment
The modifications made to PRC-002 are a zero-cost item. The costs associated with PRC-028 are substantial. Some IBR facilities have a single feeder into the 34.5kv collector bus while other sites may have 12 or more feeder circuits. Requiring monitoring on each feeder is excessive. It is estimated that it will cost $300-450k to install DFR equipment on each collection system feeder; with an aggregate cost of $4.2-$6.4 million just for that wind generation asset with at least 14 collection system feeder circuits. The MRO NSRF recommends limiting applicability to only facilities that have experienced reportable events where clear causes have not been identified and limiting the monitoring location to the BES collection bus. Another costly part depends on how exclusions are handled for older less capable equipment in PRC-028-1 R1, R2 and R3. Requiring monitoring on wind facilities is not warranted as most of the disturbance events that have been studied have revealed that photo-voltaic facilities are the most susceptible to reacting to system disturbances.

Likes 1	JEA, 1, McClung Joseph
Dislikes 0	

Response
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.

Mark Fowler - Mark Fowler On Behalf of: David Jendras Sr, Ameren - Ameren Services, 3, 6, 1; - Mark Fowler	
Answer	No
Document Name	
Comment	

Ameren supports EEI's comments on this question.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comments.	
Marcus Bortman - APS - Arizona Public Service Co. - 6	
Answer	No
Document Name	
Comment	
The SAR Scope states that "it is important that **some of these resources and nearby BES elements are monitored with DDR devices** to ensure adequate coverage for disturbance analysis while balancing cost impacts." However, the SAR does not intend that all IBR facilities need to have the level of monitoring proposed. To address this concern, the SDT should develop criteria that allows entities to select a representative number of sites in order to ensure adequate analysis of IBR performance. Requiring monitoring at all IBR facilities would result in unnecessary costs without improving reliability.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	

Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	No
Document Name	
Comment	
WEC Energy Group supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	No
Document Name	
Comment	
SMUD and BANC believe that the new Standard PRC-028-1 is not cost effective and we support the comments submitted by Southern Company.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to Southern Company's comments.	

Michael Johnson - Michael Johnson On Behalf of: Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	No
Document Name	
Comment	
PG&E supports the input provided by the NAGF and EEI on the potential costs of the proposed modifications.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF and EEI's comments.	
Andy Fuhrman - Minnkota Power Cooperative Inc. - 1,5 - MRO	
Answer	No
Document Name	
Comment	
MPC supports comments submitted by the MRO NERC Standards Review Forum (NSRF).	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response MRO NSRF's comments.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6	
Answer	No

Document Name	
Comment	
Dominion Energy supports EEI comments	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Daniel Gacek - Exelon - 1	
Answer	No
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Kinte Whitehead - Exelon - 3	
Answer	No
Document Name	
Comment	

Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Alan Kloster - Alan Kloster On Behalf of: Jennifer Flandermeyer, Evergy, 3, 6, 5, 1; Jeremy Harris, Evergy, 3, 6, 5, 1; Kevin Frick, Evergy, 3, 6, 5, 1; Marcus Moor, Evergy, 3, 6, 5, 1; - Alan Kloster	
Answer	No
Document Name	
Comment	

Evergy supports and incorporates by reference the comments of the Edison Electric Institute for question #3.

In addition, Evergy estimates that the cost of installing DFR equipment on the high side of a pad mounted transformer at the base of a wind turbine in the last 10% of an existing wind turbine feeder will be $300-450k or 2-3 times the cost of installing the same equipment in an existing substation. For example, one wind farm has 14 feeders so installing this equipment on every feeder there would cost an estimated $4.2-6.3 million dollars for that one facility.

EIA data shows that there are currently 604 wind farms with a size of 75 MW or greater with a total 975549 MW capacity. Assuming there is a feeder for every 10-20 MW worth of wind turbines and the estimate per installation, the range between $1.463-$2.195 billion dollars just to install these at the end of every feeder and does not include the substation installations that would be required. This estimate is only for feeders at wind turbines and does not include any estimates for solar farms or other IBRs so the total cost could likely be double or triple this estimate. This expense has minimal or no direct benefit to grid reliability and will increase electricity costs for everyone across North America in a quest for better data. Evergy highly suggests that the drafting team consider limiting the scope of DFR installations to areas that are identified by an RC similar to what is done in PRC-002.

Likes 0	

Dislikes 0	

Response

Thanks for your comments. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.

Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators

Answer	No
Document Name	

Comment

It is ACES' opinion that the proposed changes to PRC-002 are minimal and therefore should have little to no cost to implement.

As for the proposed PRC-028-1, we agree with the approach taken by the SDT to create a new Standard to specifically address IBR facilities; however, we strongly disagree with making this new standard inclusive of all IBR facilities regardless of risk to the BES.

It is our recommendation that PRC-028 take a similar approach as PRC-002-5 and allow the TO and RC to evaluate which IBR Facilities need SER, FR, and/or DDR capabilities installed. It is our opinion that a blanket approach is cost-prohibitive whereas a risk-based approach provides a reasonable level of information and is much more cost-effective.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	No
Document Name	
Comment	
We recommended the drafting team consider the establishment of a minimum MW threshold to ensure very small installations, such as those that may be considered BES due to co-location with synchronous machines, are excluded to ensure cost-effectiveness.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Considering all comments received, the IBR-portion of generating facility meeting Inclusion I2 of the BES definition is removed from the Applicability Section.	
Ruchi Shah - AES - AES Corporation - 5	
Answer	No

Document Name	
Comment	
There should not be any cost associated with the modifications made in PRC-002-5. However, costs associated with PRC-028-1 are substantial. Depending on the configuration and equipment capability of existing operational IBR facilities, the costs associated with retrofitting hardware, software and labor will run into 6 figure amount for a single IBR site.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Steven Taddeucci - NiSource - Northern Indiana Public Service Co. - 3	
Answer	No
Document Name	
Comment	
The PRC-002-5 changes are cost effective. PRC-028-1 is not cost effective and should align more with the requirements of PRC-002. Specifically, PRC-028 should be consistent with the PRC-002 data retrievability period of 10 calendar days instead of 30 calendar days (PRC-028 R7.1) especially for DDR data. PRC-028 should also let the TO and RC evaluate (as was done in PRC-002) which IBR Facilities need SER, FR, and/or DDR capabilities installed, instead of including all IBR facilities regardless of risk to the BES. PRC-028 should also follow PRC-002 FR requirements which do not require real and reactive power for FR data (PRC-028 R2.1.3) and have a minimum sample rate of 16 samples per cycle instead of 128 samples per cycle (PRC-	

028 R3.2.2). PRC-028 should also be consistent with PRC-002 DDR requirements for an output recording rate of electrical quantities of at least 30 times per second instead of 60 times per second (PRC-028 R5.2).	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Denise Sanchez - Denise Sanchez On Behalf of: Diana Torres, Imperial Irrigation District, 1, 6, 5, 3; Jesus Sammy Alcaraz, Imperial Irrigation District, 1, 6, 5, 3; Tino Zaragoza, Imperial Irrigation District, 1, 6, 5, 3; - Denise Sanchez	
Answer	No
Document Name	
Comment	
It will be costly to implement.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for	

FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Hillary Creurer - Allete - Minnesota Power, Inc. - 1	
Answer	No
Document Name	
Comment	
Minnesota Power's comments are aligned with those of the MRO NSRF and EEI for this question. Minnesota Power reiterates that PRC-028 would result in substantial costs for entities and disagrees with the proposal to monitor all IBR facilities.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	

Michiko Sell - Pine Gate Renewables - 5	
Answer	No
Document Name	
Comment	

We are concerned that the cost and burden of the proposed PRC-028 requirements are not justified by the reliability benefits it would provide. We believe the costs and benefits of the proposed standard can be better balanced by a. only requiring data collection at generating plants larger than 500 MVA, b. requiring data collection on a single collector feeder or IBR unit instead of every collector feeder or IBR unit in the plant, and c. only applying the data collection requirements to plants that sign an interconnection agreement after the effective date of the standard. Only applying the requirements to a single IBR unit and to larger plants will make PRC-028 more comparable to the PRC-002 companion standard for synchronous generators, avoiding undue discrimination against Inverter-Based Resources (IBRs).

Regarding potential reliability benefits of the proposed standard, we agree that ride-through issues at some IBRs have presented a legitimate reliability concern. However, the recent adoption of Federal Energy Regulatory Commission (FERC) Order 2023 directly addresses many of those concerns by imposing mandatory requirements to fully ride-through grid disturbances and to accurately validate models of plant performance at the sub-second transient timescale. Prior to the adoption of Order 2023, the proposed requirements of PRC-028 may have provided a significant reliability benefit by improving understanding of the ride-through performance of IBRs, and thus helping to identify solutions to any concerns. However, now that FERC Order 2023 already solved many of those concerns by requiring ride-through performance and accurate modeling of sub-second plant performance, it is not clear what reliability benefit PRC-028 might provide.

The proposed PRC-028 requirements would impose a considerable cost and burden on generators. While R1 and the 2.2.3. subpart of R2 that requires fault recording for “DC bus current and voltage” have an exemption that “IBR units installed prior to the effective date of this standard and are not capable of recording this data are excluded,” but R3 and the other parts of R2 appear to apply retroactively to all IBR plants. Retroactive requirements impose a much greater financial burden on the generator as those costs cannot typically be recovered once a power purchase agreement has been signed, and the cost and implementation burden for retrofits is typically much higher than if the data collection equipment were planned and installed as part of initial plant construction. Moreover, retroactive requirements set a bad precedent and introduce regulatory uncertainty that makes generation investment more challenging and risky, and thus costly. In some cases the cost of installing the required data collection, storage, and transmission equipment and associated auxiliary equipment could approach $1 million per plant, in addition to ongoing operations and maintenance and compliance costs associated with that equipment. The requirement in R3 for the fault recorder at each IBR unit (which footnote 2 defines as each inverter or wind turbine generator) to report at least 128 samples per

cycle for over two seconds per event necessitates the use of expensive high-speed sensing equipment at each IBR unit, and requires each recorder to capture, store, and transmit at least 15,000 datapoints per event.

To make the cost of PRC-028 more reasonable while preserving the value of the proposed data collection, as well as avoiding undue discrimination against IBRs relative to synchronous generators, we suggest that data collection in PRC-028 only be required prospectively and not retroactively, and only at plants that are 500 MVA and greater, which is the plant size threshold at which synchronous generator data collection is required in the PRC-002 standard. If the TO or RC/PC can compellingly demonstrate that smaller new plants should be required to comply with PRC-028's data collection requirements due to local reliability concerns, such as weak grid issues or high penetrations of IBRs in a local area, then that should be allowed.

In addition, the cost of installing a sequence of event recorder and fault recorder on the last 10% of each collector feeder per R1 and R2 is significant, as large IBR plants can each contain dozens of collector feeders. Moreover, the fact that IBR plants typically consist of multiple collector feeders with similar if not identical equipment connected to them casts further doubt on the value of installing data collection devices on each collector feeder, as the impact of the disturbance and the IBR response is likely to be similar if not identical across those feeders. Even more burdensome is that R3 requires fault recorders to be installed at each IBR unit, which footnote 2 defines as each inverter or wind turbine generator. IBR plants typically consist of dozens if not hundreds of IBR units that are essentially identical. As a result, a more reasonable requirement would be for data collection equipment to be installed on a single collector feeder or IBR unit at each plant, which should allow extrapolation of that data to other collector feeders or IBR units at the plant. If a plant contains multiple types of inverters or wind turbine generators, it may be reasonable to require data collection on each feeder or unit that uses a different inverter or generator type.

Given that there are finite resources for complying with all NERC requirements, and in light of the fact that the ride-through concerns PRC-028 is attempting to understand have already been addressed by FERC Order 2023, we are concerned that PRC-028 as proposed could actually undermine reliability by distracting from more pressing reliability needs. We believe the revisions we have proposed will result in a standard that better balances the cost of complying with standard with its reliability benefit.

Likes 0	
Dislikes 0	

Response

Thanks for your comment.

The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of "each" collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.

Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	

The NAGF notes that the cost to purchase and install monitoring equipment will vary by company. NAGF members estimates range from $100,000 to $450,000 per feeder at an IBR generation facility. High end estimate is based on having to build a new structure to house the equipment, get power and communications to it, and digging up the collector circuit to connect the equipment. Lower estimate is based on installing the recording equipment within the IBR unit, leveraging the use of existing instrument transformers, and integrating I/O from existing IBR OEM control systems. Note that having to install monitoring equipment to the IBR unit connected to last 10% of ***each*** *collector feeder length (i.e., furthest from the collector bus) in an IBR generation facility will be expensive; a wind farm that has 14 feeders, installing DFR equipment just on those 14 feeders at that single Facility, would have an estimated cost of between $1,400,000 – $6,300,000. Modifications would also be needed for the associated substation to install additional metering and RTACs (along with programming work), communication wiring, etc. Considering the number of existing BES IBR generation facilities, the cost would be in the billions of dollars to install. The concern is that the reliability benefit of installing such equipment does not justify the cost.*

Likes 0	
Dislikes 0	

Response

Thanks for your comment. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.

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

Answer	No
Document Name	

Comment

EEI is concerned that proposed PRC-028-1 does not align with the approved SAR scope and if approved would place unreasonable costs on registered entities without adequately balancing costs as required by the SAR. We further note that the SAR Scope states that “it is important that **some of these resources and nearby BES elements are monitored with DDR devices** to ensure adequate coverage for disturbance analysis while balancing cost impacts.” The SAR does not intend that all IBR facilities need to have the level of monitoring proposed. To address this concern, the SDT should develop criteria that allows entities to select a representative number of sites in order to ensure adequate analysis of IBR performance.

Likes 0	
Dislikes 0	

Response

Thanks for your comments. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for

FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.	
Alison MacKellar - Constellation - 5	
Answer	No
Document Name	
Comment	
Constellation is concerned about the possible cost involved in implementing the Fault Recording (FR) sampling rate that PRC-028 is requiring. SEL-300 series relays are used extensively throughout the industry and do not meet the required sampling rate proposed by PRC-028. If PRC-028 is approved with these required parameters many BES IBR facilities would be required to upgrade to SEL-400 series relays. This wholesale replacement for relay types would also require planned outages to facilitate. Alison Mackellar on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. The minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle.	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	No
Document Name	
Comment	
PNMR is in support of the EEI comment.	
Likes 0	

Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Kimberly Turco - Constellation - 6	
Answer	No
Document Name	
Comment	
Constellation is concerned about the possible cost involved in implementing the Fault Recording (FR) sampling rate that PRC-028 is requiring. SEL-300 series relays are used extensively throughout the industry and do not meet the required sampling rate proposed by PRC-028. If PRC-028 is approved with these required parameters many BES IBR facilities would be required to upgrade to SEL-400 series relays. This wholesale replacement for relay types would also require planned outages to facilitate. Kimberly Turco on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	Yes
Document Name	
Comment	

Because of the reliability need to assess IBR performance during disturbances, the use of current fault recorder technology and associated cost of installation is the best solution. The staged implementation plan also allows entities five (5) years to implement changes so as not to overwhelm the supply chain or overburden staff resources. Please note ERCOT is a member of the ISO RTO Council Standards Review Committee but for their own reasons elect not to support this response to Question #3.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Todd Bennett - Associated Electric Cooperative, Inc. - 3, Group Name AECI	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Jessica Cordero - Unisource - Tucson Electric Power Co. - 1 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andrea Jessup - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Kevin Conway - Public Utility District No. 1 of Pend Oreille County - 1,3,5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Allie Gavin - Allie Gavin On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Allie Gavin	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Matt Lewis - Lower Colorado River Authority - 1	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kacie Fischer - Kacie Fischer On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Kacie Fischer	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	
Document Name	
Comment	
NA	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Robert Follini - Avista - Avista Corporation - 3	
Answer	
Document Name	
Comment	

Cost effectiveness cannot be known at this time.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	
Document Name	
Comment	
Duke Energy's focus is to assure the effective and efficient reduction of risks to the reliability and security of the grid and will not provide comments on the cost effectiveness of the proposed changes.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC Entity Monitoring	
Answer	
Document Name	
Comment	
WECC will not comment on the cost effectiveness, but will leave that to applicable entities.	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ijad Dewan - Ijad Dewan On Behalf of: Alain Mukama, Hydro One Networks, Inc., 1, 3; - Ijad Dewan	
Answer	
Document Name	
Comment	
No comments	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Brad Harris - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	
Document Name	
Comment	
CenterPoint Energy Houston Electric, LLC will abstain from answering Question 3.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. Considering all comments received, many changes are made to the standards PRC-002/028 and the implementation plan.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	
Document Name	
Comment	
OPG supports the NPCC RSC's comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NPCC RSC's comments.	

4. Do you agree with the Implementation Plan for revised PRC-002-5 and new Standard PRC-028-1?	
Kimberly Turco - Constellation - 6	
Answer	No
Document Name	
Comment	
Although PRC-028 Implementation Plan mirrors the existing PRC-002-1 Implementation Plan, PRC-028 will require all BES IBRs to install DME. Depending on the number of BES IBR locations owned by the GO, this could possibly result in numerous new DME installations that will be more challenging to coordinate and schedule compared to the implementation of PRC-002-1. Kimberly Turco on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	

Answer	No
Document Name	
Comment	
ERCOT joins the comments submitted by the IRC SRC for this question and adopts them as its own.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to IRC SRC's comments.	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	No
Document Name	
Comment	
PNMR requests review of revised PRC-002 and PRC-028 prior to agreeing to the implementation plan.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Considering all received comments, changes are made to standards and the implementation plan.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	No
Document Name	
Comment	

The Implementation Plan should explicitly require any new interconnected facilities that fall under the PRC-028-1 Applicability section to be compliant on or before the date of commercial operations. There is no need to stage the phase-in over 5 years for new construction.

Likes 0	
Dislikes 0	

Response
Thanks for your comments. The implementation plan is revised. Clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.

Alison MacKellar - Constellation - 5	
Answer	No
Document Name	

Comment
Although PRC-028 Implementation Plan mirrors the existing PRC-002-1 Implementation Plan, PRC-028 will require all BES IBRs to install DME. Depending on the number of BES IBR locations owned by the GO, this could possibly result in numerous new DME installations that will be more challenging to coordinate and schedule compared to the implementation of PRC-002-1. Alison Mackellar on behalf of Constellation Segments 5 and 6

Likes 0	
Dislikes 0	

Response
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires

Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan.	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	
The NAGF provides the following implementation plan comments for consideration: *a. General: Request the SDT to consider revising the Implementation Plan to address when a new IBR generation facility is to be compliant with PRC-028-1.* *b. Page 2, "Compliance Date for PRC-028-1 Requirements R1-R7" section:* *i. Recommend revising the first paragraph such that the time period for 100% of an entities IBR generation facility to be compliant is three (3) years instead of the proposed two (2) year time limit.* *ii. Recommend deleting the third paragraph as it does not provide any value for the implementation plan.*	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order	

901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028. Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed.	
Michiko Sell - Pine Gate Renewables - 5	
Answer	No
Document Name	
Comment	
For PRC-028 we are concerned with availability of needed devices for installation. Consider adding an additional traunch and extend full implementation by a year. Also consider MW size of Facilities since this is a reliability assurance issue.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply	

chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028. Additional milestones in the implementation plan may be unnecessarily burdensome. The PRC-028 standard would apply to all IBRs that meet the Inclusion I4 of the BES definition. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.

Hillary Creurer - Allete - Minnesota Power, Inc. - 1	
Answer	No
Document Name	
Comment	
Minnesota Power agrees with the PRC-002-5 implementation plan. For the PRC-028-1, Minnesota Power's comments are aligned with the MRO NSRF and suggest a time frame of 6 calendar years to meet the 100% requirement.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring	

equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.	
Steven Taddeucci - NiSource - Northern Indiana Public Service Co. - 3	
Answer	No
Document Name	
Comment	
Concerns about PRC-028 applicability and data requirements will need to be addressed before the implementation plan can be supported.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Considering all received comments, changes are made to proposed requirements in PRC-028 as well as the implementation plan.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	No
Document Name	
Comment	
It is ACES' opinion that the proposed changes to PRC-002 are minimal; therefore, the timeline identified in the Implementation Plan is appropriate.	

As for the proposed timeline for PRC-028-1 R1-R7 identified in the Implementation Plan, it is ACES' opinion that the timelines identified for 50% and 100% compliance should be equal. We recommend the following change:

"…fully compliant at 100% of their generating plant/Facilities within six (6) calendar years of the effective date of Reliability Standard PRC-028-1."

Lastly, while an individual entity's compliance with a given requirement is auditable, their strategy for how they will manage their compliance is not auditable. Therefore, the requirement that an entity share their implementation strategy for PRC-028-1 R1-R7 with the ERO Compliance Monitoring and Enforcement Program staff should be struck from the Implementation Plan.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan.

Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.

Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed.

Andy Fuhrman - Minnkota Power Cooperative Inc. - 1,5 - MRO

Answer	No
Document Name	
Comment	
MPC supports comments submitted by the MRO NERC Standards Review Forum (NSRF).	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to MRO NSRF's comments.	
Michael Johnson - Michael Johnson On Behalf of: Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	No
Document Name	
Comment	
PG&E does not support the time frame in the current implementation plan without an exception (see the input to Question 5, item #1 below) for existing applicability to facilities at the Transmission Owner (TO) Point of Interconnection (POI). An exemption clause is given to preexisting IBR facilities (GO). At present, no TO exemption exists at the Point of interconnection. This requires installation of equipment, or replacement of existing equipment, at the POI for all identified IBR facilities. We recommend providing a TO exemption similar to that granted for GO, particularly if the bus had been identified under PRC-002 and has equipment installed to comply with PRC-002. An alternative is to make PRC-028 FR/SER/DR performance requirements identical to PRC-002.	
Likes 0	
Dislikes 0	

Response	
Thanks for your comments. See response to MRO NSRF's comments.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	No
Document Name	
Comment	
WEC Energy Group supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Jou Yang - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO NSRF	
Answer	No
Document Name	
Comment	
The PRC-002-5 implementation plan is fine as proposed (immediate) since the previous requirements did not change for the synchronous units. The two partitions of completion proposed, 50% & 100%, should be given equal time periods since the %'s are split in half - that is, the 100% time period should be "within six (6) calendar years of the effective date of PRC-028-1" (rather than in 5 calendar years). Entities should not have to share their strategy for implementation with the ERO Compliance Monitoring and Enforcement Program staff. This requirement should not be in the implementation plan.	

Likes 1	JEA, 1, McClung Joseph
Dislikes 0	

Response

Thanks for your comments.

Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan.

Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.

Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed.

Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company

Answer	No
Document Name	

Comment

The PRC-002-5 implementation plan is fine as proposed (immediate) since the previous requirements did not change for the synchronous units.

The two partitions of completion proposed, 50% & 100%, should be given equal time periods since the %'s are split in half - that is, the 100% time period should be "within six (6) calendar years of the effective date of PRC-028-1" (rather than in 5 calendar years).

Entities **should not** have to share their strategy for implementation with the ERO Compliance Monitoring and Enforcement Program staff. This requirement should not be in the implementation plan. The 100% compliant date given for R8 doesn't make sense because there may not be any DME installed at the time specified. Consider using this, "R8 is be applicable to each DME installation upon completion of the installation and commissioning of the DME equipment."	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028. Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed. Compliance date for R8 is also clarified.	
Michael Whitney - Northern California Power Agency - 3	
Answer	No
Document Name	

Comment	
NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See responses to other opposing comments. The implementation plan is revised considering comments received.	
Dennis Sismaet - Northern California Power Agency - 6	
Answer	No
Document Name	
Comment	
1. NCPA supports other opposing comments that have been submitted.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See responses to other opposing comments. The implementation plan is revised considering comments received.	
Marty Hostler - Northern California Power Agency - 4	
Answer	No
Document Name	
Comment	
NO, NCPA supports various other opposing comments that have been submitted.	
Likes 0	

Dislikes 0	
Response	
Thanks for your comments. See responses to other opposing comments. The implementation plan is revised considering comments received.	
Jennie Wike - Jennie Wike On Behalf of: Hien Ho, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; John Merrell, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Ozan Ferrin, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Terry Gifford, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; - Jennie Wike, Group Name Tacoma Power	
Answer	No
Document Name	
Comment	
Tacoma Power supports the MRO NSRF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to MRO NSRF's comments.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	No
Document Name	
Comment	
AEPC has signed on to ACES comments: It is ACES' opinion that the proposed changes to PRC-002 are minimal; therefore, the timeline identified in the Implementation Plan is appropriate.	

As for the proposed timeline for PRC-028-1 R1-R7 identified in the Implementation Plan, it is ACES' opinion that the timelines identified for 50% and 100% compliance should be equal. We recommend the following change: "…fully compliant at 100% of their generating plant/Facilities within six (6) calendar years of the effective date of Reliability Standard PRC-028-1." Lastly, while an individual entity's compliance with a given requirement is auditable, their strategy for how they will manage their compliance is not auditable. Therefore, the requirement that an entity share their implementation strategy for PRC-028-1 R1-R7 with the ERO Compliance Monitoring and Enforcement Program staff should be struck from the Implementation Plan.

Likes 0	
Dislikes 0	

Response
Thanks for your comments. Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028. Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed.
Claudine Bates - Black Hills Corporation - 6

Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Sheila Suurmeier - Black Hills Corporation - 5	
Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Micah Runner - Black Hills Corporation - 1	
Answer	No
Document Name	
Comment	

Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Josh Combs, Black Hills Corporation, 5, 6, 1, 3; - Rachel Schuldt	
Answer	No
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Wendy Kalidass - U.S. Bureau of Reclamation - 5	
Answer	No
Document Name	
Comment	
Reclamation supports a 18-month implementation time frame.	
Likes 0	

Dislikes 0	

Response

Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan.

Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.

The compliance date for R8 is also revised.

Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro

Answer	No
Document Name	

Comment

Given BC Hydro’s comments to Question #3 above, and pending additional clarifications, BC Hydro is unable to support the proposed Implementation Plan at this stage.

Likes 0	
Dislikes 0	

Response

Thanks for your comments. See response to Question #3. Also note that considering other comments, the implementation plan is revised.
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1

through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.	
Kevin Conway - Public Utility District No. 1 of Pend Oreille County - 1,3,5,6	
Answer	No
Document Name	
Comment	
Entities should have to submit a plan that is approved by the Region as being reasonable. It is difficult to determine the number of facilities and how much equipment may have to be addressed by companies that will be impacted. Timelines are clean, but do not always represent the real-life situations that must be addressed.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply	

chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	No
Document Name	
Comment	
Until the definition of inverter-based resources is clearly defined, then FE would be supportive of the implementation plan.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment.	
Donald Lock - Talen Generation, LLC - 5	
Answer	No
Document Name	
Comment	
Talen supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. Refer to response to NAGF's comment.	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	
The PRC-002-5 implementation plan is fine as proposed (immediate) since the previous requirements did not change for the synchronous units. The two partitions of completion proposed, 50% & 100%, should be given equal time periods since the %'s are split in half - that is, the 100% time period should be "within six (6) calendar years of the effective date of PRC-028-1" (rather than in 5 calendar years). Entities should not have to share their strategy for implementation with the ERO Compliance Monitoring and Enforcement Program staff. This requirement should not be in the implementation plan. The 100% compliant date given for R8 doesn't make sense because there may not be any DME installed at the time specified. Consider using this, "R8 is applicable to each DME installation upon completion of the installation and commissioning of the DME equipment."	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply	

chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028. Recommendation to share implementation strategy with ERO Compliance Monitoring and Enforcement Program staff is removed. Compliance date for R8 is also clarified.	
Thomas Foltz - AEP - 5	
Answer	No
Document Name	
Comment	
Until further clarifications are provided regarding our expressed concerns, AEP would be unable to support a proposed Implementation Period.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to other comments and changes made to PRC-002/028 standards.	
David Vickers - David Vickers On Behalf of: Daniel Roethemeyer, Vistra Energy, 5; - David Vickers	
Answer	No
Document Name	
Comment	

With the timline provided it may be difficult to procure proper equipment in time to meet requirements.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.	
Wendy Devries - CMS Energy - Consumers Energy Company - 1,2 - RF	
Answer	No
Document Name	
Comment	
The implementation plan for PRC-028-1 is to short of a time frame. 50% within in 3years won't happen due to industry wide material and equipment shortages and delays. Implementation should be extended to at least a minimum of 7 years at 50%.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comments. The implementation plan is revised. In an initial posting, Entities were required to comply with Requirements R1 through R7 at 100% of their generating plants/Facilities within five (5) calendar years of the effective date PRC-028. However, the FERC Order 901 directs that the standard is fully effective and enforceable before 2030 (see P226). The implementation plan is revised and requires Entities to comply with Requirements R1 through R7 at 100% of their generating plant/Facilities by January 1, 2030. The Reliability Standard PRC-028-1 is expected to have a wide-ranging impact on Entities as many existing Facilities would be required to have disturbance monitoring equipment. Considering time needed to procure equipment, complete design, schedule outages, and install equipment, technical or supply chain constraints may prevent Entities from being fully compliant in a timeframe stated in the Implementation Plan. Requirement R9 allows Entities of an applicable Facility in commercial operation before the effective date of Reliability Standard PRC-028-1 that is not able to install disturbance monitoring equipment per Requirements R1 through R7 to develop, maintain, and implement a Corrective Action Plan. Further clarification is provided for facilities entering commercial operation after the effective date of the PRC-028.	
Denise Sanchez - Denise Sanchez On Behalf of: Diana Torres, Imperial Irrigation District, 1, 6, 5, 3; Jesus Sammy Alcaraz, Imperial Irrigation District, 1, 6, 5, 3; Tino Zaragoza, Imperial Irrigation District, 1, 6, 5, 3; - Denise Sanchez	
Answer	No
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for taking time to review the implementation plan. Considering all received comments, the implementation plan is revised. Please review the revised implementation plan.	
Jeremy Lawson - Northern California Power Agency - 5	
Answer	No
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for taking time to review the implementation plan. Considering all received comments, the implementation plan is revised. Please review the revised implementation plan.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	Yes
Document Name	
Comment	
OPG supports the NPCC RSC's comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NPCC RSC's comments.	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	Yes
Document Name	
Comment	
EEI supports the proposed phased Implementation Plan.	
Likes 0	

Dislikes 0	
Response	
Thanks for your support.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Marcus Bortman - APS - Arizona Public Service Co. - 6	
Answer	Yes
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Mark Fowler - Mark Fowler On Behalf of: David Jendras Sr, Ameren - Ameren Services, 3, 6, 1; - Mark Fowler	
Answer	Yes
Document Name	
Comment	
Ameren supports EEI's comments on this question.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Mike Magruder - Avista - Avista Corporation - 1	
Answer	Yes
Document Name	
Comment	
Phased implementation plan is acceptable.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	Yes
Document Name	

Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Glen Farmer - Avista - Avista Corporation - 5	
Answer	Yes
Document Name	
Comment	
Phased implementation plan is acceptable.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Robert Follini - Avista - Avista Corporation - 3	
Answer	Yes
Document Name	
Comment	
Phased implementation plan is acceptable.	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kacie Fischer - Kacie Fischer On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Kacie Fischer	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Stephen Whaite - Stephen Whaite On Behalf of: Lindsey Mannion, ReliabilityFirst , 10; - Stephen Whaite, Group Name ReliabilityFirst Ballot Body Member and Proxies	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

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	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ruchi Shah - AES - AES Corporation - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Alan Kloster - Alan Kloster On Behalf of: Jennifer Flandermeyer, Evergy, 3, 6, 5, 1; Jeremy Harris, Evergy, 3, 6, 5, 1; Kevin Frick, Evergy, 3, 6, 5, 1; Marcus Moor, Evergy, 3, 6, 5, 1; - Alan Kloster	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Kinte Whitehead - Exelon - 3	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Daniel Gacek - Exelon - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Brad Harris - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Matt Lewis - Lower Colorado River Authority - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Allie Gavin - Allie Gavin On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Allie Gavin	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Martin Sidor - NRG - NRG Energy, Inc. - 5,6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Leslie Hamby - Southern Indiana Gas and Electric Co. - 3,5,6 - RF	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Andrea Jessup - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Jessica Cordero - Unisource - Tucson Electric Power Co. - 1 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Todd Bennett - Associated Electric Cooperative, Inc. - 3, Group Name AECI	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Ijad Dewan - Ijad Dewan On Behalf of: Alain Mukama, Hydro One Networks, Inc., 1, 3; - Ijad Dewan	
Answer	
Document Name	
Comment	
No comments	
Likes 0	
Dislikes 0	

Response	
Thanks for your support.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC Entity Monitoring	
Answer	
Document Name	
Comment	
No comment	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

5. Provide any additional comments for the standard drafting team to consider, if desired.	
Wendy Devries - CMS Energy - Consumers Energy Company - 1,2 - RF	
Answer	
Document Name	
Comment	
PRC-028-1 should state clearly how to determine if IBRs are capable of recording or not. IBRs downstream of a feeder shouldn't be monitored as they aren't BES assets.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Refer to the Bulk Electric System Definition Reference Document, version 2 dated April 2014. Examples provided in figures 14-1 through 14-4 show that IBR units connected to collector feeders could be BES Elements.	
David Vickers - David Vickers On Behalf of: Daniel Roethemeyer, Vistra Energy, 5; - David Vickers	
Answer	
Document Name	
Comment	
Section 1.2. Agree with the exclusion for IBRs that are currently installed. No issues with IBR fault codes, alarms, etc but the operating mode, voltage/frequency ride-through, and control system values are either static configuration parameters or operational values which are not sequence of event points. Section 4. Agree with section 4 and it is the most important for analyzing localized or wide spread events.	
Likes 0	

Dislikes 0	

Response

Thanks for your comment. See revised requirements. The SDT recognizes that voltage/frequency ride-through mode status values are static in nature. The intent is to record change of status each time IBR unit enters or exits the ride-through mode.

Thomas Foltz - AEP - 5

Answer	
Document Name	

Comment

While AEP supports the efforts of the Standards Drafting Team and their overall direction in Phase II, we are concerned by what we perceive as an excessiveness of data granularity, especially when compared to those of synchronous machines in PRC-002. The follow items are of specific concern.

1) R3.1.2. – We see no justification for, nor reliability benefit in, requiring a minimum recording rate of 128 samples per cycle. The sample rate is eight times greater than that used for synchronous machines in the equivalent requirements of PRC-002, and far exceeds the maximum sampling rate of many relay models currently used. AEP would like to suggest instead using 16 samples per cycle.

2) Subparts of R1.2 – AEP questions the reliability benefit in requiring the data specified in the subparts, which includes data not captured as "sequence of events." In addition, why would this data be necessary for IBRs but not for synchronous machines?

AEP also questions the necessity of providing the data as several projects are currently underway to address the impact IBRs have had on the BES. The purpose of Project 2020-02 is to retire PRC-024-3 and replace it with a performance-based ride-through standard that ensures generators remain connected to the BPS during system disturbances. Specifically, this SAR focuses on the generator protection and control systems that can result in the reduction or disconnection of generating resources during these events. The SAR also ensures protection or controls that fail to ride through system events are analyzed, addressed with a corrective action plan (if possible), and reported to necessary entities for situational awareness.

3) 7.1 through 7.5 – As currently written, the requirements set no expectations to encourage a timely request for data, which may put data availability at risk. The Technical Rationale states "if a request for the data is made on Day 31, that is outside the 30 calendar days specified in

the requirement, and an entity would not be out of compliance if it did not have the data", however this is not made explicitly clear within the requirements themselves. In addition, recording devices often save and discard data using a "first in / first out" methodology, so thirty full days of meaningful data may not be available if a request is made several weeks after an event. The obtainer of the data needs ample opportunity to retrieve the data after the request, and if a request is made at the end of the allowable 30 day window, it is very possible that some of the desired data may no longer be available. The data at most risk for omission would be pre-event data as well as data at the time of the event. As a result, data "inclusive of the day the data was recorded" may no longer be available. To address the core of our concerns, clarity is needed regarding the standard's expectations regarding the minimum time period that a device is expected to retain historical information. As currently written, the standard seems to infer that a device might need to retain as many as 60 days of data in order to properly fulfill a request made 30 days after an event occurs. In addition, there is no specificity given regarding how much of the 30 days of data provided be either pre- or post-event.

Likes 0	
Dislikes 0	

Response
Thanks for your comments. IBRs are fast acting devices and hence the higher sampling rate is needed. However, considering comments, the minimum recording rate for FR data is reduced to 64 samples per cycle. R1 Part 1.2: This data would be helpful to understand the operation of IBR unit during a disturbance. The FR/DDR data recorded under the PRC-028 standard would be used to analyze performance of IBRs during system disturbances. This data will also be used for model validation. The data collected under this standard is anticipated as pre-requisite for proposed PRC-029 and PRC-030 standards. The data retrievable period in Requirement R7 is reduced to 20 calendar days from initially proposed 30 calendar days.

Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	
Document Name	

Comment	
NA	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Todd Bennett - Associated Electric Cooperative, Inc. - 3, Group Name AECI	
Answer	
Document Name	
Comment	
AECI supports the drafting teams approach to PRC-002 and PRC-028 except for the creation of standard specfic defined terms for "inverter based resource (IBR)" and "IBR unit". Currently there are at a minimum of 8 active NERC projects under development to address various IBR reliability issues, multiple projects contain inconsistent standard specific defined terms for IBR and IBR unit. NERC should coordinate with industry to develop BES glossary terms for IBR and IBR unit and apply the terms to all applicable standards.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. The project 2020-06 SDT is developing definitions for IBR and IBR unit.	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	
Document Name	
Comment	

A) Applicability section 4.2.5 is confusing. Is this facility item attempting to identify the required locations for DME to be added? If so, this is out of place and needs to be addressed in a requirement rather than in the applicability section only as is done in R1, 1.2.

B) In requirement R1 sub-parts 1.2.4 and 1.2.5, it is not clear what is desired to be recorded in the SER data.

C) There are multiple control systems in play at these facilities - Requirement R1, sub-part 1.2.6 needs to be very specific to which control system, which command value, which reference value, and which feedback signals are required to be monitored. Further, these signals are not well suited for SER recording, which typically are dry contact inputs used to determine the order of events rather than the time-variation of control and process variables.

D) Requirement sub-parts 3.1.3, 3.2.3, and 3.3.3 need to specify values to be considered as an (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc) overcurrent condition, dc reverse current condition, over frequency condition, underfrequency condition.

E) The inclusion of NERC as a recipient of information upon a request is not appropriate. NERC has other means of obtaining information that should be used, including Section 1600 data requests or NERC Alerts.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

The applicability section is revised. Parts 4.2.1 – 4.2.5 are removed.

Requirement R1, subpart 1.2.6 refers to control system associated with the IBR unit. Specifying generic values for declaration of (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc) overcurrent condition, dc reverse current condition, over frequency condition, and underfrequency condition is not possible. These values should be chosen based on equipment design, operating experience etc. Regarding NERC as a receipt of information upon a request comment, the standard drafting team reviewed this comment with NERC Staff, and disagrees that alternate mechanisms under the Rules of Procedure (Section 1600 request for information or a NERC Alert) are more appropriate for obtaining time-sensitive disturbance monitoring data under the requirements. Additionally, this language is modeled on approved PRC-002-4.	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	
Document Name	
Comment	
NERC Alert R-2023-03-14-01 Level 2 – Inverter-Based Resource Performance Issues (NERC Alert) and NERC Project 2021-04 PRC-028-1 (PRC-028-1) information appear to not align. For example: (a) NERC Alert information appears to be missing from SER/FR/DFR data requests. Is any of the following information needed to perform wide area analysis, fault analysis, other? While the following three items may possibly be included as specifications required in interconnect agreement data, are they also needed for PRC-028 requirements? • Active Power Ramp Rate (after momentary cessation) • Recovery time delay • Momentary Cessation- if in use- (may be covered by fault alarm (1.2.2) and operating mode change (1.2.3)	

(b) Are the below listed signals intended to be covered by R1.2.6 Control system command values, reference values, and feedback signals of the new 28 standard? Are they values that will impact the analysis performed by the RCs and BAs? The following were of concern in the NERC Alert: • frequency tripping time delay • frequency tripping inhibit (if used) • droop performance-this is affected by FERC Order No. 842 • Indication if ramp rate is being controlled by individual unit versus by plant level controller • Typically, if plant voltage level falls below its continuous operating range the individual inverters control operation – *does this constitute a change in operating mode as covered in R1.2.3?* • Maximum Power Point Tracking (MPPT) controls (if MPPT function was frozen to pre-contingency value or reset to default). (c) The NERC Alert highlights the following items. Should they be included in PRC-028-1 as triggers: • Inverter Instantaneous AC Voltage tripping • Inverter Instantaneous AC overcurrent • Inverter phase lock loop loss of sync • Inverter DC unbalance tripping Are any point of measure (POM) or point of interconnect (POI) triggers besides the following needed: • 3.1.3.1. Neutral (residual) overcurrent and • 3.1.3.2. AC phase overvoltage and undervoltage	
Likes 0	
Dislikes 0	

Response	
Thanks for your comment. The intent of PRC-028 is to have recording available from IBR unit and IBR plant that shows plant's performance during a disturbance for use with performance evaluation and model validation. Most items mentioned in comment are appropriate details to be reflected in IBR models.	
Donald Lock - Talen Generation, LLC - 5	
Answer	
Document Name	
Comment	
Talen supports the comments of the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comment.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	
Document Name	
Comment	
FE supports EEI's comments which state: **EEI Comments on PRC-028-1**: **Purpose Statement**: EEI does not agree that the purpose statement for this Reliability Standard aligns with the intended scope of this project. To address this concern, we offer the following edits in boldface:	

To have adequate data available from **a representative number of** inverter-based resources (IBR)**/Facilities** to facilitate **the** analysis **of IBR performance during** Bulk Electric System (BES) Disturbances.

Functional Entities: EEI does not agree with the Functional Entities as listed. We believe that PRC-028 should also include Reliability Coordinators (RC) in this list, noting that the SAR was never intended to require monitoring of IBRs at all locations. Instead, the SDT should develop a criteria for identifying where and when monitoring should be installed and the RC should be the entity that 1) utilizes that criteria to determine where monitoring is needed and 2) notifies owners of their obligations.

Applicability Section: EEI does not agree with the Applicability Section of Section 4.2 because it implies that inverter-based resources are to be included in the BES Definition, Inclusion I2. (See EEI comments for Question 1)

All Requirements: EEI does not agree that this project was intended to monitor all IBRs or IBR Facilities. In the SAR it clearly states that the intent is to install DDR at some locations, not all locations. The SAR also stated that the requirements were to be balanced against costs which given the magnitude of the proposed requirements, it is difficult to see where costs were adequately balanced.

Likes 0	
Dislikes 0	

Response

Thanks for your comment.

The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events.

The recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. As such, inclusion of Reliability Coordinator as an applicable Functional Entities is not required.

The Inclusion I2 of the BES definition is removed from the Applicability section.

Wendy Kalidass - U.S. Bureau of Reclamation - 5	
Answer	
Document Name	
Comment	
Reclamation does not agree with the modifications to the wording of BES Elements in R6 and R7 in the "Violation Severity Levels" section. 'Element' is sufficiently defined in the NERC Glossary of terms and 'BES Element' encompasses the required equipment (elements) for Disturbance Monitoring. Reclamation recommends keeping the original wording "for all applicable BES Elements". Reclamation concurs that all IBR resources should have and maintain their own separate standards.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The comment referring to VSL of R6 and R7 is in regard to PRC-002. The revision is to provide clarity and is based on SDT member's experience since the enforcement of PRC-002.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Josh Combs, Black Hills Corporation, 5, 6, 1, 3; - Rachel Schuldt	
Answer	
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	

Micah Runner - Black Hills Corporation - 1	
Answer	
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Sheila Suurmeier - Black Hills Corporation - 5	
Answer	
Document Name	
Comment	
Black Hills Corporation agrees with NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NAGF's comments.	
Claudine Bates - Black Hills Corporation - 6	
Answer	
Document Name	

Comment
Black Hills Corporation agrees with NAGF comments.

Likes 0	
Dislikes 0	

Response
Thanks for your comment. See response to NAGF's comments.

Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	
Document Name	

Comment
AEPC has signed on to ACES comments: Firstly, Section 4.2 of the proposed Reliability Standard PRC-028-1 is somewhat confusing and seems to be a bit redundant; specifically, sections 4.2.1 and 4.2.5. It appears that these specific sections are dictating where specific equipment should be installed in addition to the locations specified in the various requirements of the standard. We recommend using an approach similar to the one used in PRC-002-5 Section 4.2. To accomplish this, we recommend using the following verbiage: "BES Elements associated with inverter-based portions of generating plants/Facilities meeting the criteria set by Inclusion I2, Part (b) or Inclusion I4 of the BES definition." Secondly, Requirements 1.2.4 and 1.2.5 are unclear as to what values are to be recorded. We recommend that additional clarification be made to these sections. Thirdly, Requirement 1.2.6 seems to be out of place. In a typical Sequence of Event Recording setup digital inputs are used to determine the specific sequence of occurrence for recorded events. The signals identified in Requirement 1.2.6 are typically analog signals that vary over

time in response to process conditions. We recommend either removing this requirement altogether or being much more specific as to what information should be collected and how. Lastly, we disagree with the approach that NERC should be able to request information from an entity directly via a Reliability Standard requirement. Please note that we are not opposed to NERC requesting this information nor do we think it is inappropriate for NERC to receive said data. We do however disagree with the method of collection. It is our opinion that NERC should utilize the existing data collection mechanisms (i.e. Section 1600 data requests, NERC Alerts, etc.). Thank you for the opportunity to comment.

Likes 0	
Dislikes 0	

Response
Thanks for your comments. Sub-parts 4.2.1 through 4.2.5 in Section 4.2 are removed and where necessary, those BES Elements are included in the requirements itself. Requirement R1, Part 1.2 is revised based on received comments. Regarding NERC as a receipt of information upon a request comment, the standard drafting team reviewed this comment with NERC Staff, and disagrees that alternate mechanisms under the Rules of Procedure (Section 1600 request for information or a NERC Alert) are more appropriate for obtaining time-sensitive disturbance monitoring data under the requirements. Additionally, this language is modeled on approved PRC-002-4.

Jennie Wike - Jennie Wike On Behalf of: Hien Ho, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; John Merrell, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Ozan Ferrin, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; Terry Gifford, Tacoma Public Utilities (Tacoma, WA), 1, 4, 5, 6, 3; - Jennie Wike, Group Name Tacoma Power

Answer	
Document Name	

Comment	
Tacoma Power supports the MRO NSRF comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to MRO NSRF's comments.	
Marty Hostler - Northern California Power Agency - 4	
Answer	
Document Name	
Comment	
N/A	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Michael Whitney - Northern California Power Agency - 3	
Answer	
Document Name	
Comment	
N/A	

Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	
Document Name	
Comment	
PRC-028 - If the point of 4.2.5 is to monitor the individual inverter performance prior to being summed into a collector system, I would consider mandating the last IBR on each feeder is monitored, rather than one of the IBR units in the last 10% of each feeder.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The SDT agrees that monitoring the last IBR unit on each collector feeder would be ideal. However, realizing that in some cases, monitoring last IBR unit may not be feasible, and hence monitoring an IBR unit connected to “last 10% of collector feeder length” allows for some flexibility. Note that considering other comments, the language is revised to “at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus”.	
Pamela Hunter - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC, Group Name Southern Company	
Answer	
Document Name	
Comment	

A) Applicability section 4.2.5 is confusing. Is this facility item attempting to identify the required locations for DME to be added? If so, this is out of place and needs to be addressed in a requirement rather than in the applicability section only as is done in R1, 1.2.

B) In requirement R1 sub-parts 1.2.4 and 1.2.5, it is not clear what is desired to be recorded in the SER data.

C) There are multiple control systems in play at these facilities - Requirement R1, sub-part 1.2.6 needs to be very specific to which control system, which command value, which reference value, and which feedback signals are required to be monitored. Further, these signals are not well suited for SER recording, which typically are dry contact inputs used to determine the order of events rather than the time-variation of control and process variables.

D) Requirement sub-parts 3.1.3, 3.2.3, and 3.3.3 need to specify values to be considered as an (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc)overcurrent condition, dc reverse current condition, overfrequency condition, underfrequency condition.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

Sub-parts 4.2.1 through 4.2.5 in Section 4.2 are removed and where necessary those BES Elements are included in the requirements itself.

Requirement R1, subpart 1.2.6 is removed.

Specifying generic values for declaration of (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc) overcurrent condition, dc reverse current condition, over frequency condition, and underfrequency condition is not possible. These values should be chosen based on equipment design, operating experience, etc.

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

Answer	

Document Name	2021-04.PNG

Comment

1. PRC-028 applicability section 4.2.5 is confusing. Is this facility item attempting to identify the required locations for DME to be added? If so, this is out of place and needs to be addressed in a requirement rather than in the applicability section only as is done in R1, 1.2.

2. PRC-028 in requirement R1 sub-parts 1.2.4 and 1.2.5, it is not clear what is desired to be recorded in the SER data.

3. There are multiple control systems in play at these facilities – PRC-028 Requirement R1, sub-part 1.2.6 needs to be very specific to which control system, which command value, which reference value, and which feedback signals are required to be monitored. Further, these signals are not well suited for SER recording, which typically are dry contact inputs used to determine the order of events rather than the time-variation of control and process variables.

4. PRC-028 Requirement sub-parts 3.1.3, 3.2.3, and 3.3.3 need to specify values to be considered as an (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc)overcurrent condition, dc reverse current condition, overfrequency condition, underfrequency condition.

5. The inclusion of NERC as a recipient of information upon a request is not appropriate. NERC has other means of obtaining information that should be used, including Section 1600 data requests or NERC Alerts.

6. For SER data in R1.2 (PRC-028), what is acceptable proof of exclusion for IBR units installed prior to the effective date of this standard and not capable of recording this data?

7. In PRC-028 it is recommended there be an exclusion similar to R1.2 for FR data in R2.2 and R3.2 for IBR units installed prior to the effective date of this standard that are not capable of recording this data with the required triggering, length, or sample rate. If permitted, what is acceptable proof of exclusion?

8. In PRC-028 it is recommended there be an exclusion similar to R1.2 for FR data in R2.3 and R3.3 for dynamic reactive units installed prior to the effective date of this standard that are not capable of recording this data with the required triggering, length, or sample rate? If permitted, what is acceptable proof of exclusion?

9. In PRC-028 for SER and FR data in sections R1.2, R2.2, R2.3, R3.2 and R3.3, please clarify the exclusion applies if only some data recording capability is available but not all data that the data that is available. It seems cleaner to exclude these units completely rather than use a more complex piecemeal method which may be difficult to audit.

10.Would the following situation be considered a possible violation in PRC-028? There is a discovery of recorder failure as noted may occur in R8 during a time when data was requested per R7? (recorded data is not available due to the failure)

11. The PRC-028-1 technical rationale on page 2 states: "*The standard is only applicable to Transmission Owner in case where Transmission Owner owns equipment within the IBR Plant." Should "equipment" be clarified that it is applicable to monitored elements such as breakers, transformers, reactive units or IBRs?*

12. Review the two figures called scenario 1 and scenario 2 and clarify PRC-028 applicability. Consider that Trans owner bus may or may not be applicable for PRC-002.

Consider if there may be a registration or information gap where (GO) IBR/wind/solar owners that are less than 75MVA may need to comply with PRC-028 due to the >75MVA aggregation threshold.	
Likes 1	JEA, 1, McClung Joseph
Dislikes 0	

Response

Thanks for your comments.

The applicability section is revised. Parts 4.2.1 – 4.2.5 are removed.

Requirement R1, Part 1.2 is revised.

Specifying generic values for declaration of (ac/dc) overvoltage condition, (ac/dc) undervoltage condition, (ac/dc) overcurrent condition, dc reverse current condition, over frequency condition, and underfrequency condition is not possible. These values should be chosen based on equipment design, operating experience, etc.

Regarding NERC as a receipt of information upon a request comment, the standard drafting team reviewed this comment with NERC Staff, and disagrees that alternate mechanisms under the Rules of Procedure (Section 1600 request for information or a NERC Alert) are more appropriate for obtaining time-sensitive disturbance monitoring data under the requirements. Additionally, this language is modeled on approved PRC-002-4.

Requirement R1, Part 1.2 is revised. The term “installed” is replaced with “commercial operation” and also added term “without modification” for clarity.

The exclusion in R1, Part 1.2 recognizes limitation of IBR units in commercial operation before the effective date of this standard. Such exclusion is not necessary for dynamic reactive device connected to the collector bus.

The SDT cannot comment on comment #10.

Comment #11: Clarified as suggested.

The standard applies to facilities meeting the Inclusion I4 of the BES definition. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.

Mark Fowler - Mark Fowler On Behalf of: David Jendras Sr, Ameren - Ameren Services, 3, 6, 1; - Mark Fowler	
Answer	
Document Name	
Comment	
Ameren would like more clarification around R2.2, specifically the phrase “IBR unit connected to 10% of each collector feeder length.” 2.2.3: Are they referring to a DC collection system as opposed to a DC to AC conversion at each wind turbine or solar panel? Ameren is confused as to how we would collect this data. Ameren also supports EEI's comments on this question.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The standard does not refer to DC collection system. Please refer to examples included in the technical rationale.	
Marcus Bortman - APS - Arizona Public Service Co. - 6	
Answer	
Document Name	
Comment	

As stated in our response to question 3 above, AZPS does not agree that the SAR intended that all IBR facilities should be monitored. Instead, there should be a criteria for identifying where and when monitoring should be installed similar to PRC-002 and the RC should be the entity that determines where monitoring is needed and notifies owners of their obligations.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. As such, inclusion of Reliability Coordinator as an applicable Functional Entities is not required.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC Entity Monitoring	
Answer	
Document Name	
Comment	
No additional comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	

Answer	
Document Name	
Comment	
WEC Energy Group supports the additional comments provided by the NAGF.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to NAGF's comments.	
Allie Gavin - Allie Gavin On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Allie Gavin	
Answer	
Document Name	
Comment	
In PRC-002-5 Attachment 1, Bulk Electric System (BES) is spelled out in step 1 despite the acronym being used earlier in the Attachment and SER and FR acronym description are removed. All 3 terms are spelled out and acronyms identified in PRC-002-4 standard. Acronyms only are sufficient for all 3 in Attachment 1. In Figure 2 of the PRC-028-1 Technical Rationale, it is clear the TO breaker on the generator tie line is not applicable. Please clearly identify this in the applicability section of the standard to avoid confusion between GOs and TOs for 4.2.1 Add a figure of an IBR interconnection without local high-side transformer breaker to the transmission system via transmission line to a Transmission Owner Ring Bus Substation. Clarify that the Transmission owner ring breakers do not have PRC-028-1 SER/FR responsibilities.	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. The BES, SER, and FR are spelled out first time they appear in Attachment 1 of PRC-002.

PRC-028 Technical Rationale – The example related to Figure 2 (figure 2 in revised technical rationale) clearly states that "The SER and FR data requirements for the identified BES bus are per the requirements in the Reliability Standard PRC-002."

The project 2020-06 SDT is defining IBR, which will be used in PRC-028. The use of defined term would take care of last comment.

Michael Johnson - Michael Johnson On Behalf of: Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments

Answer	
Document Name	

Comment

PG&E has the following additional input:

1 – PG&E believes the current wording of Requirement R1, Part 1.2 provides an exception for the Generator Owner (GO) for units installed prior to the effective date of the standard but is not clear the exception would be provided to the Transmission Owner (TO). This is based on the text of "… IBR unit connected to the last 10% of each collector feeder length." This implies that it applies to the GO since they would be part of the last 10% of the feeder length.

To indicate that exemption applies to both the GO and TO, PG&E suggests the following:

Take the text "IBR units installed prior to the effective date of this standard and are not capable of recording this data are excluded", remove it from Part 1.2, and make it a footnote to the main R1 text. This would clearly indicate the exemption is for both the GO and TO.

2 – PG&E supports the NAGF input for Question 5 regarding having a methodology like PRC-002 to determine if SER/FR equipment are required verses the current draft approach of requiring all BES facilities to have the equipment. 3 – PG&E believes the PRC-028 recorder specification (sampling rate, etc..) are more stringent then PRC-002. PG&E recommends that PRC-028 should be brought into alignment with what is indicted in PRC-002.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. The exemption applies to TO as well, if TO owns IBR unit where monitoring is required. However, it is very unlikely that a TO would own an IBR unit (PV/BESS inverter, WTG, etc.) for which monitoring is required. See response to NAGF's comments. IBRs are fast acting devices requiring higher sampling rate. However, considering all comments, recording rate for FR data is reduced to 64 samples per cycle.	
Andy Fuhrman - Minnkota Power Cooperative Inc. - 1,5 - MRO	
Answer	
Document Name	
Comment	
MPC supports comments submitted by the MRO NERC Standards Review Forum (NSRF).	
Likes 0	
Dislikes 0	
Response	

Thanks for your comment. See response to MRO NSRF's comments.	
Ijad Dewan - Ijad Dewan On Behalf of: Alain Mukama, Hydro One Networks, Inc., 1, 3; - Ijad Dewan	
Answer	
Document Name	
Comment	
Not applicable	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6	
Answer	
Document Name	
Comment	
Dominion Energy supports EEI comments	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comments.	
Daniel Gacek - Exelon - 1	
Answer	

Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comments.	
Kinte Whitehead - Exelon - 3	
Answer	
Document Name	
Comment	
Exelon supports the comments submitted by the EEI.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comments.	
Alan Kloster - Alan Kloster On Behalf of: Jennifer Flandermeyer, Evergy, 3, 6, 5, 1; Jeremy Harris, Evergy, 3, 6, 5, 1; Kevin Frick, Evergy, 3, 6, 5, 1; Marcus Moor, Evergy, 3, 6, 5, 1; - Alan Kloster	
Answer	
Document Name	
Comment	

Evergy supports and incorporates by reference the comments of the Edison Electric Institute for question #5.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to EEI's comments.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	
Document Name	
Comment	

Firstly, Section 4.2 of the proposed Reliability Standard PRC-028-1 is somewhat confusing and seems to be a bit redundant; specifically, sections 4.2.1 and 4.2.5. It appears that these specific sections are dictating where specific equipment should be installed in addition to the locations specified in the various requirements of the standard. We recommend using an approach similar to the one used in PRC-002-5 Section 4.2. To accomplish this, we recommend using the following verbiage:

"BES Elements associated with inverter-based portions of generating plants/Facilities meeting the criteria set by Inclusion I2, Part (b) or Inclusion I4 of the BES definition."

Secondly, Requirements 1.2.4 and 1.2.5 are unclear as to what values are to be recorded. We recommend that additional clarification be made to these sections.

Thirdly, Requirement 1.2.6 seems to be out of place. In a typical Sequence of Event Recording setup digital inputs are used to determine the specific sequence of occurrence for recorded events. The signals identified in Requirement 1.2.6 are typically analog signals that vary over time in response to process conditions. We recommend either removing this requirement altogether or being much more specific as to what information should be collected and how.

Lastly, we disagree with the approach that NERC should be able to request information from an entity directly via a Reliability Standard requirement. Please note that we are not opposed to NERC requesting this information nor do we think it is inappropriate for NERC to receive

said data. We do however disagree with the method of collection. It is our opinion that NERC should utilize the existing data collection mechanisms (i.e. Section 1600 data requests, NERC Alerts, etc.). Thank you for the opportunity to comment.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. Sub-parts 4.2.1 through 4.2.5 in Section 4.2 are removed and where necessary, those BES Elements are included in the requirements itself. Considering received comments, Requirement R1, Part 1.2 is also revised. Regarding NERC as a receipt of information upon a request comment, the standard drafting team reviewed this comment with NERC Staff, and disagrees that alternate mechanisms under the Rules of Procedure (Section 1600 request for information or a NERC Alert) are more appropriate for obtaining time-sensitive disturbance monitoring data under the requirements. Additionally, this language is modeled on approved PRC-002-4.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	
Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	

Thanks for your support.	
Ruchi Shah - AES - AES Corporation - 5	
Answer	
Document Name	
Comment	

AES Clean Energy questions the reliability need for the proposed requirements at all IBRs because this goes beyond what is required at traditional synchronous plant facilities under current PRC-002. As stated in the Purpose statement, the intent of this Reliability Standard is to "have **adequate** data available from inverter-based resources (IBR) to facilitate analysis of Bulk Electric System (BES) Disturbances." This implies that the needs are not everywhere for data to assist in analyzing disturbance events. AES Clean Energy recommends the Standard Drafting Team consider adding requirement(s) for the Transmission Owner and/or Reliability Coordinator to develop a list of IBRs in their areas that require data based on a set of criteria similar to what is currently in PRC-002 and notify the affected GOs. Along with that, AES Clean Energy also recommends that Standard Drafting Team develop a set of criteria that can be used by the TO/RC to assess where disturbance monitoring equipment should be installed in their region. This set of criteria may include:

- Minimum MW/MVA threshold for IBRs requiring SER/FR/DDR
- Amount of IBRs connected in a particular area of the TO/RC region
- Level of grid strength of areas within the TO/RC region

There may be a need for a requirement for the TO/RC to assess periodically to determine a new list of IBRs, similar to PRC-002.

AES Clean Energy also urges the ERO to be considerate of the cost of installing these equipment while drafting the expecations of the standard and identify different options to ensure reliability of the interconnection. The above recommendations are to ensure that reliability is achieved through a reasonable cost approach.

Likes 0	
Dislikes 0	
Response	

Thanks for your comment.

The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. As such, inclusion of Reliability Coordinator as an applicable Functional Entities is not required.

The SDT is cognizant of costs associated with implementing the proposed Reliability Standard PRC-028-1. In an initial posting, the SDT proposed to require SER and FR data from at least one IBR unit connected to last 10% of “each” collector feeder. However, to balance the cost and reliability need, the SER and FR data are now required from at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus. Additionally, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle. The data retrievable period is also reduced to 20 calendar days from initially proposed 30 calendar days.

Steven Taddeucci - NiSource - Northern Indiana Public Service Co. - 3	
Answer	
Document Name	
Comment	
PRC-028-1 R1 sub-part 1.2.6 is not clear as to what control system values, reference values, and feedback signals need to be monitored.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. R1, Part 1.2.6 is removed.	
Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name NPCC RSC	

Answer	
Document Name	
Comment	
NPCC RSC supports the drafting team proposal.	
Likes 0	
Dislikes 0	
Response	
Thanks for your support.	

Rachel Coyne - Texas Reliability Entity, Inc. - 10

Answer	
Document Name	
Comment	

Texas RE has the following comments for PRC-028-1:

- Texas RE recommends the drafting team define Inverter-based Resources (IBR) as it is being used increasingly in standard requirement language and a NERC Glossary definition would drive consistency. Footnote 2 may not be clear and it is inconsistent with the footnote description of IBR in proposed EOP-004-4.
- Texas RE recommends revising the PRC-028-1 Title to include all the applicable inverter-based systems such as STATCOM, SVC, HVDC, etc., other than the traditional inverter-based resources. Texas RE recommends the following verbiage: “Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources and Dynamic Devices”.
- Texas RE noticed that Section A 4.2.4 includes shunt static devices, but that device type does not appear anywhere in the requirement language. Texas RE inquires as to why this is included in section A 4.2.4
- The technical rational for PRC-028-1 states that SER data is required from all IBR units connected to last 10% of each collector feeder. Requirement 1.2, however, can be interpreted to needing the SER data from only one IBR unit from each feeder. Texas RE recommends making the requirement language consistent with the language in the technical rationale. In addition, SDT should

consider providing clarification on the 'installed date' for the IBRs that are excluded from this requirement, whether this date is the date at which the IBR is installed in the field or the date at which the IBR is synchronized to grid or the date of commercial operation. Additionally, the requirement should state that the Generator Owner shall document the IBR recording limitations including OEM data sheet or other equipment specifications.
    - Texas RE recommends the following verbiage for Requirement Part 1.2: "All IBR units connected to last 10% of each collector feeder length. The Generator Owner shall document the IBR recording limitations and provide the information to its Reliability Coordinator, Regional Entity, or NERC, upon request. Evidence may include OEM data sheet or other equipment specifications."
    - Texas RE recommends the technical rationale include the following: "IBR units with commercial operation date prior to the effective date of this standard and are not capable of recording this data are excluded."
- Texas RE seeks clarity on the sub parts of Requirement Part 1.2 regarding what specifically needs to be recorded.
- Texas RE recommends the SDT clarify whether the data included in R2.1.3 and R2.3.3 can be calculated values or not. Texas RE recommends the following verbiage for Requirement Part 2.1.3: "Three phase Real and Reactive Power (measured or calculated)"
- Requirement Part R2.2 states that IBR unit FR data is needed; however, the sub-requirements state the data can be from the unit terminals or on high-side of the IBR unit transformer. If more than one IBR units are connected to a transformer, then IBR unit level data will not be available based on the current language.
    - Texas RE recommends the language for R2 be changed to "…as applicable, at IBR unit terminals or on high-side of the IBR unit transformer if no more than one IBR is connected to a unit transformer."
- Texas RE requests the sub requirements not include the Regional Entity and NERC. Regional Entities and NERC may request data from registered entities in accordance with section 1600 of the Rules of Procedure.
- Since PRC-028 is intended to have a similar purpose as PRC-002, but specific to IBRs, Texas RE recommends PRC-028 Requirement R7 should mirror PRC-002 Requirement R11. Texas RE inquires as to why IBRs can retrieve data for 30 days while conventional units only have 10 days to retrieve data.
- Texas RE also inquires as to why the synchronized clock accuracy in PRC-028 Requirement R6 is plus/minus 100 milliseconds of UTC, but in PRC-002 Requirement R10, it is plus/minus 2 milliseconds.
- Additionally, Texas RE noticed the PRC-002 Requirement R9 output 30 times per second versus PRC-028 Requirement R5 output is 60 times per second.
- Texas RE requests the SDT update Section C Compliance to the most updated version. For example, Compliance Violation Investigations listed in section C 1.3 do not exist.

Likes 0	
Dislikes 0	

Response

Thanks for your comments.

The project 2020-06 SDT is developing definitions for IBR and IBR unit, which will be used in PRC-028 standard.

Including monitoring requirements for dynamic reactive devices and HVDC transmission lines is outside the scope of this SAR.

FR data for shunt dynamic reactive devices is required as outline in Reequipments R2, Part 2.3 and Requirement R3, Part 3.3. Static shunt reactive devices, e.g., capacitor bank, is not required. The SER data from a shunt static or dynamic reactive device is required as outlined in Requirement R1, Part 1.1.

Regarding monitoring of IBR unit on collector feeder: Based on comments received, language is revised. Please review and provide feedback.

The term “installed” is replaced with “commercial operation”. Following is added in technical rationale for R1: For IBR Unit in commercial operation prior to the effective date of this standard, SER is data is required, if IBR Unit is capable of recording. Requirement R1, Part 1.2 is revised based on received comments.

R2 states “FR data to determine following electrical quantities” implies that specified quantities could be measured or calculated.

Regarding NERC/Regional Entity as a receipt of information upon a request comment, the standard drafting team reviewed this comment with NERC Staff, and disagrees that alternate mechanisms under the Rules of Procedure (Section 1600 request for information or a NERC Alert) are more appropriate for obtaining time-sensitive disturbance monitoring data under the requirements. Additionally, this language is modeled on approved PRC-002-4.

The data retrievable period is reduced to 20 days in R7. See technical rationale for R7.

The time synchronization accuracy is revised to +/- 1ms. See technical rationale for R6. The DDR output rate of 60 times per second is required to capture fast response of IBRs during system disturbances and aligns with latest in recording technology. Section C compliance is updated.

Hillary Creurer - Allete - Minnesota Power, Inc. - 1	
Answer	
Document Name	
Comment	
Minnesota Power's comments are aligned with the MRO NSRF & EEI comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to MRO NSRF and EEI's comments.	

Bret Galbraith - Seminole Electric Cooperative, Inc. - 6	
Answer	
Document Name	
Comment	
1. In the draft Standard PRC-028, Requirement R1.2, a value of 10% is employed. Reviewing significant digits, it's unclear whether this is 10% or 10.0%, etc. Can the NERC STD provide additional guidance? 2. Some IBR units may be procured prior to the enforcement date of the Standard. Due to supply chain issues, PRC-028 R1.2 should be modified to allow an exemption for sites "procured" prior to the FERC approval of this Standard.	

3. PRC-028 R1.2 states "and are not capable of recording this data are excluded". Can the SDT provide examples of situations where an IBR is "not capable" of recording this data. This will help provide a basis for discussion with auditors who may assert that "capable" is a vague term, which may lead to unintended disagreements between a utility and audit staff. 4. It's unclear whether NERC intends to modify PRC-028 if traditional non-BES IBR are added to NERC Standards pursuant to parallel analysis ongoing at NERC. Can the NERC SDT comment on how it will deal with IBR that connects at less than 100 kV or is less than 75 MVA, etc., i.e., non-traditional BES sources?	
Likes 0	
Dislikes 0	
Response	
Thank you for your comments. Applicable requirements are revised to state that monitoring of IBR unit connected at a distance greater than or equal to 90% of the longest collector feeder is required. The word "installed" is replaced with "commercial operation" to provide clarity. The "without modification" is added for clarify the exception for IBR units. The standard applies to facilities meeting the Inclusion I4 of the BES definition. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details.	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	
Document Name	
Comment	
The NAGF notes that PRC-002 uses a methodology/threshold for selecting BES buses that require Sequence of Events Recording (SER) and Fault Recording (FR) Data. The NAGF recommends that the Standard Drafting Team consider a similar approach for PRC-028, requiring the TO and RC to identify areas within their regions that are susceptible to disturbances (or high concentration of IBRs) that would benefit from	

monitoring and recording capabilities. This would mitigate the financial impact to the industry as a whole, and target the investment on the areas that need it most.	
Likes 0	
Dislikes 0	
Response	
Thank you for your comments. The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs.	
Romel Aquino - Edison International - Southern California Edison Company - 3	
Answer	
Document Name	
Comment	
See comments submitted by the Edison Electrical Institute	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	

Document Name	
Comment	

EEI Comments on PRC-028-1:

Purpose Statement: EEI does not agree that the purpose statement for this Reliability Standard aligns with the intended scope of this project. To address this concern, we offer the following edits in boldface:

To have adequate data available from **a representative number of** inverter-based resources (IBR)**/Facilities** to facilitate **the** analysis **of IBR performance during** Bulk Electric System (BES) Disturbances.

Functional Entities: EEI does not agree with the Functional Entities as listed. We believe that PRC-028 should also include Reliability Coordinators (RC) in this list, noting that the SAR was never intended to require monitoring of IBRs at all locations. Instead, the SDT should develop a criteria for identifying where and when monitoring should be installed and the RC should be the entity that 1) utilizes that criteria to determine where monitoring is needed and 2) notifies owners of their obligations.

Applicability Section: EEI does not agree with the Applicability Section of Section 4.2 because it implies that inverter-based resources are to be included in the BES Definition, Inclusion I2. (See EEI comments for Question 1)

All Requirements: EEI does not agree that this project was intended to monitor all IBRs or IBR Facilities. The SAR states that the intent is to install DDR at some locations, not all locations. The SAR also stated that the requirements were to be balanced against costs which given the magnitude of the proposed requirements, it is difficult to see where costs were adequately balanced.

EEI recommends the SDT develop a criteria that can be used by RCs in assessing where disturbance monitoring should be installed to ensure BES performance is effectively analyzed during disturbances, particularly in areas of high IBR penetration.

Likes 0	
Dislikes 0	

Response
Thanks for your comments.

The purpose of the proposed Reliability Standard PRC-028 is revised to clarify that adequate monitoring data is available from IBRs to facilitate analysis of IBR performance during BES disturbances or events. Additionally, the recently published FERC order 901 directs NERC to include technical criteria to require registered IBR generator owners to install disturbance monitoring equipment at their buses and elements, to require registered IBR generator owners to provide disturbance monitoring data to Bulk-Power System planners and operators for analyzing disturbances on the Bulk-Power System. Additionally, the disturbance monitoring data is to be used by planners and operators to validate registered IBR models. The FERC order 901 reinforces the approach taken by this SDT to require monitoring for all IBRs. As such, inclusion of Reliability Coordinator as an applicable Functional Entities is not required. The Inclusion I2 is removed from the Applicability Section.	
Michael Jones - National Grid USA - 1	
Answer	
Document Name	
Comment	
RE: Section C. Compliance: PRC-002-5 and PRC-028-1: Please consider updating section "1.3 Compliance Monitoring and Enforcement Program" with the most recent NERC wording for this section. Please consider removing section "1.4 Additional Compliance Information - None."	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Section C, 1.3 is revised and 1.4 is removed.	
Alison MacKellar - Constellation - 5	
Answer	
Document Name	
Comment	

Constellation does not have any additional comments. Alison Mackellar on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. Section C, 1.3 is revised and 1.4 is removed.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	
Document Name	
Comment	
OPG supports the NPCC RSC's comments.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to NPCC RSC's comments.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	
Document Name	
Comment	

The requirement to install recording devices to capture IBR performance data through PRC-028-1 should align as closely as possible with the implementation timeframe for the changes made to EOP-004 in Project No. 2023-01 (EOP-004 IBR Event Reporting). This will help ensure that the Events Analysis process has all pertinent data available to make more thorough assessments of IBR-related events.

The SRC believes that referencing just Part (b) of Inclusion I2 in Section 4.2 of the Applicability section of PRC-028-1 is unnecessary, as the language already limits applicability to IBRs and it would be inappropriate to exclude any individual IBRs with a gross individual nameplate rating greater than 20 MVA from the applicability of the standard. The SRC therefore recommends that Section 4.2 of the Applicability section of PRC-028-1 be modified as follows: "The following Elements associated with the inverter-based portion of generating plants/Facilities meeting the criteria set by Inclusion I2 or Inclusion I4 of the BES definition." The SRC has proposed a corresponding modification to the Applicability section of PRC-002-5 in its response to question 1, above. The SRC also recommends that the Applicability section of both standards be aligned with the IBR registration criteria that NERC is in the process of developing under FERC proceeding RD22-4-001.

Based on its review of the draft standards, the SRC is concerned that it is unlikely that transmission system buses in areas of high IBR penetration will be required to have disturbance monitoring and the SRC notes that this monitoring is critical to determining IBR performance on the power system. The Applicability of PRC-028-1 is limited to IBR Facilities, and the methodology in PRC-002-5 Attachment 1 appears to focus on identifying buses with higher fault current levels, which are unlikely to be located in areas with high IBR penetration. The SRC requests that the SDT confirm whether this is the intent of the standards and revise the standards appropriately if this is not the intent.

The SRC notes that PRC-028-1, Requirement 3, Parts 3.1.3, 3.2.3, and 3.3.3 require various forms of trigger settings but do not define associated trigger thresholds. The SRC is concerned that the absence of trigger thresholds will result in inadequate data collection and recommends that the standard be revised to establish default trigger thresholds that apply unless otherwise agreed by the Reliability Coordinator. One possible default threshold would be a requirement that data be captured whenever an IBR changes modes.

Regarding Requirement R7, Part 7.2, the SRC is concerned that allowing 30 calendar days for data to be provided will result in an unacceptably risky delay in the event analysis process. To address this issue, the SRC recommends that Part 7.2 be revised to require that data be provided as soon as possible, but no later than 7 calendar days after a request. PMUs can provide the same data and data storage capabilities this standard requires from DDRs while also providing real-time reporting capability. We ask the project team to affirm PMUs as a means to provide the required data. If so, the performance requirements should not limit any viable option.

The SRC is concerned that Requirement R8 is inadequate to ensure availability of critical data. To address this issue, the SRC recommends that R8 be revised to require regular testing and maintenance of recording equipment and associated infrastructure or to provide that a failure to provide requested data is a violation of PRC-028-1 regardless of the cause of the failure to provide data.

Finally, the SRC recommends that the following revisions be made to PRC-028-1 to more closely align it with table 19 of IEEE 2800:

- Revise Requirement R2, Part 2.1 to require the following additional data points:

o Bus frequency,

o Calculated active and reactive power output, and

o Applicable binary status (e.g., relay out codes).

- Revise Requirement R2, Part 2.2 to require the following additional data points at the plant level:

o Bus frequency,

o Calculated active and reactive power output, and

o Applicable binary status (e.g., relay out codes).

- Revise Requirement R2, Part 2.3 to require bus frequency as an additional data point.

- Revise the total record length in Requirement R3, Parts 3.1.1, 3.2.1, and 3.3.1 from 2 seconds to 5 seconds.

- Revise Requirement R4, Part 4.2 to require the phase current AND the positive sequence current instead of only requiring one or the other.

- Revise Requirement R6, Part 6.2 to require data synchronization accuracy to 1 microsecond at the plant level and 100 microseconds at the unit level.

- Revise the data retention periods in Requirement R7, Part 7.1 to 90 days for SER and FR data and 1 year for DDR data.

- Align the SER data format in Attachment 1 with the format used in IEEE 2800 table 19 and with PRC-002 Attachment 2 by revising it to read as follows:

o Date, Time, Local Time Code, Plant Substation, Device, State, Event type (status changes, synchronization status, configuration change, etc.), Sequence number (for potential overwriting).

o The SRC notes that some breakers may be owned by the generator owner at the station beyond the first station.

- Revise Requirement R7, Part 7.4 to include a reference to IEEE revision C37.111-2013 or later.

Likes 0	
Dislikes 0	

Response

Thank you for your comments. The IBR event reporting via EOP-004 under Project No. 2023-01 is achieved by using of SCADA data. Installation of additional equipment is not expected for this task. The installation of disturbance monitoring equipment would be required to comply with the PRC-028. The implementation plan for the PRC-028 accounts for time needed to design, procure, and install necessary equipment to record required data.

Considering other comments received, the Inclusion I2 of the BES definition is removed from the Applicability Section. For now, the standard would apply to facilities meeting the Inclusion I4 of the BES definition. As directed by recent FERC Orders (Order No. 901 and IBR Registration Order), the standard would also apply to Non-BES Inverter-Based Resources that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. Refer to technical rationale for more details. The intent of PRC-028 is to require monitoring at all IBR facilities. The PRC-002 may not identify transmission buses where IBRs usually connect, however, given that all IBRs will be monitored under the PRC-028, the SDT do not see any gap. The PRC-028 does not specify trigger levels, as is the case in PRC-002 as well. It is impractical to specify trigger levels that work for all IBRs connected at various locations in all three interconnections. PMU is one type of dynamic disturbance recorder. The dynamic disturbance recorder is a more generalized term for the purpose and hence used here. PMU could be used to record required quantities. The 30-calendar time allowed is consist with time allowed in PRC-002. Requirement R8 in PRC-028 is consistent with similar requirement in PRC-002. The recording of frequency is specified in R4. The frequency should be same throughout the plant. The recording of quantities as specified should be enough to derive quantities that are not specified, such as, positive-sequence current or voltage, etc. The SDT received some feedback from OEMs regarding time synchronization accuracy. A better accuracy is always preferred, the accuracy specified in the standard strikes a balance between the latest technology and real world challenges of implementing it. Some of these issues were likely not considered by or known to WG developing IEEE Std 2800.	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	
Document Name	
Comment	

PNMR is in support of EEI's commnents for question 5.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comment. See response to EEI's comments.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	
Document Name	
Comment	
ERCOT joins the comments submitted by the IRC SRC for this question and adopts them as its own.	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments. See response to IRC SRC's comments	
Kimberly Turco - Constellation - 6	
Answer	
Document Name	
Comment	
Constellation does not have any additional comments.	

Kimberly Turco on behalf of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Thanks for your comments.	

Israel Perez (Proxy for Thomas Johnson) – Salt River Project

Questions:

1. Yes

   Response: Thanks for your support.

2. Yes

   Response: Thanks for your support.

3. No

   PRC-028 -The data sampling rates seem excessive and are a significant increase from the requirements in PRC-002. These sampling rates will prevent the use of protective relaying to satisfy the standard, which will increase cost burden

   Response: Thanks for your comment. The IBRs are fast acting devices and hence, high sampling rate compared to one specified in PRC-002 is required. However, considering comments submitted by the industry, minimum recording rate for FR data is reduced to 64 samples per cycle from initially proposed 128 samples per cycle.

4. Yes

   Response: Thanks for your support.

5. Additional Comments

   PRC-028 - If the point of 4.2.5 is to monitor the individual inverter performance prior to being summed into a collector system, I would consider mandating the last IBR on each feeder is monitored, rather than one of the IBR units in the last 10% of each feeder.

Response: Thanks for your comment. The SDT agrees that monitoring the last IBR unit on each collector feeder would be ideal. However, realizing that in some cases, monitoring last IBR unit may not be feasible, and hence monitoring an IBR unit connected to "last 10% of collector feeder length" allows for some flexibility. Note that considering other comments, the language is revised to "at least one IBR unit on any of the collector feeders that is connected at a distance ≥ 90% of the longest collector feeder from the collector bus".