Comment Report

Project Name:	2022-04 EMT Modeling - Revisions to FAC-001-4 and FAC-002-4 | SAR
Comment Period Start Date:	12/11/2024
Comment Period End Date:	1/21/2025
Associated Ballots:	

There were 39 sets of responses, including comments from approximately 127 different people from approximately 87 companies representing 10 of the Industry Segments as shown in the table on the following pages.

Questions

1. Do you agree that only FAC-001 and FAC-002 standards should be revised to fulfill the scope of the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope please provide your recommendation and explanation.

2. Do you agree that the Project Scope will fulfill all aspects of the Purpose or Goal? If you do not agree, or if you agree and wish to provide comments or suggestions for the project scope, please provide your recommendation and explanation?

3. Do you agree that the Detailed Description provides the full list of technical specifications to fulfill the Project Scope? If you do not agree, or if you agree and wish to provide comments or suggestions for the project scope, please provide your recommendation and explanation?

4. Provide any additional comments for the drafting team to consider, if desired.

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
BC Hydro and Power Authority	Adrian Andreoiu	1,3,5	WECC	BC Hydro	Hootan Jarollahi	BC Hydro and Power Authority	3	WECC
					Helen Hamilton Harding	BC Hydro and Power Authority	5	WECC
					Adrian Andreoiu	BC Hydro and Power Authority	1	WECC
MRO	Anna Martinson	1,2,3,4,5,6	MRO	MRO Group	Shonda McCain	Omaha Public Power District (OPPD)	1,3,5,6	MRO
					Michael Brytowski	Great River Energy	1,3,5,6	MRO
					Jamison Cawley	Nebraska Public Power District	1,3,5	MRO
					Jay Sethi	Manitoba Hydro (MH)	1,3,5,6	MRO
					Husam Al-Hadidi	Manitoba Hydro (System Preformance)	1,3,5,6	MRO
					Kimberly Bentley	Western Area Power Adminstration	1,6	MRO
					George Brown	Pattern Operators LP	5	MRO
					Amy Key	MidAmerican Energy Company (MEC)	1	MRO
					Dane Rogers	Oklahoma Gas and Electric (OG&E)	1,3,5,6	MRO
					Seth Shoemaker	Muscatine Power & Water	1,3,5,6	MRO
					Michael Ayotte	ITC Holdings	1	MRO

					Andrew Coffelt	Board of Public Utilities-Kansas (BPU)	1,3,5,6	MRO
					Peter Brown	Invenergy	5,6	MRO
					Angela Wheat	Southwestern Power Administration	1	MRO
					Joshua Phillips	Southwest Power Pool	2	MRO
					Patrick Tuttle	Oklahoma Municipal Power Authority	4,5	MRO
					Hayden Maples	Evergy	1,3,5,6	MRO
Southwest Power Pool, Inc. (RTO)	Charles Yeung	2	MRO,NPCC,RF,SERC,SPP RE,Texas RE,WECC	SRC 2024	Charles Yeung	SPP	2	MRO
					Ali Miremadi	CAISO	1	WECC
					Greg Campoli	NYISO	1	NPCC
					Matt Goldberg	ISO New England	2	NPCC
					Helen Lainis	IESO	2	NPCC
					Elizabeth Davis	PJM	2	RF
Exelon	Daniel Gacek	1,3		Exelon	Daniel Gacek	Exelon	1	RF
					Kinte Whitehead	Exelon	3	RF
Eversource Energy	Joshua London	1,3		Eversource	Joshua London	Eversource Energy	1	NPCC
					Vicki O'Leary	Eversource Energy	3	NPCC
Entergy	Julie Hall	1,3,6		Entergy	Oliver Burke	Entergy - Entergy Services, Inc.	1	SERC
					Jamie Prater	Entergy	5	SERC
FirstEnergy - FirstEnergy Corporation	Mark Garza	1,3,4,5,6		FE Voter	Julie Severino	FirstEnergy - FirstEnergy Corporation	1	RF
					Aaron Ghodooshim	FirstEnergy - FirstEnergy Corporation	3	RF

					Robert Loy	FirstEnergy - FirstEnergy Solutions	5	RF
					Mark Garza	FirstEnergy- FirstEnergy	1,3,4,5,6	RF
					Stacey Sheehan	FirstEnergy - FirstEnergy Corporation	6	RF
DTE Energy - Detroit Edison Company	Mohamad Elhusseini	3,5		DTE Energy	Mohamad Elhusseini	DTE Energy	5	RF
					Patricia Ireland	DTE Energy	4	RF
					Marvin Johnson	DTE Energy - Detroit Edison Company	3	RF
Black Hills Corporation	Rachel Schuldt	1,3,5,6		Black Hills Corporation - All Segments	Trevor Rombough	Black Hills Corporation	1	WECC
					Josh Combs	Black Hills Corporation	3	WECC
					Rachel Schuldt	Black Hills Corporation	6	WECC
					Carly Miller	Black Hills Corporation	5	WECC
					Sheila Suurmeier	Black Hills Corporation	5	WECC
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
					Deidre Altobell	Con Edison	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
					Dermot Smyth	Con Ed - Consolidated	1	NPCC

	Edison Co. of New York		
David Burke	Orange and Rockland	3	NPCC
Salvatore Spagnolo	New York Power Authority	1	NPCC
Sean Bodkin	Dominion - Dominion Resources, Inc.	6	NPCC
Silvia Mitchell	NextEra Energy - Florida Power and Light Co.	1	NPCC
Sean Cavote	PSEG	4	NPCC
Jason Chandler	Con Edison	5	NPCC
Shivaz Chopra	New York Power Authority	6	NPCC
Vijay Puran	New York State Department of Public Service	6	NPCC
David Kiguel	Independent	7	NPCC
Joel Charlebois	AESI	7	NPCC
Joshua London	Eversource Energy	1	NPCC
Joel Charlebois	AESI	7	NPCC
John Hastings	National Grid	1	NPCC
Erin Wilson	NB Power	1	NPCC
James Grant	NYISO	2	NPCC
Michael Couchesne	ISO-NE	2	NPCC
Kurtis Chong	IESO	2	NPCC
Michele Pagano	Con Edison	4	NPCC
Bendong Sun	Bruce Power	4	NPCC
Carvers Powers	Utility Services	5	NPCC

					Wes Yeomans	NYSRC	7	NPCC
					Emma Halilovic	Hydro One	1,3	NPCC
					Philip Nichols	National Grid	1	NPCC
					Emma Halilovic	Hydro One	1,3	NPCC
					Caver Powers	Utility Services	5	NPCC
Southwest Power Pool, Inc. (RTO)	Shannon Mickens	2	MRO,SPP RE,WECC	SPP RTO	Shannon Mickens	Southwest Power Pool Inc.	2	MRO
					Mia Wilson	Southwest Power Pool Inc.	2	MRO
					Doug Bowman	Southwest Power Pool Inc.	2	MRO
					Jonathan Hayes	Southwest Power Pool Inc.	2	MRO
					Jeff McDiarmid	Southwest Power Pool Inc.	2	MRO
					Dee Edmondson	Southwest Power Pool Inc	2	MRO
					Mason Favazza	Southwest Power Pool Inc	2	MRO
					Zach Sabey	Southwest Power Pool Inc	2	MRO
					Josh Phillips	Southwest Power Pool Inc.	2	MRO
Western Electricity Coordinating Council	Steven Rueckert	10		WECC	Steve Rueckert	WECC	10	WECC
					Curtis Crews	WECC	10	WECC

1. Do you agree that only FAC-001 and FAC-002 standards should be revised to fulfill the scope of the SAR? If you do not agree, or if you agree but have comments or suggestions for the project scope please provide your recommendation and explanation.

Thomas Foltz - AEP - 3,5,6

Answer	No
Document Name	

Comment

Please see AEP's comments and concerns provided in the response field for Question #4.

Likes 0	
Dislikes 0	

Response

Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy

Answer	No
Document Name	

Comment

Since NERC Standards are not enforceable until after commercial operation is obtained, not sure how these new requirements will prevent BPS reliability issues since the Standards will not apply until after the facility is commissioned for GO reqmnts

MOD-032 will likely also need to be revised to have alignment with the new FAC-001 and FAC-002 requirements so that follow on models are the same as what is required during the interconnection process.

MOD-026 and MOD-027 may need to be modified to obtain additional information as may be required during the interconnection process and FAC-001/FAC-002

Consideration for revision of PRC-019, PRC-029, PRC-025, and PRC-027 may be warranted when establishing new protection system requirements.

PRC-005 may need revision to include commissioning testing or follow on testing requirements to ensure the facility can still comply with the commissioning requirements documented in FAC-002 throughout its lifetime.

Likes 0	
Dislikes 0	

Response

Joshua London - Eversource Energy - 1,3, Group Name Eversource

Answer	No

Document Name	
Comment	

Because the impacts of large amounts of IBR tripping can affect more than just the entity to which the IBR is interconnected, there needs to be clearly-defined minimum requirements for all IBR. Given that some entities rely heavily or entirely on high-level requirements established in the pro-forma LGIA and have not expanded upon these requirements, FAC-001 and FAC-002 should be enhanced to clearly describe the performance-based requirements for all IBR. This will both improve system reliability and provide GOs consistent expectations and experiences throughout the continent.

Given that the performance of an IBR can be significantly impacted by firmware implemented in the controls; test, verification, and documentation of performance should not only be required during the commissioning process but also whenever IBR firmware is updated or changed. Documentation that the updated in-service facility matches the models used during the interconnection process should be provided by the GO to the TO, PC, and RC. For example, should MOD-026 be included in this SAR?

Likes 0	
Dislikes 0	
Response	

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

Answer	No
Document Name	
Comment	

Duke Energy supports EEI submitted comments.

Likes 0	
Dislikes 0	
Response	

Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group

Answer	No
Document Name	
Comment	

No. The MRO NSRF asks what is the fundamental reliability issues that needs to be corrected with FAC-002 when other methods or standards appear to be more appropriate?

· **The original SAR called out the need for EMT studies.**

o Several ISO / RTOs already request EMT models and perform EMT studies as needed.

· **FAC-001 and FAC-002 are not appropriate for verification / commissioning:**F

o All references to verification and commissioning should be removed from the SAR.

o A superior alternative would be to add the interconnection requirements into the FERC LGIA and SGIA process. This would cover all interconnecting generation.

o Alternately the SAR authors could consider a new commissioning standard and / or reverting to an earlier version of the SAR which suggested changes in MOD-026 / MOD-027.

· **IEEE 2800 Requirements:**

o The SAR appears to contain a complete list of all IEEE2800 requirements for FAC-001 inclusion in the SAR.

o The SAR is a general scoping document. A detailed SAR removes any flexibility from the SDT and in effect becomes NERC writing the standard for industry. This isn't a correct usage of the NERC standards development process.

o If the SAR authors want the SDT to address IEEE 2800 requirements, then a simple statement to do so is appropriate for the SAR, not a laundry list.

· **FAC-002 impact on study queues and generation profiles:**

o Forcing a second round of FAC-002 studies after construction could seriously impact the PC / TP study queues.

o Generation start-up due to queue delays and workforce issues could occur jeopardizing expected generation in-service dates and therefore generation reserve margins increasing the chance of a serious event.

o Initial studies are performed well in advance of development, actual construction and commissioning. Manufacturers can and do change products on a regular basis so only impactful changes should be targeted.

o There is an existing material modification study process so there isn't a true need for a second study unless it is for impactful changes.

o If a commissioning / verification standards is desired, a new standard should be developed or the SAR should revert to earlier versions calling for changes to MOD-026 / MOD-027.

· **Detailed Scope Concerns:**

o The detailed SAR scope seriously impairs the SDT's flexibility to develop the appropriate standard.

· **Accountability for Resource Conformance**

o TPs and PCs cannot be held accountable for GO conformance.

Likes 0	
Dislikes 0	

Response

Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	No

Document Name	

Comment

FAC-001 and FAC-002 are only applicable to new Facility interconnections or when making qualified changes to existing Facilities and are applicable during the interconnection process up to the commissioning of the new or modified Facility. For Facilities already in operation, it is required to modify MOD-026, MOD-027, MOD-032, and MOD-033 standards to include the IBR model validation requirements in the operating horizon.

A new SAR is already in place under NERC Project “2020-06 Verifications of Models and Data for Generators” to revise the existing Reliability Standards MOD-026 and MOD-027 or to develop a new Reliability Standard. MH believes that the MOD-026-2 standard under review can be extended to include the model verification process during commissioning. Alternatively, the SDT could consider developing a new commissioning standard to test and verify the conformity of the IBR models with applicable interconnection requirements. Another SAR has already been released to revise the MOD-033 standard to validate IBR models against actual system operational behavior during disturbances. Therefore, it is recommended to clearly define the scope of this SAR to validate IBR Facility models during the interconnection process up to commissioning.

This SAR appears to be too descriptive and lists some of the requirements already established under recently developed industry standards like IEEE 2800. Such detailed information can be included in a technical rationale document or in a standard application guideline but is not required to be included in a NERC standard.

Please refer to the third comment provided under Question 4 for the proposed changes for this SAR.

Likes 0	
Dislikes 0	

Response

Sharon Darwin - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC

Answer	No
Document Name	

Comment

The NERC FAC-001-1 enhancements to R1 are primarily concentrated on revising the interconnection requirements for Inverter-Based Resources (IBRs), which is a subset of Generating Facilities (applies to Synchronous machines as well). The Standard Drafting Team (SDT) should have the option to develop a new standard to address IBRs apart from synchronous machines, if necessary. The "New Standard" checkbox at the top of the SAR should be selected to facilitate this potential option.

Likes 0	
Dislikes 0	

Response

Rachel Schuldt - Black Hills Corporation - 1,3,5,6, Group Name Black Hills Corporation - All Segments	
Answer	No
Document Name	
Comment	

Black Hills Corporation requests clarity on whether the FAC-001 & FAC-002 SAR replaces the previously approved EMT Modeling SAR under Project 2022-04 or if it is a second SAR for the same project.

The reliability benefits of the new SAR are unclear. The PRC family of projects (PRC-028, PRC-029, PRC-030) already aims to address IBR performance issues.

Regarding FAC-001, the previously detailed interconnection requirements in FAC-001-1 were removed as they did not enhance BES reliability. The new SAR proposes adding requirements to FAC-002-4, which already mandates TPs and PCs to assess the reliability impacts of new interconnecting generation. Black Hills Corporation questions how these proposed changes will improve IBR performance beyond the existing PRC standards.

For FAC-002, the SAR seems to misunderstand the purpose of this standard and the responsibilities of TPs and PCs. Introducing new requirements for TPs and PCs to set timelines for generator interconnection processes is seen as unnecessary. Black Hills Corporation disagrees with holding TPs and PCs accountable for ensuring GO-owned resources meet defined specifications.

Regarding IBR Facility Commissioning Enhancements, the proposed enhancements do not clearly align with either FAC-001 or FAC-002. While Black Hills Corporation acknowledges the value of the proposed commissioning requirements, they do not support incorporating these into the identified Reliability Standards or developing a new standard through this SAR.

Black Hills Corporation seeks clarification on how the proposed changes will impact BES/BPS reliability and requests assurance that the proposed changes will not conflict with existing criteria.

Likes 0	
Dislikes 0	
Response	
Andrew Smith - APS - Arizona Public Service Co. - 1,3,5,6	
Answer	No
Document Name	
Comment	

AZPS supports the following comments that EEI has submitted on behalf of their members:

General Comments: EEI asks for clarity over whether the FAC-001 & FAC-002 SAR replaces the previously approve EMT Modeling SAR already approved under Project 2022-04 or is a second SAR for this Project?

The reliability benefits that will be achieved by this SAR are unclear. Under the Risk Section of the SAR, it states there is a need to add specific Standards requirements in order to improved IBR performance through better modeling, yet the purpose of the PRC family of projects was intended to solve IBR performance issues. PRC-028 is intended to solve the monitoring issues, PRC-029 is intended to solve ride through issues, and PRC-030 is intended to solve issues surrounding identifying, analyzing, and mitigating IBR performance issues.

Furthermore, it is important to understand that FAC-001-1 contained very detailed and specific interconnection requirements, yet as part a periodic review of FAC-001-1 the 6 subject matter experts assigned by the Standards Committee to review the FAC family of Reliability Standards determined those requirements added nothing to BES reliability and should be removed. (See Project 2014-03 SAR & the Paragraph 81 criteria). As a result, those requirements were removed from FAC-001.

This SAR proposes to add new requirements to FAC-002-4 to ensure that IBRs properly align with interconnection requirements when the standard already obligates TPs and PCs to study the reliability impacts of new interconnecting generation (including IBRs) and Facilities seeking to make a qualified change, including their adherence to applicable NERC Reliability Standards (See Requirement R1, subpart 1.2) during interconnection studies, noting PRC-028-1, PRC-029-1 and PRC-030-1 will all be included in those FAC-002-4 interconnection studies.

For these reasons, EEI asks NERC and the SAR authors to clarify how the proposed changes, outside of the proposed IBR Facility Commissioning Enhancements which we support, will have a meaningful impact on BES/BPS reliability over what is already in place and how the proposed changes will not conflict with Paragraph 81 Criteria.

FAC-001 Concerns: While EEI agrees that there have been performance issues with IBRs, the new PRC Reliability Standards specifically intended to address these issues should solve these concerns and as stated above, FAC-002-4 already requires the study of adherence to applicable NERC Reliability Standards. Moreover, if NERC feels that the FERC proforma GIAs and GIPs are deficient they should discuss those concerns with FERC rather than trying to solve these concerns through new or revised NERC Reliability Standards. It is also unclear how the proposed FAC-001 changes will improve IBR performance over what is already contained in PRC-029.

Moreover, there are no technical documents that support these changes or provides needed clarity on how the changes will improve reliability over what has already been developed within PRC-028, PRC-029, and PRC-030.

FAC-002 Concerns: EEI is concerned that the SAR seems to confuse the purpose of the FAC-002 Reliability Standard, as well as the roles and responsibilities for TPs and PCs under the Standard. Specifically, the TP and PC are to study the impacts of proposed new or changed Facilities on the BES. This is a necessary step for GOs prior to entering into a contract to build or modify an applicable resource. It is not necessary to add new requirements to FAC-002, the new responsibility for the TP and PC to set or determine timelines for generators interconnections processes milestones or timelines associated with model document, etc. are unnecessary and do not improve BES reliability. Nor should the TP and PC be involved or held accountable for activities such as physical testing of a resource or factory testing of a resource. We also disagree that the TP and PC have any role in determining if the models presented to them for study are accurate beyond assessing the reliability impacts to the BES.

Regarding item (2) of the scope for FAC-002-4, Requirement R1 Part 1.2 already requires TPs and PCs to assess the “adherence to … Facility interconnection requirements.” NERC Standards do not need to specify “specific steps” for such an assessment. And if there are failures to assess FAC-001-4 conformity, then the responsible entity would be in violation of FAC-002-4 R1 Part 1.2, as currently written.

Regarding item (4) of the scope, modifications to generating Facilities prior to full commercial operation should be handled by the TO’s interconnection process. For many, these types of modifications are handled under the GIP Material Modification provisions.

EEI is also concerned that the SAR, as proposed, will inappropriately make TPs and PCs accountable for determining the conformity of GO owned resources to the defined specifications provided by the GO. While we agree that the TO sets the interconnection requirements, resource conformance to those requirements will never be any better than the information supplied by the GO on their “as built” resource to the TO and it is the GO who should be held accountable for the integrity of the data and models for their “as built”.

IBR Facility Commissioning Enhancements: It is unclear where the proposed Commissioning Enhancements were intended to be added (i.e., FAC-001 or FAC-002). In our review of this SAR, we did not see clear alignment of this activity in either FAC-001 or FAC-002. And while we see value in the proposed Commissioning Requirements, we do not support adding these requirements to either of the two Reliability Standards identified in this SAR or through the provisions in this SAR to develop a new Reliability Standard.

Likes 0	
Dislikes 0	

Response	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	

No. The NV Energy asks what is the fundamental reliability issues that needs to be corrected with FAC-002 when other methods or standards appear to be more appropriate?

{C}· **The original SAR called out the need for EMT studies.**

{C}o Several ISO / RTOs already request EMT models and perform EMT studies as needed.

{C}· **FAC-001 and FAC-002 are not appropriate for verification / commissioning:**

{C}o All references to verification and commissioning should be removed from the SAR.

{C}o A superior alternative would be to add the interconnection requirements into the FERC LGIA and SGIA process. This would cover all interconnecting generation.

{C}o Alternately the SAR authors could consider a new commissioning standard and / or reverting to an earlier version of the SAR which suggested changes in MOD-026 / MOD-027.

{C}· **IEEE 2800 Requirements:**

{C}o The SAR appears to contain a complete list of all IEEE2800 requirements for FAC-001 inclusion in the SAR.

{C}o The SAR is a general scoping document. A detailed SAR removes any flexibility from the SDT and in effect becomes NERC writing the standard for industry. This isn't a correct usage of the NERC standards development process.

{C}o If the SAR authors want the SDT to address IEEE 2800 requirements, then a simple statement to do so is appropriate for the SAR, not a laundry list.

{C}· **FAC-002 impact on study queues and generation profiles:**

{C}o Forcing a second round of FAC-002 studies after construction could seriously impact the PC / TP study queues.

{C}o Generation start-up due to queue delays and workforce issues could occur jeopardizing expected generation in-service dates and therefore generation reserve margins increasing the chance of a serious event.

{C}o Initial studies are performed well in advance of development, actual construction and commissioning. Manufacturers can and do change products on a regular basis so only impactful changes should be targeted.

{C}o There is an existing material modification study process so there isn't a true need for a second study unless it is for impactful changes.

{C}o If a commissioning / verification standards is desired, a new standard should be developed or the SAR should revert to earlier versions calling for changes to MOD-026 / MOD-027.

{C}· **Detailed Scope Concerns:**

{C}o The detailed SAR scope seriously impairs the SDT's flexibility to develop the appropriate standard.

{C}· **Accountability for Resource Conformance**

{C}o TPs and PCs cannot be held accountable for GO conformance.

Likes 0	
Dislikes 0	

Response

Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter

Answer	No
Document Name	

Comment

FirstEnergy supports EEI's comments which state:

EEI asks for clarity over whether the FAC-001 & FAC-002 SAR replaces the previously approve EMT Modeling SAR already approved under Project 2022-04 or is a second SAR for this Project?
The reliability benefits that will be achieved by this SAR are unclear. Under the Risk Section of the SAR, it states there is a need to add specific Standards requirements in order to improved IBR performance through better modeling, yet the purpose of the PRC family of projects was intended to solve IBR performance issues. PRC-028 is intended to solve the monitoring issues, PRC-029 is intended to solve ride through issues, and PRC-030 is intended to solve issues surrounding identifying, analyzing, and mitigating IBR performance issues.
Furthermore, it is important to understand that FAC-001-1 contained very detailed and specific interconnection requirements, yet as part a periodic review of FAC-001-1 the 6 subject matter experts assigned by the SC to review the FAC family of Reliability Standards determined those requirements added nothing to BES reliability and should be removed. (See Project 2014-03 SAR & the Paragraph 81 criteria). As a result, those requirements were removed from FAC-001.
This SAR proposes to add new requirements to FAC-002-4 to ensure that IBRs properly align with interconnection requirements when the standard already obligates TPs and PCs to study the reliability impacts of new generation (including IBRs) and Facilities seeking to make a qualified change, including their adherence to applicable NERC Reliability Standards (See Requirement R1, subpart 1.2), noting PRC-029-1 will be included in those FAC-002-4 studies once approved.
For these reasons, EEI asks NERC and the SAR authors to clarify how the proposed changes, outside of the proposed IBR Facility Commissioning Enhancements which we support, will have a meaningful impact on BES/BPS reliability over what is already in place and how the proposed changes will not conflict with Paragraph 81 Criteria.
Below are additional comments on the proposed changes contained in this SAR:
FAC-001 Concerns
While agrees that there have been performance issues with IBRs, the new PRC Reliability Standards specifically intended to address these issues should solve these concerns and as stated above, FAC-002-4 already requires the study of adherence to applicable NERC Reliability Standards. Moreover, if NERC feels that the FERC proforma GIAs and RIAs are deficient they should discuss those concerns with FERC rather than trying to solve these concerns through new or revised NERC Reliability Standards. It is also unclear how the proposed FAC-001 changes will improve IBR performance over what is already contained in PRC-029.
Moreover, there are no technical documents that support these changes or provides needed clarity on how the changes will improve reliability over what has already been developed within PRC-028, PRC-029, and PRC-030.
FAC-002 Concerns
EEI is concerned that the SAR seems to confuse the purpose of the FAC-002 Reliability Standard, as well as the roles and responsibilities for TPs and PCs under the Standard. Specifically, the TP and PC are to study the impacts of proposed new or changed Facilities on the BES. This is a necessary

step for GOs prior to entering into a contract to build or modify an applicable resource. It is not necessary to add new requirements to FAC-002, the new responsibility for the TP and PC to set or determine timelines for generators interconnections processes milestones or timelines associated with model document, etc. are unnecessary and do not improve BES reliability. Nor should the TP and PC be involved or held accountable for activities such as physical testing of a resource or factory testing of a resource. We also disagree that the TP and PC have any role in determining the models presented to them for study beyond assess reliability impacts to the BES.
Regarding item (2) of the scope for FAC-002-4, Requirement R1 Part 1.2 already requires TPs and PCs to assess the "adherence to … Facility interconnection requirements." NERC Standards do not need to specify "specific steps" for such an assessment. And if there are failures to assess FAC-001-4 conformity, then the responsible entity would be in violation of FAC-002-4 R1 Part 1.2, as currently written.
Regarding item (4) of the scope, modifications to generating Facilities prior to full commercial operation should be handled by the TO's interconnection process. For many, these types of modifications are handled under the GIP Material Modification provisions.
EEI is also concerned that the SAR, as proposed, will inappropriately make TPs and PCs accountable for determining the conformity of GO owned resources to the defined specifications provided by the GO. While we agree that the TO sets the interconnection requirements, resource conformance to those requirements will never be any better than the information supplied by the GO on their "as built" resource to the TO and it is the GO who should be held accountable for the integrity of the data and models for their "as built".
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It is unclear where the proposed Commissioning Enhancements were intended to be added (i.e., FAC-001 or FAC-002). In our review of this SAR, we did not see clear alignment of this activity in either FAC-001 or FAC-002. And while we see value in the proposed Commissioning Requirements, we do not support adding these requirements to either of the two Reliability Standards identified in this SAR or provisions in this SAR to develop a new Reliability Standard.

Likes 0	
Dislikes 0	

Response

Hayden Maples - Evergy - 1,3,5,6 - MRO

Answer	No
Document Name	

Comment

Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI), Midwest Reliability Organization's NERC Standards Review Forum (MRO NSRF), and the North American Generator Forum (NAGF) on question 1

Likes 0	
Dislikes 0	

Response

Richard Jackson - U.S. Bureau of Reclamation - 1,5

Answer	No
Document Name	

Comment

Reclamation does not agree with modifying FAC-001 and FAC-002 to incorporate IBR resources. Reclamation recommends new standards be developed for all IBR resources. See Item 4.

Likes 0	
Dislikes 0	

Response

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

Answer	No
Document Name	

Comment

The NAGF does not agree that only FAC-001 and FAC-002 standards should be revised as other existing standards may need to be revised or new standards may need to be developed to fulfill the scope of this SAR. In addition, the NAGF believes that the Project Scope section of the SAR includes too much detail and is too prescriptive, undermining the work of the SDT and removing flexibility in implementing the scope within FAC-001, FAC-002, or other existing/new reliability standards. The NAGF recommends removing specific deliverables and allowing the SDT to develop general generator interconnection specifications and performance requirements instead.

The NAGF disagrees with the requirement for the SDT to ensure coordination with FERC Order 901, suggesting instead that the SDT should align requirements with ongoing NERC projects on IBR modeling and operational performance. If NERC desires this project to be coordinated with FERC Order 901, then NERC should ensure that the proposed SAR Project Scope language is aligned with that goal.

Additionally, NAGF believes that the approach this SAR is taking to address the risk stated within this SAR is misguided. Based on the Purpose of FAC-001 and FAC-002, these Standards are not intended to be commissioning and verification standards, but rather they are intended to ensure the necessary interconnection information is available to those seeking to connect and to ensure that the impact of interconnections are properly studied and understood. Any specific performance, modeling, or validation requirements should be addressed by the appropriate NERC Standard, or a newly created standard within the appropriate Standard Family (if creation of a new Standard is foreseen as a possible outcome, the “New Standard” box should be checked in the SAR type section).

Likes 0	
Dislikes 0	

Response

Scott Thompson - PNM Resources - 1,3,5 - WECC,Texas RE

Answer	No
Document Name	

Comment

Define requirements to be clear for IBRs that are clearly defined minimums to follow.

Likes 0	

Dislikes 0	
Response	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	
Comment	

EEI General Comments on this SAR:

EEI asks for clarity over whether the FAC-001 & FAC-002 SAR replaces the previously approve EMT Modeling SAR already approved under Project 2022-04 or is a second SAR for this Project?

The reliability benefits that will be achieved by this SAR are unclear. Under the Risk Section of the SAR, it states there is a need to add **specific Standards requirements** in order to improved IBR performance through better modeling, yet the purpose of the PRC family of projects was intended to solve IBR performance issues. PRC-028 is intended to solve the monitoring issues, PRC-029 is intended to solve ride through issues, and PRC-030 is intended to solve issues surrounding identifying, analyzing, and mitigating IBR performance issues.

Furthermore, it is important to understand that FAC-001-1 contained very detailed and specific interconnection requirements, yet as part a periodic review of FAC-001-1 the 6 subject matter experts assigned by the SC to review the FAC family of Reliability Standards determined those requirements added nothing to BES reliability and should be removed. (See Project 2014-03 SAR & the Paragraph 81 criteria). As a result, those requirements were removed from FAC-001.

This SAR proposes to add new requirements to FAC-002-4 to ensure that IBRs properly align with interconnection requirements when the standard already obligates TPs and PCs to study the reliability impacts of new interconnecting generation (including IBRs) and Facilities seeking to make a qualified change, including their adherence to **applicable** NERC Reliability Standards (See Requirement R1, subpart 1.2) during interconnection studies, noting PRC-028-1, PRC-029-1 and PRC-030-1 will all be included in those FAC-002-4 interconnection studies.

For these reasons, EEI asks NERC and the SAR authors to clarify how the proposed changes, outside of the proposed IBR Facility Commissioning Enhancements which we support, will have a meaningful impact on BES/BPS reliability over what is already in place and how the proposed changes will not conflict with Paragraph 81 Criteria.

Below are additional comments on the proposed changes contained in this SAR:

FAC-001 Concerns

While agrees that there have been performance issues with IBRs, the new PRC Reliability Standards specifically intended to address these issues should solve these concerns and as stated above, FAC-002-4 already requires the study of adherence to applicable NERC Reliability Standards. Moreover, if NERC feels that the FERC proforma GIAs and GIPs are deficient they should discuss those concerns with FERC rather than trying to solve these concerns through new or revised NERC Reliability Standards. It is also unclear how the proposed FAC-001 changes will improve IBR performance over what is already contained in PRC-029.

Moreover, there are no technical documents that support these changes or provides needed clarity on how the changes will improve reliability over what has already been developed within PRC-028, PRC-029, and PRC-030.

FAC-002 Concerns

EEI is concerned that the SAR seems to confuse the purpose of the FAC-002 Reliability Standard, as well as the roles and responsibilities for TPs and PCs under the Standard. Specifically, the TP and PC are to study the impacts of **proposed** new or changed Facilities on the BES. This is a necessary

step for GOs prior to entering into a contract to build or modify an applicable resource. It is not necessary to add new requirements to FAC-002, the new responsibility for the TP and PC to set or determine timelines for generators interconnections processes milestones or timelines associated with model document, etc. are unnecessary and do not improve BES reliability. Nor should the TP and PC be involved or held accountable for activities such as physical testing of a resource or factory testing of a resource. We also disagree that the TP and PC have any role in determining if the models presented to them for study are accurate beyond assessing the reliability impacts to the BES.

Regarding item (2) of the scope for FAC-002-4, Requirement R1 Part 1.2 already requires TPs and PCs to assess the "adherence to … Facility interconnection requirements." NERC Standards do not need to specify "specific steps" for such an assessment. And if there are failures to assess FAC-001-4 conformity, then the responsible entity would be in violation of FAC-002-4 R1 Part 1.2, as currently written.

Regarding item (4) of the scope, modifications to generating Facilities prior to full commercial operation should be handled by the TO's interconnection process. For many, these types of modifications are handled under the GIP Material Modification provisions.

EEI is also concerned that the SAR, as proposed, will inappropriately make TPs and PCs accountable for determining the conformity of GO owned resources to the defined specifications provided by the GO. While we agree that the TO sets the interconnection requirements, resource conformance to those requirements will never be any better than the information supplied by the GO on their "as built" resource to the TO and it is the GO who should be held accountable for the integrity of the data and models for their "as built".

IBR Facility Commissioning Enhancements

It is unclear where the proposed Commissioning Enhancements were intended to be added (i.e., FAC-001 or FAC-002). In our review of this SAR, we did not see clear alignment of this activity in either FAC-001 or FAC-002. And while we see value in the proposed Commissioning Requirements, we do not support adding these requirements to either of the two Reliability Standards identified in this SAR.

Likes 0	
Dislikes 0	

Response

Nick Leathers - Ameren - Ameren Services - 1,3,5,6 - MRO,SERC

Answer	No
Document Name	

Comment

Ameren agrees with EEI's comments.

Likes 0	
Dislikes 0	

Response

Daniel Gacek - Exelon - 1,3, Group Name Exelon

Answer	No

Document Name	
Comment	
Exelon supports the purpose of this project, and we support revisions to FAC-001 and FAC-002 to include requirements for IBRs to have certain technical capababilities. However, as stated in the EEI comments, specific performance requirements belong in the various NERC standards, not in the Interconnection Agreements.	
Likes 0	
Dislikes 0	
Response	
Adrian Harris - Midcontinent ISO, Inc. - 2 - MRO,SERC,RF	
Answer	No
Document Name	
Comment	
Submitted with 3rd party comments	
Likes 0	
Dislikes 0	
Response	
Lori Frisk - Allete - Minnesota Power, Inc. - 1 - MRO	
Answer	No
Document Name	
Comment	
Minnesota Power supports EEI’s comments.	
Likes 0	
Dislikes 0	
Response	
Gail Elliott - International Transmission Company Holdings Corporation - NA - Not Applicable - MRO,RF	
Answer	No
Document Name	

Comment
ITC supports the response submitted by EEI

Likes 0	
Dislikes 0	

Response

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

Answer	No
Document Name	

Comment
BPA believes successful implementation of the proposed revisions to FAC-001 and FAC-002 will demand further revisions to many more NERC standards: MOD-026, MOD-027, TPL-001, multiple PRC standards, and potentially IRO/TOP standards governing Operating Horizon studies. BPA recommends creating a new FAC standard(s) to house specific and unique IBR Interconnection requirements. BPA interprets that this project scope proposal would unnecessarily extend the duration of already-protracted Interconnection Studies. It would also present issues and potential hurdles/roadblock for entities to perform a successful implementation of any resulting requirements. At present, the interconnection process requires GOs to submit design models prior to energization (after 180 days). *BPA's current LGIP timeline (source: WECC Model Validation Guideline) is performed in 5 stages. Stage 1: GOs submit a planning level powerflow model. Stage 2: GOs submit a planning level dynamic model. Stage 3: GO provides a 'Design Model' 160 days prior to energization. Stage 4: GOs provides an 'As-Built' model 90 days after initial sync. Stage 5: GOs provide a 'Validated Model' 180 days after initial sync*. BPA believes if the scope of the proposed SAR were to be included in the current FAC-001 and FAC-002 standards, it would create confusion and administrative burden with no reduction of risk or benefit to reliability.

Likes 0	
Dislikes 0	

Response

Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO

Answer	No
Document Name	

Comment
SPP has a concern about the FAC-002 Standard being the appropriate document to implement requirements changes pertaining to systemic deficiencies in IBR modeling.

As a reminder, the purpose of the FAC-002 Standard is to study the impact of interconnecting new or changed Facilities on the Bulk Electric System. From our perspective, this standard is not applicable to modeling from a data collection, verification or validation perspective.

Furthermore, SPP has a concern about the interpretation of how the terms “verification” and “validation” are defined. At this point, neither term is defined in the NERC Glossary of Term nor the Rules of Procedure (RoP). Moreover, there is a high expectation by NERC for applicable entities to conduct more through verification and validation checks for the appropriate models to conduct an assessment like the Conformity Study. At this point, there is no clarity on appropriate steps needed as well as what data is required to conduct the verification and validation process, specifically, for the Conformity Study.

To the extent the drafting team seeks to implement these changes in the FAC standards, SPP recommends that the drafting team take into consideration a review of PRC-006-5, PRC-012-2, and PRC-027-1 Standards to ensure all applicable data associated with Inverter Based Resources (IBRs) are included in the data collection, verification and validation process for model builds from a protection perspective.

Similarly, SPP recommends that the drafting team take into consideration reviewing the following MOD Standards that could align with this project’s intent such as: MOD-025, MOD-026, MOD-027 (all modeling verification) and MOD-033 (modeling validation). For clarity, MOD-032 (data collection) is already being worked on via Project 2022-02.

Finally, SPP recommends that the drafting team consider structuring proposed definitions for the terms “verification” and “validation” and implement them in both the NERC Glossary of Terms as well as the Rules of Procedure (RoP).

Likes 0	
Dislikes 0	

Response

Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC,Texas RE,NPCC,RF, Group Name SRC 2024

Answer	No
Document Name	

Comment

The SAR scope includes adding requirements for pre-commissioning documentation and post-commissioning verification for GOs. The ISO/RTO Council (IRC) Standards Review Committee (SRC) believes these requirements should not be placed in FAC-001 or FAC-002, as they would be a better fit for a new standard or for MOD-025, 026, and 027, which address verification of generator and plant capabilities and performance. FAC-001 primarily addresses the documentation of facility interconnection requirements, while FAC-002 focuses on the PC’s/TP’s responsibility to use specific case studies or snapshots to assess the impact of new or significantly modified facilities (including all types of generation resources, not just IBRs) on the overall power system. Although GOs are a responsible entity in FAC-002, their role under the FAC-002 construct is to provide the support needed for the TO and TP to perform their studies. The SAR’s goal of requiring GOs to evaluate and validate IBR-specific model performance is a better fit for the MOD series of standards or for a new Reliability Standard, as meeting individual model performance criteria alone may not guarantee reliability under broader system conditions.

PRC standards should also be included to allow for consideration of topics such as disturbance monitoring and protection impacts.

NOTE - ERCOT does not join the following statement: “*PRC standards should also be included to allow for consideration of topics such as disturbance monitoring and protection impacts*”

Likes 0	
Dislikes 0	

Response

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) and adopts them as its own, except that ERCOT does not join the portion of the SRC comments that references the PRC standards.

Likes 0	
Dislikes 0	

Response

Kyle Thomas - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	

Comment
Elevate Energy Consulting appreciates the opportunity to provide comments on this SAR. It is unclear where the facility commissioning enhancements that are proposed will reside in the standards development activities for these two standards. Given the comlexity of facility commissioning enhancements, the SDTs may find that it best to create a new standard for commissioning activities entirely, rather than adding to FAC-001 or FAC-002. However, presently, the "New Standard" checkbox at the top of the SAR is not selected, which would preclude the drafting team from pursuing this. So recommend the "New Standard" checkbox be selected and sufficient clarifying language should be added so that there is guidance and/or flexibility for the SDT as they consider how best to implement this SAR. In addition, some parts of this SAR may also warrant review of incorporation into FERC Order 901 standards and SDT activities. In addition to updating FAC-001 and FAC-002, the SDTs may find that additional updates or revisions to those Order 901 standards may be applicable to this SAR as well.

Likes 0	
Dislikes 0	

Response

Isidoro Behar - Long Island Power Authority - 1	
Answer	Yes
Document Name	

Comment

Comments: It is also necessary to improve interconnection requirements (in coordination with the many industry efforts for this within NERC, FERC, and IEEE 2800) in order to achieve clear and thorough interconnection requirements across the industry that are not overly burdensome to the parties of the interconnection process.

Likes 0	
Dislikes 0	

Response

Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC

Answer	Yes
Document Name	

Comment

WECC agrees with the scope, and suggests that the drafting team ensure as much conformity with IEEE 2800 as possible and no conflicting requirements that would force an entity to pick one over the other.

WECC also suggests that consideration for testing standards (such as MOD-026 and MOD-027) should be evaluated to see if the interconnection requirements are fully realized.

Likes 0	
Dislikes 0	

Response

Nicolas Turcotte - Hydro-Quebec (HQ) - 1,5

Answer	Yes
Document Name	

Comment

Because the impacts of large amounts of IBR tripping can affect more than just the entity to which the IBR is interconnected, there needs to be clearly defined minimum requirements for all IBR. Given that some entities rely heavily or entirely on high-level requirements established in the pro-forma LGIA and have not expanded upon these requirements, FAC-001 and FAC-002 should be enhanced to clearly describe the performance-based requirements for all IBR. This will both improve system reliability and provide GOs consistent expectations and experiences throughout the continent.

Likes 0	
Dislikes 0	

Response

Ruchi Shah - AES - AES Corporation - 5

Answer	Yes
Document Name	
Comment	
While AES US Renewables agrees that FAC-001 and FAC-002 are the appropriate standards for revision to meet the scope of the SAR, there is also the possibility that some of the requirements may need to be developed under a new standard, especially those requirements under the IBR Facility Commissioning Enhancements scope. So, we recommend that the “New Standard” option is checked under the SAR Type field so that the drafting team is not limited to just being able to revise existing standards.	
Likes 0	
Dislikes 0	
Response	
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	
Because the impacts of large amounts of IBR tripping can affect more than just the entity to which the IBR is interconnected, there needs to be clearly defined minimum requirements for all IBR. Given that some entities rely heavily or entirely on high-level requirements established in the pro-forma LGIA and have not expanded upon these requirements, FAC-001 and FAC-002 should be enhanced to clearly describe the performance-based requirements for all IBR. This will both improve system reliability and provide GOs consistent expectations and experiences throughout the continent.	
Likes 0	
Dislikes 0	
Response	
Julie Hall - Entergy - 1,3,6, Group Name Entergy	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Adrian Andreoiu - BC Hydro and Power Authority - 1,3,5, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Greg Sorenson - ReliabilityFirst - 10 - RF	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Alain Mukama - Hydro One Networks, Inc. - 1 - NPCC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Amy Wilke - American Transmission Company, LLC - 1	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Israel Perez - Salt River Project - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	
Document Name	
Comment	
Texas RE agrees with the scope of the SAR. Texas RE recommends the drafting team consider including FAC-001-4 Requirement R4 to include specific coordinated studies in Requirement R4 which need to be developed to assess the impacts on the interconnecting systems such as insulation coordination, maintaining voltage and reactive levels at the point of interconnection, protection coordination, power quality impacts, voltage/frequency ride-through determination/settings, etc. The standard revision should clearly require GOs to address all Facility Interconnection requirements established by TOs in Requirement R1.	
Likes 0	
Dislikes 0	
Response	
Elizabeth Davis - PJM Interconnection, L.L.C. - 2 - RF	
Answer	
Document Name	
Comment	
PJM supports the ISO RTO Council Standards Review Committee (IRC SRC) comments and would also support the need in revising FAC-001 and FAC-002 in addition to creating a new or revised standard(s) via the MOD family of Standards. The primary concern is to ensure resource parameter/equipment changes would be addressed, and allow for addressing verification of resource capabilities and performance (post commissioning	

changes). PJM understands the SAR's goal of requiring GOs to evaluate and validate IBR-specific model performance may need to be addressed in both FAC and MOD standards. PJM welcomes any questions from the Standard Drafting Team (SDT) regarding this update and wants to take this opportunity to thank the SDT for their work and sharing their expertise on this Project.	
Likes 0	
Dislikes 0	
Response	

2. Do you agree that the Project Scope will fulfill all aspects of the Purpose or Goal? If you do not agree, or if you agree and wish to provide comments or suggestions for the project scope, please provide your recommendation and explanation?

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

Answer	No
Document Name	

Comment

ERCOT joins the comments submitted by the IRC SRC and adopts them as its own.

Likes 0	
Dislikes 0	

Response

Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC,Texas RE,NPCC,RF, Group Name SRC 2024

Answer	No
Document Name	

Comment

Any new or revised standards should clearly identify what constitutes an accurate model. When doing so, all critical control loops should be considered, including those that impact large signal disturbance response and fast transient response. The scope of the project should be revised to clarify whether NERC intends the new or modified requirements to apply to all types of generation resources. One of the stated purposes of the SAR is to ensure consistent implementation of FERC LGIA/LGIP/SGIA/SGIP agreements, which apply to all generation resource types. However, much of the SAR focuses specifically on IBRs. Project Scope items 1 and 4 both address IBR-specific topics. However, items 2 and 3 do not reference IBRs and seem to be intended to address all generator types. Consequently, the SAR should be revised to clarify that[KM1] it applies to all generation resource types as opposed to IBRs specifically.

Additionally, Project Scope items 1 and 3 appear to assume the TO/TP will have discretion to determine the “requirements” for the GO. TOs/TPs/PCs already have the ability to establish interconnection policies and processes for their systems; consequently, the primary reliability value of this SAR will be in the development of a standard that establishes specific, universally applicable GO requirements that are relevant to all systems within the ERO footprint. Such a standard should be clear that it does not preclude TOs/TPs/PCs from establishing additional requirements specific to their systems, but should include universally applicable GO requirements rather than simply attaching a TO/TP/PC compliance burden to existing TO/TP/PC interconnection policies and processes.

The SRC also notes that Project Scope item 4 seems to be missing an “ensure” at the beginning of the item, and recommends that the scope of items 2 and 4 be revised to clarify that the drafting team needs to determine the appropriate registered entity to have the obligation to perform the assessment steps and update the models. The SRC notes that the GO must update model parameters based on testing or information from the OEM, as the TP cannot be required to provide this information.

Finally, the purpose/goal section describes the hand-off between the developer and the GO and indicates that NERC Reliability Standards become subject to mandatory enforcement only upon commercial operation. It is unclear how conformity assessment and model update requirements that apply during the interconnection process could be enforced on an unregistered developer with no obligation to comply with NERC Reliability Standards.

Placing a compliance obligation for conformity assessment/model update requirements on the PC/TP/TO is not an adequate solution to this issue, as these entities are poorly positioned to perform these types of requirements.

Likes 0	
Dislikes 0	

Response

Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO

Answer	No
Document Name	

Comment

SPP has a concern that the proposed language in the goal section (bullet #1) and the scope section (bullet #1) pertaining to coordination activities for IBR performance requirements in the FAC-001 Standards. The goal language suggests that there will be coordination amongst the TO, TP and PC while the scope language only includes the TO and TP.

Goal language (bullet 1):

Enhancing the latest FAC-001 Standard, in complement with FERC Order No. 2023 and FERC GIA/GIP to require that TOs in coordination with their associated Transmission Planners (TP) and Planning Coordinators (PC) establish IBR performance requirements covering specific topics of paramount importance for BPS reliability while leveraging technical aspects of work already completed within the industry.

Scope language (bullet 1):

Include specific IBR interconnection topics in FAC-001-4 for which generator interconnection requirements shall be defined by TOs/TPs

As a reminder, FAC-001 only discusses the efforts of the Transmission Owner (TO) and Generation Owner (GO) making their requirements available to entities seeking to interconnect with them and have no applicability to running an assesment.

SPP's second concern applies to the proposed language in the goal section (bullet #3) and the scope section (bullet #3) pertaining to the GO providing quality evidence for their commission checks.

At this point, this proposed language does not provide clarity in the goal and scope language defining the appropriate entities in which that information should be shared with.

Additionally, SPP recommends that the drafting team takes into consideration modifying the scope language (bullet #1) to include the Planning Coordinator in those coordination efforts to ensure proper language alignment in the SAR.

Finally, SPP recommends that the drafting team takes into consideration aligning the goal and scope language (bullet 3) to clearly identify all appropriate entities that will need to have the evidence for their commission checks.

Likes 0	
Dislikes 0	

Response

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

Answer	No
Document Name	

Comment

BPA understands the SAR scope, as proposed, seeks to align with FERC 901 and FERC 2023 objectives, but the SAR proposes increased compliance overhead without tangible BES reliability benefits, as compared to other design standards like IEEE 2800 or revisions to NERC PRC-standards governing IBRs. BPA believes regulatory improvements aimed at the root-causes of the cited disturbance events are occurring/have already occurred (e.g. IEEE 2800, PRC-029/PRC-030, etc), in which case this SAR appears duplicative.

Likes 0	
Dislikes 0	

Response

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

Answer	No
Document Name	

Comment

ITC supports the response submitted by EEI

Likes 0	
Dislikes 0	

Response

Lori Frisk - Allete - Minnesota Power, Inc. - 1 - MRO

Answer	No
Document Name	

Comment

Minnesota Power supports EEI’s comments.

Likes 0	
Dislikes 0	
Response	
Adrian Harris - Midcontinent ISO, Inc. - 2 - MRO,SERC,RF	
Answer	No
Document Name	
Comment	
It's long standing practice for TO/TPs to determine details regional and local requirements. The revised standard would point out critical areas to have requirements with technical details left up to those closest reliability needs and impacts.	
Likes 0	
Dislikes 0	
Response	
Daniel Gacek - Exelon - 1,3, Group Name Exelon	
Answer	No
Document Name	
Comment	
Exelon supports the purpose of the project, the Project Scope should be more broad to allow the drafting team to revise additional standards as may be required to acheive the project purpose.	
Likes 0	
Dislikes 0	
Response	
Nick Leathers - Ameren - Ameren Services - 1,3,5,6 - MRO,SERC	
Answer	No
Document Name	
Comment	
Ameren agrees with EEI's comments.	
Likes 0	

Dislikes 0	
Response	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	
Comment	
The proposed changes are not necessary and will not improve BES reliability over what has already been accomplished through the development of PRC-028, PRC-029, and PRC-030. Additionally, this SAR inappropriately places the onus of resource compliance with the TP and PC rather than the GO. While the TO sets interconnection requirements and makes them available upon request through FAC-001; and the TP and PC review and study the impacts of proposed new or changed generator interconnections through FAC-002; The responsibility for the resource to conform with those requirements must remain with the GO. EEI does see value in the IBR Facility Commissioning Enhancements contained in this SAR. However, we do not agree that those changes should be made within either FAC-001 or FAC-002.	
Likes 0	
Dislikes 0	
Response	
Scott Thompson - PNM Resources - 1,3,5 - WECC,Texas RE	
Answer	No
Document Name	
Comment	
The proposed enhancements, like the current version of FAC-002, do not require the TO to maintain a database of baseline EMT models to use for FAC-002 studies, which will make it difficult to ensure EMT models being used are accurate.	
Likes 0	
Dislikes 0	
Response	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	

The NAGF does not agree that the Project Scope as written will fulfill all aspects of the Purpose or Goal. The proposed SAR is too detailed, which limits the SDT's flexibility. The proposed SAR should focus solely on reliability enhancing outcomes and not prescribing explicit requirements which the SDT must meet.

Additionally, NAGF believes that references to LGIA and SGIA should be removed as they fall under FERC jurisdiction, not NERC. Furthermore, in many cases the modifications to the LGIA and SGIA would be the correct mechanism for addressing concerns raised by this SAR, instead of the Standard Drafting process.

Likes 0	
Dislikes 0	

Response

Richard Jackson - U.S. Bureau of Reclamation - 1,5

Answer	No
Document Name	

Comment

See the response to items 1 and 4.

Likes 0	
Dislikes 0	

Response

Hayden Maples - Evergy - 1,3,5,6 - MRO

Answer	No
Document Name	

Comment

Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI) on question 2

Likes 0	
Dislikes 0	

Response

Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter

Answer	No
Document Name	

Comment
FirstEnergy supports EEI's comments which state: This SAR is fundamentally flawed for two reasons. First, the proposed changes are not necessary and will not improve BES reliability over what has already been accomplished through the development of PRC-028, PRC-029, and PRC-030. Secondly, this SAR inappropriately places the onus of resource compliance with the TP and PC rather than the GO. While the TO sets interconnection requirements and makes them available upon request through FAC-001; and the TP and PC review and study the impacts of proposed new or changed generator interconnections through FAC-002; The responsibility for resource conforms with those requirements must remain with the GO. EEI does see value in the IBR Facility Commissioning Enhancements contained in this SAR. However, we do not agree that those changes should be made within either FAC-001 or FAC-002.

Likes 0	
Dislikes 0	

Response

Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	

Comment
Comments: No. See question 1 on scope concerns.

Likes 0	
Dislikes 0	

Response

Andrew Smith - APS - Arizona Public Service Co. - 1,3,5,6	
Answer	No
Document Name	

Comment
AZPS supports the following comments that EEI has submitted on behalf of their members: The proposed changes are not necessary and will not improve BES reliability over what has already been accomplished through the development of PRC-028, PRC-029, and PRC-030. Additionally, this SAR inappropriately places the onus of resource compliance with the TP and PC rather than the GO. While the TO sets interconnection requirements and makes them available upon request through FAC-001; and the TP and PC review and study the impacts of proposed new or changed generator interconnections through FAC-002; The responsibility for the resource to conform with those requirements must remain with the GO.

EEI does see value in the IBR Facility Commissioning Enhancements contained in this SAR. However, we do not agree that those changes should be made within either FAC-001 or FAC-002.

Likes 0	
Dislikes 0	

Response

Rachel Schuldt - Black Hills Corporation - 1,3,5,6, Group Name Black Hills Corporation - All Segments

Answer	No
Document Name	

Comment

The proposed changes are unnecessary and won't improve BES reliability beyond what PRC-028, PRC-029, and PRC-030 have already achieved. This SAR wrongly shifts the responsibility for resource compliance from the GO to the TP and PC. While the TO sets interconnection requirements (FAC-001) and the TP and PC study the impacts of new or changed generator interconnections (FAC-002), the GO should remain responsible for meeting these requirements.

Black Hills Corporation sees value in the IBR Facility Commissioning Enhancements in this SAR but does not support making these changes within FAC-001 or FAC-002.

Likes 0	
Dislikes 0	

Response

Sharon Darwin - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC

Answer	No
Document Name	

Comment

Southern Company notes that it is unclear under the current scope as to which entity (TP/PC and/or GO) would be the responsible party if the facility fails to meet the conformity assessment developed by TPs and PCs under FAC-002-4. Furthermore, it is not specified whether the additional "Facility Pre-Commissioning Enhancements" will be incorporated into FAC-001 or FAC-002. Therefore, the SAR needs to provide more clarity and guidance in these areas.

Regarding the proposed additional requirements in (3b.), Southern Company notes that not all parameters and control modes can be performance tested. Also, it would be better for the results to match the expected performance of the latest model instead of what was used in the IC studies. Finally, making the standard more explicit as to whom (TP/PC/TO) is responsible for the compliance requirement would allow that responsible party(s) to have a process by which it requests validation and/or attestation from the plant. Southern Company believes the TO/TP/PC cannot and should not be held to a GO responsibility to perform as required.

Regarding the proposed requirements in (4), any IBR control parameter updates made during the commissioning process should not blindly trigger a “re-study”. Perhaps requiring an assessment of changes to determine if it needs to be re-studied would be the more effective approach. As written, this implementation would drastically affect the scope and compliance documentation.	
Likes 0	
Dislikes 0	
Response	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	No
Document Name	
Comment	
Please refer to the comment provided for Q1.	
Likes 0	
Dislikes 0	
Response	
Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group	
Answer	No
Document Name	
Comment	
No. See question 1 on scope concerns.	
Likes 0	
Dislikes 0	
Response	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	No
Document Name	
Comment	
Duke Energy supports EEI submitted comments with the exception to eliminate the suggested IBR Facility Commissioning Enhancements.	

Likes 0	
Dislikes 0	
Response	
Greg Sorenson - ReliabilityFirst - 10 - RF	
Answer	No
Document Name	
Comment	
RF supports the addition of EMT model development and analysis to the generation interconnection process. However, there are existing dynamic studies conducted that identify risks associated with generation performance that should continue to be performed. The proposed enhancements, like the current version of FAC-002, do not require the TO to maintain a database of baseline EMT models to use for FAC-002 studies, which will make it difficult to ensure EMT models being used are accurate.	
Likes 0	
Dislikes 0	
Response	
Julie Hall - Entergy - 1,3,6, Group Name Entergy	
Answer	No
Document Name	
Comment	
Expectations between “pre-commissioning”, “commissioning” and “commissioned” are not clear. Items dealing with “commissioned” assets should be the purview of the MOD standards.	
Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP - 3,5,6	
Answer	No
Document Name	
Comment	

Please see AEP's comments and concerns provided in the response field for Question #4.

Likes 0	
Dislikes 0	

Response

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

Given that the performance of an IBR can be significantly impacted by firmware implemented in the controls; test, verification, and documentation of performance should not only be required during the commissioning process but also whenever IBR firmware is updated or changed. Documentation that the updated in-service facility matches the models used during the interconnection process should be provided by the GO to the TO, PC, and RC. For example, should MOD-026 be included in this SAR?

Likes 0	
Dislikes 0	

Response

Nicolas Turcotte - Hydro-Quebec (HQ) - 1,5

Answer	Yes
Document Name	

Comment

Given that the performance of an IBR can be significantly impacted by firmware implemented in the controls; test, verification, and documentation of performance should not only be required during the commissioning process but also whenever IBR firmware is updated or changed. Documentation that the updated in-service facility matches the models used during the interconnection process should be provided by the GO to the TO, PC, and RC. For example, should MOD-026 be included in this SAR?

Likes 0	
Dislikes 0	

Response

Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC

Answer	Yes
Document Name	

Comment
WECC asks that the drafting team ensure that any modifications to FAC-001 and/or FAC-002 aligh with changes to MOD-032 and TPL-001 being developed under Project 2022-02. WECC also questions whether in the scoping section there could be room for more specificity in respect to "pre-commissioning" to consider including a specific time domain to be from "first synch" date to "commercial operating date." Consideration for a set of engineering-based pre-commissioning requirements to be augmented by local TO/TP requirements should be considered to support consistency in pre-commissioning and ultamately commissioning requirements.

Likes 0	
Dislikes 0	

Response

Isidoro Behar - Long Island Power Authority - 1	
Answer	Yes
Document Name	

Comment
Comments: It will be important to avoid conflicts with the coming release of IEEE 2800.2.

Likes 0	
Dislikes 0	

Response

Joshua London - Eversource Energy - 1,3, Group Name Eversource	
Answer	Yes
Document Name	

Comment
Given that the performance of an IBR can be significantly impacted by firmware implemented in the controls; test, verification, and documentation of performance should not only be required during the commissioning process but also whenever IBR firmware is updated or changed. Documentation that the updated in-service facility matches the models used during the interconnection process should be provided by the GO to the TO, PC, and RC. For example, should MOD-026 be included in this SAR?

Likes 0	
Dislikes 0	

Response

Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy	
Answer	Yes
Document Name	
Comment	
NERC Standards are not enforceable until after facility is commissioned so BPS reliability impacts may not be caught at the proper time	
Likes 0	
Dislikes 0	
Response	
Kyle Thomas - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Israel Perez - Salt River Project - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Ruchi Shah - AES - AES Corporation - 5	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Amy Wilke - American Transmission Company, LLC - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Alain Mukama - Hydro One Networks, Inc. - 1 - NPCC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	
Document Name	
Comment	
Texas RE agrees with the SAR goal of incorporating IBR Facility Commissioning enhancements. It is unclear, however, how these commissioning enhancements will be integrated into the interconnection study requirements standards in FAC-001-4 and FAC-002-4. Texas RE inquires as to whether new requirements will be added to these standards and will the Standards titles be changed to “Facility Interconnection and Commissioning Requirements”?	
Likes 0	

Dislikes 0	
Response	

3. Do you agree that the Detailed Description provides the full list of technical specifications to fulfill the Project Scope? If you do not agree, or if you agree and wish to provide comments or suggestions for the project scope, please provide your recommendation and explanation?

Thomas Foltz - AEP - 3,5,6

Answer	No
Document Name	

Comment

Please see AEP's comments and concerns provided in the response field for Question #4.

Likes 0	
Dislikes 0	

Response

Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy

Answer	No
Document Name	

Comment

For modeling, the detailed description still seems to leave the decision to the GO as to what models are submitted. This needs to be standardized and determined by the TO. Some GOs will choose generic models since they are less expensive

Likes 0	
Dislikes 0	

Response

Julie Hall - Entergy - 1,3,6, Group Name Entergy

Answer	No
Document Name	

Comment

The list of requirements seems overly specific for a SAR, and may hamstring the SDT during the standard development process.

Likes 0	
Dislikes 0	

Response

Adrian Andreoiu - BC Hydro and Power Authority - 1,3,5, Group Name BC Hydro	
Answer	No
Document Name	
Comment	
BC Hydro appreciates the opportunity to comment and offers the following. In the Detailed Description section of the SAR, under the IBR Facility Commissioning Enhancements, a requirement to report to the ERO Enterprise discrepancies between the study model and the commissioned in-service facilities is outlined. It is not obvious how this is supported by the identified needs and how this may help alleviate the BES risks. BC Hydro requests that a reference to any technical documentation supporting this requirement be added and expanded on as appropriate, or remove this from the project deliverables list.	
Likes 0	
Dislikes 0	
Response	
Greg Sorenson - ReliabilityFirst - 10 - RF	
Answer	No
Document Name	
Comment	
The FAC-001-4 Enhancements to requirement R1 do contain a complete list of technical specifications; however, the SAR is written such that the interconnection requirements, at a minimum, include some or all of the specifications. By not making these subparts required, an entity does not have to address or include all or most of the specifications. The FAC-002-4 Enhancements do not require baseline EMT models to be updated and used, making it hard to require that an entity have these models.	
Likes 0	
Dislikes 0	
Response	
Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	No
Document Name	
Comment	
Duke Energy supports EEI and NAGF submitted comments.	

Additionally, except for the commissioning enhancements, Duke Energy disagrees with the inclusion of the following SAR IBR Facility Commissioning Enhancements section language "…Any discrepancies should be identified and reported to the ERO Enterprise…"	
Likes 0	
Dislikes 0	
Response	
Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group	
Answer	No
Document Name	
Comment	
No. See question 1 on scope concerns and why including a laundry list of technical specifications isn't correct.	
Likes 0	
Dislikes 0	
Response	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	No
Document Name	
Comment	
Please refer to the additional comments provided under Q4.	
Likes 0	
Dislikes 0	
Response	
Sharon Darwin - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC	
Answer	No
Document Name	
Comment	
Under NERC FAC-001-4 Enhancements to R1, it is stated that the TO shall document the enhanced facility interconnection requirements and make them available upon request. If the goal of the SAR is to ensure that interconnection requirements are compliant from the interconnection studies phase	

through the commercial operation phase (when NERC Standards apply), Southern Company feels it would be best for the currently drafted wording "make them available upon request" to be removed.

The SAR proposes to enhance the scope of FAC-002-4 under "Additional Requirement" and would require TPs/PCs to develop a process for "assessment and conformity" to ensure that new and existing IBRs seeking to make a Qualified Change conform with the newly implemented interconnection requirements. If implemented, there will be challenges for existing equipment (e.g., existing PV inverters), including technical limitations that will limit facilities from meeting these new requirements.

Additionally, it is unclear where the proposed "IBR Facility Commissioning Enhancements" will be incorporated within the standards development activities to ensure that the GO of a registered IBR facility is meeting the interconnection requirements. Although the IBR Facility Commissioning Enhancements mention that the “GO of a registered IBR facility must provide adequate proof that the facility was commissioned reliably,” it is not clear or emphatic in specifying if the GO would actually be the responsible party if an IBR fails to meet the requirements, despite studies, documentation, and/or attestation provided to the TO, TOP, PC, RC and BA, indicating it would not fail.

Likes 0	
Dislikes 0	

Response

Rachel Schuldt - Black Hills Corporation - 1,3,5,6, Group Name Black Hills Corporation - All Segments

Answer	No
Document Name	

Comment

Black Hills Corporation believes that including detailed technical specifications in a NERC Reliability Standard is unnecessary and duplicates IEEE Standard 2800-2022. This duplication does not enhance BES reliability, as PRC-029 already addresses ride-through requirements for interconnecting IBRs. Black Hills Corporation supports the IBR Facility Commissioning Enhancements but suggests placing them in a new NERC Reliability Standard based on a separate SAR.

Likes 0	
Dislikes 0	

Response

Andrew Smith - APS - Arizona Public Service Co. - 1,3,5,6

Answer	No
Document Name	

Comment

AZPS supports the following comments that EEI has submitted on behalf of their members:

EEI does not agree that the detailed list of technical specifications are appropriate for a NERC Reliability Standard and does little more than attempt to duplicate what is already contained in the IEEE Standard 2800-2022, noting other standards are not to be incorporated in NERC Standards. Moreover,

it is unclear how this duplication of those requirements will improve BES reliability when significant efforts have already been made to provide clear ride-through requirements within PRC-029 and all interconnecting IBRs will be required to meet those requirements once this Reliability Standard is approved and goes into enforcement. Moreover, listing the highly prescriptive technical specifications for interconnecting IBRs is unnecessary (in light of PRC-029). It is unlikely to have any impact on BES reliability and is likely duplicative with PRC-028, PRC-029, and PRC-030.

EEI supports the IBR Facility Commissioning Enhancements but feel they would be better placed in a new NERC Reliability Standard, based on a separate SAR for that specific purpose.

Likes 0	
Dislikes 0	

Response

Dwanique Spiller - Berkshire Hathaway - NV Energy - 5

Answer	No
Document Name	

Comment

No. See question 1 on scope concerns and why including a laundry list of technical specifications isn't correct.

Likes 0	
Dislikes 0	

Response

Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter

Answer	No
Document Name	

Comment

FirstEnergy supports EEI's comments which state:

EEI does not agree that the detailed list of technical specifications are appropriate for a NERC Reliability Standard and does little more than attempt to duplicate what is already contained in the IEEE Standard 2800-2022. Moreover, it is unclear how this duplication of those requirements will improve BES reliability when significant efforts have already been made to provide clear ride-through requirements within PRC-029 and all interconnecting IBRs will be required to meet those requirements once this Reliability Standard is approved. Moreover, listing the highly prescriptive technical specifications for interconnecting IBRs is unnecessary (in light of PRC-029), unlikely to have any impact on BES reliability is likely duplicative.

EEI supports the IBR Facility Commissioning Enhancements but feel they would be better placed in a new NERC Reliability Standard.

Likes 0	
Dislikes 0	

Response	
Hayden Maples - Evergy - 1,3,5,6 - MRO	
Answer	No
Document Name	
Comment	
Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI) and the North American Generator Forum (NAGF) on question 3	
Likes 0	
Dislikes 0	
Response	
Richard Jackson - U.S. Bureau of Reclamation - 1,5	
Answer	No
Document Name	
Comment	
See the response to items 1 and 4.	
Likes 0	
Dislikes 0	
Response	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	
The NAGF does not agree with the Detailed Description section of the proposed SAR as we believe that it is too detailed and oversteps what should be contained in a SAR. A SAR should not be so detailed that specific technical specifications and requirements are spelled out and expect the standard drafting to incorporate. The SAR should focus on identifying a risk to Reliability, properly defining the problem, and empowering the SDT to address the issue(s) in a way that meets the needs of all stakeholders.	
Likes 0	
Dislikes 0	

Response

Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	

Comment
EEI does not agree that the detailed list of technical specifications are appropriate for a NERC Reliability Standard and does little more than attempt to duplicate what is already contained in the IEEE Standard 2800-2022, noting other standards are not to be incorporated in NERC Standards. Moreover, it is unclear how this duplication of those requirements will improve BES reliability when significant efforts have already been made to provide clear ride-through requirements within PRC-029 and all interconnecting IBRs will be required to meet those requirements once this Reliability Standard is approved and goes into enforcement. Moreover, listing the highly prescriptive technical specifications for interconnecting IBRs is unnecessary (in light of PRC-029), and it is unlikely to have any impact on BES reliability is likely duplicative with PRC-028, PRC-029, and PRC-030. EEI supports the IBR Facility Commissioning Enhancements but feel they would be better placed in a new NERC Reliability Standard, based on a separate SAR for that specific purpose.

Likes 0	
Dislikes 0	

Response

Nick Leathers - Ameren - Ameren Services - 1,3,5,6 - MRO,SERC	
Answer	No
Document Name	

Comment
Ameren agrees with EEI's comments.

Likes 0	
Dislikes 0	

Response

Daniel Gacek - Exelon - 1,3, Group Name Exelon	
Answer	No
Document Name	

Comment

Exelon supports adding requirements for IBRs to have certain technical capabilities such as requiring inverters to align with IEEE 2800. The requirements to configure the IBRs to perform in a specific manner, as well as requirement to demonstrate performance, belong in other NERC standards.	
Likes 0	
Dislikes 0	
Response	
Adrian Harris - Midcontinent ISO, Inc. - 2 - MRO,SERC,RF	
Answer	No
Document Name	
Comment	
Submitted with 3rd party comments	
Likes 0	
Dislikes 0	
Response	
Lori Frisk - Allete - Minnesota Power, Inc. - 1 - MRO	
Answer	No
Document Name	
Comment	
Minnesota Power supports EEI’s comments.	
Likes 0	
Dislikes 0	
Response	
Gail Elliott - International Transmission Company Holdings Corporation - NA - Not Applicable - MRO,RF	
Answer	No
Document Name	
Comment	

ITC supports the response submitted by EEI	
Likes 0	
Dislikes 0	
Response	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC,Texas RE,NPCC,RF, Group Name SRC 2024	
Answer	No
Document Name	
Comment	
Although it is helpful for the drafting team to have a list of all known issues that need to be included in the standards, such a list can be interpreted to preclude the drafting team from addressing additional issues that may be identified during the drafting and commenting process. The SAR should clarify that the list is not exhaustive and additional requirements can be proposed (but must be balloted separately).	
Likes 0	
Dislikes 0	
Response	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	No
Document Name	
Comment	
ERCOT joins the comments submitted by the IRC SRC and adopts them as its own.	
Likes 0	
Dislikes 0	
Response	
Kyle Thomas - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	
Comment	

In this list of enhancements, Power Quality is a missing technical specification. Power Quality is included as a critical section in IEEE 2800-2022, and yet this section and associated enhancements are missing from the SAR and should be included. In order to update the Detailed Description to include Power Quality, the following bullet and sub-bullets can be added under the "NERC FAC-001-4 Enhancements to the requirement R1":

•Power quality requirements
•Limitations of voltage fluctuations induced by an IBR plant (e.g., specifying requirements for rapid voltage changes - frequent or infrequent - and flicker)
•Limitations of harmonic distortion (e.g., specifying requirements for harmonic current distortion and harmonic voltage distortion)
•Limitations of overvoltage contribution (e.g., specifying requirements for limitation of cumulative instantaneous overvoltage and overvoltage over one fundamental frequency period)

Likes 0	
Dislikes 0	

Response

Isidoro Behar - Long Island Power Authority - 1

Answer	Yes
Document Name	

Comment

Comments: The following comments and suggestions on the project scope:

On NERC FAC-001-4 Enhancements:

- **Interconnection Integrity:** With respect to a plant's susceptibility to electromagnetic interference, it can be very difficult to specify or test such a requirement. More clarity and specifics will be expected of the standard drafting team. Otherwise, it a becoming a meaningless "checkbox" that waters down the otherwise very meaningful and important requirements proposed.

- **Model benchmarking:** The benchmarking of models on different simulation software is recommended to ensure a reasonable alignment of all models associated with a given plant.

  ○ It is strongly recommended that reasonableness be left to engineering judgment and not to attempt to apply quantitative criteria to a match, which is exceedingly difficult to do well. Simple time-step-wise error calculations (as has been proposed and used in some places) are fraught with problems, headaches, and arguments that will slow down the interconnection process and burden all entities involved, usually for no good reason. For any material differences observed, an explanation grounded in fundamentals should be considered acceptable. Such a requirement should also be accompanied by guidance on what is acceptable and what is not, much as ERCOT has done to-date with MQT.

  ○ The extensiveness of the benchmarking varies greatly in the US today, from nothing to 180 different tests with different operating points, grid strengths, disturbances, etc. The recommended set of tests is somewhere between these. This effort is not intended to be a stability study and should not take an exhaustive form of one. A full factorial matrix of potential operating conditions is not necessary, but a strategic spot-checking of benchmarking is warranted, that is intended to check the most common operating conditions (Pmax and Pmin), a range of grid strength (high and low), and the most common types of disturbances. Edge cases should be reserved for a stability study.

- **Model verification against product settings:**

○ This requirement is critical, and efforts/approaches vary widely in the industry today. There needs to be a clear process for linking product settings to the model for all IBR and for power plant controllers. This should include not only a parameter mapping (with relationships between model parameters and equipment parameters), but also a description of the process by which the model parameters are frozen - after studies are accepted and prior to commissioning, then transferred to commissioning, and which parameters are allowed to be "field tuned," and if any parameters are adjusted, the process by which they are fed back to the models, which may trigger re-study and/or re-benchmarking.

○ On a specific technical topic for validation, the communications links used to pass control signals within the plant deserves special attention to ensure that control loop latencies, particularly between the power plant controller and the inverters, are not so long as to negatively impact stability margin, which can show up when there is a weak grid contingency. However, care should be exercised in developing the requirement. A simple maximum transport delay on communications links may not be a good approach. An appropriate approach considers that communications links may be complicated with multiple network switches in the path, that read/write buffers on every controller vary, that measurement transducers also vary, and that these are all a part of the control loop. Therefore, it is recommended to write the requirement in terms of the performance (stability) of the control loop under specified grid conditions. It is noted that under strong grid conditions for voltage regulating control loops, there may be ample stability margin and that risks due to control loop latency may be masked. Therefore, the requirement could be augmented with a step test in the control loop and then measure the reaction time to capture the full control loop latency. However, note that latencies can be dynamic – a function of the number of units online among other factors, and so even such a test, while a good practice, is not fool-proof.

● **Model validation:** This refers to validation of the model against an equipment type test. This should be differentiated from "model validation" per NERC-MOD-026 where a limited set of field tests are matched with a model for a specific plant. Instead, this comment on model validation refers to a model validation could be conducted in a laboratory setting or in a specific field test to demonstrate that the control structure represented in the model corresponds with that of the equipment for a range events, including large signal disturbances (like faults) that are generally not field-testable. Clear documentation (and rigorous revision control on equipment firmware and models) should be required.

● **Measurement data for performance monitoring and validation:** Measurements for capturing high-quality phase voltages and phase currents from major IBR installations is strongly recommended. This is more than just having measurement capability. In addition to measurement capability specification (which signals, what equipment, what data rate, what duration), consideration should be given to (a) event triggering to ensure that significant events are automatically captured and (b) data retrieval to ensure that captured data from an event is not overwritten by a subsequent event, so that the data can be stored for a reasonable period of time while it may be determined if an analysis is necessary. Further consideration may be warranted on the use and accuracy of capacitively-coupled voltage transducers (CCVTs) for validation, as these often have complex behavior outside of fundamental frequency dynamics.

● **Test and verification requirements:** In general, we recommend that verification should be happening along the way in the process, marked by a few gate-keeping points at handoffs. For instance, there should be a verification step when the studies are completed (model and settings are firmed up) prior to the hand-off to commissioning. At this step, the verification likely would involve a review by the equipment manufacturer to ensure all settings are appropriate (none out of bounds). A subsequent verification step would occur after commissioning, to ensure that the as-built settings are documented and match with the inputs to commissioning. It is also worth considering a mid-point verification step within the commissioning process of very large installations to check the settings and performance of the plant midway through commissioning.

FAC-002-4 Enhancements

● **Submission of qualified changes, updated models, model documentation, and test reports. The assessment may include physical testing such as factory testing or simulation-based assessment using detailed, representative models of the IBR facility that will be built in the field:**

○ It is recommended to capture what constitutes a qualified change. This should include changes to parameters (in the inverter or power plant controller) that impact grid performance (some effort is needed to define this). This should also include changes to firmware.

○ Changes to firmware and/or parameters should be required to be documented rigorously with the changes, the date, and a meaningful description of the changes, and a justification for why or why not a re-study is needed.

○ Revision history should be built off upgrades. For new products or a substantially changed firmware, this should revert to type testing / validation.

○ In principle, inverter firmware and controls and power plant controls should be treated similarly in terms of revision history and logging. But discretion is needed on what types of changes trigger re-study or re-validation. It does not make sense to hold inverters and PPCs to the same standard because in general, a power plant controller cannot instruct a trip of the plant. Therefore, the criteria should be highest for the controls that have the most responsibility for the plant – the inverter controls and other plant protection systems that can trip the plant. This should also include consideration of supplemental IBR like STATCOMs, particularly where a failure of the supplemental IBR would result in the trip of the plant. Changes to the power plant controller should allow more flexibility and judgment, as should changes to communications equipment, transducers, instrument transformers, etc. so as not to overburden GO and TO study teams with evaluating very low-risk changes.

From IBR Facility Commissioning Enhancements

- **New requirements created by applicable entities that require the GO of a registered IBR facility provide adequate proof that the facility was commissioned**

○ Yes, this is critical. The proof should be in the form of documentation linking equipment settings and equipment firmware revision to model settings and model revision.

- **Documentation to the TO, Transmission Operator (TOP), TP, PC, Reliability Coordinator (RC), and BA regarding commissioning checks related to protection and control systems as well as plant capability**

○ Is this referring to protection and control systems outside the inverters (like feeder protections, transformer protection, etc)? If so, how would such requirements be coordinated with PRC-024 and PRC-029? The differences need to be articulated clearly.

- **Documentation that the commissioned in-service facility matches the model used during the interconnection process**

○ This is critical and covered in prior comments, where there should be a verification step after commissioning to review documentation that links equipment settings and equipment firmware revision to model settings and model revision. For any differences, these need to be fed back to the models and decisions need to be made in terms of re-study or re-benchmarking requirements.

Likes 0	
Dislikes 0	

Response

Ruchi Shah - AES - AES Corporation - 5

Answer	Yes
Document Name	

Comment

AES US Renewables agree with the technical specifications listed in the SAR. In particular, we agree with the specifications listed for FAC-001 as that will ensure consistency and uniformity on interconnection requirements across all TO footprints for IBRs.

Likes 0	

Dislikes 0	
Response	
Scott Thompson - PNM Resources - 1,3,5 - WECC,Texas RE	
Answer	Yes
Document Name	
Comment	
During the last comment review, the drafting team discussion indicated that a Planning Coordinator with more than one zone may utilize the same weather event. This understanding should be documented within the standard to ensure there is no ambiguity should an entity conduct such an approach. The MRO-NSRF would like to see clarification in the language that indicates regions are allowed to utilize the same scenario provided it meets the requirements in 2.1 and 2.2.	
Likes 0	
Dislikes 0	
Response	
Cain Braveheart - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
BPA agrees that the Details support the Proposed Scope. As noted in response to question 1, BPA believes for any meaningful improvement to system reliability, a full suite of standards that would need to be revised includes MOD-26, MOD-27, MOD-32, PRC-24, PRC-29, PRC-30, TPL-001, and potentially TOP and IRO standards that govern Operating Horizon studies. Alternatively, brand new, dedicated MOD/PRC/TPL/TOP/IRO standards for “IBR performance” may be required for effective implementation. BPA believes the SAR scope, as proposed, will unequivocally increase costs and schedules for BES interconnection requests by requiring more time-intensive Interconnection studies. There is no clear demonstration these costs are covered by tangible reliability benefits.	
Likes 0	
Dislikes 0	
Response	
Alain Mukama - Hydro One Networks, Inc. - 1 - NPCC	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Amy Wilke - American Transmission Company, LLC - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Israel Perez - Salt River Project - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Joshua London - Eversource Energy - 1,3, Group Name Eversource	
Answer	
Document Name	
Comment	
The full list of technical specifications to fulfill the Project Scope is best determined by the collective knowledge and experience of the Standard Drafting Team members.	
Likes 0	
Dislikes 0	
Response	
Nicolas Turcotte - Hydro-Quebec (HQ) - 1,5	
Answer	
Document Name	
Comment	
The full list of technical specifications to fulfill the Project Scope is best determined by the collective knowledge and experience of the Standard Drafting Team members.	
Likes 0	
Dislikes 0	
Response	
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	
The full list of technical specifications to fulfill the Project Scope is best determined by the collective knowledge and experience of the Standard Drafting Team members.	
Likes 0	
Dislikes 0	
Response	
Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO	
Answer	
Document Name	
Comment	
N/A	
Likes 0	
Dislikes 0	
Response	

4. Provide any additional comments for the drafting team to consider, if desired.

Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	
Document Name	
Comment	

ERCOT joins the comments submitted by the IRC SRC and adopts them as its own.

Likes 0	
Dislikes 0	
Response	

Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC,Texas RE,NPCC,RF, Group Name SRC 2024	
Answer	
Document Name	
Comment	

In the Detailed Description section, the SAR should specify that the project team needs to define the specific necessary enhancements to any Reliability Standards modified as a result of this SAR. Any resulting standards should define specific GO requirements that are universally applicable within all systems in the ERO footprint and should not have non-specific obligations for the PC/TP/TO to have a “process” or “facility interconnection requirement”—such requirements would only create administrative compliance burdens with no reliability benefit, as all PCs/TPs/TOs already have “processes” and “facility interconnection requirements.” The SAR should be clear that it would not be appropriate for the drafting team to consider this kind of approach. Any affected standards should only be modified or created to the extent that universally specified requirements that would enhance reliability can be identified and made applicable to all PCs/TPs/TOs. Any resulting standards should also be clear that they do not preclude TOs/TPs/PCs from establishing additional requirements specific to their systems.

(note that ISO New England does not support the above comment but supports the other Standards Review Committee comments)

In general, the SAR scope should clarify that the drafting team should develop specific, universally applicable GO requirements that will be useful for all systems in the ERO footprint while preserving the ability of TPs/TOs/PCs to establish additional requirements specific to their system.

As currently drafted, this SAR proposes enhancements to FAC-001 and 002 (interconnection processes) to address observed IBR reliability issues. While the SRC believes some of the proposed revisions should be placed in other standards (as detailed in the SRC’s response to question 1), to the extent this SAR does result in changes to FAC-001 and 002, it seems to be aligned with Project 2023-05, which essentially has the same objectives for DER. Thus, it is unclear why this SAR was assigned to the EMT modeling project 2022-04 rather than project 2023-05 or established as a new project, especially since the scope of this SAR does not appear to be directly related to EMT modeling. If the underlying reasoning is that incorporating EMT modeling requirements is the only way the proposed revisions can be effective (a debatable proposition), the SAR should be more explicit about consideration of new EMT modeling requirements within the context of this SAR. If this SAR is not intended to address EMT modeling, the 2022-04 drafting team should establish and communicate clear priorities with respect to how and when it will move forward with this SAR or the EMT modeling SAR.

Likes 0	
Dislikes 0	

Response

Shannon Mickens - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SPP RTO

Answer	
Document Name	

Comment

SPP has a concern that the language in the SAR and comment form does not align and meet the industry need to address IBR deficiencies pertaining to performance and modeling issues. There is language in the FAC-002 Enhancement section of the SAR that talks about bench marking models associated with the EMT modeling process. However, there is no language discussing the need or impact of the EMT model and/or study.

Furthermore, the background language in the comment form focuses on the TP and PC conducting an EMT study, but there is no language discussing the need for a Conformity Study.

In contrast, the SAR proposes a definition for a Conformity Study found in footnote 11. There is language in the scope of the document expressing a need to implement steps for the Conformity Study instead of the EMT Study, it is our understanding that Conformity Study is the assessment that should be conducted during the interconnection and commissioning time not the EMT Study.

SPP recommends that the drafting team take into consideration reviewing the SAR and comment form language and ensure there is proper alignment as well as clear emphasis on which study will be needed during this phase of the interconnection process.

Likes 0	
Dislikes 0	

Response

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

Answer	
Document Name	

Comment

BPA disagrees with NERC’s premise on root causes of IBR performance deficiencies. Mandating widescale increase in EMT modeling and simulations will not necessarily achieve the stated goals of improving BPS Reliability. This SAR proposes low-value increased compliance overhead without improving actual System Reliability, as compared to other regulatory changes like IEEE 2800 or proposed revisions to NERC PRC-standards governing IBR resources.

BPA petitions the SDT to contemplate how validating 'As-Built' EMT models can be reasonably implemented from a TO/TP perspective. BPA suggests the SDT consider this scope may be best as a GO-responsibility instead of a TP or TO responsibility. BPA believes Model Validation for EMT-scale models will be time and labor intensive and could potentially protract the schedule of Interconnections under the FERC LGIP.	
Likes 0	
Dislikes 0	
Response	
Israel Perez - Salt River Project - 1,3,5,6 - WECC	
Answer	
Document Name	
Comment	
SRP believes that engineers should have the ability to use their discretion on what models are needed for their studies.	
Likes 0	
Dislikes 0	
Response	
Adrian Harris - Midcontinent ISO, Inc. - 2 - MRO,SERC,RF	
Answer	
Document Name	
Comment	
Submitted with 3rd party comments	
Likes 0	
Dislikes 0	
Response	
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	

The changes described in the SAR are much overdue.	
Likes 0	
Dislikes 0	
Response	
Nick Leathers - Ameren - Ameren Services - 1,3,5,6 - MRO,SERC	
Answer	
Document Name	
Comment	
N/A	
Likes 0	
Dislikes 0	
Response	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	
Document Name	
Comment	
The NAGF is concerned that the level of detail prescribed in this proposed SAR far exceeds what is necessary to incorporate EMT modeling/studies and include model quality checks for all models used in reliability studies. As written, the proposed SAR will restrict the Standard Drafting Teams ability to address a reliability risk while forcing a single desired outcome.	
Likes 0	
Dislikes 0	
Response	
Richard Jackson - U.S. Bureau of Reclamation - 1,5	
Answer	
Document Name	
Comment	

NERC has not been consistent with IBR resource compliance development. In some circumstances, existing standards have been modified and updated to incorporate IBR's, while in other instances new standards have been developed solely for IBR resources.

It is becoming more confusing and burdensome to have specific resources (IBR's) that have unique synchronization and tripping attributes tied to existing standards that incorporate the rest of industry (gas, hydropower, etc). Doing so makes these standards more complex, difficult to navigate as well as to implement based on the requirements, especially for those in industry who either do not own or only partially own IBR resources. It also makes existing standards very difficult to update for the SDT as specific requirements are made for IBR's that do not incorporate the rest of industry. IBR resources should be monitored on their own unique standards.

Likes 0	
Dislikes 0	

Response

Ruchi Shah - AES - AES Corporation - 5

Answer	
Document Name	

Comment

AES US Renewables recommend including reference to the Reliability Guideline on Commissioning Best Practices that are currently being developed in the NERC IRPS for the drafting team to consider using when working on revising FAC-002 or a new standard once the SAR has been approved by the Standards Committee.

Likes 0	
Dislikes 0	

Response

Hayden Maples - Evergy - 1,3,5,6 - MRO

Answer	
Document Name	

Comment

Evergy supports and incorporates by reference the comments of the Midwest Reliability Organization's NERC Standards Review Forum (MRO NSRF) and the North American Generator Forum (NAGF) on question 4

Likes 0	
Dislikes 0	

Response

Mark Garza - FirstEnergy - FirstEnergy Corporation - 1,3,4,5,6, Group Name FE Voter	
Answer	
Document Name	
Comment	
No additional comments.	
Likes 0	
Dislikes 0	
Response	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	
Document Name	
Comment	
NV Energy agrees regarding the concern with large loads (data centers, AI computing demands, cryptocurrency mining, etc...) that are anticipated to be connected to the Bulk Power System of the coming year, which may have an impact on the reliability of the Bulk Power System while also not being subject to existing standards. NV Energy would be supportive of appropriate measures to ensure that these loads do not negatively impact the reliability of the Bulk Power System. However, these efforts should be handled separately from existing requirements on registered entities.	
Likes 0	
Dislikes 0	
Response	
Sharon Darwin - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - SERC	
Answer	
Document Name	
Comment	
It will be a net positive outcome if the resulting standard revisions create alignment with new Order 2023 requirements and increase the consistency of interconnection/commissioning practices for TOs across the country. This could also help drive consistency with OEMs and EPC contractors throughout the design and develop phases. The risk is adding new steps and obligations resulting in a further slowing of study and commissioning processes. This should support/align with Order 2023's objective of making interconnection processes more efficient.	
Likes 0	
Dislikes 0	
Response	

Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	
Document Name	

Comment

It is recommended to make the following changes:

1. The second sub-bullet under the “Reactive power-voltage control requirements within the continuous operation region” on page 7.
   - Voltage and reactive power control modes (e.g., specifying voltage regulation capability by changing reactive power output, voltage control modes during normal operation, and **conditions that may trigger the control mode switch.**
2. Second sub-bullet point in page 8:
   - Model Validation report showing benchmarking between all submitted model types (Standard Library Model, Positive Sequence User-defined model, and Electromagnetic Transient (EMT)) model and the **actual installed** equipment as per FERC Order 2023.
3. The second bullet point on page 8:
   - Test and verification requirements (e.g., specifying requirements for testing and verifying an IBR Facility’s conformity with applicable interconnection requirements during the interconnection process)
4. The last bullet point on page 8:
   - Documentation that the commissioned in-service facility matches the model used during the interconnection process. Any discrepancies **outside of the specified tolerance limits** should be identified and reported to the ERO …….

Likes 0	
Dislikes 0	

Response

Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC	
Answer	
Document Name	

Comment

WECC would like to emphasize an aspect of the SAR that is key and paramount. Updated information about the plant is needed after it is online so that the AS BUILT INFORMATION is available. If the information is not collected at that time there is a possibility that it may never be available as has been experienced.

Reading through the SAR – it seems as though the notion of the particular grid mode of the IBR Inverter’s intended operating mode, for example, “Grid Following” vs “Grid Forming” shold be considered. The SDT should then consider what if any standard language should be written as intended for the specific intended modes of the inverters.

Similar consideration for IBR BESS – Battery Energy Storage Systems.

WECC askes that the drafting team consider the question: Consideration of Inclusion of requirement language specifically addressing when and where software changes to key components of the IBR (I.E., IBR plant voltage controllers) necessitate re-validation and re-commissioning (leveraging obligations in MOD-26 and MOD-27). There is some evidence of situations where there have been vendor-driven software changes and then the entity

1. Overlooks the obligation to coordinate with Planning to revalidate performance to model or
2. New software might possibly add previously unavailable capability which mandates a commissioning cycle, requiring coordination with Planning.

In the Reliability Principles section, should the SDT consider including

(4) Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented. Specifically: In situations where an IBR has a large BESS co-located or the proposed IBR is a large-scale BESS (depending on charge state and other factors) as a possible resource for emergency operation, system restoration of the interconnected bulk power system. This could included conditions such as load shed or frequency response or reactive response. Seemingly, if these intentions are conditioned at the Facility Interconnection phase of development then those intended operating modalities would benefit from proper performance modeling, validation, and commissioning.

5- In the IBR Facility Commissioning Enhancements section (page 8-9)- The bullet regarding matching (i.e."…the commissioned in-service facility matches the model used during the interconnection process.") should be reconsidered to be more definitive. The term "transmission entities" is broad and may not capture the list provided elsewhere. Also, the value of submitting to the ERO Enterprise is negligible and questionable. CAPS are generally retained by entities and not provided to the ERO Enterprise. Timelines for the comparison should be set as well as the completion of CAPs.

Likes 0	
Dislikes 0	

Response

Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group

Answer	
Document Name	

Comment

MRO NSRF agrees regarding the concern with large loads (data centers, AI computing demands, cryptocurrency mining, etc...) that are anticipated to be connected to the Bulk Power System of the coming year, which may have an impact on the reliability of the Bulk Power System while also not being subject to existing standards. MRO NSRF would be supportive of appropriate measures to ensure that these loads do not negatively impact the reliability of the Bulk Power System. However, these efforts should be handled separately from existing requirements on registered entities.

Likes 0	
Dislikes 0	

Response

Andy Thomas - Duke Energy - 1,3,5,6 - SERC,RF	
Answer	
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Alain Mukama - Hydro One Networks, Inc. - 1 - NPCC	
Answer	
Document Name	
Comment	
No comments.	
Likes 0	
Dislikes 0	
Response	
Greg Sorenson - ReliabilityFirst - 10 - RF	
Answer	
Document Name	
Comment	
The main concern of Project 2022-04 is to address lack of accurate modeling data and the need to perform electromagnetic transient (EMT) studies during the interconnection process and long-term planning horizon. The current SAR enhancements do not ensure consistent practices in implementation or adequate benchmarking of models due to a lack of actual required steps a TO/TP has to follow via FAC-002 to ensure the EMT models being used are accurate.	
Likes 0	
Dislikes 0	
Response	

Isidoro Behar - Long Island Power Authority - 1	
Answer	
Document Name	
Comment	
Comments: N/A	
Likes 0	
Dislikes 0	
Response	
Joshua London - Eversource Energy - 1,3, Group Name Eversource	
Answer	
Document Name	
Comment	
The changes described in the SAR are much overdue.	
Likes 0	
Dislikes 0	
Response	
Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5, Group Name DTE Energy	
Answer	
Document Name	
Comment	
Model types need to be specified by the TOs so that all GOs are submitting the same model types and are not able to choose a generic over a UDM just because it is cheaper to build a generic model.	
Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP - 3,5,6	
Answer	

Document Name	

Comment

This SAR, while correctly identifying the present problem of IBR disturbance ride-through performance deficiencies as seen in the event reports, as well as deficiencies in interconnection studies, modeling, and project commissioning procedures in support of ride-through performance, overlooks a number of relevant facts:

1) Resolution of ride-through performance deficiencies is already well underway in PRC-029 and PRC-030 as presently filed.

2) There is a sharp distinction between interconnection facility requirements specified in TO FAC-001 documents that are to be satisfied prior to project operation and that TOs can enforce by delaying the project versus performance requirements that apply only after a project is in operation that TOs have no means to enforce.

3) Pre-interconnection study dynamic model verification/validation is a critical aspect of ensuring acceptable performance of projects following their interconnection.

4) EMT modeling is necessary to assess IBR ride-through capability but the role of EMT studies in achieving this assessment has not been adequately defined nor are EMT models universally required at this point.

5) If TOs are going to be held responsible for devising performance requirements in their FAC-001 documents, expect there to be variability of such requirements from one TO to another. In the interest of uniformity and consistency, it is far better to produce a continent-wide standard that spells out necessary performance requirements and this has already been done in PRC-029.

6) There does not seem to be any applicable generation entity prior to IBR project interconnection that can be held to NERC standards. GOs only become applicable entities once a project is in service.

7) TOs have no mechanisms to enforce performance requirements such as disturbance ride-through once a project is in operation. If the ERO says it will enforce whatever a TO may happen to add to their FAC-001 document, that leaves IBR GOs with uncertainty as to precisely what they will have to comply with once the revised FAC-001 standard becomes enforceable. They will rightly resist passing such an open-ended version of FAC-001.

Failure to consider these facts has led the SAR authors to propose FAC-001 and FAC-002 solutions that will fail to produce uniform enforceable improvements in IBR project ride-through and unnecessarily burden already overburdened TOs and TPs with obligations they can hardly fulfill. Moreover, obligations that should be assigned to project developers during the interconnection study process will end up being put on TOs and TPs to somehow enforce.

AEP recommends the following revisions to what is proposed in this SAR:

1) Acknowledge that PRC-029 and PRC-030 contain the necessary requirements to ensure acceptable ride-through performance once IBR projects are operational. Further acknowledge that PRC-029 contains requirements on GOs that IBR designs also adhere to PRC-029 ride-through requirements. Also acknowledge the distinction between interconnection facility requirements (what TO FAC-001 documents generally now contain that are to be satisfied prior to operation) versus performance requirements that apply during operation or that may be evaluated with dynamic modeling and simulation.

2) Insert into FAC-002 a requirement for IBR GOs to perform EMT and PSPD dynamic model true-ups in conjunction with commissioning tests by means of the MOD-026-2 dynamic model verification / validation framework on new (or modified) IBR projects *prior to* commercial operation. While the GO will not be a NERC registered entity prior to commissioning, this could be required to be completed *upon* commissioning or within a specified timeframe after commissioning for the GO to be compliant.

3) Insert provisions in FAC-002 allowing TPs a period of time to compare original and trued-up modeling and rerun the IBR interconnection study if the TP's initial screening analysis shows significant differences between original and updated modeling, and provisions allowing TPs and obligations requiring GOs to address any newfound deficiencies in project performance *prior to* commercial operation.

4) Insert into FAC-002 an EMT-based IBR ride-through evaluation requirement on an individual project level. This should be a requirement on GOs but discretionary for TPs. NERC should then make available a tool that allows both TPs and GOs to insert a project EMT model into a model test platform that automates a series of voltage and frequency trajectories that will test the individual project EMT model for its ride-through performance based on PRC-029 Attachments. (Note: ERCOT has a tool that may be adapted for the purpose) No large-scale system simulations in EMT should be required to do ride-through evaluations.

5) In the detailed scope, remove from “FAC-001-4 Enhancements to R1” the following:
* “Response to transmission system abnormal conditions” since this is already being specified in PRC-029
* “Modeling Data” since these points are already being covered in MOD-026-2 under draft
* “Measurement data for performance monitoring and validation” since this is already covered in PRC-028

Also remove from detailed scope “FAC-002-4 Enhancements” the following:
* “Additional requirement” since the referenced assessment is already covered by FAC-002 R1.2, because generation interconnection process timelines and associated pressures should not be a concern in NERC standards, and because the implied model verification/validation aspects may be covered by MOD-026-2

There should be no need for any revisions to FAC-001 in this SAR, only FAC-002.

Likes 0	
Dislikes 0	

Response