

Comment Report

Project Name: 2020-06 Verifications of Models and Data for Generators | Standard Authorization Request
Comment Period Start Date: 5/28/2024
Comment Period End Date: 6/26/2024
Associated Ballots:

There were 40 sets of responses, including comments from approximately 111 different people from approximately 69 companies representing 10 of the Industry Segments as shown in the table on the following pages.

Questions

- 1. Are there any areas of concern that duplicative coverage or competing expectations would occur, if so, what are these areas the team should be aware of when drafting?**
- 2. 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
Southwest Power Pool, Inc. (RTO)	Charles Yeung	2	MRO,SPP RE,WECC	SRC 2024	Charles Yeung	SPP	2	MRO
					Ali Miremadi	CAISO	1	WECC
					Helen Lainis	IESO	1	NPCC
					Bobbi Welch	Midcontinent ISO, Inc.	2	MRO
					Greg Campoli	NYISO	1	NPCC
					Elizabeth Davis	PJM	2	RF
					Kennedy Meier	Electric Reliability Council of Texas, Inc.	2	Texas RE
					Matt Goldberg	ISO New England	2	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	1,4,5,6		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
Southern	Pamela Hunter	1,3,5,6	SERC	Southern	Matt Carden	Southern	1	SERC

Company - Southern Company Services, Inc.				Company		Company - Southern Company Services, Inc.		
					Joel Dembowski	Southern Company - Alabama Power Company	3	SERC
					Ron Carlsen	Southern Company - Southern Company Generation	6	SERC
					Leslie Burke	Southern Company - Southern Company Generation	5	SERC
Black Hills Corporation	Rachel Schuldt	1,3,5,6		Black Hills Corporation - All Segments	Micah Runner	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 Edison Co. of New York	1	NPCC
David Burke	Orange and Rockland	3	NPCC
Peter Yost	Con Ed - Consolidated Edison Co. of New York	3	NPCC
Salvatore Spagnolo	New York Power Authority	1	NPCC
Sean Bodkin	Dominion - Dominion Resources, Inc.	6	NPCC
David Kwan	Ontario Power Generation	4	NPCC
Silvia Mitchell	NextEra Energy - Florida Power and Light Co.	1	NPCC
Sean Cavote	PSEG	4	NPCC
Jason Chandler	Con Edison	5	NPCC
Tracy MacNicoll	Utility Services	5	NPCC
Shivaz Chopra	New York Power Authority	6	NPCC
Vijay Puran	New York State Department of Public Service	6	NPCC
David Kiguel	Independent	7	NPCC
Joel Charlebois	AESI	7	NPCC
Joshua London	Eversource Energy	1	NPCC
Emma Halilovic	Hydro One Networks, Inc.	1,2	NPCC
Emma Halilovic	Hydro One Networks, Inc.	1,2	NPCC
Chantal Mazza	Hydro Quebec	1,2	NPCC

					Emma Halilovic	Hydro One Networks, Inc.	1,2	NPCC
					Chantal Mazza	Hydro Quebec	1,2	NPCC
					Nicolas Turcotte	Hydro-Quebec (HQ)	1	NPCC
					Jeffrey Streifling	NB Power Corporation	1,4,10	NPCC
					Jeffrey Streifling	NB Power Corporation	1,4,10	NPCC
					Jeffrey Streifling	NB Power Corporation	1,4,10	NPCC
					Joel Charlebois	AESI	7	NPCC
Southwest Power Pool, Inc. (RTO)	Shannon Mickens	2	MRO,SPP RE,WECC	SPP RTO	Shannon Mickens	Southwest Power Pool Inc.	2	MRO
					Mia Wilson	Southwest Power Pool Inc.	2	MRO
					Eddie Watson	Southwest Power Pool Inc.	2	MRO
					Steve Purdy	Southwest Power Pool Inc.	2	MRO
					Jim Williams	Southwest Power Pool Inc.	2	MRO
					Jeff McDiarmid	Southwest Power Pool Inc.	2	MRO
					Mason Favazza	Southwest Power Pool Inc.	2	MRO
					Eric Sullivan	Southwest Power Pool Inc.	2	MRO
					Heather Harris	Southwest Power Pool Inc.	2	MRO
					Scott Jordan	Southwest Power Pool Inc.	2	MRO
					Hugh Benfer	Southwest Power Pool Inc.	2	MRO

					Zach Sabey	Southwest Power Pool Inc.	2	MRO
					Bryan Wood	Southwest Power Pool Inc	2	MRO
					Margaret Quispe	Southwest Power Pool Inc	2	MRO
					Will Tootle	Southwest Power Pool Inc.	2	MRO
					ashley Stringer	Southwest Power Pool Inc.	2	MRO
					Brett Springfield	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. Are there any areas of concern that duplicative coverage or competing expectations would occur, if so, what are these areas the team should be aware of when drafting?

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

Answer No

Document Name

Comment

Possible answers:Yes (could not correct it above).

There may be overlap with theFAC-002 and/or MOD-025/026/027/032 Standards that could occur if not coordinated together.

How will this Standard or Standards be different from the requirements for FR, DDR, and SER data in PRC-028 as noted in item #1 under detailed description to install and provide disturbance monitoring information to BPS planners and operators.

Will the specific attributes being required in the dynamic model be similar to that which is required in MOD-032 currently or will there be a separate set of criteria to be met?

There appears that there could be significant overlap with SARs 2022-04, 2022-02, and 2023-05.

Likes 0

Dislikes 0

Response

(Drafting team's response to submitter's comments)

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

Answer No

Document Name

Comment

Until the Order 901 Milestone 3 SARs are more clearly defined, we cannot effectively assess whether this SAR contains any duplication in coverage or competing expectations.

Likes 0

Dislikes 0

Response

Daniel Gacek - Exelon - 1,3

Answer No

Document Name

Comment

Not at this time, however several SARs are posted for comments and subject to modifications.

Likes 0

Dislikes 0

Response**Patricia Lynch - NRG - NRG Energy, Inc. - 5,6**

Answer

No

Document Name

Comment

Likes 0

Dislikes 0

Response**Stephen Stafford - Georgia Transmission Corporation - 1 - SERC**

Answer

No

Document Name

Comment

Likes 0

Dislikes 0

Response**Diana Aguas - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE**

Answer

No

Document Name

Comment

Likes 0

Dislikes 0

Response

Anna Todd - Southern Indiana Gas and Electric Co. - 3,5,6 - RF

Answer No

Document Name

Comment

Likes 0

Dislikes 0

Response

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

Answer No

Document Name

Comment

Likes 0

Dislikes 0

Response

Jessica Cordero - Unisource - Tucson Electric Power Co. - 1

Answer Yes

Document Name

Comment

TEPC agrees with EEI's response - EEI believes that until the Order 901 Milestone SARs are better defined, we cannot address whether the SARs provide any duplication in coverage.

Likes 0

Dislikes 0

Response

Jennifer Weber - Tennessee Valley Authority - 1,3,5,6 - SERC

Answer	Yes
Document Name	
Comment	
Request that this SAR be revised to combine with the previous SAR accepted by the Standards Committee on 7/21/2021. Three draft revisions of MOD-026-2 have been balloted as well as 2 new definitions. This is not addressed in this new proposed SAR. It is confusing to industry to have multiple SARs open on the same standard and leaves industry unclear on the path forward for this Project.	
Likes 0	
Dislikes 0	
Response	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	Yes
Document Name	
Comment	
It looks like the Phase-2 objectives duplicate the scope of the Project 2022-04 EMT Modeling Standard Drafting Team, where FAC-002-4 is currently under revision to include EMT modeling and study requirements. Coordinating with the Project 2022-04 EMT Modeling Standard Drafting Team is advisable to check whether they can address some of the objectives in this new SAR.	
Phase 2 Objectives (not required as part of 901 Milestone 3 timeline)	
4. Either revise FAC-002 or create a new SAR to incorporate similar changes to IBR validation during the interconnection process or create a new IBR model validation standard to require model validation using actual performance data to validate model quality during the interconnection process.	
Likes 0	
Dislikes 0	
Response	
Kimberly Turco - Constellation - 5,6	
Answer	Yes
Document Name	
Comment	
Constellation feels projects have listed PRC-029 or PRC 030 as examples to may necessitate some form of change to the model but also are mentioning impacts in existing standards such as TPL-001-5, MOD-32, MOD-026, MOD-027, MOD-025, PRC-019 and IRO-010, the standard drafting team should ensure there is not duplicative requirements.	

Kimberly Turco on behalf of Constellation Segments 5 and 6

Likes 0

Dislikes 0

Response

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

Answer

Yes

Document Name

Comment

Entergy has the following concerns around duplicative coverage or competing expectations:

- Multiple projects appear to be asking for or talking about similar/same questions and issues.
- Mod-033 is not appropriate Standard to do model validation for IBRs.
- If IBRs are removed from MOD-026 and MOD-027, then MOD-033 needs to include requirements for all the testing and validation that are required in MOD-026 and MOD-27.
- Various SDTs do not seem to be communicating.
- This project appears to be negating much of the previous work done to approve and implement MOD-026 and MOD-027.

Likes 0

Dislikes 0

Response

Alison MacKellar - Constellation - 5,6

Answer

Yes

Document Name

Comment

Constellation feels projects have listed PRC-029 or PRC 030 as examples to may necessitate some form of change to the model but also are mentioning impacts in existing standards such as TPL-001-5, MOD-32, MOD-026, MOD-027, MOD-025, PRC-019 and IRO-010, the standard drafting team should ensure there is not duplicative requirements.

Alison Mackellar on behalf of Constellation Segments 5 and 6

Likes 0

Dislikes 0

Response

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

Answer Yes

Document Name

Comment

Black Hills Corporation agrees with the NAGF in their 3 detailed description sections that the narratives added confusion and could lead to duplicative or competing outcomes, as written below:

The NAGF provides the following comments regarding possible duplication/overlap for consideration:

a. Detailed Description Section:

i. FERC Order 901 Directives Assigned to this SAR (page 4) – The paragraph states “As of April 1, 2024, this SAR will address the following FERC Order 901 directives, with the scope for this SAR emphasized in bold as appropriate”. 13 sections of the FERC Order 901 directives are included in the Detailed Description Section of which only 3 are bolded (1, 9, and 10). It is unclear as to value of including the non-bolded narratives as it adds significant confusion to the SAR. Recommend removing the non-bolded FERC Order 901 directive narratives from this section or clearly identify DT work activities associated with these non-bolded narratives.

ii. The NAGF notes that the inclusion of the following FERC Order 901 directive narratives in both the Project 2022-02 and this draft SARs Detailed Description section could lead to duplicative or competing outcomes:

#4 (unbolded)

#9 (bolded)

#10 (bolded)

#13 (unbolded)

iii. Given the numerous parallel NERC IBR efforts and the speed at which they are progressing, it is unclear as to the potential for duplication/overlap among these efforts. The NAGF and industry expect that NERC will have checks in place to ensure there are no duplication or competing expectations for these important IBR activities.

Likes 0

Dislikes 0

Response

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

Answer Yes

Document Name

Comment

The NAGF provides the following comments regarding possible duplication/overlap for consideration:

a. Detailed Description Section:

i. FERC Order 901 Directives Assigned to this SAR (page 4) – The paragraph states “As of April 1, 2024, this SAR will address the following FERC Order 901 directives, with the scope for this SAR emphasized in bold as appropriate:”. 13 sections of the FERC Order 901 directives are included in the Detailed Description Section of which only 3 are bolded (1, 9, and 10). It is unclear as to value of including the non-bolded narratives as it adds significant confusion to the SAR. Recommend removing the non-bolded FERC Order 901 directive narratives from this section or clearly identify DT work activities associated with these non-bolded narratives.

ii. The NAGF notes that the inclusion of the following FERC Order 901 directive narratives in both the Project 2022-02 and this draft SARs Detailed Description section could lead to duplicative or competing outcomes:

#4 (unbolded)

#9 (bolded)

#10 (bolded)

#13 (unbolded)

iii. Given the numerous parallel NERC IBR efforts and the speed at which they are progressing, it is unclear as to the potential for duplication/overlap among these efforts. The NAGF and industry expect that NERC will have checks in place to ensure there are no duplication or competing expectations for these important IBR activities.

Likes 0

Dislikes 0

Response

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

Answer

Yes

Document Name

Comment

The purpose section of the SAR needs to be limited to the specific purpose of the SAR (the second paragraph).

The detailed description section should be much more precise and not include items that are to be action items for the drafting team. Consider only including the bolded part of the long list of directive elements which are unique to the purpose of this SAR. Take care to not include duplicative bolded text in two concurrent SARs being written. See the comment below regarding this subject.

The project scope of the SR needs to be more succinct and not include material duplicated in other SARs (e.g. 2022-02) for both phases listed.

Some detailed description section duplicates bolded text in two SARs – creating confusion of which project is supposed to address the directive. FERC Order 901 Directives Assigned to this SAR (page 5) – The paragraph states “As of April 1, 2024, this SAR will address the following FERC Order 901 directives, with the scope for this SAR emphasized in bold as appropriate:”. 26 sections of the FERC Order 901 directives are included in the Detailed Description Section of which only 3 are bolded (17, 24, and 25). It is unclear as to value of including the non-bolded narratives and it adds significant confusion to the SAR. We recommend removing the non-bolded FERC Order 901 directive narratives from this section or clearly identify DT work activities associated with these non-bolded narratives.

With so many standards currently in revision with unknown outcomes, it is impossible to predict conflicts before they occur. NERC supposedly has

internal groups tasked with preventing duplication and conflicting competition between standards during development.

Likes 0

Dislikes 0

Response

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

Answer

Yes

Document Name

Comment

Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI) on question 1

Likes 0

Dislikes 0

Response

Christy Thompson - PPL - Louisville Gas and Electric Co. - 3,5,6 - SERC

Answer

Yes

Document Name

Comment

The recently released PRC-029-1 standard from project 2020-02 include multiple requirements in the form “Each GO or TO of an applicable IBR shall ensure that...” followed by a condition and a performance requirement. Measures include requirements in the form “Each GO and TO shall have evidence of actual recorded data...”. Essentially, PRC-029-1 requires post-event validation against performance criteria. This SAR requires post-event validation against models. These two things may be competing goals if model performance indicates failure to meet performance criteria. Though PRC-029-1 is still under development and the event validation components may be an overstep in its scope, care should be taken to not duplicate event validation work.

The recently released PRC-030-1 standard from project 2023-02 also includes requirements that overlap the stated purpose of this SAR. Specifically, requirement R4 of PRC-030-1 requires GOs to “analyze its IBRs performance” for certain system events. While this standard is also under development, the DT must consider that two different entities will be attempting to complete the same task. Again, this poses risk for duplicative coverage and competing expectations. For example, suppose due to PRC-030-1 the GO initiates a project to change inverter settings in a way that improves the simulated performance match for the event studied under PRC-030-1, but degrades the simulated performance match for an event studied by the TP under the requirements developed by this SAR. It is well known in the industry that model tweaks can simultaneously improve and degrade model performance depending on the event studied.

The DT must consider the scope and frequency of MOD-033. MOD-033 currently requires steady-state and stability validation once every 24 calendar months. Moreover, the stability portion only requires a validation of a single dynamic local event. The DT must keep in mind that MOD-033 is considered sufficient for the validation of the entire BES and has been serving the industry well. It is unreasonable to subject PCs and TPs to IBR validation activities that are inconsistent with the expectations of MOD-033. I.e., if the entire system is validated once every two years, a DER does not need to be

validated for every event.

The DT must consider the scope, timelines, and mitigations associated with MOD-026 and MOD-027. These standards directly relative to the scope of the SAR. Requirement R3 in each standard states “Each GO shall provide a written response to its TP” if the TP indicates that “the simulated ... response did not match[approximate] the recorded response” for one to three events. While it is understood not all IBR owners are NERC registered entities, these standards currently set the expectation for the exact types of concerns raised in the SAR. The current mitigation requires coordination between the TP and GO to resolve or technically justify model issues.

Likes 0

Dislikes 0

Response

Daniela Atanasovski - APS - Arizona Public Service Co. - 1,3,5,6

Answer

Yes

Document Name

Comment

Until the Order 901 Milestone 3 SARs are more clearly defined, we cannot effectively assess whether this SAR contains any duplication in coverage or competing expectations.

Likes 0

Dislikes 0

Response

Greg Sorenson - ReliabilityFirst - 10 - RF

Answer

Yes

Document Name

Comment

The SAR states, “Specifically, we direct NERC to develop new or modified Reliability Standards that require planning coordinators, transmission planners, reliability coordinators, transmission operators, and balancing authorities to establish for each interconnection a uniform framework with modeling criteria, a registered modeling designee, and necessary data exchange requirements both between themselves and with the generator owners, transmission owners, and distribution providers to coordinate the creation of transmission planning, operations, and interconnection wide models (i.e., system models) and the validation of each respective system model.” This may create a competing expectation, or order-of-operation issue with the effort to modify MOD-032. The modeling criteria would need to be established prior to the development of the validation requirements. There also could be some duplication with MOD-033 as it also deals with system model validation.

Likes 0

Dislikes 0

Response

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

Answer Yes

Document Name

Comment

Potential for duplicate coverage to the following projects: 2022-04, 2022-02, and 2023-05.

FAC-002 and/or MOD-025/026/027/032 Standards that could occur if not coordinated together

How will this Standard or Standards be different from the requirements for FR, DDR, and SER data in PRC-028 as noted in item #1 under detailed description to install and provide disturbance monitoring information to BPS planners and operators. Will the specific attributes being required in the dynamic model be similar to that which is required in MOD-032 currently or will there be a separate set of criteria to be met?

Likes 0

Dislikes 0

Response

Joseph Gatten - Xcel Energy, Inc. - 1,3,5,6 - MRO,WECC

Answer Yes

Document Name

Comment

Xcel Energy supports the comments of the EEI.

Likes 0

Dislikes 0

Response

Bobbi Welch - Midcontinent ISO, Inc. - 2

Answer Yes

Document Name

Comment

MISO supports comments submitted by the ISO/RTO Council (IRC) Standards Review Committee (SRC).

Likes 0

Dislikes 0

Response**Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2024****Answer**

Yes

Document Name**Comment**

The ISO/RTO Council (IRC) Standards Review Committee (SRC) submits four comments in response to this question:

- 1) Need clarity on the expected entity for compliance with IBR model validation. The SRC proposes the IBR facility owner as the appropriate entity to validate the models that represent its equipment and devices.
- 2) Allow flexibility to revise all standards to ensure the IBR requirements are not applied to non-IBR.
- 3) Clarify whether this project or 2021-01 has authority over final proposed language.
- 4) Validation requirements for an interconnection study need to recognize limitations on data.

Phase 1 objectives:

Item 1:

MOD-033 is already a “system model validation” standard that requires comparison of simulation results to an actual event (field measurement). It seems odd to reference this existing standard (applicable to the PC, RC, and TOP) if the intention of this SAR is to require IBR-specific model validation. The SAR should be more clear about the intended entity that would have a compliance obligation to perform model validation. As a practical matter, the SRC proposes the IBR-facility owner should be the entity obligated to validate the models that represent its equipment and devices.

“2. Revise MOD-026 and MOD-027 to remove IBR from those Standards as this holistic approach includes some form of ongoing quality review and corrections based on new performance-based validation.”

The SAR should provide better clarity on the expectations of how it will align with the SAR from 2021 Since that SAR is still valid and not being revised to preclude IBRs, this SAR needs to be clear on the “authority” over the 2021 SAR for IBR requirements. Furthermore MOD-026/027 seems to be a logical starting point for an SDT to consider since those currently address model verification for generating plant volt/var and active power/frequency control functions.

However, if the SDT elects to create a separate standard for IBR model validation, the SAR scope should provide the SDT the flexibility to determine how best to establish IBR-specific model validation requirements (and whether they should be a part of MOD-026/027, MOD-033, or a new standard). If the SDT elects to create a separate standard for IBR model validation, the SAR scope should allow the SDT the flexibility needed to make appropriate revisions to MOD-026/027 (e.g. limiting applicability to non-IBR, etc.).

“3. The drafting team shall ensure that implementation plans for new or modified Reliability

Standards related to Milestone 3 of the Work Plan are aligned and do not create a reliability gap

during implementation.”

Both this SAR and the SAR for Project 2021-01 reference the same objective to address gaps for all Milestone 3 standards.

We agree with the need to ensure there are no reliability gaps during implementation. But it is unclear in the SAR how this team’s work is different than the work the Project 2021-01 drafting team will be responsible for.

The comparison exercises currently required by MOD-033 are themselves duplicative – if a system model consists of validated and verified models of individual components (generators, plants, IBR, transmission elements, loads, etc.), that are tuned to reflect actual event conditions, then system simulation results would more closely match with actual performance. Correcting system model performance to match measured values can only be effectively and conclusively completed by correcting/validating individual component models impacted by the disturbance event.

Phase 2 objectives:

“4. Either revise FAC-002 or create a new SAR to incorporate similar changes to IBR validation during the interconnection process or create a new IBR model validation standard to require model validation using actual performance data to validate model quality during the interconnection process.”

The FAC-002 standard’s purpose is to require the study of interconnection requests, not to address model validation, whereas the MOD series of standards is focused on the accuracy and integrity of models. Whether the team decides to revise FAC-002 or create a new standard for model validation, the scope must consider the limitations of model validation at the time of an interconnection study.

If validation is intended to refer to a confirmation that IBR simulation model performance matches field performance, validation is not possible throughout most of the interconnection process since there is no field performance that can be measured until after construction is complete. If the SAR is contemplating validation tests that occur as part of plant commissioning, the SAR should be more precise in identifying that portion of the interconnection process.

Likes 0

Dislikes 0

Response

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

Answer

Yes

Document Name

Comment

ERCOT joins the comments submitted by the ISO/RTO Council (IRC) Standards Review Committee (SRC) and adopts them as its own.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Duke Energy agrees with and supports EEI comments for Question 1.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Ameren supports EEI's Comments on this project.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Until the Order 901 Milestone 3 SARs are more clearly defined, we cannot effectively assess whether this SAR contains any duplication in coverage or competing expectations.

Likes 0

Dislikes 0

Response

Dwanique Spiller - Berkshire Hathaway - NV Energy - 5

Answer

Document Name

Comment

Until the Order 901 Milestone 3 SARs are more clearly defined, we cannot effectively assess whether this SAR contains any duplication in coverage or competing expectations.

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

2. 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, Group Name SRC 2024

Answer

Document Name

Comment

The SRC submits five comments in response to this question:

- 1) The SAR should be revised to clarify whether the responsible party for non-associated DERs will be identified by NERC or by the NERC standards process.
- 2) Require minimum categories or data to be identified to meet FERC directive.
- 3) Address use of phasor-domain vs EMT specific models.
- 4) Allow for creation of guidelines to address older facilities that may not have EMT data available.
- 5) Models for IBRs not subject to NERC standards and registration are not available.

It is unclear how the standard language is to be written to meet objective no. 9. The language directs NERC (the organization) to determine and specify the team that will assign responsibility for non-associated DERs, which suggests that NERC staff will execute this directive. It would be preferable if the drafting team had the ability to propose the responsible entity and allow for stakeholder feedback and ballot.

9. "Furthermore, for those areas with IBR-DERs in the aggregate that materially impact the reliable operation of the Bulk-Power System but do not have an associated registered distribution provider, we modify the NOPR proposal to direct NERC to determine the appropriate registered

entity responsible for the data and parameters of IBR-DERs in the aggregate and to establish a

process that requires identified registered entities to coordinate, validate, and keep up to date

the system models.” (P 157)

The scope of the SAR should include item 4 from the FERC Order approving the NERC IBR Workplan. The bolded text is a clear directive from FERC.

4. “Regarding CAISO’s concern regarding the potential “compliance trap” where planners and operators rely on third-party data and IRC’s request that the final rule specify the data to be submitted by all IBRs (i.e., registered IBRs, unregistered IBRs, and IBR-DERs in the aggregate) and transmission devices using similar technologies, we direct NERC to determine through its standards development process the minimum categories or types of data that must be provided to transmission planners, transmission operators, transmission owners, and distribution providers necessary to predict the behavior of all IBRs and to ensure that compliance obligations are clear.”

The SAR must direct the SDT to address the use of Phasor domain models or detailed EMT models. The final standards must be clear in how these models will be used. Our preference is to address both types of models and to require benchmarking of both types against each other.

Similarly, the scope should include the ability for the SDT to develop guidelines on how to address grandfathered facilities with no EMT models. For many of these facilities, the OEM is no longer supporting the inverter vintage or is completely out of business.

The SAR should recognize modeling limitations for non-registered IBRs or those connected to non-registered distribution providers. Regarding the multiple SAR references to unregistered IBRs and IBR-DERs – the SRC agrees that such data exchange, modeling, validation and coordination is best served by the generation owners, transmission owners, and distribution providers. However, such data and parameter requests will presumptively not meet the intended results as unregistered IBRs and IBR-DERs are not required to comply with NERC Reliability Standards. This is even further magnified for unregistered IBRs and IBR-DERs that are connected to non-registered distribution providers. Generally, case studies do not include resources of 20MW or lower, and the requirement to add such resources is anticipated to result in significant costs without any known benefits to modeling at the distribution level.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

The relevance of modeling validation references in sub-part H to revisions of FAC-002 for the Inverter-Based Resource (IBR) during the interconnection process is unclear. The drafting team should clarify the relationship to the Correction Action Plan (CAP) criteria and indicate these other projects should be finalized before adopting similar criteria to TPL-001 and PRC-030. The drafting team should also consider if this is a separate issue that needs to be

removed and addressed by a different drafting team for not aligning with the Phase 2 Objective.

As noted in the SRC comments, we recommend that the drafting team provide more clarity in the SAR on responsibilities and how modeling data is validated.

Finally, SPP recommends that the drafting team add the Planning Coordinator (PC) to the applicable entities of the SAR. We anticipate the PC may be impacted via this validation of modeling data.

Likes 0

Dislikes 0

Response

Dwanique Spiller - Berkshire Hathaway - NV Energy - 5

Answer

Document Name

Comment

The following comments are intended to address NV Energy concerns with the Proposed SAR. Our negative response also reflects our opinion that the SAR needs to be revised prior to final approval.

Detail Description/FERC Order 901 Directives for Milestone 3 Part 2 Comments

While NV Energy generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope (i.e., Items 1, 3, 5, 6, 7, & 10), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

{C}· **Item 2** contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.

{C}· **Item 5** directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.

{C}· **Items 4, 8, and 11** all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs directives are to be addressed.

{C}· **Items 8, and 11** contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.

{C}· **Item 8** addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated

with validating those models.

NV Energy also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: NV Energy is concerned that some of the suggested changes under the Item 1 work scope, which aligns to MOD-033 seem to confuse the intent of this Reliability Standard. Specifically, MOD-033 is intended to validate resource models against actual system events/data, whereas MOD-026 and MOD-027 are intended to verify individual resource models in dynamic simulations. We additionally ask that the phrase “actual performance data” be clarified, noting this is an undefined term and could be understood to mean many things. To address the clarity issue of Item 1 we suggest the following edits in boldface below:

Either revise MOD-033 or create a new **IBR model** system model validation Reliability Standard **that more accurately validates IBR performance within those interconnected transmission system studies to require model validation** using actual performance data.

Item 1a: NV Energy suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. NV ENERGY also suggests that given MOD-033 is the focus of Item 1, it is important to maintain context that MOD-033 is focused specifically on validating resource performance within system models. Verifying the accuracy of IBR models should be conducted under the new Reliability Standard that would be created under Item 2. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated within MOD-033. Furthermore, additional clarity is needed regarding what performance data is going to be available for the aggregated unregistered IBRs and IBR DERs that have a material impact, while registered IBR owners will have specific data requirements through PRC-028, we are unaware of similar requirements for unregistered resources. To address all but the performance data issues for unregistered resources, we offer the following suggested changes in boldface for Item 1a:

include **a complete set of validation expectations criteria for validating system planning models that requires assessing and validating IBR performance, as well as assessing the impact of both unregistered IBRs (in aggregate) and IBR-DERs (in aggregate) that have been identified as having a material impact on the BPS through the use of using** performance data (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: NV Energy suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate and high-quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how system planning models are to be validated. The DT should only develop requirements that obligate Planning Coordinators to have processes in place that validate IBR models within system planning models and include methods to reconcile any model issues with resource owners (i.e., IBR-GOs).

include requirements that ensure Planning Coordinators have processes in place that can identify IBR model problems within system planning models and requirements for insuring IBR GOs are held accountable for providing updated models that more accurately validate IBR performance against actual performance data. minimum criteria for performing validation (e.g., time, tolerance, impact);

Item 1f: NV Energy does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: NV Energy supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include Require requirements that obligate planner and operators to incorporate in their model verification processes documented communications with communicate any performance criteria to Generator Owners IBR owners to address deficiencies in IBR models. Include requirements for IBR owners to provide timely updates to their IBR models in response to issues identified in communications from planners and operators.

Item 1h: This item should be deleted because none of the directives associated with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: NV Energy believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: NV Energy does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Item 2:

NV Energy suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- {C}· Establishes uniform processes regardless of the IBR type; and
- {C}· Provides consistency among verification processes with other NERC Reliability Standards; and
- {C}· Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- {C}· Removes IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

NV Energy does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large

and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. NV Energy recognizes that additional work will be needed to address all the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR later to address this work.

Likes 0

Dislikes 0

Response

Daniel Gacek - Exelon - 1,3

Answer

Document Name

Comment

In Project Scope, Phase 2, Section 4c, clarify the action to be taken if performance data (of IBR during disturbances...) if no such events have taken place. Consider defining performance data as performance during disturbances combined with performance during staged testing.

In Detailed Description, Sections 3 and 9, registered entities may be limited in some case with the quality and level of fidelity that can be provided of the dynamic behavior of existing, unregistered IBR and IBR-DER resources.

Additionally, Exelon support the concerns expressed in the EEI comments.

Likes 0

Dislikes 0

Response

Bobbi Welch - Midcontinent ISO, Inc. - 2

Answer

Document Name

Comment

MISO supports comments submitted by the ISO/RTO Council (IRC) Standards Review Committee (SRC).

In addition, while the resulting standard may or may not apply directly to the function of Planning Coordinator, MISO requests that Planning Coordinators be added to the list of functions considered to serve on the Standard Drafting Team due to the role they play in performing wide area planning studies. (SAR, page 6)

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

None

Likes 0

Dislikes 0

Response

Joseph Gatten - Xcel Energy, Inc. - 1,3,5,6 - MRO,WECC

Answer

Document Name

Comment

Xcel Energy supports the comments of the EEI.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

MOD-033 is about validating the full system model not a specific generator models. A holistic approach has been cited as the reason to remove IBR from MOD-026 and Mod-027. Thus, adding IBRs specifically to MOD-033 seems to counter that approach. As does, adding IBR validation during the interconnection process to FAC-002.. The addition will also put an additional burden on the PC to work with GO for get data for generators that are not yet in service and may not have an obligation under the NERC standards.

Modeling gaps that exists in the interconnection process needs to be handled through FERC revisions to the interconnection process not through NERC standards.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

FirstEnergy supports EEI's comments which state:

The following comments are intended to address EEI concerns with the Proposed SAR. Our negative response also reflect our opinion that the SAR needs to be revised prior to final approval.

Detail Description/FERC Order 901 Directives for Milestone 3 Part 2 Comments

While EEI generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope (i.e., Items 1, 3, 5, 6, 7, & 10), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

Item 2 contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.

Item 5 directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.

Items 4, 8, and 11 all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs directives are to be addressed.

Items 8, and 11 contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.

Item 8 addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated with validating those models.

EEI also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all of the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: EEI is concerned that some of the suggested changes under the Item 1 work scope, which aligns to MOD-033 seem to confuse the intent of this Reliability Standard. Specifically, MOD-033 is intended to validate resource models against actual system events/data, whereas MOD-026 and MOD-027 are intended to verify individual resource models in dynamic simulations. We additionally ask that the phrase “actual performance data” be clarified, noting this is an undefined term and could be understood to mean many things. To address the clarity issue of Item 1 we suggest the following edits in boldface below:

Either revise MOD-033 or create a new **IBR model** system model validation Reliability Standard **that more accurately validates IBR performance within those interconnected transmission system studies to require model validation** using actual performance data.

Item 1a: EEI suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. EEI also suggests that given MOD-033 is the focus of Item 1, it is important to maintain context that MOD-033 is focused specifically on validating resource performance within system models. Verifying the accuracy of IBR models should be conducted under the new Reliability Standard that would be created under Item 2. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated within MOD-033. Furthermore, additional clarity is needed regarding what performance data is going to be available for the aggregated unregistered IBRs and IBR DERs that have a material impact, while registered IBR owners will have specific data requirements through PRC-028, we are unaware of similar requirements for unregistered resources. To address all but the performance data issues for unregistered resources, we offer the following suggested changes in boldface for Item 1a:

include **a complete set of validation expectations criteria for validating system planning models that requires assessing and validating IBR performance, as well as assessing the impact of both unregistered IBRs (in aggregate) and IBR-DERs (in aggregate) that have been identified as having a material impact on the BPS through the use of using performance data** (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: EEI suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate and high quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how system planning models are to be validated. The DT should only develop requirements that obligate Planning Coordinators to have processes in place that validate IBR models within system planning models and include methods to reconcile any model issues with resource owners (i.e., IBR-GOs).

include **requirements that ensure Planning Coordinators have processes in place that are capable of identifying IBR model problems within system planning models and requirements for insuring IBR GOs are held accountable for providing updated models that more accurately validate IBR performance against actual performance data. minimum criteria for performing validation (e.g., time, tolerance, impact);**

Item 1f: EEI does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: EEI supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include Require requirements that obligate planner and operators to **incorporate in their model verification processes documented communications with communicate any performance criteria to Generator Owners IBR owners to address deficiencies in IBR models. Include requirements for IBR owners to provide timely updates to their IBR models in response to issues identified in communications from**

planners and operators.

Item 1h: This item should be deleted because none of the directives associated with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: EEI believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: EEI does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Item 2:

EEI suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all of the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- Establishes uniform processes regardless of the IBR type; and
- Provides consistency among verification processes with other NERC Reliability Standards; and
- Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- Removes IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

EEI does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. EEI recognizes that additional work will be needed to address all of the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR at a later date to address this work.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

BPA believes the industry will still need IBR model data if IBR applicability was removed from MOD-025/026/027 and PRC-019. BPA believes MOD-033 is not the correct standard to modify. BPA recommends a new suite of standards be created for IBR model verification.

BPA believes MOD-033 should not be modified for the following observations:

Under “Project Scope”, the “Phase 1 Objectives” 1. Says “Either revise MOD-033 or create a new IBR model validation Reliability Standard to require model validation using actual performance data.” Item ‘b’ says “leverage the most accurate and highest quality model type available”. BPA believes that according to NERC MOD-033-2 A.1, MOD-033-2 is a system model validation standard. According to A.3., the purpose is to analyze the reliability of the interconnected transmission system. For Transmission Operators in WECC, using the highest quality model type available could imply using generator models outside of the WECC base cases (and potentially in a different simulation domain altogether). BPA believes using different models would create difficulties meeting the purpose of MOD-033-2 because the models validated may differ from those most often used to analyze the reliability of the interconnected transmission system.

“Project Scope... Phase 1 Objectives:... d” suggests revising MOD-033 to “be designed to follow and be able to leverage new performance validations expected to be done during the interconnection process...”. The performance validations as part of the interconnection process are also detailed and local to plants. BPA believes it is unrealistic to validate details of all plants in a system model validation like MOD-033. BPA also believes following performance validation procedures performed during commissioning for all plants is a separate set of activities than MOD-033 event analysis. BPA believes leveraging performance validations done during the interconnection process can be helpful, but should not be specifically required for Transmission Operators to demonstrate the models match actual data for the event and timestamp chosen under MOD-033-2.

MOD-033-2 compliance obligations can be met with one dynamic event and one steady state timestamp. BPA believes including “a complete set of validation expectations” as in Phase 1 Objectives,1,a seems to imply that all IBR models are getting validated. BPA recognizes the intent to remove “IBR” from MOD-026/027. If modeling data is still required after being removed from MOD-026/027, BPA recommends data would be best placed in a standard with a targeted electrical scope, not a system model validation.

Likes 0

Dislikes 0

Response

Greg Sorenson - ReliabilityFirst - 10 - RF

Answer

Document Name

Comment

There is some concern about the development of requirements to both create and validate dynamic models for 1) transmission owners that have unregistered IBRs on their system, and 2) distribution providers that have IBR-DERs on their system. It may be difficult to hold transmission owners and distribution providers accountable for model creation and validation for unregistered IBRs and IBR-DERs.

It may be challenging for transmission owners to consistently obtain quality IBR data from unregistered entities. Item 141 of FERC Order No. 901 (page 105) contains language that adds caveats to this requirement. “Recognizing that there may be instances in which transmission owners are unable to gather accurate unregistered IBR modeling data and parameters to create and maintain accurate unregistered IBR dynamic models in their transmission owner areas, we modify the NOPR proposal and direct NERC to develop new or modified Reliability Standards that require each transmission owner, if unable to gather accurate unregistered IBR data or unable to gather unregistered IBR data at all, to provide instead to the Bulk-Power System planners and operators in their areas, dynamic models of unregistered IBRs using estimated data in accordance with this final rule’s section IV.B.3data sharing directives.” The drafted SAR does not contain this language, but should be amended to have it included for clarity on overall expectations. This would follow SPIDERWG recommendations for setting the initial parameterization for the DER-A dynamic model based on the estimated vintage of IEEE 1547 that is dominant in the area. However, setting default parameters based on estimates does not lend itself to successful

validation of the model. RF also does not recommend adjusting model parameters to exactly match real-world measurements during anomalous events, but rather using these events as an opportunity to adjust.

There are several places in the SAR that uses the terms “in the aggregate have a material impact on the Bulk-Power System” What criteria is being proposed to define this?

The SAR includes language that directs “NERC to determine the appropriate registered entity responsible for the data and parameters of IBR-DERs” for those entities that “do not have an associated distribution provider.” Can this be accomplished in a Reliability Standard? Or would this require the review of a new Registered Function (similar to a Load Serving Entity)?

The SAR states, “Specifically, we direct NERC to develop new or modified Reliability Standards that require planning coordinators, transmission planners, reliability coordinators, transmission operators, and balancing authorities to establish for each interconnection a uniform framework with modeling criteria, a registered modeling designee, and necessary data exchange requirements both between themselves and with the generator owners, transmission owners, and distribution providers to coordinate the creation of transmission planning, operations, and interconnection wide models (i.e., system models) and the validation of each respective system model.” For the Eastern Interconnection, the MOD-032 designee is presently the Eastern Interconnection Reliability Assessment Group (ERAG), which is comprised of NERC, MRO, RF, SERC, and NPCC. The SDT should be made aware of this and strongly consider utilization of the existing MOD-032 designees for each Interconnection.

The SAR also states, “Further, we direct NERC to include in the new or modified Reliability Standards a requirement for generator owners, transmission owners, and distribution providers to regularly update and communicate the verified data and models of registered IBRs, unregistered IBRs, and IBR-DERs by comparing their resulting models against actual operational behavior to achieve and maintain necessary modeling accuracy for inclusion of these resources in the system models.” It may be impractical to compare all IBR-DER models to actual operational behavior due to the vast number of connections to the electric grid and operational scenarios. Consideration should be given to the utilization of sampling representative equipment, configurations, operational conditions, and/or delivery points rather than require the validation of thousands of IBR-DER installations. Will the SDT recommend different alternatives to achieve this or leave it up to each registered entity?

ReliabilityFirst appreciates the efforts of the drafting team on this important project.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

The following comments are intended to address EEI concerns with the Proposed SAR. Our negative response also reflects our opinion that the SAR needs to be revised prior to final approval.

Detail Description/FERC Order 901 Directives for Milestone 3 Part 2 Comments

While EEI generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope (i.e., Items 1, 3, 5, 6, 7, & 10), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

Item 2 contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report

comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.

Item 5 directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.

Items 4, 8, and 11 all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs directives are to be addressed.

Items 8, and 11 contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.

Item 8 addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated with validating those models.

EEl also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all of the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: EEl is concerned that some of the suggested changes under the Item 1 work scope, which aligns to MOD-033 seem to confuse the intent of this Reliability Standard. Specifically, MOD-033 is intended to validate resource models against actual system events/data, whereas MOD-026 and MOD-027 are intended to verify individual resource models in dynamic simulations. We additionally ask that the phrase “actual performance data” be clarified, noting this is an undefined term and could be understood to mean many things. To address the clarity issue of Item 1 we suggest the following edits in boldface below:

Either revise MOD-033 or create a new system model validation Reliability Standard **that more accurately validates IBR performance within those interconnected transmission system studies** using actual performance data.

Item 1a: EEl suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. EEl also suggests that given MOD-033 is the focus of Item 1, it is important to maintain context that MOD-033 is focused specifically on validating resource performance within system models. Verifying the accuracy of IBR models should be conducted under the new Reliability Standard that would be created under Item 2. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated within MOD-033. Furthermore, additional clarity is needed regarding what performance data is going to be available for the aggregated unregistered IBRs and IBR DERs that have a material impact, while registered IBR owners will have specific data requirements through PRC-028, we are unaware of similar requirements for unregistered resources. To address all but the performance data issues for unregistered resources, we offer the following suggested changes in boldface for Item 1a:

include **criteria for validating system planning models that requires assessing and validating IBR performance, as well as assessing the impact of both unregistered IBRs (in aggregate) and IBR-DERs (in aggregate) that have been identified as having a material impact on the BPS through the use of using** performance data (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: EEl suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate

and high quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how system planning models are to be validated. The DT should only develop requirements that obligate Planning Coordinators to have processes in place that validate IBR models within system planning models and include methods to reconcile any model issues with resource owners (i.e., IBR-GOs).

include requirements that ensure Planning Coordinators have processes in place that are capable of identifying IBR model problems within system planning models and requirements for insuring IBR GOs are held accountable for providing updated models that more accurately validate IBR performance against actual performance data.;

Item 1f: EEI does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: EEI supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include Require requirements that obligate planner and operators to incorporate in their model verification processes documented communications with IBR owners to address deficiencies in IBR models. Include requirements for IBR owners to provide timely updates to their IBR models in response to issues identified in communications from planners and operators.

Item 1h: This item should be deleted because none of the directives associated with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: EEI believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: EEI does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Item 2:

EEI suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all of the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- Establishes uniform processes regardless of the IBR type; and
- Provides consistency among verification processes with other NERC Reliability Standards; and
- Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- Removes IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

EEl does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. EEl recognizes that additional work will be needed to address all of the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR at a later date to address this work.

Likes 0

Dislikes 0

Response

Kyle Thomas - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable

Answer

Document Name

Comment

The SAR appears open-ended in terms of proposed revisions, detailed descriptions, and overlap with the other two modeling SARs (Milestone 3 Part 1 SAR and Part 3 SAR) – which are primarily text extracted from FERC Order 901. NERC, the NERC RSTC, the NERC Standards Committee, and industry have tended to avoid creating new standards projects with open-ended SARs as this shows insufficient supporting evidence and background to help a small SDT accomplish its mission. This seems particularly relevant given the massive scale, depth, and breadth of these proposed changes and do not believe this is the most effective/efficient SAR definition to address the directives and reliability risks, as it is unclear what the SARs are actually addressing from a reliability perspective. It also appears there are some FERC directives that are linked to a reliability risk that needs to be mitigated, but between this SAR and the other two it is unclear if they are being addressed or not – these risks should be mitigated between these SARs.

In the Purpose or Goal section, this SAR and the Project 2022-02 SAR both state the projects and SDTs will be a clearing house for the modeling work. It seems having two SARs act as a clearing house for modeling work is not necessary and should be clarified.

In the Project Scope, it is unclear which NERC entities have what roles for each of the IBR categories (registered IBRs, non-registered IBRs, and DERs) during the interconnection process are applicable to this SAR and the other two modeling related SARs.

In the Detailed Description section, repeating all FERC Order 901 directives in full and then only bolding the specific directives that this SAR addresses is confusing and inefficient. Recommend deleting all unrelated language and only keeping the specific directives that this SAR is addressing to add clarity to this SAR.

It seems there has been insufficient attention given to the cost-benefit analysis for this SAR. NERC has simply stated “currently unknown” and did not provide any additional analysis or consideration for costs and how to minimize such costs across all registered entities involved, except for one mention of if fewer reoccurring staged tests are performed, which is fairly vague. The vast proposed revisions will significantly increase costs to registered entities, affecting business operations and costs to consumers. Therefore, more due diligence and consideration should be given to cost across all the proposed standards projects.

We recommend that the SAR drafting team extend the comment period on this SAR and the other two modeling related SARs until after the July 10 NERC Webinar that will inform the industry further about these three SARs and have a question-and-answer period for attendees. This webinar seems

like it will be very informative and helpful to the industry in understanding these three SARs, which would further support the comment period and balloting process for getting the SARs approved.

There should be a much clearer linkage to the EMT-related NERC projects and EMT modeling requirements in general, which are the best models and studies to evaluated IBR ride-through and other technical performance criteria. While FERC did not call out EMT requirements in Order 901, it did recommend continuing to pursue efforts and those efforts should be closely aligned with this SAR.

Likes 0

Dislikes 0

Response

Anna Todd - Southern Indiana Gas and Electric Co. - 3,5,6 - RF

Answer

Document Name

Comment

Southern Indiana Gas and Electric Company d/b/a CenterPoint Energy Indiana South (SIGE) supports comments submitted by the Edison Electric Institute (EEI).

Regarding Phase 2 Objectives, SIGE believes that IBR validation requirements during the interconnection process should be addressed within the Generator Interconnection process itself instead of being addressed within a new or revised standard.

SIGE requests further detail surrounding FERC Order 901 Directive 1 regarding “Bulk-Power System planners and operators to validate registered IBR models using disturbance monitoring data from installed registered IBR generator owners’ disturbance monitoring equipment”.

Likes 0

Dislikes 0

Response

Diana Aguas - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE

Answer

Document Name

Comment

CenterPoint Energy Houston Electric, LLC (CEHE) agrees with the comments as submitted by Edison Electric Institute (EEI) for Phase 1 Objective 1j as listed below.

EEI Item 1j: EEI does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Additionally, CEHE believes the associated cost with the implementation of a new standard with model validation will require Transmission Owners/Transmission Planners to incur high costs for additional resources to coordinate/validate data in the creation of these interconnection-wide models.

Likes 0

Dislikes 0

Response

Ijad Dewan - Hydro One Networks, Inc. - 1 - NPCC

Answer

Document Name

Comment

The SAR may clarify model validation by performance data is for what time scale, is it for PSS/E, PSLF type dynamic model only or also include EMT and short circuit model for IBR?

In related standard list, PRC-028 (new) can be considered, since this SAR is for model validation by performance data, it may consider what data is available under PRC-028.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Ameren supports EEI's Comments on this project.

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

From the proposed SAR, it is not possible to determine if it is intended to address only RMS models or also include EMT models. The scope of the SAR should be clarified.

Model requirements for existing IBR projects should be addressed by the DT, especially what to do for projects whose manufacturer does not exist anymore (for instance, propose a library of generic models to use for project owners who cannot provide OEM models, perhaps based on site tests to determine the parameters to use).

The required testing for model validation needs to be periodic and often enough to reflect software/firmware updates provided by the OEMs for the inverter controls. These software/firmware updates are expected to be released somewhat frequently over the lifespan of the equipment to provide both security and performance improvements. The controls of large synchronous generators did not change in any appreciable manner over decades unless completely replaced, but the functionality of IBR (either intermittent resource or storage-based) can be changed dramatically just by a simple upload of new firmware.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item.

Item 1 Part F seems to be missing some language since it doesn't have a complete thought and ends with a "-" instead of a ";" like the rest of the items.

The model data sharing related to FAC-002 must consider both the models and the model parameters.

Likes 0

Dislikes 0

Response

Daniela Atanasovski - APS - Arizona Public Service Co. - 1,3,5,6

Answer

Document Name

Comment

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

The following comments are intended to address EEI concerns with the Proposed SAR. Our negative response also reflects our opinion that the SAR needs to be revised prior to final approval.

Detail Description/FERC Order 901 Directives for Milestone 3 Part 2 Comments

While EEI generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope (i.e., Items

1, 3, 5, 6, 7, & 10), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

- **Item 2** contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.
- **Item 5** directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.
- **Items 4, 8, and 11** all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs directives are to be addressed.
- **Items 8, and 11** contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.
- **Item 8** addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated with validating those models.

EEl also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all of the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: EEl is concerned that some of the suggested changes under the Item 1 work scope, which aligns to MOD-033 seem to confuse the intent of this Reliability Standard. Specifically, MOD-033 is intended to validate resource models against actual system events/data, whereas MOD-026 and MOD-027 are intended to verify individual resource models in dynamic simulations. We additionally ask that the phrase “actual performance data” be clarified, noting this is an undefined term and could be understood to mean many things. To address the clarity issue of Item 1 we suggest the following edits below:

Either revise MOD-033 or create a new system model validation Reliability Standard that more accurately validates IBR performance within those interconnected transmission system studies using actual performance data.

Item 1a: EEl suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. EEl also suggests that given MOD-033 is the focus of Item 1, it is important to maintain context that MOD-033 is focused specifically on validating resource performance within system models. Verifying the accuracy of IBR models should be conducted under the new Reliability Standard that would be created under Item 2. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated within MOD-033. Furthermore, additional clarity is needed regarding what performance data is going to be available for the aggregated unregistered IBRs and IBR DERs that have a material impact, while registered IBR owners will have specific data requirements through PRC-028, we are unaware of similar requirements for unregistered resources. To address all but the performance data issues for unregistered resources, we offer the following suggested changes in boldface for Item 1a:

include criteria for validating system planning models that requires assessing and validating IBR performance, as well as assessing the impact of both unregistered IBRs (in aggregate) and IBR-DERs (in aggregate) that have been identified as having a material impact on the BPS through the use of performance data (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: EEI suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate and high quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how system planning models are to be validated. The DT should only develop requirements that obligate Planning Coordinators to have processes in place that validate IBR models within system planning models and include methods to reconcile any model issues with resource owners (i.e., IBR-GOs).

include requirements that ensure Planning Coordinators have processes in place that are capable of identifying IBR model problems within system planning models and requirements for insuring IBR GOs are held accountable for providing updated models that more accurately validate IBR performance against actual performance data.

Item 1f: EEI does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: EEI supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include requirements that obligate planner and operators to incorporate in their model verification processes documented communications with IBR owners to address deficiencies in IBR models. Include requirements for IBR owners to provide timely updates to their IBR models in response to issues identified in communications from planners and operators.

Item 1h: This item should be deleted because none of the directives associated with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: EEI believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: EEI does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Item 2:

EEI suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all of the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- Establishes uniform processes regardless of the IBR type; and
- Provides consistency among verification processes with other NERC Reliability Standards; and
- Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- Removes IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

EEI does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. EEI recognizes that additional work will be needed to address all of the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR at a later date to address this work.

Likes 0

Dislikes 0

Response

Christy Thompson - PPL - Louisville Gas and Electric Co. - 3,5,6 - SERC

Answer

Document Name

Comment

The FERC Directives assigned to this SAR, as listed in the Detailed Description, are not addressed in a straightforward manner in the Objectives listed in the Project Scope.

The Directives can be summarized in the following groups:

1. Providing accurate models (Directives 3, 4, and 12)
2. Developing a model verification process (Directives 2, 5, 6, 7, and 9)
3. Performing model validation (Directives 1, 8, 10, and 11)

The first group of Directives regarding the provision or maintenance of updated models is within the scope of MOD-032. Indeed, recent revisions the MOD-032 have already begun to address these issues, including the party responsible for models of unregistered IBRs and IBR-DERs (Directive 12). Requirement R1 of MOD-032-2 requires PCs and TPs to develop “modeling data requirements and reporting procedures.” Moreover, Requirement R2 of MOD-032-2 provides a mechanism for the correction of inaccurate models. The DT should not modify MOD-033 or create a new Reliability Standard that conflicts with or causes confusion with MOD-032. Thus, Directives 3, 4, and 12 should be coordinated appropriately with the DTs working on MOD-032.

The second group of Directives require the development of a model verification process. MOD-026 and MOD-027 already provide a framework for model verification that has been effective for synchronous generators. While the DT may consider a new standard for a model verification process due to some of the particular concerns of IBRs and IBR-DERs, there are several issues with the DT’s Objectives:

- Objective 1 identifies MOD-033 as a potential standard to revise. MOD-033 pertains exclusively model validation against actual system events/data. It is critical to understand the distinction between MOD-033 and MOD-026/027 in this regard.

- Objective 1(a) is a potential over-reach of FERC’s Directives in its requirement of a “complete set of validation expectations”.

- Objective 1(b) again over-specifies and is unnecessary. PCs and TPs should develop model requirements and verification processes including

the specification of required models and model types. Moreover, the “highest quality model type available” depends on the simulation being performed. EMT models have the potential for much higher accuracy than RMS models, but they cannot be used in interconnection-wide base cases. Again, PCs and TPs must have the flexibility to develop requirements on when each type of model should be used.

• Objective 1(d) introduces confusion between staged testing and system event response. The process used to validate models in interconnection studies or in plant commissioning is not suitable to be “followed” in validations against system event data.

• Objective 1(e) again over-reaches the FERC Directives. TPs are already required to justify their verification requirements through MOD-026 and MOD-027 (see Requirements R3 and R6). These processes are sufficient today, and the SAR scope should be modified to permit a similar process for IBRs. It should also be noted that the diverse and expert team developing IEEE Std 2800-2022 was unable to come to a consensus on what constitutes an acceptable “match” for model validation.

• Objective 1(f) is related to Objective 1(e). The FERC Directives only call for the Reliability Standard to address the development of a model verification process. The Directives do not call on NERC to establish minimum criteria for validation allowing TPs and TOs “some” flexibility.

• Objective 1(h) is related to Objective 1(e) and 1(f). Again, the DT is not responsible for establishing criteria, nor does the DT have responsibility to ensure TP or TO criteria is risk-based and region-specific. The DT is only tasked with developing or modifying a Reliability Standard to accomplish the FERC Directives, none of which require the establishment of specific performance criteria.

• Objective 1(j) needs to be removed. The development of CAPs for failed model validation is inconsistent with MOD-026/027. While a mitigation process should be defined, this process should not amount to a CAP.

The third group of Directives require model validation to be performed against actual system data. These Directives are consistent with the purpose of MOD-033 and may be adequately addressed by minor revisions to that standard. Specifically, Directive 1 requires model validations against disturbance data “from installed registered IBR generator owners’ disturbance monitoring equipment,” however provision of data from these entities is not covered by Requirement R2.

Given the issues and concerns presented above, it is recommended that the DT replace Objective 1 of the SAR with three items better aligned to FERC’s Directives. Below is a suggested structure:

1. Coordinate with the DT assigned to Project 2022-02 and any other DTs working on revisions to MOD-032 to ensure that:

- a. Generator owners of registered IBRs, transmission owners that have unregistered IBRs on their system, and distribution providers that have IBR-DERs on their system to provide models that represent the dynamic behavior of these IBRs.
- b. Provided models are at a sufficient level of fidelity to provide to Bulk-Power System planners and operators to perform valid interconnection-wide, planning, and operational studies on a basis comparable to synchronous generation resources.
- c. Provided models accurately represent the dynamic performance of registered and unregistered IBRs, including momentary cessation and/or tripping, and all ride through behavior.

2. Either revise MOD-026 and MOD-027 or create a new Reliability Standard to require a model verification process that:

- a. Determines whether the development of benchmark cases to test model performance and a subsequent report comparing model performance are needed and at what periodicity.
- b. Provides a uniform model verification process that creates consistency among the model verification processes for existing and any new or modified Reliability Standards.

c. Utilizes a timeline consistent with FERC Order No. 2023 modeling deadline requirements.

d. Requires identified registered entities to coordinate, validate, and keep up to date their models.

3. Revise MOD-033 to ensure that:

a. Registered IBR models can be validated using disturbance monitoring data from installed registered IBR generator owners' disturbance monitoring equipment.

b. All generator owner, transmission owner, and distribution provider verified IBR models (i.e., models of registered IBRs, unregistered IBRs, and IBR-DERs that in the aggregate have a material impact on the Bulk-Power System) and resulting system models are validated against actual system operational behavior.

Regarding Phase 2 Objective 4, the opportunity to do model verification using "actual performance data" "during the interconnection process" is extremely limited. Most model verification during the interconnection process is aimed at ensuring consistency in submitted data, adherence to model requirements, and evaluation of model performance. Only during the plant commissioning process is there an opportunity to validate models against "actual performance data" (in this case, from staged testing). Specific notes on the sub-items of Objective 2 follow:

• Items (a), (b), (e), (f), and (g) are also included under Objective 1, and the comments made on those items previously also apply under Objective 2.

• Item (c) is beyond the scope of FAC-002, and is covered by Phase 1 of this SAR. FAC-002 should remain focused on studies during the interconnection process, and allow other standard to address "post-interconnection validations" (as they already do).

• Item (d) does not make sense in the context of Objective 2 as the Objective pertains to the development of the validation process that item (d) says to leverage.

• Item (h) should also be removed as CAPs should not apply to facilities that are not yet commercially operational, and model verification should be required in the interconnection process prior to commercial operation.

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 Edison Electric Institute (EEI) on question 2

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Condensation of the document is needed. Only the specific actions to be taken by the standard drafting team need to be included in the Purpose or Goal, Project Scope, and Detailed Description sections. The remainder of the background information needs to be removed from the SAR.

We provide the following additional comments for consideration:

a. IBR manufacturer-specific user written models are unique to each facility. These models require a significant investment of time and money to develop/test/validate and therefore sharing of such OEM proprietary models is unlikely. The NAGF proposes that NERC consider developing model specifications as a method for determining the most appropriate models for industry to use.

b. The NAGF notes that current IBR models do not accurately represent momentary cessation/tripping and ride through behavior.

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 provides the following additional comments for consideration:

a. The NAGF recommends that the SAR identify actions to be performed by the Drafting Team. Including unapplicable/background narrative from FERC Order 901 directives in the SAR only adds confusion and uncertainty as to the actions to be performed by the DT.

b. Project Scope Phase 1 Objectives (pages 2-3) – The NAGF notes that every time a system disturbance occurs, there is the possibility that an IBR model will need to be revised to accurately reflect actual IBR facility response. IBR facilities reaction to system conditions/disturbances will vary due to the type of system disturbance experienced. Trying to modify IBR models to replicate actual IBR performance for all types of system events is not feasible and would be an inefficient use of limited GO/GOP resources.

c. The NAGF notes that this project and other IBR related projects being fast tracked will apply to registered IBR, unregistered IBRs and IBR-DER. However, the new entry IBR facilities have yet to be identified and therefore are not stakeholders participating in the development process for NERC IBR related projects. This is unacceptable and must be addressed by NERC ASAP.

Likes 0

Dislikes 0

Response

Junji Yamaguchi - Hydro-Quebec (HQ) - 1,5

Answer

Document Name

Comment

From the proposed SAR, it is not possible to determine if it is intended to address only RMS models or also include EMT models. The scope of the SAR should be clarified.

Model requirements for existing IBR projects should be addressed by the DT, especially what to do for projects whose manufacturer does not exist anymore (for instance, propose a library of generic models to use for project owners who cannot provide OEM models, perhaps based on site tests to determine the parameters to use).

Likes 0

Dislikes 0

Response

Rachel Coyne - Texas Reliability Entity, Inc. - 10

Answer

Document Name

Comment

Texas RE supports the development of a new IBR model validation Reliability Standard and the phase 1 objectives.

Texas RE encourages the drafting team to consider that the initial model should be developed based on staged testing to establish a baseline model data. These data parameters should be verified at the Point of Interconnection through field testing at individual unit model and aggregated unit models to accurately represent the actual system operating conditions. Any adjustments to the model parameters should be done to meet the Transmission Planner or Planning Coordinator's requirements.

Periodic model validations must be conducted based on actual performance data from disturbance events or periodic testing timeframe to verify that the system changes are not impacting the IBR performances.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Duke Energy agrees with and supports EEI comments for Question 2.

Additionally, Duke Energy submits the following Project Scope comments in addition to EEI comments:

Item 1c: Please clarify the phrase "staged testing".

Item 1j: Suggest the implementation of a hybrid two-stage process that:

(a) initially utilizes requirements that model some of the processes successfully used in MOD-026/027 (and MOD-033) for synchronous resources but tailored to the model verification process needs of transmission planners for both individual IBRs and aggregated IBR resources, and, (b) transitions to a CAP if the MOD-026/027/033 efforts are inadequate.

Likes 0

Dislikes 0

Response

Chantal Mazza - Hydro-Quebec (HQ) - 1 - NPCC

Answer

Document Name

Comment

From the proposed SAR, it is not possible to determine if it is intended to address only RMS models or also include EMT models. The scope of the SAR should be clarified.

Model requirements for existing IBR projects should be addressed by the DT, especially what to do for projects whose manufacturer does not exist anymore (for instance, propose a library of generic models to use for project owners who cannot provide OEM models, perhaps based on site tests to determine the parameters to use).

The required testing for model validation needs to be periodic and often enough to reflect software/firmware updates provided by the OEMs for the inverter controls. These software/firmware updates are expected to be released somewhat frequently over the lifespan of the equipment to provide both security and performance improvements. The controls of large synchronous generators did not change in any appreciable manner over decades unless completely replaced, but the functionality of IBR (either intermittent resource or storage-based) can be changed dramatically just by a simple upload of new firmware.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item.

Item 1 Part F seems to be missing some language since it doesn't have a complete thought and ends with a "-" instead of a ";" like the rest of the items.

The model data sharing related to FAC-002 must consider both the models and the model parameters.

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

Black Hills Corporation agrees with additional comments from NAGF and EEI, as follows:

The NAGF provides the following additional comments for consideration:

- a. The NAGF recommends that the SAR identify actions to be performed by the Drafting Team. Including unapplicable/background narrative from FERC Order 901 directives in the SAR only adds confusion and uncertainty as to the actions to be performed by the DT.
- b. Project Scope Phase 1 Objectives (pages 2-3) – The NAGF notes that every time a system disturbance occurs, there is the possibility that an IBR model will need to be revised to accurately reflect actual IBR facility response. IBR facilities reaction to system conditions/disturbances will vary due to the type of system disturbance experienced. Trying to modify IBR models to replicate actual IBR performance for all types of system events is not feasible and would be an inefficient use of limited GO/GOP resources.
- c. The NAGF notes that this project and other IBR related projects being fast tracked will apply to registered IBR, unregistered IBRs and IBR-DER. However, the new entry IBR facilities have yet to be identified and therefore are not stakeholders participating in the development process for NERC IBR related projects. This is unacceptable and must be addressed by NERC ASAP.

EEI provides the following additional comments for consideration:

While EEI generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope, when EEI edits are included (i.e., Items 1, 3, 5, 6, 7, 10,), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

- **Item 2** contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.
- **Item 5** directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.
- **Items 4, 8, and 11** all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs

directives are to be addressed.

· **Items 8, and 11** contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.

· **Item 8** addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated with validating those models.

EEl also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all of the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: Please clarify what is meant by actual performance data, noting this is an undefined term and could be understood to mean many things.

Item 1a: EEl suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated. Finally, we suggest that the DT clarify the term performance data by adding “from disturbance monitoring equipment”, unless something else was meant by that term and if so, please clarify the intended meaning. To address our concerns, we offer the following suggested changes:

Include (*remove: a complete set of criteria validation expectations*) for validating models received from registered IBR-GOs and TOs (non-registered aggregated IBRs with material impacts on the BPS) and DPs (aggregated IBR-DERs with material impacts on the BPS) using performance data **from disturbance monitoring equipment** (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: EEl suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate and high quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how IBR models are to be validated. The DT should only develop requirements that obligate transmission planners to have processes for model validation and records to demonstrate they followed those processes.

include **requirements that require transmission planners to have processes for model validation that include documentation that those processes were followed.** (*remove: minimum criteria for performing validation (e.g., time, tolerance, impact)*);

Item 1f: EEl does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: EEl supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include (remove: *Require*) requirements that obligate planner and operators to **incorporate in their model verification processes documented communications with** (remove: *communicate any performance criteria to Generator Owners*) **IBR owner to address deficiencies in IBR models.**

Item 1h: This item should be deleted because none of the directives aligned with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: EEI believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: EEI does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance. Instead, we suggest that the DT develop requirements in a new Reliability Standard that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of transmission planners for both individual IBRs and aggregated IBR resources.

Item 2:

EEI suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all of the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- Establishes uniform processes regardless of the IBR type; and
- Provides consistency among verification processes with other NERC Reliability Standards; and
- Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- Removes IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

EEI does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. EEI recognizes that additional work will be needed to address all of the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR at a later date to address this work.

Likes	0
Dislikes	0

Response

Alison MacKellar - Constellation - 5,6

Answer

Document Name

Comment

NERC needs to find a way to incorporate the intent of this standard into existing/future standards. Competing projects have made it very difficult to track in conjunction with FERC 901 and areas should be consolidated as much as possible which it sounds the intent of this SAR.

Alison Mackellar on behalf of Constellation Segments 5 and 6

Likes 0

Dislikes 0

Response

Stephen Stafford - Georgia Transmission Corporation - 1 - SERC

Answer

Document Name

Comment

- The developers of the SAR did not answer the question: Are there alternatives (e.g. guidelines, white papers, alerts, etc.) that have been considered or could meet the objectives? The question should be answered. The answer should paraphrase the following:
 - Since the directives of FERC Order 901 instruct NERC to develop new or modified standards, there were no other alternatives considered.
- Regarding the Objective 4 (Either revise FAC-002 or create a new SAR to incorporate similar changes to IBR validation during the interconnection process or create a new IBR model validation standard to require model validation using actual performance data to validate model quality during the interconnection process.):
 - GTC opposes such a requirement on the basis that you do not have an actual disturbance from which to collect data when the generator is initially interconnected. Therefore, a staged test should be done by the Generator Owner.
- Regarding Directives 3 & 4 which (among other things) require Transmission Owners that have unregistered IBRs on their system to provide dynamic models that accurately represent the dynamic performance of registered and unregistered IBRs, including momentary cessation and/or tripping, and all ride through behavior:
 - GTC objects to such a requirement; we recommend NERC consider a different approach that places the requirement on the generator owner.

Likes 0

Dislikes 0

Response

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

Answer	
Document Name	
Comment	
<p>Phase1 – Item 1.a – How will actual performance data be useful for IBR validation if no appropriate disturbance (e.g. fault response or steady-state voltage dip) has occurred near a particular IBR plant?</p> <p>Phase1 – Item 1.a – Requiring PC validation for faults/events near each of the IBR plants to perform effective model validation (stability, short circuit, & EMT models) and compare each IBR response against performance criteria is a significant scope addition for MOD-033.</p>	
Likes 0	
Dislikes 0	
Response	
Joshua London - Eversource Energy - 1,3	
Answer	
Document Name	
Comment	
<p>The required testing for model validation needs to be periodic and often enough to reflect software/firmware updates provided by the OEMs for the inverter controls. These software/firmware updates are expected to be released somewhat frequently over the lifespan of the equipment in order to provide both security and performance improvements. The controls of large synchronous generators did not change in any appreciable manner over decades unless completely replaced, but the functionality of IBR (either intermittent resource or storage-based) can be changed dramatically just by a simple upload of new firmware.</p> <p>Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item.</p> <p>Item 1 Part F seems to be missing some language since it doesn't have a complete thought and ends with a "-" instead of a ";" like the rest of the items.</p> <p>The model data sharing related to FAC-002 must consider both the models and the model parameters.</p>	
Likes 0	
Dislikes 0	
Response	
Kimberly Turco - Constellation - 5,6	
Answer	
Document Name	

Comment

NERC needs to find a way to incorporate the intent of this standard into existing/future standards. Competing projects have made it very difficult to track in conjunction with FERC 901 and areas should be consolidated as much as possible which it sounds the intent of this SAR.

Kimberly Turco on behalf of Constellation Segments 5 and 6

Likes 0

Dislikes 0

Response

Jennifer Weber - Tennessee Valley Authority - 1,3,5,6 - SERC

Answer

Document Name

Comment

As with Project 2022-02 (Uniform Modeling Framework for IBR), it's unreasonable to place requirements on TOs for "unregistered IBRs" as they (the unregistered IBRs) have no requirements to provide any information (test data, models, etc.) that would allow the TOs to do the things the SAR is requiring. If the "unregistered IBRs" models are that important to the planning studies, they should have to register and provide required data like registered generators.

If NERC is going to go down this path such that TO provided models, based on operational data, are acceptable for unregistered IBRs, why can't the TOs provide the models for other generators and, thereby, get rid of the requirements for the GOs to provide verified models in MOD-026 and MOD-027?

Likes 0

Dislikes 0

Response

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

Answer

Document Name

Comment

What is the threshold for IBR-DER to be required to provide this information to the TO's or DP's. How will this be enforced as it will be the responsibility of the generator owner/operator of the site to provide the information to the TO/DP

If the GO/GOP does not want to provide the necessary information for whatever reason, the TO/DP should not be considered non-compliant with the Standard. This needs responsibility needs to be placed on the GO/GOP to provide the information to the TO/DP.

Likes 0

Dislikes 0

Response

Jessica Cordero - Unisource - Tucson Electric Power Co. - 1

Answer

Document Name

Comment

TEPC agrees with the following EEI comments: EEI does not agree that the proposed Project SAR is sufficiently clear or covers all of the items listed in the Detailed Description Section of this SAR and needs further work before this SAR is approved.

Likes 0

Dislikes 0

Response

Thomas Foltz - AEP - 3,5,6

Answer

Document Name

Comment

This SAR does not seem to recognize that MOD-026-2 is well along and on track to eventually replace MOD-026-1 and MOD-027-1. If the SAR's intent is to remove IBRs from MOD-026-2, that would be a disruption to the progress made by the MOD-026-2 standard drafting team. AEP advises against redirecting Project 2020-06 SDT in this manner.

MOD-026-2 under draft by the Project 2020-06 SDT already allows for (though is not dependent on) use of performance data as recorded during system events to verify and validate dynamic modeling, including dynamic modeling of IBRs. Some aspects of this SAR's phase 1 scope may be appropriate for the Project 2020-06 SDT to consider but not under MOD-033. MOD-033 is system level model verification and validation, not individual plant verification and validation. Project 2020-06 should be allowed to proceed with MOD-026-2 under the original plan and SAR. This will cover post-commissioning model verification and validation well enough. The need at present is for IBR dynamic model verification and validation prior to interconnection to support the interconnection study process. This newly proposed SAR does address that in phase 2 of its scope. However, introducing model verification and validation (which is a big piece of IEEE 2800.2, now underway) will slow down the interconnection process, which FERC order 2023 seeks to accelerate. If NERC desires to support interconnection study process with model verification and validation, then the existing SAR should be revised to merely expand the scope of 2020-06 to encompass pre-commissioning model verification and validation of IBRs and stay clear of MOD-033 and FAC-002. FAC-002 is concerned with the reliability impact of interconnections and should not get diverted into model verification and validation and the correcting of substandard IBR performance.

CAPs are typically executed by the same entity who creates the CAP. This SAR mentions corrective action plans devised by TPs and TOPs for GOs and TOs to execute which is an arrangement that GOs and TOs may not view favorably. At the very least, there would need to be some agreement between the two parties so that an entity is not expected to execute a CAP that they believe is not practical or feasible.

This SAR seems to seek performance data as recorded during system events as the chief basis on which to validate dynamic modeling. However, dependence on chance events cannot be the basis for any systematic or periodic validation and should be considered only as a supplemental basis if suitable events occur. As stated above, MOD-026-2 allows for the use of performance data as recorded during system events to verify and validate dynamic modeling including dynamic modeling of IBRs but is not dependent on it. AEP believes that the process being defined in MOD-026-2 sets forth the proper perspective on the use of performance data for model validation.

Likes 0

Dislikes 0

Response

Patricia Lynch - NRG - NRG Energy, Inc. - 5,6

Answer

Document Name

Comment

None

Likes 0

Dislikes 0

Response

Comments received from Gail Elliott/ITC

1. Are there any areas of concern that duplicative coverage or competing expectations would occur, if so, what are these areas the team should be aware of when drafting?

Yes

No

Comments: Consideration should be given to the existing MOD-026 Project 2020-06 and other standards to determine if these requirements can be incorporated into this standard revision. Maintaining a one standard approach should be evaluated for ease in both GOs and TPs making sure evaluations both by generators and planners of the submitted data.

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

Yes

No

Comments: ITC submits following comments:

1. Consider the inclusion of Planning Coordinators as an entity that may be included in the required work.

2. Disturbance Monitoring - Review the requirements in PRC-028 to confirm that no duplication of work will be required for the GOs, including Category 2 IBRs, for the installation of disturbance monitoring. A consideration if disturbance monitoring should be required for synchronous machines connected to the 60kV – 100 kV BPS.

The following comments are intended to address ITC's concerns with the Proposed SAR. Our negative response also reflect our opinion that the SAR needs to be revised prior to final approval.

Detail Description/FERC Order 901 Directives for Milestone 3 Part 2 Comments

While ITC generally agrees that many of the FERC Order 901 directives allocated to this project are reflected in this proposed Project Scope (i.e., Items 1, 3, 5, 6, 7, & 10), we do not agree the following directives have been sufficiently addressed in the SAR:

Note: Item numbers below align with those contained in the Detailed Description Section of the SAR.

- **Item 2** contains a directive that requires the assessment and development of benchmark cases to test model performance as well as a report comparing model performance and associated periodicity requirements. In our review of the Scope items, we do not find this task. We further note that if this task is to be done outside of this project, then it should be made clear where this work is being done and this directive should be removed from the Detail Scope section of the SAR.
- **Item 5** directs the establishment of uniform model verification processes. While we have included this item as being addressed in the proposed SAR, we do suggest that clearer language be added to certain SAR scope items to strengthen this directive and ensure it will be thoroughly addressed.
- **Items 4, 8, and 11** all contain directives that address issues with unregistered IBRs yet none of the language in the SAR scope clearly addresses those entities or the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where unregistered IBRs directives are to be addressed.
- **Items 8, and 11** contain directives that address issues with IBR-DERs yet none of the language in the SAR scope clearly address those entities and the associated NERC obligations. To address this issue, we ask that the SAR be modified to make it clearer where IBR-DERs directives are to be addressed.
- **Item 8** addresses the verification of aggregated models for unregistered IBRs and IBR-DER that have a material impact on the BPS, but the proposed SAR contains nothing in the proposed Project Scope that addresses this issue. To address this issue, we suggest adding language to the proposed scope to address the associated directives on verifying aggregated unregistered IBRs and IBR DERs and the process differences associated with validating those models.

ITC also suggests that Items 9 and 12 be removed from the Detailed Description section of this SAR because the directives contained in these Items are directives for NERC not the DT.

Next, we offer the following comments on the specifics of the Project Scope items and offer some suggested comments, edits, and deletions that provide clearer alignment to the directives, noting not all of the concerns listed above are reflected in the comments below.

Phase 1 Objectives Comments:

Item 1: ITC is concerned that some of the suggested changes under the Item 1 work scope, which aligns to MOD-033 seem to confuse the intent of this Reliability Standard. Specifically, MOD-033 is intended to validate resource models against actual system events/data, whereas MOD-026 and MOD-027 are intended to verify individual resource models in dynamic simulations. We additionally ask that the phrase “actual performance data” be clarified, noting this is an undefined term and could be understood to mean many things. To address the clarity issue of Item 1 we suggest the following edits in boldface below:

Either revise MOD-033 or create a new **IBR model** system model validation Reliability Standard **that more accurately validates IBR performance within those interconnected transmission system studies to require model validation** using actual performance data.

Item 1a: ITC suggests not using the phrase “validation expectations” because the phrase has no meaning in the context of a NERC Reliability Standard. Noting an expectation is not a requirement. ITC also suggests that given MOD-033 is the focus of Item 1, it is important to maintain context that MOD-033 is focused specifically on validating resource performance within system models. Verifying the accuracy of IBR models should be conducted under the new Reliability Standard that would be created under Item 2. We additionally suggest adding aggregated IBR models for non-registered IBR and IBR-DERs that have a material impact on the BPS because both need to be validated within MOD-033. Furthermore, additional clarity is needed regarding what performance data is going to be available for the aggregated unregistered IBRs and IBR DERs that have a material impact, while registered IBR owners will have specific data requirements through PRC-028, we are unaware of similar requirements for unregistered resources. To address all but the performance data issues for unregistered resources, we offer the following suggested changes in boldface for Item 1a:

include ~~a complete set of validation expectations~~ **criteria for validating system planning models that requires assessing and validating IBR performance, as well as assessing the impact of both unregistered IBRs (in aggregate) and IBR-DERs (in aggregate) that have been identified as having a material impact on the BPS through the use of using** performance data (must include performance data of IBR during disturbances as well as other performance measures);

Item 1b: ITC suggest deleting item 1b because it is unnecessary to include language within a NERC Reliability Standard that simply asks for accurate and high quality standards.

Item 1c: As stated above, we suggest that the term “performance data” be clarified.

Item 1d: Suggest deleting Item 1d because it lacks clarity about what the DT is expected to do to fulfill this item. Moreover, we understand Phase 2 is necessary to fulfill other Milestones not Milestone 3, Part 2 and therefore should not be included in this SAR.

Item 1e: The SAR should not attempt to prescriptively define how system planning models are to be validated. The DT should only develop requirements that obligate Planning Coordinators to have processes in place that validate IBR models within system planning models and include methods to reconcile any model issues with resource owners (i.e., IBR-GOs).

include **requirements that ensure Planning Coordinators have processes in place that are capable of identifying IBR model problems within system planning models and requirements for insuring IBR GOs are held accountable for providing updated models that more accurately validate IBR performance against actual performance data. minimum criteria for performing validation (e.g., time, tolerance, impact);**

Item 1f: ITC does not agree with Item 1f. As stated in paragraph 143 of FERC Order 901, what is required is the development of a new or revised Reliability Standard that establishes “uniform model verification processes” not specific performance criteria. For this reason, we suggest deleting Item 1f because this item goes beyond what was directed by the Commission.

Item 1g: ITC supports requirements that include expanded communication processes that obligate IBR owners and planners to cooperatively communicate to resolve issues with IBR model validation. However, we do not support including “performance criteria” because that is not what Order 901 directed. For this reason, we suggest the following changes to Item 1g:

Include Require requirements that obligate planner and operators to incorporate in their model verification processes documented communications with communicate any performance criteria to Generator Owners IBR owners to address deficiencies in IBR models. Include requirements for IBR owners to provide timely updates to their IBR models in response to issues identified in communications from planners and operators.

Item 1h: This item should be deleted because none of the directives associated with this project include the establishment of “performance criteria”, what is directed is the development of processes to validate IBR models. The development of performance criteria goes beyond the directives of FERC Order 901.

Item 1i: ITC believes that trying to add considerations for other future work overly complicates this project. Consider deleting this item.

Item 1j: ITC does not agree that the use of Corrective Action Plans is the right tool for addressing issues with IBR model performance within dynamic simulations (New Standard) and system planning models (MOD-033 or New Reliability Standard). Instead, we suggest that the DT develop requirements in that model some of the processes successfully used in MOD-026 & MOD-027 for synchronous resources but tailored to the model verification process needs of for both individual IBRs and aggregated IBR resources.

Item 2:

ITC suggests Items 1 & 2 do not fully capture the directives identified in FERC Order 901 specific to model verification. We also suggest that Item 2 should more clearly capture all of the directives noted in FERC Order 901 specific to model verification (see Items 5, 6, & 7). To address these directives, we offer the following:

Develop a new or revised Reliability Standard that address IBR model verification processes that:

- Establishes uniform processes regardless of the IBR type; and
- Provides consistency among verification processes with other NERC Reliability Standards; and
- Contains process timelines consistent with FERC Order No. 2023 modeling deadline requirements; and
- Either include the new work required into the new MOD-026 or develop a new standard for this work and remove IBRs from MOD-026 and MOD-027.

Item 3: No suggested changes.

Item 4 (Phase 2):

ITC does not agree that there is any benefit in adding scope items that fall outside of Milestone 3 at this time. The scope is already very large and including Phase 2 work that is so prescriptive and speculative when it is not clear exactly what additional work will be necessary does not add to the SAR and may only delay approval of the SAR. ITC recognizes that additional work will be needed to address all of the directives in FERC Order 901, but it is more important at this time to address those directives identified as Milestone 3. There will be plenty of time to add additional scope later. For these reasons we suggest deleting the Phase 2 work and submitting a revised SAR at a later date to address this work.