NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project Name:	2020-06 Verifications of Models and Data for Generators | Draft 1 of IBR Definitions
Comment Period Start Date:	11/16/2023
Comment Period End Date:	1/9/2024
Associated Ballot(s):	2020-06 Verifications of Models and Data for Generators IBR Unit IN 1 DEF 2020-06 Verifications of Models and Data for Generators IBR-related Definitions | Implementation Plan IN 1 OT 2020-06 Verifications of Models and Data for Generators Inverter-Based Resource (IBR) IN 1 DEF

There were 73 sets of responses, including comments from approximately 179 different people from approximately 113 companies representing 10 of the Industry Segments as shown in the table on the following pages.

All comments submitted can be reviewed in their original format on the project page.

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

Questions

1. Do you support the definition for IBR as proposed, or with non-substantive changes? If you do not support the definition as proposed, please explain the changes that, if made, would result in your support.

2. Do you support the definition for IBR Unit as proposed, or with non-substantive changes? If you do not support the definition as proposed, please explain the changes that, if made, would result in your support.

3. Provide any additional comments for the DT to consider, if desired.

The Industry Segments are:

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

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
BC Hydro and Power Authority	Adrian Andreoiu	1	WECC	BC Hydro	Hootan Jarollahi	BC Hydro and Power Authority	3	WECC
					Helen Hamilton Harding	BC Hydro and Power Authority	5	WECC
					Adrian Andreoiu	BC Hydro and Power Authority	1	WECC
MRO	Anna Martinson	1,2,3,4,5,6	MRO	MRO Group	Shonda McCain	Omaha Public Power District (OPPD)	1,3,5,6	MRO
					Michael Brytowski	Great River Energy	1,3,5,6	MRO
					Jamison Cawley	Nebraska Public Power District	1,3,5	MRO
					Jay Sethi	Manitoba Hydro (MH)	1,3,5,6	MRO
					Husam Al-Hadidi	Manitoba Hydro (System Preformance)	1,3,5,6	MRO

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Kimberly Bentley	Western Area Power Adminstration	1,6	MRO
					Jaimin Patal	Saskatchewan Power Coporation (SPC)	1	MRO
					Angela Wheat	Southwestern Power Administration	1	MRO
					George Brown	Pattern Operators LP	5	MRO
					Larry Heckert	Alliant Energy (ALTE)	4	MRO
					Terry Harbour	MidAmerican Energy Company (MEC)	1,3	MRO
					Dane Rogers	Oklahoma Gas and Electric (OG&E)	1,3,5,6	MRO
					Seth Shoemaker	Muscatine Power & Water	1,3,5,6	MRO

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Bobbi Welch	Midcontinent ISO, Inc.	2	MRO
					Michael Ayotte	ITC Holdings	1	MRO
					Andrew Coffelt	Board of Public Utilities-Kansas (BPU)	1,3,5,6	MRO
Southwest Power Pool, Inc. (RTO)	Charles Yeung	2	MRO,SPP RE,WECC	SRC 2023	Charles Yeung	SPP	2	MRO
					Ali Miremadi	CAISO	1	WECC
					Helen Lainis	IESO	1	NPCC
					Bobbi Welch	Midcontinent ISO, Inc.	2	MRO
					Greg Campoli	NYISO	1	NPCC
					Elizabeth Davis	PJM	2	RF
					Kennedy Meier	Electric Reliability Council of Texas, Inc.	2	Texas RE
WEC Energy Group, Inc.	Christine Kane	3		WEC Energy Group	Christine Kane	WEC Energy Group	3	RF
					Matthew Beilfuss	WEC Energy Group, Inc.	4	RF

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Clarice Zellmer	WEC Energy Group, Inc.	5	RF
					David Boeshaar	WEC Energy Group, Inc.	6	RF
Southern Company - Southern Company Services, Inc.	Colby Galloway	1,3,5,6	MRO,RF,SERC,Texas RE,WECC	Southern Company	Matt Carden	Southern Company - Southern Company Services, Inc.	1	SERC
					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

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
Public Utility District No. 1 of Chelan County	Diane E Landry	1		CHPD	Joyce Gundry	Public Utility District No. 1 of Chelan County	3	WECC
					Anne Kronshage	Public Utility District No. 1 of Chelan County	6	WECC
					Rebecca Zahler	Public Utility District No. 1 of Chelan County	5	WECC
ACES Power Marketing	Jodirah Green	1,3,4,5,6	MRO,RF,SERC,Texas RE,WECC	ACES Collaborators	Bob Soloman	Hoosier Energy Electric Cooperative	1	RF
					Kris Carper	Arizona Electric Power Cooperative, Inc.	1	WECC
					Scott Brame	North Carolina Electric Membership Corporation	3,4,5	SERC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Jason Procuniar	Buckeye Power, Inc.	4	RF
					Kevin Lyons	Central Iowa Power Cooperative	1	MRO
					Amber Skillern	East Kentucky Power Cooperative	1	SERC
					Nick Fogleman	Prairie Power, Inc.	1,3	SERC
					Kylee Kropp	Sunflower Electric Power Corporation	1	MRO
					Austin Towne	Western Farmers Electric Cooperative	1,5	Texas RE
Eversource Energy	Joshua London	1		Eversource	Joshua London	Eversource Energy	1	NPCC
					Vicki O'Leary	Eversource Energy	3	NPCC
FirstEnergy - FirstEnergy Corporation	Mark Garza	4		FE Voter	Julie Severino	FirstEnergy - FirstEnergy Corporation	1	RF

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Aaron Ghodooshim	FirstEnergy - FirstEnergy Corporation	3	RF
					Robert Loy	FirstEnergy - FirstEnergy Solutions	5	RF
					Mark Garza	FirstEnergy- FirstEnergy	1,3,4,5,6	RF
					Stacey Sheehan	FirstEnergy - FirstEnergy Corporation	6	RF
Michael Johnson	Michael Johnson		WECC	PG&E All Segments	Marco Rios	Pacific Gas and Electric Company	1	WECC
					Sandra Ellis	Pacific Gas and Electric Company	3	WECC
					Frank Lee	Pacific Gas and Electric Company	5	WECC
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

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Alain Mukama	Hydro One Networks, Inc.	1	NPCC
					Deidre Altobell	Con Edison	1	NPCC
					Jeffrey Streifling	NB Power Corporation	1	NPCC
					Michele Tondalo	United Illuminating Co.	1	NPCC
					Stephanie Ullah-Mazzuca	Orange and Rockland	1	NPCC
					Michael Ridolfino	Central Hudson Gas & Electric Corp.	1	NPCC
					Randy Buswell	Vermont Electric Power Company	1	NPCC
					James Grant	NYISO	2	NPCC
					John Pearson	ISO New England, Inc.	2	NPCC
					Harishkumar Subramani Vijay Kumar	Independent Electricity System Operator	2	NPCC

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

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
						Florida Power and Light Co.		
					Glen Smith	Entergy Services	4	NPCC
					Sean Cavote	PSEG	4	NPCC
					Jason Chandler	Con Edison	5	NPCC
					Tracy MacNicoll	Utility Services	5	NPCC
					Shivaz Chopra	New York Power Authority	6	NPCC
					Vijay Puran	New York State Department of Public Service	6	NPCC
					ALAN ADAMSON	New York State Reliability Council	10	NPCC
					David Kiguel	Independent	7	NPCC
					Joel Charlebois	AESI	7	NPCC
					Joshua London	Eversource Energy	1	NPCC

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
Elevate Energy Consulting	Ryan Quint	NA - Not Applicable	NA - Not Applicable	Elevate Energy Consulting	Ryan Quint	Elevate Energy Consulting		NA - Not Applicable
					N/A	N/A		NA - Not Applicable
Dominion - Dominion Resources, Inc.	Sean Bodkin	6		Dominion	Connie Lowe	Dominion - Dominion Resources, Inc.	3	NA - Not Applicable
					Lou Oberski	Dominion - Dominion Resources, Inc.	5	NA - Not Applicable
					Larry Nash	Dominion - Dominion Virginia Power	1	NA - Not Applicable
					Rachel Snead	Dominion - Dominion Resources, Inc.	5	NA - Not Applicable
Shannon Mickens	Shannon Mickens		MRO,SPP RE,WECC	SPP RTO	Shannon Mickens	Southwest Power Pool Inc.	2	MRO
					Mia Wilson	Southwest Power Pool Inc.	2	MRO

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
					Josh Phillips	Southwest Power Pool Inc.	2	MRO
					Darian Richards	Southwest Power Pool Inc	2	MRO
					Jim William	Southwest Power Pool Inc.	2	MRO
					Mason Favazza	Southwest Power Pool Inc.	2	MRO
					Scott Jordan	Southwest Power Pool Inc.	2	MRO
					Will Tootle	Southwest Power Pool Inc.	2	MRO
					Zach Sabey	Southwest Power Pool Inc.	2	MRO
Stephen Whaite	Stephen Whaite		RF	ReliabilityFirst Ballot Body Member and Proxies	Lindsey Mannion	ReliabilityFirst	10	RF
					Stephen Whaite	ReliabilityFirst	10	RF

Organization Name	Name	Segment(s)	Region	Group Name	Group Member Name	Group Member Organization	Group Member Segment(s)	Group Member Region
Western Electricity Coordinating Council	Steven Rueckert	10		WECC	Steve Rueckert	WECC	10	WECC
					Phil O'Donnell	WECC	10	WECC
Tim Kelley	Tim Kelley		WECC	SMUD and BANC	Nicole Looney	Sacramento Municipal Utility District	3	WECC
					Charles Norton	Sacramento Municipal Utility District	6	WECC
					Wei Shao	Sacramento Municipal Utility District	1	WECC
					Foung Mua	Sacramento Municipal Utility District	4	WECC
					Nicole Goi	Sacramento Municipal Utility District	5	WECC
					Kevin Smith	Balancing Authority of Northern California	1	WECC

1. *Do you support the definition for IBR as proposed, or with non-substantive changes? If you do not support the definition as proposed, please explain the changes that, if made, would result in your support*.	
Kristina Marriott - Miller Bros. Solar, LLC - 5 - MRO,WECC,Texas RE	
Answer	No
Document Name	
Comment	
The Inverter Based Resource proposed definition includes distribution. GADS and other regional (ISO/RTO) definitions support BPS (transmission and sub-transmission) and purposely leave out distribution systems (distributed energy resources (DERs)). We recommend also having this delineation to help industry terms align. Thus, DER should have its own definition and a MW delineation or facility descriptions as part of its definition. We believe having MW delineation may help approval odds of both definitions. This may also help with the inclusions and exclusions of IBRs and DERs for upcoming standards. Further we recommend that BESS Resource should be excluded from this definition, and should be its own definition. Separating these items out may help the inclusion and exclusion of certain units/facilities. We also recommend that converter unit resources should be its own definition. Reasoning for breaking these resources out as their own definition, makes it easier to include, exclude, delineate and detail requirements for each kind of resource within upcoming standards. Example: EMT modeling requirements, event reporting, and performances should differ between IBRs, BESS Resources and Converter Based Resources. Also, many companies (GOs) are separating out their PV Plant as one legal entity and their BESS as another legal entity. With this in mind, making separate definitions also helps these companies.	
Likes 0	
Dislikes 0	
Response	
1. This parenthetical has been removed, and further discussion about this topic is included in the technical rationale.	

2. A table has been added to the technical rationale, and the list of technologies has been removed from the definition. 3. The language has been updated, but in general the SDT believes a BESS is an IBR whether it is charging or discharging. Reliability Standards drafting teams will have the responsibility of deciding whether requirements apply in both modes or not. Additionally, the DT wanted to define as few terms as possible. The commenter is welcome to submit a SAR in the future to address their concern. 4. Thank you for the comment. The DT has chosen to keep the BESS as part of the IBR definition. 5.	
Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO	
Answer	No
Document Name	
Comment	
· Item 4 in the background of the IBR definition documents indicates that the IBR is synonymous with the term “IBR plant/facility”, where a step-up transformer, collector systems, main power transformers, power plant controllers, etc., all belong to the IBR. However, these details are not mentioned in the IBR definition. Therefore, it is recommended to include these details in the IBR definition to clarify the definition. · The isolated IBR, regardless of their energy resource, interconnecting via a dedicated VSC-HVDC transmission facility should be included in the IBR definition.	
Likes 0	
Dislikes 0	
Response	
Please see the Technical Rationale. This is included under the definition and the technical rationale explains this more thoroughly.	
Sean Bodkin - Dominion - Dominion Resources, Inc. - 6, Group Name Dominion	

Answer	No
Document Name	
Comment	
The proposed defintion conflicts with the BES definition and also appears to be an attempt to expand NERC jurisidction into the distribution system. The definition is expansive and goes beyond a defintoin of what an Inverter Based Resource is technically. Dominion Energy recommends that NERC use the FERC definition of IBR: IBRs include solar photovoltaic, wind, fuel cell, and battery storage resources powering electronic devices that change direct current power produced by these resources to alternating current power to be transmitted on the BPS. The FERC definition clearly communicates that only resources that are intending to move power across the BPS are a jurisdictional IBR and does not conflict with the existing and approved BES definition. Dominion Energy also supports EEI comments.	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Ryan Quint - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable, Group Name Elevate Energy Consulting	
Answer	No
Document Name	
Comment	

The drafting team has presented a good draft definition of IBR but the proposed definition includes some technical issues that could create challenges, inconsistencies, and applicability challenges when used in the NERC Reliability Standards. These issues should be further vetted and considered by the drafting team for the next iteration. Potential issues include:

1. The parenthetical "(transmission, sub-transmission, or distribution system)" encapsulates all IBRs connected to the power grid which is a good approach to create a generic definition that can then be further specified for applicability to requirements. However, the phrase could also be removed and the meaning would remain the same. So therefore, it may not be necessary to add that level of specificity to the Glossary Term knowing that further clarification would be needed for applicability in the Standards.
    - IBRs connected to the distribution system are classified as distributed energy resources (DERs) and would need a separate definition to classify them as such for any DER-related standards modifications.
2. The list of IBR technologies at the end of the definition is confusing in that it is unclear whether this list is inclusive or exclusive. As written, one cannot clearly determine whether the list defines the types of resources that are considered IBRs or if they are simply examples. There are other types of IBRs such as FACTS devices (STATCOMs, SVCs, etc.) and HVDC circuits that are not included in this list. Therefore, as written, the definition will cause a significant amount of confusion and require significant clarifying language in every standard where used.
3. The *ERO Enterprise CMEP Practice Guide: Application of the Bulk Electric System Definition to Battery Energy Storage Systems and Hybrid Resources Version 1* clarifies that BESS applicability is irrespective of charging and discharging. This is relevant to these definitions in that the proposed IBR definition states "A source (or sink in the case of a charging BESS)" but it is unclear what value the parenthetical addition brings to the definition. A BESS is a source of electric power when discharging and therefore could be classified accordingly without the additional language. The drafting team should consider this when developing the definition given the past precedence set with the Practice Guide. Similarly, if the team decides to keep it, it could be integrated into the definition so there are less parentheticals throughout.

The following are supported in the definition:

1. The use of "electric power system" is likely a suitable term in that it is generic enough for a definition such as this. Again, without the additional text that appears to be unnecessary, as described above.

A more fundamental definition such as the following may be just as useful for reference in NERC Standards: “A source of electric power connected to the electric power system that consists of one or more IBR Unit(s) operated as a single resource at a common point of connection.

Likes 0	
Dislikes 0	

Response

1. This parenthetical has been removed, and further discussion about this topic is included in the technical rationale.
2. A table has been added to the technical rationale, and the list of technologies has been removed from the definition.
3. The language has been updated, but in general the SDT believes a BESS is an IBR whether it is charging or discharging. Reliability Standards drafting teams will have the responsibility of deciding whether requirements apply in both modes or not.
4. Language has been removed.

Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter

Answer	No
Document Name	

Comment

FirstEnergy supports EEI’s comments which state:

EEI appreciates the efforts to develop the proposed IBR definition, however, we do not support the definition as currently written

Our concerns include the specificity in the technology types covered in the proposed definition, noting that NERC definitions should be technology agnostic. Also, as written the definition seems to cast an overly broad net relative to the size and voltage class for the IBR resources yielding insufficient regulatory clarity necessary for entities to apply the definition in any meaningful way. While the definition is not intended to identify specific resource applicability, it still should be clear enough to provide a regulatory floor as it relates to NERC Reliability Standards.

To address these concerns, either the IEEE definition of IBRs, as defined in IEEE 2800-2022 (IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems, See Section 3, page 31) or the informal definition of IBRs as proposed by the FERC Commission on Nov. 17, 2023 should be leveraged. Finally, consideration should be given to defining DERs separately noting these resources, while also inverter based, represent a specific class of IBRs that are directly connected to the distribution system and in many cases serve a very different purpose outside of supporting the reliability of the Bulk Power System.	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Michael Johnson - Michael Johnson On Behalf of: Frank Lee, Pacific Gas and Electric Company, 3, 1, 5; Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	No
Document Name	
Comment	
PG&E does not support the definition of an IBR as written because it is too narrow to only define the listed 5 items as IBR technologies. There are other generation types that use IBR technologies that produce MWs such as Flywheels, Tidal flows, etc… that if left out, will result in future ambiguity. PG&E's recommendation is to either list other generation methods by name or the Drafting Team (DT) should include in the requirement text "and other" to ensure emerging generation or technologies are not excluded to avoid future modifications to the definition.	
Likes 0	
Dislikes 0	

Response	
A table has been added to the technical rationale to help further clarify	
Ruchi Shah - AES - AES Corporation - 5	
Answer	No
Document Name	
Comment	
AES Clean Energy supports NAGF's comments and NAGF's proposed definition for IBR.	
Likes 0	
Dislikes 0	
Response	
Please see NAGF response.	
Andy Thomas - DTE Energy - 1,3,5,6 - SERC,RF	
Answer	No
Document Name	
Comment	
Duke Energy provides the following guidance: Delete proposed NERC IBR definition and substitute the IEEE 2800 "IBR Plant" definition. The IEEE2800 definition is well vetted within the industry and serves the NERC intended purpose for this application. Note: The proposed NERC IBR definition fits the IBR Plant definition from IEEE 2800.	
Likes 0	
Dislikes 0	

Response
The IEEE 2800 definition was used in this NERC definition, there is effectively no difference between them.

Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group	
Answer	No
Document Name	
Comment	
MRO NSRF does not support the definition as written due to the following concerns: The phrase "**that is connected to the electric power system (transmission, sub-transmission, or distribution)**" needs to be removed. Language is unnecessary. The sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** should be deleted. When possible, language used in standards and definitions should be technology neutral. The broadness of the definition generates ambiguity and will create difficultly in the application for NERC compliance. While identifying specific resource applicability isn't the aim, the definition should provide a clear regulatory framework as a baseline for adherence to NERC Reliability Standards.	
Likes 1	Lincoln Electric System, 5, Millard Brittany
Dislikes 0	

Response
The last sentence of the IBR definition was updated, and additional information provided in the Technical Rationale.

Casey Perry - PNM Resources - 1,3 - WECC,Texas RE

Answer	No
Document Name	
Comment	
PNM and TNMP supports EEI comments but also provide recommended modification of the IBR definition. Inverter Based Resource: A source of electric power that is connected to the and consists of one or more IBR Unit(s) operated as a single resource at common point of interconnection. IBRs include but are not limited to solar photovoltaic (PV), Type 3 and Type 4 wind BESS, and fuel cell.	
Likes 0	
Dislikes 0	
Response	
See EEI response.	

Srikanth Chennupati - Entergy - Entergy Services, Inc. - 1,3,5,7 - SERC	
Answer	No
Document Name	
Comment	
The definition of IBR is very vague. Entergy recommends The Inverter Based Resource(IBR) definition should clearly state that this definition should apply to only transmission connected facilities. Distribution connected facilities should be called DER in alignment with other NERC Posted guidelines.	
Likes 0	
Dislikes 0	
Response	

The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.

Sheila Suurmeier - Black Hills Corporation - 5	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI Comments.	
Likes 0	
Dislikes 0	
Response	
See NAGF and EEI responses.	

Micah Runner - Black Hills Corporation - 1	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response	

See NAGF and EEI responses.	
Carly Miller - Carly Miller On Behalf of: Josh Combs, Black Hills Corporation, 5, 1, 3, 6; - Carly Miller	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response	
See NAGF and EEI responses.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Rachel Schuldt, Black Hills Corporation, 5, 1, 3, 6; - Black Hills Corporation - 6	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response	
See NAGF and EEI responses.	

Jennifer Neville - Western Area Power Administration - 6	
Answer	No
Document Name	
Comment	
• Remove the phrase "**that is connected to the electric power system (transmission, sub-transmission, or distribution)**" as it is unnecessary language. • Delete the sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** because the language is not technology neutral. • The definition should provide a clarity for regulatory pruposes, currently the broadness of the definition generates ambiguity and will create difficultly in the application for NERC compliance.	
Likes 0	
Dislikes 0	
Response	
• Has been removed from the definition and clarified in the technical rationale. • Has been removed from the definition and clarified in the technical rationale. • The base definition can be further clarified in each NERC reliability standard by that SDT. IBR is ambiguous as it covers many differing fuel sources.	

Tracy MacNicoll - Utility Services, Inc. - 4	
Answer	No
Document Name	
Comment	
"(transmission, sub-transmission, or distribution system)" is unnecessary for the definition. This clarification would be made in the Applicability or Facilities section of a standard.	

The last sentence should have "may include". If it is only those 4 generating types, the rest of the definition wouldn't be necessary.	
Likes 0	
Dislikes 0	
Response	
• Has been removed from the definition and further clarified in the technical rationale • Has been added to say may include but not limited to, and was moved to the technical rationale	
James Keele - Entergy - 3	
Answer	No
Document Name	
Comment	
Entergy recommends The Inverter Based Resource(IBR) definition should clearly state that this definition should apply to only transmission connected facilities. Distribution connected facilities should be called DER in alignment with other NERC Posted guidelines.	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC	
Answer	No
Document Name	
Comment	

The first sentence of the proposed definition includes the phrase "(or sink in the case of a charging battery energy storage system (BESS)" which limits the applicability of an IBR to just BESS. Energy storage systems that could use IBRs are not limited to BESS - they could be used in other energy storage technologies such as compressed gas, gravity based, etc. Also, using the word "or" limits the IBR to one or the other, when it could be both. Suggest changing "or" to "and/or" and removing the word "battery" and "(BESS)" such that it reads " "(and/or sink when used in conjunction with an energy storage system)". Also, change "BESS" to "energy storage system" in the last sentence.

The last sentence of the proposed definition includes the phrase "IBRs include solar photovoltaic (PV)… This seems to indicate that IBRs are PVs, etc., when they actually only support them. Suggest changing the sentence to read "IBRs are typically used with solar photovoltaic (PV), Type 3 and Type 4 wind, energy storage, and fuel cells."

Likes 0	
Dislikes 0	

Response

Removed this language and moved it to the technical rationale to further clarify. The new language says may include but is not limited to.

Has been removed from the definition and moved to the technical rationale.

Zahid Qayyum - New York Power Authority - 5

Answer	No
Document Name	

Comment

NYPA reviewed the proposed IBR definition and suggests a revision. Given the dynamic nature of IBR technology, it's advisable not to specify certain types as the sole IBRs; instead, they could be cited as examples.

The term "IBR Unit" causes confusion as it says every inverter is a unit in the current definition, and NYPA recommends adopting an alternative term in alignment with other NERC standards.

*Additionally, it's essential to explicitly include hybrid plants in the IBR definition, as the current background section lacks clarity on the designated IBR portion. Besides, NYPA also recommends using **Inverter Based Unit(s)** instead of **IBR Units (s)** in the following sentence as it intends to explain IBR itself:* *"…and that consists of one or more **IBR Unit(s)** operated as a single resource at a common point of interconnection…"*

Likes 0	
Dislikes 0	

Response

1. SDT agrees and has moved this to the technical rationale with examples
2. This is the intent, every inverter is an IBR unit, the resource or IBR as a whole is comprised of those units. This aligns with the IEEE 2800 definition.
3. The definition does not exclude Hybrid IBRs, no change is needed here.

Ben Hammer - Western Area Power Administration - 1

Answer	No
Document Name	

Comment

The phrase "**that is connected to the electric power system (transmission, sub-transmission, or distribution)**" needs to be removed. Language is unnecessary.

The sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** should be deleted. When possible, language used in standards and definitions should be technology neutral.

The broadness of the definition generates ambiguity and will create difficultly in the application for NERC compliance. While identifying specific resource applicability isn't the aim, the definition should provide a clear regulatory framework as a baseline for adherence to NERC Reliability Standards.

Likes 0	
Dislikes 0	
Response	
• Has been removed from the definition and clarified in the technical rationale • Has been removed from the definition and clarified in the technical rationale • The base definition can be further clarified in each NERC reliability standard by that SDT. IBR is ambiguous as it covers many differing fuel sources.	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	No
Document Name	
Comment	
Either delete the sentence “IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell.” all together or add "may include". .	
Likes 0	
Dislikes 0	
Response	
Has been removed, and added “may include but not limited to” language in the technical rationale.	
Marty Hostler - Northern California Power Agency - 4	
Answer	No
Document Name	
Comment	

BES needs to be included in the Definition. We already have experience with regulators making up their own interpretation when "BES" is not included. For example, in CIP-002-5.1a IRC 2.11 Auditors claim since BES is not before the word generation, GOP's must include non-BES generation in their Control Center assessments. Even though a GOP can not possibly perform a GOP functional obligation for a non-BES generator, as it has no NERC functional obligations.	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Lauren Giordano - Lauren Giordano On Behalf of: Dennis Sismaet, Northern California Power Agency, 4, 6, 3, 5; Jeremy Lawson, Northern California Power Agency, 4, 6, 3, 5; Marty Hostler, Northern California Power Agency, 4, 6, 3, 5; - Lauren Giordano	
Answer	No
Document Name	
Comment	
BES needs to be included in the Definition. We already have experience with regulators making up their own interpretation when "BES" in not included. For example, in CIP-002-5.1A IRC 2.11 Auditors claim since BES is not before the word generation, GOP's must include non-BES generation in their Control Center assessments. Even though a GOP cannot possibly perform a GOP functional obligation for a non-BES generator as it has no NERC functional obligations	
Likes 0	
Dislikes 0	
Response	

The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Michael Whitney - Northern California Power Agency - 3,4,5,6	
Answer	No
Document Name	
Comment	
BES needs to be included in the Definition. We already have experience with regulators making up their own interpretation when "BES" in not included. For example, in CIP-002-5.1A IRC 2.11 Auditors claim since BES is not before the word generation, GOP's must include non-BES generation in their Control Center assessments. Even though a GOP cannot possibly perform a GOP functional obligation for a non-BES generator as it has no NERC functional obligations. Marty Hostler, Northern California Power Agency, 4, 1/8/2024	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	No
Document Name	
Comment	
WEC Energy Group supports the comments of the NAGF, the MRO NSRF and EEI.	

Likes 0	
Dislikes 0	
Response	
See EEI, NAGF, and MRO NSRF Comments.	
Stephen Stafford - Stephen Stafford On Behalf of: Greg Davis, Georgia Transmission Corporation, 1; - Stephen Stafford	
Answer	No
Document Name	
Comment	
Remove the reference for sink in the IBR definition. A sink (load) is not a resource. Consider referring to a discharging battery energy storage system (BESS).	
Likes 0	
Dislikes 0	
Response	
Language removed and clarified within the technical rationale.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1	
Answer	No
Document Name	
Comment	
AEPC signed on to ACES comments:	

It is ACES' viewpoint that the proposed definitions are a welcome step towards better defining what is inherently a somewhat nebulous concept. While we can appreciate the approach taken by the Drafting Team, we believe further refinement is necessary. We would like to specifically emphasize our agreement with the 3rd bullet point of the "Background" section. We believe that it is imperative that the industry adopt specific definitions to distinguish between an individual "IBR unit" and the "IBR plant/facility as a whole" thereby allowing each SDT the flexibility to draft each individual standard or requirement with the correct scope for each. While we agree that creating distinct definitions is the correct method to clearly define these resource types, it is our interpretation that the currently proposed IBR definition does not align with this stated approach. It is our opinion that the first sentence of the IBR definition is redundant to the IBR unit definition and should be struck.

Furthermore, we do not believe that the IBR definition should be limited by a specific listing of technologies as is done in the last sentence of the definition. The last sentence of the 6th bullet point in the background section states:

- "The DT's intent with the phrase "IBRs include" is to articulate a specific list of IBRs. Therefore, other technologies not listed would not be considered an IBR."

It is our perspective that if a specific list of applicable technologies is required to clearly define this term, then the rest of the definition is moot and can be eliminated. In other words, rather than providing a definition and an all-inclusive list of applicable technologies, why not simply provide an all-inclusive list? We believe this approach needlessly limits the IBR definition to current technologies in common use and does not allow enough flexibility for future technological growth nor changes in industry trends.
It is our recommendation that the IBR definition be modified as follows:

- "One or more IBR Unit(s), operated as a single resource at a common point of interconnection, connected to the electric power system (transmission, sub-transmission, or distribution system).
- IBRs may include, but are not limited to, any combination of one or more of the following installation types: solar photovoltaic (PV), wind turbine, battery energy storage system, and fuel cell."

Likes 0	
Dislikes 0	

Response

SDT Agrees and language has been modified with clarification added to the technical rationale.

List has been removed from the language and added to the technical rationale with “may include but not limited to” language.	
Tammy Porter - Tammy Porter On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Tammy Porter	
Answer	No
Document Name	
Comment	
We are in agreement with other comments that, although the applicability section of MOD-026-2 limits resources set by the NERC I4 BES definition, the proposed IBR definition needs to clearly state that it aligns with the NERC I4 BES definition. The current definition may imply that each IBR, ranging from roof top solar to large dispatchable units, would fall under future NERC standards whose applicability does not explicitly include the NERC I4 BES definition. It would be a costly undertaking for a larger utility to include all connected IBR units outside the I4 BES definition. In short, the applicability scope of MOD-026-2 is directed toward NERC’s I4 BES definition, and the IBR definition need to reflect this boundary as well. Also, to better incorporate the industry recommendation to use other defined terms when possible, such as Real Power, we recommend replacing “electric power” to “Real Power.”	
Likes 0	
Dislikes 0	
Response	
The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.	
Alan Kloster - Alan Kloster On Behalf of: Jeremy Harris, Evergy, 3, 5, 1, 6; Kevin Frick, Evergy, 3, 5, 1, 6; Marcus Moor, Evergy, 3, 5, 1, 6; Tiffany Lake, Evergy, 3, 5, 1, 6; - Alan Kloster	
Answer	No
Document Name	
Comment	

Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI), MRO NSRF and the NAGF reasons for not supporting the proposed definition for question #1. Evergy also humbly submits the following proposed definition for the drafting teams consideration:

Inverter-Based Resource - A generating resource or an energy storage system that relies on power electronic interfaces (inverter**s**, converter**s**, etc.) to deliver electric power to a common point of interconnection.

Likes 0	
Dislikes 0	

Response

Please see EEI, NAGF, and MRO-NSRF comments.

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

Answer	No
Document Name	

Comment

The NAGF does not support the proposed IBR definition draft #1 for the following reasons:

a. It is unclear if the proposed IBR definition draft #1 would make a three (3) unit IBR generating plant a single Inverter-Based Resource or multiple Inverter-Based Resources. A 2x1 synchronous combined cycle gas plant has three generating units that can be controlled separately. Inverter-based resources may also be structured and controlled as distinct units behind a common point of interconnection. When this occurs, these separately controlled groups of inverters are considered generating units within a single plant.

b. Recommend removing the parenthetical narrative “(transmission, sub-transmission, and distribution system).

c. Recommend deleting the last sentence of the proposed IBR definition draft #1. It appears that any type of inverter not listed is excluded. While at this time the list may be complete, there will be different types of inverter resources in the future that are applicable under the IBR definition. The NAGF recommends the following alternative definition for IBR: **Inverter-Based Resource (IBR):** A source (or sink in the case of a charging battery energy storage system (BESS)) of electric power that consists of one or more IBR Unit(s) at a common point of interconnection.	
Likes 0	
Dislikes 0	
Response	
a. IBR Definition would include these projects dependent on how they were operated. Either they would be separate IBR's or one whole IBR. It would depend on the circumstance, but the definition would cover it in either case. b. Language removed from the definition, and further clarified in the technical rationale. c. SDT Agrees and has moved this list to the technical rationale with "May include but not limited to" language.	
Selene Willis - Edison International - Southern California Edison Company - 5	
Answer	No
Document Name	
Comment	
"See comments submitted by the Edison Electric Institute"	
Likes 0	
Dislikes 0	
Response	
Please see response to EEI.	

Kenya Streeter - Edison International - Southern California Edison Company - 1,3,5,6	
Answer	No
Document Name	
Comment	
See comments submitted by the Edison Electric Institute	
Likes 0	
Dislikes 0	
Response	
Please see response to EEI comments.	
Daniela Atanasovski - APS - Arizona Public Service Co. - 1	
Answer	No
Document Name	
Comment	
AZPS supports the following comments that were submitted by EEI on behalf of its members: EEI appreciates the efforts to develop the proposed IBR definition, however, we do not support the definition as currently written. Our concerns include the specificity in the technology types covered in the proposed definition, noting that NERC definitions should be technology agnostic. Also, as written the definition seems to cast an overly broad net relative to the size and voltage class for the IBR resources yielding insufficient regulatory clarity necessary for entities to apply the definition in any meaningful way. While the definition is not intended to identify specific resource applicability, it still should be clear enough to provide a regulatory floor as it relates to NERC Reliability Standards.	

To address these concerns, either the IEEE definition of IBRs, as defined in IEEE 2800-2022 (IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems, See Section 3, page 31) or the informal definition of IBRs as proposed by the FERC Commission on Nov. 17, 2023 should be leveraged.

EEI further notes that the Project 2022-02 SDT has already attempted to define DERs separately within that project and while these resources are also inverter based, they represent a specific class of IBRs that are directly connected to the distribution system and in many cases serve a very different purpose outside of supporting the reliability of the Bulk Power System and therefore should be defined separately.

Likes 0	
Dislikes 0	

Response

Please see response to EEI comments.

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

Answer	No
Document Name	

Comment

EEI appreciates the efforts to develop the proposed IBR definition, however, we do not support the definition as currently written. Our concerns include the specificity in the technology types covered in the proposed definition, noting that NERC definitions should be technology agnostic. Also, as written the definition seems to cast an overly broad net relative to the size and voltage class for the IBR resources yielding insufficient regulatory clarity necessary for entities to apply the definition in any meaningful way. While the definition is not intended to identify specific resource applicability, it still should be clear enough to provide a regulatory floor as it relates to NERC Reliability Standards.

To address these concerns, either the IEEE definition of IBRs, as defined in IEEE 2800-2022 (IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems, See Section 3, page 31) or the informal definition of IBRs as proposed by the FERC Commission on Nov. 17, 2023 should be leveraged.

EEI further notes that the Project 2022-02 SDT attempted to define DERs separately within that project. While these resources are also inverter based, they represent a specific class of IBRs that are directly connected to the distribution system and in many cases serve a different purpose outside of supporting the reliability of the Bulk Power System and therefore should be defined separately.	
Likes 0	
Dislikes 0	
Response	
Please see the first part of the Technical Rationale. This is the approach used by the DT in the IBR and IBR Unit definitions. The IBR definition is written in such a way that an IBR is defined based on its technology and not its voltage connection level or size (MVA). This is stated in the Technical Rationale. Additionally, a DER can include IBR technologies plus other generators that are not inverter-based.	
Dwanique Spiller - Berkshire Hathaway - NV Energy - 5	
Answer	No
Document Name	
Comment	
The phrase "**that is connected to the electric power system (transmission, sub-transmission, or distribution)**" needs to be removed. Language is unnecessary. The sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** Should be deleted. When possible, language used in standards and definitions should be technology neutral. If a resource would otherwise meet the criteria for being classified as an IBR, the specific device type should not be taken into consideration as a means of exclusion. Any resource that meets the inclusion criteria of Bulk Electric System should be subject to the appropriate reliability standards, regardless of specific device type. This is important for ensuring that standards and associated language have the necessary flexibility to adapt to future technology and changing resource mixes. Additionally, while the Standard Drafting Team's intent in this being a closed list is stated in the Technical	

Rationale, the writing of this sentence does not clearly convey that intent, as “includes” has been interpreted to be both limiting and non-limiting in various jurisdictions.	
Likes 0	
Dislikes 0	
Response	
• Has been removed, and language added to the technical rationale to clarify. • Has been removed, and language added to the technical rationale to clarify.	
Gail Elliott - Gail Elliott On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Gail Elliott	
Answer	No
Document Name	
Comment	
ITC supports the comments provided by MRO NSRF	
Likes 0	
Dislikes 0	
Response	
Please see MRO NSRF comments.	
Rachel Coyne - Texas Reliability Entity, Inc. - 10	
Answer	No
Document Name	
Comment	

Texas RE is concerned that the proposed definition of IBR Unit does not account for Reactive Power capabilities required to maintain BPS reliability. Since, all Inverter-based Resources (IBR) shall be capable of providing dynamic reactive power support to the grid to maintain voltage stability, Texas RE recommends the definition of IBR Unit be revised to include Reactive Power capabilities required to maintain BPS reliability.

According to the background section, the IBR definition should not designate the location of the resource connection. The verbiage of the definition, however, indicates that it is connected to the electric power system (transmission, sub-transmission, or distribution). Texas RE recommends removing the reference to transmission, sub-transmission, and distribution.

Likes 0	
Dislikes 0	

Response

SDT does not specifically include reactive power in order to remove any confusion about whether or not FACTS devices would be included. The IBR definition is meant to only apply to generation type resources.

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

Answer	No
Document Name	

Comment

WECC suggests that the drafting team attempt to not include one-off technology-based language within the definition (i.e., “sink” phrase). Essentially, batteries, in order to charge and discharge, have bi-directional converters (AC to DC when charging and DC to AC when discharging.) Using “IBR” as part of the definition of IBR even as a descriptor of the unit type is somewhat circular. The phrase “operated as a single resource at a common point of interconnection” may be troublesome as there are configurations where devices connect to separate systems and then those systems make multiple connections (both to sub-transmission and in some cases transmission level voltages.) There should not be a loophole for compliance built into a definition (if a company puts two connections to separate parts of a station there will be the discussion about applicability of the definition.) Additionally, if there are multiple owners with multiple strings of IBRS but collect to a single GSU and a single point of interconnection, there could be confusion regarding joint-

owned and responsibilities OR there could be the argument that it is not a single resource and does not meet the definition. WECC suggests the following definition:"

Inverter-Based Resource (IBR)- A dispersed power producing resource that uses equipment explicitly for the transformation of current flow from DC to AC, AC to DC, or some combination thereof including, but not limited to, solar photovoltaic (PV), Type 3 wind, Type 4 wind, battery energy storage system (BESS) and fuel cell technologies or combinations of said technologies."

Likes 0	
Dislikes 0	

Response

Language has been removed and clarification has been added to the technical rational about BESS, voltage class, and other applicability concerns.

Shannon Mickens - Shannon Mickens On Behalf of: Joshua Phillips, Southwest Power Pool, Inc. (RTO), 2; - Shannon Mickens, Group Name SPP RTO

Answer	No
Document Name	

Comment

SPP has a concern that the proposed definition for Inverter-Based Resource (IBR) creates confusion on how to identify the resource as well as define the responsibility. The initial draft for IBRs focused around the inclusion of the Power Electronic Device (PED) while the recent version includes language pertaining to a source/sink. From our perspective, the latest version (including source/sink) doesn't create a clear and concise picture defining the definition. Moreover, those terms are more associated with Transmission Service Request (TSR) that allows a utility to allocate physical capacity in the form of transmission service rights (TSRs) for the transmission of electric power.

SPP recommends that the drafting team considers removing the terms "source and sink" from the proposed definition and replaced them with language that aligns with their purpose (proposed language shown below).

From our perspective, the proposed IBR definition doesn't include language showing what a facility/plant is and the difference in reference to an IBR unit (device) as noted in the rationale language.

Inverter-Based Resource (IBR): A generation (plant) (or load (storage facility) in the case of a charging battery energy storage system (BESS)) of electric power that is connected to the electric power system (transmission, sub-transmission, or distribution system), and that consists of one or more IBR Unit(s) operated as a single resource at a common point of interconnection. IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell.

Likes 0	
Dislikes 0	

Response

The SDT agrees and this language has been removed from the definition and added to the technical rationale with further clarification

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

Answer	No
Document Name	

Comment

Comments: It is ACES' viewpoint that the proposed definitions are a welcome step towards better defining what is inherently a somewhat nebulous concept. While we can appreciate the approach taken by the Drafting Team, we believe further refinement is necessary.

We would like to specifically emphasize our agreement with the 3rd bullet point of the "Background" section. We believe that it is imperative that the industry adopt specific definitions to distinguish between an individual "IBR unit" and the "IBR plant/facility as a whole" thereby allowing each SDT the flexibility to draft each individual standard or requirement with the correct scope for each.

While we agree that creating distinct definitions is the correct method to clearly define these resource types, it is our interpretation that the currently proposed IBR definition does not align with this stated approach. It is our opinion that the first sentence of the IBR definition is redundant to the IBR unit definition and should be struck.

Furthermore, we do not believe that the IBR definition should be limited by a specific listing of technologies as is done in the last sentence of the definition. The last sentence of the 6th bullet point in the background section states: “The DT’s intent with the phrase "IBRs include" is to ariculate a specific list of IBRs. Therefore, other technologies not listed would not be considered an IBR.” It is our perspective that if a specific list of applicable technologies is required to clearly define this term, then the rest of the definition is moot and can be eliminated. In other words, rather than providing a definition and an all-inclusive list of applicable technologies, why not simply provide an all-inclusive list? We believe this approach needlessly limits the IBR definition to current technologies in common use and does not allow enough flexibility for future technological growthnor changes in industry trends. It is our recommendation that the IBR definition be modified as follows: “One or more IBR Unit(s), operated as a single resource at a common point of interconnection, connected to the electric power system (transmission, sub-transmission, or distribution system). IBRs may include, but are not limited to, any combination of one or more of the following installation types: solar photovoltaic (PV), wind turbine, battery energy storage system, and fuel cell.”	
Likes 0	
Dislikes 0	
Response	
IBRs include, but are not limited to, any combination of one or more of the following: solar photovoltaic (PV), wind turbine (Type 3&4), battery energy storage system, and fuel cell.”	
LaTroy Brumfield - American Transmission Company, LLC - 1	
Answer	No
Document Name	
Comment	

ATC mostly agrees with the MRO NSRF's comment on this matter.

ATC agrees with the MRO NSRF that the phrase "**that is connected to the electric power system (transmission, sub-transmission, or distribution)**" should be removed as the highlighted language is unnecessary.

ATC also agrees with the MRO NSRF that the sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** should be deleted. When possible, language used in standards and definitions should be technology neutral.

However, ATC believes that the IBR definition should not explicitly include applicability considerations within the definition itself, but that should be left within the Applicability section of each standard. ATC does not believe the IBR definition should reference the BES definition as even the BES definition may shift and change to accommodate the new IBR-GO and IBR-GOP thresholds being considered. This may have unintended consequences for the IBR definition down the line.

Likes 0	
Dislikes 0	

Response

Please see MRO-NSRF Comments.

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

Answer	No
Document Name	

Comment

The ISO RTO Council (IRC) Standards Review Committee (SRC) believes the definition does not fully align with the intent described in the background material provided with the definition. Specifically, the proposed definition does not appear to fully include "the equipment designed primarily for delivering the power to a common point of interconnection . . . ." Additionally, it seems to be unnecessary for the definition to include a BESS-specific parenthetical since the proposed definition of IBR Unit already addresses energy storage systems. Additionally, new technologies may emerge that include devices that are not capable of storing energy in batteries, but are capable of functioning as both a source and a sink of electric power, and it would be inappropriate for the definition to exclude these devices if they

otherwise meet the definition of an IBR. We also believe it is unnecessary for the proposed IBR definition to reference specific fuel sources such as solar photovoltaic and wind. The type of fuel used is not the defining characteristic of IBRs, and the definition should not be limited to currently known fuel types and configurations.

Finally, it is unnecessary to specify that the IBR interconnection point is transmission, sub-transmission and distribution. The applicability of the IBR requirements is defined by the BES definition and distribution level applicability through the NERC Rules of Procedure. Any changes to applicability would require a change in the term if these are included. Consequently, the BESS-specific parenthetical should be removed from the definition of IBR and the definition be further revised to read as follows:

Inverter-Based Resource (IBR): A source of electric power that is connected to the electric power system, and that consists of one or more IBR Unit(s) operated as a single resource at a common point of interconnection. An IBR consists of the IBR Unit(s), and the equipment designed primarily for delivering the power to a common point of interconnection (e.g., step-up transformers, collector system(s), main power transformer(s), power plant controller(s), reactive resources within the IBR plant, and a voltage source converter high-voltage direct current (VSC HVDC) system with a dedicated connection to the IBR). A Battery Energy Storage System (BESS) operating in charging mode, acting as a sink of electrical energy, is considered an IBR.

Likes 0	
Dislikes 0	

Response

- Language has been added to the technical rationale to further clarify that this equipment is part of the IBR.
- Language was removed and clarification in the technical rational has been added.
- The updated definition stays silent on the applicability. In general, the SDT believes an IBR is an IBR regardless of the voltage class it is connected to or the size. This is further described in the technical rationale.

Elizabeth Davis - Elizabeth Davis On Behalf of: Thomas Foster, PJM Interconnection, L.L.C., 2; - Elizabeth Davis

Answer	No
Document Name	

Comment

Please reference IRC SRC comments. Thank you.	
Likes 0	
Dislikes 0	
Response	
Please see IRC-SRC response.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. - 2	
Answer	No
Document Name	
Comment	
ERCOT joins the comments submitted by the ISO/RTO Council (IRC) Standards Review Committee (SRC) and adopts them as its own.	
Likes 0	
Dislikes 0	
Response	
Please see IRC-SRC response.	
Robert Blackney - Edison International - Southern California Edison Company - 1	
Answer	No
Document Name	
Comment	
See comments submitted by the Edison Electric Institute (EEI).	

Likes 0	
Dislikes 0	
Response	
Please see EEI response.	
Patricia Lynch - NRG - NRG Energy, Inc. - 5	
Answer	No
Document Name	
Comment	

NRG is in support of the NAGF comments concerning the proposed definition of IBR as:

a. It is unclear if the proposed IBR definition draft #1 would make a three (3) unit IBR generating plant a single Inverter-Based Resource or multiple Inverter-Based Resources. A 2x1 synchronous combined cycle gas plant has three generating units that can be controlled separately. Inverter-based resources may also be structured and controlled as distinct units behind a common point of interconnection. When this occurs, these separately controlled groups of inverters are considered generating units within a single plant.

b. Recommend deleting the last sentence of the proposed IBR definition draft #1. It appears that any type of inverter not listed is excluded. While at this time the list may be complete, there will be different types of inverter resources in the future that are applicable under the IBR definition.

As proposed by NAGF, an alternate definition for IBR can include the following:

Inverter-Based Resource (IBR): *A source (or sink in the case of a charging battery energy storage system (BESS)) of electric power that consists of one or more IBR Unit(s) at a common point of interconnection.*

Likes 0	
Dislikes 0	
Response	

a. IBR Definition would include these projects dependent on how they were operated. Either they would be separate IBR's or one whole IBR. It would depend on the circumstance, but the definition would cover it in either case.
b. Language removed ,and added to the technical rational with further clarification

Thomas Foltz - AEP - 5	
Answer	Yes
Document Name	
Comment	
While AEP does not object to the definition as proposed, we would like to suggest the drafting team to consider revising it as follows: IBR Unit: An individual device, or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that *functionally integrate* at a *delivery* point on the collector system.	
Likes 0	
Dislikes 0	
Response	

Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
BC Hydro requests that SDT clarify whether the last sentence, which only appears to serve as examples, is intended to convey any additional material criteria to the application of the proposed definition.	

Using the “connected to electric power system” in the definition appears to further qualify IBRs; however, as “electric power system” is not a defined term, this wording may only result in unnecessary applicability interpretations. BC Hydro suggests that the applicability to specific reliability standards be kept outside the IBR definition (such as within the Facility section of Standards), or further define the criteria that would make an inverter-based resource an IBR for the purpose of the NERC standards applicability.	
Likes 0	
Dislikes 0	
Response	
Change made. A clarifying phrase “but not limited to” was added. A list of example IBRs were added to the Technical Rationale.	
Alison MacKellar - Constellation - 5	
Answer	Yes
Document Name	
Comment	
Constellation has no additional comments. Alison Mackellar on behalf of Constellation Segments 5 and 6.	
Likes 0	
Dislikes 0	
Response	
Kimberly Turco - Constellation - 6	

Answer	Yes
Document Name	
Comment	
Constellation has no additional comments Kimberly Turco on behald of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
Anna Todd - Southern Indiana Gas and Electric Co. - 3,5,6 - RF	
Answer	Yes
Document Name	
Comment	
N/A	
Likes 0	
Dislikes 0	
Response	
Daniel Gacek - Exelon - 1	
Answer	Yes
Document Name	

Comment	
While Exelon supports the proposed definition, we support the questions presented in the EEI comments.	
Likes 0	
Dislikes 0	
Response	
Thank you for the support and please see response to EEI comments.	
Colby Galloway - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name Southern Company	
Answer	Yes
Document Name	
Comment	
Southern Company suggests that additional clarification could be provided to further indicate that this definition is intended to apply to an entire facility or electric power producing plant.	
Likes 0	
Dislikes 0	
Response	
See updated Technical Rationale.	
Joshua London - Eversource Energy - 1, Group Name Eversource	
Answer	Yes
Document Name	
Comment	

The sentence "**IBRs include solar photovoltaic (PV), Type 3 and Type 4 wind, BESS, and fuel cell."** should be deleted or edited to say "Examples of IBRs include". Definitions should not require the statement of specific technologies for an individual to understand that those technologies fall under the definition as doing so may lead a reader to believe only those specific technologies are in-scope. If you want to provide examples, then it should be stated that way.	
Likes 0	
Dislikes 0	
Response	
Definition is updated. See Table in Technical Rationale.	
Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name NPCC RSC	
Answer	Yes
Document Name	
Comment	
NPCC RSC supports the definition for IBR as proposed.	
Likes 0	
Dislikes 0	
Response	
Russell Jones - Invenergy LLC - 5	
Answer	Yes
Document Name	
Comment	

Invenergy supports the spirit of the definition proposed and does not offer any substantive changes. We do, however, have concerns about the application of this definition to various reliability standards going forward. More specifically, Invenergy believes the drafting team should consider how this broad definition will be applied in specific Reliability Standard requirements to different roles (transmission, sub-transmission, distribution) and different technologies (PV, Type 3 and Type 4 wind, BESS, and fuel cell) where nuance may be required to account for technological limitations or differences.	
Likes 0	
Dislikes 0	
Response	
Colin Chilcoat - Invenergy LLC - 6	
Answer	Yes
Document Name	
Comment	
Invenergy supports the spirit of the definition proposed and does not offer any substantive changes. We do, however, have concerns about the application of this definition to various reliability standards going forward. More specifically, Invenergy believes the drafting team should consider how this broad definition will be applied in specific Reliability Standard requirements to different roles (transmission, sub-transmission, distribution) and different technologies (PV, Type 3 and Type 4 wind, BESS, and fuel cell) where nuance may be required to account for technological limitations or differences.	
Likes 0	
Dislikes 0	
Response	
If there are nuances that need to be addressed for each standard or technology, then those need to be made in the respective standard. Additionally, more Technical Rationale and Implementation Guidance can be created in the future as industry and the ERO learn more about the application and implementation of the terms.	

Kinte Whitehead - Exelon - 1,3	
Answer	Yes
Document Name	
Comment	
While Exelon supports the proposed definition, we support the question presented in the EEI comments.	
Likes 0	
Dislikes 0	
Response	
Please see response to EEI comments.	
Constantin Chitescu - Ontario Power Generation Inc. - 5	
Answer	Yes
Document Name	
Comment	
OPG supports NPCC Regional Standards Committee’s comments.	
Likes 0	
Dislikes 0	
Response	
Diane E Landry - Public Utility District No. 1 of Chelan County - 1, Group Name CHPD	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Cain Braveheart - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Mike Magruder - Avista - Avista Corporation - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Stephen Whaite - Stephen Whaite On Behalf of: Lindsey Mannion, ReliabilityFirst , 10; - Stephen Whaite, Group Name ReliabilityFirst Ballot Body Member and Proxies	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	Yes
Document Name	

Comment	
Likes 0	
Dislikes 0	
Response	
Jesus Sammy Alcaraz - Imperial Irrigation District - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Diana Aguas - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Matt Lewis - Lower Colorado River Authority - 1,5	
Answer	Yes

Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Nikki Carson-Marquis - Nikki Carson-Marquis On Behalf of: Theresa Allard, Minnkota Power Cooperative Inc., 1; - Nikki Carson-Marquis	
Answer	
Document Name	
Comment	
No. Minnkota Power Cooperative supports comments by ACES and the MRO New Standard Review Forum (NSRF). MPC believes the IBR definition should be technology-neutral and should avoid listing examples within the final definition.	
Likes 0	
Dislikes 0	
Response	
Please see response to ACES and MRO NSRF comments.	

2. *Do you support the definition for IBR Unit as proposed, or with non-substantive changes? If you do not support the definition as proposed, please explain the changes that, if made, would result in your support*.

Patricia Lynch - NRG - NRG Energy, Inc. – 5	
Answer	No
Document Name	
Comment	

NRG is in support of the NAGF comments that has been submitted regarding this proposed definition:

The NAGF does not support the proposed IBR Unit definition draft #1 for the following reasons:

a. Utilizing the term IBR Unit to refer to a single inverter within the generating plant will cause significant confusion at the plant level. Unless any instruction provided to the plant is written, then it will not be clear if the term IBR Unit is the defined term used by NERC or if it is intended to mean the generating unit (Unit 1, 2 or 3), IBR unit. This level of potential confusion is unacceptable resulting in an unacceptable risk of the BES being misoperated. The word "unit" has long been associated with a distinct operating segment of a plant. For this reason, the NAGF does not support the use of the term unit to mean anything less than the dispatchable grouping of inverters.

The NAGF recommends the following alternative definition for IBR Unit:

***IBR Unit:** All or part of an Inverter-Based Resource that is operated as a single resource. An IBR Unit may consist of one or more IBR Devices.*

In addition, the NAGF recommends the creation of the definition for IBR Device:

***IBR Device:** An individual device, or a grouping of multiple devices, (including equipment connected to the DC terminal of the inverter) that includes power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that connects at a single point on the collector system.*

These proposed alternative definitions will enable applicable NERC standards to be clear when a protection device or modeling information is needed at the device or unit level without causing confusion. While normally the use of the IEEE definition would be supported, in this case it is likely to cause more problems and uncertainty for the industry.

Likes 0	
Dislikes 0	

Response:	
While the definition of IBR Unit is aligned with the IEEE 2800 definition, it will only apply to NERC standards. It is further not a term that needs to be used between Transmission Operators and IBR plant personnel. The proposed IBR Unit definition is necessary if standard requirements need to be applied at the individual inverter level instead of the plant/facility as a whole. The definition of IBR Device given above cannot be distinguished from the proposed definition of IBR Unit.	
Robert Blackney - Edison International - Southern California Edison Company – 1	
Answer	No
Document Name	
Comment	
See comments submitted by the Edison Electric Institute (EEI).	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Kennedy Meier - Electric Reliability Council of Texas, Inc. – 2	
Answer	No
Document Name	
Comment	
ERCOT joins the comments submitted by the IRC SRC and adopts them as its own.	
Likes 0	
Dislikes 0	
Response:	

Please see the SDT's reply to IRC SRC comments.	
Elizabeth Davis - Elizabeth Davis On Behalf of: Thomas Foster, PJM Interconnection, L.L.C., 2; - Elizabeth Davis	
Answer	No
Document Name	
Comment	
Please reference IRC SRC comments. Thank you.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to IRC SRC comments.	
Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	No
Document Name	
Comment	
The IRC SRC believes that the definition should be revised to clarify that the phrase "and that connect together at a single point on the collector system" is only intended to apply to "a grouping of multiple devices" and not to "an individual device." The definition should be revised to read as follows: **IBR Unit:** An individual device that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system **or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system and delivering that power at a common point**.	
Likes 0	

Dislikes 0	
Response:	
The IBR Unit definition has been expanded to better distinguish between individual inverter devices and groupings of inverter devices according to the comment.	
LaTroy Brumfield - American Transmission Company, LLC - 1	
Answer	No
Document Name	
Comment	
ATC supports the comments of the MRO NSRF indicating that two separate definitions are not needed, and the use of the term facility or plant can be used to differentiate between the IBR and the IBR facility.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to MRO NSRF comments.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	No
Document Name	
Comment	
Similar to our interpretation of the IBR definition, as stated above, we believe the currently proposed IBR Unit definition contains superfluous language that overlaps the proposed IBR definition and should be modified. It is our opinion that the IBR unit definition should utilize a standalone technologically agnostic approach. Therefore, we are in favor of removing all references to multiple devices within this single	

unit definition. We recommend that the IBR Unit definition be modified as follows: "An individual device that uses a power electronic interface(s), such as an inverter or converter, that is capable of exporting Real Power from a primary energy source or energy storage system."	
Likes 0	
Dislikes 0	
Response:	
No change. Examples of groupings of inverter devices that should each be understood as an IBR Unit as distinct from an IBR plant/facility have been added to the technical rationale.	
Shannon Mickens - Shannon Mickens On Behalf of: Joshua Phillips, Southwest Power Pool, Inc. (RTO), 2; - Shannon Mickens, Group Name SPP RTO	
Answer	No
Document Name	
Comment	
SPP has a concern in reference to the proposed definition for the IBR Unit. We understand that the drafting team used definitions from the IEEE 1547 and 2800 Standards to structure the proposed definition. However, there is the concern that the drafting team has not created enough rationale language defining the components of an actual IBR device. In our evaluation, we noticed that the IBR definition in the IEEE 2800 Standard mentions that an IBR Device is "a *collector system* or *supplemental".* From our perspective, there will need to be some clarity placed around the definition of an IBR device. With that said, SPP recommends that the drafting team considers creating a definition for the term "IBR Device" as well as provide a list of those types of elements to help ensure there is a clear and concise distinction of an IBR Unit and IBR Device.	
Likes 0	
Dislikes 0	

Response:	
The SDT is not defining an IBR device because it would only end up being synonymous with IBR Unit for any usage in NERC standards. Examples of groupings of inverter devices that should each be understood as an IBR Unit as distinct from an IBR plant/facility have been added to the technical rationale to help clarify.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC	
Answer	No
Document Name	
Comment	
The definitions does not address Reactive Power. The phrase "that connect together at a single point on the collector system" may be troublesome as there are configurations where devices connect to separate systems and then those systems make multiple connections (both to sub-transmission and in some cases transmission level voltages.) As indicated in our response to question 1, there should not be a loophole for compliance built into a definition. In the December 5 presentation, if there are two owners of the two sets of IBR Units, are there two IBRs or one IBR that is co-owned/jointly-owned? "IBR" in the presentation provided December 5, slide 10 appears to indicate the inverter banks and the power source are part of the BES but slide 7 only calls out the inverters as an IBR Unit. The SDT needs to clarify if the primary energy source is part of the IBR Unit (thus part of the BES) to help ensure consistency by industry when used in a Standard. For instance- are freeze protection measures only for the inverter or the inverter and the primary energy source? Slide 8 clearly reveals more details than the definition of IBR states and does not support the BES definition clearly.	
Likes 0	
Dislikes 0	
Response:	
Reactive power is not a defining characteristic of either an IBR or IBR Unit so it does not need to be stipulated in the definitions. An IBR may or may not be capable of producing reactive power. As stated in the technical rationale, IBR and IBR Unit are defined by technology type and not by ownership or what system they may be connected to or whether they may be considered BES or not.	
Rachel Coyne - Texas Reliability Entity, Inc. – 10	
Answer	No

Document Name	
Comment	
Texas RE is concerned the current verbiage of IBR Unit does not include the capabilities for absorbing or delivering reactive power which is essential for electric system operations. Texas RE recommends the following verbiage: IBR Unit: An individual device, or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power and capable of providing dynamic Reactive Power support from a primary energy source or energy storage system, and that connect together at a single point on a collector system.	
Likes 0	
Dislikes 0	
Response:	
Essential as it may be, reactive power is not a defining characteristic of either IBR or IBR Unit so it does not need to be stipulated in the definitions. There may be IBR Units not capable of providing reactive power that should still be classified as IBR Units if other stipulations are met.	
Gail Elliott - Gail Elliott On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Gail Elliott	
Answer	No
Document Name	
Comment	
ITC supports the comments provided by MRO NSRF	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to MRO NSRF comments.	

Dwanique Spiller - Berkshire Hathaway - NV Energy – 5	
Answer	No
Document Name	
Comment	
There should not be two separate definitions. IBR should be defined to address the resource itself. The term facility{C}[1] can be included when necessary to refer to a group of IBRs and the equipment associated with the group. This is the how Standards and associated language address synchronous resources and is easily understood and applied.	
Likes 0	
Dislikes 0	
Response:	
The proposed definitions are both necessary because NERC standard requirements may need to be applied at both the individual inverter level and the plant/facility as a whole.	
Mark Gray - Edison Electric Institute - NA - Not Applicable - NA - Not Applicable	
Answer	No
Document Name	
Comment	
We do not support the proposed definition for IBR unit. Given the linkage between IBR and IBR Unit, we cannot support this definition until the core IBR definition is resolved.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI's comment under Q1.	

Daniela Atanasovski - APS - Arizona Public Service Co. – 1	
Answer	No
Document Name	
Comment	
AZPS supports the following comments that were submitted by EEI on behalf of its members: We do not support the proposed definition for IBR unit. Given the linkage between IBR and IBR Unit, we cannot support this definition until the core IBR definition is resolved.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Kenya Streeter - Edison International - Southern California Edison Company - 1,3,5,6	
Answer	No
Document Name	
Comment	
See comments submitted by the Edison Electric Institute	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Selene Willis - Edison International - Southern California Edison Company - 5	

Answer	No
Document Name	
Comment	
"See comments submitted by the Edison Electric Institute"	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Wayne Sipperly - North American Generator Forum - 5 - MRO,WECC,Texas RE,NPCC,SERC,RF	
Answer	No
Document Name	
Comment	

The NAGF does not support the proposed IBR Unit definition draft #1 for the following reasons:

a. Utilizing the term IBR Unit to refer to a single inverter within the generating plant will cause significant confusion at the plant level. Unless any instruction provided to the plant is written, then it will not be clear if the term IBR Unit is the defined term used by NERC or if it is intended to mean the generating unit (Unit 1, 2 or 3), IBR unit. This level of potential confusion is unacceptable resulting in an unacceptable risk of the BES being misoperated. The word "unit" has long been associated with a distinct operating segment of a plant. For this reason, the NAGF does not support the use of the term unit to mean anything less than the dispatchable grouping of inverters.

The NAGF recommends the following alternative definition for IBR Unit:

IBR Unit: All or part of an Inverter-Based Resource that is operated as a single resource. An IBR Unit may consist of one or more IBR Devices.

In addition, the NAGF recommends the creation of the definition for IBR Device: **IBR Device:** An individual device, or a grouping of multiple devices, (including equipment connected to the DC terminal of the inverter) that includes power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that connects at a single point on the collector system. These proposed alternative definitions will enable applicable NERC standards to be clear when a protection device or modeling information is needed at the device or unit level without causing confusion. While normally the use of the IEEE definition would be supported, in this case it is likely to cause more problems and uncertainty for the industry.	
Likes 0	
Dislikes 0	
Response:	
While the definition of IBR Unit is aligned with the IEEE 2800 definition, it will only apply to NERC standards. It is further not a term that needs to be used between Transmission Operators and IBR plant personnel. The proposed IBR Unit definition is necessary if standard requirements need to be applied at the individual inverter level instead of the plant/facility as a whole. The definition of IBR Device given above cannot be distinguished from the proposed definition of IBR Unit.	
Alan Kloster - Alan Kloster On Behalf of: Jeremy Harris, Evergy, 3, 5, 1, 6; Kevin Frick, Evergy, 3, 5, 1, 6; Marcus Moor, Evergy, 3, 5, 1, 6; Tiffany Lake, Evergy, 3, 5, 1, 6; - Alan Kloster	
Answer	No
Document Name	
Comment	
Evergy supports and incorporates by reference the comments of the Edison Electric Institute (EEI), MRO NSRF and the NAGF for question #2.	
Likes 0	
Dislikes 0	

Response:	
Please see the SDT's reply to these comments.	
Tammy Porter - Tammy Porter On Behalf of: Byron Booker, Oncor Electric Delivery, 1; - Tammy Porter	
Answer	No
Document Name	
Comment	
Again we echo our previous comment in the IBR definition, chiefly that the NERC I4 BES definition needs to be explicitly stated or reflected in this definition. The labor and cost of the compliance effort would not serve the customer well if we needed to incorporate all connected IBR units outside of the I4 definition.	
Likes 0	
Dislikes 0	
Response:	
The applicability sections of NERC standards identify which IBRs and which IBR Units are subject to the standard. As stated in the technical rationale, IBR and IBR Unit are defined by technology type and not by whether they may be considered BES or not. The Glossary should not limit the applicability which may need to be extended beyond BES in some standards.	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. – 1	
Answer	No
Document Name	
Comment	
AEPC signed on to ACES comments: Similar to our interpretation of the IBR definition, as stated above, we believe the currently proposed IBR Unit definition contains superfluous language that overlaps the proposed IBR definition and should be modified. It is our opinion that the IBR unit definition should	

utilize a standalone technologically agnostic approach. Therefore, we are in favor of removing all references to multiple devices within this single unit definition. We recommend that the IBR Unit definition be modified as follows: • "An individual device that uses a power electronic interface(s), such as an inverter or converter, that is capable of exporting Real Power from a primary energy source or energy storage system."	
Likes 0	
Dislikes 0	
Response:	
No change. Examples of groupings of inverter devices that should each be understood as an IBR Unit as distinct from an IBR plant/facility have been added to the technical rationale.	
Stephen Stafford - Stephen Stafford On Behalf of: Greg Davis, Georgia Transmission Corporation, 1; - Stephen Stafford	
Answer	No
Document Name	
Comment	
The IBR Unit definition lacks clarity in the last part of the definition. GTC recommends rewording this part of the definition as follows: "An individual device, or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that are electrically connected on a collector system."	
Likes 0	
Dislikes 0	
Response:	
No change. A single point on the collector system is already stipulated in the proposed definition.	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	No
Document Name	

Comment	
WEC Energy Group supports the comments of the NAGF, the MRO NSRF and EEI.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's replies to these comments.	
Michael Whitney - Northern California Power Agency - 3,4,5,6	
Answer	No
Document Name	
Comment	
See response to question 1. BES needs to be included here too. Connected to a BES collector.	
Likes 0	
Dislikes 0	
Response:	
A glossary definition should not limit applicability of a standard. The applicability section of each standard should establish if the standard is limited to BES elements or not.	
Lauren Giordano - Lauren Giordano On Behalf of: Dennis Sismaet, Northern California Power Agency, 4, 6, 3, 5; Jeremy Lawson, Northern California Power Agency, 4, 6, 3, 5; Marty Hostler, Northern California Power Agency, 4, 6, 3, 5; - Lauren Giordano	
Answer	No
Document Name	
Comment	

See response to question 1. BES needs to be included here too. Connected to a BES collector.	
Likes 0	
Dislikes 0	
Response:	
A glossary definition should not limit applicability of a standard. The applicability section of each standard should establish if the standard is limited to BES elements or not.	
Marty Hostler - Northern California Power Agency – 4	
Answer	No
Document Name	
Comment	
See response to question 1. BES needs to be included here too. Connect to a BES collector.	
Likes 0	
Dislikes 0	
Response:	
A glossary definition should not limit applicability of a standard. The applicability section of each standard should establish if the standard is limited to BES elements or not.	
Anna Todd - Southern Indiana Gas and Electric Co. - 3,5,6 - RF	
Answer	No
Document Name	
Comment	
SIGE recommends adding Reactive Power language to the proposed definition.	

Likes 0	
Dislikes 0	
Response:	
Reactive power is not a defining characteristic of either IBR or IBR Unit, so it does not need to be stipulated in the definitions. An IBR that does not produce or absorb reactive power can still be an IBR.	
Ben Hammer - Western Area Power Administration – 1	
Answer	No
Document Name	
Comment	
There should not be two separate definitions. IBR should be defined to address the resource itself. The term F(f)acility(1) can be included when necessary to refer to a group of IBRs and the equipment associated with the group. This is the how Standards and associated language address synchronous resources and is easily understood and applied. Additionally, the use of the term unit adds potential additional confusion based on the understanding and usage of the term for synchronous generation. 1: Facility as defined in the NERC Glossary of Terms, “A set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)”	
Likes 0	
Dislikes 0	
Response:	
The proposed definitions are both necessary because NERC standard requirements may need to be applied at both the individual inverter level and the plant/facility as a whole. The SDT does not see there would be any confusion with the term “unit” as it is applied to synchronous generation as long as the IBR piece is not missing.	
Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 – SERC	
Answer	No
Document Name	

Comment	
The proposed definition includes the phrase “capable of exporting Real Power”. They can also “import” power when used as a sink for energy storage systems. They are also not limited to “Real Power” as they can also produce “Reactive Power” such as synthetic inertia.	
Likes 0	
Dislikes 0	
Response:	
Both points are true and explained in the technical rationale accompanying the proposed definitions.	
James Keele - Entergy – 3	
Answer	No
Document Name	
Comment	
Entergy recommend changing IBR Unit definition to the following. **IBR Unit:** An individual device, or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that connect together at the collector substation.	
Likes 0	
Dislikes 0	
Response:	
No change. The proposed IBR Unit definition stipulates connections to the collector system but not to the collector substation. Changing this to “collector substation” would make the proposed IBR Unit definition confused with the collector system itself.	
Jennifer Neville - Western Area Power Administration – 6	
Answer	No

Document Name	
Comment	
There should not be two separate definitions. IBR should be defined to address the resource itself. The NERC defined term "Facility" can be included when necessary to refer to a group of IBRs and the equipment associated with the group. Additionally, the use of the term unit adds potential additional confusion based on the understanding and usage of the term for synchronous generation.	
Likes 0	
Dislikes 0	
Response:	
The proposed definitions are both necessary because NERC standard requirements may need to be applied at both the individual inverter level and the plant/facility as a whole.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Rachel Schuldt, Black Hills Corporation, 5, 1, 3, 6; - Black Hills Corporation – 6	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to these comments.	
Carly Miller - Carly Miller On Behalf of: Josh Combs, Black Hills Corporation, 5, 1, 3, 6; - Carly Miller	
Answer	No

Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to these comments.	
Micah Runner - Black Hills Corporation – 1	
Answer	No
Document Name	
Comment	
Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to these comments.	
Sheila Suurmeier - Black Hills Corporation – 5	
Answer	No
Document Name	
Comment	

Black Hills Corporation supports NAGF and EEI comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to these comments.	
Srikanth Chennupati - Entergy - Entergy Services, Inc. - 1,3,5,7 – SERC	
Answer	No
Document Name	
Comment	
Entergy recommend changing IBR Unit definition to the following. **IBR Unit:** An individual device, or a grouping of multiple devices, that uses a power electronic interface(s), such as an inverter or converter, capable of exporting Real Power from a primary energy source or energy storage system, and that connect together at the collector substation.	
Likes 0	
Dislikes 0	
Response:	
No change. The proposed IBR Unit definition stipulates connections to the collector system but not to the collector substation. Changing this to "collector substation" would make the proposed IBR Unit definition confused with the collector system itself.	
Casey Perry - PNM Resources - 1,3 - WECC, Texas RE	
Answer	No
Document Name	
Comment	

PNM and TNMP supports EEI comments but also provide specific recommended changes to the IBR definition. IBR Unit: Device(s) that uses a power electronic interface(s), such as an inverter or converter, capable or exporting Real Power from a primary energy source or energy storage system, and that connect at a single point on the collector system.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group	
Answer	No
Document Name	
Comment	
There should not be two separate definitions. IBR should be defined to address the resource itself. The term F(f)acility(1) can be included when necessary to refer to a group of IBRs and the equipment associated with the group. This is the how Standards and associated language address synchronous resources and is easily understood and applied. Additionally, the use of the term unit adds potential additional confusion based on the understanding and usage of the term for synchronous generation. 1: Facility as defined in the NERC Glossary of Terms, "A set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)"	
Likes 1	Lincoln Electric System, 5, Millard Brittany
Dislikes 0	
Response:	

The proposed definitions are both necessary because NERC standard requirements may need to be applied at both the individual inverter level and the plant/facility as a whole. The SDT does not see there would be any confusion with the term “unit” as it is applied to synchronous generation as long as the IBR piece is not missing.	
Andy Thomas - DTE Energy - 1,3,5,6 - SERC,RF	
Answer	No
Document Name	
Comment	
Duke Energy provides the following guidance: Delete the proposed NERC IBR Unit definition and substitute the IEEE 2800 “IBR Unit” definition. The IEEE2800 definition is well vetted within the industry and serves the NERC intended purpose for this application.	
Likes 0	
Dislikes 0	
Response:	
No change. The proposed IBR Unit definition is essentially the same as the 2800 definition but with added clarification to stipulate exporting of Real power, association with an energy storage system, and attachment to the collector system of an IBR plant/facility.	
Ruchi Shah - AES - AES Corporation – 5	
Answer	No
Document Name	
Comment	
AES Clean Energy supports NAGF’s comments, and NAGF’s proposed definition for IBR Unit as well as creation of a new term called IBR Device.	
Likes 0	
Dislikes 0	

Response:	
Please see the SDT's reply to NAGF comments.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	No
Document Name	
Comment	
We do not support the proposed definition for IBR unit. Given the linkage between IBR and IBR Unit, we cannot support this definition until the core IBR definition is resolved.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Ryan Quint - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable, Group Name Elevate Energy Consulting	
Answer	No
Document Name	
Comment	

The drafting team has presented a good draft definition of IBR Unit but the proposed definition includes some technical issues that could create challenges, inconsistencies, and applicability challenges when used in the NERC Reliability Standards. These issues should be further vetted and considered by the drafting team for the next iteration. Potential issues include:

1. The proposed term uses "Real Power", which significantly restricts the use of the IBR definition above. In the proposed term, IBR Unit must export Real Power whereas the proposed IBR definition as a whole is defined as "electric power" (no specification of Real Power or Reactive Power). Therefore, this definition as proposed precludes STATCOMs, SVCs, and HVDC circuits from being considered IBRs in NERC standards. This will require significant clarifying language to address within every standard where these

types of inverter-based devices and technologies should be considered. As NERC has initiated projects to more directly pull in these resources to applicable standards, it would be a significant misstep to not include them in the IBR definition.
    - Note that this broader term for IBR has been used for over 7 years by NERC and is described clearly in the NERC IBR Risk Mitigation Strategy (https://www.nerc.com/comm/Documents/NERC_IBR_Strategy.pdf). Risks posed to the BPS related to IBRs are across all resource types, not just generating resources. Stability studies conducted by NERC and stakeholders following the Blue Cut Fire and Canyon 2 Fire disturbances highlighted that momentary cessation of solar PV IBRs would then cause unexpected and unwanted blocking on a major HVDC circuit in the Western Interconnection, which would subsequently cause instability, uncontrolled separation, and cascading. Ensuring reliable performance, accurate modeling, and sufficiently detailed studies of all these devices and resources is critical to reliable operation of the BPS.
    - Similarly, the phrase "from a primary energy source or energy storage system" can add some confusion as well, as it has nothing to do with the IBR Unit itself. For example, STATCOMs, SVCs, and HVDC then do not meet this definition (or only implicitly, at best), which relates to the added confusion above.
2. The proposed definition states "that connect together at a single point on the collector system," implying that the common connection must be on the collector system for all IBR Units. This is often not the case, such as with wind collector systems aggregating at the substation. Minor issue, but one that should possibly be clarified in future revision. The SDT could consider something like "that connect to single point(s) of connection through a collector system."

A definition such as the following may be more appropriate: "An individual device or a grouping of multiple devices that uses a power electronic interface(s), such as an inverter or converter."

Likes 0	
Dislikes 0	

Response:

FACTS devices and HVDC systems are deliberately excluded from both proposed definitions. If they are applicable in any standard, the standard may and should refer to them as FACTS and HVDC. The SDT believes that the general usage of the term IBR is directed to Real Power producing (or absorbing in the case of batteries) devices and did not want to depart from this understood use. As for the single point on the collector system, standards may need to apply requirements at inverter terminals instead of the POI or POM. The intent of the proposed IBR Unit definition is to facilitate such requirements. The technical rationale explains in more detail with examples how the definition is intended to be applied.

Sean Bodkin - Dominion - Dominion Resources, Inc. - 6, Group Name Dominion

Answer	No
Document Name	
Comment	
Please see previous comment.	
Likes 0	
Dislikes 0	
Response	
N/A	

Kristina Marriott - Miller Bros. Solar, LLC - 5 - MRO,WECC,Texas RE

Answer	No
Document Name	
Comment	
The DT specifically mentions the differences between inverter and converter within the Background of the proposed definition. We recommend that these "definitions" be included as part of the overall unit definition. Furthermore, converter should be its own definition. This may help the inclusion and exclusion of such units for specific standards. "An inverter is a power electronic device that inverts DC power to AC sinusoidal power. A rectifier is a power electronic device that rectifies AC sinusoidal power to DC power. A converter is a power electronic device that performs rectification and/or inversion. " Since a battery energy storage system may have both, we recommend a detailed definition of BESS unit. We do understand the initial mindset of the DT, separating these out may make it easier for future standards (Modeling, Protection studies, Performance, CIP, Maintenance, etc).	
Likes 0	
Dislikes 0	

Response:	
The SDT does not believe it is necessary to define the terms inverter, converter, and rectifier in the NERC glossary. There should be no confusion about these terms but just in case there is some uncertainty, the technical rationale has these quoted statements. Regarding the battery comment, if a battery needs to have requirements in a standard distinct from other IBRs, it may be referred to as a battery or BESS. The SDT is attempting to fulfill its charge with as few additions to the glossary as possible.	
Constantin Chitescu - Ontario Power Generation Inc. – 5	
Answer	Yes
Document Name	
Comment	
OPG supports NPCC Regional Standards Committee's comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to NPCC comments.	
Ruida Shu - Northeast Power Coordinating Council - 1,2,3,4,5,6,7,8,9,10 - NPCC, Group Name NPCC RSC	
Answer	Yes
Document Name	
Comment	
NPCC RSC supports the definition for IBR Unit as proposed.	
Likes 0	
Dislikes 0	
Response:	

Thank you.	
Colby Galloway - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name Southern Company	
Answer	Yes
Document Name	
Comment	
Southern Company understands that the IBR Unit definition is essentially addressing the power conversion device at most typical DC-to-AC type and AC-DC-AC type electric generating stations. Southern Company respectfully requests that additional examples be provided to further clarify the various configurations that typically exist at IBR facilities, including AC-DC-DC converters, solar plant string inverters, individual inverter modules, groups of modules, etc., and to, in each case, identify which parts are to be considered the IBR Unit or IBR Units. Further, Southern Company believes that this is essential based on the probable use of these definitions as seen in the use of IBR Unit in MOD-026-2 Draft 3 (Jun 2022).	
Likes 0	
Dislikes 0	
Response:	
Examples have been added to the technical rationale.	
Kimberly Turco - Constellation – 6	
Answer	Yes
Document Name	
Comment	
Constellation has no additional comments Kimberly Turco on behald of Constellation Segments 5 and 6	

Likes 0	
Dislikes 0	
Response	
Thank you.	
Alison MacKellar - Constellation – 5	
Answer	Yes
Document Name	
Comment	
Constellation has no additional comments. Alison Mackellar on behalf of Constellation Segments 5 and 6.	
Likes 0	
Dislikes 0	
Response	
Thank you.	
Michael Johnson - Michael Johnson On Behalf of: Frank Lee, Pacific Gas and Electric Company, 3, 1, 5; Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	Yes
Document Name	
Comment	
PG&E supports the IBR Unit definition.	
Likes 0	

Dislikes 0	
Response:	
Thank you.	
Duane Franke - Manitoba Hydro - 1,3,5,6 – MRO	
Answer	Yes
Document Name	
Comment	
The IEEE definition says may include unit transformer in the IBR *unit* definition. There may be some confusion when the other equipment (ex. transformer) is to be included; at the IBR unit level or IBR plant/facility level?	
Likes 0	
Dislikes 0	
Response	
Some examples of IBR Units have been added to the technical rationale. It is understood and explained that a GSU transformer stepping up from inverter level voltage to the collector system voltage may be considered a component of an IBR unit.	
Kinte Whitehead - Exelon - 1,3	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Colin Chilcoat - Invenergy LLC - 6	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Russell Jones - Invenergy LLC - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Matt Lewis - Lower Colorado River Authority - 1,5	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Teresa Krabe - Lower Colorado River Authority - 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Joshua London - Eversource Energy - 1, Group Name Eversource	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Daniel Gacek - Exelon - 1	

Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Tim Kelley - Tim Kelley On Behalf of: Charles Norton, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Foung Mua, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Kevin Smith, Balancing Authority of Northern California, 1; Nicole Looney, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Ryder Couch, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; Wei Shao, Sacramento Municipal Utility District, 3, 6, 4, 1, 5; - Tim Kelley, Group Name SMUD and BANC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Diana Aguas - CenterPoint Energy Houston Electric, LLC - 1 - Texas RE	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Donna Wood - Tri-State G and T Association, Inc. - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Tracy MacNicoll - Utility Services, Inc. - 4	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Jesus Sammy Alcaraz - Imperial Irrigation District - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Stephen Whaite - Stephen Whaite On Behalf of: Lindsey Mannion, ReliabilityFirst , 10; - Stephen Whaite, Group Name ReliabilityFirst Ballot Body Member and Proxies	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Mohamad Elhusseini - DTE Energy - Detroit Edison Company - 3,5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Adrian Andreoiu - BC Hydro and Power Authority - 1, Group Name BC Hydro	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	

Mike Magruder - Avista - Avista Corporation - 1	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Cain Braveheart - Bonneville Power Administration - 1,3,5,6 - WECC	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Diane E Landry - Public Utility District No. 1 of Chelan County - 1, Group Name CHPD	
Answer	Yes
Document Name	
Comment	

Likes 0	
Dislikes 0	
Response	
Thomas Foltz - AEP – 5	
Answer	Yes
Document Name	
Comment	
Likes 0	
Dislikes 0	
Response	
Nikki Carson-Marquis - Nikki Carson-Marquis On Behalf of: Theresa Allard, Minnkota Power Cooperative Inc., 1; - Nikki Carson-Marquis	
Answer	
Document Name	
Comment	
No. Minnkota Power Cooperative supports the reasoning provided in the ACES comments.	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to ACES comments.	

3. *Provide any additional comments for the DT to consider, if desired*.	
Duane Franke - Manitoba Hydro - 1,3,5,6 – MRO	
Answer	
Document Name	
Comment	
· The IBR definition states that an IBR can be connected to the transmission, sub-transmission, and distribution systems. However, the last bullet of the background in the IBR definition documents says that DER-related projects may or may not need to use the same definition of IBR/IBR units. It is suggested that NERC collaborate with different departments to use the same definition and to reduce confusion. · What about the IBR unit and IBR plant auxiliary equipment? Does it belong to the IBR and IBR units? More clarity is required to the IBR/IBR unit definition regarding auxiliary equipment. · It is not clear how the terms IBR & IBR Unit fit in with the term dispersed power producing resource. If an IBR is also a dispersed power producing resource, what term is MOD 26-2 going to use? IBRs or the BES inclusion term using dispersed power producing (generating) resource.	
Likes 0	
Dislikes 0	
Response	
The SDT maintains that an IBR is defined according to technology and is not defined by where it is connected or its size. The NERC Glossary must not define applicability because different standards may need wider or more restrictive applicability depending on their objectives. The applicability section of each standard is where BES or non-BES IBR applicability should be established and MOD-026 should not be setting the scope for other standards that may need to use the terms.	
Diane E Landry - Public Utility District No. 1 of Chelan County - 1, Group Name CHPD	

Answer	
Document Name	
Comment	
Further clarification requested regarding whether the definition is for IBRs applied to the BES, or for all categories of IBRs. MOD-026 currently limits scope to BES under 'Applicability' of the MOD-026 standard. However, since the new term is defined apart from the MOD-026 standard, it is recommended that BES applicability be included in the definition, so the application of the term is consistent with MOD-026 units, should the term be used elsewhere. The concern is that the term could be used beyond the scope of units defined under MOD-026 if this BES is not clarified; for example, a 1 MW PV unit connected to a distribution system would fall under the scope of the proposed definition, although it is neither BES nor in-scope under MOD-026.	
Likes 0	
Dislikes 0	
Response	
The SDT maintains that an IBR is defined according to technology and is not defined by where it is connected or its size. The NERC Glossary must not define applicability because different standards may need wider or more restrictive applicability depending on their objectives. The applicability section of each standard is where BES or non-BES IBR applicability should be established and MOD-026 should not be setting the scope for other standards that may need to use the terms.	
Ryan Quint - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable, Group Name Elevate Energy Consulting	
Answer	
Document Name	
Comment	
1. The definitions are leveraging IEEE 2800-2022 as a reference; however, there are notable differences between definitions. Most importantly, IEEE 2800-2022 is careful in its consideration of supplemental IBR, defined as "any equipment within an IBR plant, which may or may not be inverter-based…" These could include capacitor banks, STATCOMs, harmonic filters, protection systems, plant-level controllers, etc., which should all be considered as part of the overall IBR facility. If the resource (or part of the	

resource) is deemed “IBR”, then all applicable components that support that resource (such as those listed above) should be considered part of the IBR. 2. The drafting team should consider how these definitions will apply to hybrid/co-located resources. Some consideration and clarifications, if needed, could be useful as the terms get used in NERC Reliability Standards. Growth of hybrid resources across the BPS will make this a notable issue moving forward, so careful consideration of this topic now will be most effective.	
Likes 0	
Dislikes 0	
Response	
Any auxiliary equipment at the collector station behind the interface to the transmission system, including all the mentioned items, is part of the IBR plant/facility. The SDT has included this clarification in the technical rationale.	
Mark Garza - FirstEnergy - FirstEnergy Corporation - 4, Group Name FE Voter	
Answer	
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Michael Johnson - Michael Johnson On Behalf of: Frank Lee, Pacific Gas and Electric Company, 3, 1, 5; Marco Rios, Pacific Gas and Electric Company, 3, 1, 5; Sandra Ellis, Pacific Gas and Electric Company, 3, 1, 5; - Michael Johnson, Group Name PG&E All Segments	
Answer	
Document Name	
Comment	

PG&E thanks the Drafting Team's effort in creating an IBR definition that can be used throughout the industry for other current and future standards development work.	
Likes 0	
Dislikes 0	
Response:	
Thank you.	
Ruchi Shah - AES - AES Corporation – 5	
Answer	
Document Name	
Comment	
AES Clean Energy recommends most of the Background section (except the last two main bullets) of the IBR Definition document be included in a separate document (such as a technical rationale or implementation guidance).	
Likes 0	
Dislikes 0	
Response:	
Thak you	
Andy Thomas - DTE Energy - 1,3,5,6 - SERC,RF	
Answer	
Document Name	
Comment	
None.	

Likes 0	
Dislikes 0	
Response	
Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name MRO Group	
Answer	
Document Name	
Comment	
IBR: A single generating unit of generating Facility as identified through Inclusion I2 or I4 of the BES Definition that utilizes a power electronic interface to convert its self-generated(1) DC electricity to AC electricity for the primary purpose of supplying power to the Bulk Power System. 1: This includes DC electricity that is discharged from devices such as batteries and fuel cells.	
Likes 1	Lincoln Electric System, 5, Millard Brittany
Dislikes 0	
Response	
Thank you for this suggestion but the SDT will stick with its proposal as revised based on feedback from other commenters.	
Casey Perry - PNM Resources - 1,3 - WECC,Texas RE	
Answer	
Document Name	
Comment	
Request SDT to provide a full list of specific IBR devices that will be covered under this definition.	

Likes 0	
Dislikes 0	
Response	
The common forms of IBRs are listed in a non-exclusive list within the proposed definition. The SDT does not want to exclude any future technologies unknown at present that could qualify as IBRs.	
Srikanth Chennupati - Entergy - Entergy Services, Inc. - 1,3,5,7 – SERC	
Answer	
Document Name	
Comment	
Clarify how these IBR and IBR Unit definitions will interact with other projects proposed definitions for DERs.	
Likes 0	
Dislikes 0	
Response	
The SDT maintains that an IBR is defined according to technology and is not defined by where it is connected or its size. Therefore, DERs that are also IBRs should be considered a subset of IBRs.	
Israel Perez - Israel Perez On Behalf of: Mathew Weber, Salt River Project, 3, 1, 6, 5; Sarah Blankenship, Salt River Project, 3, 1, 6, 5; Thomas Johnson, Salt River Project, 3, 1, 6, 5; Timothy Singh, Salt River Project, 3, 1, 6, 5; - Israel Perez	
Answer	
Document Name	
Comment	
SRP does not support the addition or modification of this term and simply adding it to Reliability Standards that previously did not have IBR applicability. SRP strongly feels IBRs should have separate standards.	

Likes 0	
Dislikes 0	
Response	
Whether there should be separate standards for IBRs or whether IBRs applicability may be inserted into standards that presently do no pertain to IBRs is a matter to be determined by each relevant SAR and/or SDT.	
Sheila Suurmeier - Black Hills Corporation – 5	
Answer	
Document Name	
Comment	
Black Hills Corporation supports NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Please see the SDT's reply to NAGF comments.	
Micah Runner - Black Hills Corporation – 1	
Answer	
Document Name	
Comment	
Black Hills Corporation supports NAGF comments.	
Likes 0	
Dislikes 0	

Response	
Please see the SDT's reply to NAGF comments.	
Carly Miller - Carly Miller On Behalf of: Josh Combs, Black Hills Corporation, 5, 1, 3, 6; - Carly Miller	
Answer	
Document Name	
Comment	
Black Hills Corporation supports NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Please see the SDT's reply to NAGF comments.	
Rachel Schuldt - Rachel Schuldt On Behalf of: Rachel Schuldt, Black Hills Corporation, 5, 1, 3, 6; - Black Hills Corporation - 6	
Answer	
Document Name	
Comment	
Black Hills Corporation supports NAGF comments.	
Likes 0	
Dislikes 0	
Response	
Please see the SDT's reply to NAGF comments.	
Alison MacKellar - Constellation – 5	

Answer	
Document Name	
Comment	
Constellation has no additional comments. Alison Mackellar on behalf of Constellation Segments 5 and 6.	
Likes 0	
Dislikes 0	
Response	

Jennifer Neville - Western Area Power Administration – 6	
Answer	
Document Name	
Comment	
Suggested IBR definition: A single generating unit of generating facility as identified through Inclusion I2 or I4 of the BES Definition that utilizes a power electronic interface to convert its self-generated(1) DC electricity to AC electricity for the primary purpose of supplying power to the Bulk Power System. (1): This includes DC electricity that is discharged from devices such as batteries and fuel cells.	
Likes 0	
Dislikes 0	
Response	
Thank you for this suggestion but the SDT will stick with its proposal as revised based on feedback from other commenters.	

Kimberly Turco - Constellation – 6	
Answer	
Document Name	
Comment	
Constellation has no additional comments Kimberly Turco on behald of Constellation Segments 5 and 6	
Likes 0	
Dislikes 0	
Response	
James Keele - Entergy – 3	
Answer	
Document Name	
Comment	
Clarify how these IBR and IBR Unit definitions will interact with other projects proposed definitions for DERs.	
Likes 0	
Dislikes 0	
Response:	
The SDT maintains that an IBR is defined according to technology and is not defined by where it is connected or its size. Therefore, DERs that are also IBRs should be considered a subset of IBRs.	
Ben Hammer - Western Area Power Administration – 1	

Answer	
Document Name	
Comment	
IBR: A single generating unit of generating Facility as identified through Inclusion I2 or I4 of the BES Definition that utilizes a power electronic interface to convert its self-generated(1) DC electricity to AC electricity for the primary purpose of supplying power to the Bulk Power System. 1: This includes DC electricity that is discharged from devices such as batteries and fuel cells.	
Likes 0	
Dislikes 0	
Response	
Thank you for this suggestion but the SDT will stick with its proposal as revised based on feedback from other commenters.	
Donna Wood - Tri-State G and T Association, Inc. – 1	
Answer	
Document Name	
Comment	
NA	
Likes 0	
Dislikes 0	
Response	
Nikki Carson-Marquis - Nikki Carson-Marquis On Behalf of: Theresa Allard, Minnkota Power Cooperative Inc., 1; - Nikki Carson-Marquis	

Answer	
Document Name	
Comment	
Minnkota Power Cooperative appreciates the SDT's efforts to define impactful terms. MPC recommends distinguishing "IBR" and "IBR Unit" terms from those of the same name in IEEE 2800-2022 to avoid conflating the two entities' similar terminology.	
Likes 0	
Dislikes 0	
Response:	
No change. The proposed NERC glossary IBR definition deviates slightly from the 2800 definition in that the proposed NERC glossary definition is not limited to transmission interconnections but also encompasses DERs. The proposed IBR Unit definition is essentially the same as the 2800 definition but with added clarification to stipulate exporting of Real Power, association with an energy storage system, and attachment to the collector system of an IBR plant/facility.	
Anna Todd - Southern Indiana Gas and Electric Co. - 3,5,6 – RF	
Answer	
Document Name	
Comment	
N/A	
Likes 0	
Dislikes 0	
Response	
Marty Hostler - Northern California Power Agency – 4	

Answer	
Document Name	
Comment	
None.	
Likes 0	
Dislikes 0	
Response	
Michael Whitney - Northern California Power Agency - 3,4,5,6	
Answer	
Document Name	
Comment	
No	
Likes 0	
Dislikes 0	
Response	
Christine Kane - WEC Energy Group, Inc. - 3, Group Name WEC Energy Group	
Answer	
Document Name	
Comment	

No additional comments	
Likes 0	
Dislikes 0	
Response	
Jennifer Bray - Arizona Electric Power Cooperative, Inc. – 1	
Answer	
Document Name	
Comment	
AEPC signed on to ACES comments: We at ACES appreciate the effort put forth by the Drafting Team in developing these proposed definitions. We especially appreciate the fact that the Drafting Team used an industry standard source (IEEE 2800-2022) as a starting point for their efforts. While we do not completely agree with the exact language as currently proposed, we do agree with the overall premise utilized by the Drafting team. Thank you for the opportunity to comment.	
Likes 0	
Dislikes 0	
Response:	
Thank you for your comment.	
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 proposed Inverter-Based Resources (IBR) Definitions – Background section* *i. General – this section provides supporting information that is critical to understanding the IBR Definitions and therefore should be memorialized in a technical rational or similar document.* *ii. Bullet # 7 – the entire collocated synchronous generation and BESS facility should not be considered an IBR; only the IBR portion of the facility (i.e. the BESS) should be considered IBR. Recommend revising the language to clarify.*	
Likes 0	
Dislikes 0	
Response	
Language updated in the Technical Rationale.	
Selene Willis - Edison International - Southern California Edison Company – 5	
Answer	
Document Name	
Comment	
"See comments submitted by the Edison Electric Institute"	
Likes 0	
Dislikes 0	
Response:	

Please see the SDT's reply to EEI comments.	
Romel Aquino - Edison International - Southern California Edison Company – 3	
Answer	
Document Name	
Comment	
See comments submitted by the Edison Electric Institute	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Kenya Streeter - Edison International - Southern California Edison Company - 1,3,5,6	
Answer	
Document Name	
Comment	
See comments submitted by the Edison Electric Institute	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to EEI comments.	
Daniela Atanasovski - APS - Arizona Public Service Co. – 1	
Answer	

Document Name	
Comment	
None	
Likes 0	
Dislikes 0	
Response	
Gail Elliott - Gail Elliott On Behalf of: Michael Moltane, International Transmission Company Holdings Corporation, 1; - Gail Elliott	
Answer	
Document Name	
Comment	
ITC supports the comments provided by MRO NSRF	
Likes 0	
Dislikes 0	
Response:	
Please see the SDT's reply to NAGF comments.	
Colby Galloway - Southern Company - Southern Company Services, Inc. - 1,3,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name Southern Company	
Answer	
Document Name	
Comment	

None	
Likes 0	
Dislikes 0	
Response	
Joshua London - Eversource Energy - 1, Group Name Eversource	
Answer	
Document Name	
Comment	
There appears to be confusing circular logic with calling the second definition IBR Unit. By shortening to “IBR” you are stating it is previously defined, but the definition of Inverter-Based Resource relies upon the **definition** of “IBR Unit”. Change “IBR Unit” to “Inverter-Based Resource Unit.	
Likes 0	
Dislikes 0	
Response:	
Thank you for this suggestion. Revised to Inverter-Based Resource Unit (IBR Unit).	
Teresa Krabe - Lower Colorado River Authority – 5	
Answer	
Document Name	
Comment	
IBRs do not have an electromagnetic link to grid power which can extract stored inertial energy.	

Likes 0	
Dislikes 0	
Response:	
This is true.	
Matt Lewis - Lower Colorado River Authority - 1,5	
Answer	
Document Name	
Comment	
IBRs do not have an electromagnetic link to grid power which can extract stored inertial energy.	
Likes 0	
Dislikes 0	
Response:	
This is true.	
Steven Rueckert - Western Electricity Coordinating Council - 10, Group Name WECC	
Answer	
Document Name	
Comment	
WECC appreciates the efforts and understands the difficulties in proposing definitions. WECC can support the definitions if the Implementation Guidance or Definition Guidance (like the BES Reference Guide) with drawings that clearly depict the difference between an IBR and an IBR Unit as well as BES relationship to each are developed. This will get industry on the same page and the ERO Enterprise on the same page. Do not allow other uses such as IBR plant or IBR Facility or hybrid IBR within the Implementation Guidance or any	

Standard. If there needs to be additional descriptors add it to the definition—consistency in terminology will make applicability easier for everyone. In slide 14 of the Dec 5 presentation, the example 6.3 verbiage appears to reflect IBR aspects and IBR Unit aspects but uses “Facility” for IBR. Are the “enabled protective and limiting functions” directly tripping the IRB Unit(s) or IBR (versus Facility)? Or an IBR Facility?

Likes 0	
Dislikes 0	

Response:
Examples of IBR Units have been added to the technical rationale. In answer to the December 5 presentation slide question; a single or multiple IBR Units can trip or the entire IBR (facility/plant) can trip based on the enabled protective and limiting functions.

Shannon Mickens - Shannon Mickens On Behalf of: Joshua Phillips, Southwest Power Pool, Inc. (RTO), 2; - Shannon Mickens, Group Name SPP RTO	
Answer	
Document Name	
Comment	
SPP recommends that the drafting team reference the IEEE 1547-2018 Standard in the background details since there are terms from that standard has been included in the proposed definitions (for example electric power system (eps) and Energy storage system (ess). Additionally, SPP recommends that the drafting team consider coordinating with NERC staff to implement the definitions into the Rules of Procedures (RoP) to ensure proper alignment with the proposed efforts associated with the Glossary of Terms.	
Likes 0	
Dislikes 0	

Response:	
The SDT does not see a need to reference the above mentioned terms in the IEEE 1547 standard. The SDT has been charged with proposing NERC glossary definitions only. NERC may choose to update the ROP.	
Russell Jones - Invenergy LLC – 5	
Answer	
Document Name	
Comment	
Invenergy supports the spirit of the definition proposed and does not offer any substantive changes. We do, however, have concerns about the application of this definition to various reliability standards going forward. More specifically, Invenergy believes the drafting team should consider how this broad definition will be applied in specific Reliability Standard requirements to different roles (transmission, sub-transmission, distribution) and different technologies (PV, Type 3 and Type 4 wind, BESS, and fuel cell) where nuance may be required to account for technological limitations or differences.	
Likes 0	
Dislikes 0	
Response:	
The applicability section of each standard will establish the scope of its applicability to various IBR connection locations, sizing, and IBR types as necessary for each standard.	
Jodirah Green - ACES Power Marketing - 1,3,4,5,6 - MRO,WECC,Texas RE,SERC,RF, Group Name ACES Collaborators	
Answer	
Document Name	
Comment	

We at ACES appreciate the effort put forth by the Drafting Team in developing these proposed definitions. We especially appreciate the fact that the Drafting Team used an industry standard source (IEEE 2800-2022) as a starting point for their efforts. While we do not completely agree with the exact language as currently proposed, we do agree with the overall premise utilized by the Drafting team.

Thank you for the opportunity to comment.

Likes 0	
Dislikes 0	

Response:

Thank you for your comment.

LaTroy Brumfield - American Transmission Company, LLC - 1

Answer	
Document Name	

Comment

Below is a consideration for an updated definition of IBR.

IBR: A single generating unit or generating Facility that utilizes a power electronic interface to convert its self-generated(1) DC electricity to AC electricity for the primary purpose of supplying power to the Bulk Power System.

1: This includes DC electricity that is discharged from devices such as batteries and fuel cells. Self-generated also implies that FACTs devices that simply convert power do not apply to this definition.

Likes 0	
Dislikes 0	

Response:

Thank you for this suggestion but the SDT will stick with its proposal as revised based on feedback from other commenters.

Charles Yeung - Southwest Power Pool, Inc. (RTO) - 2 - MRO,WECC, Group Name SRC 2023	
Answer	
Document Name	
Comment	
The SRC notes the inconsistent use of “electric power system” and “electric system” throughout various definitions in the NERC Glossary and recommends NERC give some thought to standardizing this language in the future.	
Likes 0	
Dislikes 0	
Response:	
For all practical purposes, the terms are synonymous.	
Elizabeth Davis - Elizabeth Davis On Behalf of: Thomas Foster, PJM Interconnection, L.L.C., 2; - Elizabeth Davis	
Answer	
Document Name	
Comment	
PJM recommends the following concise axioms in managing future updates: 1) All IBRs are comprised of one or more IBR Units. 2) An IBR unit is a generator that employs inverter(s) to create power. 3) To be an IBR unit, the DC side must be able to generate power onto the AC side past the POI. 4) An IBR unit may also consume power, but to be an IBR unit, axiom 3 must be met. 5) IBRs are the combination of IBR units, conversion (inverter), and AC equipment up to a POI.	

Likes 0	
Dislikes 0	
Response:	
Thank you for your comment.	
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:	
Please see the SDT's reply to IRC SRC comments.	
Constantin Chitescu - Ontario Power Generation Inc. – 5	
Answer	
Document Name	
Comment	
OPG supports NPCC Regional Standards Committee's comments.	
Likes 0	
Dislikes 0	
Response:	

Please see the SDT's reply to NPCC comments.

End of Report