# Comment Report

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| **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 Ballots: | 2020-06 Verifications of Models and Data for Generators IBR Unit IN 1 DEF<br>2020-06 Verifications of Models and Data for Generators IBR-related Definitions \| Implementation Plan IN 1 OT<br>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.

**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.**

| 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 |
| | | | | | 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 |

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|---|---|---|---|---|---|---|---|---|
| | | | | | Dane Rogers | Oklahoma Gas and Electric (OG&E) | 1,3,5,6 | MRO |
| | | | | | Seth Shoemaker | Muscatine Power & Water | 1,3,5,6 | MRO |
| | | | | | 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 |
| | | | | | 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 | 6 | SERC |

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| | | | | | | Company - Southern Company Generation | | |
| | | | | | Leslie Burke | Southern Company - Southern Company Generation | 5 | SERC |
| 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 |
| | | | | | 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 | 1,5 | Texas RE |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | Farmers Electric Cooperative | | |
| 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 |
| | | | | | 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 |
| | | | | | 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 | Central | 1 | NPCC |

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|---|---|---|---|
| Ridolfino | Hudson Gas & Electric Corp. | | |
| Randy Buswell | Vermont Electric Power Company | 1 | NPCC |
| James Grant | NYISO | 2 | NPCC |
| John Pearson | ISO New England, Inc. | 2 | NPCC |
| Harishkumar Subramani Vijay Kumar | Independent Electricity System Operator | 2 | NPCC |
| Randy MacDonald | New Brunswick Power Corporation | 2 | NPCC |
| Dermot Smyth | Con Ed - Consolidated Edison Co. of New York | 1 | NPCC |
| David Burke | Orange and Rockland | 3 | NPCC |
| Peter Yost | Con Ed - Consolidated Edison Co. of New York | 3 | NPCC |
| Salvatore Spagnolo | New York Power Authority | 1 | NPCC |
| Sean Bodkin | Dominion - Dominion Resources, Inc. | 6 | NPCC |
| David Kwan | Ontario Power Generation | 4 | NPCC |
| Silvia Mitchell | NextEra Energy - Florida Power and Light Co. | 1 | NPCC |
| Glen Smith | Entergy Services | 4 | NPCC |
| Sean Cavote | PSEG | 4 | NPCC |
| Jason Chandler | Con Edison | 5 | NPCC |
| Tracy MacNicoll | Utility Services | 5 | NPCC |

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|---|---|---|---|---|---|---|---|---|
| | | | | | 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 |
| 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 |
| | | | | | Josh Phillips | Southwest Power Pool Inc. | 2 | MRO |
| | | | | | Darian Richards | Southwest Power Pool | 2 | MRO |

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| | | | | | | Inc | | |
| | | | | | 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 |
| 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** | |
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| **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 seperating out their PV Plant as one legal entity and their BESS as another legal entity. With this in mind, making seperate definitions also helps these companies.

| Likes 0 | |
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| Dislikes 0 | |
| **Response** | |

| **Duane Franke - Manitoba Hydro - 1,3,5,6 - MRO** | |
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| **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 | |
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| Dislikes 0 | |

| Response |
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| **Sean Bodkin - Dominion - Dominion Resources, Inc. - 6, Group Name** Dominion | |
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| **Answer** | No |
| **Document Name** | |

| **Comment** |
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| 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.<br><br>Dominion Energy also supports EEI comments. |

| Likes 0 | |
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| Dislikes 0 | |

| **Response** |
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| **Ryan Quint - Elevate Energy Consulting - NA - Not Applicable - NA - Not Applicable, Group Name** Elevate Energy Consulting | |
| --- | --- |
| **Answer** | No |
| **Document Name** | |

| **Comment** |
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| 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:<br><br>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.<br>o 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.<br>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.<br>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.

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| Likes 0 | |
| Dislikes 0 | |

**Response**

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

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| **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.

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| 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

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|---|---|
| **Answer** | No |
| **Document Name** | |

| Comment |
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| 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. |

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| Likes 0 | |
| Dislikes 0 | |

| Response |
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| **Ruchi Shah - AES - AES Corporation - 5** | |
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| **Answer** | No |
| **Document Name** | |

| Comment |
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| AES Clean Energy supports NAGF's comments and NAGF's proposed definition for IBR. |

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| Likes 0 | |
| Dislikes 0 | |

| Response |
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| **Andy Thomas - DTE Energy - 1,3,5,6 - SERC,RF** | |
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| **Answer** | No |
| **Document Name** | |

| Comment |
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| 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. |

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| Likes 0 | |
| Dislikes 0 | |

| Response |
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| **Anna Martinson - MRO - 1,2,3,4,5,6 - MRO, Group Name** MRO Group | |
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| **Answer** | No |

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| **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.

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| Likes 1 | Lincoln Electric System, 5, Millard Brittany |
| Dislikes 0 | |
| **Response** | |

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| **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.

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| Likes 0 | |
| Dislikes 0 | |
| **Response** | |

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| **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

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| facilities. Distribution connected facilities should be called DER in alignment with other NERC Posted guidelines. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
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| **Sheila Suurmeier - Black Hills Corporation - 5** | |
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF and EEI Comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **Micah Runner - Black Hills Corporation - 1** | |
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF and EEI comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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 | |

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| Dislikes 0 | |
| **Response** | |
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| **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** | |
| | |
| **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.<br>• 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.<br>• 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** | |
| | |
| **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.

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| Likes 0 | |
| Dislikes 0 | |

**Response**

**James Keele - Entergy - 3**

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|---|---|
| **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.

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|---|---|
| Likes 0 | |
| Dislikes 0 | |

**Response**

**Dennis Chastain - Tennessee Valley Authority - 1,3,5,6 - SERC**

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| **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.”

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| Likes 0 | |
| Dislikes 0 | |

**Response**

| Zahid Qayyum - New York Power Authority - 5 | |
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| **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** | |

| 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** | |

| 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** | |
| | |

| Marty Hostler - Northern California Power Agency - 4 | |
|---|---|
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| BES needs to be included in the Definition.<br><br>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** | |
| | |

| 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 | |
|---|---|
| | |
| **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.<br><br>Marty Hostler, Northern California Power Agency, 4, 1/8/2024 | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **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**

**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**

**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** | |
| | |
| **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:<br><br>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** | |
| | |
| **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:*<br><br>*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**

**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**

**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**

**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**

**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 |
| --- |
| |

| 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 |
| --- |
| |

| 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 |
| --- |
| |

| 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**

**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**

**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**

**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 thisterm, 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**

**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**

**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**

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

NRG is in support of the NAGF comments concerning the proposed definiton 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**

**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**

**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** | |
| | |
| **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** | |
| | |
| **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 |
| --- |
| |

| **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** | |
| | |
| **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** | |
| | |
| **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**

**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 definiton:

*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**

**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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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.”<br><br>The definition should be revised to read as follows:<br><br>**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**

**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**

**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**

| | |
|---|---|
| **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.<br><br>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** | |
| | |
| **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** | |
| | |
| **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:<br><br>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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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:<br><br>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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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** |
|---|
| |

| **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** | |
| | |

| **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** | |
| | |

| **Jennifer Bray - Arizona Electric Power Cooperative, Inc. - 1** | |
|---|---|
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| AEPC signed on to ACES comments:<br><br>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<br>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**

**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**

**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**

**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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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**

**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**

**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**

**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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |

| | |
|---|---|
| **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** | |
| | |
| **Micah Runner - Black Hills Corporation - 1** | |
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF and EEI comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **Sheila Suurmeier - Black Hills Corporation - 5** | |
| **Answer** | No |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF and EEI comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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**

**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**

**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.

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|---|---|
| Likes 0 | |
| Dislikes 0 | |

**Response**

**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**

**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**

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

| | |
|---|---|
| **Answer** | No |

| | |
|---|---|
| **Document Name** | |
| **Comment** | |
| Please see previous comment. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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.<br><br>"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. "<br><br>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** | |
| | |
| **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** | |

| | |
|---|---|
| | |
| **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** | |
| | |
| **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** | |
| | |
| **Kimberly Turco - Constellation - 6** | |
| **Answer** | Yes |
| **Document Name** | |
| **Comment** | |
| Constellation has no additional comments<br><br>Kimberly Turco on behald of Constellation Segments 5 and 6 | |

| | |
|---|---|
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **Alison MacKellar - Constellation - 5** | |
| **Answer** | Yes |
| **Document Name** | |
| **Comment** | |
| Constellation has no additional comments.<br><br>Alison Mackellar on behalf of Constellation Segments 5 and 6. | |
| 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** | Yes |
| **Document Name** | |
| **Comment** | |
| PG&E supports the IBR Unit definition. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **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** | |
| | |

**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**

**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**

**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.<br>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** | |
| | |

**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** | |
| | |

| | |
|---|---|
| **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** | |
| | |
| **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.<br><br>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** | |
| | |

| | |
|---|---|
| **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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **Sheila Suurmeier - Black Hills Corporation - 5** | |

| | |
|---|---|
| **Answer** | |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **Micah Runner - Black Hills Corporation - 1** | |
| **Answer** | |
| **Document Name** | |
| **Comment** | |
| Black Hills Corporation supports NAGF comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **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 |
| --- |
| |

| Alison MacKellar - Constellation - 5 | |
| --- | --- |
| **Answer** | |
| **Document Name** | |

| Comment |
| --- |
| Constellation has no additional comments.<br><br>Alison Mackellar on behalf of Constellation Segments 5 and 6. |

| | |
| --- | --- |
| Likes 0 | |
| Dislikes 0 | |

| Response |
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| |

| 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.<br><br>(1): This includes DC electricity that is discharged from devices such as batteries and fuel cells. |

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| Likes 0 | |
| Dislikes 0 | |

| Response |
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| |

| Kimberly Turco - Constellation - 6 | |
| --- | --- |
| **Answer** | |

| | |
|---|---|
| **Document Name** | |
| **Comment** | |
| Constellation has no additional comments<br><br>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** | |
| | |
| **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.<br><br>1: This includes DC electricity that is discharged from devices such as batteries and fuel cells. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |

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|---|---|
| **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** | |
| | |
| **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.

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|---|---|
| Likes 0 | |
| Dislikes 0 | |

**Response**

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

| | |
|---|---|
| **Answer** | |
| **Document Name** | |

**Comment**

*The NAGF provides the following additional comments for consideration:*

*a. The 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.*

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| Likes 0 | |
| Dislikes 0 | |

**Response**

**Selene Willis - Edison International - Southern California Edison Company - 5**

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| **Answer** | |
| **Document Name** | |

**Comment**

“See comments submitted by the Edison Electric Institute”

| | |
|---|---|
| Likes 0 | |

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|---|---|
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |
| **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** | |
| | |

| | |
|---|---|
| **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** | |
| | |
| **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** | |
| | |
| **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 defintionsif 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 eachare 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.<br><br>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 |
| --- |
| |

**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 to coordinate 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.

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| Likes 0 | |
| Dislikes 0 | |

| Response |
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| |

**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.

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| Likes 0 | |
| Dislikes 0 | |

| Response |
| --- |
| |

**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**

**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**

**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.

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|---|---|
| Likes 0 | |

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|---|---|
| Dislikes 0 | |
| **Response** | |
| | |
| **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:<br>1) All IBRs are comprised of one or more IBR Units.<br>2) An IBR unit is a generator that employs inverter(s) to create power.<br>3) To be an IBR unit, the DC side must be able to generate power onto the AC side past the POI.<br>4) An IBR unit may also consume power, but to be an IBR unit, axiom 3 must be met.<br>5) IBRs are the combination of IBR units, conversion (inverter), and AC equipment up to a POI. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |
| **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** | |
| | |
| **Constantin Chitescu - Ontario Power Generation Inc. - 5** | |
| **Answer** | |

| | |
|---|---|
| **Document Name** | |
| **Comment** | |
| OPG supports NPCC Regional Standards Committee’s comments. | |
| Likes 0 | |
| Dislikes 0 | |
| **Response** | |
| | |