

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Industry Webinar

Project 2023-01 EOP-004 IBR Event Reporting

March 12, 2024

Charlie Cook, Chair (Duke Energy)

Patrick Gravois, ERCOT

Ali Miremadi, Vice Chair (CA-ISO)

Becca Skalko, SDT Member (MISO)

Chris Larson, NERC Standards Developer

RELIABILITY | RESILIENCE | SECURITY



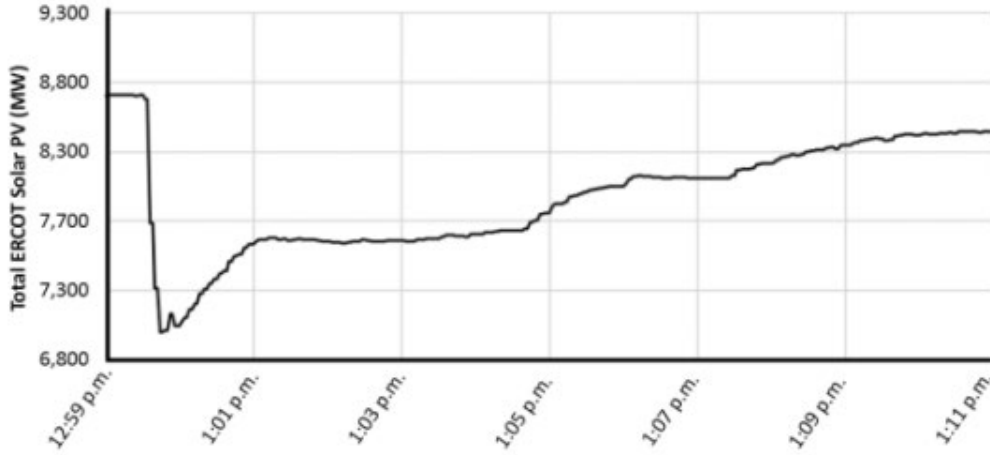
- North American Electric Reliability Corporation (NERC) Antitrust Guidelines
 - It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition
- Notice of Open Meeting
 - Participants are reminded that this webinar is public. The access number was widely distributed. Speakers on the call should keep in mind that the listening audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.

- Project Background
- Industry need
- What we heard
- Summary of Changes (Draft 2)
- Attachment 1 – Event thresholds for reporting
- Technical Rationale
- Implementation Plan
- Project Timeline
- Resources
- Questions & Answers

Name	Company
Charlie Cook (chair)	Duke Energy
Ali Miremadi (vice-chair)	California ISO
Patrick Gravois	ERCOT
Michael Ropp	Sandia National Laboratories
Filippo Benigni	Florida Power & Light
Todd Bennett	AECI
Kellie Macpherson	Radian Generation
Cindy Robert	Hydro-Quebec
Rebecca Skalko	MISO
Mario L. Kiresich	SCE
Rob Robertson	Leeward Renewable Energy
Cory Danson	WAPA-Sierra Nevada Region

- May & June 2021 TX events – [Odessa Disturbance Report](#)
- 11 IBR loss events (>500MW) in last ~3.5 years (Event Analysis)
- Existing “generation loss” threshold uses large size threshold
 - 2,000MW Eastern, Western, Quebec; 1,400MW ERCOT
- Multiple widespread PV loss events did not meet EOP-004-4 “Generation loss” threshold
- EOP-004 event reporting helps with quicker response to widespread inverter-based resource (IBR) loss, improved awareness, gathering event data, and data preservation
- Initial SAR accepted by SC – January 2023
- Standard Drafting Team formed – May 2023

- Multiple widespread IBR generation loss events since 2020
- Current EOP-004 criteria uses relatively large size threshold for generation loss events more suitable for synchronous generation
- ERO has analyzed IBR generation loss events that did not meet current EOP-004 criteria which highlighted systemic reliability risks posed by IBRs
- ERO Event Analysis (EA) Process is voluntary in nature and involves significantly longer reporting timelines
- ERO EA team currently must wait until brief report is submitted before sending RFIs (~20 days after the event); difficult to perform root cause analysis and develop mitigation actions due to unavailability and overwriting of useful data
- 2020 San Fernando Disturbance Report recommendations:
 - Ad hoc reporting of events involving multiple generating resources and possible systemic issues is not an acceptable level of reporting
 - EOP-004 should be reviewed in terms of the thresholds used for generator tripping events and the extent of resources involved in the disturbance
- IRPS drafted a SAR to address this outstanding recommendation



<https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx>

- Loss of IBR generation events need to be identified in a timely manner to collect valuable data before it is overwritten; current standards only require this data to be retained for 10 days
- Lower threshold of IBR generation loss needed to identify events involving multiple resources with systemic reliability risks
- Revision to EOP-004 needed to align with ERO Event Analysis (EA) process and categorization to ensure generation loss events impacting multiple IBRs are identified and reported
 - Category 1i: A non-consequential interruption of inverter type resources aggregated to 500 MW or more not caused by a fault on its inverters, or its ac terminal equipment.
 - Category 1j: A non-consequential interruption of a DC tie(s), between two separate asynchronous systems, loaded at 500 MW or more, when the outage is not caused by a fault on the dc tie, its inverters, or its ac terminal equipment.

- Not all BAs have the resources to identify, collect data, analyze, and mitigate IBR generation loss events; therefore, it is beneficial that NERC staff is notified and involved in this process
- Improved reporting requirements will ultimately lead to improved performance of IBRs due to detailed analysis and coordination with affected entities

- Footnote 1 – a desired definition for IBR
- Concerns whether or not reporting requirement included distribution-connected IBR
- 500 MW Threshold
- Increase 500 MW threshold
- Request to add “two or more” facilities
- Clarify if interconnected at single point or BA wide
- Modify language for “sudden loss” to exclude natural causes
- BA the only entity required to report

- Addition of two thresholds for reporting
 - IBR generation loss > 500MW
 - Loss of DC Tie Line loaded > 500MW
- IBR definition (Project 2020-06)
- IBR generation examples include solar photovoltaic, Type 3 and Type 4 wind, and battery energy storage
- Exemptions to reporting IBR generation loss threshold
- Updates to the Technical Rationale
- Examples of IBR generation loss in Technical Rationale
- The obligation of IBR generation loss reporting is only for the BA

Event Type	Entity with Reporting Responsibility	Threshold for Reporting
IBR generation loss	BA	<p>Total<u>An unexpected, sudden loss of aggregated generation loss of</u> ≥ 500 MW from inverter-based resource(s) (IBR)³<u>occurring within a 30-second period</u>Inverter-Based Resource(s)¹.</p> <p>IBR generation loss shall be calculated <u>by the BA</u> using Telemetering data²<u>by from IBR generators within its Balancing Authority Area (including, at a minimum, BES-connected IBRs, and BPS-connected IBRs for which the BA has Telemetering data). This calculation involves</u> subtracting the lowest aggregated IBR generation output <u>observed during, occurring within a 30-second period following a Contingency,</u> from the pre-disturbance<u>pre-Contingency</u> aggregated IBR generation output.</p> <p><u>The Responsible Entity is not required to report losses due to weather patterns, lack of wind, change in irradiance, fuel unavailability, curtailment, ramping, planned outage, planned testing, failure of SCADA or Telemetering data, or due to the loss of a radial transmission facility that disconnects the IBR generators.</u></p>

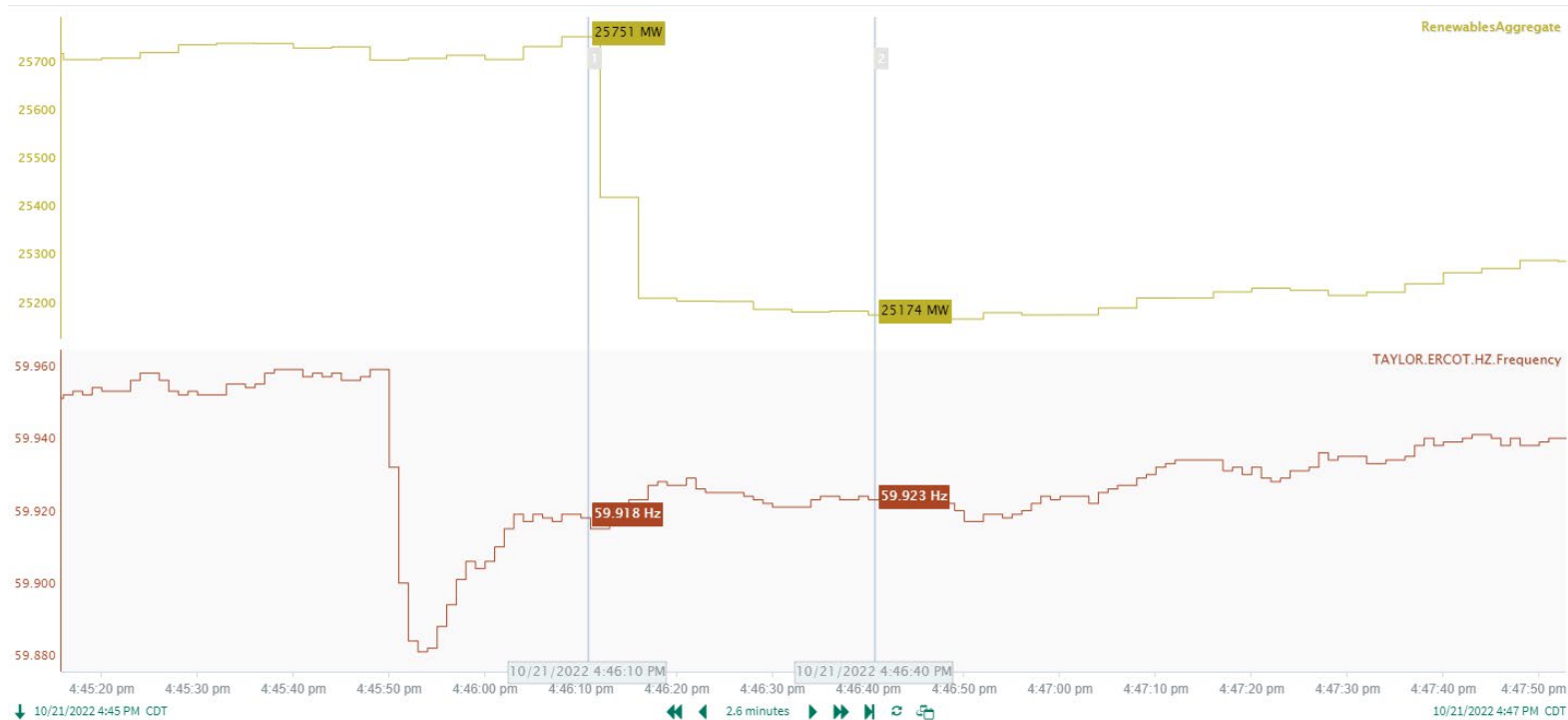
Loss of DC Tie Line	BA <u>(source side)</u>	Loss of a DC Tie Line, between two separate asynchronous systems, loaded at ≥ 500 MW.
---------------------	-------------------------	--------------------------------------------------------------------------------------------

Event Type	Entity with Reporting Responsibility	Threshold for Reporting
IBR generation loss	BA	<p>An unexpected, sudden loss of aggregated generation ≥ 500 MW from Inverter-Based Resource(s)¹.</p> <p>IBR generation loss shall be calculated by the BA using Telemetry data from IBR generators within its Balancing Authority Area (including, at a minimum, BES-connected IBRs, and BPS-connected IBRs for which the BA has Telemetry data). This calculation involves subtracting the lowest aggregated IBR generation output, occurring within a 30-second period following a Contingency, from the pre-Contingency aggregated IBR generation output.</p> <p>The Responsible Entity is not required to report losses due to weather patterns, lack of wind, change in irradiance, fuel unavailability, curtailment, ramping, planned outage, planned testing, failure of SCADA or Telemetry data, or due to the loss of a radial transmission facility that disconnects the IBR generators.</p>
Loss of DC Tie Line	BA (source side)	Loss of a DC Tie Line, between two separate asynchronous systems, loaded at ≥ 500 MW.

- [Technical Rationale](#) (Draft 2)
- The term “loss” includes instances the IBR unit(s) trips offline, or there is a full or partial reduction of active power output (MW).
- Exemptions to reporting: “The Responsible Entity is not required to report losses due to weather patterns, lack of wind, change in irradiance, fuel unavailability, curtailment, ramping, planned outage, planned testing, failure of SCADA or Telemetry data, or due to the loss of a radial transmission facility that disconnects the IBR generators.”
- Rationale for 30 second period
- Rationale for Telemetry data
- Non-generation inverter-based devices are not applicable for EOP-004, e.g. HVDC transmission, STATCOM, or SVC

- ERCOT began developing tools to identify IBR generation loss events after Odessa 2022 event
- Multiple criteria in place to trigger event identification
 - Solar drops greater than 150 MW which coincides with frequency drop
 - Wind drops greater than 200 MW which coincides with frequency drop
 - Combined wind and solar drop greater than 400 MW
- Tools automatically identify events but still have a manual process for engineers to look in tools and analyze events 1-2 times a week
- Working on process to send notifications of events greater than 400 MW
- Will fine-tune process during 2-year implementation period for EOP-004

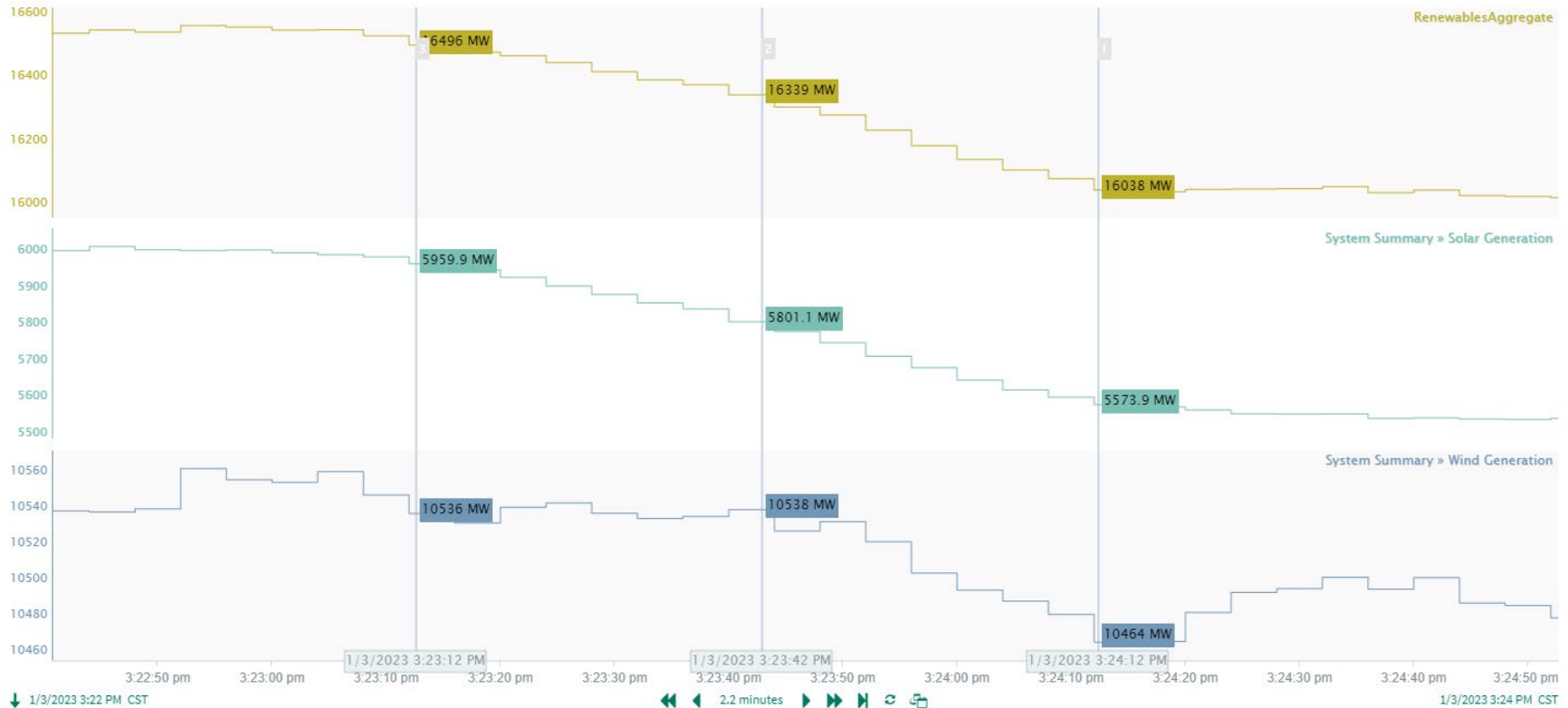
- Event on 10/21/2022 in which IBR tag drops 577 MW within 30 second period
- Frequency drop of 0.08 Hz occurs ~20 sec. prior (SCADA delay for unit telemetry and aggregation)
- Reportable in new EOP-004



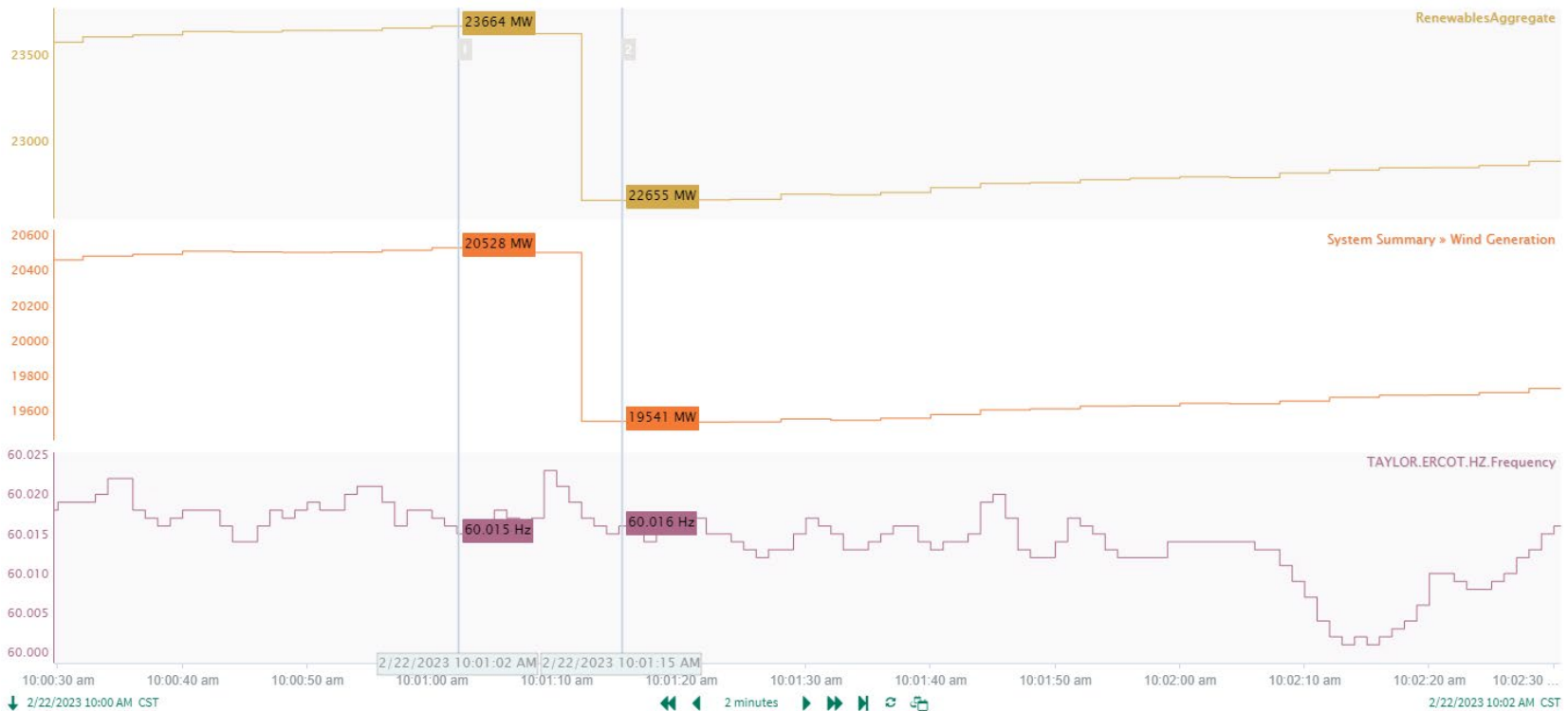
- Event on 10/27/2022 in which IBR tag drops 652 MW within 30 second period
- Frequency drop of 0.096 Hz occurs ~8 sec. prior
- ERCOT analysis determined 430 MW of loss was consequential (Transmission Line trip) and 179 MW was non-consequential IBR loss



- Ramp-down due to curtailment on 1/3/2023
- Not reportable in new EOP-004 even if greater than 500 MW in 30 second period



- Event on 2/22/2023 in which IBR tag drops 1,009 MW within 30 second period
- Frequency drop not commensurate with size of apparent generation loss
- Control room alarms showed ICCP link outage of large GOP
- Not reportable in new EOP-004



Effective Date of EOP-004-5

Where approval by an applicable governmental authority is required, the standard shall become effective on the first day of the first calendar quarter that is twenty-four (24) months after the effective date of the applicable governmental authority's order approving the standard, or as otherwise provided for by the applicable governmental authority.

- 24-month implementation period
- Implementation Plan only applies to BAs
- BAs are provided time to:
 - Identify which resources are IBR, if they haven't done so already; and
 - Create indication for control room staff
- Only resources that BA already has telemetering data (visibility) need to be included; BA does not need to seek out telemetering data for resources for which they do not normally have visibility
- No actions for GO/GOP under the new IBR reporting Criteria

- 45-day informal comment period
 - Scheduled for February 12 to March 27, 2024
- Subsequent additional ballot (AB2)
 - Scheduled for July/August 2024
- NERC Board Adoption
 - Scheduled for December 2024

- [Project 2023-01 EOP-004 IBR Event Reporting \(website\)](#)
- [ERO Event Analysis Program](#)
- [Inverter-Based Resource Strategy](#), June 2022
- [FERC Order No. 901](#), October 2023
- [NERC Work Plan to Address FERC Order No. 901](#), January 2024
- [IBR Registration Initiative Resources](#), February 2024
 - [IBR Registration Quick Reference Guide](#), February 2024



Questions and Answers