TEXAS RE

# Inverter-Based Resources (IBRs) Data and Reports

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# Upcoming Texas RE Events

**August 28, 2024**

Cyber & Physical Security Workshop

**September 10, 2024**

Cybersecurity

**September 19, 2024**

Supply Chain Series

# Upcoming ERO Enterprise Events

**August 6-8, 2024**

Physical Security Workshop

**August 7, 2024**

Protection System Workshop

**August 13-15, 2024**

Power Systems Security Conference

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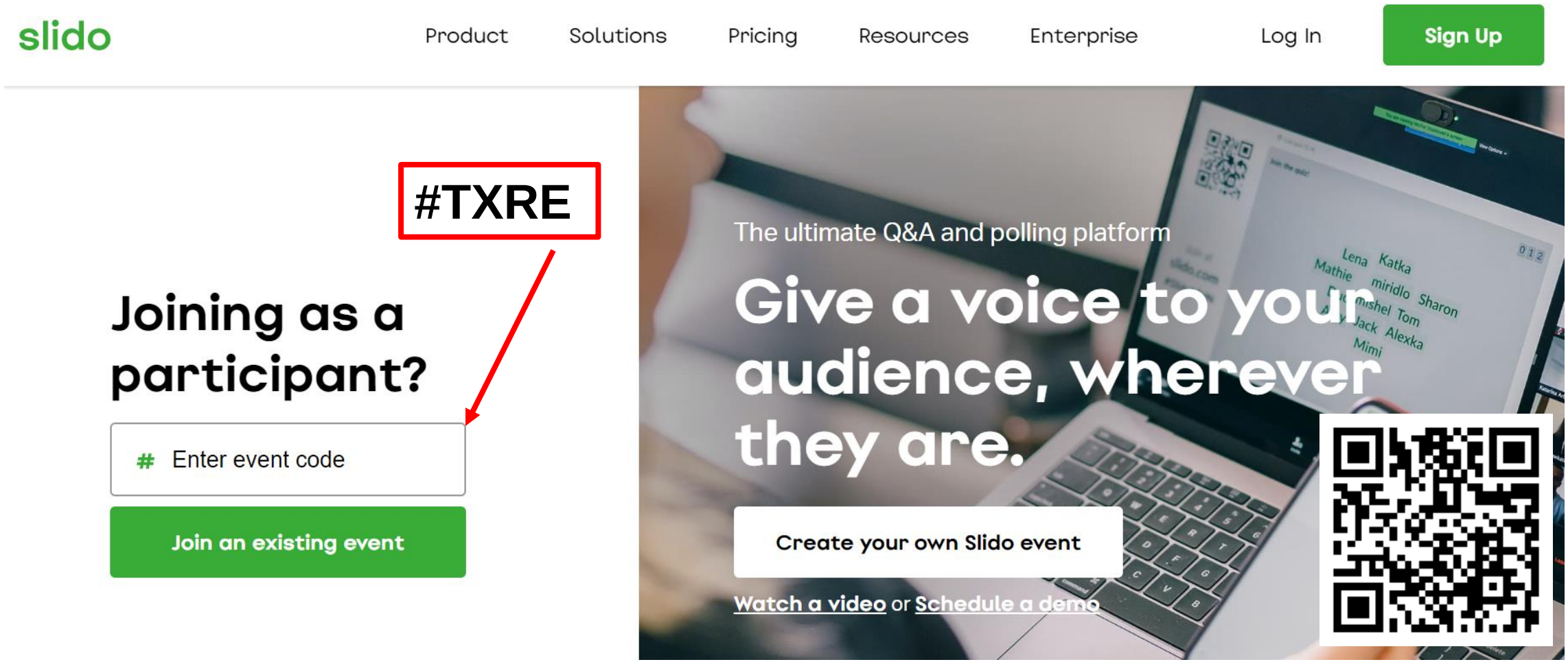
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# NERC IBR Modeling Alert Summary

## Timeline

- Issued June 4, 2024
- Follow-up to March 23 NERC Alert 2 on equipment settings and performance and the various IBR disturbance event reports since 2017
- 4th NERC Alert on IBRs since 2017
- Pertains to all IBRs – solar, wind (Type 3-4), and batteries
- Submittal due September 2, 2024 - with separate approval (acknowledgement by June 11)

## Purpose

- Provide recommendations to industry
- Gather data on extent of IBR model quality deficiencies
- Gain insight into modeling practices
- Data collection includes specific settings for inverter and plant level controls

# Responding to this NERC Alert

## Do you own any BPS-connected IBR generating facilities?

If NO – submit this response and approval

If YES – data collection for IBR generating facilities includes: solar photovoltaic (PV), type 3 and type 4 wind, battery energy storage systems (BESS), and any hybrid facilities with an IBR component

Specifically, detailed data responses apply to NERC-registered Bulk Electric System (BES) IBRs

- Identified by Inclusion I4 of the NERC BES Definition, facilities with nameplate aggregation >75MVA and connected at 100kV and above
- IBRs within scope of NERC's proposed Category 2 GO Registry Criteria (facilities rated at 20 MVA connected at 60kV and above) do not have any requirements to respond to this alert

All Transmission Planners and Planning Coordinators should respond to questions and provide data submittals where applicable

# Recommendations for Planning Coordinators and Transmission Planners

1. All models should be detailed and accurate representations of expected or as-built facilities across all expected operational conditions
2. Industry-approved standard library positive sequence phasor domain (PSPD) models are sufficient for use in Interconnection-wide base-case creation
3. Equipment-specific models should be used for detailed reliability studies (e.g., during generation interconnection studies and local reliability studies)
4. Clear, consistent, sufficiently detailed, and comprehensive modeling requirements should include standard library, PSPD, and EMT models
5. TPs and PCs model requirements should include acceptable positive sequence library equipment-specific PSPD and equipment-specific EMT model (if EMT analysis performed)

# Questions for Planning Coordinators and Transmission Planners

**Each TP and PC should respond to fifteen questions on various aspects of modeling. All are YES/NO except the following:**

**Question 4:** Provide a link(s) to your organization's publicly available model submission and model quality requirements

**Question 12:** Provide a copy or link to your organization's quantitative metrics used to determine model accuracy (if applicable)

**Question 15:** Submit one PSPD dynamic model (.dyd or .dyr) and associated loadflow model file (.epc or .sav) representative of your distribution, sub-transmission, and transmission systems used during Interconnection and Planning studies

**-GOs will need PC/TP assistance to complete planning case(s)**
**-Bus #s and machine ID #s part of responses**

# Recommendations for Generator Owners

Coordinate with inverter manufacturers, plant controller manufacturers, TPs, and PCs to meet all TP and PC modeling requirements and provide adequate proof of conformance

Maintain an accurate and representative model throughout the lifecycle of the project, and notify TP and PC of expected changes

Implement all applicable recommendations in this alert such that an updated set (e.g., standard library, equipment specific PSPD, and EMT) of dynamic models is available for inclusion in the next applicable TP and PC annual model updates

# Generator Owner Data Submission Worksheet

**GOs complete one Data Submission Worksheet per IBR plant**

- **Inverter information – 9 questions**
- **Inverter and Facility Protection and Capability – 17 questions**
- **Comments column**

Note that four questions refer to populating separate worksheets on:

- Voltage Protection
- Frequency Protection
- Reactive Capability
- Model Data (actual dynamic and load flow models)

Further, two questions require collaboration with PC/TP for model information

# Section 1600 Data Collection

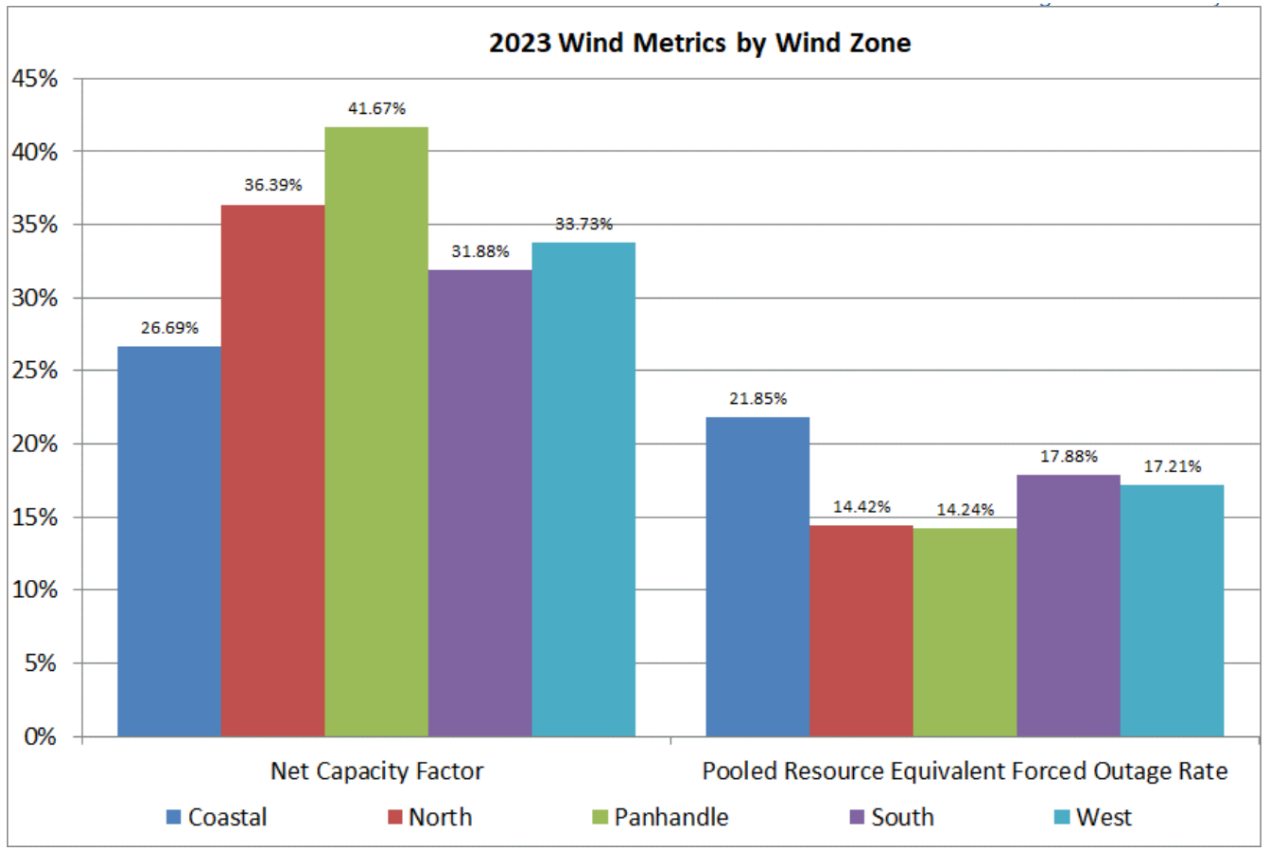
## Currently registered GOs file the following data (or will begin this year) quarterly

- GADS
- MIDAS

## NERC and Texas RE use the data in performance analyses, such as:

- NERC's State of Reliability Report
- Texas RE's Reliability Performance and Regional Risk Assessment

## Entities often use this data for internal performance monitoring and benchmarking



# MIDAS—Misoperation Data Reporting System

## Currently applies to registered wind and solar GOs

## Modest changes

- Removed: ***Is this a GADS/TADS reportable event and element/unit ID fields***
- Added: ***Count of Transmission Transformers/AC & DC Circuits/Units removed from service***
- Effective for Misoperations that occurred as of 1/1/2024
- Historical Misoperations not affected

## Portal update – Development in progress

- 2024 bulk submission spreadsheet posted
- Update expected to be complete in April
- Instructions for performing historical Misoperation updates are available on the MIDAS page of NERC.com

## 2024 MIDAS Data Reporting Instructions

# GADS Reporting for Wind and Solar

## Reporting requirements became effective January 1, 2024

- Entities are required to collect and be ready to report data for operations as of January 1, 2024

## Wind and Solar applications deployed in late April

- Reporting deadlines have been extended to Q3 deadline

## webCARES digital certificates by OATI required for access

- Registered entities that do not have webCARES accounts will be contacted by NERC and OATI
- For each application (GADS Wind and GADS Solar), NERC will provide up to two digital certificates per company

## Data migration (wind) in progress

- Recorded training is available on the NERC webpage: GADS Solar Training | GADS Wind Training

# GADS Wind Changes

## Not Changing

- Reporting threshold
  - Wind plants with a total installed capacity of 75MW or greater with a commissioning date of January 1, 2005, or later, for any portion of the plant

## Changing

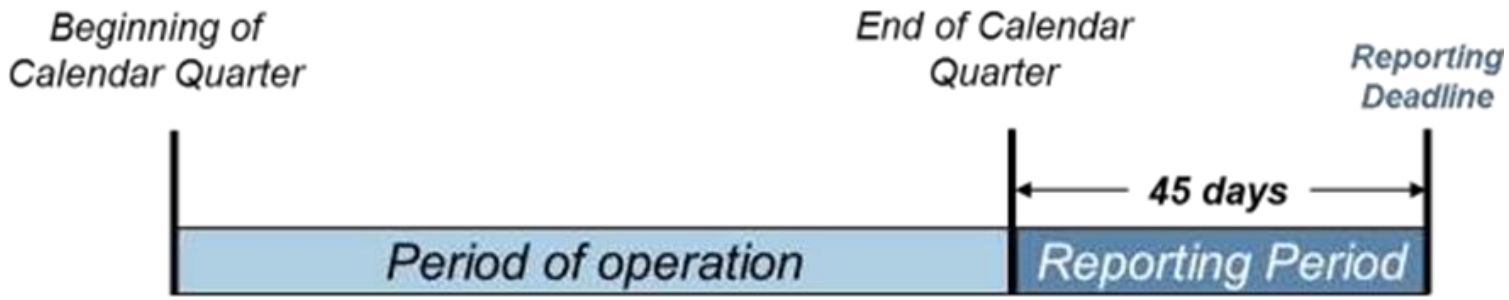
- The GADS Section 1600 data request modifies GADS reporting for wind plants:
  - Now applies to Generator Owners – formerly Generator Operators
  - Changes to Inventory/configuration
    - Plant level information
    - Connected energy storage
    - Added Plant EIA code
  - New: event reporting
    - Contributing operating condition
  - Changes to performance data
    - Eliminated voluntary component outage data and other voluntary derate and delay fields
  - New Platform (OATI) – same provider as conventional GADS
  - 2024 GADS Wind Data Reporting Instructions

# GADS Solar—New

Applies to NERC-registered Generator Owners for solar PV plants with a plant total installed capacity of 20 MW or greater per plant with commercial operation that began on January 1, 2010, (or later) regardless of interconnection

Reporting will be phased-in

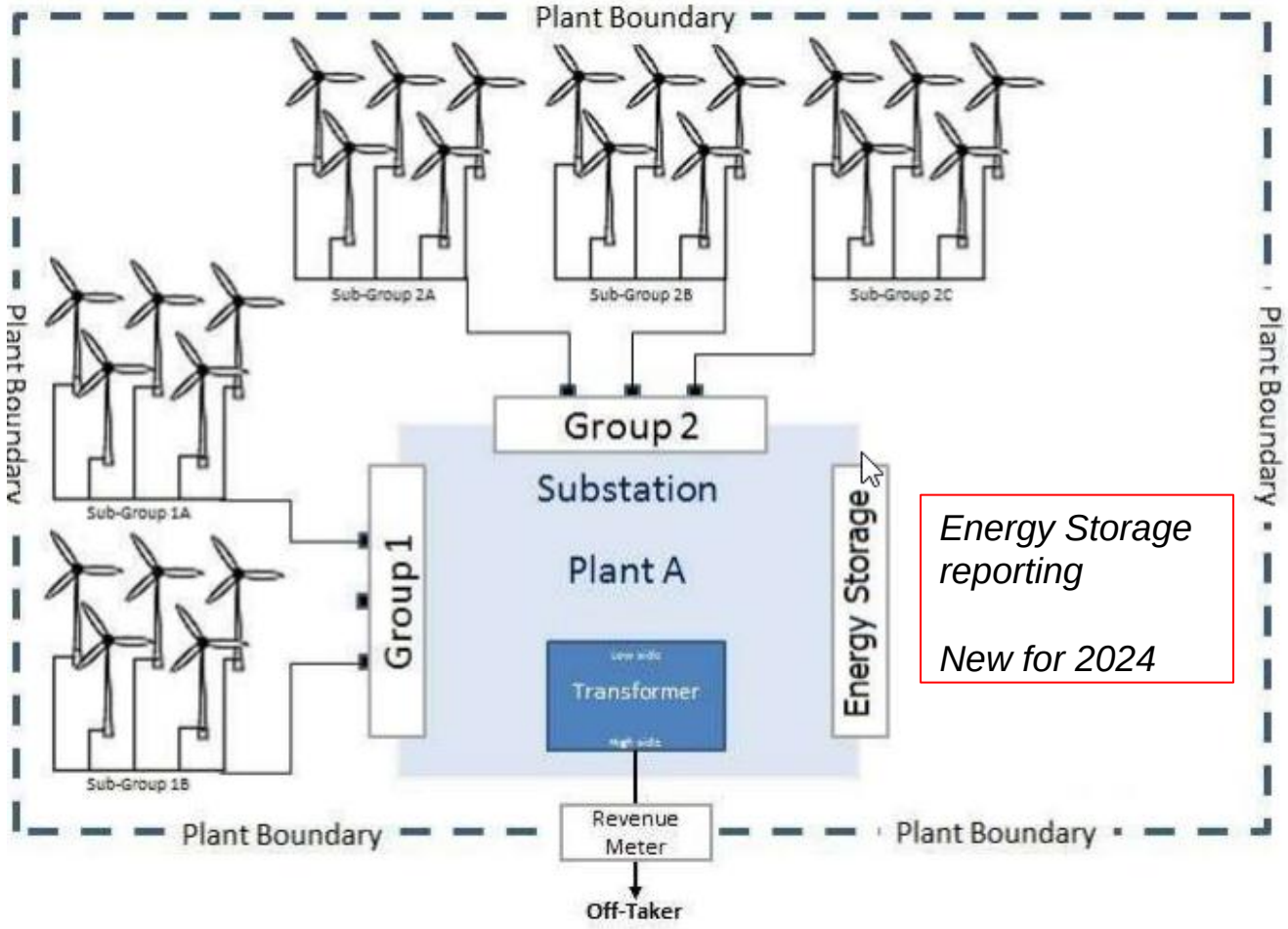
- 2024 – Plants with a plant total installed capacity of 100 MW or more
- 2025 – Plants with a plant total installed capacity of 20 MW or more




2024 GADS Solar Data Reporting Instructions

# GADS Wind Configuration Definitions

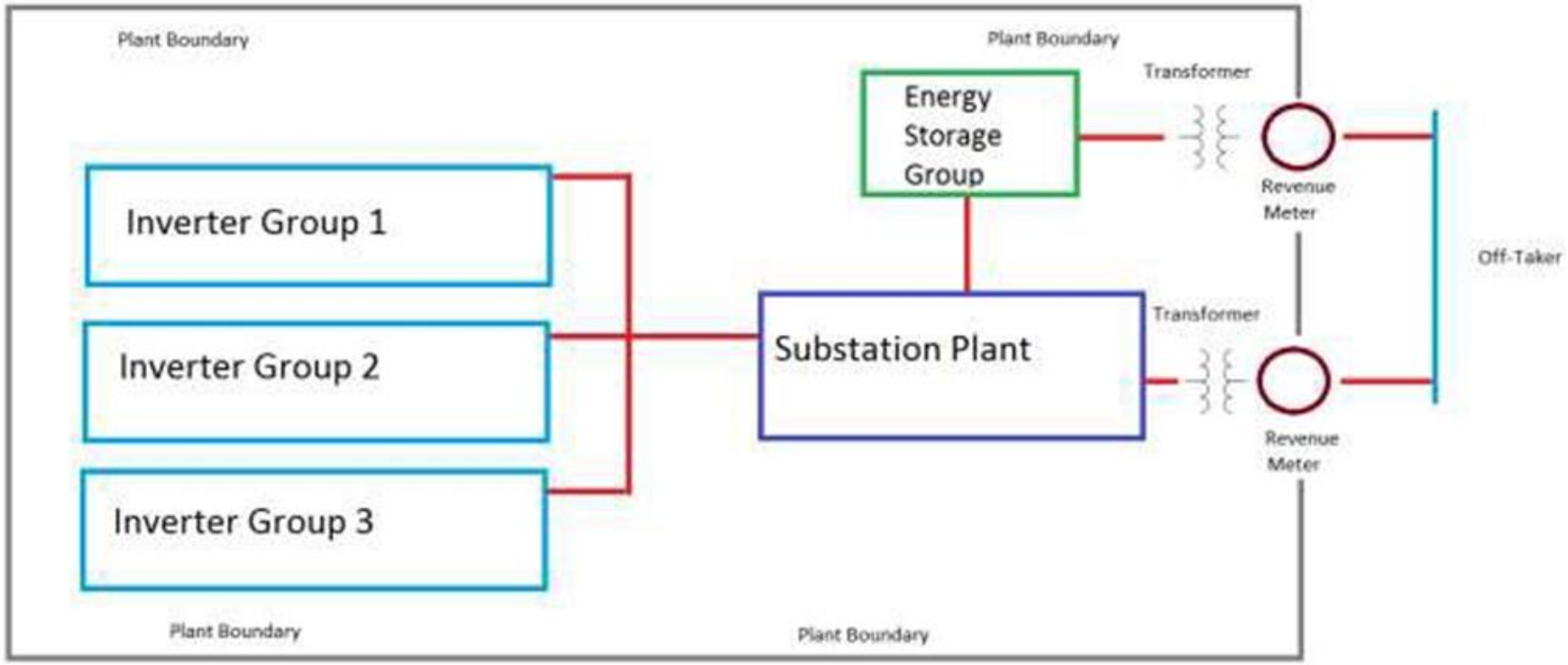
- **Sub-Group**: A group of turbines with the same manufacturer, design, model number, and phase of construction
- **Group**: One or more sub-groups, typically differentiated by the phase or year they were commissioned
- **Turbine Hours:** The number of turbines in a sub-group multiplied by the number of hours in a calendar month
  - E.g., 10 turbines * 720 hours in April = 7,200 turbine hours




*Energy Storage reporting*

*New for 2024*

# GADS Solar Groups



# Performance Data

**Monthly performance data is reported quarterly**

**Gross Actual Generation (GAG) & Net Actual Generation (NAG)**

**Net Maximum Capacity (NMC)**

**Resource Unavailable Hours:** Capture periods when fuel is not sufficient to generate

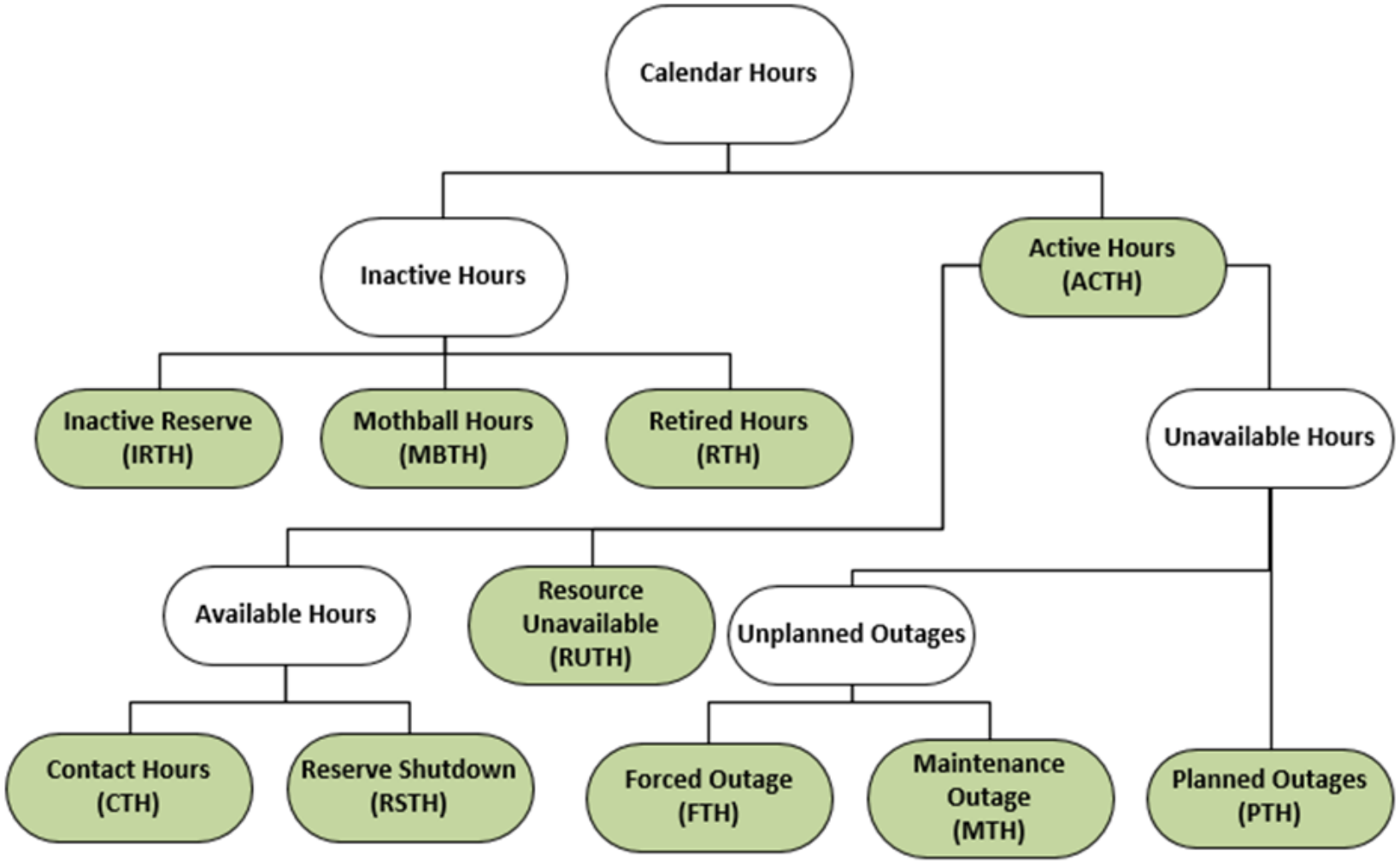
## Hours-based reporting across different operational states

Hours = month hours * number of turbines, inverters, or energy storage devices in the group

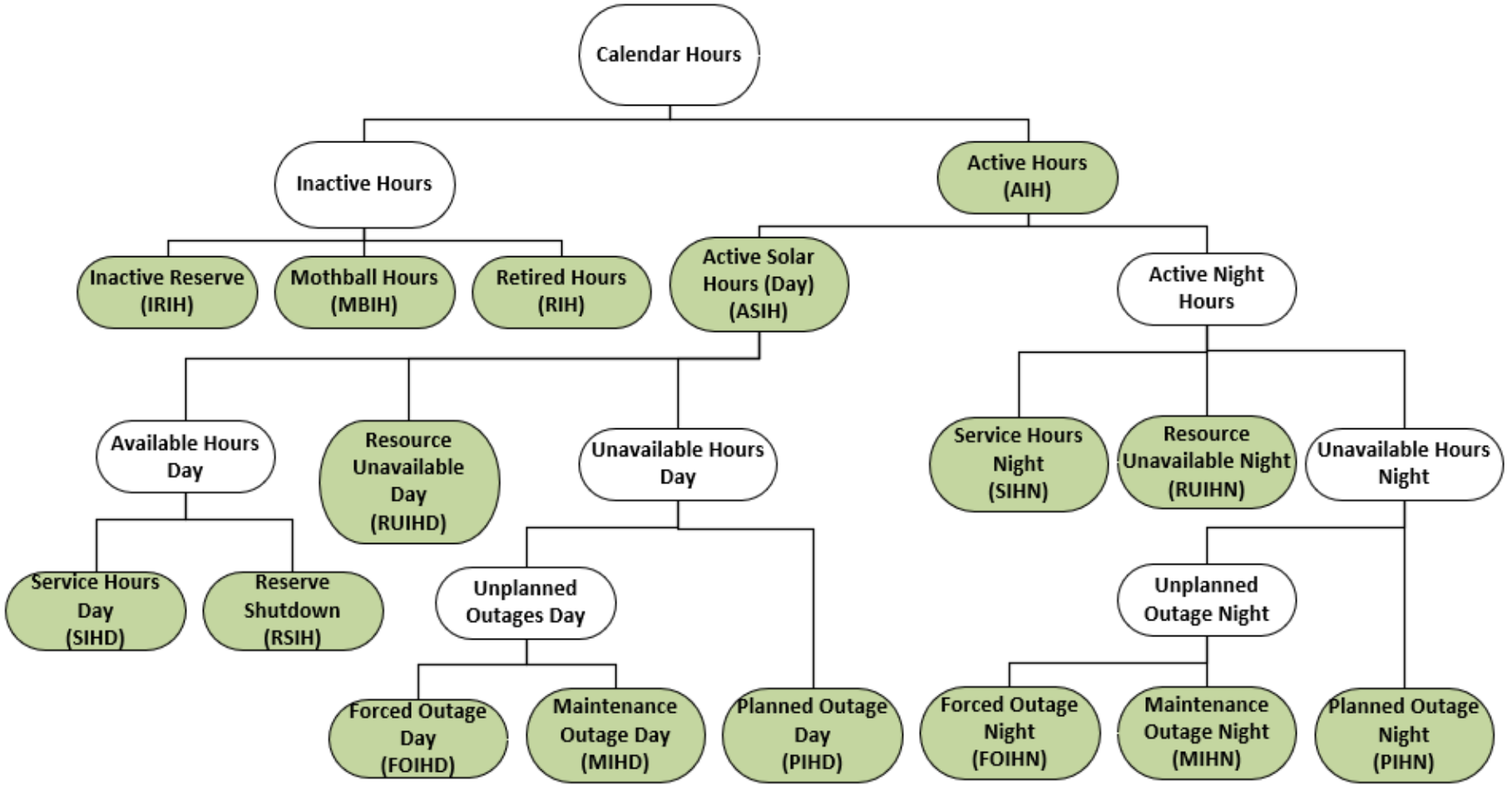
Turbine Hours = sub-group turbine count * calendar hours

- 10 turbines * 744 hours in January = 7,440 Turbine Hours
- Same concept applies to Inverter Group and Energy Storage Group Hours

# GADS Wind Data Classification



# Solar Performance Data Classification



# GADS Event Reporting for Wind and Solar

## Significant difference from conventional generating unit event reporting in recognition of the variability of the resource

- Objective is to identify outages that are impactful to the grid

## Event Start Criteria

- An event starts when there is a loss of at least 20 MW of plant total installed capacity due to a forced outage

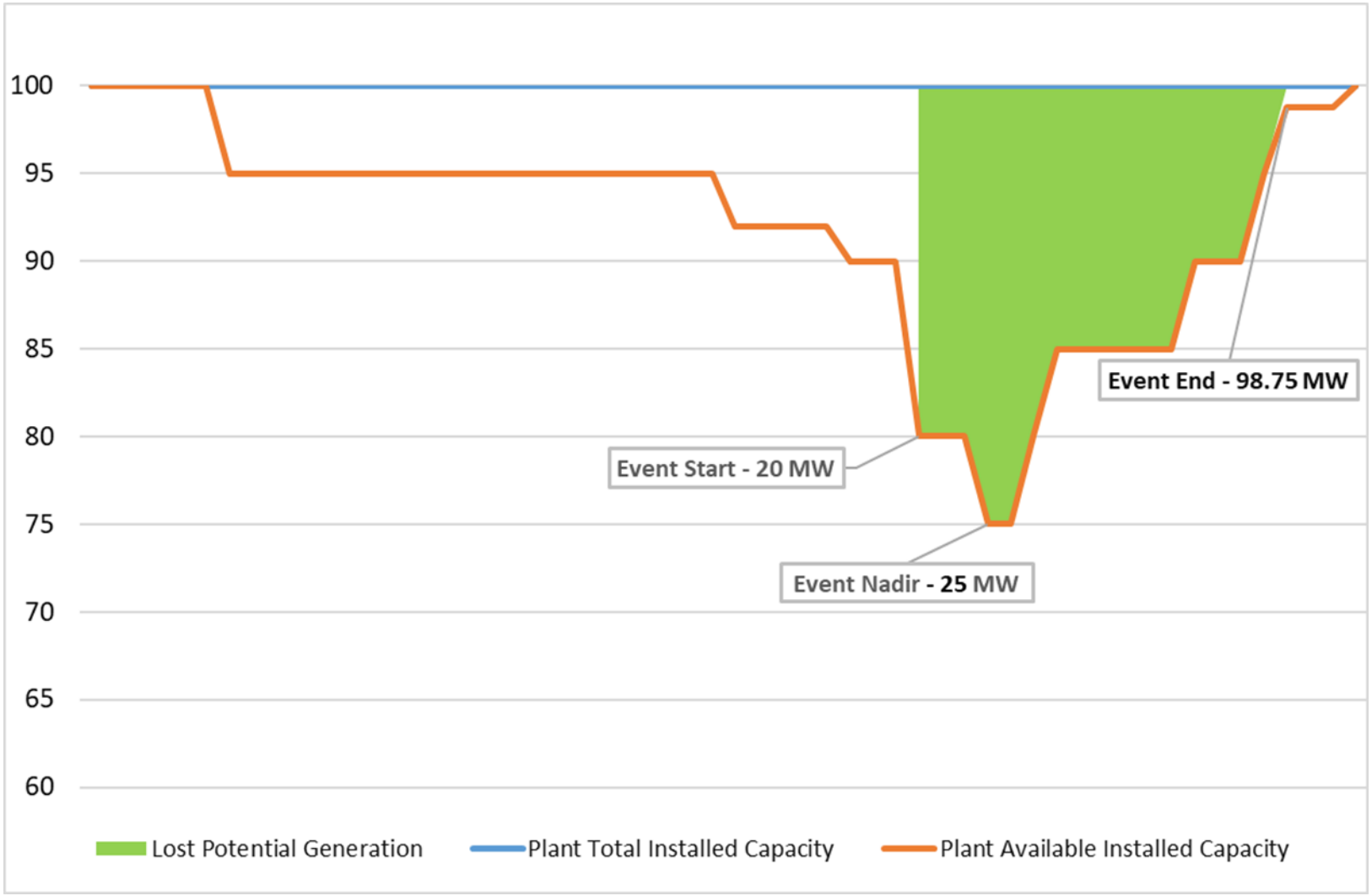
## Event End Criteria

- 95% of the plant total installed capacity that was unavailable due to the forced outage event has been returned to service AND
- Less than 20 MW of plant total installed capacity is unavailable due to a forced outage

## One primary cause code required, multiple cause codes may be assigned

## One contributing operating condition per event

# Event Example—100 MW Nameplate Facility




Event start doesn't occur until output drops to 20 MW below plant total installed capacity due to a forced outage

Event ends when output returns to 98.75 MW

This is 95% of total plant installed capability unavailable at nadir (95% of 25 MW lost, 23.75 MW)

# Contributing Operating Conditions—Required Input with Events

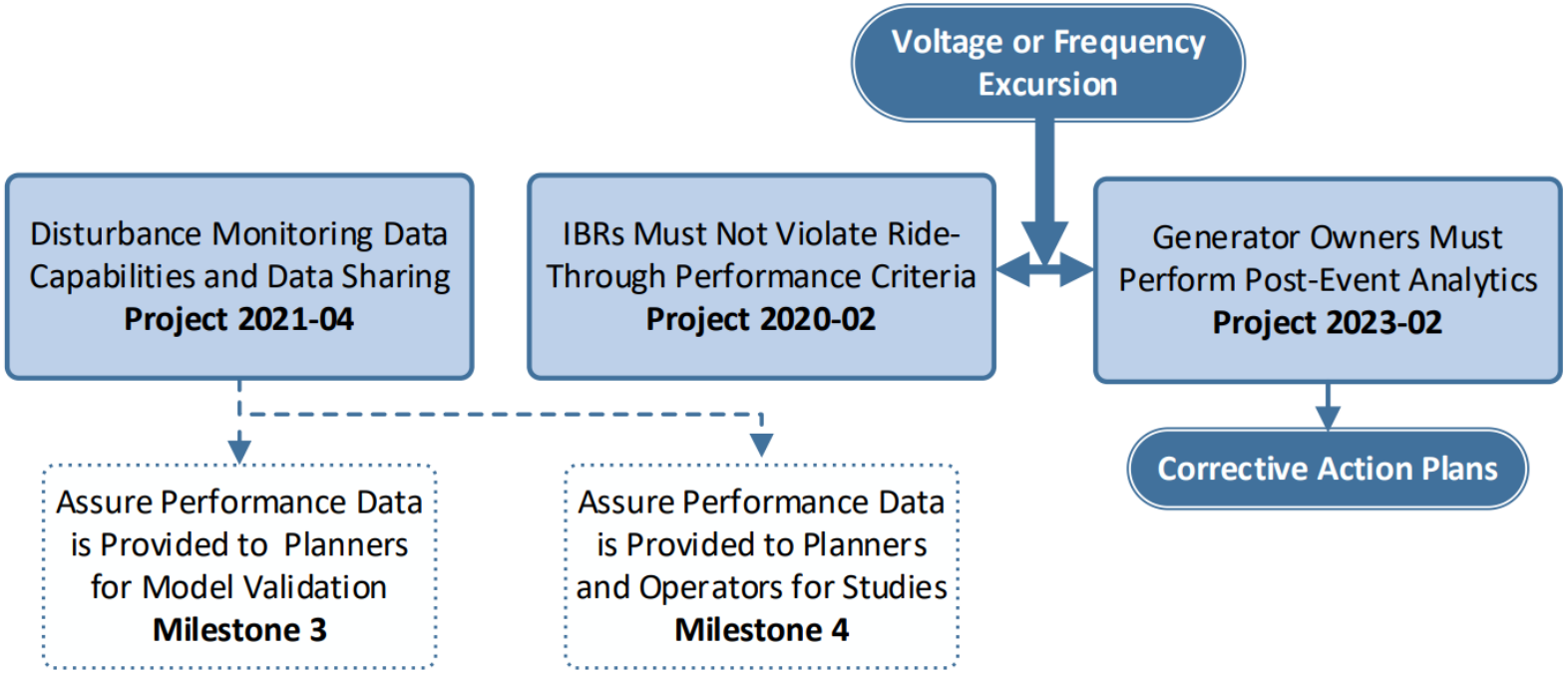
| Contributing Operating Condition | Code | Description |
|---|---|---|
| No Contributing Condition* | 0 | Outage or damage that occurred during normal operating (“blue-sky”) conditions without external influence. |
| Flood or High Water | 1 | Outage or damage occurred that is determined to be outside of design considerations due to due to flooding or high-water that occurs due to a natural or man-made event. This includes pre-emptive actions as well. |
| Drought or Low Water | 2 | Outage or damage occurred due to drought or low-water conditions that are determined to be outside of design considerations and that occurs due to a natural or man-made event. |
| Fire, including wildfires | 3 | Outage or damage occurred due to fire that occurs due to a natural or man-made event or equipment that gets involved from a fire initiated from another system in the plant. This includes pre-emptive actions as well. |
| Lightning | 4 | Outage or damage occurred due to lightning striking the equipment during a thunder and lightning storm. |
| Geomagnetic Disturbance | 5 | Outage or damage occurred due to a geomagnetic disturbance. This includes pre-emptive actions as well. |
| Earthquake | 6 | Outage or damage occurred due to an earthquake. |
| Tornado | 7 | Outage or damage occurred due to a tornado. This includes pre-emptive actions as well. |
| Hurricane | 8 | Outage or damage occurred due to a hurricane. This includes pre-emptive actions as well. |
| Cold Weather Conditions | 9 | Outage or damage occurred due to cold. |
| Hot Weather Conditions | A | Outage or damage occurred due to heat. |
| Ice, Hail, and/or Snow | B | Outage or damage occurred due to hail, ice and/or snow accumulation. |
| Turbulent Wind | C | Outage or damage occurred due to abnormally turbulent winds. |
| Avalanche or Landslide | D | Outage or damage occurred due to an avalanche or landslide. |
| State of Emergency declared by applicable authority or Other External Disturbance | Z | Outage or damage occurred due to state of emergency declared by applicable authority or other external disturbance. |

# Standards—FERC 901 Milestone 2

**Balloting open until August 12, on three Milestone 2-associated standards (PRC-028, PRC-029 and PRC-030)**

**IBR Definitions – Project 2020-06 Verifications of Models and Data for Generators – also out for ballot until August 12**

- Sub-BES IBR – Category 2 Generator Owners and Generator Operators – proposed compliance in 2027 after registration by May 2026
- Order 901 expects fully implemented Milestone 2 projects by January 1, 2030



# Category 2 GO and GOP Registration

November 17, 2022, FERC order in Docket No. RD22-4-000 to register IBRs not historically required to meet NERC standards

Project 2024-01 Rules of Procedure Definitions Alignment (Generator Owner and Generator Operator) – Standards Authorization Request – balloting through August 20, 2024

Texas RE will provide an update on registration at our Understanding New Generator Obligations workshop on October 16, 2024

# NERC IBR Event Reports in Draft

- March 2024 Southern California IBR Loss following Disturbance
- 2nd Loss of Solar Event in Southwestern Utah – Improved Performance
- Review of Past Wind Events in Texas for Systemic Concerns
- Texas RE continues to follow-up with ERCOT ISO and others on recommendations and corrective actions in Odessa and other past IBR event report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