

# NERC

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# Project 2021-07

Extreme Cold Weather Grid Operations, Preparedness and  
Coordination

Industry Webinar  
August 16, 2022

**RELIABILITY | RESILIENCE | SECURITY**



## Administrative

- Review NERC Antitrust Compliance Guidelines and Public Announcement

## Agenda

- Project Background
- Implementation Plan
- Standards Updates
- Posting Update
- Q&A

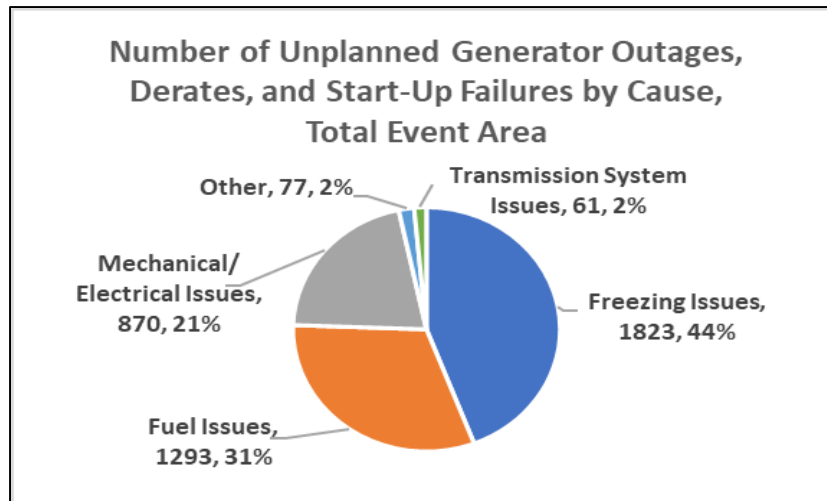
It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement 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. It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Participants are reminded that this meeting is public. Notice of the meeting was widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.

Name	Entity
Kenneth Luebbert	Eversource, Inc.
Matthew Harward	Southwest Power Pool, Inc.
Venona Greaff	Oxy
Derek Kassimer	ReliabilityFirst
Jonathan Davidson	City Utilities of Springfield
David McRee	Duke Energy
Thor Angle	Puget Sound Energy
Keith Smith	Orsted Onshore North American
Chad Wiseman	Newfoundland & Labrador Hydro
Bradley Pabian	Louisville Gas & Electric and Kentucky Utilities
Collin Martin	Oncor Electric Delivery, LLC
Jill Loewer	Utility Services
David Kezell	Electric Reliability Council of Texas, Inc. (ERCOT)
Ryan Salisbury	Oklahoma Gas & Electric
David Deerman	Southern Company Services

- During the week of February 14, 2021, for over two consecutive days, ERCOT averaged 34,000 megawatts (MW) of generation outages, nearly half of ERCOT's 2021 all-time winter peak load of 69,871 MW.
- Largest controlled firm load shed event in U.S. history (23,418 MW), third largest in quantity of outaged MW of load (August '03 and August '96 blackouts).
- Fourth event in the past 10 years which jeopardized bulk-power system reliability due to unplanned generating unit outages which escalated due to cold weather.





- 75 percent of the generating unit outages, derates, and failures to start, were caused by:
  - Freezing Issues (44 percent)
  - Fuel Issues (31 percent)

- Freezing Issues – generating units:
  - Frozen instrumentation (transmitters, sensing lines)
    - 34.5% ERCOT, 55% MISO South, 14.7% SPP
  - Icing on wind turbine blades
    - 32 percent in both ERCOT and SPP
- Protecting transmitters, sensing lines and instrumentation, as well as wind turbine blades against icing, could have cut the MW of generating units experiencing freeze-related outages:
  - by 67 percent in ERCOT,
  - by 47 percent in SPP, and
  - by 55 percent in MISO South.

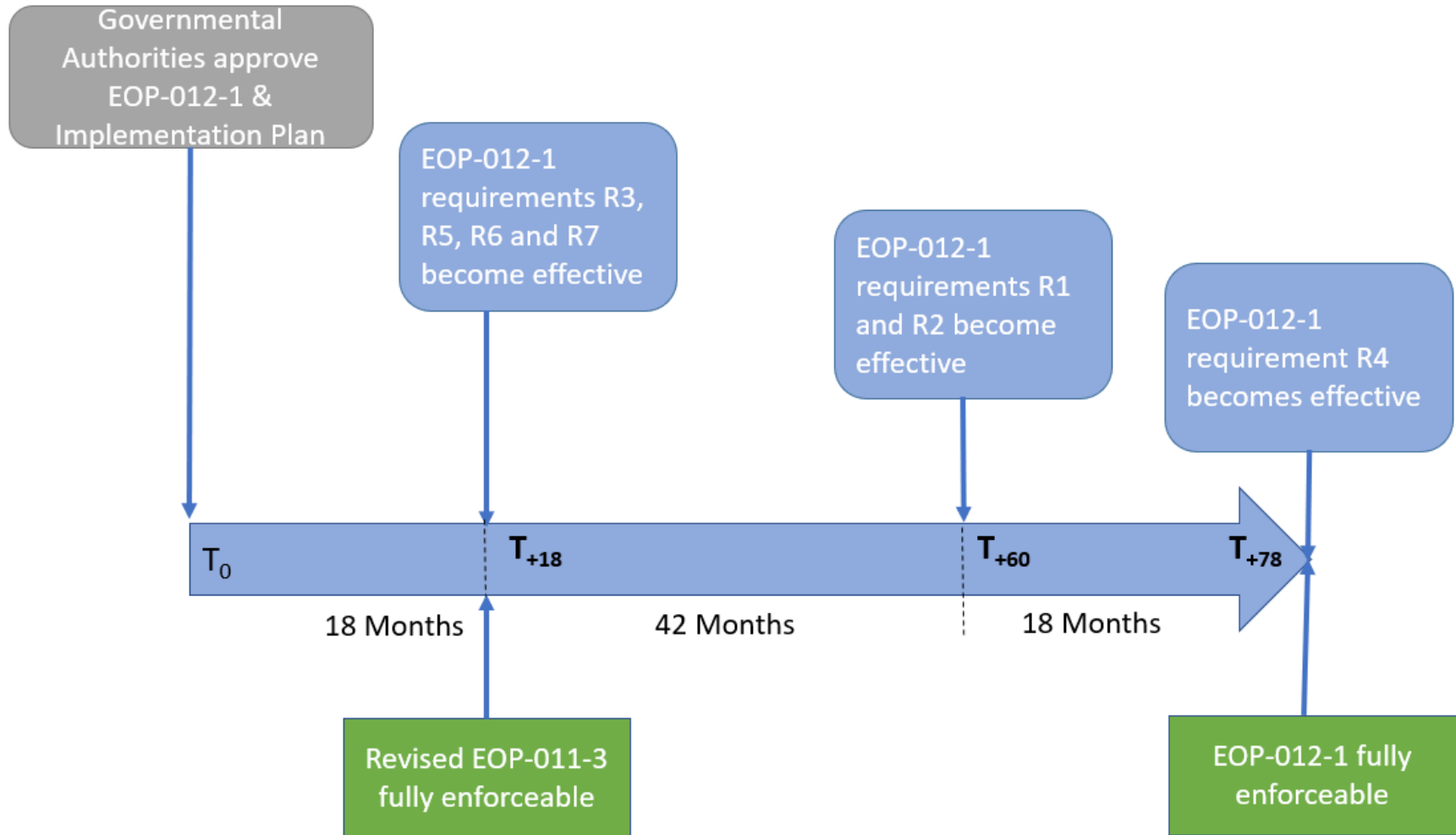


- Phase 1 includes the following Recommendations from the Joint Inquiry Report:
  - 1d – GO Corrective Action Plan
  - 1e – Revise GO training requirement to require annual training
  - 1f – GO operation to specific ambient temperature and weather conditions (retrofit and new build)
  - 1j – TO, TOP and DP separation of circuits used for manual load shed
- Due to NERC Board by September 30, 2022

- Phase 2 includes the following Recommendations from the Joint Inquiry Report:
  - 1a – GO identification of cold-weather-critical components and systems
  - 1b – GO identification and implementation of freeze protection measures on each of the elements identified per 1a
  - 1c – GO requirement to account for the effects of precipitation and wind
  - 1g – Revisions to provide greater specificity of the role each GO, GOP, and BA plays in determining generator capacity.
  - 1h – Language in BA operating plans that prohibits critical natural gas infrastructure loads from participating in demand response programs.
  - 1i – Specific requirements applicable to BAs, TOPs, PCs, and TPs around manual and automatic load shedding that protect critical natural gas infrastructure from load shedding.
- Due to NERC Board by September 30, 2023

- Recommendations
  - 1d – GO Corrective Action Plan
    - See new EOP-012-1 Requirements 6 & 7
  - 1e – Revise GO training requirement to include annual periodicity completed
    - See new EOP-012-1 Requirement 5
  - 1f – GO operation to specific ambient temperature and weather conditions (retrofit and new build)
    - See new EOP-012-1 Requirements 1, 2, & 7
  - 1j – TO, TOP and DP separation of circuits used for manual load shed
    - See revised EOP-011-3 sections 1.2.5 and 2.2.8

- Recommendations
  - 1d – GO Corrective Action Plans
    - 18 months after new EOP-012-1 Standard is approved
  - 1e – Revise GO training requirement to include annual periodicity completed
    - 18 months after new EOP-012-1 Standard is approved
  - 1f – GO operation to specific ambient temperature and weather conditions (retrofit and new build)
    - 5 years after new EOP-012-1 Standard is approved
  - 1j – TO, TOP and DP separation of circuits used for manual load shed
    - 18 months after revised EOP-011-3 and EOP-012-1 Standards are approved



- Standard Drafting Team concluded, in consultation with NERC Legal, that a generator retrofit requirement is permitted so long as: (1) the requirement provides for the reliable operation of the Bulk-Power System; and (2) does not require the enlargement (i.e. growth or expansion) of existing facilities or the construction of new generation capacity.
- See [Summary Response to Comments](#) for detailed basis for this conclusion

- **Generator Cold Weather Critical Component**

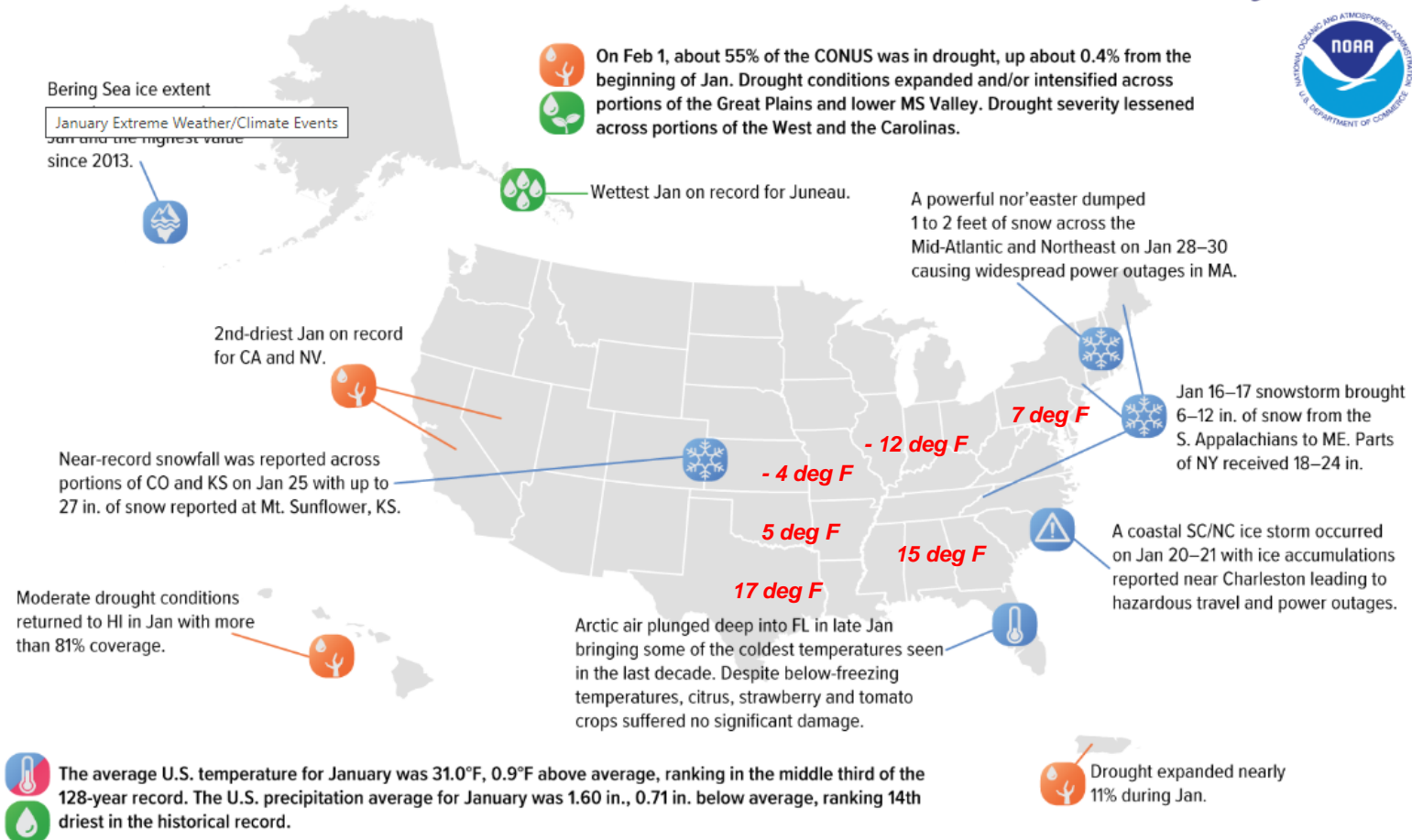
- *Any generating unit component or associated fixed fuel supply component, that is under the Generator Owner's control and is susceptible to freezing issues, the occurrence of which would likely lead to a Generator Cold Weather Reliability Event.*
- Partially addresses Phase 2 Recommendation (1a – GO identification of cold-weather-critical components and systems)
- Ensures that there is clarity in the standards that freeze protection measures only apply to a subset of components that may be susceptible to freezing and are critical to the operation of generating units.
- A fixed fuel supply component is intended to cover non-mobile equipment that supports the reliable delivery of fuel to the generating unit that is controlled by the Generator Owner. It would not include mobile equipment such as trains, bulldozers, or other equipment that are not fixed in one location.

- **Extreme Cold Weather Temperature**

- *The temperature equal to the lowest 0.2 percentile of the hourly temperatures measured in December, January, and February from 1/1/2000 through the date the temperature is calculated.*
- Matches standard language with typical engineering practice to use a statistical approach to determine the design temperature when implementing generation facility freeze protection measures
- Using the lowest 0.2 percentile of winter month temperatures since 1/1/2000 to identify a temperature yields a value which has been rarely surpassed but which allows some margin for a Generator Owner to have previously demonstrated successful operation

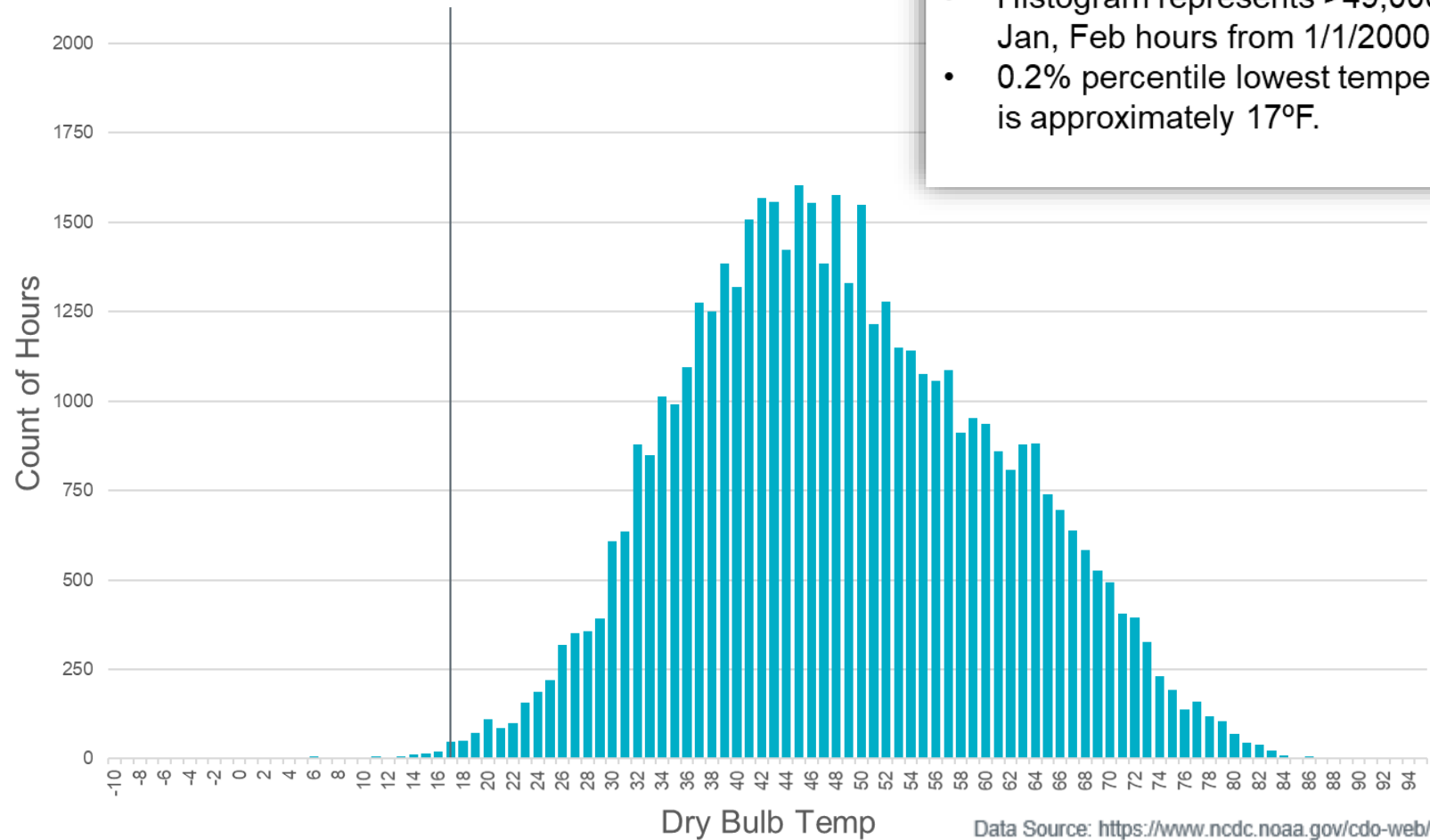


## U.S. Selected Significant Climate Anomalies and Events for January 2022



Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/sotc>

# Temperature Histogram for Dallas, TX



- Histogram represents >49,000 Dec, Jan, Feb hours from 1/1/2000.
- 0.2% percentile lowest temperature is approximately 17°F.

Data Source: <https://www.ncdc.noaa.gov/cdo-web/>

- **Generator Cold Weather Reliability Event**

*One of the following events:*

- (1) a forced derate of more than 10% of the total capacity of the unit and exceeding 20 MWs for longer than four hours in duration;*
- (2) a start-up failure where the unit fails to synchronize within a specified start-up time;*
- or*
- (3) a Forced Outage,*

*for which the apparent cause(s) is due to freezing of equipment within the Generator Owner's control and the dry bulb temperature at the time of the event was at or above the Extreme Cold Weather Temperature.*

- **Generator Cold Weather Reliability Event**

- Limits event to those that are impactful to grid operation. Either a Forced Outage or a startup failure on a BES Generating Unit or a derate that is significant in scale and duration.
- Limits event to only those that are apparently caused by freezing or equipment under the Generator Owner's control
  - Use of the word apparent was intentional to clarify that the standard did not intend to require a detailed root cause analysis for every Generator Cold Weather Reliability Event
- Does not discourage Generator Owners from preparing to operate below the Extreme Cold Weather Temperature for a site as well as addressing any freeze issues if they arise, as it does not require CAPs when freeze issues occur at those temperatures (but at a minimum, generators are able to perform to the Extreme Cold Weather Temperature). Generator Owners should continue to provide accurate minimum operating temperatures to the BAs.

- **Facilities Section**
  - Which Generating Units does this apply to?
    - Generating units that are obligated to serve a Balancing Authority load through an Open Access Transmission Tariff or contractual agreement, or
    - Identified as a Blackstart Resource
  
  - Which units may operate but are not included in the standard?
    - Units that typically do not continuously run for four hours below 32 degrees Fahrenheit (0 degrees Celsius)
    - Exclusion applies even if said Units above have been called upon to mitigate emergencies at or below 32 degrees Fahrenheit.

- EOP-012 Requirement R1 and R2 have been written to address FERC Key Recommendation 1f:
  - *To require Generator Owners to retrofit existing generating units, and when building new generating units, to design them, to operate to a specified ambient temperature and weather conditions (e.g., wind, freezing precipitation). The specified ambient temperature and weather conditions should be based on available extreme temperature and weather data for the generating unit's location.*

- For NEW generating units (COD after Effective Date of R1)
- Implement freeze protection measures to provide capability to operate for  $\geq 12$  hours at the Extreme Cold Weather Temperature assuming a concurrent 20 mph wind on any exposed Generator Cold Weather Critical Components; or
- Explain in a declaration any technical, commercial, or operational constraints that preclude the ability to implement such measures

- For EXISTING generating units (COD prior to Effective Date of R2)
- Add new or modify existing freeze protection measures to provide capability to operate for  $\geq 1$  hour at the Extreme Cold Weather Temperature.
- Any generating units that do not have this capability shall develop a Corrective Action Plan (CAP) for identified issues, including any needed modifications to the cold weather preparedness plan required under R3.



- New for EOP-012-1 R3
  - Cold Weather Preparedness Plans to additionally include:
    - 3.1 Extreme Cold Weather Temperature for generating unit(s), including the calculation date and source of temperature data (new term- **see Slide 13 - 14**)
    - 3.2 Documentation identifying Generator Cold Weather Critical Components (new term – **see Slide 13-14**)
    - 3.3 Documentation of freeze protection measures implemented on Generator Cold Weather Critical Components, including measures that reduce the cooling effects of wind due to heat loss, and, where applicable, the effects of freezing precipitation (e.g., sleet, snow, ice, and freezing rain).

- Language that was moved over from EOP-011-2 (Standards Effective April 1, 2023) remains largely unmodified.
  - Each Generator Owner to implement and maintain one or more cold weather preparedness plans for its generating unit(s) subject to the standard which include the following:
    - 3.4 Annual maintenance and inspection of such measures
    - 3.5.1 Generating unit limitations and expected performance in cold weather
      - Capability and availability
      - Fuel supply and inventory concerns
      - Fuel switching capabilities
      - Environmental constraints
    - 3.5.2 Each Generator Owner to develop accurate data to include:
      - The generating unit(s)' minimum design temperature (i.e., faceplate capability) during cold weather or
      - minimum historical operating temperature or
      - engineering analysis to determine current minimum cold weather performance temperature.

- Once every 5 years perform a review of temp, plan, and freeze protection measures
  - 4.1 Calculate the Extreme Cold Weather Temperature, and update the cold weather preparedness plan if this temperature is now lower than the previous lowest calculation;
  - 4.2. Review its documented generating unit(s) minimum temperature contained within its cold weather preparedness plan(s), pursuant to Part 3.5.2; and
  - 4.3. Review whether its generating units have the freeze protection measures required to operate at Extreme Cold Weather Temperature pursuant to R1 or R2 as applicable, and if not, develop a CAP for the identified issues, including identification of any needed modifications to the cold weather preparedness plan required under Requirement R3

- EOP-012 Requirement R5 has been modified to address FERC Key Recommendation 1e:
  - *To revise EOP-011-2, R8, to require Generator Owners and Generator Operators to conduct annual unit-specific cold weather preparedness plan training.*

- EOP-012 Requirement R6 has been written to address FERC Key Recommendation 1d:
  - *To require Generator Owners that experience outages, failures to start, or derates due to freezing to review the generating unit's outage, failure to start, or derate and develop and implement a corrective action plan (CAP) for the identified equipment, and evaluate whether the CAP applies to similar equipment for its other generating units. Based on the evaluation, the Generator Owner will either revise its cold weather preparedness plan to apply the CAP to the similar equipment, or explain in a declaration (a) why no revisions to the cold weather preparedness plan are appropriate, and (b) that no further corrective actions will be taken. The Standards Drafting Team should specify the specific timing for the CAP to be developed and implemented after the outage, derate or failure to start, but the CAP should be developed as quickly as possible, and be completed by no later than the beginning of the next winter season.*

## Corrective Action Plans shall be developed for:

- A Generator Cold Weather Reliability Event:
  - a forced derate of more than 10% of the total capacity of the unit and exceeding 20 MWs for longer than four hours in duration;
  - A start-up failure where the unit fails to synchronize within a specified start-up time, or
  - A Forced Outage

## When the following conditions are met:

- The apparent cause(s) is due to freezing of equipment within the Generator Owner's control and the dry bulb temperature at the time of the event was at or above the Extreme Cold Weather Temperature.

- The Report identifies that most of the outages and derates in the February 2021 event were due to freezing of instrumentation, transmitters, sensing lines, or wind turbine blades (p 166 in report). As such, the SDT followed the Report recommendation to require a CAP when the apparent cause of the event is freezing.
- The SDT defined a new term, **Generator Cold Weather Reliability Event**, to clearly define the circumstances for which a CAP is required.
- The defined term will make the standard easier to understand and implement by providing clear and reasonable factors to determine whether the impact of an event requires mitigation.

- CAPs shall be developed:
  - no later than 150 days subsequent to the event OR
  - by July 1 that follows the event, whichever is earlier

This timeframe was chosen to allow Generator Owner's to review multiple events holistically following a winter season, and create one CAP for equipment with common failure causes



- To better ensure CAPs are executed, this separate requirement was drafted to implement the CAP after being developed in Requirements R2, R4, and R6.
- If implementation is not possible due to any technical, commercial or operational constraints as defined by the GO, a declaration explaining these constraints is sufficient.
- CAPs need to be updated as necessary if actions or timetables change

- Documents Included
  - EOP-012-1 (clean and redline)
  - Implementation Plan
  - Technical Rationale for EOP-012-1
  - Mapping Document
- Posting Date: August 3 – September 1, 2022 (30 days)
- [Project Page](#)

- Respond to Comments
  - Team Meetings September 2022
  - Final Ballot in September 2022
  - NERC Board Deadline September 30, 2022
- Point of Contact
  - Alison Oswald, Senior Standards Developer
    - [Alison.oswald@nerc.net](mailto:Alison.oswald@nerc.net) or call 404-446-9668
- Webinar Slides and Recording Posting
  - Within 48-72 hours of Webinar completion
  - Will be available in the Standards, Compliance, and Enforcement Bulletin

- Informal Discussion
  - Via the Questions and Answers Objectives feature
  - Chat only goes to the host, not panelists
  - Respond to stakeholder questions
- Other
  - Some questions may require future team consideration
  - Please reference slide number, standard section, etc., if applicable
  - Team will address as many questions as possible
  - Webinar and chat comments are not a part of the official project record
  - Questions regarding compliance with existing Reliability Standards should be directed to ERO Enterprise compliance staff, not the SDT



# Questions and Answers



**Webinar has ended – Thank You**