

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Project 2021-07

Extreme Cold Weather Grid Operations, Preparedness and Coordination

Industry Webinar
May 24, 2022

RELIABILITY | RESILIENCE | SECURITY



Administrative

- Review NERC Antitrust Compliance Guidelines and Public Announcement

Agenda

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

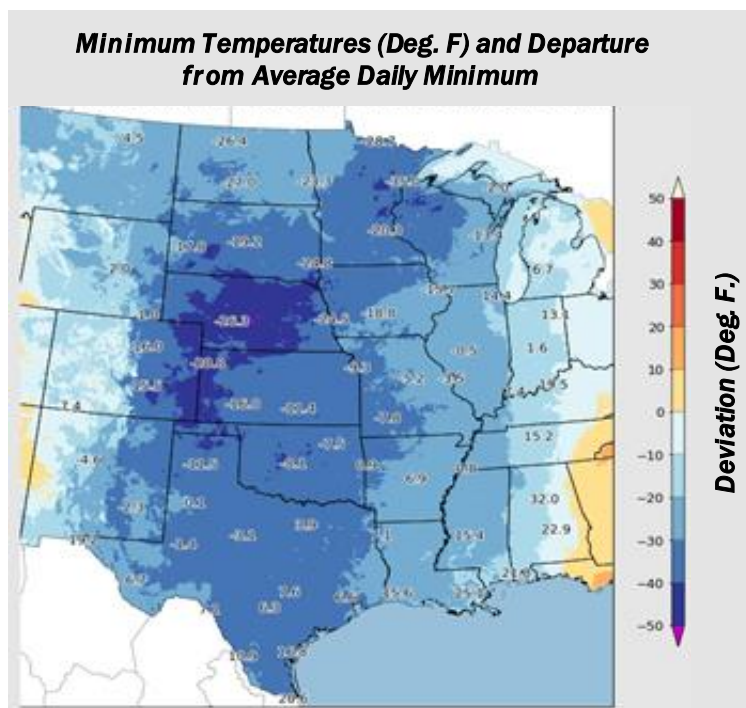
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Participants are reminded that this meeting is public. Notice of the meeting was widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition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

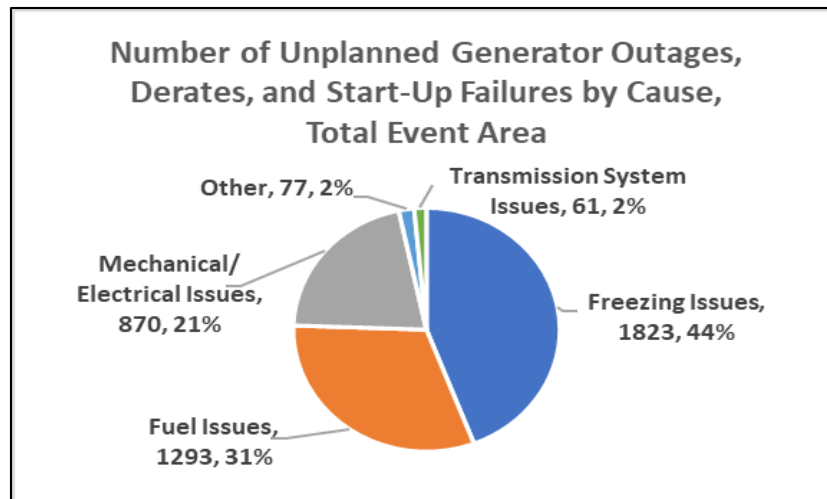
Name	Entity
Kenneth Luebbert	Eversource, Inc.
Matthew Harward	Southwest Power Pool, Inc.
Venona Greaff	Oxy
Derek Kassimer	ReliabilityFirst
Jonathan Davidson	City Utilities of Springfield
David McRee	Duke Energy
Thor Angle	Puget Sound Energy
Keith Smith	Orsted Onshore North American
Chad Wiseman	Newfoundland & 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.





- Comparing 1983, 1989, 2011, 2018 and 2021 cold weather conditions
- In every event, average daily temperatures fell below freezing in Dallas, Houston, and Jackson, for at least 3 days.
- 1983 was colder than 2021 on multiple days in Dallas, Houston and Jackson, MS, and 1989 was still coldest recorded winter for Houston and Galveston; 14 days below freezing over 2-3 weeks.
- 1983, 2011 and 2018 events all had significant freezing precipitation, like 2021.



- 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 include annual periodicity completed
 - 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 Requirement 6
 - 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
 - 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 Standard is approved

- EOP-011 Requirement R1 Part 1.2.5 has been expanded to address FERC Key Recommendation 1j:
 - *In minimizing the overlap of manual and automatic load shed, the load shed procedures of Transmission Operators, Transmission Owners (TOs) and Distribution Providers (DPs) should separate the circuits that will be used for manual load shed from circuits used for underfrequency load shed (UFLS)/undervoltage load shed (UVLS) or serving critical load. UFLS/UVLS circuits should only be used for manual load shed as a last resort and should start with the final stage (lowest frequency).*
- This Standard modification adds additional criteria TOPs should consider when developing their load shed procedures

- EOP-011-2 Requirement R1 Part 1.2.5 required TOPs to:
 - Have an Operating Plan that included processes to prepare for and mitigate Emergencies including provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency
- EOP-011-3 proposed to expand upon these ‘provisions’
 - Provisions to minimize the overlap of circuits that are designated for manual Load shed and circuits that serve designated critical loads;
 - Provisions to minimize the overlap of circuits that are designated for manual Load shed and circuits that are utilized for underfrequency load shed (UFLS) or undervoltage load shed (UVLS); and
 - Provisions for limiting the utilization of UFLS or UVLS circuits for manual Load shed to situations where warranted by system conditions

- The SDT elected to keep the phase “minimize the overlap” because it is not always practical or warranted to completely separate circuits used for each of these purposes
- This requirement can be accomplished in many different ways
 - Creating separate and distinct lists for each circuit type
 - Using prioritization and control-inhibit functions in an EMS
 - Varying the critical load priority
 - Each system is unique and will have various constraints that must be balanced

- EOP-011-2 Requirement R2 Part 2.2.8 required BAs to:
 - Have an Operating Plan that included provisions for operator-controlled manual Load shedding w/ its BA area
- EOP-011-3 Requirement R2 Part 2.2.8 clarifies that the BA would create the specifications for the provisions and the TOP would implement them, since the BA would not have the capability to implement
 - Provisions for Transmission Operators to implement operator-controlled manual Load shed in accordance with Requirements R1 Part 1.2.5

- **Facilities Section**
 - Which Generating Units does this apply to?
 - To address the Report's request to exclude units solely committed for summer period, the Facilities section defines which units are to be considered for this Standard.
 - Generating units that the Generator Owner plans to operate during its winter season.
 - When is the Winter Season?
 - A period of time specified by the Balancing Authority where the generator is located.
 - Which units may operate but are not included in the standard?
 - Units used only during Capacity Emergencies or Energy Emergencies are excluded

- 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.*

- Must ensure generating units can operate at minimum hourly temperature measured in proximity to generating unit
- 1975 date selected to approximate the most recent 50 years
- Generating units account for cooling effects of wind and impacts of precipitation to allow for different geographies
- Rule is specific to freeze protection measures

- Existing generating units that require modification to meet the new standard must develop and implement a Corrective Action Plan (CAP)
 - Describes corrective actions and planned modifications
 - Provides a timetable
 - Identifies temporary operating limitations
- Generator Owners may declare and must document technical, commercial or operational constraints that impede or preclude corrective actions to meet the standard

- Generator Owners that declare that a new unit is not able to implement freeze protection measures to meet the R1 standard must document the technical, commercial or operational constraints on implementation.
- Generator Owners must review this determination every 5 calendar years and document that the inability to apply such freeze protection measures still exists
- As new freeze protection technologies become commercially available, this 5-year periodic review would implicitly require their application or a newly documented declaration that technical, commercial or operational constraints still preclude their application

- EOP-011-2 language that was moved over from EOP-011-2 (Effective April 1, 2023)
- Addition of minimum hourly temp (new term- see Slide 25)
- Purpose of R3: The *2019 FERC and NERC Staff Report on The South Central United States Cold Weather Bulk Electric System Event of January 17, 2018* (Report) recommends modified Reliability Standards to require Generator Owners to implement “winterization activities on generating units to prepare for [cold weather].”

- To address these recommendations contained in the Report, the DT for Project 2019-06 Cold Weather developed requirements for 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:
 - appropriate freeze protection measures
 - periodic maintenance and inspection of such measures
 - accurate ambient temperature design specifications
 - and generating unit limitations and expected performance in cold weather.
- The requirement is deleted from EOP-011-3, and is placed as R3 in the new EOP Reliability Standard dedicated solely to extreme cold weather preparedness.

- Additionally, Project 2019-06 Cold Weather requires the 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.
- The requirement is also deleted from EOP-011-3, and is placed as R3 in the new EOP Reliability Standard dedicated solely to extreme cold weather preparedness.
- NEW FOR EOP-12-2 R3:
 - Documented minimum hourly temperature experienced at its location since 1/1/1975 or a lesser period if reliable data is not available to 1975
 - This is in response to the new recommendations and consistent with the other terms being added for EOP-12

- 5 year review of temp, plan, freeze protection measures
 - 4.1. Review the documented minimum hourly temperature developed pursuant to Part 3.1, and update the cold weather preparedness plan with the lowest temperature as necessary;
 - 4.2. Review its documented cold weather minimum temperature contained within its cold weather preparedness plan(s) for its generating units, pursuant to Part 3.4.2; and
 - 4.3. Review whether its generating units have the freeze protection measures required to operate at the lowest temperature established pursuant to Requirement R1 and, if not, implement appropriate modifications per the requirements of Part 1.4. (i.e., CAP)

- 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 derate of more than 10% of the total capacity of the unit for longer than four hours in duration, or
- 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:

- (i) the apparent cause(s) of the event is due to freezing of the Generator Owner's equipment within the Generator Owner's control, and
- (ii) the ambient conditions at the site at the time of the event are at or above the temperature documented in Part 3.4.2

- *Each Generator Owner that owns a generating unit that experiences an event resulting in a derate of more than 10% of the total capacity of the unit 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 for which (i) the **apparent cause(s) of the event is due to freezing of the Generator Owner's equipment within the Generator Owner's control***
- 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. Generator Owners should use professional judgement, expertise and operating experience to assess the apparent cause of these events to judge if freezing is the cause or not.

- 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

*R6.2.6. A declaration, where deemed appropriate by the Generator Owner based on the review of Parts 6.2.1 through 6.2.5 that no revisions to the cold weather preparedness plan are required and that no further corrective actions will be taken. The Generator Owner **shall document technical, commercial, or operational constraints as defined by the Generator Owner as support for such declaration***

If after reviewing parts 6.2.1 – 6.2.5, the Generator Owner can declare that no updates to the cold weather preparedness plan are necessary and no further corrective actions will be taken. In this scenario, the CAP needs to include that declaration as well as the constraints that led to it which includes:

- Technical
- Commercial
- Operational

- Documents Included
 - EOP-011-3
 - EOP-012-1
 - Implementation Plan
 - Technical Rationale for EOP-011-3 and EOP-012-1
 - Mapping Document
- Posting Date: May 19 – June 17, 2022 (30 days)
- [Project Page](#)

- Respond to Comments
 - Team Meetings in June and July 2022
 - Second Posting as required from August – 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 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