

# Technical Rationale for Reliability Standard EOP-012-3

October 2024

## EOP-012-3 – Extreme Cold Weather Preparedness and Operations

### Introduction

This document explains the technical rationale and justification for the proposed Reliability Standard EOP-012-3. It provides stakeholders and the ERO Enterprise with an understanding of the technology and technical requirements in the Reliability Standard. This Technical Rationale and Justification for EOP-012-3 is not a Reliability Standard and should not be considered mandatory and enforceable.

### Background

From February 8 through February 20, 2021, extreme cold weather and precipitation caused large numbers of generating units to experience outages, derates or failures to start, resulting in energy and transmission emergencies (referred to as the “Event”). The total Event firm load shed was the largest controlled firm load shed event in U.S. history and was the third largest in quantity of outaged megawatts (MW) of load after the August 2003 Northeast blackout and the August 1996 West Coast blackout. The Event was most severe from February 15 through February 18, 2021, and it contributed to power outages affecting millions of electricity customers throughout the regions of ERCOT, SPP, and MISO South. Additionally, the February 2021 event is the fourth cold weather event in the past 10 years, which jeopardized BPS reliability. A joint inquiry was conducted to discover reliability-related findings and develop recommendations from Federal Energy Regulatory Commission (FERC), NERC, and Regional Entity staff. The FERC, NERC, and Regional Entity Staff Report into the February 2021 Cold Weather Outages<sup>1</sup> (“Joint Inquiry Report”) was published on November 16, 2021.

Project 2021-07 was a two-phase project to address the 10 sub-recommendations in Key Recommendation 1 of the Joint Inquiry Report for new or enhanced NERC Reliability Standards. Reliability Standard EOP-012-1 was originally developed to address Recommendations 1d, 1e, and 1f of the Joint Inquiry Report through new and enhanced requirements for generator preparedness for extreme cold weather conditions. Reliability Standard EOP-012-2 was revised to address Key Recommendations 1a, 1b, and 1c as well as the FERC directives in the February 2023 Order approving the Phase 1 standards EOP-011-3 and EOP-012-1.<sup>2</sup>

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<sup>1</sup> [The February 2021 Cold Weather Outages in Texas and the South Central United States | FERC, NERC and Regional Entity Staff Report | Federal Energy Regulatory Commission](#)

<sup>2</sup> *N. Am. Elec. Reliability Corp.*, 182 FERC ¶ 61,094 (2023) (FERC Order), *notice denying reh’g and providing for further consideration*, 183 FERC ¶ 62,034 (2023).

Reliability Standard EOP-012-3 is being revised to address FERC directives in the June 2024 order approving EOP-011-4 and EOP-012-2<sup>3</sup>.

## Defined Terms

Previous DTs developed five defined terms to be added to the NERC Glossary of Terms to make the requirements easier to read and understand. Project 2024-03 updated one term (Generator Cold Weather Constraint) to meet the FERC directives in the June 2024 Order and provided additional language to clarify issues noted during the development of EOP-012-3, 2024 Small Group Advisory Session(s), and input received during outreach with industry. These five terms are:

### 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.*

The definition of Extreme Cold Weather Temperature (ECWT) was developed by the 2021-07 Drafting Team (DT) to provide clarity to the Generator Owner (GO) on determining what temperature triggers the requirement obligations. Each GO should select a reliable source of data from a recording location near the plant to determine their ECWT. Sources could include, for example, the National Weather Service (NWS) or National Oceanographic and Atmospheric Administration (NOAA) weather stations, Federal Aviation Administration (FAA) weather stations, or Environment and Climate Change Canada location for Canadian entities<sup>4</sup>, etc. NOAA's National Centers for Environmental Information provides Climate Data Online (CDO) as a free resource that includes quality-controlled weather data and 30-year Climate Normals<sup>5</sup>. In general, GOs should use the location nearest the plant, but may select a further location if geographic or local climatic patterns make a further location more representative of the weather at the generating unit. GOs may use on-site weather stations if data, which reasonably matches reliable nearby off-site sources since January 1, 2000, is available. The starting period chosen by the 2021-07 DT to gather data to determine the lowest temperatures that occur near a facility is based on the completion of the modernization of the National Weather Service project known as MAR (Modernization and Associated Restructuring). This project was completed in the year 2000. In general, the National Weather Service modernization provides weather data to be available at most large airports. This will make it fairly accessible for companies to gather data and perform the required analysis. The December through February timeframe was selected to correspond to the meteorological winter, as defined by NOAA.<sup>6</sup>

The 2021-07 DT discussed methods for determining an ECWT with engineering design professionals, and it was determined that it is typical engineering practice to use a statistical approach to determine the design temperature when implementing generation facility freeze protection measures. The 2021-07 DT determined that only winter temperature values (i.e. between December and February) shall be used for the statistical approach and based on analysis of multiple weather data sites, it was determined that by using the lowest 0.2 percentile, there will be sufficient data points to ensure that a single hour at a temperature that may not be accurate, or may be a statistical anomaly, doesn't result in an overly

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<sup>3</sup> *N.A.M.Elec.Reliability Corp.*, 187 FERC ¶ 61,204 (FERC Order)

<sup>4</sup> [Environment and Climate Change Canada - Canada.ca](https://www.ec.gc.ca/environnement/Environment%20and%20Climate%20Change%20Canada)

<sup>5</sup> <https://www.ncei.noaa.gov/products/land-based-station/us-climate-normals>

<sup>6</sup> <https://www.ncei.noaa.gov/news/meteorological-versus-astronomical-seasons>

<sup>6</sup> [Report \(nerc.com\)](#)

conservative design or preclude the ability of the GO to use historical operating data to prove compliance to the requirements. The 2021-07 DT selected the 0.2 percentile of winter month temperatures since 1/1/2000 to identify a temperature which has been rarely surpassed, but which allows some margin for a GO to have previously demonstrated successful operation. The 2021-07 DT considered using the lowest recorded hourly ambient temperature, but upon further review of the historical weather data and generally accepted design principles, determined that the statistical approach to setting the ECWT for a site's location was more reasonable.

The 2024-03 DT recognized comments and concerns raised during the 2024 Small Group Advisory Session on cold weather preparedness regarding application of the ECWT calculation if hourly temperature values were questionable. If complete data sets are not available (e.g., data is corrupt or missing) at a single weather station back to January 1, 2000, the GO should document the methodology they use to determine their ECWT, such as appending data from multiple weather stations or selecting a complete or partial data set from a weather station further away from the facility. The 2021-07 and 2024-03 DTs realized that a complete data set (i.e., all hours of every day of every year for the months of December, January, and February) may not be available due to a variety of technical reasons. To that point, the Generator Owner's approach in handling the missing/corrupt data should be documented in their methodology and available to Compliance Monitoring Enforcement Program (CMEP) staff as needed. Please reference the Calculating Extreme Cold Weather Temperature document drafted by the 2021-07 DT and updated by the 2024-03 DT for an example of how to calculate the ECWT.

### **Generator Cold Weather Critical Component**

*Any generating unit component or system, 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. This definition excludes any component or system or associated Fixed Fuel Supply Component located inside a permanent building with a heating source that regularly maintains the space at a temperature above 32 degrees Fahrenheit (0 degrees Celsius).*

The 2021-07 DT felt the best method to address where freeze protection measures should be implemented was to define a term which specifies a subset of components that may be susceptible to freezing and are critical to the operation of generating units. GOs should consider previous freeze-related issues experienced by the generating unit(s), as well as actions taken to mitigate those freeze-related issues, when establishing its list of Cold Weather Critical Components. The 2021-07 DT also felt it is appropriate to specifically exclude components that are not susceptible to freezing due to being inside heated buildings that maintain the interior temperature above freezing.

The 2021-07 DT's intent with regard to the language "that is under the Generator's Owner's control" was to clearly delineate that cold weather events external to the generation site such as loss of fuel supply or loss of auxiliary power to the site that resulted in a Generator Cold Weather Reliability Event (see definition below) would not be subject to this standard. Furthermore, ice buildup on transmission lines and/or high voltage lines between the generating station and point of interconnection with the Transmission Owner would not constitute a freezing condition in the context of this Standard, and therefore, these lines would not be considered a Generator Cold Weather Critical Component.

The 2021-07 DT’s intent with the use of the phrase “permanent building” is to refer to a structure that is in place year round, shall accommodate personnel entry, and has a heating source that regularly maintains the space at a temperature above 32 degrees Fahrenheit for the purpose of protecting components from freezing (e.g. heated container that protects inverter-based resources or battery energy systems). The 2024-03 DT recognized comments and concerns raised during the 2024 Small Group Advisory Session on cold weather preparedness regarding heating of the “permanent building.” The HVAC/heating system is not a freeze protection measure in terms of being included in the cold weather preparedness plan as it is not protecting a Generator Cold Weather Critical Component (per the definition) nor is it a Generator Cold Weather Critical Component. The 2024-03 DT expects the HVAC/heating system to be part of routine maintenance and monitoring to ensure that the heated building remains above 32 degrees Fahrenheit.

### **Fixed Fuel Supply Component**

*Non-mobile equipment that supports the reliable delivery of fuel to the generating unit and under the control of the Generator Owner at a plant site. Gaseous, liquid, or solid fuel handling components that are installed on site as fixed parts of the fuel delivery system that are under the Generator Owner’s control are included. Mobile equipment such as trains, bulldozers, or other equipment that are not fixed in one location are excluded.*

The 2021-07 DT wanted to clarify the boundaries of responsibility for the GO as it relates to sites having fuel handling equipment within their control and responsibility to provide freeze protection. The intent of this definition is to clarify that mobile equipment is not part of this requirement, but permanent fixed equipment impacting fuel delivery needed for generation is included.

### **Generator Cold Weather Reliability Event**

*One of the following events for which the apparent cause(s) is due to freezing of equipment or impacts of freezing precipitation (e.g., sleet, snow, ice, and freezing rain) on 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:*

- (1) a forced derate of more than 10% of the total capacity of the unit but not less than 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.*

**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 standard 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.*

The Key Recommendation from the Joint Inquiry Report recommends a Reliability Standard that requires GOs to develop a Corrective Action Plan for generating units that experience outages, failures to starts, or derates due to freezing. The Joint Inquiry 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 the Joint Inquiry Report). As such, the 2021-07 DT followed the Joint Inquiry Report recommendation to require a Corrective Action Plan when the apparent cause of the event is freezing of equipment or impacts of freezing precipitation (e.g., sleet, snow, ice, or freezing rain) on equipment. The 2021-07 DT felt that it was important to clearly call out freezing precipitation as these events were included in the outages and derates that identified as freezing in the Joint Inquiry Report. Furthermore, Key Recommendation 1c of the report requires GOs to account for the effect of precipitation. The 2021-07 DT has developed parameters around these events to clarify a reasonable baseline of what level of derate qualifies as an event, and provide additional language to identify what constitutes a start-up failure. With the additional clarifications, the 2021-07 DT determined that the standard would benefit from a defined term, to clearly and efficiently state what constitutes an event. The result is a new defined term, Generator Cold Weather Reliability Event, that defines the circumstances for which a Corrective Action Plan is required (i.e., when a freezing event affects the equipment within the control of the GO). 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. The 2021-07 DT is using the definition of apparent as defined in the Webster’s dictionary as “clear or manifest to the understanding”.

The Corrective Action Plan requirement applies to any forced outage due to freezing, regardless of duration. Derates, which are short lived (specified as four hours by the 2021-07 DT) or of small capacity impact (specified as less than 20 MW by the 2021-07 DT, which corresponds with the threshold for Bulk Electric System (BES) impacting generation units), are excluded from the Corrective Action Plan requirement to limit the administrative burden to GOs for events that are minimally impacting to the BES. Also excluded are proactive operational actions to limit the potential of forced outages or derates. It should be noted that nothing in this standard prevents a GO from taking its own corrective actions resulting from such events. Startup failures for conventional generation are defined using the GADS definition with the removal of “following an outage or reserve shutdown”, since the definition of reserve shutdown is different in GADS than it is in some of the Regional Transmission Organizations (RTO’s) and Independent System Operators (ISOs). From the GADS data reporting instructions, the startup period for each unit is determined by the operating company. It is unique for each unit and depends on the condition of the unit at the time of startup (cold, warm, or hot). A typical unit startup occurs in three phases: warm up, synchronization, and ramp up. NERC defines a startup period to begin with the command to start and end when the unit is synchronized. A startup failure begins when a problem preventing the unit from synchronizing occurs. The startup failure ends when the unit is synchronized, another startup failure occurs, or the unit enters another permissible state.

The 2021-07 DT determined that Corrective Action Plans will be required for any freezing event that occurs at temperatures above the generator site’s ECWT. By using the site’s ECWT, as opposed to the generator unit minimum temperature as defined by the GO in Requirement R1 Part 1.2.2 as the threshold, this achieves the following:

- Provides a consistent basis for the temperature at which CAPS are required for all GOs

- Provides a consistent basis for when Corrective Action Plans are required for all generation types
- Provides a consistent basis for when Corrective Action Plans are required regardless of the level of effort that GOs may have applied to-date winterizing their generators such that they can operate to the ECWT that their sites will reasonably experience
- Removes any incentive (perceived or real) to not further winterize GOs generating sites to meet the ECWT at the GO site by not providing a window where one site might not be subject to the Corrective Action Plan requirement while sites in the same vicinity experiencing the same temperatures are subject to this requirement
- Removes any disincentive for GOs to design the units to operate well below the ECWT for a site by not requiring them to perform Corrective Action Plans while sites in the same vicinity experiencing the same temperatures are subject to this requirement

### ***Generator Cold Weather Constraint***

*A condition that would preclude a Generator Owner from implementing freeze protection measures on one or more Generator Cold Weather Critical Components*

The 2024-03 DT reviewed the material from the June 2024 FERC Order when determining how best to update the Generator Cold Weather Constraint definition. The 2024-03 DT relied upon industry and FERC guidance as a basis for updating the definition language and the process captured in Attachment 1 of EOP-012-3. The 2024-03 DT also ensured that constraint language would be fully captured within the Standard itself through Attachment 1.

The 2024-03 DT felt that an Attachment that included specific language further explaining Generator Cold Weather Constraints with discrete pre-approved Generator Cold Weather Constraints and other Generator Cold Weather Constraints requiring pre-approval meets the FERC (and industry) expectations to provide unambiguous, objective, and auditable language. The 2024-03 DT discussed providing clarity with examples knowing that additional instances or conditions that may be considered a Generator Cold Weather Constraint may exist.

Per the FERC Order, NERC staff is responsible to provide a process describing the receipt, evaluation, approval (as needed), and validation of Generator Cold Weather Constraints. This process is captured in the Generator Cold Weather CAP Extension and Constraint Process document.

Attachment 1 contains a non-comprehensive list of preapproved Generator Cold Weather Constraints as well as a list of situations, circumstances, and criteria that may constitute a Generator Cold Weather Constraint that a Generator Owner must submit to the CEA for approval.

Once a declaration is approved by the CEA it is considered valid. It is the GO's responsibility to document in the Generator Cold Weather Constraint declaration the circumstances and reasons why the modification needed to address the freeze protection measure(s) is not being implemented. A Generator Cold Weather Constraint declaration that no further corrective actions will be taken is expected to be used sparingly.

The 2024-03 DT is intentionally leaving room for additional instances of Generator Cold Weather Constraints as it would be impossible to foresee every potential circumstance that could possibly necessitate a review of potential freeze protection technologies across the breadth of the US and Canada and the breadth of generating unit types and ages that fall under this Standard. Furthermore, the 2024-03 DT wants to ensure that the Standard language supports the adoption of new freeze protection measure practices, methods, or technologies while not immediately requiring a new freeze protection measure practice, method, or technology to be implemented industry-wide when a leading utility pilots a novel approach, as this would be a disincentive to utilities piloting new technologies. The 2024-03 DT encourages additional studying and implementation of freeze protection measures to remove Generator Cold Weather Constraints as appropriate over time.

In the June 27, 2024, FERC Order, there was a directive to change the frequency of Generator Cold Weather Constraint reviews to facilitate consideration of new freeze protection measure technologies to reduce the risk resulting from the need for a Generator Cold Weather Constraint. That change is captured in Requirement R8 discussed later in this Technical Rationale document.

## Facilities

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### *4.1. Facilities:*

*4.1.1. Bulk Electric System (BES) generating units. For purposes of this standard, the term “generating unit” subject to these requirements refers to the following BES resources:*

*4.1.1.1. A BES generating resource identified in the BES definition, Inclusion I2 and I4;  
or*

*4.1.1.2. A Blackstart Resource, identified in the BES definition, Inclusion I3.*

After reviewing this reference material and the efforts of the 2021-07 DT, the 2024-03 DT determined that EOP-012-3 should continue to apply to all Bulk Electric System (BES) generating units in order to ensure consistency in extreme cold weather preparedness. The Applicability section first defines “generating unit” as a BES resource. The NERC Glossary of Terms provides the foundation for what BES resources are included in the definition (see Inclusions I2 through I4). Additionally, Blackstart Resources are also specifically declared subject to the winterization requirements. Such Blackstart Resources, consistent with the NERC Glossary of Terms, are those units designated in the Transmission Operator’s restoration plans. Proposed EOP-012-3 clarifies which Facilities and their Generator Cold Weather Critical Components are subject to implementing freeze protection measures through specific language in Requirements R2 and R3. The 2024-03 DT briefly discussed Generator Owner Category 2 Inverter-Based Resource applicability to EOP-012-3 but it was noted the applicability is under review per the Order 901 NERC Plan so no changes were presented.

## Requirement R1

- R1.** *At least once every five calendar years, each Generator Owner shall, for each of its applicable generating unit(s): [Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*
- 1.1.** *Calculate the Extreme Cold Weather Temperature for each of its applicable unit(s) and identify the calculation date and source of temperature data; and*
- 1.1.1.** *If the re-calculated Extreme Cold Weather Temperature is lower than the previous Extreme Cold Weather Temperature, the entity shall review and update its cold weather preparedness plan under Requirement R4 within six (6) calendar months of the recalculation. If new corrective actions are needed to provide the required operational capability under Requirement R2 or R3, the entity shall develop a Corrective Action Plan within 6 calendar months of the recalculation.*
- 1.2.** *Identify generating unit(s) cold weather data, to include:*
- 1.2.1.** *Generating unit(s) operating limitations in cold weather to include:*
- 1.2.1.1.** *Capability and availability;*
- 1.2.1.2.** *Fuel supply and inventory concerns;*
- 1.2.1.3.** *Start-up issues;*
- 1.2.1.4.** *Fuel switching capabilities; and*
- 1.2.1.5.** *Environmental constraints.*
- 1.2.2.** *Generating unit(s) minimum:*
- Design temperature and if available, the concurrent wind speed and precipitation;*
  - Historical operating temperature at least one hour in duration, and if available, the concurrent wind speed and precipitation; or*
  - Current cold weather performance temperature determined by an engineering analysis, which includes the concurrent wind speed and precipitation.*

The Project 2024-03’s Technical Rationale language for Requirement R1 did not substantially change from 2021-07 DT language and, as such, use of DT below is referencing 2021-07 DT. Much of the criteria of R1 is carried over from the previously approved EOP-011 Standard and requires the GO to document several cold weather performance parameters for the unit. This information is valuable, and in some cases, must be shared with other entities. For Requirement R1 Part 1.1, the GO is required to calculate the Extreme Cold Weather Temperature (ECWT) for each unit using a reliable source of data (See the supporting document “Calculating Extreme Cold Weather Temperature”). The DT believes that the GO is in the best position to select the most representative weather information relative to its generating unit. The ECWT will be updated if a new lower ECWT is determined under the periodic review requirement of R1. Defining

the operating limitations in Requirement R1 Part 1.2.1 will make affected personnel more aware of unit capabilities and constraints as well as systems and practices that may be necessary to ensure reliability in cold weather, particularly when alternative fuels are involved. In addition, the unit minimum temperature identified in Requirement R1 Part 1.2.2 is used to demonstrate compliance with Requirement R3 for existing units. The DT chose one hour of historical operating data recognizing that there is extremely limited historical operating data available for a unit below their ECWT. This was not to infer that the DT expects that existing generation will only reliably operate for one hour during an extreme cold weather event. The information contained within Requirement R1 Part 1.2 is required to be requested by the Balancing Authorities in TOP-003 to make sure they have the most accurate unit performance information possible for their reliability analysis during the winter season. It is critical, especially if a Corrective Action Plan, extension request for a Corrective Action Plan, or a Generator Cold Weather Constraint declaration is in effect, that the Generator Owner keep Requirement R1 Part 1.2 information updated with those entities requiring said information. The 2024-03 DT did not add a notification Requirement to EOP-012-3 as TOP-003 and IRO-010 obligate the applicable entities (Balancing Authority, Reliability Coordinator, and Transmission Operator) to have *“Provisions for notification of BES generating unit(s) during local forecasted cold weather to include”* Requirement R1 Part 1.2 information. Balancing Authority(ies), Reliability Coordinators, and Transmission Operators should ensure complete coverage and timeliness of Requirement R1 Part 1.2 data submission within their data specifications.

It is recognized that the determination of a single unit minimum temperature is of limited value if applied without consideration of the other ambient conditions under which it was determined, that is, wind and precipitation. Consideration of wind and precipitation, along with the minimum temperature, provides a greater understanding of the potential generating unit capability for cold weather resource planning. The Standard requires that the GO include wind and precipitation data with their generating unit minimum temperature data when the data is available. The impact of deviations from this known temperature/wind/precipitation stated point are expected to be evaluated qualitatively. For example, if the historical minimum temperature occurred at low wind and dry conditions, and actual future cold weather event expected conditions are high winds with precipitation, planning personnel will recognize that a specific unit may not achieve the minimum temperature and can arrange for additional resources. The opposite also applies, i.e., if a design minimum temperature assumes some level of wind and precipitation and actual cold weather expectations are for low wind and dry conditions, planning personnel will recognize that there is increased likelihood that a generation resource may continue to be available below its minimum temperature. If no information about wind or precipitation is known, wind and precipitation are assumed to be zero at the minimum temperature until further information is obtained. The 2024-03 DT did provide updated language within the *“Defined Terms”* section of this Technical Rationale document to capture concerns regarding ECWT data availability.

## Requirement R2

**R2.** *Applicable to generating units which begin commercial operation<sup>7</sup> on or after October 1, 2027: Each Generator Owner, for each generating unit that has a calculated Extreme Cold Weather Temperature at or below 32 degrees Fahrenheit (zero degrees Celsius) as determined in Requirement R1, and that self-commits or is required to operate at or below a temperature of 32 degrees Fahrenheit (zero degrees Celsius),<sup>8</sup> shall: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning, Operations Planning]*

**2.1** *For generating units for which the Generator Owner first contractually committed to design criteria<sup>9</sup> relevant to this Requirement before February 16, 2023<sup>10</sup>:*

- *Implement freeze protection measures to protect Generator Cold Weather Critical Components that provide the capability to operate at the unit(s)' Extreme Cold Weather Temperature with sustained concurrent twenty (20) mph wind speed for (i) a period of not less than twelve (12) continuous hours, or (ii) the maximum operational duration for intermittent energy resources if less than twelve (12) continuous hours; or*
- *Have a Corrective Action Plan(s) in place (to include any applicable Generator Cold Weather Constraint(s) upon beginning commercial operation, to add new or modify existing or previously planned freeze protection measures to provide the capability to operate at the unit(s)' Extreme Cold Weather Temperature with a sustained concurrent twenty (20) mph wind speed for (i) a period of not less than twelve (12) continuous hours, or (ii) the maximum operational duration for intermittent energy resources if less than twelve (12) continuous hours.*

**2.2** *For generating units for which the Generator Owner first contractually committed to design criteria<sup>11</sup> relevant to this Requirement on or after February 16, 2023<sup>12</sup>:*

- *Implement freeze protection measures to protect Generator Cold Weather Critical Components that provide the capability to operate at the unit(s)' Extreme Cold Weather Temperature with sustained concurrent twenty (20) mph wind speed for (i) a period of not less than twelve (12) continuous hours, or (ii) the maximum operational duration for intermittent energy resources if less than twelve (12) continuous hours; or*

*Document in a declaration, with justification, as applicable, a Generator Cold Weather Constraint in accordance with Requirement R8.*

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<sup>7</sup> Commercial operation means achievement of this designation indicating that the facility has received all approvals necessary for operation after completion of initial start-up testing.

<sup>8</sup> Generating unit(s) that do not self-commit or are not required to operate at or below a temperature of 32 degrees Fahrenheit (zero degrees Celsius), but may be called upon to operate in order to assist in the mitigation of BES Emergencies, Capacity Emergencies, or Energy Emergencies during periods at or below a temperature of 32 degrees Fahrenheit (zero degrees Celsius), are exempt from this requirement.

<sup>9</sup> Such commitments would be demonstrated by signed contractual commitments, emailed correspondence agreeing to thermal design criteria, or other similar documented evidence.

<sup>10</sup> Or the date the definition of Extreme Cold Weather Temperature was approved in the relevant jurisdiction.

<sup>11</sup> Such commitments would be demonstrated by signed contractual commitments, emailed correspondence agreeing to thermal design criteria, or other similar documented evidence.

<sup>12</sup> Or the date the definition of Extreme Cold Weather Temperature was approved in the relevant jurisdiction.

The Joint Inquiry Report Key Recommendation 1f referenced recommendation 12 of the 2011 report<sup>8</sup> suggesting that consideration should be given to designing all new generation plants and designing modifications to existing plants (unless committed solely for summer peaking purposes) to be able to perform at the lowest recorded ambient temperature for the nearest location for which historical weather data is available.

The 2021-07 DT believed and 2024-03 DT believes that there needs to be allowances made for units that are in the development process, and for which the design phase may have already commenced. The 2021-07 DT recommended this requirement apply to generation going into service three (3) years after the effective date of EOP-012-1 (i.e., October 1, 2027, based on an effective date of October 1, 2024). The 2024-03 DT edited Requirement R2 in response to the June 2024 FERC Order Paragraph 72 to create differentiation among units based on when the ECWT definition became effective (February 16, 2023). The ECWT definition date was selected as it is a specific point in time where Generator Owners had clear direction for design implications as well as being unambiguous and auditable. The changes proposed recognize the potential conditions that exist in terms of generators under consideration or construction, but removes the means of achieving compliance through a Corrective Action Plan for units establishing their design criteria on or after February 16, 2023. Allowances for Corrective Action Plans to achieve the required design criteria were maintained as a means of compliance, but only for units which established design criteria prior to February 16, 2023. Additionally, the 2024-03 DT identified that Generator Owners may need to declare a Generator Cold Weather Constraint for units that commit to design criteria on or after the February 16, 2023 date under certain circumstances. Generation that begins commercial operation before October 1, 2027 would be subject to Requirement R3.

GOs with generating units that enter commercial operation on or after October 1, 2027 that contractually committed to design criteria before the ECWT definition approval date (February 16, 2023) and cannot operate for twelve (12) continuous hours at the ECWT taking into account a concurrent twenty (20) mph wind speed shall have a Corrective Action Plan upon beginning commercial operations. The GO then must implement the Corrective Action Plan according to Requirement R7. It is recognized that Generator Cold Weather Constraints may exist that prevent a new generating unit(s) from being capable of twelve (12) continuous hours of operation at their identified ECWT. Thus, the 2021-07 DT included, in Requirement R7 Part 7.4, the option for the GO to make a declaration supporting why Generator Cold Weather Constraints preclude the ability to implement appropriate freeze protection measures.

GOs with generating units that enter commercial operation on or after October 1, 2027 that contractually committed to design criteria on or after the ECWT definition approval date (February 16, 2023) that are not able to comply with Requirement R2 would be required to declare a Generator Cold Weather Constraint in accordance with Requirement R8.

The 2021-07 DT chose 12 hours of continuous operation because it is a typical length of the nighttime in winter in most regions of the US and Canada and typically include the hours with the coldest experienced temperatures. The 2021-07 DT was of the opinion that tying the requirement to the 12-hour period would

provide a reasonable level of reliability during a cold weather event. The 2021-07 DT chose a concurrent sustained 20 mph wind speed after an evaluation using the wind chill formula developed by the NWS in the United States. Though wind chill temperature is not an exact science, it is widely understood to reflect the non-linear increased rate of convective heat loss due to air moving at different velocities. Commonly available charts show wind chill temperatures as a function of actual air temperature at various wind speeds. Approximately 2/3 of the wind chill temperature drop between 0–60 mph is achieved at 20 mph. Using the NWS chart, this holds true for still air temperatures starting at 40 F and dropping in 20-degree increments to -40 F. Further, 20 mph is a wind speed commonly experienced across the ERO and yet appropriately higher than the approximate average wind speeds in the United States and Canada, 6-12 mph and 8-11 mph respectively. Each of these three probabilistically infrequent conditions (the ECWT, a steady 20 mph wind, and a duration of 12 continuous hours at these conditions) is in and of itself conservative. When they have their effects combined, it results in a requirement that will significantly contribute to BES reliability during extreme cold weather conditions.

## Requirement R3

The Drafting Team did not make any changes to this Requirement. Therefore, the technical rationales are not provided here.

## Requirement R4

- R4.** *Each Generator Owner shall implement and maintain one or more cold weather preparedness plan(s) for its generating units. The cold weather preparedness plan(s) shall include the following, at a minimum:*  
*[Violation Risk Factor: High] [Time Horizon: Operations Planning and Real-time Operations]*
- 4.1** *The lowest calculated Extreme Cold Weather Temperature for each unit, as determined in Requirement R1;*
  - 4.2** *The generating unit cold weather data, as determined in Part 1.2;*
  - 4.3** *Documentation identifying Generator Cold Weather Critical Components;*
  - 4.4** *Documentation of freeze protection measures implemented on Generator Cold Weather Critical Components which may include measures used to reduce the cooling effects of wind determined necessary by the Generator Owner to protect against heat loss, and where applicable, the effects of freezing precipitation (e.g., sleet, snow, ice, and freezing rain); and*
  - 4.5** *Annual inspection and maintenance of generating unit(s) freeze protection measures implemented on Generator Cold Weather Critical Components.*

## General Considerations

Requirement R4 requires GOs to develop and maintain cold weather preparedness plans for their unit(s) and describes the information and documentation required in such plans. It is an expansion of the cold weather preparedness plan required under Requirement R7 of EOP-011-2 and is intended to be used and reviewed regularly by the GO. Originally, Requirement R4 Part 4.5 required the GO to annually inspect and perform necessary maintenance of freeze protection measures. The 2024-03 DT added some clarifying language to ensure that annual inspection and maintenance of freeze protection measures is applied specifically to Generator Cold Weather Critical Components. While other freeze protection measures may be applied to equipment by the Generator Owner, the freeze protection measures included in the cold weather preparedness plan with annual inspections and maintenance are expected to be those applied to Generator Cold Weather Critical Components. Working in concert with other parts of EOP-012-3, including but not limited to Requirements R1, R5, R6, and R7, the substantive elements of the cold weather preparedness plan will be subject to review requirements, updated as necessary, and the GO is required to annually train personnel on its requirements.

#### **Requirement R4 Part 4.1**

In Requirement R4 Part 4.1, the GO is required to include in the cold weather preparedness plan the lowest ECWT, as calculated pursuant to Requirement R1, for each unit using reliable source(s) of data. The 2021-07 DT believed that the GO is in the best position to select the most representative weather information relative to its generating unit. The cold weather preparedness plan will be updated if a new lower ECWT is calculated under the Requirement R1 periodic review language.

#### **Requirement R4 Part 4.2**

Requirement R4 Part 4.2 is intended to capture within the cold weather preparedness plan the information being developed pursuant to Requirement R1 Part 1.2, which is carried over from the previously approved EOP-011 Standard, and requires the GO to document several cold weather performance parameters for the unit. This information is valuable, and in some cases, must be shared with other entities consistent with the data specification requirements contained in TOP-003 and IRO-010. A requirement for the GO to document this information within the cold weather preparedness plan ensures the information is readily available and documented when the GO responds to a data specification. It should be noted that if a Corrective Action Plan extension request is approved, the underlying generator cold weather data as called out in Requirement R1 Part 1.2 should be correctly identified by the Generator Owner and provided to the Reliability Coordinators, Balancing Authorities, and Transmission Operators as requested. The June 2024 FERC Order mentions this in Paragraph 3. The 2024-03 DT believes that the data specification Reliability Standards applicable to Reliability Coordinators, Balancing Authorities, and Transmission Operators (e.g., IRO-010 and TOP-003) require the entities to request the information and the GO is therefore obligated to provide the most current version of the Corrective Action Plan. The 2024-03 DT did not believe a notification Requirement was needed in EOP-012-3 in addition to those already existing in the data specification Reliability Standards. The 2024-03 DT encourages parties to work together to ensure the most accurate and up to date information is provided especially when conditions increase risk to reliable operations. See the Technical Rationale for Requirement R1 for substantive rationale regarding the operating limitations and generating unit minimum temperatures documented in the cold weather preparedness plan.

### **Requirement R4 Part 4.3**

In Requirement R4 Part 4.3, the GO identifies the Generator Cold Weather Critical Components to help inform their decision on where to implement appropriate freeze protection measures. The NERC *Reliability Guideline, Generating Unit Winter Weather Readiness – Current Industry Practices*<sup>10</sup>, presents a suggested list of components that GOs may choose to utilize when developing their own Generator Cold Weather Critical Component inventory. The GO shall develop and maintain a list of Generator Cold Weather Critical Components for each unit.

### **Requirement R4 Part 4.4**

Requirement R4 Part 4.4 requires GOs to document the freeze protection measures implemented on Generator Cold Weather Critical Components. These freeze protection measures should include those to reduce the cooling effects of wind. Requirement R4 does not require GOs to install new freeze protection measures to reduce the cooling effects of wind, but rather to identify freeze protection measures for Generator Cold Weather Critical Components that will protect against heat loss and the effect of freezing precipitation, where applicable, and document those measures (e.g., water-resistant insulation, protective shielding, insulated boxes, etc.). These measures could include temporary measures as well, such as wind breaks, but there is no expectation for entities to list all climate-controlled areas as freeze protection measures. Specifically, the freeze protection measures applied to Generator Cold Weather Critical Components must be captured in the cold weather preparedness plan.

### **Requirement R4 Part 4.5**

Requirement R4 Part 4.5 is largely carried over from the previously approved EOP-011 Standard and requires annual inspection and maintenance of the freeze protection measures applied to Generator Cold Weather Critical Components identified in the cold weather preparedness plan. The 2024-03 DT added clarifying language to emphasize the need to effectively mitigate risk on the Generator Cold Weather Critical Components. This Requirement ensures these freeze protection measures will be ready and serviceable when needed.

## **Requirement R5**

**The Drafting Team did not make any changes to this Requirement. Therefore, the technical rationales are not provided here.**

## **Requirement R6**

***R6.** Each Generator Owner shall, for each generating unit that has a calculated Extreme Cold Weather Temperature at or below 32 degrees Fahrenheit (zero degrees Celsius) as determined in Requirement R1 and that self-commits or is required to operate at or below a temperature of 32*

*degrees Fahrenheit (zero degrees Celsius),<sup>13</sup> develop and implement a Corrective Action Plan when the generating unit experiences a Generator Cold Weather Reliability Event. The Corrective Action Plan shall be developed before the first day of July, but not more than 150 days after the Generator Cold Weather Reliability Event. The Generator Owner shall: [Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

- 6.1.** *Ensure the Corrective Action Plan contains at a minimum:*
  - 6.1.1.** *A summary of the identified cause(s) for the Generator Cold Weather Reliability Event, where applicable, and any relevant associated data;*
  - 6.1.2.** *A list of actions to add new or remedy existing freeze protection measures;*
  - 6.1.3.** *An identification of operating limitations or impacts to the cold weather preparedness plan that would apply until execution of the corrective action(s) identified in the Corrective Action Plan;*
  - 6.1.4.** *A description of the updates to the cold weather preparedness plan required under Requirement R4 to identify updates or additions to the Generator Cold Weather Critical Components and their freeze protection measures, if required;*
  - 6.1.5.** *A timetable specifying that implementation of the Corrective Action Plan shall be completed prior to the first day of December following the Generator Cold Weather Reliability Event; and;*
  - 6.1.6.** *A review of applicability to similar freeze protection measures at generating units owned by the Generator Owner, with a specified timetable for corrective actions to be completed within 24 calendar months of the Generator Cold Weather Reliability Event;*
- 6.2.** *Update the Corrective Action Plan action(s) and timetable(s), with justification, and submit a Corrective Action Plan extension request to the Compliance Enforcement Authority (CEA) for approval where the timetable(s) for completing selected actions are projected to exceed the timelines in Part 6.1. The submitted Corrective Action Plan extension request shall include the following:*
  - 6.2.1.** *Circumstances causing the delay and how those circumstances are beyond the control of the Generator Owner;*
  - 6.2.2.** *Revisions to the selected actions in Part 6.1, if any, including utilization of Operating Procedures, if applicable; and*
  - 6.2.3.** *Updated timetable for implementing the selected actions in Part 6.1.*
- 6.3.** *Document in a declaration, with justification, any Generator Cold Weather Constraint in accordance with Requirement R8, if applicable, that precludes the Generator Owner from implementing selected action(s) contained within the Corrective Action Plan.*

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<sup>13</sup> Generating unit(s) that do not self-commit or are not required to operate at or below a temperature of 32 degrees Fahrenheit (zero degrees Celsius), but may be called upon to operate in order to assist in the mitigation of BES Emergencies, Capacity Emergencies, or Energy Emergencies during periods at or below a temperature of 32 degrees Fahrenheit (zero degrees Celsius), are exempt from this requirement.

***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 standard 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.*

The Key Recommendation from the Joint Inquiry Report recommended a Reliability Standard that requires GOs to develop a Corrective Action Plan for generating units that experience outages, failures to starts, or derates due to freezing. The Joint Inquiry 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 the Joint Inquiry Report). As such, the 2021-07 DT followed the Joint Inquiry Report recommendation to require a Corrective Action Plan when the apparent cause of the event is freezing. The 2021-07 DT developed parameters around these events to clarify a reasonable baseline of what level of derate qualified as an event and provide additional language to identify what constitutes a start-up failure. With the additional clarifications, the 2021-07 DT determined that the Reliability Standard would benefit from a defined term, to clearly and efficiently state what constitutes an event. The result was a defined term, Generator Cold Weather Reliability Event, that describes the circumstances for which a Corrective Action Plan is required (i.e., when a freezing event affects the equipment within the control of the GO). The defined term made the Reliability Standard easier to understand and implement by providing clear and reasonable factors to determine whether the impact of an event requires mitigation. However, because of the June 2024 FERC Order, the development and implementation of a Corrective Action Plan was required to be updated by the 2024-03 DT to provide clearer obligations for those units that suffer a Cold Weather Reliability Event. In general, the 2024-03 DT understands that if a Generator Cold Weather Reliability Event occurs, Generator Owners will remediate the issue as soon as possible.

### **General Considerations for All Corrective Action Plans**

To simplify the proposed requirements related to creating a Corrective Action Plan, the 2021-07 DT used the NERC Definition of a Corrective Action Plan. The Corrective Action Plan definition reads “A list of actions and an associated timetable for implementation to remedy a specific problem.” As written, the definition requires two parts for a document to qualify as a Corrective Action Plan, i.e., a list of items to be addressed and a timeline for completion. A Corrective Action Plan without both a list of actions and the timeline to implement is not complete. The 2024-03 DT provided additional language for Corrective Action Plans to clarify expectations for those Corrective Action Plans created as a result of a Generator Cold Weather Reliability Event and other Corrective Action Plans referenced throughout the Requirement language. The resulting language kept the underlying structure developed during previous Projects but clarified and added information as needed to meet the June 2024 FERC Order.

The Corrective Action Plan requirement applies to Generator Cold Weather Reliability Events. It should be noted that nothing in this standard prevents a GO from taking its own corrective actions resulting from events that do not meet the criteria of a Generator Cold Weather Reliability Event. Startup failure criteria were based on the GADS definition with the removal of “following an outage or reserve shutdown”, since the definition of reserve shutdown is different in GADS than it is in some of the Regional Transmission Organizations (RTO’s).

R6 requires the GO to develop a Corrective Action Plan by the first of July or within 150 days of the Generator Cold Weather Reliability Event. These timeframe options were chosen by the 2021-07 DT and maintained by the 2024-03 DT to allow GOs to review multiple events holistically following a winter season, if that scenario occurs, and create one Corrective Action Plan for components with common failure causes. Care should be taken when developing a multi-unit or multi-event Corrective Action Plan to ensure it meets the Corrective Action Plan criteria for each unit (e.g., actions and timetables may be different.)

The 2021-07 DT determined that Corrective Action Plans would be required for any freezing event that occurs at temperatures at or above the site’s ECWT in accordance the definition of Generator Cold Weather Reliability Event. Using the site’s ECWT as the threshold, as opposed to the generator unit minimum temperature as determined by the GO, achieves the following:

- Provides a consistent basis for the temperature at which Corrective Action Plans are required for all GOs
- Provides a consistent basis for when Corrective Action Plans are required for all generation types
- Provides a consistent basis for when Corrective Action Plans are required regardless of the level of effort that GOs may have applied to-date winterizing their generators such that they can operate to the ECWT that their sites will reasonably experience
- Removes any incentive (perceived or real) to not further winterize GOs sites to meet the ECWT at the GO site by not providing a window where one site might not be subject to the Corrective Action Plans requirement while sites in the same vicinity experiencing the same temperatures are subject to this requirement
- Removes any disincentive for GOs to design the units to operate well below the ECWT for a site by not requiring them to perform Corrective Action Plans while sites in the same vicinity experiencing the same temperatures are subject to this requirement

If a Corrective Action Plan extension is denied by the CEA, then the GO's Correction Action Plan completion date to meet compliance will be equal to the CEA's evaluation time period added to the original due date.

The 2024-03 DT provided clarifying language to have Corrective Action Plans developed in response to Generator Cold Weather Reliability Events completed by the first day of December of the winter season following the Generator Cold Weather Reliability Event. Allowances for events which occur early winter season, which varies across the North American continent, were provided with the expectation that more

transient fixes occurring after a Generator Cold Weather Reliability Event would be applied quickly but allowing a reasonable time horizon for compliance with this Requirement. A Corrective Action Plan triggered by a Generator Cold Weather Reliability Event and for which the apparent cause is the failure of relatively simple existing piece of freeze protection equipment, the scope of the Corrective Action Plan may be documented after the fact. Such prompt repairs may be completed before creation of the Corrective Action Plan, and the GO may complete the implementation of the Corrective Action Plan simply by evaluating the requirements of R6 and documenting how and when the repair work was completed. An example of this circumstance would be a freezing event caused by a single heat trace circuit failure which would have been sufficient to prevent the event had it not failed. Just to be clear, a Corrective Action Plan is required for Generator Cold Weather Reliability Events. The June 2024 FERC Order also directed changes affecting the application of a Generator Cold Weather Reliability Event Corrective Action Plans with regards to other units within a Generator Owner's fleet. The 2024-03 DT followed the FERC example and allowed a 24-calendar month window to address corrective actions on other units. This timeframe would allow Generator Owners with larger fleets to accommodate the changes if needed.

The 2024-03 DT also created language that allows for Corrective Action Plan extension requests using an ERO Enterprise process. ERO Enterprise staff have developed a process that leveraged the current TPL-007 Corrective Action Plan extension process ([See ERO Enterprise Periodic Data Submittal Schedule](#)). The process will allow a thorough review in a timely manner for any Corrective Action Plan extension requests including those that go beyond the 24 or 48 calendar month timetables. While there may be actions impacting the implementation and completion of Corrective Action Plans beyond the control of Generator Owners (e.g., supply chain issues), the Generator Owners should accelerate completion of corrective actions as much as possible to support reliable operations.

The 2024-03 DT updated language regarding Generator Cold Weather Constraints to clarify expectations. Please review Requirement R8 and Attachment 1 for further discussions of Generator Cold Weather Constraints.

## Requirement R7

**R7.** *Each Generator Owner, for each Corrective Action Plan developed pursuant to Requirements R1, R2, or R3, shall, as applicable: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

**7.1.** *Include a timetable for implementing the selected corrective action(s) that shall:*

**7.1.1.** *List the action(s) which remedy(ies) issues with existing freeze protection measures, if any, to be completed within 24 calendar months of completing development of the Corrective Action Plan, regardless of any longer timelines in the Corrective Action Plan associated with new freeze protection measures;*

- 7.1.2. List the action(s) which require(s) new freeze protection measures, if any, to be completed within 48 calendar months of completing development of the Corrective Action Plan; and*
- 7.1.3. Describe the updates to the cold weather preparedness plan required under Requirement R4 to identify the updates or additions to the Generator Cold Weather Critical Components and their freeze protection measures.*
- 7.2. Complete all the actions described in Corrective Action Plan in accordance with the specified timetables in Part 7.1;**
- 7.3. Submit a Corrective Action Plan extension request, for the approval of the CEA, where the timetable(s) exceed the timelines for completing selected actions are projected to exceed the timelines in Part 7.1. The submitted request shall:**
  - 7.3.1 Explain the circumstances causing the delay and how those circumstances are beyond the control of the Generator Owner;*
  - 7.3.2 Include, as applicable, revisions to the selected actions in Part 7.1, including utilization of Operating Procedures; and*
  - 7.3.3 Include an updated timetable for implementing the selected actions in Part 7.1.*
- 7.4. Document in a declaration, with justification, any Generator Cold Weather Constraint in accordance with Requirement R8 that precludes the Generator Owner from implementing selected action(s) contained within the Corrective Action Plan.**

In EOP-012-2, R7 was expanded from EOP-012-1 to provide additional definition on the requirements to implement a Corrective Action Plan, and to meet the direction for this requirement set by the February 2023 FERC Order. One such direction was to define expectations on implementation timelines for Corrective Action Plans. Under EOP-012-2 R7, Corrective Action Plans were divided into two categories: 1) those which address existing freeze protection measure(s), and 2) those which require new equipment or freeze protection measure(s). The former category required completion of the Corrective Action Plan to remedy the cause(s) within 24 months, and the latter required completion of the Corrective Action Plan within 48 months. The 2021-07 DT modeled this timeline structure after similar Corrective Action Plan implementation requirements in TPL-007. These are maximum durations and entities are expected to work diligently to correct issues and take prompt actions to mitigate future issues as soon as practical. At the same time, the 2021-07 DT recognized that the following time consuming activities make the 24 and 48 calendar months maximum timelines reasonable: scoping applicability to similar units, freeze protection engineering and design, project development, annual budgeting process, material supply lead times, outage scheduling, skilled labor availability, and startup/commissioning. However, the June 2024 FERC Order, established directives to clarify timelines and responsibilities associated with Corrective Action Plans. The 2024-03 DT chose to specifically remove Corrective Action Plan obligations for Generator Cold Weather Reliability Events and place those in Requirement R6. For Requirement 7, the 2024-03 DT provided clarifying language regarding existing and new freeze protection measures and the

associated completion timelines. Language was provided for Corrective Action Plans that may include changes to existing freeze protection measures and addition of new freeze protection measures to help clarify expectations for completing the corrective actions. Entities are expected to work diligently to correct issues and take prompt actions to mitigate future recurrence. The 2024-03 DT updated Part 7.1.3. for completeness to ensure updates would be made to document needed changes to the cold weather preparedness plan(s) to eliminate recurrence of issue(s) identified in the Corrective Action Plan. In clarifying these timeframes, the 2024-03 DT considered the FERC directives.

Within the revised Requirement R7, the GO is required to implement the Corrective Action Plan within a timetable defined by the GO in the Corrective Action Plan but limited by maximum durations in Part 7.1. If the GO is unable to complete the Corrective Action Plan within the time limits in Part 7.1, or the corrective action(s) change, the GO is required to update the Corrective Action Plan with justification. GOs that are unable to complete the Corrective Action Plan due to a Generator Cold Weather Constraint are required under Part 7.4 to create a declaration of the Generator Cold Weather Constraint which shall be provided to the Compliance Enforcement Authority per Requirement R8. Further requirements for the Generator Cold Weather Constraints are provided under Requirement R8.

The 2024-03 DT also created language that allows for Corrective Action Plan extension requests using an ERO Enterprise process. ERO Enterprise staff developed a process that leveraged the current TPL-007 Corrective Action Plan extension process ([See ERO Enterprise Periodic Data Submittal Schedule](#)). The process will allow a thorough review in a timely manner for any Corrective Action Plan extension requests including those that go beyond the 24 or 48 calendar months. The 2024-03 DT utilized the precedent set by TPL-007 to ensure the unique circumstances of each request will be considered while also avoiding potential compliance burdens which may not have a corresponding reliability benefit (e.g. specific timelines for submission & approval of extension requests). While there may be actions impacting the implementation and completion of Corrective Action Plans beyond the control of Generator Owners (e.g., supply chain issues), the Generator Owners should accelerate completion of corrective actions as much as possible to support reliable operations. It is expected that extension requests will be limited in nature. Generator Owners will have to provide clear justifications with supporting materials within the extension request. Due diligence in ordering equipment, obtaining permits, etc., will be considered as part of the determination of whether a particular set of facts constitute circumstances beyond the control of the entity. Denials of extension requests will be minimized if Generator Owners work diligently to correct issues and take prompt actions. Denial of an extension means the initial timelines for corrective actions must be met.

The 2024-03 DT updated language regarding Generator Cold Weather Constraints to clarify expectations. Please review Requirement R8 for further discussions of Generator Cold Weather Constraints.

If one or more actions within a Corrective Action Plan fall under a Generator Cold Weather Constraint declaration, it is the intent of the DT that only those affected actions would not be implemented as part of the Corrective Action Plan. The remaining corrective actions should be implemented per the timelines

provided unless dependent upon the corrective action triggering the Generator Cold Weather Constraint declaration.

## Requirement R8

- R8.** *Each Generator Owner that declares a Generator Cold Weather Constraint in accordance with Attachment 1 shall: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
- 8.1** *Submit its Generator Cold Weather Constraint declaration(s) to the CEA within 45 days of determining that the Generator Cold Weather Constraint is applicable. For Generator Cold Weather Constraints determined in accordance with Requirement R2 for generating unit(s) upon beginning commercial operation, submit the Generator Cold Weather Constraint declaration(s) no later than 15 days after commercial operation;*
- 8.2** *Review any Generator Cold Weather Constraint declaration validated by the CEA every 24 calendar months to determine if it remains valid under Attachment 1;*
- 8.3** *Update the operating limitations associated with capability and availability under Requirement R1 Part 1.2 if applicable; and*
- 8.4** *If the CEA determines the declared Generator Cold Weather Constraint is invalid, update its Corrective Action Plan(s) to require corrective actions be completed in accordance with the timetables in Requirement R6 Part 6.1 or Requirement R7 Part 7.1, to begin from the date the Generator Owner is notified that the Generator Cold Weather Constraint is invalid.*

In the February 2023 FERC Order, the Commission expressed concern that a GO may make a Generator Cold Weather Constraint declaration without informing planning and operational entities (e.g., the Balancing Authority) that are expecting the reliable operation of the generating unit to its ECWT.<sup>[1]</sup> An additional concern was that the Generator Cold Weather Constraint declarations may be used by a functional entity as an opt-out of compliance with requirements set forth in the standards or in a corrective action plan.<sup>[2]</sup> To mitigate the concern, the Commission directed NERC to work with Commission staff and submit a data collection and assessment plan that contains information related to GO constraint declarations and explanations thereof.<sup>[3]</sup> The 2021-07 DT expected that ERO Enterprise compliance staff will be responsible for reviewing declared Generator Cold Weather Constraints and assessing compliance with the Generator Cold Weather Constraint definition criteria in accordance with established processes. The June 2024 FERC Order directives included more discrete language that required NERC to receive, review, evaluate, and confirm the validity of each Generator Cold Weather Constraint in a timely manner. Additionally, the June 2024 FERC Order directives required an increase in the frequency of reviews of Generator Cold Weather Constraints. If a Corrective Action Plan extension is denied by the CEA, then the GO's Correction Action Plan completion date to meet compliance will be equal to the CEA's evaluation time period added to the original due date.

The 2024-03 DT updated Requirement R8 to require the GO to submit, to the Compliance Enforcement Authority, a Generator Cold Weather Constraint in accordance with Attachment 1 under specific timelines. The ERO Enterprise staff have developed a process that leveraged the current TPL-007 Corrective Action Plan extension process (See ERO Enterprise Periodic Data Submittal Schedule) as a foundation for the Generator Cold Weather Constraint process. The process will allow a thorough review in a timely manner for any Generator Cold Weather Constraint submitted. The 2024-03 DT created Attachment 1 to provide clear expectations on Generator Cold Weather Constraint conditions. Attachment 1 contains some “pre-approved” Generator Cold Weather Constraint conditions as well as examples of other possible Generator Cold Weather Constraint conditions that may be considered valid. To be clear, the “pre-approved” Generator Cold weather Constraints require submittal per the ERO Enterprise process. The 2024-03 DT could not create an exhaustive list of Generator Cold Weather Constraint conditions but provided language that allows professional judgement to be utilized. The 2024-03 DT believes this process in conjunction with Requirement R8 and Attachment 1 effectively meets the FERC directive regarding receiving, reviewing, evaluating, and confirming the validity of Generator Cold Weather Constraints.

Initially EOP-012-1 required an annual review of Generator Cold Weather Constraints that was subsequently changed to five years in EOP-012-2. The June 2024 FERC Order directed that the review frequency be increased. While Generator Owners should perform a review and update any constraint declarations as needed, the 2024-03 DT developed language to require a review of validated Generator Cold Weather Constraints every 24 calendar months. The 2024-03 DT did send a survey out during the development of Requirement R8 language asking for stakeholder input and leveraged the results in the determination of 24 calendar months.

The 2021-07 DT believed that Generator Cold Weather Constraint declarations would be the exception but it is clear to the 2024-03 DT that certain conditions may exist (based on general weather patterns) that will increase the amount of Generator Cold Weather Constraint declarations and subsequent submittals. In anticipation of that scenario and following the June 2024 FERC Order the 2024-03 DT considers the ERO Enterprise process a valuable tool to capture data that may help future understanding of the effectiveness of the ECWT (which is required by the February 2023 FERC Order and subsequent NERC filing regarding cold weather data collection.)

Updated Generator Cold Weather Constraint declarations would also require an update to the operating limitations provided via data specifications to the entities overseeing reliability (e.g., Balancing Authority, Transmission Operator, or Reliability Coordinator). In this manner, information relevant to valid Generator Cold Weather Constraint declarations are made available to the planning and operational entities pursuant to their data collection authority contained in TOP-003 and IRO-010.

## Attachment 1

*Generator Owners shall determine the applicability of a Generator Cold Weather Constraint declared under Requirements R2, R6, and R7 as described below.*

*A Generator Cold Weather Constraint is any condition that would preclude a Generator Owner from implementing freeze protection measures on one or more Generator Cold Weather Critical Components using the following criteria:*

### **Pre-Approved Generator Cold Weather Constraints**

*The following are circumstances which, if present and confirmed as valid by the Compliance Enforcement Authority, will constitute Generator Cold Weather Constraints:*

- *Wind turbine towers that have structural limitations established by Original Equipment Manufacturers (OEMs) based on a minimum temperature that is higher than the Extreme Cold Weather Temperature calculated per Requirement R1.*
- *Heat tracing or other de-icing technologies for wind turbine blades that are not available in the Generator Owner's location.*
- *Replacing existing wind turbine blades with new blades solely for the purpose of adding de-icing or ice-minimizing capabilities.*
- *Applying heat to remove accumulated frozen precipitation on solar panels.*
- *Applying heat upstream of inlet air filters to prevent the buildup of frozen precipitation on combustion turbine inlet air filters.*

### **Case-by-case Determinations**

*The following situations may constitute a Generator Cold Weather Constraint, depending on the facts and circumstances. Only upon approval by the Compliance Enforcement Authority will these circumstances comprise a valid Generator Cold Weather Constraint:*

1. *The application of a specific freeze protection measure will void an equipment warranty.*
2. *The application of a specific freeze protection measure is precluded by technical or physical limitations. For example:*
  - a. *Installing wind breaks around a cooling tower or air-cooled heat exchanger which requires free airflow for its functionality;*
  - b. *Applying freeze control measures with size or weight that would require the structural re-design and re-construction of the protected equipment or its support system.*
  - c. *Other similar circumstances as determined through operating experience or engineering analysis and supported with justification.*
3. *The application of a specific freeze protection measure or measures would adversely affect the reliability of the Bulk Power System to an extent that outweighs the reliability benefit of applying the freeze protection measure(s). For example:*
  - a. *The application of freeze protection measures would result in the premature retirement of an existing dispatchable generating unit with no acceptable replacement currently available;*
  - b. *The freeze protection measures would be applied to a generating unit that has a previously published retirement date within three years of the Generator Cold Weather Constraint declaration;*

- c. The application of freeze protection measures would cause the Generator Owner to cancel plans to finish the development of a new generating unit(s);*
  - d. The application of freeze protection measures would reduce the generating unit's ability to provide Real Power and Reactive Power by more than three percent; or*
  - e. The application of freeze protection measures would reduce the summer net dependable capability<sup>14</sup> of the generating unit by more than three percent.*
- 4. The application of a specific freeze protection measure would introduce the risk of noncompliance with other statutory, regulatory, or health and safety requirements or standards for which relief via waiver, exemption or other means of excused noncompliance is not available during extreme cold weather.*
  - 5. Other situations identified by the Generator Owner that may, based on the specific circumstances beyond the Generator Owner's control, limit its ability to apply freeze protection measures to Cold Weather Critical Components.*

*When submitting a Generator Cold Weather Constraint declaration to the CEA per Requirement R8, the Generator Owner must include documentation that defends and supports the declared constraint and also describes other compensating or mitigating freeze protection measures, if applicable, that the Generator Owner will apply. An approved Generator Cold Weather Constraint declaration for any specific Generator Cold Weather Critical Component does not relieve the Generator Owner of its obligation to otherwise prepare its applicable generating unit(s) to meet the requirements of EOP-012-3.*

The 2024-03 DT chose to utilize a limited and discrete list of pre-approved Generator Cold Weather Constraints as well as a description of other case-by-case situational descriptions that may constitute Generator Cold Weather Constraints. All declared Generator Cold Weather Constraints must be confirmed as valid by the Compliance Enforcement Authority. Nevertheless, the limited and discrete list is intended to describe specific circumstances that, if met, would have a very high probability of being approved. The 2024-03 DT discussed providing clarity with examples (as noted by FERC Order Paragraph 47) knowing that additional instances or conditions that may be considered a Generator Cold Weather Constraint may exist.

Per the FERC Order, NERC staff is responsible to provide a process describing the receipt, evaluation, approval (as needed), and validation of Generator Cold Weather Constraints. This process is captured in the "Generator Cold Weather CAP Extension and Constraint Process" document.

In summary, Attachment 1 contains a list of circumstances that, if confirmed valid by the Compliance Enforcement Authority, are considered to constitute pre-approved Generator Cold Weather Constraints as well as a list of additional situations, circumstances, and criteria that may constitute a Generator Cold Weather Constraint. In utilizing this second list, a Generator Owner must submit to the Compliance Enforcement Authority documentation that defends and supports its declared constraint and describes

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<sup>14</sup> "Net dependable capability" refers to the definition used for reporting to the NERC Generating Availability Data System (GADS).

other compensating or mitigating freeze protection measures, if applicable, that the Generator Owner will apply.

Once a declaration is approved by the CEA it is considered valid.

The 2024-03 DT is intentionally leaving room for additional instances of Generator Cold Weather Constraints to be presented as it would be impossible to foresee every potential set of circumstances that could possibly constitute a constraint. Furthermore, the 2024-03 DT wants to ensure that the Standard language supports the development and adoption of new freeze protection measures, practices, methods, or technologies while not immediately requiring that the new freeze protection measures, practices, methods, or technologies be implemented industry-wide. The 2024-03 DT encourages additional study and implementation of freeze protection measures to remove Generator Cold Weather Constraints, as appropriate, over time.

The 2024-03 DT updated the definition of Generator Cold Weather Constraints to provide clarity as directed by FERC. In addition to modifying the definition, the 2024-03 DT developed Attachment 1. Requirement R8 provides entities a clear understanding of what is expected when managing Generator Cold Weather Constraints and directly references use of Attachment 1. The list of “pre-approved” Generator Cold Weather Constraints focuses on technical issues or conditions that are known to exist which may have limited-to-no freeze protection measures available to implement. A Generator Owner is still required to submit “pre-approved” Generator Cold Weather Constraints. The case-by-case determination section of Attachment 1 provides examples of conditions or issues that may constitute a valid Generator Cold Weather Constraint depending on the facts and circumstances. The language provided is meant to be objective, unambiguous, and auditable.

With all Generator Cold Weather Constraints, it is the responsibility of the Generator Owner to provide supporting materials to facilitate approval and validation of the Generator Cold Weather Constraint by the ERO Enterprise. As mentioned in the Requirement R8 Technical Rational discussion, an ERO Enterprise process has been developed to support the FERC directives in the June 2024 FERC Order. The 2024-03 DT believes the new definition of Generator Cold Weather Constraint, updated language throughout the Standard with emphasis on Requirement R8, and the contents of Attachment 1 provides significant clarity to industry on what is expected for Generator Cold Weather Constraints to be considered valid.