2023 Winter Weather Readiness Workshop for Generation Resources

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• Slides throughout the ERCOT presentations shared today may contain paraphrased summaries of some of the rule’s requirements. In case of a conflict between the information in this presentation and the rule, the rule prevails.
Contents

• Overview of Summer 2023 - the first summer of ERCOT weatherization inspections under the PUC Weather Emergency Preparedness rule

• Review of new winter requirements “Beginning in 2023” - for additional detail please see the slide deck “2023 Initial Winter Weatherization Workshop 2023-07-28” available at https://www.ercot.com/gridinfo/generation/winterready
Summer 2023 Overview

- 2023 was the second hottest summer on record behind 2011 with mean temps of 84.5 and 84.6 respectively
- September 2023 was the hottest September on record
- 550 weatherization inspections were completed
- 16 total cure periods assigned, all remedied within 45 days

Cure Periods were assigned for 5 types of Compliance Deficiencies
  - Failure to review staffing plans
  - Failure to train personnel
  - Failure to create a hot weather critical components (HWCC) list
  - Failure to maintain HWCCs
  - Failure to monitor HWCCs

<table>
<thead>
<tr>
<th></th>
<th>Generation Resource Inspections</th>
<th>Transmission Facility Inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>58</td>
<td>44</td>
</tr>
<tr>
<td>July</td>
<td>56</td>
<td>98</td>
</tr>
<tr>
<td>August</td>
<td>52</td>
<td>99</td>
</tr>
<tr>
<td>September</td>
<td>42</td>
<td>101</td>
</tr>
<tr>
<td>TOTAL</td>
<td>208</td>
<td>342</td>
</tr>
</tbody>
</table>
How can cold wind impact critical components?

- It increases the rate at which heat is removed from equipment.
- A component that tolerates a certain cold temperature in still air or in a low wind condition may malfunction at that same temperature when exposed to higher wind speeds.
  - Heat trace adds heat to protected devices and systems at rates intended to protect against specific conditions.
  - Cold temperatures combined with wind can create conditions that remove heat more quickly than heat trace can add heat, ultimately resulting in the potential for freezing failures.
Beginning in 2023, . . .

- Two provisions of the Weather Emergency Preparedness rule become effective 12/1/23:
  
  - 16 TAC § 25.55(c)(1)(B), Implement additional weather emergency preparation measures that could reasonably be expected to ensure sustained operation at the 95th percentile minimum average 72-hour wind chill temperature reported in ERCOT’s historical weather study for the weather zone in which the resource (TSP facility) is located.
  
  - 16 TAC § 25.55(c)(1)(E), Create a list of all cold weather critical components, review the list at least annually prior to the beginning of the winter season, and update the list as necessary.

ERCOT issued an interpretation letter on July 13, 2023 and it was accepted at the PUC open meeting on July 20, 2023.

PUC staff issued a memo on the same day as the meeting memorializing items from the discussion, including the ERCOT letter, found at:

https://interchange.puc.texas.gov/search/documents/?controlNumber=54444&itemNumber=44
Summary of 20 July 2023 PUC Memo Directives

- Commissioners directed Commission Staff to file a memorandum summarizing a decision related to ERCOT’s proposed plan to implement the wind chill value weather preparation standard.
- Commissioners unanimously supported concepts and implementation plan in ERCOT’s 7/13/23 memorandum and directed ERCOT to implement that plan beginning 12/1/23.
- Commissioners directed ERCOT to:

  1. Require each generation entity and transmission service provider to file with its declaration of winter weather preparedness the ambient temperature and wind speed design values for each resource or facility under that entity’s control;²
  2. Assess, in part, a resource’s or facility’s winter weather preparedness on the 95th percentile, minimum average 72-hour wind chill values included in ERCOT’s 2021 weather study as Table 72;
  3. Inspect documents verifying the design criteria and the entity’s efforts to prepare its resource or facility to that design criteria, as needed; and
  4. Evaluate actual temperature and wind speed experienced at a resource or facility that suffers an outage or deration during winter weather conditions, as described by the rule.

² If a generation entity or transmission service provider does not have access to original or current design criteria for ambient temperature or wind speed, the entity must devise those values based on the entity’s experience operating the resource or facility.
Adequacy of Preparation Measures

<table>
<thead>
<tr>
<th>Weather Zone</th>
<th>95th Percentile Minimum Average 72-hour Wind Chill</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>-5.0°</td>
</tr>
<tr>
<td>North Central</td>
<td>-0.5°</td>
</tr>
<tr>
<td>West</td>
<td>0.3°</td>
</tr>
<tr>
<td>Far West</td>
<td>1.3°</td>
</tr>
<tr>
<td>East</td>
<td>4.4°</td>
</tr>
<tr>
<td>Coast</td>
<td>18.1°</td>
</tr>
<tr>
<td>South Central</td>
<td>8.4°</td>
</tr>
<tr>
<td>Southern</td>
<td>16.3°</td>
</tr>
<tr>
<td>Valley</td>
<td>20.0°</td>
</tr>
<tr>
<td>Panhandle</td>
<td>-17.6°</td>
</tr>
</tbody>
</table>

Market participants must provide the temperatures and wind speed design values for the current thermal (not structural) design of existing generation resources and transmission facilities (“facilities”).

Associated Wind Chill temperature can be calculated using the NOAA/NWS Wind Chill Chart equation:

\[
\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})
\]

where T is temperature (°F) and V is wind speed (mph) used in the thermal design.

This calculated wind chill can be compared to the chart values shown above.
Appendix A Revisions

Three New Columns have been added

Added new columns for Design Basis Cold Temperature (°F) and Design Basis Wind Speed (mph) - use thermal design basis, not structural design basis for wind

By December 1, 2023 this resource has been fully commissioned? (Y/N)