



Should NERC Impose Winter Preparedness Requirements on Generators?

Deborah Carpentier

During February 2011, the southwestern United States experienced unusually severe cold and windy weather, with many cities experiencing a 50-degree drop in temperature over an 18-hour period, with sustained winds of 30 to 40 miles an hour. During this period, generating units in the Southwest experienced an outage, a derate, or a failure to start, leading to controlled load shedding of about 5,300 megawatts.

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The Federal Energy Regulatory Commission (FERC) and North American Electric Reliability

Corporation (NERC) formed a task force to investigate the 2011 event and issued a report in August 2011.¹ The task force found that the majority of the problems experienced by many generators that tripped, suffered derates, or failed to start during the event were attributable, either directly or indirectly, to the cold weather.² These generators experienced, for example, frozen sensing lines, water lines, and valves.³ In addition, balancing authorities, reliability coordinators, and generators often did not know the temperature design limitations of the generators, and thus did not “realize the extent to which generation would be lost when temperatures dropped.”⁴

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Deborah Carpentier (carpentierd@dicksteinshapiro.com) is a partner in Dickstein Shapiro LLP's Energy Practice. She focuses primarily on federal regulatory and transactional energy issues for electric utilities and natural gas companies in matters before the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC). This article is provided by Dickstein Shapiro LLP only for educational and informational purposes and is neither intended as nor should it be construed as legal advice. This article may be considered advertising under applicable state laws.

Although the 2011 event was the longest cold spell in 25 years in the region, the task force found that many generators failed to adequately apply and institutionalize knowledge and recommendations from previous severe cold-weather events in the region. Similar to findings from those previous events, the task force found that generators had missing or inadequate wind breaks, had inadequate insulation and lagging (metal covering for insulation), failed to

have or to maintain heating elements and heat lamps in instrument cabinets, and failed to train operators and maintenance personnel on winter preparations.⁵

RECOMMENDATIONS

To ensure that it and its equipment are adequately prepared for cold weather, the task force—and some of NERC’s “Lessons Learned”—recommend, among other things, that a generator do the following:⁶

- Prepare for the winter season with the same urgency and priority as it prepares for the summer because although plant personnel and system operators, “in the main, performed admirably” during the 2011 event “shedding load in the winter places lives and property at risk”; and therefore, “more thorough preparation for cold weather could have prevented many of the weather-related outages.”⁷
- Establish policies—to be reinforced by senior management annually—that hold personnel accountable for winter preparation, provide for awareness and maintenance training on freeze protection equipment and other cold-weather issues, and include audit procedures.

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- Develop a preventative maintenance program for freeze protection elements (e.g., heat tracing equipment, thermal insulation, and wind breaks/enclosures) that specifies inspection and testing intervals before and during the winter.

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- Evaluate and test freeze protection elements after the winter to identify improvements

needed, required maintenance, or replacement for the following winter.

- *Before* winter starts, see that the following is undertaken:
 - Inspect and maintain heat tracing equipment, including the equipment’s power supply, continuity of the heat trace circuits, integrity of all connections, and monitoring devices.

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- Inspect all thermal insulation to ensure that it is properly installed; does not have cuts, tears, or holes; and has not reached the end of its useful life.
- Plan to erect adequate wind breaks and enclosures designed to withstand high winds and installed before extreme weather begins, and after having performed an engineering study to determine the proper placement of such structures.

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- Ensure that winterization supplies and equipment are in place for cold-weather events and that preventive action in anticipation of such events is taken in a timely manner, such as installing adequate wind breaks, scheduling additional personnel, and draining noncritical service water lines.
- Identify weak points in its plant where equipment freezing would bring a unit offline.
- Have written procedures in place for operating its unit in freezing weather conditions with potential loss of critical instrumentation.
- Install monitoring and alarms to give advance warning of pending potential freeze-related problems in critical areas.

- Perform a comprehensive engineering design analysis to determine its ambient temperature design operating limits, including the effect of wind chill and the temperature heat tracing and insulation can prevent moisture in critical components from freezing.
- Establish communication practices to inform the Balancing Authority and Reliability Coordinator of the ambient temperature limitation, and when the plant cannot meet that limitation.

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- Ensure that the plant can operate reliably at its design minimum ambient temperature.

CALLS FOR MANDATORY WINTERIZATION REQUIREMENTS

The task force found that the lack of any state, regional, or reliability standards that directly require generators to perform winterization left winter readiness dependent on plant or corporate choices. It recommended that southwestern states should consider enacting legislation requiring generators to submit winterization plans. These statutes could direct state utility commissions to develop best winterization practices, give them authority to impose penalties for noncompliance, and require senior management to approve such winterization plans.⁸

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In the *Report*, though, NERC concluded that there would be a reliability benefit from amending the Emergency Preparedness and Operations reliability standards (EOP Standards) to require generators to implement plans to winterize generating units “to maximize generator output and availability,” and intends to propose modifications to the EOP Standards.⁹ Thus, NERC staff appears to support a solution that would impose

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REGIONAL COMPARED TO NATIONWIDE SOLUTION

The *Report* was based on events in an area where extreme cold-weather events are not the norm.

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Understandably, given the consequences of the 2011 event in terms of cost and human hardship, improvements and possibly mandatory requirements are needed in the Southwest. But taking a broad brush to apply new mandatory standards on all generators is not the right approach.

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What the *Report* made clear was that there was a regional problem, and the recommendations therein “would substantially reduce the risk of blackouts . . . during the next extreme cold weather event that hits the Southwest.”¹⁰ Moreover, the task force’s findings/recommendations the performance of generators during the 2011 event may not be the same in areas where cold weather is not unusual.

For example, the *Report* recognized that generating plants in the Southwest, unlike facilities in cold climates, are designed “so that their boilers, turbines, and other auxiliary systems are exposed to ambient weather conditions” to prevent heat build-up from occurring in the sum-

mer, and use heat tracing, wind breaks/enclosures, and/or heat sources to prevent freezing.¹¹ A solution that fits plants designed for warmer climates might not be appropriate (or needed) for plants designed for colder climates. Accordingly, a regional approach would be preferable.

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While uniform standards may be beneficial in some respects, compliance with mandatory standards is not cost-free. It takes time and resources (which are not unlimited), including the possible need for additional personnel and an increase in the scope of audits. Therefore, imposing any of the recommendations as mandatory in regions where similar problems have not manifested, and where generating units are designed differently because cold-weather operations are the norm, could lead to the reallocation of resources that may be better spent on other activities that otherwise would be beneficial to the reliability of the bulk power system.

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Without the kind of in-depth analysis for other regions that the task force performed regarding the Southwest, it would be difficult to identify actual problems, and thus, a cookie-cutter solution is not ideal. Understanding though that there might be lessons learned from the 2011 event that might inform generators outside of the southwest, NERC should consider taking a regional approach to changing the EOP Standards. For example, instead of NERC proposing a one-size-fits-all standard, each Regional Entity, as necessary, could propose a regional variation to the emergency operations standards

to address the unique cold-weather-related issues of its region.

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But if NERC nevertheless proposes nationwide winter preparedness standards, it should, at a minimum, explain why a nationwide approach is preferable to a regional solution by identifying the problems such standards would address in areas outside of the Southwest, and what benefit the proposed standards would have on reliable operation of the bulk power system in such areas. 

If NERC nevertheless proposes nationwide winter preparedness standards, it should, at a minimum, explain why a nationwide approach is preferable to a regional solution.

NOTES

1. Federal Energy Regulatory Commission and the North American Electric Reliability Corporation. (2011, August). *Report on outages and curtailments during the southwest cold weather event of February 1–5, 2011: Causes and recommendations*; pp. 1–2, 169. Retrieved from <http://www.ferc.gov/legal/staff-reports/08-16-11-report.pdf>.
2. Ibid., p. 8. Although this column focuses on the findings and recommendations of the *Report* as to cold-weather issues associated with generators, the *Report* also addresses other elements of the bulk power system (BPS) and natural gas pipelines, including findings and recommendations with respect to generators with dual fuel capability.
3. Ibid., pp. 8, 139–143.
4. Ibid., p. 196.
5. See, e.g., Ibid., at pp. 175–180, 195–197.
6. Ibid., pp. 197, 201–209; NERC Lesson Learned, *Generating Unit Temperature Design Parameters and Extreme Winter Conditions* (September 28, 2011); NERC Lesson Learned, *Adequate Maintenance and Inspection of Generator Freeze Protection* (September 28, 2011); NERC Lesson Learned, *Plant Instrument and Sensing Equipment Freezing Due to Heat Trace and Insulation Failures* (October 18, 2011).
7. Ibid., p. 197.
8. Ibid., p. 203.
9. Ibid., pp. 203–204. In its *Reliability Standards Development Plan 2012–2014* (November 2, 2011), p. 3, NERC states that it currently is investigating cold-weather preparedness and winterization as an emerging issue that may result in a new standard.
10. Ibid., p. 10 (emphasis added).
11. Ibid., p. 142.