

April 15, 2026

VIA EMAIL

Board Members
Electric Power Board
1214 Church Street
Nashville, TN 37246

Re: Transmittal of PA Consulting's 30-Day Interim Report – Winter Storm Fern After Action Review

Dear Members of the Electric Power Board:

On behalf of Sherrard Roe Voigt & Harbison, PLC and Adams & Reese, L.L.P. (collectively, the “Law Firms”), we are pleased to transmit the enclosed 30-Day Interim Report prepared by PA Consulting Group, Inc. (“PA Consulting”) in connection with the Winter Storm Fern After Action Review of Nashville Electric Service (“NES”).

Selection of PA Consulting

Pursuant to our engagement, the Law Firms conducted a rigorous and comprehensive selection process to identify a national consulting firm with the requisite expertise to conduct this independent review. We issued a detailed Request for Proposal to 18 qualified consulting firms with demonstrated capabilities in utility disaster preparedness and after-action reviews. We received proposals from multiple firms. We then conducted selection interviews with the finalists.

Following careful evaluation, we selected PA Consulting based on their exceptional qualifications, including their team’s experience assessing over 30 major utility storm responses over the past 25 years, their recent leadership of the CenterPoint Energy Hurricane Beryl independent after-action review, their complete independence from NES and the Board, and their proven methodology grounded in FEMA standards and industry best practices.

Scope and Pace of the Review

PA Consulting has conducted an intensive and expedited initial assessment over the past 30 days. Their work has included nine rounds of comprehensive document and data requests submitted to NES, encompassing customer outage information, Outage Management System data, asset records, logistics and materials data, and internal and external communications. PA Consulting has conducted extensive interviews with NES personnel and stakeholders, including

sessions with key leadership and personnel responsible for emergency preparedness and response, including numerous management, operational, engineering, and field personnel across multiple rounds of interviews. PA Consulting's team—including seasoned emergency preparedness experts, utility operations specialists, data analysts, and communications professionals with decades of combined experience—has been on-site at NES facilities for multiple days to facilitate interviews and working sessions.

Nature of Interim Findings

Given the expedited timeline of this initial 30-day review, the speed with which this report has been assembled, and the fact that PA Consulting's comprehensive review and work remain ongoing, the Board should understand that the findings, conclusions, and recommendations contained in the enclosed 30-Day Interim Report are necessarily preliminary, tentative, and non-final. This interim report is intended to identify time-sensitive, high-priority improvement actions for NES's consideration and to present initial observations regarding key areas of analysis. The Final Report, due on or about June 15, 2026, will provide a comprehensive assessment across all focus areas, with additional detail, analysis, and supporting data, and may refine, revise, or expand upon the preliminary findings presented in the initial report.

We remain available to answer any questions the Board may have regarding this report or the ongoing review. We sincerely appreciate the opportunity to be of service.

Best regards,

SHERRARD ROE VOIGT & HARBISON, PLC



William L. Harbison

ADAMS & REESE, L.L.P.



Aubrey B. Harwell, Jr.



Winter Storm Fern After Action Review

30-Day Interim Report
15 April 2026

Bringing Ingenuity to Life.
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Executive Summary

Winter Storm Fern significantly impacted the Nashville Electric Service (NES) service territory in late January 2026. This rare ice storm caused approximately 49% of all NES customers to lose power at the peak of the event. The significant ice buildup led to extensive damage to trees and overhead electric infrastructure. Impacts were not uniform across the service territory, with the most concentrated damage observed in portions of southwest Davidson County. During the initial days of the storm, customers were unable to report outages due to issues with the outage reporting system and call center operations. In addition, restoration information was at times inaccurate, inconsistent, and delayed. Collectively, the weather conditions, extensive damage, and the busy signals that some customers faced when they called to report outages contributed to a negative customer experience.

PA Consulting Group, Inc. (PA) was engaged to conduct an independent comprehensive review of NES's preparedness, response, and restoration efforts for Winter Storm Fern, including evaluation of the Emergency Response Plan (ERP), Incident Command Structure (ICS), damage assessment, restoration strategy, Estimated Time of Restoration (ETR) development, communications, resource deployment, customer experience, materials and logistics, and operational technology performance. Findings and recommendations¹ in this 30-day interim report highlight time-sensitive, high-priority improvement actions that need to be addressed immediately.

Initial Recommendations:

- Expand ERP and associated training and exercise programs to help NES and stakeholders to better prepare for and respond to large scale events.
- Update ICS with clear roles, responsibilities, and accountability to ensure clear delineation of focus areas and coordination.
- Develop a damage prediction model to support earlier decisions and action surrounding resource activation, customer communication, and response planning.
- Develop and Embrace ETR strategy during normal operations and major events, with the goal to develop customer specific ETR for unplanned outages on blue sky days and during weather events, as well as global ETRs for major events within 48 hours.
- Establish a storm-specific communications structure with a designated communications lead and supporting communication pathways across all parts of the response organization.

Initial Findings:

At the peak of the event, over 230,000 customers were without power, reflecting the scale and severity of system impacts. Restoration efforts were further challenged by access issues (debris, continued freezing temperatures, and initially the lack of underground mark-out services) all of which contributed to extended outage durations and increased restoration complexity. NES brought in crews (contractor and mutual assistance) to help restore power. Ultimately, NES announced full restoration following Winter Storm Fern on February 9, 16 days after initial storm-related outages.

NES encountered operational and communication challenges during storm restoration. These included:

- The ERP was aligned at a high level with industry practices but lacked the detail, scalability, and procedural guidance needed to support a large-scale event, resulting in reliance on institutional knowledge rather than structured execution.
- The Incident Command structure, while established, lacked continuity due to simultaneous role rotations, unstaffed critical positions, and the absence of defined transition protocols. This resulted in a less than clear view of the chain of command, which led to inconsistent messaging.
- NES did not have a damage prediction model or a reliable method for estimating resource needs ahead of the storm, limiting its ability to proactively secure outside assistance and resulted in a delayed request for resources and slower overall response.

¹ Our findings and recommendations are preliminary, but are not expected to change directionally. The associated detailed implementation recommendations may be refined as analysis continues and additional information is obtained.

- Delayed calculation and communication of ETRs resulting from the absence of a standardized, repeatable ETR process (despite NES's outage management system's ability to generate ETRs), which limited NES's ability to shape customer expectations during the response.
- NES lacked a coordinated communications function capable of supporting a real-time response. Communications operated in parallel with operations rather than as an integrated function, with limited access to operational data and inconsistent execution of defined roles and workflows. This resulted in a reactive approach to communications. It resulted in delayed, inconsistent, and at times inaccurate messaging, as well as duplicated customer inquiries across multiple channels into NES which further added to the workloads of operators who had to address public inquiries in addition to active restoration activities.

Through the course of our interviews, we identified a number of areas where NES's restoration efforts went well and deserved to be recognized:

- Despite the freezing conditions and extensive damage, NES's restoration efforts only resulted in 17 minor injuries (slips and trips type incidents) and did not result in any serious injuries to restoration forces or the public.
- NES utilized crews to restore power using a parallel restoration process, where different types of crews (line crews working on primary power lines 4kV and above and service crews working on 120/240V lines) were dispatched to work at the same time. Industry norm typically sees service crews getting dispatched after the line crews have completed restoration on primary distribution lines.
- NES loading facilities in the North, West, and Donelson Service centers are set up well to transfer materials quickly and efficiently onto bucket trucks (NES and non-NES). The facilities allow trucks to back into a loading bay that is connected to either side of the warehousing facility, streamlining the material flow from warehouse to bucket trucks.
- As restoration efforts through (Wednesday) Day 4 were clearly not meeting customer expectations, NES shifted its approach and utilized outside resources for assistance beyond restoration and logistics support. NES sought help from utility experts (albeit a little delayed) to provide assistance in developing mechanics to calculate ETRs. NES recognized there was a need for technical expertise and brought in seasoned help to close gaps and create new processes.
- There was little to no evidence of crews (NES or non-NES) having to wait around for work assignments or materials.
- NES recognized vegetation management was a contributor to outages in Fern. Immediately following Fern, NES took appropriate, aggressive action to enhance vegetation trimming standards (wider clearances between trees and power lines, as well as removing any overhanging limbs).

Introduction

In March 2026, PA Consulting Group, Inc. (“PA”) was engaged by Sherrard Roe Voigt & Harbison, PLC and Adams & Reese, L.L.P. to conduct an independent investigation of Nashville Electric Service’s preparedness for and response to Winter Storm Fern (“Fern”), including the development of an After-Action Review. The review and resulting report are intended to establish a sequence of events during the restoration process, recognize areas where NES aligns with industry practices, and provide actionable recommendations for storm response and preparedness efforts. These recommendations are aimed at improving overall system resilience and enhancing customer experience during the next major weather event.

To achieve this, PA is conducting a comprehensive review of NES’s storm preparedness, response, and restoration efforts to Winter Storm Fern. This included the evaluation of NES’s ERP, ICS, damage assessment processes, and restoration strategies, as well as ETR development and communication. We are also assessing external communications, resource acquisition and deployment, customer experience, materials and logistics, and the performance of operational technology systems. Before PA issues the Final Report, we will review and analyze NES safety practices, board roles and responsibilities, and post-storm recovery activities to provide a complete view of overall response effectiveness.

This Interim Report presents our initial assessment of NES’s response to Fern identifying time-sensitive, high-priority improvement actions for near-term consideration. Our report reflects an analysis of available data, stakeholder input, and supporting documentation to highlight key observations and early insights. While this initial report focuses on immediate recommendations for consideration, the following Final Report will detail NES’s system readiness prior to the storm including vegetation management and maintenance practices, as well as specific preparedness efforts (e.g., mutual aid and external resource management, damage prediction process, etc.) related to Winter Storm Fern. It should be noted that the initial findings and recommendations presented herein are subject to change as analysis continues and additional information is obtained and will be further refined in our Final Report.

Winter Storm Fern

The most significant impacts from Winter Storm Fern in the Nashville area began the evening hours of Saturday, January 24 and persisted through Sunday, January 25. The storm brought a destructive combination of snow, sleet, and freezing rain, driven by the interaction of warm, moisture-rich air from the Gulf of Mexico overriding a shallow but persistent arctic air mass at the surface.²

Initial Forecasts

Winter Storm Fern was initially tracked by NES on Wednesday, January 21, 2026, at which time NES hosted a preliminary planning meeting to prepare for the storm. Forecasts issued on January 21 by the National Weather Service (NWS) indicated that the developing winter storm system was positioned over the Southern Plains and Southwest and had not yet reached the Mid-South. The system subsequently moved eastward, impacting Tennessee and the NES service territory in the days that followed.³

On Thursday, January 22, NWS issued a Winter Storm Warning for the Nashville area, forecasting storm impacts from approximately 12:00 AM CT Saturday, January 24 with a 20% probability of measurable snowfall and a 69% probability of freezing rain exceeding 0.25 inches. The forecasted freezing rain and potential resultant ice should have been an initial sign of potential for significant damage to the electrical grid, and potential need for additional crews.

Ice Accumulation during Fern

The Nashville area experienced precipitation during the first two days of the storm. On Saturday, January 24, NWS recorded approximately 0.36 inches of liquid-equivalent precipitation and 1.4 inches of snowfall at Nashville International Airport. On Sunday, January 25, Nashville set a new daily precipitation

² NWS area forecast discussion January 25, 2026

³ “The Washington Post. (2026, January 21). *Major winter storm to spread snow and ice across the U.S.* <https://www.washingtonpost.com/weather/2026/01/21/winter-storm-forecast-snow-ice-travel-impacts/>

record with approximately 1.92 inches of liquid-equivalent precipitation, the majority of which fell as freezing rain and sleet rather than snow.⁴

The transition from snow to freezing rain resulted in devastating ice accumulation across the NES service territory. Official reports indicated that Nashville received an average of 0.42 inches of ice,⁵ though localized amounts varied significantly. Some areas in and around Davidson County, such as Brentwood, reported up to 0.75 inches of ice.⁶

Storm impacts were not uniform across the NES service territory.⁷ Post-event reporting and utility updates indicated that the most severe damage was concentrated in portions of southwest Davidson County, while smaller pockets of outages persisted across other areas of the service territory⁸ which is covered by NES's West Service Center. Damage and outages were widespread across the NES service territory, with Bellevue/West Nashville being particularly hard hit. Anecdotally, this is the area that has shown the most resistance to tree trimming efforts.

Ice Accumulation & Restoration impacts

Ice is a weather condition that presents particular challenges to utility restoration efforts. The weight of accumulated ice, combined with occasional wind gusts, caused extensive damage to vegetation and overhead electric infrastructure throughout the NES service territory. Ice accumulations in the range of 0.35 to 0.50 inches are widely recognized as highly disruptive, capable of snapping large tree limbs, pulling down distribution lines, and exceeding structural tolerances of poles and crossarms. NES and local media reporting throughout Winter Storm Fern documented extensive systemwide infrastructure damage, including hundreds of broken poles across the service area, as crews worked through dangerous ice-related conditions.^{9, 10}

Restoration efforts were significantly hindered by the volume of fallen trees and debris, impassable and ice-covered roadways. Sustained sub-freezing temperatures persisted for several days following the storm.¹¹ These compounding factors extended restoration durations and intensified the operational challenges faced by NES crews and mutual assistance resources.

Restoration Curve

A utility's storm restoration curve provides a structured view of outage progression and restoration performance, offering insight into the customer experience and system resilience. It reflects how outages are resolved over time, highlighting differences between customers restored early and those with extended interruptions, and supports identification of opportunities for operational improvement and targeted system investment.

Figure 1 illustrates NES's restoration performance during Winter Storm Fern across the period January 25 through February 7. At the height of the storm, NES experienced 231,749 customer outages, representing approximately 49% of its total customer base. The restoration curve highlights a sharp surge in outages as ice accumulation intensified and infrastructure failed, followed by a steady increase in the percentage of customers restored as recovery operations progressed. Three distinct phases defined the customer experience: (1) a rapid escalation in outages at the storm's peak, (2) sustained progress as access, assessment, and resource deployment stabilized, and (3) a gradual final phase with

⁴ National Weather Service. (2026, January). *Preliminary Local Climatological Data (WS Form: F-6) - Nashville, January 2026*. <https://forecast.weather.gov/product.php?site=OHX&issuedby=BNA&product=CF6&format=CI&version=4&glossary=0>

⁵ Axios. (2026, January 28). *Nashville ice storm: 0.42 inches recorded*. <https://www.axios.com/local/nashville/2026/01/28/nashville-ice-storm-0-42-inches-recorded>

⁶ The Weather Channel. (2026, January 26). *Winter Storm Fern Turns Deadly In Louisiana, Outages For Hundreds Of Thousands Vulnerable To Ice, Snow*. <https://weather.com/news/weather/news/2026-01-25-live-updates-january-25-winter-storm-fern>

⁷ National Weather Service / NOAA. (2026). *Late January 2026 Winter Event Ice Accumulation & Snowfall Maps (Jan 23–27, 2026)*. NOAA ArcGIS Dashboard. <https://noaa.maps.arcgis.com/apps/dashboards/7e01cb15ec0b46b18e53b307cd5d42cd>

⁸ Tennessee Lookout. (2026, January 30). *Tennessee governor urges better Nashville Electric Service efforts in winter storm*. <https://tennesseelookout.com/2026/01/30/tennessee-governor-urges-better-nashville-electric-service-efforts-in-winter-storm/>

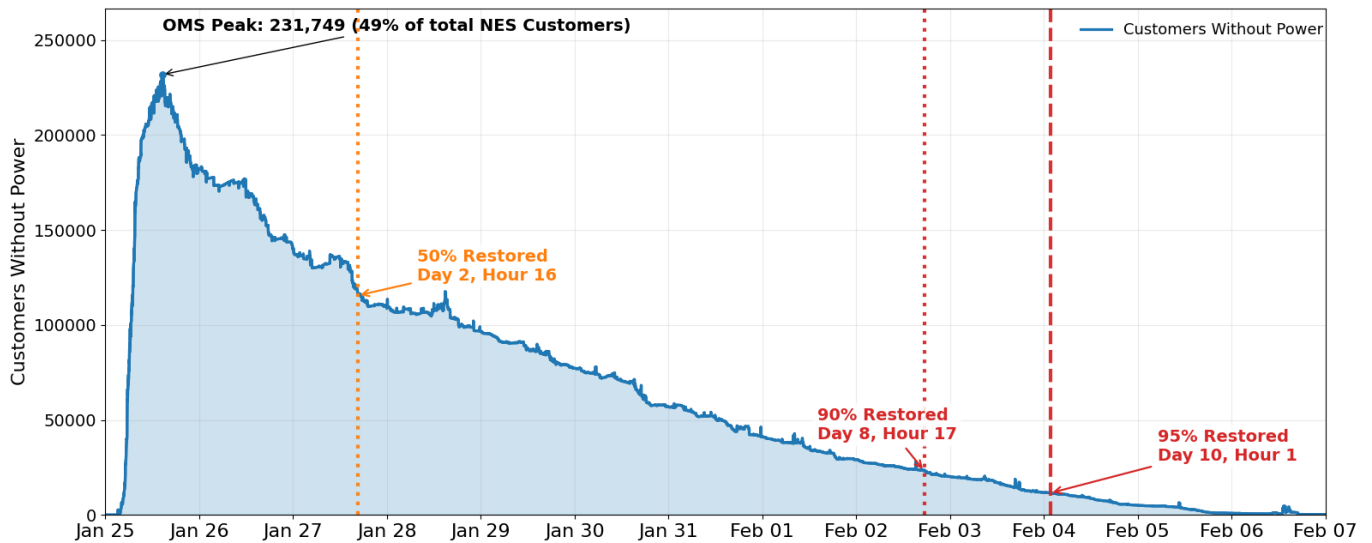
⁹ WZTV Fox 17 Nashville. (2026, January 27). *Thousands of Bellevue residents still in the dark four days into ice storm*. <https://fox17.com/news/local/thousands-of-bellevue-residents-still-in-the-dark-four-days-into-ice-storm-power-outages-nashville-tennessee>

¹⁰ WKRN News 2. (2026, January 25). *Nashville mayor declares state of emergency amid winter storm (ice snapping limbs/lines; broken poles; circuits out)*. <https://www.wkrn.com/news/local-news/nashville/nashville-mayor-freddie-oconnell-state-of-emergency-winter-ice-storm>

¹¹ The Weather Channel. (2026, January 26). *Winter Storm Fern Turns Deadly In Louisiana, Outages For Hundreds Of Thousands Vulnerable To Ice, Snow*. <https://weather.com/news/weather/news/2026-01-25-live-updates-january-25-winter-storm-fern>

labor-intensive repairs such as broken poles and primary/service-level restoration. Notably, the milestone of restoring 50% of customers was reached within the first 3 days, while 90% restoration was achieved near the end of the recovery period in about 9 days. Overall, the restoration curve underscores both the magnitude of the storm’s impact and the operational complexity of returning service during a severe ice event.

Figure 1. NES Winter Storm Fern Restoration Curve



Initial Recommendations - Details

The following recommendations outline immediate, high-priority actions for implementation ahead of the Final Report to address critical gaps identified during this assessment. They are intended to enhance NES’s preparedness and response effectiveness in the near term, with a focus on improving coordination, decision-making, and execution during the early stages of an event.

Each recommendation includes a brief summary and outlines specific near-term actions for implementation. Supporting background information, along with our initial findings and observations, is provided to give context on the conditions identified during this assessment. We have also included relevant industry best practices to illustrate how NES compares to leading utilities. Additional details are provided, where applicable, to support understanding, alignment, and effective execution of each recommendation.

Recommendation: Expand ERP and associated training and exercise programs to help NES and stakeholders to better prepare for and respond to large scale events

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| <p>Summary</p> | <p>NES should enhance its existing ERP to address what would be required to recover from large scale events. NES should also design and execute associated trainings and exercises around potential worst-case scenarios to ensure it creates muscle memory to help it recover from large scale outage events.</p> |
| <p>Immediate Action(s)</p> | <ul style="list-style-type: none"> • Hire a professional Emergency Preparedness individual to 1) update / redraft the ERP to address updates to ICS, roles and responsibilities, and manage the training and exercise programs • Establish primary and secondary storm duties for every NES employee • Expand ERP scalability to support large-scale events and establish clear resource management / scale up protocol |

Background & Industry Best Practices

ERPs outline how utilities approach and recover from abnormal conditions (e.g., major outages, cyber events, spills and other environmental incidents). ERPs do not have to be very detailed and prescriptive, as the detailed processes and procedures are covered in other documents (e.g., operating procedures, business continuity plans, crisis management plans). Major events are expected to be “all-hands-on-deck” type scenarios, and all utility employees are expected to contribute to the restoration efforts. Utility employees will have at least two storm roles (primary and secondary, and sometimes tertiary) they are expected to carry out during major event responses.

Utilities will conduct annual reviews of its ERP and conduct various types of exercises and drills to ensure that the personnel who are tasked with carrying out a storm duty can do so when activated in their storm roles. Utilities who are well prepared and industry leading will conduct multi-day exercises that is designed to challenge key decision makers and processes to 1) ensure knowledge of plans and processes to be followed, 2) test and validate processes (e.g., process hand offs such as how damage assessment info gets translated into work plans and materials lists, and information flows between groups such as field estimated restoration times), and 3) proactively address identified bottlenecks in the processes.

Initial Findings & Observations

The NES ERP framework is generally aligned with industry practices and is structured so that individual plans or components (e.g., operations, communications, logistics) can be activated independently or in combination based on the nature and severity of the event. The components function as independent, focused plans within the broader ERP. However, the ERP lacks sufficient detail to be consistently actionable, as there is no clear guidance on role of the crisis management teams and incident teams during storm activation. Key elements such as checklists, standardized processes, and clear procedural guidance are not defined, leading to a reliance on institutional knowledge and the individuals filling those roles. As a result, the ERP functions more as a high-level reference guide than a practical tool, as observed during Winter Storm Fern.

Additionally, the ERP was not designed to support an event of this scale. The plan’s highest defined severity level aligns with outages to 50,000 customers, while the impacts of Fern significantly exceeded that threshold. As a result, the ERP did not provide a scalable framework for managing a large-scale event, limiting its applicability under these conditions. While certain foundational principles and general guidance from the ERP were applied, it is difficult to assess adherence in a meaningful way, as the plan does not define expectations, processes, or governance structures for events of this magnitude.

Recommendation Details

NES should hire an experienced emergency preparedness individual to manage annual reviews of ERP (including but not limited to incorporation of lessons learned and process updates; annual ERP training schedules and courses; design and execution of ERP related training and exercises). Further, the ERP needs to be updated to incorporate any updates to the ICS roles and responsibilities (see ICS recommendation), and reference (or develop) plans and procedures. Finally, the ERP should define processes to be activated during large scale restoration efforts to address the influx of crews required to restore (e.g., develop plans for who can serve as bird dogs, what are the required training materials, what Information Technology (IT) and Operational Technology (OT) systems they will need to use, and when they will be activated in their role).

Recommendation: Update ICS with clear roles, responsibilities, and accountability to ensure clear delineation of focus areas and coordination

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| <p>Summary</p> | <p>NES should establish a structured incident management approach consistent with FEMA’s National Incident Management System (NIMS) to support more effective coordination and execution during storm response. This includes clearly defining roles and responsibilities across functions, with designated personnel and backups in place to maintain continuity throughout the event. The approach should be integrated with core utility operations, such as System Control, Geographic Information System (GIS), Communications, and field activities, to support coordinated storm restoration.</p> |
| <p>Immediate Action(s)</p> | <ul style="list-style-type: none"> • Update the ICS to better align with FEMA’s NIMS and NES’s operational needs • Assign primary and secondary personnel to each ICS leadership role • Eliminate full-role rotations during active storm events to maintain continuity |

Background & Industry Best Practices

FEMA established NIMS as the standardized approach to incident management that enables effective command, control, and coordination of emergency response through a common organizational structure. The ICS, as it is more commonly known in the utility industry, integrates personnel, resources, communications, and procedures to support efficient and coordinated decision-making across multiple agencies and jurisdictions during complex events.

For utilities, ICS provides a critical framework for organizing emergency response and recovery activities by aligning field operations, planning, logistics, and communications under a unified structure. This enables effective coordination with mutual aid partners, government agencies, and external stakeholders, ensuring efficient resource deployment, improved situational awareness, and consistent communication throughout the restoration process. ICS is a standard utility practice typically outlined in Emergency Response Plans (ERPs), where roles and responsibilities are assigned and defined. Aside from general framework, ICS provides a formal organizational reporting structure in addition to templates to be utilized throughout storm restoration (e.g., Incident Action Plan).

ICS is widely adopted across the utility industry and is considered a foundational element of effective storm response. Its absence or incomplete implementation can significantly hinder coordination, decision-making, and overall restoration performance during major events.

Initial Findings & Observations

Prior to Winter Storm Fern, NES established an Incident Command structure with defined roles, assigned personnel, and associated responsibilities, supported by a maintained roster for storm response. These roles are staffed on a rotating basis, with individuals serving one-week assignments before transitioning to the next designee. Rotations occur simultaneously across roles without overlap, which may limit continuity during transition periods.

Further, the command duty roster contains roles that are no longer needed or have no official duties during an event (e.g., Finance Coordinator). During Winter Storm Fern, NES did not have formal processes in place to ensure continuity of information across rotations. Two ICS roles - Damage Assessment Team Leader and Safety & Transportation Coordinator, were also not staffed during the storm response.

We did not identify any leading utilities that rotate ICS roles during an emergency response. While some utilities maintain rotating standby assignments prior to an event, once activated, personnel remain in their designated roles for the duration of the response to ensure continuity and effectiveness.

Recommendation Details

Under a standard ICS model, the Incident Commander serves as the central authority, with clear accountability for decision-making and approval of operational plans, communications, and response actions. To support this structure, roles and responsibilities for each ICS position should be clearly defined, with multiple trained individuals identified for each role to ensure continuity. During incident response, each individual should be assigned to a single role to maintain clarity of responsibility and avoid conflicting priorities.

Recommendation: Develop a damage prediction model to support earlier decisions and action surrounding resource activation, customer communication, and response planning

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| Summary | NES should develop a damage prediction model to translate anticipated damage from weather forecast into a level of restoration effort required to bring system back to normal conditions. |
| Immediate Action(s) | <ul style="list-style-type: none"> Explore 3rd party weather services that offer damage prediction models Analyze past restoration efforts to determine typical restoration times for various types of repairs (e.g., construction hours required per substation, transmission structure, distribution pole to be set, spans of wire (transmission, distribution primary, laterals / secondaries, services), underground cables Develop a model that can calculate the anticipated number of resources (line and service) given the anticipated damage (hours of work), and desired restoration duration / costs |

Background & Industry Best Practices

One of the key decisions utility incident commanders will need to make prior to the anticipated impact is the determination of how many resources are needed to recover from major outage events caused by weather or other hazards (e.g., physical attack). This decision essentially boils down to understanding the trade-offs between the acceptable restoration duration, and the number (and costs) of resources needed to achieve the acceptable restoration duration, and achieving a practical balance between restoration speed and cost.

To help better prepare for major events exceeding the capabilities of utilities' existing crews and "native" contracted resources, US utilities have developed models of various sophistication to determine the number of resources needed for the restoration effort. At the core, the models are all designed to translate weather pattern driven damage levels (e.g., poles destroyed, spans of wire downs) into total labor hours needed to recover. An illustrative governing equation for the model is shown below:

$$Total\ Restoration\ Duration = \frac{Total\ labor\ required\ (\#\ of\ damaged\ poles \times \frac{hours}{pole} + \# \ of\ downed\ spans \times \frac{hours}{span} + \dots)}{Restoration\ rate\ (total\ number\ of\ crews \times \frac{productive\ hours\ per\ day}{crew})}$$

Once the total labor hours are established, the models will determine for given restoration duration target (set by utility internal targets driven by either utility's own policies or regulatory requirements) the numbers and types of crews needed to recover. More advanced models will take into consideration the utility's ability to manage foreign crews (e.g., inefficient scaling up resources beyond a threshold number of resources) as well as costs associated with the restoration efforts (materials and labor). The model helps decision makers refine the number of resources needed. This model is further used during the restoration effort as estimated damage becomes assessed damage, and clearer, more granular ETRs can be calculated.

Initial Findings & Observations

NES did not have a damage prediction model prior to Winter Storm Fern impacting its service territory. NES has never utilized more than 500 outside resources in large scale restorations, and did not have a reliable way of determining the number of resources needed to recover from Winter Storm Fern. By the time resource requests were made, NES was in a passive position of being resource takers in the sense that they were taking whatever resources were made available as restoration crews were released from utilities that were not impacted.

Recommendation Details

NES should develop a model that can determine the resource requirements (crews / FTEs) for any given expected amount of damage (labor hours). This model will require the following inputs:

- 1) Anticipated (or assessed) damage amounts resulting from storm tracks (e.g., count of damaged / destroyed poles, counts of damaged and downed spans of wire, number of impacted substations)
- 2) Historical / anticipated restoration job requirements (e.g., labor hours required to restore substations, broken poles, downed wires)
- 3) Anticipated labor costs associated with various restoration resources (e.g., NES crews, sustaining/native contractors, non-native contractors and mutual assistance crews)

Recommendation: Develop and Embrace ETR strategy during normal operations and major events, with the goal to develop customer ETR for unplanned outages on blue sky days and during weather events, as well as global ETRs for major events within 48 hours

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| Summary | NES should establish a formal process to develop and communicate ETRs, including global and localized ETRs during major events. ETRs should be generated using real-time data including damage assessments, crew availability, restoration productivity, and overall progress, supported by historical storm performance data. Once established, this process should be supported by a clear communication structure to ensure consistency, accuracy, and one single source of truth across all customer-facing channels. |
| Immediate Action(s) | <ul style="list-style-type: none"> • Utilize the Outage Management System (OMS) as the central platform to integrate outage data, damage assessments, crew status, and grid design and connectivity • Define a standard methodology for calculating global ETRs including required data sources, assumptions, and validation steps • Establish a clear communication structure that centralizes ETR messaging and ensures all customer-facing channels publish from a single, verified source of truth |

Background & Industry Best Practices

ETR is a critical tool used by utilities to set clear customer expectations, communicate important safety information, and inform operational decisions throughout the restoration process. It is widely considered a standard outage management practice across the industry and one of the most valuable pieces of information for customers, as it directly influences decision-making related to shelter, travel, business continuity, and the use of backup resources. Timely and accurate ETRs also support public safety by helping customers understand the duration of outages, reducing unnecessary inquiries, and enabling coordination with local agencies and critical services. ETRs do not have to be 100% accurate to serve the intended purpose of helping customers make meaningful decisions to improve their customer experience (e.g., hotel arrangements during prolonged outages).

Operationally, ETRs align internal teams, mutual aid crews, and external stakeholders around a common timeline supporting job prioritization, resource allocation, and performance tracking. They also enable consistent messaging across customer channels, leadership briefings, and regulatory or governmental updates. Utilities typically provide two types of ETRs: a global ETR, established early to define the overall restoration horizon, and local ETRs, which are refined and updated regularly as damage assessments progress and restoration work advances.

Initial Findings & Observations

Consistent with its historical practice of not providing ETRs for unplanned outages, NES did not initially provide ETR during Fern. NES's Hitachi OMS system is capable of generating ETRs, but values it generates have not been configured to NES's historical performances and requirements. The existing system infrastructure at NES is sufficient to support calculation of ETRs.

As restoration challenges intensified due to prolonged low temperatures and system impacts, along with requests from leadership, NES deviated from this practice and first communicated a global ETR on Day 7 of restoration efforts. At that time, NES provided both a system-wide global ETR and localized ETRs by ZIP code. Once initial ETRs were established, NES calculated and published refined ETRs each morning and afternoon for the remainder of the restoration effort.

Overall, NES's ETR performance highlights a gap between system capability and operational practice. While global and local ETRs were ultimately provided, they were introduced late (and required external support), limiting their effectiveness. Establishing a standardized, repeatable ETR process would enable earlier, more consistent communication and better align with industry practices.

Recommendation Details

Develop and embrace an ETR strategy including: 1) configuring NES's Hitachi Outage Management System's default ETR values based on historical NES restoration performances 2) Identifying threshold to calculate global ETRs, 3) Develop methodologies to calculate global and local area ETRs, and 4) Establish clear ETR communications protocols for normal operations (system generated ETRs) as well as major event responses (Global ETRs transitioning to Local Area ETRs)

Recommendation: Establish a storm-specific communications function with a designated communications lead and supporting communication pathways and infrastructure

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| <p>Summary</p> | <p>NES should implement a proactive, coordinated storm-specific communications organization that consolidates all communications under a single functional group under the NES ICS. The communications organization should also designate a communications lead with clear understanding of roles and responsibilities.</p> |
| <p>Immediate Action(s)</p> | <ul style="list-style-type: none"> • Designate a single communications lead (e.g., Public Information Officer) with clear storm-specific responsibilities and authority to propose and shape messages and coordinate all inquiries across all customer-facing communications channels. • Refine (define where unclear) information pathways between System Control, Customer Service, government relations, and external partners to ensure the correct information and data are used for communications (internal and external) • Update the communications approval workflow to be aligned with ICS, documenting communications roles, approval processes and timelines. |

Background & Industry Best Practices

US utility customers expect their utilities to be prepared for the worst-case scenarios, and expect timely, transparent updates and clear acknowledgment of concerns during major events. Across the industry, utilities stand up a communications section that is integrated into the overall ICS, with clear roles, structured workflows and information sources during major events. The overall Incident Commander (IC) is the overall decision-making authority – in the communications space this means the IC has final approvals on the messages to be communicated throughout the response (e.g. for press releases; Intelligent Voice Response, web, and outage map messages). The role of the communications section under ICS is to advise the IC on what messages need to be communicated at various points (e.g., what talking points need to be raised early on to satisfy the public’s need for information in the absence of a global ETR before damage assessment is completed, what resources are available in terms of heating / cooling centers are available to customers, and what to expect if there is damage to customer owned and maintained service connections prior to re-energization). The communications section also is the interface between the public (customers and stakeholders) and the utility, that is, the communications section is the response organization that funnels and triages inquiries during the event to allow other parts of the ICS to focus on their areas of responsibility.

Leading utilities have pre-defined communications templates for various scenarios to enable fast, consistent execution should events occur. In addition to reacting to inbound inquiries during major events, leading utilities also utilize a proactive communications approach to shape customer expectations throughout the restoration process. Utilities are expected to maintain a steady cadence of updates, even if the message is “we are continuously working diligently to restore power to all those affected”. Proactive communications, acknowledging concerns, clarifying uncertainties, and reinforcing known information helps build and sustain trust, which can also reduce inbound inquiries into the utilities during an already stressful time.

Initial Findings & Observations

The NES communications function lacked the structure, governance, data access, and leadership needed to operate as a unified crisis communications effort, resulting in delayed and inconsistent communications.

Communications, operations, customer-facing teams, and government relations operated in parallel rather than through a unified structure, resulting in inconsistent updates, fragmented decision-making, and misaligned messaging. Communications lacked direct access to operational data and relied on verbal updates and manual workarounds. There was no clear communications leadership to integrate information or approve messaging, and approval pathways were inconsistent and often slow. External partners operated in parallel with the communication team, contributing to misalignment.

Recommendation Details

NES should strengthen its communications function with defined roles, refined and clear information pathways, and direct access to operational information to develop timely, accurate and meaningful messaging. A well-integrated communication section structure within an overall ICS, with a designated communications lead, streamlined approvals, predeveloped templates are needed to address the shortcomings experienced during Winter Storm Fern.



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