

AEIC

EST 1885

Best Practices for Storm Preparation and Response

A whitepaper prepared by the AEIC Storm Team

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Acknowledgements

The Association of Edison Illuminating Companies (AEIC) thanks the members of the AEIC Storm Team for their commitment to developing and documenting best practices for storm preparation and response for the electric utility industry. Special thanks to Brian Lindsay, Scott Moore, and Eric McIntyre at Southern Company for their leadership and to Georgia Power and Duke Energy for sharing their experiences and lessons learned from Hurricane Helene.

Introduction

Over the past 15 years, AEIC's Storm Team has provided a forum for power delivery professionals to exchange new ideas, information and lessons learned from restoration events. The committee develops a series of best practices and tools in the areas of storm restoration and system hardening, pre-storm checklists, storm restoration best practices, and practices that impact Emergency Preparedness work groups/Storm Centers.

In 2024, the hurricane season produced 18 named storms including seven tropical storms, six hurricanes (Categories 1 and 2), and five major hurricanes (Categories 3, 4, 5). Hurricane Helene was one of the most destructive weather events to ever hit the Mid- and South Atlantic regions of the United States. High winds and severe flooding resulted in significant loss of life and caused more than an estimated $75 Billion in damage to property and critical infrastructure including the power grid.

In responding to Hurricane Helene, AEIC members Duke Energy and Georgia Power utilized many of the best practices originally developed by the Storm Team in the wake of Hurricane Sandy in 2012. These best practices have been continually improved over time based on lessons learned from each new storm event. The scope and scale of the preparation and response needed to address the unprecedented impacts of Hurricane Helene provided new learning opportunities that can benefit all electric utilities as they plan for the next significant weather event.

Whitepaper Objective and Organization

This paper summarizes best practices for electric utilities for storm preparation and response. These best practices have been developed over the past 15 years by the AEIC Storm Team and continue to be reviewed and modified based on the lessons learned from each new weather event. This paper also includes case studies of application of these best practices by AEIC member companies in response to Hurricane Helene in 2024. This paper is structured as follows:

- Introduction
- Summary of Best Practices
- Summaries of Utility Cases from Hurricane Helene

Storm Team Areas of Focus

Storm Preparedness Planning

- Encourage drills and training to ensure storm response readiness.
- Learn from others that have been impacted recently by hurricanes, winter storms, wildfires, etc.
- Share forecasting tools and technologies for advanced storm preparedness.
- Review strategies on how Data Analytics can help before, during and post event.

Storm Response and Restoration

- Implementation strategies of best practices for safe and efficient restoration.
- Share innovative tools and strategies for damage assessment and restoration.

System Hardening and Resilience

- Advocate for infrastructure hardening to better withstand severe events.
- Share successful case studies on system hardening initiatives.
- Develop guidelines for resilience investments, including automation and vegetation management strategies.

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  - Duke Energy
  - Georgia Power
- Appendix of Storm Team Resources

Best Practices

1. **Scalable Storm Plans**
   - Be able to scale up to the worst-case scenario. Worst-case should be considered as half of the customer base out of service (at a minimum) and crew needs are 10 to 15 times the normal workforce on the system

KEY TAKEAWAY:

Storm plans must be "scalable" and flexible such that a utility can prepare and respond effectively to all hazards and magnitudes of system damage that might be encountered.

   - Maintain predefined levels with some definitions.
     - Level of Decentralization needed for logistics (staging areas, lodging, material lay-down areas)
     - Level of Decentralization needed for Operations (multiple control centers, additional personnel, field dispatching, transfer of control)
     - Appropriate communication strategy
     - Involvement of non-operating personnel
   - Prediction or early assessment methodology for level of activation -Very Important to Recognize "early warning signs" and react with appropriate level of response.
     - Utilize or develop a method or program for predicting outages and system damage and resource requirements for an anticipated event
     - Use historical information in the development of the storm plan to help define the necessary levels of response and trigger points and resource requirements. Some information that could be used is: Type of Event, Number of Outages, Number of Substations/Path of Prior Storms/ Circuits Out, Initial Number of Cases of Trouble, Manpower utilized, Length of Restoration

2. **Post Event Switching**
   - Isolate damaged facilities and alternately feed sections of line to pick up as many customers as possible prior to beginning system repairs.

KEY TAKEAWAY:

Immediately utilize all qualified switching and crew personnel to patrol locked out feeders to a point, open line switches and re-energize substation breaker.

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- Don't tie up lineman with replacing infrastructure immediately following the event.
- Train non-operating personnel to take over wire sitting duties (if required) such that all operating personnel remain available to perform switching.

NOTE: Remove all non-switching related duties from system operators such that their sole focus is safe, effective switching.

3. Decentralize Operations

- This helps host utilities assign work to mutual assistance resources much more efficiently. Decentralizing operations into smaller operations centers can help reduce restoration times as mutual assistance crews will be able to focus more time restoring power and less time waiting for a central operations center to dispatch work or switching instructions.

KEY TAKEAWAYS:

When possible, shift system operations and dispatching to satellite locations (local operating centers, subs or staging areas). The operational decisions for the area assigned can be made more efficiently and can remove the bottleneck from a central operations center

Personnel in charge of the restoration responsibilities at these satellite locations should assume responsibility for prioritizing and dispatching work assignments to damage assessors and line crews, updating the OMS, and controlling the switching for these areas.

- Not doing this creates a bottleneck during a major event.

4. Transfer of Control

- Transferring control will significantly reduce delays by allowing these storm teams to perform their own damage assessment, switching and dispatching of work without waiting on the host utility personnel to become available. This frees up the host utility to better allocate its personnel to support contract crews or other smaller storm teams.

KEY TAKEAWAY:

Have established electrical system operating procedures in place to allow for turning over control of a substation, feeder or area to self-contained storm teams from other utilities to manage restoration efforts in specified areas.

- Transferring control can further help to improve communications between the self-contained storm teams and the host utility. It reduces confusion, allows a greater sense of ownership and reduces workload on system operators. It also allows for more timely and accurate Estimated Times of Restoration (ETRs).

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5. **Developing and Maintaining ETRs**

Non-Major Storm (ETRs automatically assigned by the OMS)

- Distribution Control/Operations Center monitors and manages outages and default ETR until dispatched to crew.
- Crew assesses outage and determines if ETR can be met
- If the ETR can't be met, crew provides updated ETR
- Distribution Control/Operations Center manages new ETR & request status prior to ETR expiring
- Complete order when service restored

KEY TAKEAWAY:

While the severity of the storm can influence the steps in the process for determining ETRs, it is important to communicate effectively internally across operational areas and externally with customers and key stakeholders.

Major Storm (Default ETR is turned off or over-ridden)

- Communicate to customers that we are assessing damage and will provide an ETR upon completion of the damage assessment
- Develop ETR strategy with the following targets: Provide ETR as soon as have sufficient information, System ETR within 24 hours of end of storm - Use data from past events, current storm information, initial damage assessment, and ETR estimation tools to establish system ETR, Circuit/feeder level ETR - 48 hours to 72 hours depending on extent of damage, Device/customer level ETR – when crews assigned and detailed ETR is available
- Incident Command/Storm Director approves System ETR before communicating
- Storm plans include roles responsible for updating OMS and monitoring ETR status relative to goals

6. **Communication Plan**

- ETR must be timely, accurate, updated and more granular with time
- Defined Protocol for Formal Status Updates – After 24 hours give an overall timeframe for ETR; After 48 hours give an ETR by circuit/feeder level; After 72 hours give an ETR by local area
- Encompass all levels of organization in the Communication Plan

KEY TAKEAWAY:

Address needs and set expectations of all internal and external stakeholders throughout the entire course of the event. The message needs to be consistent, proactive, and visual.

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- Corporate - Consistent Message - Information/Data comes from one centralized source, Proactive Stance on Message - Shape the Message, Information out prior to event to show Preparatory Steps
- Emergency Operating Center - Establishing/Strengthening Relationships w/ local EOCs, Provide the information for Regional/State Message for picture of damage and restoration process, Defined Protocol for Formal Status Updates
- Field Operation - ETR's - timely, accurate and updated, more granular w/ time, wire down/priority communication

- Provide daily updates to all employees (including field workers) that is consistent with external message
- Utilize all forms of communication channels
- Establish/Strengthen Relationships at local level and have individuals assigned to Key Contacts – PSC, Governor's office, Legislative Leaders, County, Municipal Officials, State EMA/FEMA, State Patrol, etc.
- Have a Communication Plan Outside of the Event to update City and County officials and Media Representatives on Utility's Emergency Preparedness Plan

7. Staging/Processing Sites and Logistics Plan

KEY TAKEAWAY:

Create a blueprint for multiple sites in strategic locations and have plans in place for all logistics needs.

Create a blueprint for multiple sites in strategic locations:

- Determine capacity of site
- Locate in the proximity of the storm damage • Allow for smooth traffic flow - Preprint directional signs to facilitate entrance/exit
- Communications ability (T1 Line, cell, internet, radio, etc.)
- Adequate parking
- Ensure proper security
- Fueling at night

Have plans in place for all logistics needs:

- Organize, document, train and practice for all logistics needs.
- Document, contract and prioritize:
  - Housing (Hotels, Brick & Mortar, Sleeper Trailers, Tents)
  - Food (Catering, Restaurants, Box lunches, etc.)
- Set up multiple sites and times for safety briefings, badging, etc.
- Provide adequate staffing to facilitate processing and on-site needs
- Daily communications with site management with updates on needs, resources, outage & safety updates, etc.
- Utilize bussing to transport crews to and from hotels

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8. **Material Acquisition and Delivery**

KEY TAKEAWAY:

Currently, the vast majority of storm material requested during an emergency event and/or extreme temperature event is procured on a per ticket basis which can lead to timely restorations.

- Have Vendor Agreements/Contracts in Place for Storm Stock prior to the event.
    - It is impractical to maintain sufficient inventory for major storms.
- Have vendors deliver directly to Staging Sites and Job Sites
- Have Pre-made Storm Kits on Hand and material trailers with basic materials stored and ready to dispatch.
- Have a Material Substitution List
- Materials Mutual Assistance (not used for blue-sky day events)
- When shortages are predicted, request material needs via Mutual Assistance quickly. Allow some flexibility in matching materials to your specs. Make a timely and very specific request via mutual assistance.
- Have teams (Material Runners) ready to deliver major materials (transformers, poles, etc.) to job sites before restoration teams arrive on site. This will reduce idle wait time and travel of crews and increase crew productivity.

9. **Emergency Materials Management**

KEY TAKEAWAY:

Vendor contracts for "storm stock," timely and specific mutual assistance requests, and material runners at the ready can ensure you have the right materials in the right place at the right time, allowing crews to get to work immediately.

Current State

- Once a work order has been created, crews are assigned to the respective materials
- Crews deliver materials to be installed on site during repair/replacement
- Crews make repairs/replacements and haul off old or damaged equipment which can cause unnecessary time delay for future WO ETORs.

Ideal State

- **The crew's sole focus is to make repairs!**
- Upon event creation, crews will dispatch to WO location while "runners" or "hot shots" gather material for the respective WO.
- Once on site, hot shots will drop off material and haul off any old/damaged material from site.
- While assigned WO crews are making repairs, hot shots are already enroute to the next WO location so that material is on site prior to crew arrival.

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Future State

- Electronic tracking of all materials per work order
- GPS tracking of materials to give better ETA which will in turn drive ETOR
- RFID Scan of all materials prior to departure and scan upon arrival to prevent missing material during transit.

10. Pre-Staging Best Practices

Prior to having crews enroute to your service territory for pre-staging the following items are recommended to be identified and stood up:

- Identify alternative routes due to changing weather predictions/conditions including any emergency declarations
- Identify and secure sites for mobilization of pre-staged crews prior to the decision to stand up o Hotels and parking sites should meet weather event impact levels (CAT 5 hotel, equipment impact)
- Identify the type of crews for prestaging (refer to resource typing sheet) post RAMPUP matching and allocation call
- Pre-identified areas for onboarding (reduce the bottleneck) with the ability to convey to responding crews:
  - Where they will be sleeping
  - Where they will get their next meal
  - Contact information of the host utility
- Contingency planning around accommodations (lodging and food)
- Set up a regular communication cadence with responding utilities for responding crews (scheduling and coordinating show up times and locations)
- Use resource management tool (ex. MARC, Storm Manager, ARCOS) to inbound crews and proactively communicate crew destination/staging area
- Reference “Pandemic Best Practices”
- Verify that crews identified for prestaging have been sent a safety orientation that can be taken prior to their arrival

KEY TAKEAWAY:

Following a pre-staging checklist is essential to ensuring the highest levels of coordination, safety, and support for responding crews.

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11. Storm Packets

KEY TAKEAWAY:

Storm packets ensure an organized, coordinated, and continuous workflow that can help minimize downtime.

- Work assignments / packets should be prepared by night team (9pm – 6am)
- Include: outage info, feeder map, directions to jobsite/staging site, clearance/switching orders, ground placements, switch locations/alternate feeds, established work location/boundaries, damage assessment forms
- May be Electronic or Paper
- Need to have a continuous workflow to minimize downtime of evaluators and crews waiting on work. Crew and evaluator leaders can immediately pick up their packet and move to the assigned feeder or area
- Distribute to Crew Coordinator at beginning of the work day

12. Self-contained Storm Teams

KEY TAKEAWAY:

Host utilities must work with responding utilities to define the composition of the storm team and clarify key information.

Responding utility

- Send advance team ahead of crews to evaluate conditions, meet with local leadership
- Storm team may include Supervision, Crews, Troublemen, Evaluators, Fleet, IT, Security, Logistics Support, Storm Command Trailer, Supply Chain, Safety logistics, Administrative Support, Pole Setting Crews, Vegetation Crews

Host utility

- Communicate with sending utility to define the composition of team immediately following mutual assistance call. Clarify terminology, define work/safety practices, worker capabilities, bargaining unit issues, unique characteristics of geography of host utility
- Assign self-contained teams to specific geographic areas
- Utilize GPS kit, tracking devices, common website that displays GPS locations

***Reference "Crew Support Levels" within the appendix section of this document**

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13. Damage Assessment

KEY TAKEAWAY:

Utilize technology to capture storm assessment data but always have a manual back-up plan in case technology is unavailable.

- Perform initial assessment to determine severity of the damage
    - Use visual sampling for initial, quick assessment and compare to data from past events to help determine resource needs as soon as possible
- Comprehensive assessment while resources are in route
    - This will allow restoration assignments to be available once crews arrive at the staging site. This prevents delays in getting crews to the job sites
- Provide incoming resources with a list of terminology, symbols, and definitions.
- Utilize technology – have a plan in place to capture storm assessment data:
    - This may include the use of laptops, smart phones, tablets, UAS teams
    - Tie into OMS, touch screens and drop down menus, produce work packets (paper or electronic), maps on storage devices and/or cloud storage for mutual aid teams, GPS, review compatibility with MA partners, mobile printers)
- Backup plan to manually capture damage assessment data if technology is unavailable (cell phones, internet).

14. Use of non-T & D Personnel

KEY TAKEAWAY:

Assigning storm roles to non-T&D personnel will increase the manpower available for restoration and improve efficiencies.

Ensure all company employees have pre-defined storm roles and are trained prior to event to serve as:

- Damage Assessors / Drivers
- Foreign Crew Escorts
- Line Crew Assistance
- Material Delivery
- Wire Down Guard
- Logistics Coordinator / Meal Delivery
- Call Backs
- Family Assistance

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15. Mobile Dispatch Technology

- Allow field employees to input create/dispatch and close-out jobs
- Evaluate technology compatibility with Mutual Assistance partners

KEY TAKEAWAY:

The use of Mobile Dispatch is especially helpful when completing single event jobs to help reduce the opportunity to miss these isolated trouble cases.

- During large events, equip guides leading MA teams with a computer (and maybe printer) to update OMS, print jobs, etc.
- Paper packets should always be available as a backup in case of communications issues

****Non-native crews seem to work better and are accustomed to paper job packages.**

16. Road Clearing/Wires Down

- Have non-Operating personnel trained to address wires down
- Have a process in place to work with City Crews, County Crews, Fire, Police, EOC's, and the Public for handling hazards

KEY TAKEAWAY:

Make sure to have processes and reporting capabilities in place for wires down and conduct annual training for all team members including non-operating personnel.

- Have Wire Down Reports in Outage Management System
- Process for Wires Down and Prioritization
  - Team previews field to identify if electric utility wire or telephone/cable
  - Team submits ticket for cut/clear OR places field sign indicating wire has been inspected and is telephone/cable
  - Types of employees – Evaluators, OH Pole Inspectors, Street Light Repairmen, Meter Mechanics, Meter Journeyman
- Conduct Annual Training

17. On/Off System Support - Resource Readiness

Host Utility

- Reference "Work Crew-Resource Type" within the appendix section of this presentation

KEY TAKEAWAY:

Prior and during the triggering of the mutual aid lever for storm support, host utilities should identify what type of resources are needed and could potentially be utilized during a specific time during the restoration process. Responding utilities should Identify resources that are available and proactively identify what level of crew support they can offer and what level of specialized support.

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- Reference “Support Team- Resource Type” within the appendix section of this presentation
- Reference “Crew Support Levels” within the appendix of this presentation
- Reference planning checklist for host utility within appendix of this presentation

Responding Utility

- Reference “Work Crew-Resource Type” within the appendix section of this presentation
- Reference “Support Team- Resource Type” within the appendix section of this presentation
- Reference “Crew Support Levels” within the appendix of this presentation
- Reference planning checklist for responding utility within the appendix of this presentation

18. Communication Wire / Fiber

KEY TAKEAWAY:

Engage early with key stakeholders for consistency and coordination and develop key internal and external communications paths.

- Have electric representative liaison along with communications company liaison engaging early within the local or state EOC (Emergency Operations Center) for consistency, coordination, and line of sight during an event
- Look into possibly initiating joint locates when “cultivating” is needing to be performed due to damage assessment (replacing poles, URD wire, etc.)
- Understand the emergency one call locate procedures and resource needs due to identified damage
- Have an internal and external communication process around wire down / damaged
    - Internal – communicate expectations around communication cable “clearing” up and making safe process
    - External – communicate process for wire down identification to appropriate stakeholders (power utility & communication)
    - Establish, at the local level, a communication path between the utility and comm. space for points of contact for expedited response when needed.

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Case Studies: AEIC Member Response to Hurricane Helene

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Duke Energy Response to Hurricane Helene





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Preparing for Helene

Sept. 23-Sept. 26

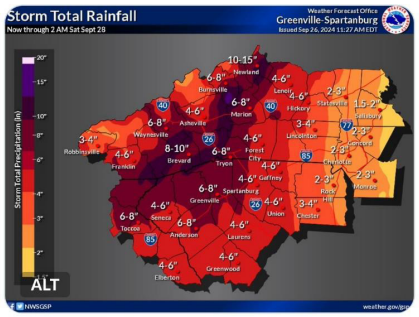
- Duke Meteorology team recognized the threat as Helene forms
- Carolinas Incident Command was stood up and began storm preparation
- Western North Carolina Distribution and Transmission requested and received additional line workers, Damage Assessors, and Vegetation crews
- These crews were pre-staged and ready to support the storm
- At peak, more than 23,000 total resources were supporting the storm in the Carolinas

x.com

NWS GSP @NWSGSP

URGENT MESSAGE

This will be one of the most significant weather events to happen in the western portions of the area in the modern era. Record flooding is forecasted and has been compared to the floods of 1916 in the Asheville area.



12:56 PM · Sep 26, 2024 · **1.3M** Views

DUKE ENERGY

Devastation







Transmission Impact

	Retail Substations	Industrial Customer	Wholesale PODs
Peak Storm - NC	96	81	47
Peak Storm - SC	111	115	80

Materials Required

- 187 poles
- 374 crossarms
- 140k feet of conductor
- 55 lattice tower arms

Aerial damage assessment – 4 helicopters (1 DE, 3 contract) starting 9/27 PM; 2 more added later

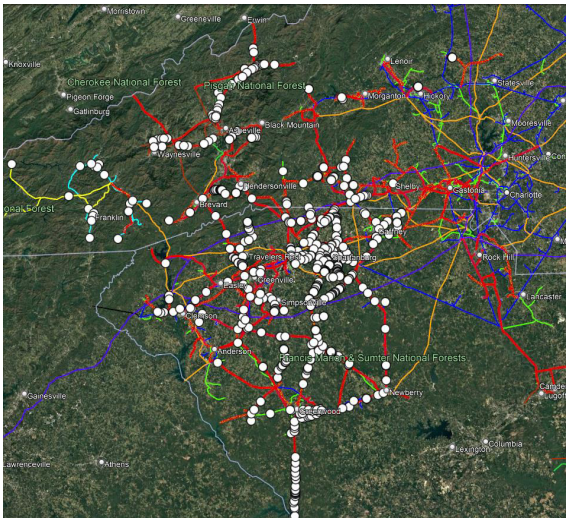
- After restoring service, aerial damage assessment performed for entire impacted area
  - 7,430 circuit miles flown
  - 472 leaning/danger trees
  - 134 line issues
  - 27 temporary fixes

5 substation projects underway to replace flood-damaged equipment

- Biltmore 115kV
- New Salem 115kV
- Marshall Hydro Plant
- Turner Shoals
- Beech Street Retail

54 projects initiated to address damaged line structures

Line kV	Line Outages	Total Lines	Impact
<100kV	131	291	45%
100-199 kV	130	440	30%
>200kV	5	106	5%



Distribution Impact

	Outage Events	Customers Impacted
NC	25,852	1,482,471

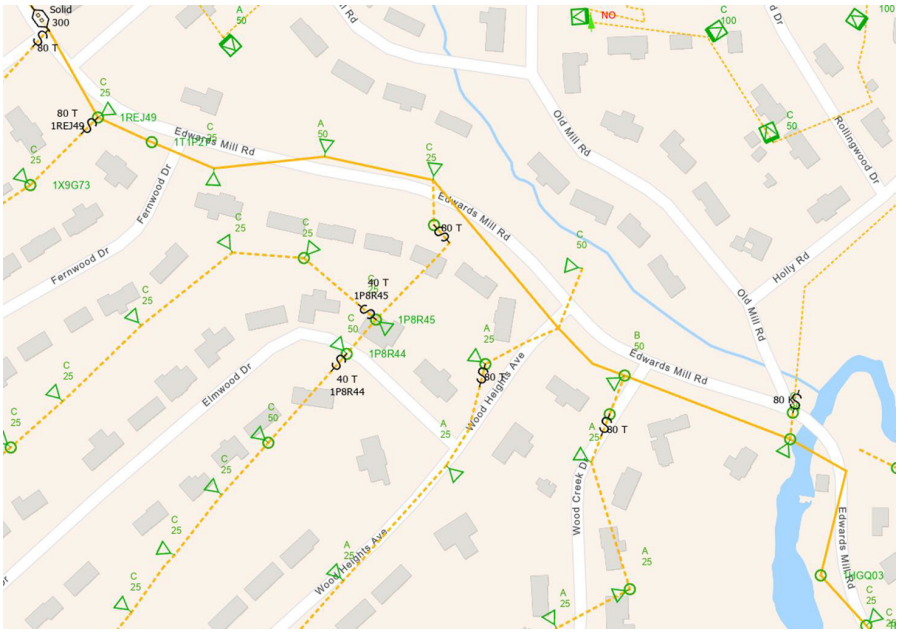
- More than 23,000 field personnel contributed to the restoration (D/T Line, Damage Assessment, Vegetation Management, Leadership)

- Materials consumed (240K miles driven by corporate trucking, 390K miles by materials vendors)
  - Poles – 14,000
  - Transformers – 11,250
  - Wire/cable – 9 million feet
  - Crossarms – 30,800



Restoration Process

- Damage assessment
- Critical customers
- Decentralize dispatch (break into zones and resource coordinators)
- Assign resources by zone/circuit to meet ETR
- Organize zone restoration plan by circuit
- Repair and energize backbone
- Repair and energize fused line sections
- Check and adjust along the way



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Restoration





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Corporate Responders
Government and Community Relations

Power Grid Operations

- Following landfall, the GCR team deployed various stakeholder engagement practices to address critical customer issues and maintain positive relationships with the communities we serve.
- The collaborative efforts of Duke Energy, local authorities, and N/S Carolina residents were an integral component to the effectiveness of our storm restoration efforts. This historic experience highlighted the significance of preparedness, communication, and community solidarity in overcoming natural disasters.
- Communicated to more than 9,000 recipients resulting in recognition from key leaders and positive social media engagement.

- All employees have storm roles
- Customer contact center support
- Staging and logistics
- Resource management
- Damage assessment
- Field leadership support
- State Emergency Operations Center support
- Communications

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Corporate Communications

Customer Delivery

Power Grid Operations

Social media inbound overview

- Helene produced the highest inbound social media volume since Irma; demonstrating the utilization of social media as a communication tool during storms.

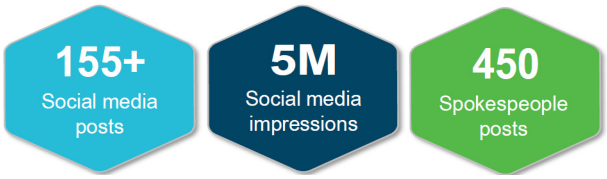
Key Data Points



Social media outbound overview

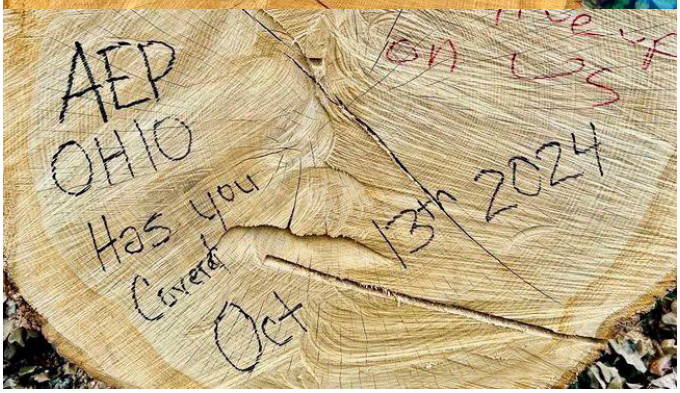
- Proactive social media content reached more than five million people online and drove traditional media stories, helped drive direct to customer communications, and helped provide content and information to more customers.
- Duke Energy spokespeople also kept information flowing, publishing more than 450 posts on Twitter/X generating connection with an additional 750,000+ users.

Key Data Points



Customer Response





"Considering the amount of damage we sustained, Duke kept in contact through many days of no power with text messages. The updates helped us plan how to take care of our family. The number of workers that came to fix our county was phenomenal."



"Your team was absolutely amazing every step of the way dealing with so much to repair. Communication was frequent and timely. You got crews organized and in position early. It is remarkable how fast you restored power. Thank you all!"

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After Action Review

Power Grid Operations

- Review security and nursing support plan at base camps and operations center during major events.
- Evaluate Starlink+Cell phone vs. Satellite phones.
- Explore various IT/Communications solutions (Land mobile radio and starlink).
- Ensure off-season training for applications/technology.
- Develop “Loss of Communications” one-pager with preparation to distribute pre-storm.
- Aerial DA process went smoothly with strong support from Aviation.
- Ensure logistics contractors are aware of Duke Energy safety protocols.

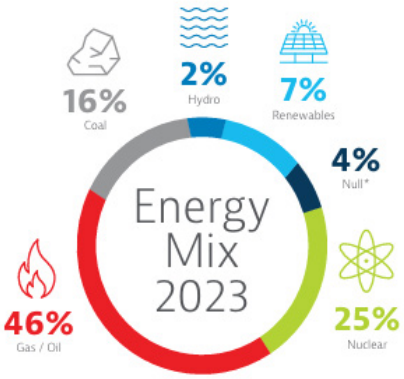

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Hurricane Helene Recap

Eric McIntyre, Storm Center Operations Manager Georgia Power

Georgia Power

GEORGIA POWER AT A GLANCE

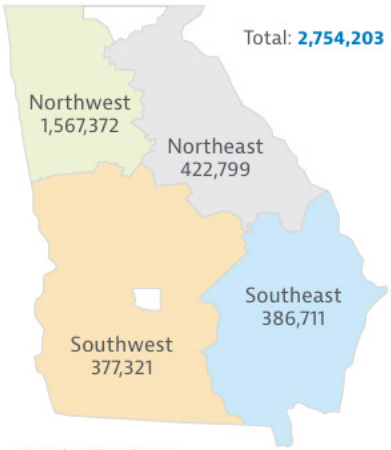


* Georgia Power reports only the null energy output from some renewable generating facilities. Ownership of the associated renewable energy credits (RECs) is specified in each respective power purchase agreement or program tariff. The party that owns the RECs retains the right to use and report them.

Distribution Lines
78,583 miles

Transmission Lines ***(GPC owned)***
11,855

Customers by Region*
(Reflects 2023 region organization)



Service Territory

Georgia Power provides electric service to customers in 155 of the state's 159 counties.

**Excludes wholesale customers*

Georgia Power

EXECUTIVE SUMMARY

Helene entered Georgia around 5:00 PM on 9/26 as a **Category 1 hurricane**. Helene exited the state around 12:00 PM on 9/27 as a tropical storm.

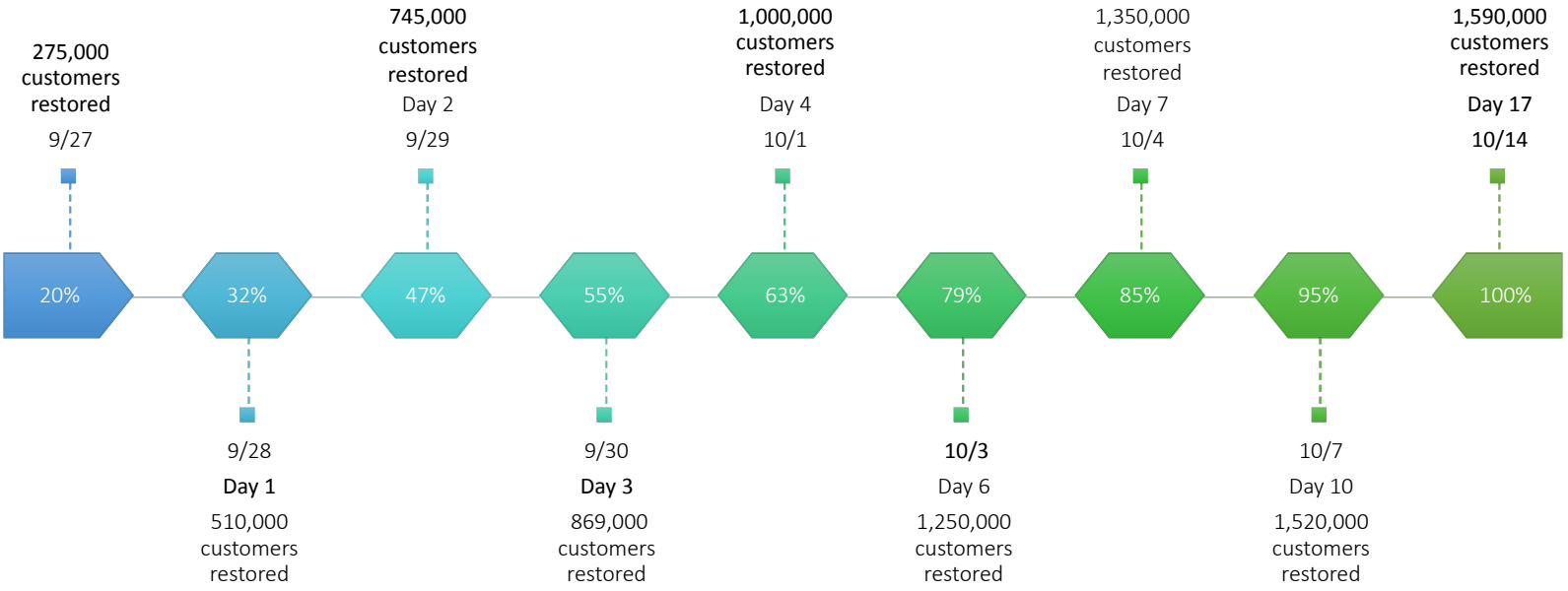
Nearly **2/3 of the state of Georgia** was affected, an area totaling **46,000 square miles** from Valdosta to Macon, across to Augusta and south to Savannah and Brunswick.

Sustained **wind speeds were between 39-69 mph** across the affected area, with **gusts between 50-100 mph**. Total **rainfall was between 1 - 12 inches** across the affected area. At least **three tornados** were confirmed.

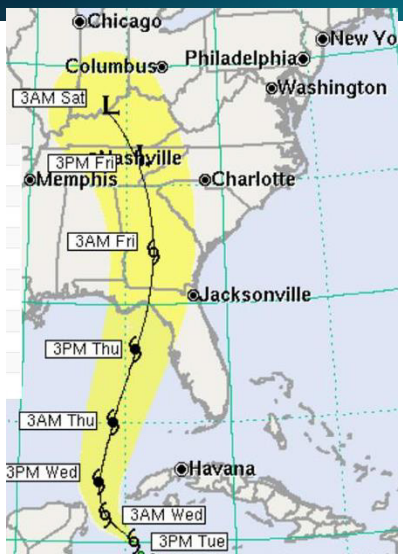
Overall, **1,590,000 customers** were affected by outages.



1 7 -DAY RESTORATION TIMELINE



HELENE FORECASTED TRACK



SEPTEMBER 24



SEPTEMBER 25



SEPTEMBER 26

HELENE ACTUAL PATH THROUGH GEORGIA



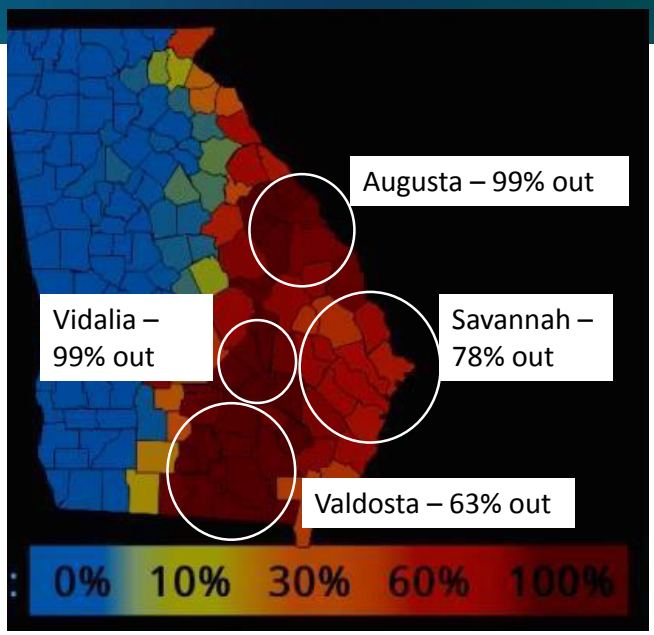
SEPTEMBER 25



SEPTEMBER 26

DEVESTATING IMPACTS














STOP
ALL WAY
STOP
ALL WAY
1394


VALDOSTA-LOWNDES COUNTY
PARKS & RECREATION
AUTHORITY








30.902715°N 83.231711°W 283.694ft
UAV GPC

THE MOST DESTRUCTIVE STORM IN GEORGIA POWER HISTORY





Distribution	Transmission
5.7k Transformers *Compared to **1,000** during Hurricane Michael*	**230** Facilities restored
1.5k Miles of Wire *Compared to 227 during Hurricane Michael (2018)*	**1,200** Spans of Line impacted
11.9k Broken Poles *Previous peak **2,000** during Hurricane Michael*	**345** Structures Replaced

ENGAGING OVER 20,000 RESOURCES FROM 35 STATES...

10,000
Distribution Line Personnel

1,500
Transmission Line Personnel

5,700
Vegetation Management

390
Security Personnel

1,700
Damage Assessment Personnel

500
Customer Care Representatives

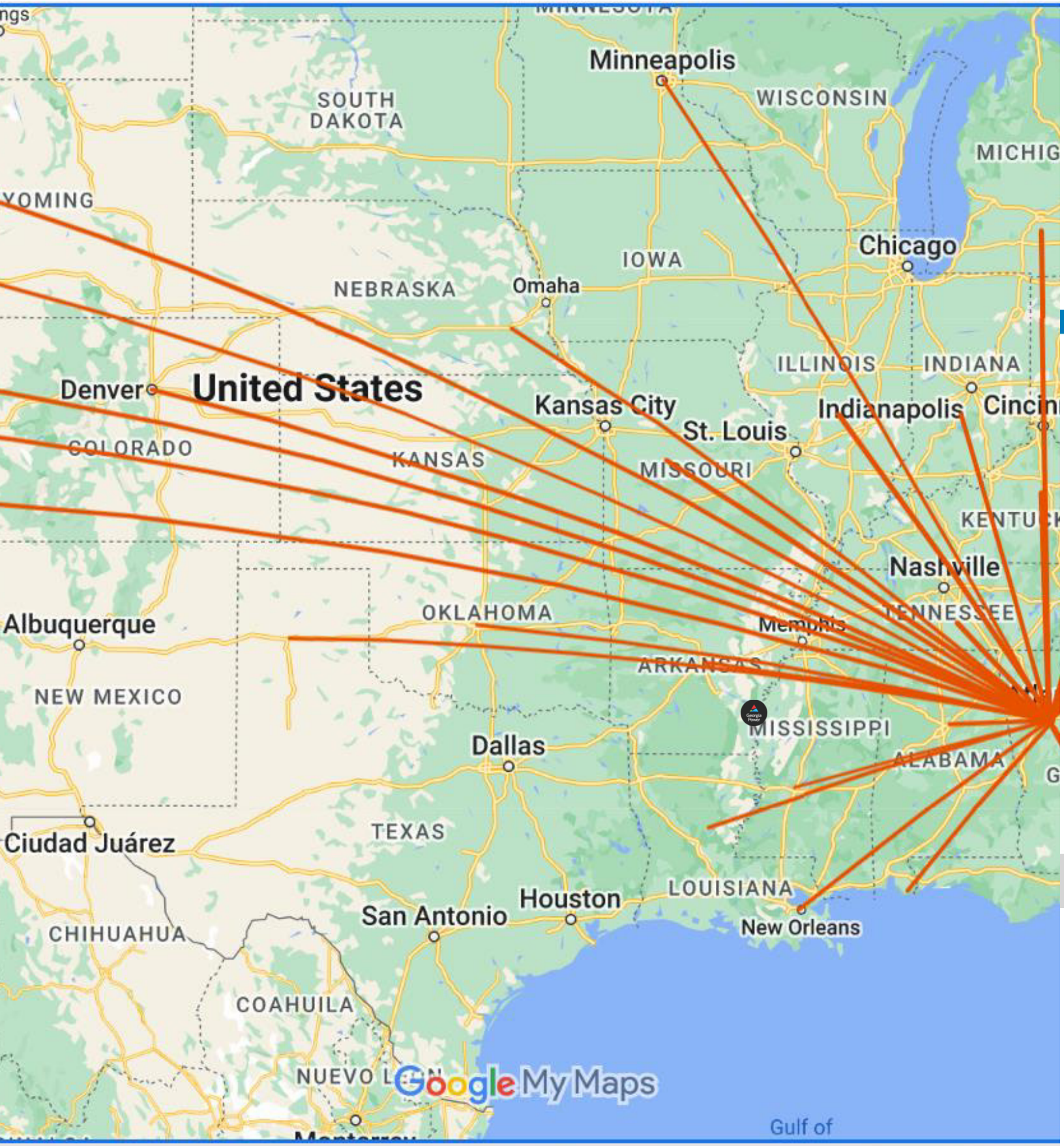
550
Volunteers

34
Staging Sites






Georgia Power


Minneapolis
SOUTH DAKOTA
WISCONSIN
MICHIG
YOMING
Chicago
IOWA
NEBRASKA
Omaha
ILLINOIS
INDIANA
Denver
United States
Kansas City
Indianapolis
Cincin
St. Louis
COLORADO
KANSAS
MISSOURI
KENTU
Nashville
Albuquerque
OKLAHOMA
TENNESSEE
Memphis
ARKANSAS
NEW MEXICO
MISSISSIPPI
Dallas
ALABAMA
TEXAS
Ciudad Juárez
LOUISIANA
Houston
San Antonio
New Orleans
CHIHUAHUA
COAHUILA
NUEVO L
Google My Maps
Gulf of

CHALLENGES

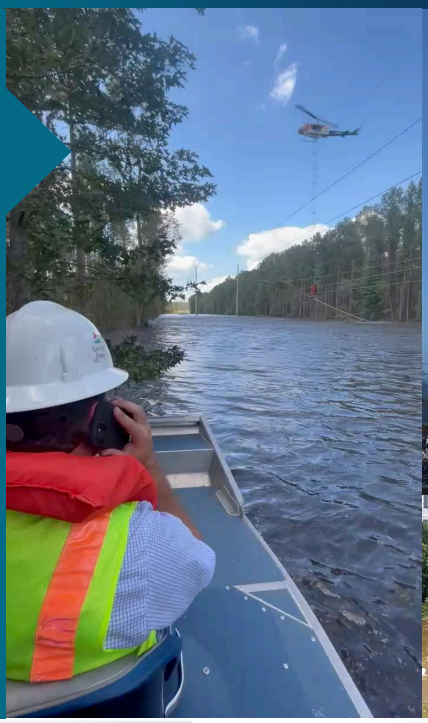
ACCES S I S S U ES D U E TO ROAD CLOSURES & FLOODING

TRANSMISSION DAMAGES

LACK OF INTERNET & CELLULAR

R E B U I L D E F F O R T V S . R E S T O R AT I O N

S TA G I N G A R E A S I T E S







21,700

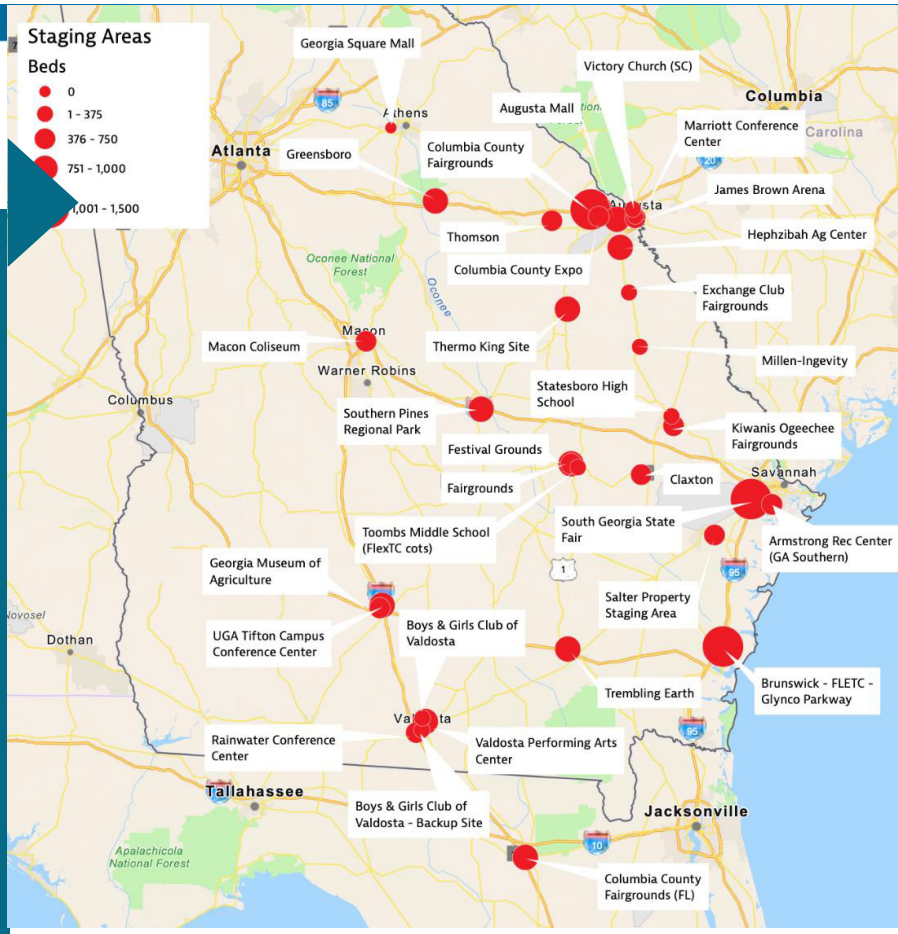
Beds

2,425

Cots

34

Staging Sites



KEY TAKEAWAYS | LESSONS LEARNED

- Diversify Communication
- Increase Drone Usage
- Staging Site Efficiency
- Increase Logistics Team Sizes
- ERT Methodology for Extended Storm Events



KEY TAKEAWAYS | LESSONS LEARNED: COMMUNICATIONS STRATEGY



- Evolving visual communication strategy
- Full court media outreach
- Social media real-time updates

3.9mil
Proactive Outage Alerts Delivered

300k
Outage Calls Received

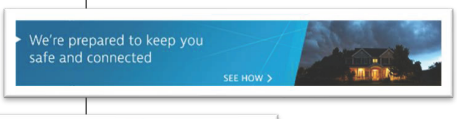
82%
Calls Handled by IVR

Before the Storm

During the Storm

After the Storm

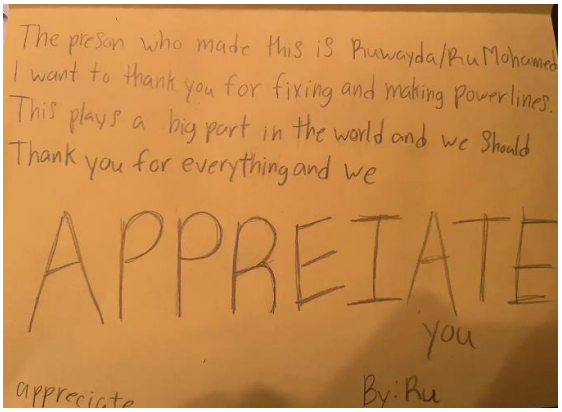
- Preparedness tips for customers
- Previewed GPC's preparedness efforts
- Shared consistent messaging through multiple channels



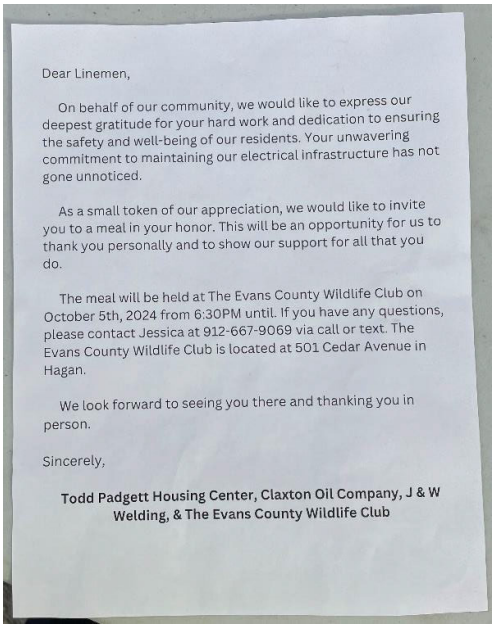


- Share critical safety information
- "From the field" updates
- Social serves as source of gratitude to our customers and employees

78%
Positive Social Media Sentiment







Dear Linemen,

On behalf of our community, we would like to express our deepest gratitude for your hard work and dedication to ensuring the safety and well-being of our residents. Your unwavering commitment to maintaining our electrical infrastructure has not gone unnoticed.

As a small token of our appreciation, we would like to invite you to a meal in your honor. This will be an opportunity for us to thank you personally and to show our support for all that you do.

The meal will be held at The Evans County Wildlife Club on October 5th, 2024 from 6:30PM until. If you have any questions, please contact Jessica at 912-667-9069 via call or text. The Evans County Wildlife Club is located at 501 Cedar Avenue in Hagan.

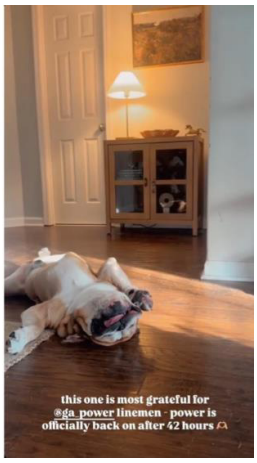
We look forward to seeing you there and thanking you in person.

Sincerely,

Todd Padgett Housing Center, Claxton Oil Company, J & W Welding, & The Evans County Wildlife Club









Helene Success Stories

- Bringing in APC DCC operators to assist GPC in the control centers and local offices was immensely helpful.
- Issuing feeder-level Transfer of Controls greatly helped with eliminating bottlenecks and multiple requests for device-level clearances. [76]
- Having experienced APC personnel running staging sites relieved GPC of some of the workload and helped ensure that the sites were well-run.
- Bringing multiple communications tools such as Southern LINC and Starlink greatly facilitated teams getting setup and working quickly.
- Using ESDA for damage assessment significantly sped up reporting on system damage.

Areas For Improvement

- Information sharing was difficult with shared spreadsheets being passed around. Need a more accessible and centralized solution to coordinating personnel and logistics.
- Having sufficient staff trained and experienced to run staging sites. More people need a storm role and the training to fulfill it. 77
- More pre-planning of staging sites is needed to better determine ahead of time the layout and available resources for each site.

Appendix: Storm Team Resources

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Work Crew - Resource Type

Type	Description	What they can do	Comments
1	Handle end-to-end Distribution Work Crews	Feeders, Set Poles/Wire (any size), Troubleshooting, one/two man trouble tickets	Determine whether OH, UG or both
2	Heavy Distribution Crews	Feeders, Set Poles/Wire (any size)	Crews not able to break down into service work
3	Service / Secondary Crews	Secondary / Drops	Doesn't require primary qualification
4	Network Crews	Troubleshooting/Remediation	Are they able to perform OH service work (trucks/ladders)? Require Liaison?
5	Underground Crews	Troubleshooting/Remediation	Are they able to perform OH service work?
6	Substation Crews	Issue Remediation	Substation specific
7	Transmission Crews	Line Section Only	Transmission specific. Do they have proper tools to perform distribution work if requested?
8	Vegetation Management	Ensure lines are clear ahead of work	First wave after isolation
9	Field Service Reps	Customer contact/meter touch/wire sitters	Work isolated to the meter
10	Grounding Crews (2man metering)	Ground for VM crews	Often work with Veg Mgmt
11	Wire Watcher Crew	Onsite resource for making sure wire down remains safe	Before and during event

Support Team – Resource Type

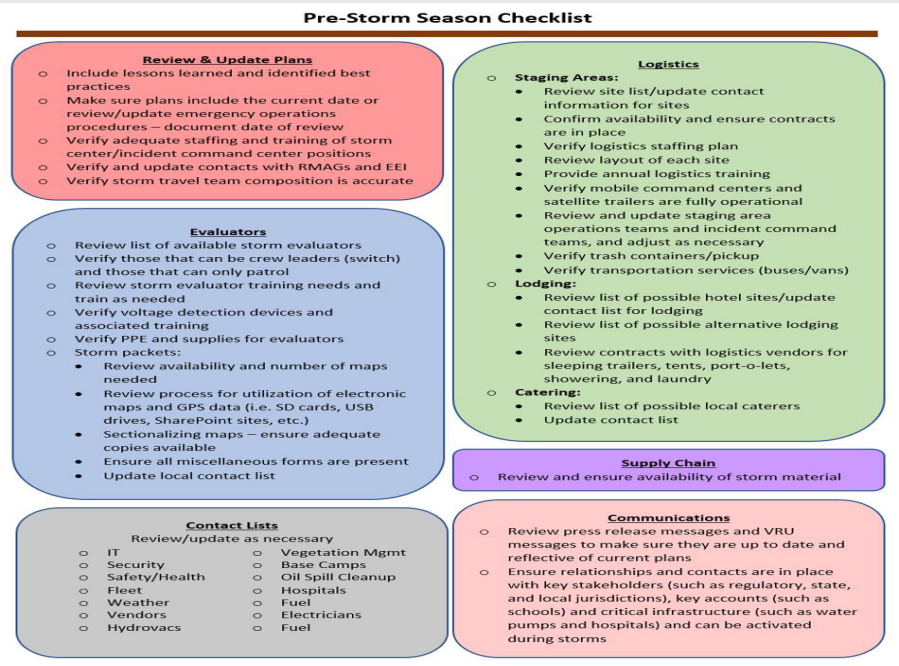
Type	Description	What they can do	Comments
1S	Incident Management Team (IMT)	Manages event	IC, OSC, PSC, PIO, Safety - ex: can run staging sites & coordinate work
2S	Management Team	Oversees crews	
3S	Logistics - site	Oversees staging sites	
3SA	Logistics - other	Material/agency coordination/virtual assistance	
4S	Damage Assessment	Determine field damage	
5S	Air Operations	UAS/Helicopter/Fixed wing use	
6S	IT/Telecom/Test Engineers	Communication support, work with fiber (splicing)	
7S	System Operations Control	Control/assist with dispatching and switching	
8S	Virtual Operations Support	Back office support	Ex: Complete using SAP if access
9S	Call Center Support	Provide assistance with incoming customer calls	
10S	Vegetation Mgmt Support	Foresters - organizing Veg Mgmt crews	Often work next to Ops
11S	Civil Crew Mgmt	Pole digging, Hydrovac	
12S	Contract Line Crew Coordinator	Coordinate work of Line Crews	

Crew Support Levels

Resources	Level 1 Base	Level 2 Enhanced	Level 3 Self-Contained
Crews/Supervisors/Safety	X	X	X
Logistics Support: Traditional (Restaurant & Hotels)		X *	X *
Logistics Support: Non-Traditional (Catering & Sleeper Trailers, Bathroom/Showers)			X *
Fleet (Mechanic / Tires)	X	X	X
Security		X	X
Damage Assessment		X	X
Manage Staging Area			X

* Ensure good communication to prevent acquiring duplicate resources

Pre-Storm Season Checklist



Pre-Storm Season Checklist

Review & Update Plans

- Include lessons learned and identified best practices
- Make sure plans include the current date or review/update emergency operations procedures – document date of review
- Verify adequate staffing and training of storm center/incident command center positions
- Verify and update contacts with RMAGs and EEI
- Verify storm travel team composition is accurate

Evaluators

- Review list of available storm evaluators
- Verify those that can be crew leaders (switch) and those that can only patrol
- Review storm evaluator training needs and train as needed
- Verify voltage detection devices and associated training
- Verify PPE and supplies for evaluators
- Storm packets:
  - Review availability and number of maps needed
  - Review process for utilization of electronic maps and GPS data (i.e. SD cards, USB drives, SharePoint sites, etc.)
  - Sectionalizing maps – ensure adequate copies available
  - Ensure all miscellaneous forms are present
  - Update local contact list

Contact Lists

Review/update as necessary

- IT
- Security
- Safety/Health
- Fleet
- Weather
- Vendors
- Hydrovacs
- Vegetation Mgmt
- Base Camps
- Oil Spill Cleanup
- Hospitals
- Fuel
- Electricians
- Fuel

Logistics

- **Staging Areas:**
  - Review site list/update contact information for sites
  - Confirm availability and ensure contracts are in place
  - Verify logistics staffing plan
  - Review layout of each site
  - Provide annual logistics training
  - Verify mobile command centers and satellite trailers are fully operational
  - Review and update staging area operations teams and incident command teams, and adjust as necessary
  - Verify trash containers/pickup
  - Verify transportation services (buses/vans)
- **Lodging:**
  - Review list of possible hotel sites/update contact list for lodging
  - Review list of possible alternative lodging sites
  - Review contracts with logistics vendors for sleeping trailers, tents, port-o-lets, showering, and laundry
- **Catering:**
  - Review list of possible local caterers
  - Update contact list

Supply Chain

- Review and ensure availability of storm material

Communications

- Review press release messages and VRU messages to make sure they are up to date and reflective of current plans
- Ensure relationships and contacts are in place with key stakeholders (such as regulatory, state, and local jurisdictions), key accounts (such as schools) and critical infrastructure (such as water pumps and hospitals) and can be activated during storms

Planning Checklist for Mutual Assistance

In the event a mutual aid lever is pulled by a utility then the following questions shall be asked from the host and responding utility. In an effort to achieve "right crew, right allocation" the responding utility questions should be asked prior to allocation of resources. These questions serve as a planning lever for safe, effective, and efficient service restoration

Host Utility

- What type of line skills will you be sending (ex. Journeyman, apprentice, or both)
- What type of equipment are you bringing?
- What type of work can you do (ex. Construction, service work, or both)
- Where are you coming from?
- What is the anticipated arrival time?
- Can your group be split up?
- Are you a Level 3 self-contained team?
- Housing information, what are the total count of employees and support, are there any females?
- Who is the primary contract person (ex. Name, phone number, e-mail)

Planning Checklist for Mutual Assistance Cont'd

Responding Utility

- Where will the safety orientation be located?
- What is our destination? Are there any emergency declarations or other documents that may be needed for travel to the location?
- Who is our point of contact?
- Will security personnel be provided?
- Do you need any special equipment (refer to the specialized equipment list within appendix of this deck)
- Do you have/need any damage Assessors? Do you have a need for management teams to manage contractors or staging sites?
- Is food and lodging in place? We will need to be self-contained level 3?
- What type of work do you plan for us to perform? Will there be significant "rear lot" work? Any non- common distribution voltages such as 34.5 KV?
- What are the weather and road conditions like?

Specialized Equipment List

AEIC Specialized Equipment List

	Swamp Machine/ Marsh Master	Air Boats	Drones	Mini Backyard Derrick	Mobile Command Center	Mobile Satellite Comm Trailers	Dozier	Tracked Digger Derricks	Tracked Aerial Buckets	Backhoe	Fuel Tanker	Generators	Rock Drilling Machine	Mats and Matting Crew (mats are utilized in marshy areas as a temporary roadway for equipment)	Rope Gun (For river crossings/mountain terrain)	Wire Tensionors	Mobile Subs
AEP Energy, Inc.																	
Alabama Power Company	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X
AmerenIllinois	X		X	X			X	X		X							
Ameren Missouri	X			X	X		X			X							
CenterPoint Energy	X		X	X		X	X	X	X	X		X		X		X	
Commonwealth Edison			X		X	X				X					X		
Consolidated Edison				X	X	X				X		X				X	
Consumers Energy																	
CPS Energy			X	X	X		X	X	X	X	X						
Dominion Energy, Inc.	X			X	X					X					X		
DTE Energy Co.			X	X	X	X	X			X	X	X	X	X			
Eversource Energy																	
FirstEnergy Corp.				X	X		X			X			X	X	X		
Florida Power & Light Company	X		X	X	X	X		X	X	X	X	X	X	X		X	X
Georgia Power			X	X	X	X					X						
Georgia Transmission Corp																	
Hawaiian Electric Industries, Inc.			X	X						X	X	X			X	X	
Jacksonville Electric Authority			X	X			X			X		X					
LG&E and KU Services Company				X	X					X							
Minnesota Power	X			X				X	X	X							
NIPSCO	X			X				X		X						X	
Oklahoma Gas & Electric	X			X			X			X				X		X	
Oncor Electric Delivery				X	X	X		X	X			X	X		X	X	X
Pacific Gas and Electric Company																	
PPL Electric Utilities			X	X			X			X		X				X	X
Southern California Edison			X	X	X	X	X	X			X	X				X	X
We Energies																	
Xcel Energy Inc	X		X	X		X	X			X	X			X			

OTHER EQUIPMENT:
Helicopters - heavy lift for material, crew transport, etc. **Snow Cats** - Various snow equipment
Road Graders
Large capacity equipment trailers Water Guns (for cleaning transmission insulators)
Water Trucks
Shelter Tents, Sleeper Trailers, Shower Facilities; Washer Facilities

Logistics Specialized Equipment

AEIC Logistics Equipment List

	Sleeper Units	Shower Units	Portable Restrooms	Mobile Command Center	Forte Command Units	Mobile Satellite Communications Trailers	Generators	Fuel Tanker	Fuel Bobtail
Alabama Power				2	2	7	X	2	4
AmerenIllinois						X			
Ameren Missouri				2			*		
CenterPoint Energy						X	X		
Commonwealth Edison Company				X		X			
Consolidated Edison				X		X	X		
CPS Energy				X				X	
Dominion Energy, Inc.				1				5	
DTE Energy Co.				X		X	X	X	
FirstEnergy Corp.				2		1			
Florida Power & Light Company	63			4	49	X	17	3 tractors/10 trailers	5
Georgia Power				2		3		3	3
Hawaiian Electric Industries, Inc.							X	X	
LG&E and KU Services Company Mississippi				X					
Power				1					
Oncor Electric Delivery				X		X	X		
PPL Electric Utilities				1			28		
Southern California Edison				1		X	X	X	1
*Tampa Electric Co				1	10		3	1	
Xcel Energy Inc				X		X			

X = from specialized equipment *Tampa Electric list /spreadsheet posted on 5-2018

35' truck mounted command unit

16' X 16' FORTS, self contained with 12kW Diesel gen sets

1-300kW, 2-150kW generators 1-

1000 gal fuel tanker

- an off-road articulating digger derrick designed to minimize its environmental footprint, a.k.a.'Predator'
- 6 WD amphibious ATV's, a.k.a. 'ARGO's (manufacturer)

Ameren MO.

Ameren does not own large generators but do maintain contracts with local vendors

GA Power

Has access to sleeper units and shower units through vendor

Dominion

Fuel tankers are currently outfitted for oil. Can be retrofitted for fuel quickly at a small cost.

Glossary

Bird Dog / Guide – Host liaison, switchman, Foreign Crew Coordinator, etc.

DCC / DOC – Distribution Control or Operating Center

Derrick – Production digger truck

DMS – Distribution Management System (outage/switching management application)

ADMS – Advanced Distribution Management System

AMI/AMS- Automated Metering Infrastructure, System

EMA – Emergency Management Agency (state or local)

ETR – Estimated Time of Restoration

Groundman / Helper – Entry level crew position

HydroVac – Vacuum truck or trailer

ICS – Incident Command System (structure for managing event)

IMT – Incident Management Team

- Incident Commander – Provides overall direction for IMT
- Planning Section Chief – Prepares plan for restoration effort
- Operation Section Chief – Manages work of crews and evaluators
- Logistics Section Chief – Coordinates housing, food, fuel and material

Material Handler – Bucket truck with lifting capability

Non-traditional Housing – Community or Gov. buildings w/cots, dorms, sleeper trailers, tents w/cots, etc.

OMS – Outage Management System

Glossary Cont'd

PUC / PSC – Public Utilities / Public Service Commission

RMAG – Regional Mutual Assistance Group (non profit org to facilitate mutual assistance requests)

SCADA – Supervisory Control and Data Acquisition (remotely operates sub and line devices)

Service Truck – Usually 30' – 35' bucket truck or pickup

Storm Kit – Preassembled commonly used material

TCC – Transmission Control Center

Wire Guards / Sitters – Where mandated, personnel that stands by downed conductors