Restoration Best Practices GUIDEBOOK

June 2018

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AMERICAN PUBLIC POWER ASSOCIATION™

Powering Strong Communities

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Executive Summary

"As community-owned resources, public power utilities are committed to improving the resiliency of their systems and responding expeditiously to disasters, including by restoring service as quickly and efficiently as possible."

– American Public Power Association, Resolution 18-04

There are more than 2,000 public power utilities in the United States and its territories. Public power utilities come in all sizes, from serving a few meters up to millions of customers. Representatives of public power utilities of all sizes helped in the identification of the best practices noted in this guidebook. The budget and scale of the largest public power utilities support implementation of practices and technology which may not be not practical for small to midsize public power utilities. Throughout this guidebook, best practices more appropriate for larger utilities are so noted.

This guidebook is consistent with an all-hazards approach, and it serves to enhance the Mutual Aid Program of the American Public Power Association, upon which the mainland US and its Caribbean territories relied in 2017.

This guidebook is for public power utility staff and others tasked with restoration operations and emergency management. The Restoration Best Practices Guidebook documents best practices at public power utilities, so that others can learn and – as appropriate – implement these best practices before and during their next significant outage event.

This guidebook contains recommended best practices organized into four sections: preparedness, activation and initiation, restoration operations, and cost recovery and mitigation. Relevant highlights from each section include the following:

- During ***preparedness***, utilities must take seriously the responsibility of being ready, including establishing effective restoration plans, training and exercising those plans, utilizing all utility staff, and ensuring adequate depth of staffing. Utilities must also understand the mutual aid system, including whom to contact, how to request resources, and use of the pre-approved documentation (such as the Association's mutual aid agreement) that formalize these exchanges.

- During ***activation and initiation***, utilities must be primed to conduct effective and rapid damage assessments, to stand up their restoration organization, and to request mutual aid.

- During ***restoration operations***, utilities must deploy an effective and scalable management structure, including a best-practice safety program, effective command and delegation of authority in the field, and designated management roles within a physical location that can be used as a "command center." Utilities must also have plans to provide for the logistical needs of incoming mutual aid crews.

- In order to achieve effective ***cost recovery and mitigation***, utilities must understand the complex and nuanced FEMA reimbursement systems, including documentation of pre-storm maintenance and inspections; post-storm damages; proper procurement and contracting; and all labor, material, and equipment utilization.

Introduction

1. Purpose and Scope

The *Restoration Best Practices Guidebook* provides guidance and best practices to help public power utility managers improve restoration processes, efforts, and statistics. It focuses on both common electric sector issues and the select needs of public power utilities. This guidebook is consistent with an all-hazards approach, and it serves to enhance the Mutual Aid Program of the American Public Power Association (the Association).

The audience for this publication includes staff at public power utility utilities, joint action agencies (JAAs), and state and regional associations who are tasked with restoration operations and emergency management.

2. Methodology

The content of this document is drawn primarily from more than a dozen interviews conducted during 2017 and 2018. The research team spoke to knowledgeable staff from representative association members (including utilities, JAAs, state associations, and regional associations) with experience in restoration operations, and subject matter experts at the US Department of Energy. Interviewees also completed a detailed written survey.

The selected interviewees represent organizations that serve small communities to major cities, are in all regions of the United States, and face a broad spectrum of hazards and restoration scenarios. They also have experience in mutual aid both as "host" and "responding" utilities.

The interviewees served as an advisory group that vetted and validated the recommendations in this guidebook.

The guidebook references additional planning and guidance documents provided by the Association and the interviewees. Some of these resources are contained in the Appendices and all are available at ***www.PublicPower.org/Resource/Restoration-Best-Practices-Guidebook***.

Recommendations: Preparedness

To be prepared for restoration events and mutual aid activations utilities and other entities involved in mutual aid networks can take the following recommendations to keep staff familiar with the mutual aid process and to develop response plans. These recommendations are targeted mainly to public power utilities, with occasional implications for other various regional coordinating bodies.

1. The Mutual Aid System for Public Power Utilities

Public power utilities depend on a variety of partners and networks for provision of external resources for power restoration. These include:

- The American Public Power Association's Mutual Aid Program, including regional network coordinators or the Association itself as a national coordinator
- Adjacent or nearby utilities including public power, co-ops, and/or investor-owned utilities (IOUs)
- State and regional utility associations
- Multi-state (and Canadian province) regional utility groups (e.g., the Western Energy Institute (WEI))

Each of these mutual aid networks has unique characteristics that may play out differently for specific public power utilities and various outage/restoration scenarios.

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a. Utilities should develop depth and redundancy in the mutual aid network(s) on which they rely

Public power utilities should explore and understand the various strengths and characteristics of different available mutual aid networks. They should consider developing multiple and redundant relationships with mutual aid networks of various types, scales, and characteristics; this allows for increased depth, flexibility, and resiliency in the face of crises. Under "blue skies," public power utilities communicate and coordinate with any/all network(s) they intend to utilize for restoration support.

Key

The icons next to each practice identify which audience(s) should understand or follow the recommendation.

H Utility requesting mutual aid, or hosting

R Responding utilities

A Joint Action Agencies, state and regional associations, and other coordinating entities

Public power utilities should also support initiatives to integrate mutual aid support across public power, IOU, and co-op providers, including resource-request and typing efforts, training and exercising, and development of mutual aid agreements, memoranda of understanding (MOU) and model contracts.

b. Hosting and responding utilities should exchange key information prior to deployments

Many of the issues should be considered and discussed by responding and receiving utilities in real-time, prior to any mutual aid resource deployment, so that issues can be identified and addressed as needed. These may include:

- Baseline safety practices
- Number of individuals in a crew (including primary qualified personnel and level of apprentice participation)
- Standards for primary qualified personnel
- Primary voltage that can be gloved energized (where possible)
- Management staff (including safety officer) provided
- Command-and-control capability to independently manage resources across multiple incident assignments
- Vehicle(s) provided (e.g., bucket trucks, service trucks, on-road diggers, pickups, track diggers, etc.)
- Specialty equipment provided (e.g., safety equipment, climbing gear)
- Self-sufficient logistical capabilities
- Certification and licenses
- Continuous time-commitment (deployment) availability
- Workday limitations and break requirements
- Union affiliation
- Any special considerations due to unique geography
- Workers compensation and insurance requirements

Utilities and associations often maintain pre-deployment "issues checklists" for this purpose. Utilities should also document their own needs and characteristics – including the above factors as well as system characteristics such as uncommon voltages or other idiosyncratic equipment – in advance of needing to request resources.

2. Preparedness for Responding Utilities

Utilities that contribute mutual aid resources can improve their crews' experiences and the overall response in various ways.

R a. Responding utilities should have plans for mutual aid deployments

Public power utilities should develop, train, exercise, and maintain plans for mutual aid deployments well in advance of contributing resources. Plans should address command, safety, logistics, finance/administrative documentation, and other key issues. Plans should be brief and easily implementable.

"We put out the call to all the cities here, and they send whoever they can, and we all just meet together as one large entity, so that way we can get a better response, a quicker response, to be able to go help."

– Tom Dougherty, Municipal Electric Systems of Oklahoma

A b. Mutual aid resources should deploy under a single command

Public power state/regional associations and JAAs should deploy mutual aid resources under a single command (or "flag") when applicable. This is especially important in cases where numerous small utilities may be contributing resources. This practice makes it easier for a host utility to incorporate incoming resources, manage recovery operations, and maintain span-of-control.

Implementation of this concept requires advance planning and coordination across members of the public power state association, regional association or JAA to standardize and/or formalize resource typing, safety procedures, logistics management reimbursement rates, and other activities.

R c. Utilities deploying mutual aid should gather advance "scout" information

When possible, public power utilities responding to mutual aid efforts should send an advance individual or team to gather intelligence and to "scout" the situation. These staff should have sufficient logistical and operational experience and subject matter expertise. They should assess issues including the restoration plan, overall organization, safety rules, security, policies and procedures, communications, logistical concerns, etc. These staff should identify any challenges and work with the host utility and deploying resources to identify mitigation or work-arounds prior to the arrival of additional mutual aid resources.

Alternatively, if a scout is not a viable option, a detailed conference call could be conducted between the requesting and responding utilities to discuss pertinent information.

A responding utility must understand the context into which its crews will be sent (e.g., whether they will be in an urban or suburban setting with abundant accommodations and access to supplies, or in a rural or back-country setting into which everything must be transported).

3. Preparedness for Host Utilities

Public power utilities use various metrics regarding their operations and past outages to determine the number and types of resources needed for a mutual aid event. Factors include number of incidents, poles, wires down, transformers, and customers. These statistics will vary based on the geographic footprint, location, and size of the utility and internal resources (staff and/or available contractors).

Utilities can conduct the following activities and plan access to required material and staff resources that lead to successful restoration operations, inclusive of the use of mutual aid.

a. Utilities should have a restoration plan

All public power utilities should have a restoration plan that addresses pre-event preparations, event (response), and after-action analysis. Planning scenario(s) should allow for at least 80-100 percent loss of power to customers (though not necessarily physical distribution-asset destruction). If the utility has generation and transmission, a NERC-compliant System Restoration Plan should be addressed. Restoration plans should address pre-event, event and post event considerations for:

- Activation
- Safety
- Damage assessment
- Command structure (roles and responsibilities)
- Operational communications
- External communications (public and media)
- Government relations/ liaisons
- Restoration operations
- Operational (real-time) planning
- Logistics
- Mutual assistance, including any special considerations due to unique geography (including being on island or otherwise isolated)
- Finance/administrative functions (including procurement and contracting)
- Documentation
- "Battle rhythm" and operational periods
- Reporting requirements (internal and external)
- Training and exercises
- Plan maintenance

Details on how to plan for each of these topic areas is provided throughout this guidebook.

A restoration plan should be concise and implementable, and should include tools, forms, templates, and checklists as appropriate.

Public power utilities should also be familiar with the Association's *Mutual Aid Playbook*, their network coordinator, and relevant forms and communications protocols.

"Everybody in our company knows their responsibilities. And going over that ahead of time with everybody, then everybody knows, 'If something goes bad, here's what I'm doing'."

– Scott Sligh, Riviera Utilities (Alabama)

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b. Utilities should train and exercise their restoration plans

All utility restoration plans should be regularly trained and exercised, for both notice and no-notice events. Exercising should involve discussion-based and operations-based activities. Staff should be trained and exercised in the primary and any secondary roles they may be expected to fill. A corrective action program (CAP) should be maintained and have clear program ownership.

The Association's *Emergency Preparedness Tabletop Exercise in a Box* provides all necessary information and guidance for utilities to create, conduct, and evaluate disaster-response exercises.[1]

"What made our restoration efforts work so well was our utilities had every employee within their utilities in a storm-related role. Some were out dealing with customers and communicating restoration activities with different customers, making sure that those areas are being taken care of, so it allowed those involved in the direct restoration process to just focus on that."

– Amy Zubaly, Florida Municipal Electric Association

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c. Utilities should fully utilize their employees during restoration, including support services

During restoration, everyone in the organization should have a "storm role," even if this is not part of an individual's day-to-day responsibilities. Such responsibilities should be matched to the individual's skillset. Former linemen and others with operational knowledge of the system might be utilized as safety supervisors, bird dogs, or elsewhere in the restoration operation. Those with accounting or related administrative skills might keep track of invoices and payments to contractors and responding utilities. Others might support crew lodging or food logistics, or other necessary activities.

Personnel who do not perform tasks similar to what they would do in a storm role on a regular basis can maintain a level of competency through training and exercises. The restoration plan should outline position responsibilities and procedures for all storm roles, and staff should be familiar with the roles their position may entail in a storm. It is critical that persons put into a "storm role" have appropriate training, especially those in customer-facing roles.

Note that full utilization of employees during outages may require creative problem identification and solving. For example, if schools and daycares are closed during an outage, the utility may consider providing daycare for employees' children.

1 This free product can be downloaded through the Association's Product Store via *www.PublicPower.org*.

d. Utilities should develop well-established relationships with key partners

Prior to requesting mutual aid, under blue sky conditions, it is important for public power utilities to have well-established relationships with local police, fire, emergency management, and other municipal or county departments, as well as the local government itself. Utilities should also have working relationships with the state personnel responsible for overall electricity restoration coordination – if the state has such personnel – and with their American Public Power Association Mutual Aid Network Coordinator.

e. Utilities and local governing bodies should be primed to activate mutual aid

Mutual aid requests must be able to be made without delay. Delays slow restoration efforts and – in a regional event – may make it more difficult to find available crews. Local governing bodies must be willing to approve utility managers' requests for mutual aid with minimal delay. This can be facilitated through pre-event education and good real-time communication. To expedite this process, utilities and local governing bodies can establish automatic triggers (for example, a set percentage of customers without power, accompanied by a minimum and number of incidents) for authorizing mutual aid requests, or utility managers may be given the authority to request mutual aid.

f. Utilities should establish MOUs and contracts with potential providers of outside resources

It is a best practice for public power utilities to establish pre-established and signed MOUs with multiple outside utilities. Each utility has a unique landscape of possible partners, but as a rule some should be nearby, while others should be remote and therefore unlikely to be impacted by regional events.

All public power utilities and co-ops share a simple, one-page mutual aid agreement that provides a reimbursement framework for mutual aid. Such a document may be signed between utilities in real-time, but a best practice is for public power utilities to maintain a file of pre-signed MOUs with other utilities, including public power, co-ops, and IOUs.

In advance of an event, public power utilities and impacted local government offices should be familiar with the American Public Power Association's mutual aid agreement, and any concerns (such as liability or workers compensation) should be addressed within any documents that will be utilized in formalizing mutual aid.

Utilities should also establish correctly procured standby contracts with vendors and shippers to support restoration operations.

g. Utilities should have access to all necessary equipment and material for restoration (including use of "storm trailers")

Lack of sufficient material during restoration operations not only slows restoration, it also undermines crews' morale, as they are forced to scrounge and compete for necessary equipment. Utilities should therefore maintain a stock of necessary material and equipment. Utilities may also establish agreements with neighboring utilities to sell required materials on an at-cost basis during restoration. In such cases, a utility must be confident that the providing organization can document how suppliers are procured. Resource availability should be aligned to a utility's restoration plan, and therefore sufficient for up to and including total system outage.

Such materials may be stored and ready to deploy in storm trailers. In some cases, this could be accomplished by a regional group of utilities with similar material and equipment specifications.

Utilities that employ atypical system components (e.g., any unique or rare-voltage equipment and materials), should maintain either a stock of necessary material, and/or standby contracts with vendors and shippers to support restoration operations, up to and including total system outage.

h. Utilities might consider maintaining retired, tooled trucks for restoration operations

Some utilities might consider maintaining a supply of staged, retired trucks so that responding utilities from distant locations would need only send crews. In order to be effective, this requires that such vehicles be fully tooled, regularly maintained, licensed, registered, and insured.

This practice is strongly indicated for utilities that might bring in crews from far away, or that might not be accessible by road (e.g., on islands or in locations with a single access road that may be compromised after a storm).

Recommendations: Activation and Initiation

The below recommendations focus on considerations when determining the scope of restoration operations, including the need for pre-staging and moving incoming crews to requesting utilities' service areas.

1. Activation and Escalation of Restoration Activities

A common finding in after-action reporting is a failure to trigger appropriate response capabilities. This is especially problematic for hazards and weather events whose impacts accrue slowly, over time, such as extended snow, ice, or wind storms. Setting up clear triggers to determine when to escalate a response allows utilities to more easily activate and execute an effective restoration.

"[Under normal circumstances] we like to throw all our resources at trying to keep up with the number of outages coming in. [But in a major outage], we need to transition to a damage assessment mode, where we pull people back to give them rest. We do that 'timeout' to figure out where the outages are and prioritize those customers. You can run crews for 18 to 20 hours, but after that, they're spent. Once the sun clears, everybody expects their power to be restored. If you've shot all your resources out in the beginning of the storm, [then] all of your crews need to pull off and get rest."

– Jeff Briggs, Sacramento Municipal Utility District

a. Utilities should establish clear triggers for escalating response capabilities

Public power utilities should establish, and formalize in written procedures, clear triggers for standing up response operations and activating the restoration plan. This clearly outlines when a utility must pivot from working at full capacity to a more strategic, deliberate, planning-oriented posture. Knowing when a response will be escalated allows a utility to plan resource needs, operational periods, strategic objectives, staff fatigue, external communications, and more.

A utility might set an objective standard as its trigger (e.g., a certain percentage of meters out and number of incidents, or a restoration that will take more than 24 hours using in-house resources).

Key

The icons next to each practice identify which audience(s) should understand or follow the recommendation.

H Utility requesting mutual aid, or hosting

R Responding utilities

A Joint Action Agencies, state and regional associations, and other coordinating entities

b. Utilities should establish clear triggers for requesting mutual aid

Public power utilities should also have specific triggers for activation of mutual aid. Public power utilities should incorporate triggers for the activation of mutual aid and requesting assistance from local, state, regional, or other assets. These triggers could also depend on estimated restoration times (e.g., a restoration that will take more than 48 hours using in-house resources). Finally, the utility should consider the scale of the forthcoming event as mutual aid resources might be in high demand.

2. Pre-Staging of Resources

Resource staging – placing crews and material in proximity to likely impacts – is a consideration for large-scale, forecasted events. These include hurricanes and tropical storms, winter storms, nor'easters, and other large weather systems. Pre-staging is not an option for no-notice events such as earthquakes, tsunamis, mudslides, and tornados. Hazards that are predictable to some degree, but that may be difficult to forecast – such as wind events, ice storms, wildfires, or cyber or physical attacks – might be candidates for pre-staging.

Whether as a host or responding utility, pre-staging can be a challenge, in particular for medium and small organizations. The high and uncertain costs of pre-staging may be prohibitive, and the small geography covered by many public power utilities means that predicting specific impacts is difficult.

a. Utilities should develop a plan to provide clear guidance on pre-staging activities

In some states (such as Florida), both the public and state and local government expect pre-staging to occur.

Utilities that engage in pre-staging should develop and maintain a strategic plan to guide the overall staging approach and site operations and logistics.

Public power utility pre-staging sites should be:

- Out of harm's way (if possible)
- Located in an area unlikely to be isolated or cut off from damaged areas
- Positioned to quickly respond to the highest likelihood for damages
- Sufficiently dispersed such that low-likelihood or non-forecast outcomes can also be addressed

b. Utilities should develop positive relationships with their governors and request early Disaster Declarations to facilitate pre-staging

For small and medium public power utilities, pre-staging prior to a Disaster Declaration carries additional financial risk, because reimbursement may not be forthcoming.

Utilities should therefore advise governors — under "blue skies" and in advance of major storms — that early declarations will facilitate action on pre-staging.

3. Damage Assessment and Modelling

The single most crucial element of an effective response is accurate and timely damage assessment. Damage assessment provides initial situational awareness, which drives all subsequent resource and operational decision-making, identification of resource needs (including mutual aid), estimation of restoration time, and public messaging.

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a. Utilities should conduct pre-event hazard and vulnerability assessments on systems and service areas to understand the risk profiles

Prior to an outage, a public power utility must maintain an accurate understanding of its baseline system, including its unique characteristics.

For example, a utility might assess whether lines and other infrastructure run along easy-to-access streets, or if part of the distribution system is in easements behind houses surrounded by mature trees or has areas with significant below-ground components.

Utilities must also consider what hazards are likely to impact the area, and the various implications of these hazards. Hazards might include hurricanes, floods, tsunamis, ice storms, snow, wind, mudslides, fires, and intentional hazards such as cyber or physical attacks.

Understanding a utility's vulnerabilities and hazard profile helps it to estimate potential impacts (onset, duration, impact, etc.). Understanding system characteristics helps a utility to know what type of mutual aid and skills it may need during a major outage.

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b. Utilities should set target deadlines post-incident for preliminary and full damage assessments, and these should not delay mutual aid requests

At the onset of an outage, effective response and resource requests are predicated on a fast, effective, preliminary damage assessment. An initial "windshield" assessment should therefore be conducted as soon as visibility is adequate and conditions are safe. If a utility uses Supervisory Control and Data Acquisition (SCADA) systems, such an assessment is likely possible without even going into the field.

Full damage/system assessments should be conducted within 24 hours of the preliminary assessment, if possible.

If the preliminary assessment leads command to believe that the situation is too large to complete damage/system assessment in 24 hours, then command should prioritize obtaining the information needed to place an accurate initial resource request through mutual aid (i.e., correct quantity and type).

c. Utilities should rely on trained experts and technicians who know the electric system for damage assessments

Qualified personnel should conduct damage assessments with system schematics and geographic information. Personnel may be internally designated damage assessors or qualified line crews or retirees, or they may be obtained through mutual aid. Regardless, damage assessors must have the expertise and experience to identify work needs (including tree vs line needs) and equipment needs, to phase work requests, and meet documentation required by the Federal Emergency Management Agency (FEMA).

Some costs for damage inspections might be reimbursable by FEMA if properly documented as having been conducted for the purpose of developing a damage description (DDS) or scope of work (SOW) related to the repair or restoration of a specific facility.

"If you've done an accurate damage assessment, that means your restoration is going to go much smoother. You'll know you've got the materials in the warehouse on hand, and if you don't have them, you'll have them on the way. You'll get the right number of people to where you're maximizing effort – you're not bumping into people and you're also not just standing around. You won't have a service vehicle trying to put up transmission lines. You are able to determine, 'I've got this many locations and I've got this type of work, so I've got the right types of crews assigned to each job.' The better the assessment, the better response, and the quicker and more efficient it gets done."

– Rick McKinley, Kirkwood Electric Department (Missouri)

d. Damage assessments should be comprehensive, thorough, and accurate

Damage assessments must be thorough and accurate. The end goal is to understand the root cause of outage(s). Leadership will need to know if a few targeted fixes will restore a large number of meters, or if it will take many crews doing a large number of small, slow repairs to restore customers.

The damage assessment process must include documenting inventory of equipment needs (e.g., number of poles, cross-arms, transformers, trucks, material, specialized equipment), necessary staff (by type) to conduct restoration work, and accessibility of the work location (including an approximate time impact of this factor).

Full and accurate damage assessments, coupled with specific knowledge of the system, represent the *only* means for placing complete and accurate resource requests.

A complete resource request should include:

- Specific type and quantity of personnel, material, and equipment needed
- Voltages working
- Construction standards
- Logistical support needed

In a major outage, full damage assessment may be time-consuming and should not delay requesting aid. In such cases, leadership should prioritize obtaining the information needed to place an accurate initial resource request through mutual aid (i.e., correct quantity and type).

"When we have an outage, the meter will tell us the customer has an outage, so we don't have to rely on them calling in to let us know. Based on the number of outages and locations, we have software that identifies what it believes to be the cause of the outage, and we're able to predictively figure out if it's a fuse or a transformer or something else."

– Jeff Briggs, Sacramento Municipal Utility District

H e. Where possible, utilities should use technology to support damage assessment

It is a best practice to be able to view damage from multiple perspectives as rapidly as possible. This means public power utilities should leverage technology such as outage management systems, SCADA, and aerial systems (drones or manned aircraft) to the highest degree practicable, within budget considerations.

There are limitations to the use of drones. First, the technology comes with a cost and requires trained staff support to use. Also, drones must be operated within "line of sight" to comply with existing Federal Aviation Administration (FAA) rules. This means that drones may offer limited advantage if damage is visible from the street. However, drones offer advantages if damage is tucked in easements or beyond inaccessible roads. Some of the limitations of drones may be overcome by use of manned aircraft (helicopter or fixed-wing), which can assess damage in remote or otherwise inaccessible areas.

The various types of damage assessment technologies should therefore be utilized in tandem – one should not be considered to replace the other(s).

H f. Utilities should utilize a standard damage assessment documentation form that captures information required by FEMA

Effective damage assessment requires documentation tools. Forms should be pre-set and formalized – whether contained on paper or in electronic format. Example damage assessment forms are widely available.[2] In addition to documenting damages observed, the form should capture the assessor's qualification and the technology utilized. Using one form for each problem area supports both operational management and FEMA reimbursement.

4. Fleet Movement

Fleet movement can either facilitate or impede resource movement during the activation phase. Challenges to fleet movement include, but are not limited to:

- Weigh stations
- Fuel availability
- Trip/fuel/weight permits
- Credentialing and access
- Road closures
- Toll roads and bridges
- Door decals
- Letters of invitation
- Movement (out or back) not coinciding with the duration of federal or state Declarations and related waivers

2 FEMA, *Damage Assessment Operations Manual* (2016).

a. Host utilities should work with state transportation agencies to obtain necessary waivers in advance

Driving to mutual aid deployments can involve a number of challenges, as listed above. In many cases waivers can be obtained, but if executed in real-time, such processes consume time and resources and are limited to specific chokepoints.

Utilities that request mutual aid should minimize the challenges for incoming crews by getting any necessary waivers from state departments of transportation (DOTs), or other state agencies as applicable. Inspection and permitting should be waived for both incoming and returning crews. Ideally, incoming mutual aid crews are treated like first responders (not "regular traffic"), including state police escorts where appropriate. Where exceptions and waivers cannot be obtained, requesting utilities should clearly communicate vehicular and driver requirements to potential contributors of mutual aid.

Any special consideration due to unique geography and weather should be identified and addressed in advance. Utilities can gather real-time information regarding any terrain- or weather-related issues on the *Safe Travel USA* online portal.[3]

b. Public power utilities should participate in the All-Hazards Consortium Multi-State Fleet Response Working Group

The focus of the Multi-State Fleet Response Working Group is on expediting safe and effective restoration of critical infrastructure to support community resilience. The working group strives to create trusted relationships among its stakeholders and to facilitate integrated planning across different industries and between the public and private sectors. Working group members include, among others: the American Public Power Association, state DOTs, FEMA, DOE, USDOT, EEI, and utilities throughout the country.[4]

As members of the working group, public power utilities can further its objective of expedited power restoration by expediting fleet movement of mutual aid crews through an integrated national system.

3 Iteris, Inc. *Safe Travel USA 511*. The Safe Travel USA website (***www.safetravelusa.com***) links directly to each state's current travel advisories through the state DOT website, where further information about fleet movement (e.g., permitting requirements, toll locations) can be obtained.

4 All Hazards Consortium. *The Multi-State Fleet Response Working Group Fact Sheet*; visit ***www.fleetresponse.org*** for more information.

c. Host utilities should provide clear travel orders and a point of contact to incoming crews

In some instances, mutual aid providers have been deployed to an impacted state or region without specific deployment or travel orders. This leaves crews open to the whims of local jurisdictions they pass through, and it undermines the overall effectiveness of restoration efforts.

All deployed mutual aid crews should therefore be paired with a particular requesting utility and provided a specific point of contact for when they arrive.

d. Utilities should send mutual aid resources in manageably sized groups

Responding mutual aid crews should travel in smaller groups of vehicles rather than large convoys, to ease the space and time (queueing) requirements associated with fueling, parking accommodations, and other fleet movement issues.

"Imagine 20 vehicles all lined up at the local gas station with a couple of credit cards. It's just not efficient. Next time we're going to break up our deployment into smaller groups, so there's only a few trucks per credit card, because what we did is we caused a lot of traffic at the fuel stations and it created problems."

– Walter Rodriguez, Los Angeles Department of Water and Power

e. Utilities might consider shipping vehicles and equipment and flying crews to limit wear and overuse prior to actual restoration work

Utilities should consider shipping vehicles and equipment and flying crews when traveling long distances. Driving coast-to-coast is time-consuming and results in crews arriving tired. It also implies wear on vehicles, which are not designed for long-distance drives.

Recommendations: Restoration Operations

Although every incident is unique, and no amount of planning can predict and address every aspect of the incident, factors to consider in planning for and executing restoration operations include command structure, logistics, communication, safety, onboarding, and media relations.

1. Command Structure and Coordination

Prior to initiating restoration operations or onboarding mutual aid resources, a public power utility must have a solid concept for how it will organize its efforts.

a. Utilities should establish clear lines of authority and span of control in their response structures

Efficient operations during response relies on effective command and devolved authority.

First, leadership must maintain situational awareness and provide clear tasking and prioritization to crews, which are organized by circuit or substation. Command should take place according to a cycle that repeats on a pre-set schedule: understand the existing situation, assess and address resource needs, assign tasks, allow crews to do their work, assess progress, and repeat. This process allows command to effectively deploy crews.

Second, crews (whether local or mutual aid) should be empowered to operate safely with maximum autonomy, to the greatest degree possible. For delegation of authority to work, a restoration operation needs for all parties to maintain access to a good plan, effective and reliable communication with the command center, an effective "bird dog," system information (especially maps), clearly understood procedures for marking and communicating work progress, and good safety protocols (e.g., lock-out-tag-out). Communication on these items should be accomplished as near real-time as possible, rather than waiting until the end of the day to communicate progress. A management concept with sufficiently devolved authority *should* be able to function even on "auto-pilot," in the absence of effective real-time communication.

The same principles apply to all scales of utilities, and at smaller scales roles can be combined. However, during restoration operations, everyone should know their role and responsibility and remain in their "lane;" managers must be willing to assign and delegate tasks.

Key

The icons next to each practice identify which audience(s) should understand or follow the recommendation.

H Utility requesting mutual aid, or hosting

R Responding utilities

A Joint Action Agencies, state and regional associations, and other coordinating entities

"We follow the FEMA framework ICS system. We have an incident commander and section chiefs looking at the bigger picture as the damage reports come in, listening to where we have crews working, giving input on where people need to be and to go next, and – most important – giving estimated times of restoration to our communications folks so they can put that out. That seems to work pretty well."

– Scott Sligh, Riviera Utilities (Alabama)

b. Utilities should understand and consider adapting the Incident Command System to their response organizations

Public power utilities should conceive of restoration operations as an emergency management activity, with distinct roles for command, public information, liaison, safety, operations, planning, logistics, and finance/administration. This approach is generally consistent with the Incident Command System (ICS), regardless of whether the term is used. ICS can be an effective management approach if properly adapted for use by public power utilities.[5]

Small and medium organizations (including state associations and JAAs) might only be minimally aware of ICS. Organizations that have some exposure perceive it to be intimidating and not customized to utilities. To be sure, ICS comprises a body of knowledge that requires time to learn, to adapt to an organization, and to train and exercise – time which staff in small and medium utilities, lacking dedicated emergency managers, may not have.

ICS provides standardized forms and information/process flows, which can be adapted to organizations such as electrical utilities. It also provides organizational structures and position checklists, including specific roles for: Incident Commander, Public Information Officer, Liaison Officer, and Safety Officer, plus Supervisory roles for operations, logistics, planning, and finance/administration.

Since all levels of government now use ICS, it is a de facto best practice. Public power utilities should gain an understanding of the principles of ICS, including its flexibility, scalability, interchangeable "parts" (staff), and its built-in accountability. Minimally, utility managers should be sufficiently conversant in ICS to be able to work with an external ICS organization or interface with local or state Emergency Operations Centers. Wider adoption of ICS would facilitate expanded use of resource typing by ICS position or packaged Incident Management Teams (IMTs).

5 Incident Command System (ICS) is a standardized on-scene emergency management construct specifically designed to provide for an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries (FEMA, *ICS Training Glossary*). ICS uses a common operational framework that enables seamless integration with all emergency response personnel across all involved response entities. Key aspects of ICS are that it is flexible and scalable; it uses common terminology; it promotes integrated communications; and it is a platform for comprehensive resource management. Under the National Incident Management System (NIMS), ICS is the standard system for public-sector response management at all levels of government in the US, and it is encouraged for private sector partners as well.

c. A host utility should be prepared to incorporate mutual aid crews into its organizational structure

One of the most important qualities of an effective restoration is its ability to scale up or down, including the seamless incorporation of mutual aid resources. If effective command is established, maintaining a reasonable "span of control," then the raw number of crews should remain manageable, in terms of operations, resources, and safety. It is a best practice to be able to manage a workforce several times larger than normal.

Host utilities must also know their incoming resources' command structure before they arrive, and plan to incorporate them (i.e., under whom, how they will get assignments, how they will request resources). Typically, mutual aid crews arrive with a supervisor (who should represent the single point-of-contact); however, this is not a standard practice. As resource typing within the Association and MAWG evolves, this should become a requirement for mutual aid deployments, with specific qualifications for the role.

"A bird dog should be a retiree who knows the system, knows the circuits, versus somebody who's riding around and [only] knows an address. The bird dog makes sure [a crew is] settled on this particular job, and then looks at the next one and finds out if they need any special equipment or poles or whatever."

– Jon Beasley, Electric Cities of Georgia

d. Utilities should select "bird dogs" based on experience, knowledge, and technical qualifications

A crucial and unique element in a utility's ability to manage and scale its resources in the field is the effective use of "bird dogs," or crew guides. A bird dog serves as facilitator, guide, liaison, manager, scout, and troubleshooter for mutual aid crews in the field. Bird dogs therefore must be experienced, knowledgeable, and technically qualified for field work and understand line work, safety rules, and system schematics. They could be former line personnel that now hold a different position in the utility, qualified retirees, substation personnel, or current line personnel.

For small restorations, bird dogs may be assigned to crews on a one-to-one basis, but as operations scale up, this will not suffice. Utilities that have matched one bird dog per mutual aid crew have found themselves unable to scale up and as a result, were unable to accept enough mutual aid resources to support an effective restoration. A single bird dog can facilitate the work of multiple crews, if each crew is empowered with clear tasking, effective real-time radio communications, and good map information. In the most effective operations, the bird dog can make work assignments and then scope the next worksite, troubleshoot issues in advance, and ensure correct and adequate resources.

The number of bird dogs needed will vary depending on the technology the mutual assistance crews have and the type of restoration, circuit base, regional base, and/or incident base.

"[It is important to] have access to circuit maps, or at least mutual aid crew leaders [should] have them to share with mutual aid crews. We're only a small muni of 3,000 customers, but we have all of our circuit maps in .pdf, and through writing our storm plan, we have 15 extra sets [of maps]. And we have all of it on laptop and CAD for our guys in the trucks. If I have a bunch of muni crews coming in here and we assign them a circuit, what better way than to have a detailed map – not only do they know where they're going, but they know all the control points and fuse sizes and so on. [Having] circuit maps is a requirement for restoration practices"

– Owen McIntee, Village of Spencerport Municipal Electric (New York)

e. Host utilities should provide crew leaders with geographical and electrical system data

To be effective, crew leaders need geographical and system data, including control points, fuse sizes, construction standards, etc. These can be AutoCAD-based paper maps, although maps accessible online via tablet or smartphone are preferable and can be color-coded in real time to indicate work status.

f. A utility's restoration organization should not substantially diverge from its day-to-day processes

Whether or not organizations adopt or adapt ICS, they should not reserve their response/restoration organizational structure or processes for emergencies or outages. Response operations – and ICS in particular – require consistent practice to be effective in restorations. Therefore, these should be used for day-today management and tracking of work in line, tree, troubleshooting, warehouse, and other operations.

Day-to-day use of ICS means there is less need to "transition" to emergency operations or storm response mode – it is simply "scaling up." Many organizations already use ICS in this manner.

g. Utilities should train at least three staff members for each key role in the organizational structure

All key roles in a restoration organization should be cross-trained and redundant. No individual in an organization should centralize knowledge or institutional memory so as to become a "single point of failure." This principle can be difficult to enact, particularly in medium and small organizations. However, formalized plans and procedures, adequately trained and exercised, can support the ability of alternate staff to assume key roles.

For utilities that have sufficient staff, a minimum of three personnel per role should be designated and trained for all incident management structure positions, including as bird dogs.

h. Utilities should activate a command center to coordinate information and resource deployment

Another key aspect of effective organizations is the utilization of a *physical* command center. Standing up a physical space for command facilitates direct, face-to-face interaction among restoration command staff and senior leadership, as they all work to set strategy and objectives (but not tactics), coordinate resources, and execute public and governmental communications.

It is often useful to have a non-operational policy-level senior manager present as a liaison to management.

i. Utilities might consider using a crisis management team to support restoration operations

For significant restoration events, public power utilities should consider standing up an all-hazards crisis management team (CMT). The CMT works in parallel to the restoration operation, typically with representation in (or adjacent to) the command center. It is typically staffed by day-to-day senior managers operating in crisis mode. The CMT focuses on strategic risk and impacts to the organization, and strategic communications and external relations. CMTs are typical only in medium or large organizations.

2. Safety

In the field, safety is the preeminent operational concern. Integrating and managing safety standards and cultures from multiple organizations during restoration operations is therefore a high priority.

a. Utilities should adopt a Safety Manual

Most public power utilities have adopted the Association's *Safety Manual* (which mirrors OSHA 1910-269 and the National Electric Safety Code).[6] Following the guidance in the *Safety Manual* is a best practice and should be adopted by all members. Any exceptions made to this guidance should reflect enhanced requirements or address particular characteristics of equipment or the utility's system.

"We follow our own safety rules, and we use the APPA manual. We make it known to our employees that we will follow our own safety work practices wherever we go."

– Walter Rodriguez, Los Angeles Department of Water and Power

b. In the case of variances, utilities should follow their own safety procedures

Regardless of standards adopted across organizations, variance in safety practices, equipment, and culture should be expected in mutual aid activations.

In such cases, crews should be allowed to adhere to their own safety standards and practices, unless such practices are patently unsafe or will cause intolerable operational impacts. This is because crews will generally be safer in practice if they are utilizing familiar procedures and equipment.

Regardless, all variance in safety standards, and any operational impacts thereof, should be addressed at the command level and communicated clearly to all personnel prior to deploying crews into the field.

6 American Public Power Association. *Safety Manual for an Electric Utility*, 16th ed. (2017).

c. Responding utilities should send safety officers

In any response operation, safety must be monitored if it is to be maintained. However, during large restoration efforts, supervisory staff may be spread thin. It is therefore a best practice for mutual aid crews to send their own safety officer(s), when possible.

d. Host utilities should activate a safety officer in their response structure

It is a best practice to staff a safety officer within command, inclusive of responsibility for:

- overall operational safety;
- safety briefings;
- integrating rest, breaks, and time off into crew shift schedules to support safe operations (and in some cases, compliance with union rules); and
- ensuring rest and breaks for command staff to maintain mental sharpness and effectiveness.

"Onboarding really makes for a smooth transition with people from out of town: having someone [from the host utility] talking to [mutual aid crews] when they're an hour out. Telling them where to go, where they're going to be staying, what they can expect, like, 'We're going to have a safety briefing, we're going to have to do this, do that, and I want you to be over here, and just kind of getting them prepped before they even get there.' That really works well."

– Scott Sligh, Riviera Utilities (Alabama)

3. Onboarding and In-briefing

Restoration operations, especially after a disaster, inherently stress those involved. It is imperative for host and responding utilities to work together to minimize stress on incoming mutual aid crews by providing them with the necessary information, equipment, and other resources to help them succeed.

a. Host utilities should provide pre-arrival information to incoming crews

Prior to the arrival of mutual aid resources, the host utility should provide a point of contact who will monitor any logistical challenges and update the crews' estimated time of arrival. Mutual aid crews should be provided an agenda of their onboarding briefing prior to arrival, including any key read-ahead materials including the safety manual, construction standards, etc. Host utilities should also provide incoming crews with information on available and recommended lodging, meals, fuel, and other relevant logistical information.

"When you bring in some mutual aid crews that are working on your system – in an orientation process, you [should be] covering your system with them, your switching, the process by which you're going to start restoring power. The better your coordination is on that, the better the entire restoration picture is, that's for sure."

– Kenny Roberts, ElectriCities of North Carolina

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b. Host utilities should provide an in-depth onboarding orientation prior to deploying incoming crews

Prior to deployment into the field, host utilities should provide all incoming mutual aid crews with a thorough and formal onboarding briefing covering all aspects of safety, operations and procedures (i.e., the restoration plan), relevant technical system information, communications protocols, etc. Crews should also be provided reference materials including electrical system information and circuit maps. Finally, crews should be introduced to relevant personnel, including the command team and their bird dog.

4. Crew Logistics

Every mutual aid crew has stories about deploying only to find inadequate provisions for basic logistical needs. This can directly cause safety or operational problems, and it can also undermine morale, which can have secondary impacts on safety, incident command, and other areas. It can also undermine a utility's ability to secure mutual aid in the future.

"Having a logistics person – a point person who is responsible for receiving crews and making sure they have motel rooms and letting people know where to eat at, where to get fuel at – that's what makes mutual aid successful."

– Jon Beasley, Electric Cities of Georgia

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a. Utilities should develop, maintain, and staff a Logistics Plan, including checklists that identify expectations for both host and assisting utilities

Utilities requesting mutual aid must develop logistics checklists and plans prior to a mutual aid event, and then have staff to oversee the plans during an event. This is a core responsibility of utilities requesting mutual aid. Advance planning reduces adverse effects on the restoration. A logistics plan should address a worst-case scenario, and cover how crews will access:

- Lodging
- Food
- Laundry
- Bathing
- Power/generators
- Security
- Fuel

Some of these items may require standby vendor relationships or other pre-planning and outreach.

"We have pre-set lodging for smaller-size crews identified in our mobilization plan with the local fire department. We also have some cots, some sheets, some towels, so if we need to mobilize crews to come in from out of town, we at least have these things available. We also have a warehouse, so worst-case visiting linemen can sleep in our warehouse – it gets them out of their trucks."

– Rick McKinley, Kirkwood Electric Department (Missouri)

b. Utilities should identify and maintain agreements for provision of lodging

Lodging is the most pressing logistical need. Utilities should have standing relationships with hotels and motels, if possible. Lodging does not always mean hotels. Hotels might be unavailable to utility crews due to competition from residents and other utilities, or from damage to hotel accommodations. Public power utilities should therefore be creative in seeking comfortable solutions for crews, which may include military bases, fire houses, schools, police stations, convention facilities, cruise ships, churches or church residences, community colleges, heated utility warehouses, or bunk trailers.

Public power utilities should work with neighboring jurisdictions to host or share management of incoming crews' logistics, as well as with jurisdictions that are beyond a hazard impact area. This can be done during both the pre-event and post-incident phases.

If non-hotel accommodations are contemplated, utilities should consider securing and maintaining a supply of linens, cots, towels, and other items for accommodating incoming crews.

During exigent circumstances in which restoration operations are remote, or it is not possible to secure sufficient accommodations, public power utilities may consider implementing a "basecamp" model. A "basecamp" model is one in which utilities would hire a contractor to set up sleeping tents or trailers, food tents, laundry, etc. in an open space. It should be noted that many crews dislike such accommodations, and they require a scale that may be too large for some public power utilities.

"In one instance we had a contractor on standby, and they came in and set up bunkhouses, shower houses, laundry houses, and [they] cooked three meals a day for us and all the mutual aid crews who came in. Without them, we would have been in really bad shape, because our entire system and surrounding systems were out of power. We couldn't get groceries, no hotels open, nothing to feed and house people."

– Kenny Roberts, ElectriCities of North Carolina

c. Utilities should maintain standby contracts for logistical support

It is a best practice to maintain a standby contract with a vendor that can assist with accommodations, in the event that logistical needs exceed a utility's capacity. Such contractors bring in and provide bunks, showers, laundry, and food on an extended basis.

d. Utilities should be aware of and prepared for mutual assistance contingencies for extreme events with atypical characteristics, including island operations

The hurricanes of 2017 and the subsequent mutual aid provided by public power organizations to Puerto Rico and the US Virgin Islands demonstrated unique issues associated with supporting organizations on islands.

Utilities operating in these unique geographies face inherent limitations once their resources are depleted. Their daily inventory of equipment and resources might not be adequate to support operations during disasters. Utilities providing mutual aid to island locations might take on more responsibilities compared with mutual aid on the mainland, which can lead to higher levels of liability, cost, and logistical complexity.

Questions for island utilities as well as responding utilities to consider include:

- What additional equipment, vehicles, or provisions are required for island deployments?
- What equipment (e.g., ramps, cranes) is available on the island to support loading/unloading vehicles and other equipment? Do responding utilities need to bring their own loading/unloading equipment?
- If there is a delay in loading or unloading, is there a storage charge at the port, whether on mainland or island? Who will bear this cost?
- Which utility is responsible for the financial burden of, and coordination with, the US Coast Guard, ensuring vehicles meet fuel level regulations?
- What are relevant insurance requirements and liabilities, and how will these be reflected in or impacted by the mutual agreement with the host utility?
- Who will be responsible for any extra fees for a delayed departure due to natural forces (e.g., bad weather)?
- What is the requirement for utilizing a Marine Surveyor?

With island deployments, there are special considerations for regulations, permitting, and customary practices, especially relating to port/border security when returning from island territories. These requirements must often be obtained in a piecemeal fashion from various agencies. Some points to consider include:

- Vehicles and equipment must be free of any plant material, dirt, or soil prior to loading (USDA)
- An Ocean Bill of Lading (OBL) and a cargo list of vehicles and equipment (manifest) must be presented to comply with USDA requirements, allowing for a “stamp” of satisfactory inspection (USDA)
- A request for inspection from USDA must be scheduled. It may be several days before they can schedule an inspection, so plan your return accordingly (USDA)
- A list of all vehicles loaded has to be presented at port when returning (Customs and Border Protection)
- All regulations as stated in 49 CFR (US Coast Guard)
- Shipping company specific rules and requirements

5. Restoration Planning and Operations

Effective execution of restoration can occur when the preconditions for restoration operations – resources, damage assessment, command structure, safety, crew logistics, and communications – are met. This section provides specific recommendations for the minimum required considerations when planning for restoration activities. Restoration plans created prior to a disaster, during "blue sky" days, are most beneficial.

a. Utilities should follow a standard restoration prioritization

It is best practice to approach restoration priorities as described below.

For large utilities, or utilities with multiple functions, the overall sequence is always:

1. Generation
2. Transmission
3. Distribution

Within distribution, restoration should be sequenced as follows:

1. Dangerous situations (if these do not have high restoration value, they may just be made safe without repairs)
2. Critical customers and critical infrastructure/key resources (CI/KR), including public-safety buildings, hospitals, nursing homes, emergency shelters, and schools (if in use)
3. Commercial areas that provide basic necessities such as gas and groceries
4. Repairs that energize the largest number of individuals (*not* meters)

Utilities may further define various restoration concepts for response, depending on whether the impacts are of an incident, regional, and/or circuit-base nature.

Public power utilities should also coordinate in advance (and during restoration) with local and state emergency management agencies on CI/KR and other related restoration priorities. Although many communities maintain a medical priority list, these tend to contain self-identified individuals and should be used only in consultation with local emergency management agencies regarding their validity.

b. Host utilities should determine how they will manage crews' work assignments

The first requirement of effective leadership (i.e., command) is clearly defined operational areas. Whether organized by circuit base, region, and/or incident base, the operating area must have common definitions among command and field crews.

As command makes work assignments, the more complex or idiosyncratic tasks should always be tasked to local crews.

Beyond this, crews should be assigned work in a way that maximizes their autonomy. A preferred method is to assign crews responsibility for a given location, and instruct them to work in a set progression, making repairs as they are identified by the crew or its bird dog. Progress is reported as work is completed, and the bird dog handles any equipment needs. Assigning mutual aid crews to a specific geography allows the crew to gain familiarity with the area and need progressively less oversight.

It is important for command to coordinate the activities of the various crews in the field so as to avoid unsafe conditions, such as one crew authorizing energizing lines on which another crew is working. Command also must coordinate and sequence the work of

different crew types (e.g., tree and right-of-way crews and line crews), and it must ensure that the correct crew types are assigned to particular tasks (e.g., bucket trucks for street work vs. climbers for backyard/easement work). In some cases, use of combined "strike teams" can be effective.

c. When practicable, utilities should work mutual aid crews only during daytime hours

Although not ideal, nighttime operations are a requirement in many parts of the country and during some large-scale restorations. However, for both safety and effectiveness, utilities should give preference to assigning mutual aid crews only during daylight hours. When possible, mutual aid crews should not be assigned complex, sensitive, or dangerous tasks during darkness.

"I've seen a big difference in utilities that have an outage management system and crew truck GPS tied together – that helps coordination a lot. I highly recommend that people get that. That makes it a much safer working environment, helps coordinate priorities of restoration, and helps set up better boundaries."

– Kenny Roberts, ElectriCities of North Carolina

d. Where possible, utilities should leverage technology to manage system and restoration operations

Most large public power utilities, and many medium-sized organizations, have implemented outage management systems (OMS). Such systems allow full visibility of the distribution network and grid, meaning a utility is not reliant on calls for situational awareness. OMS are able to pinpoint the likely repair needed – e.g., which fuse or transformer needs work – and to generate an estimated time of restoration (ETR). OMS can also automate web-based reporting to external partners and the public. Combined with SCADA and global positioning system (GPS)-enabled vehicles, OMS are a powerful tool for automating operations, managing restorations, and maintaining situational awareness. Any investment in OMS or other systems should be implemented strategically, so as to integrate with and leverage potential future technology investments (e.g., interactive voice recognition).

In many places, the public expects the information and features associated with an OMS – especially if neighboring utilities have implemented such systems. Implementation of OMS requires time, money, and training, but the benefits are clear. Therefore, OMS should be considered a best practice for systems of medium or large size. And utilities who do implement an OMS should ensure that it is scalable to handle worst-case outage events.

For smaller utilities, OMS (and SCADA) may not be cost effective, due to the limited number of meters served. Moreover, OMS are resource-intensive, and without dedicated staffing to manage the system, an OMS will not be sustainable or convey its promised benefits. Utilities that do not have an OMS must maintain an adequate call center and a documented procedure for tracking, analyzing, and assigning work.

e. Utilities should manage the assignment of resources and equipment to crews

Procurement, staging, distribution, utilization, and tracking of restoration equipment and material should be effectively planned and managed as part of restoration operations. Warehouse operations should be staffed and supervised, and neither crews nor bird dogs should have unaccountable access to supplies.

Planning for restoration logistics should address worst-case needs for resources including materials, supplies, equipment, fuel, and staging site.

6. Operational Communications

Effective and reliable operational communication is required for an effective operation.

a. Utilities should pursue redundancy in communication modes

Restoration operations must have reliable real-time communication between command and the field, and neither cell service nor voice over internet protocol (VoIP) should be considered reliable options.

If an operation must rely on cell service, the utility should consider working with vendors to have portable cell towers available. At a minimum, utilities should meet with cell service providers on blue sky days to plan and identify restoration priorities. However, cell phones should not be considered reliable for operational communications to the field, due to unreliability of coverage.

If an operation must in any way rely on landline phone service for short or long-distance communications, it should have access to copper line phones (which do not require power), or ensure that VoIP has extended generator backup and/or uninterrupted power supply (UPS); however, VoIP still remains vulnerable to internet or internet service provider (ISP) failures.

Finally, if an operation must rely on satellite phones, then it should establish protocols in advance and/or at the onset of an outage regarding pre-set times-of-day for regular communications, since satellite phones require specific conditions and locations to get a signal.

b. Utilities should use two-way radios

Given the challenges described above, a best practice is to use two-way radio. The trend of moving from radio to cell communications for day-to-day operations is not sustainable during restorations. Utilities should maintain a cache of radio equipment, including handhelds, bases, and repeaters as necessary. Alternatively, utilities can establish pre-event vendor contracts or mutual aid relationships to obtain adequate supplies, or JAAs or state associations can maintain caches of this equipment.

It is also a best practice to establish and exercise radio interoperability with city, county, or state emergency responders.

"Reliable communication is one of the most important things out there when you're trying to get the restoration done. If you've got crews coming in from all over the state, they don't have a way to communicate with each other. We're moving to a statewide channel that we can all access. So once you roll up on one of these storms, you can go to that particular channel, and then you would have communications with anybody across the state when they come in to help you – they don't lose their radio communications."

– Tom Dougherty, Municipal Electric Systems of Oklahoma

c. Utilities should designate pre-established radio channels for restoration operations

Public power utilities should coordinate with each other during the preparedness phase (i.e., during "blue skies"), through appropriate entities, to pre-designate radio channels for use in coordinating operational activities and command-and-control during restoration operations.

d. Utilities should determine a schedule for regularly testing communications equipment

Unless bound by a higher standard (e.g., the North American Electric Reliability Corporation (NERC)), thorough monthly testing of communications hardware and paths, and documentation of needs related to restoration operations, must be part of preparedness. This recommendation also applies to systems that are used regularly.

7. Media/ Public Affairs and Government Relations

Restoring power is only part of the task during a large outage; communicating with the media and the public, and managing their expectations, is also critical. With the increased use of social media over the last decade, the expectation for public information has accelerated.

The Association's Integrated Media and Communications team is available to advise and support Association members during preparedness and response on messaging, strategy, social media, and other related issues.

a. Utilities should develop and maintain a crisis communications plan and, depending on size, a crisis management plan

Public power utilities should have a plan for managing media and public communications during an outage or other significant crisis. This may be a stand-alone plan, integrated into a restoration plan, or a subset of a broader communications plan. Communications and government relations may or may not be addressed in the same plan.

If the utility has dedicated communication staff, they should "own" this plan, in coordination with the department that owns the restoration plan.

The plan should lay out basic concepts for:

- Communications staffing
- Internal (staff) messaging
- Communications directly to customers
- Event-driven communications to the media
- Media and social media monitoring
- Responses to unique requests and crises
- Government relations (if not addressed under a separate plan)
- Communications templates
- Communications approval

The Association developed a guidance document for its members, which provides information for working with the media and communicating with stakeholders before, during, and after a storm. The guide includes a list of "do's and don'ts," checklists, and sample messaging.[7]

Additional detail on select plan components is provided below.

"We had a CEO/General Manager, and he did a tremendous job acting as PIO – answering customer questions about restoration times, and why this group has lights and the others didn't. So they can be invaluable in a situation like that. Somebody that is well-versed in the operations of your system can really, really do a good job to make your organization look good."

– Kim Culpepper, Tennessee Valley Public Power Association

b. Utilities should staff an effective public/government relations team

During restoration operations, all roles should be clearly delineated – even if one person must perform several roles, as is common in small and medium organizations.

There are at least several roles key to an effective communications operation:

- Designate one individual as a public information officer (PIO). This person oversees media and public communications, including overall unity of message, content for delivery to media and social media, internal messaging, and talking points for media appearances. They coordinate with an external Emergency Operations Center (EOC)[8] or Joint Information Center (JIC),[9] and identify a media spokesperson. Except in a very small organization, the responsibilities of this position should not fall to someone with significant operational responsibilities. Ideally, a PIO is on call 24/7, during restoration and under blue skies.

7 American Public Power Association. *Storm Communications Guide for Public Power Utilities*; members can download a complimentary electronic copy from (https://ebiz.publicpower.org/APPAEbiz/ProductCatalog/Product.aspx?ID=6448).

8 An Emergency Operations Center (EOC) is the physical location at which the coordination of information and resources to support on-scene operations takes place (FEMA, *ICS Training Glossary*). EOCs may be activated at the municipal, county, and/or state level. Typically, the key external EOC for a public power utility will be the local jurisdiction's EOC. This facility will be overseeing emergency operations and are a focal point to collect and disseminate information, identify and provide resources, facilitate communications, and provide overall coordination support for all entities involved in emergency response.

9 A Joint Information Center (JIC) is a facility that may be established to coordinate all incident-related public information activities, across various jurisdictions, levels of government, and private organizations. It serves as the central point of contact for all news media. Public information officials from all participating agencies should co-locate at the JIC. (FEMA, *ICS Training Glossary*).

- A separate, distinct role that must be assigned is a media spokesperson. This person must have authority in the organization and project a confident, calming face to the media and the public. It is preferable for this person to have experience in talking with the media.
- An effective response organization may also have a dedicated social media expert.
- If government relations is not a stand-alone function in the organization, this role should also be described as part of the communications function.
- Finally, all communications must be closely coordinated with and vetted by the overall operational commander, and such a person may directly support the media spokesperson by providing technical information to the media. It is also important that all information presented as fact originate from operations.

In a large organization, each of the above will be different individuals; in a very small organization, one or two individuals may fulfill all of these roles. Regardless, face-to-face coordination among these roles, in a utility command center, is a best practice.

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c. Utilities should distribute timely and accurate communications via multiple media

Information should be conveyed to the public directly using multiple outlets, including the utility's website, social media, public service announcements (PSA), and call centers. A good communications operation will share pre-incident information and be proactive, putting information out on its own timeline and initiative, rather than only reacting to queries.

An effective media relations team will know its media partners in advance, and it will communicate with them under blue skies as well, to provide helpful information and to educate media partners on basic electric utility and restoration operations.

As with most cases in communications, the more substantive information that can be provided regarding actions and expected outcomes during a utility outage, the less frustration and hostility will be experienced. Even "holding statements" without new information are prefererable to silence. In short: more communication is better.

H R

d. Utilities should leverage general-purpose messaging

Content generation for communications during an outage should leverage pre-scripted, general-purpose messaging (often called "evergreen" content), customized with "tactical" (incident-specific) content about the specific situation, including information on ETR. Evergreen content should include public safety messaging (e.g., not to use outdoor gas cooking appliances for heat, or not to allow home generators to feed into the system and endanger linemen).

All organizations can benefit from pre-scripted messaging and talking points for likely hazard impacts, although the need is most acute for those without dedicated external communications staff. Example pre-scripted messaging is available in the American Public Power Association's Storm Communications Guide as well as in the related resources identified in Appendix B.

e. Utilities should leverage technology as they are able

As possible, public power utilities should consider how tools such as a dedicated website, OMS, Advanced Metering Infrastructure (AMI), or a sophisticated call center can help with communication. Every utility faces constraints; some small and medium sized utilities may not have the budget or the staff to support such investments.

Whatever investments a utility does make must be integrated into a cohesive communications strategy, plan, and staffing structure. However, outside of the time to develop and distribute messages, many effective communications channels, including earned media and social media, have low or no cost to the utility.

f. Utilities should monitor social media

Residents turn to social media channels to report and receive information. A utility's customers see a utility's activity on social media and establish expectations (reasonable or otherwise) for communication, compare these expectations to neighboring utilities, and can allow or stop worst-case stories and rumors from spreading quickly on it. Social media should therefore be leveraged as an amplifier of content that goes out over traditional media channels.

Unlike traditional media, social media are two-way modes, and so a utility's communications staff must treat these tools as having different qualities and legitimate operational/ intelligence value.

Communications staff should monitor social media for trending themes, including accurate information and inaccurate rumors ("rumor control"). Both should be proactively addressed by the utility, using social and traditional media.

Beyond "chatter," social media can also provide operational intelligence. Residents will commonly call for help, report on what they are seeing, and ask legitimate questions via social media – especially Twitter.

Ideally, an organization will staff a dedicated social media position under the PIO, who can provide constant updates, helpful hints, direct responses to queries, and relay operational intelligence of situational awareness to operational staff. Communications staff should use social media under normal day-to-day, blue sky situations, as well as during response, so that both they and the public are familiar with these resources and accounts.

g. Utilities should activate an adequately staffed call-center function

Impacted utilities should have call-in advice capability for customers, hosted by live people with reliable information. The service must have adequate staffing and technical capacity, including reliable power. The public should be reminded of the call center function via media and social media messaging.

Some public power utilities may rely on other municipal departments to support call center capabilities. Others may rely on contracted services. Call center capabilities should also be a resource that is made available through mutual aid.

h. Utilities should communicate regularly with government partners, leveraging relationships and channels established pre-event

A utility's communications (or dedicated government relations) staff should establish outreach to local, state, and federal partners during pre-event phase, and should utilize these channels to provide information during response. As a rule, the greater the quantity of useful information (situational awareness or situational reports) that is regularly and proactively provided to external government partners, the less inclined they will be to involve themselves in utility or restoration operations.

"When you see accurate restoration times that are out there, or estimates, that's better than telling folks you're going to be on in three hours but it actually takes thirteen hours. If we've got a six hour job, we'll tell customers eight. I'd rather be heavy on that end than short. Regardless what mechanism it's done with, a mayor with a press conference or an OMS or your website, being conservative with restoration times is key."

– Owen McIntee, Village of Spencerport Municipal Electric (New York)

i. Utilities should provide *accurate* ETRs to the public, even if these are less *specific*

Communicating restoration goals can be a nettlesome issue during restoration. In some states, the government establishes target restoration goals (in Florida, for example, the standard goal is 72 hours).[10] External pressure notwithstanding, it is typically best practice to provide general, but likely accurate, ETR targets (e.g., "later in the week") to the public rather than specific, but potentially inaccurate, ones (e.g., "Thursday by noon"); accuracy is also supported by citing the conservative end of any spectrum of uncertainty or estimates.

In reporting progress, use of "percent restored" as a metric is often problematic due to the difference between meters or system capacity restored versus residents' power restored. Metrics focused on residents are always preferable.

Utilities using OMS to provide real-time ETRs to customers via a website or mobile application should also consider messaging that tempers expectations of the specificity of such projections, and perhaps explain the systems' defaults and assumptions.

8. Liaison with External Operational Partners

Restoration operations often requires communicating with, and sometimes even assistance from, agencies and organizations outside of the utility sector. It is helpful to develop and maintain positive relationships with these entities in order to streamline interorganizational relations during an outage.

a. Utilities should have a dedicated seat in the local government EOC

It is a best practice for public power utilities to have a dedicated seat and workstation in the city or county EOC, and to have a line of communication to the state EOC, whether by having a seat there as well or by working with a JAA or state association that does. Utilities should also have access to any emergency management IT platforms that their local or state EOCs utilize. This allows for real-time exchange of situational information.

10 Amy Zubaly, Florida Municipal Electric Association

"We work with the city, county, [and] state emergency management all the time. Because we're looking for the power outages on our side, and they're looking at the whole big picture, so they might have something that would influence our restoration. We work with them very closely. It helps us out quite a bit."

– Ken Lewis, Salt River Project

Public power utilities, in their own estimation, are better at doing the work of restoration than advertising it. But providing operational situational awareness and reporting up the line – e.g., both to local partners and to the Association (which reports to DOE via Emergency Support Function 12 (ESF12)) – is a crucial element of supporting the broader response and recovery from major outages. Information should be relayed regarding outage and restoration status, ETR, resources in the field, and challenges being encountered.

b. Utilities should understand the support roles played by federal partners

Public power utilities should be familiar with the roles that federal partners play. During preparedness, the DOE works through industry groups (including the Association), local and state governments, and other federal agencies to support electric-utility sector readiness (This guidebook is an example of a DOE-supported initiative). FEMA plays a similar role in supporting broader state and local readiness efforts. Utilities should maintain awareness of these agencies' activities and the resources they support. They should also maintain active relationships with representatives of the Federal Bureau of Investigation (FBI), fusion centers, and other sources of risk and threat intelligence.

During restoration operations, the federal partners have no direct role in a utility's decision-making on items such as operations, logistics, and resources. Instead, DOE is the lead coordinating entity for ESF 12 under the National Response Framework (NRF). ESF 12 is a component of the National Response Coordination Center (NRCC), which is overseen by FEMA.

ESF 12 works with industry representatives – including the Association, NRECA, and EEI – to collect and assess information for development of situation reports (SitReps). ESF 12 also receives situational information from required Federal Energy Regulatory Commission (FERC)/NERC reporting, as well as DOE Electric Emergency Incident and Disturbance Reports (OE 417). From these, ESF 12 develops SitReps that describe the situation, who is affected, response activities, and timelines, as well as identifying gaps where the federal government can assist, e.g., by facilitating transportation, regulatory waivers, logistics, access, credentials, communications, prioritization, and information sharing. ESF 12 also works directly to communicate and address identified challenges, using all available partners and resources.

For complex responses, ESF 12 stands up an industry room, where trade groups are able to be physically represented at the Emergency Response Organization (ERO). ESF 12 also provides technical assistance and advice to FEMA, the US Army Corps of Engineers (USACE), and other agencies, and it works to maintain unity of message among all parties.

After a restoration, FEMA also plays a crucial role in reimbursement.

Recommendations: Cost Recovery and Mitigation

FEMA provides reimbursement to public power utilities for costs related to Declared Disasters, including restoration and mitigation. From the perspective of an impacted utility, the primary goal in dealing with FEMA is to not "leave money on the table."

Many public power utilities are already familiar with FEMA grant programs. The Association includes guidance for getting public assistance from FEMA in the *FEMA Public Assistance and Federal Procurement Toolkit for Public Power Utilities (2018).*

1. Working with FEMA

It is important for public power utilities to have some understanding and expectations regarding interactions with FEMA.

a. Utilities should be familiar with FEMA eligibility guidance and how it is applied

In order to receive reimbursement from FEMA, utilities need to understand FEMA's established policies and procedures.

However, FEMA's rules and regulations are open to some interpretation, and FEMA employees and contractors do not always give the same guidance on issues such as eligible costs or documentation. FEMA's rules on these and other issues has been observed to change from incident to incident and applicant to applicant. Additionally, each of FEMA's ten regions (to which FEMA project specialists report) operates according to its own "customary set of practices," which also affect interpretations of rules and regulations. Such variability often leads to applicants disagreeing with a FEMA determination, which is redressed through the dispute and appeal process (see below).

b. Utilities should be familiar with their FEMA counterparts

Due to the sometimes complex nature of interactions with FEMA, it is a best practice for local governments, utilities, as well as state associations and JAAs, to have annual discussions with a representative of their FEMA region. Knowing potential partners and understanding their perspectives in advance typically results in more amicable relations and smoother operations during and after a disaster. In addition, advance discussions between a utility and FEMA might help to smooth out workflow issues that can otherwise occur during a response.

Key

The icons next to each practice identify which audience(s) should understand or follow the recommendation.

H Utility requesting mutual aid, or hosting

R Responding utilities

A Joint Action Agencies, state and regional associations, and other coordinating entities

c. Utilities should designate a FEMA specialist

FEMA requirements can be intimidating and frustrating for those unfamiliar with FEMA and its processes. It is therefore a best practice to dedicate staff to this specialized area of expertise.

During response, in larger operations, FEMA interactions and documentation should fall under the finance function (the Finance/Administration Section in an ICS command structure). This should be a defined and trained role, staffed by someone with grant management expertise and – if possible – experience in working with FEMA. They should refer regularly to the Association's *FEMA Public Assistance and Federal Procurement Toolkit* and embed the guidance in restoration plans and procedures.

Use of ICS is also a best practice for working with FEMA. Many of the forms utilized in ICS, and the structured system for moving those forms through the organization, are effective at capturing information that FEMA will request. FEMA's Public Assistance grant program captures project documentation through Project Worksheets (PWs). Coordination with a local EOC that utilizes ICS forms can also help support documentation.

d. Utilities should leverage political partners to support Disaster Declarations

Disaster-related costs are only reimbursable for disasters that receive a federal Declaration under the Stafford Act, and Declarations are issued on a county-by-county basis. Therefore, utilities should be aggressive in working with their governor and congressional delegation to support getting a Declaration for the utility's county.

e. Utilities should understand their rights to appeal, where indicated

Utility applicants may disagree with FEMA eligibility determinations. In some cases, redress or compromise may be possible through simple conversations with FEMA, especially if a utility already knows its FEMA counterparts. That failing, an applicant may appeal.

FEMA has a two-stage appeal process. First appeals go to the FEMA Regional Office, which is staffed by colleagues of those who made the disputed determination. If the first appeal is successful, the process ends there. If the first appeal is unsuccessful, the applicant has the option of filing a second appeal with FEMA Headquarters. It is important to note that all of the applicant's arguments must be entered into the "administrative record" during the first appeal, as no new arguments can be subsequently offered.

Some applicants are successful in staffing their own appeals, but sometimes outside subject-matter expertise can be useful. FEMA reimburses contractor support for *successful* appeals as direct administrative costs (DAC) at a rate of 75 percent or 90 percent, depending on the disaster.[11]

11 FEMA. *Public Assistance Program and Policy Guide* (January 2018); a new alternative is that FEMA funds DACs at 4 percent of the PW value, with additional incentives for early close-out.

2. FEMA Public Assistance

The majority of federal reimbursement assistance to public power utilities comes from FEMA's Public Assistance grant program. It is therefore crucial to understand the rules and practices around PA. Additional detail and guidance on each of the recommended practices below is provided in the Association's *FEMA Public Assistance Toolkit*.

a. Utilities should understand the FEMA reimbursement and process

There are four basic phases to the FEMA PA grant process. The process may take several months or many years, depending on the nature and extent of damages and the time required to repair or restore damaged facilities.

1. ***Apply for eligibility***. An applicant makes a Request for Public Assistance (RPA) to FEMA to determine eligibility to receive FEMA funding. If approved, FEMA will hold a kickoff or scoping meeting with the applicant. Within 60 days of the initial scoping meeting with FEMA, applicants must provide a high-level inventory of damages. This should list what is damaged and where, as well as costs from emergency protective measures and debris removal. Once this is submitted, no additions can be made unless something was undiscovered.

2. ***Carefully document damages and repairs through Project Worksheets***. Project worksheets (PWs) require a high level of granularity in the development of a Damage Description (DDS) and Statement of Work (SOW) that detail the needs to restore a damaged facility to its pre-disaster condition. PWs must be developed for each "facility," which FEMA defines as, "a building, works, system, or equipment, built or manufactured, or an improved and maintained natural feature." In terms of utilities, this may mean any eligible structure that can be meaningfully delineated from others – i.e., a substation, pole, circuit, roadway, or some defined miles of line. A best practice is for applicants to work with FEMA to define large enough "facilities" that the number of PWs remains reasonable. Circuits are a typical "facility."

3. ***Repair and restore***. During this phase, engineering and design documents are developed, repair estimates refined, mitigation opportunities are identified, and repair and restoration commences. A utility might amend the SOW or conduct a scope alignment with FEMA during this phase. It is also during this phase that the applicant begins drawing down FEMA funds to reimburse money expended on the approved SOW.

4. ***Project closeout.*** The final phase occurs after the repair or restoration of a facility is completed. This is when the PWs are effectively audited, and either closed out or – if the closeout officer determines there is a problem – additional documentation may be requested, or funds may be clawed back ("de-obligated") from an applicant. Closeout may happen years after an event, and the reviewer may not be familiar with the event. Therefore, it is essential that PWs are written to clearly describe what happened, demonstrate that the disaster caused the damage, and document and link all associated costs. PWs must tell a story, and when developing a PW with FEMA, an applicant should be asking if someone reading the PW years from now would clearly understand that story.

b. Utilities should always maintain FEMA-compliant documentation

Thorough and accurate documentation is essential for FEMA reimbursement. During the damage assessment process, costs should be linked to specific damage sites and event locations, and from then on, all associated staff, equipment, and material usage should be coded accordingly. This should be done at the smallest reasonable geography. It is easier to consolidate documentation later for PWs if allowed, rather than the difficult task of breaking out undifferentiated documentation after the fact.

Always maintain damage and repair documentation to meet standards of thoroughness and clarity required for submitting a PW, even if a Declaration is uncertain or not expected. This way, there is no need to make a decision or change documentation protocols in order to comply with FEMA requirements. Tablet-based apps that document damage and associate it with photographs, geo-codes, etc. can be a great help in compiling FEMA-compliant documentation.[12]

c. Utilities should conduct all procurement and contracting in compliance with FEMA standards

Costs associated with contracted goods or services must demonstrate proper procurement in order to be eligible for FEMA reimbursement. A utility's procurement procedure must comply with the most stringent of applicable local, state, and federal procurement standards. Contracts must also be of the appropriate type (time and materials, firm fixed price, cost-plus, etc.). Emergency contracting is allowed, but limited to 60 or 90 days, after which the work must be competitively bid; however, there are exceptions for small contracts.[13] Above all, procurement must be documented adequately, and contracts must themselves contain specific language for compliance with federal standards.[14]

All procurement and contracting must be done in compliance with FEMA standards, so that a contract would not present an issue for FEMA reimbursement. It should be noted that use of mutual aid is considered appropriate by FEMA, but mutual aid agreements should contain clear terms and conditions describing the type of aid to be provided, the scope of work, and the terms of reimbursement for the work, including costs associated with travel, meals, and lodging.

Utilities should have properly procured pre-event contracts for goods and services. Utilities should also maintain blank, FEMA-compliant contracts ready to utilize – and be properly procured – during an outage.[15]

12 Some example tablet-based applications include: ARCOS Damage Assessment and Field Inspection, ArcGIS Damage Assessment Collector, Clearion Damage Assessment, and Hexagon Damage Assessment.
13 APPA. *FEMA PA Toolkit*.
14 APPA. *FEMA PA Toolkit*.
15 APPA. *FEMA PA Toolkit*.

d. Utilities should understand FEMA requirements for documenting time and labor

A public power utility's use of its own resources in restoration is an eligible expense. This includes labor costs associated with emergency protective measures, debris, and repairs, and is inclusive of salary and benefit costs for both regular hours and overtime. In order for equipment costs to be eligible, their use must be linked to a specific operator for an eligible project. In order to be reimbursed for its materials, a utility must demonstrate when these went into stock, what they cost, where they were used, and how.

Any staff in the field or providing for public safety are eligible costs; however, many roles in restoration that do *not* directly provide restoration – such as PIOs or damage assessors – are generally *in*eligible. Standby time and duplicative roles are not eligible. Utilities should be conscious of how they characterize labor and how they record time.

e. Utilities should document regular maintenance and inspections

FEMA will not pay for repairs that it deems to have resulted from deferred maintenance, neglect, or previous damage. Therefore, utilities must be able to document that any facilities it claims to have been damaged by a disaster had been properly and regularly inspected and maintained. Utilities should similarly be able to document a regular tree-trimming schedule and frequent line inspections.

f. Utilities should regularly review and update deductibles and asset value statements with an insurance broker

FEMA requires adequate insurance, and it only pays damages to the extent not covered by insurance. Public power utilities should self-assess their assets to ensure an accurate statement of values, and that all insurance is adequate. Utilities also must abide by "obtain and maintain" requirements from projects funded by prior FEMA grants.

3. Mitigation and System Hardening

Restoration presents an opportunity for upgrades to the system, including hardening and mitigation.

a. Utilities should improve system components during repair to higher standards than required

As damaged elements of a system are restored, it is a best practice to harden the components as indicated. This practice may be funded through several FEMA sources, including PA program funds (sec. 406), or Hazard Mitigation Program Grant (HMPG) funds (sec. 404). Such improvements should be prescribed in a plan, in advance of any outage.

It is typically a cost-effective practice to build the system to withstand incrementally more than the existing risk profile would indicate. This practice should be implemented both during restoration and as part of normal maintenance and system upgrades. Using the National Electrical Safety Code (NESC) as a basis,[16] key system components might be elevated with additional freeboard above the base flood elevation, be hardened to one performance "class" greater than required for hazards that are typically experienced, or other factors.

16 IEEE Standards Association. *2017 National Electrical Safety Code (NESC)* (August 2016).

b. Utilities should have a FEMA-approved Hazard Mitigation Plan, or participate in a municipal/county plan

In order to access FEMA HMGP funds, a utility must have – or participate in – a FEMA-approved Hazard Mitigation Plan. It is a best practice for public power utilities to include mitigation initiatives in municipal or county Hazard Mitigation Plans.

HMGP is addressed in the Association's new PA guidance and is referenced in federal rules.[17] Public power utilities wishing to pursue 404 or 406 mitigation funds should staff a FEMA specialist position or consider hiring a consultant on a pre-event basis (which may be covered as a direct administrative cost).

c. Utilities could develop and maintain Readiness Plans

Alternately, public power utilities could draft and file Readiness Plans describing intended seasonal upgrades and hardening. These could provide a basis for additional investment to city councils or boards during restoration.

17 44 CFR 201.

APPENDICES

Acronyms and Abbreviations

AMI	Advanced Metering Infrastructure
CAD	Computer-Aided Design
CI/KR	Critical Infrastructure and Key Resources
CMT	Crisis Management Team
CNG	Compressed Natural Gas
CUEA	California Utility Emergency Association
DA	Damage Assessment
DAC	Direct Administrative Cost
DDS	Damage Description
DHS	Department of Homeland Security
DOE	Department of Energy
DOT	Department of Transportation
EEI	Edison Electric Institute
EMA	Emergency Management Agency
EMAC	Emergency Management Assistance Compact
EOC	Emergency Operations Center
ERO	Emergency Response Organization
ESF 12	Emergency Support Function 12: Energy
ERT	Estimated Restoration Time
ETR	Estimated Time of Restoration
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FTE	Full-Time Equivalent
GPS	Global Positioning System
HMPG	Hazard Mitigation Program Grant
ICS	Incident Command System
IMT	Incident Management Team
IOU	Investor-Owned Utility
ISP	Internet Service Provider
IT	Information Technology
JAA	Joint Action Agency
JIC	Joint Information Center
MA	Mutual Aid or Mutual Assistance
MAWG	Mutual Aid Working Group
MOU	Memorandum of Understanding
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFPA	National Fire Protection Administration
NRCC	National Response Coordination Center
NRF	National Response Framework
NRECA	National Rural Electric Cooperative Association
OMS	Outage Management System
OSHA	Occupational Safety and Health Administration
PA	Public Assistance
PIO	Public Information Officer
PSA	Public Service Announcement
PW	Project Worksheet
RMAG	Regional Mutual Assistance Group
ROW	Right of Way
RPA	Request for Public Assistance
SCADA	Supervisory Control and Data Acquisition
SOW	Scope of Work
SitRep	Situation Report
SOP	Standard Operating Procedure
UPS	Uninterrupted Power Supply
USACE	US Army Corps of Engineers
VoIP	Voice over Internet Protocol

Resources

The following resources from the American Public Power Association will be of use in implementing the best practices described in this Guidebook. The below are available through the Association's website, ***www.PublicPower.org/Resource/Restoration-Best-Practices-Guidebook***.

- *All-Hazards Guidebook for Public Power Utilities* (forthcoming)
- Communications plan template
- Emergency Preparedness Tabletop Exercise in Box
- Example communications messaging
- Example emergency assistance agreement
- Mutual Aid Agreement
- *Mutual Aid Playbook*
- *Public Assistance and Federal Procurement Toolkit* (forthcoming)
- Sample public-private utility mutual assistance protocol (from New York State)
- Sample state-level mutual aid playbook (from New York State)
- Sample utility-level mutual assistance crew's guidebook (from LADWP)
- *Safety Manual for an Electric Utility*, 16th Ed.,
- Storm Communications Guide for Public Power Utilities

Emergency management courses

FEMA offers free, online courses on emergency management topics, which can be accessed at ***https://training.fema.gov/is/.*** Related courses include:

- IS-29: Public Information Officer Awareness
- IS-100.b: Introduction to Incident Command System (ICS)
- IS-200.b: ICS for Single Resources and Initial Action Incidents
- IS-235.b: Emergency Planning
- IS-700.a: National Incident Management System (NIMS): An Introduction
- IS-800.b: National Response Framework (NRF): An Introduction
- IS-812: Emergency Support Function (ESF) #12 – Energy

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