

Incident Action Checklist – Power Outages

For on-the-go convenience, the actions in this checklist are divided into three “rip & run” sections and are examples of activities that drinking water and wastewater utilities can take to prepare for, respond to and recover from power outages. You can also populate the “My Contacts” section with critical information that your utility may need during a power outage.

Power Outages and Water Utilities

The loss of electric power can have profound impacts on drinking water and wastewater utilities. Sometimes the loss of power can be caused by events that can be predicted in advance such as hurricanes or ice storms. Other power outages, such as those caused by earthquakes, cyber incidents or space weather may occur with little or no notice. In California, the Public Safety Power Shutoff program allows electric companies to proactively shut off grid power to customers, including water utilities, to reduce fire ignition potential in high risk areas when extreme conditions present a clear and imminent danger to public safety.

The impacts of losing grid power at drinking water and wastewater utilities may include pressure losses and boil water advisories, a reduction or cessation of water treatment, sewage back up and the discharge of untreated sewage into public right of ways, rivers and streams. The consequences of these impacts on the community could be devastating:

- Firefighters would not be able to access water from hydrants.
- Local healthcare facilities and hospitals may have to evacuate patients or close.
- Restaurants and businesses may have to close, resulting in economic losses.
- Homes, businesses and healthcare facilities may become unsanitary and uninhabitable.
- Environmental damage could occur.



There are many steps drinking water and wastewater utilities can take to obtain backup power and ensure that their lifeline services continue as long as possible during grid power outages.



Preparing for the Loss of Power During Hurricanes

New Hanover County, North Carolina

When Hurricane Florence struck New Hanover County in September 2018, Cape Fear Public Utility Authority (CFPUA) was ready: facility and vehicle fuel tanks were topped off (a standard practice for CFPUA, especially in advance of a hurricane); generator run times and fuel capacities were calculated to help ensure continuity of operations under back-up power; and existing emergency fuel supply contracts were implemented.

With four major treatment plants, 150 pump stations and dozens of groundwater well sites, all facilities were preemptively running on emergency generator power when tropical storm force winds made landfall. When the full force of the hurricane struck, ninety percent of the county and all CFPUA facilities lost grid power. The emergency generators did their job of maintaining power to all critical facilities and equipment.

Still, these preparations were almost not enough when the fuel supplier was unable to fulfill its contract. During the hurricane, the supplier lost grid power and had no redundancy. Business employees had evacuated and there were not enough drivers to dedicate themselves to supplying fuel to CFPUA.

Working with the County Emergency Operations Center (EOC), CFPUA was able to obtain fuel from a terminal at the North Carolina State Port. Determining a vendor's ability to maintain business continuity was identified as a planning gap in the utility's after-action report. In the aftermath of Florence, CFPUA increased fuel storage capacity by contracting for seasonal fuel tanks, purchasing additional saddle tanks for vehicles and requiring emergency fuel vendors to have backup power on-site. The utility also purchased its own 2,800-gallon fuel truck to ensure it can pick up and deliver fuel at any time.





Planning

- Create and maintain an emergency response plan and a business continuity plan for all critical system components.
- Develop plans that specifically address actions to be taken during power outages; plans should address both short-duration and long-duration outages.
- Develop and issue standard operating procedures to manage power outages.
- Know your system; have a plan for stationary and portable generators. Make sure, if possible, that generators are pre-staged at locations when an event can be expected to potentially affect one or more of your stations.
- Develop roles and responsibilities for staff before, during and after a power outage, including appropriate communication protocols.

Coordination

- Get to know key staff at your electric utility, especially your designated account representative, if assigned one. Learn if circuits (e.g., power transmission lines or electric service area zone) serving your utility are in high risk fire areas, such as in the western states.
- Obtain 24/7 emergency contact information for your electric utility and local emergency management agency and plan together for power outage events.
- For a Public Safety Power Shutoff, confirm with your electric provider and local emergency management agency the communication method and timing (e.g., 72 hours before the shutoff) by which you will be notified of a planned outage.

- Determine where your treatment facility and key pumping stations rank on the prioritization list for power restoration. Try to get as high on the list as possible by making sure the list manager understands the reliance of the community (e.g., fire protection, hospitals, shelters and sensitive populations) on drinking water and wastewater services.
- Make sure your electric utility has the actual street addresses and locations of your treatment facilities and pumping stations. In case street signs are damaged or lost, also include latitude and longitude positions. Decimal latitude/longitude positions should be recorded with a value six digits to the right of the decimal point.
- Learn what alternative communication methods (e.g., 2-way radios, ham radio operators, satellite phones) are available in your community.
- Join your state's Water and Wastewater Agency Response Network (WARN).
- Develop an approved notification procedure for communicating boil water advisories, water use restrictions and other information to customers during a power outage (e.g., precautionary boil water notices, reverse 911).
- Develop standard written notification templates to quickly send alerts in emergencies. Ensure customer information is regularly updated.
- Participate in local, state and federal emergency preparedness exercises.

Generators and Bypass Pumps

- Conduct a power assessment to determine your utility's critical facility backup power requirements. The assessment should provide the kilowatt, voltage, and phase(s) of any required generators. It should also include a basic order of connection materials needed (e.g., number and length of cables to connect generator, number and size of lugs to connect cable runs) and to what location within each facility's electrical system the generator needs to be connected.



- Ensure generators and associated electrical connection points are always accessible to qualified personnel.
- Determine lift station bypass capabilities and needed pump sizes, hoses and connections.
- Install transfer switches (automatic or manual depending on mode of operation) and quick-connect plugs to connect your facility's electrical equipment to generators.
- Purchase generators and bypass pumps or develop plans to obtain them through a contractor or mutual aid agreement to be utilized during a power outage. Be sure any contract includes wording that you are a priority customer. Consider renting generators in advance of hurricane or fire season.
- Maintain your generator(s) according to the manufacturer's recommendations and annually exercise generators under full load. Identify maintenance requirements and arrange for specialized support as necessary.
- Keep basic maintenance supplies on hand (e.g., Diesel Emissions Fluid (DEF), coolant, belts, oil, fuel filters).
- Keep small generators and variable frequency drives (VFDs) on trailers for easy transport during emergencies and maintain the trailers, especially the tires.
- Develop transportation routes and a rotation plan for facilities if there are not enough generators or bypass pumps available for each facility.

Fuel

- Know the pros and cons of the various fuel types.
- Calculate how much fuel is needed to operate each generator and bypass pump for one day and determine your total on-site fuel storage. Be sure to include DEF requirements, as applicable. The U.S. Army Corps of Engineers uses the following formula to determine the approximate generator fuel consumption for a 24-hour period: Generator kW size x 0.07 gallons/hour/kW x 24 hours.
- Develop a fuel management plan that includes fuel polishing and fuel additives (e.g., algaecides). Because of potential fuel quality issues, consider stocking extra fuel filters.
- Have contracts with multiple fuel vendors and check their ability to pump and move fuel during a power outage. Be sure these contracts include wording that you are a priority customer.
- Have multiple options to move fuel during an emergency, possibly including tanks mounted on utility owned vehicles.
- Monitor fuel tank levels and refill when they fall below a defined level so that tanks are as full as possible for a no-notice power outage.
- If a storm or other emergency situation is predicted, fill vehicle, equipment and fuel storage tanks to capacity. Have an alternate plan for pumping from fuel storage tanks if their pumps operate on grid power only.
- Work with your city, county and state to develop an area wide emergency operations fuel acquisition and distribution plan.
- If applicable, establish contacts at your natural gas utility and learn about their response and recovery plans.

Notes:



Notifications

Immediately notify your electric utility and local emergency management agency of power outages impacting your facilities. Inform them of:

- how long you can sustain operations without grid power
- the consequences to the community of the loss or reduction of water and wastewater services (e.g., a possible reduction in fire protection)

Know water storage and wet well capacities for determining when storage will be exhausted.

Maintain contact with your electric utility provider to obtain power outage duration estimates.

Notify your regulatory or primacy agency if operations and/or water quality or quantity are affected by a power outage, if your utility is running on generator power and what your fuel status is.

Notify the public of any boil water notices or water use restrictions.

As needed, request generators and fuel through your WARN, other mutual aid networks and/or the local emergency operations center (EOC). Once your need is met, be sure to cancel any outstanding requests.

Implement pre-developed emergency response and communications plans.

Generators

Monitor power quality and proactively switch to generators if there is poor power quality, which can damage equipment.

Ensure that generators are connected by qualified personnel.

Use backup generators, as needed, to supply power to critical facilities.

Transport small generators on trailers and address operations, security and logistics (e.g., maintenance, fuel, parts) for mobile generators.

Establish a schedule for maintenance, fuel checks and refueling for each generator, and ensure scheduled maintenance is regularly completed. The standard service interval is 240 operational hours or after every 10 days of continuous operations. Be sure to plan for redundancy as in most events there is over 10% failure of backup equipment.

Consult with air quality agencies as necessary for emergency waivers for prolonged use of certain kinds of generators.

Ensure sufficient personnel are available and cross-trained to serve as generator operators. Smaller utilities may need pre-arranged emergency service contracts with qualified electricians or to work with their WARN.

Notes:



Fuel

- Constantly monitor fuel quality and needs and coordinate fuel deliveries to generators. If possible, shut down generator during refueling.
- Shut down generators based on operational conditions to conserve fuel.
- Consider cancelling any non-essential trips in utility administrative vehicles to prolong your fuel reserves.
- Adjust climate control systems and any other large electrical uses at critical facilities to prolong generator run times.
- Implement staff carpooling to and from work where possible.

Operations

- Plan for and be prepared to reduce levels of service across the system or in pressure zones incrementally; plans should include actions taken to restore operations to normal levels.

- Be prepared to operate components of your utility manually without the aid of computerized systems.
- Implement plans, procedures or agreements to provide alternate drinking water as necessary.
- If possible, switch to source water with less power intensive requirements.
- Consider use of interties and emergency connections with neighboring utilities unaffected by the power disruption.

Documentation

- Document all damage assessments, mutual aid requests, emergency repair work, fuel and equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.

Notes:

Actions to Recover from a Power Outage



Coordination

- Check with your electric utility to make sure that all three phases of power are available before switching back to grid power. When power is restored, not all three phases may be initially available, which can damage three-phase equipment.
- Follow set procedures for taking your facilities off generator power and back onto grid power.
- Conduct an after-action discussion with utility staff to identify portions of the response that went well and areas for improvement.
- Share key after-action items and lessons learned with your electric utility provider, emergency management agency and other response partners (e.g., fuel vendors).

Notifications

- Revise or lift (as applicable) any water use advisories that were put in place during the outage.
- Update your status with your regulatory or primacy agency and your local emergency management agency.
- Notify utility staff that any energy consumption restrictions that may have been put into place are now lifted.

Generators

- Perform any necessary maintenance or repairs on generators.
- Consider testing your generator oil for signs of metal, which could indicate engine wear and the need for repairs.
- If a generator is serviced or repaired, be sure to test it under load after work is complete.

Fuel

- Clean tanks as necessary and polish on-hand fuel supply as time allows.
- Refill tanks as necessary. Stabilize fuel.
- Establish new fuel vendor contracts as applicable.
- Assess your on-site fuel storage and adjust as necessary.

Documentation

- Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, [Federal Funding for Utilities—Water/Wastewater—in National Disasters](#) (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs.
- Develop a lessons learned document and/or an after action report (AAR) to keep a record of your response activities. Update your risk assessment, emergency response plans and contingency plans.

Notes:

My Contacts and Resources



CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Electric Utility	
	City emergency management	
	County emergency management	
	Fuel provider	
	Generator service provider	
	Licensed electrician	
	WARN Chair	
	Local Health Department	
	State Primacy Agency	
	State emergency management	

Resources

- [Public Safety Power Shutoff \(PSPS\) Standard Operating Procedures](#) (EPA)
Provides a more detailed list of actions than this Incident Action Checklist to prepare for, respond to and recover from power outages. Although this resource was developed for PSPS events in California, it is applicable to most power outages across the country.
- [Power Resilience Guide for Water and Wastewater Utilities](#) (EPA)
- [Connecting Water Utilities and Emergency Management Agencies](#) (EPA)
- [Water and Wastewater Agency Response Network](#) (EPA)
- [Federal Funding for Utilities—Water/Wastewater—in National Disasters \(Fed FUNDS\)](#) (EPA)