



POWER RESILIENCE

Guide for Water and Wastewater Utilities



Overview

This guide includes information from water industry professionals on how to increase power resilience in disasters. The purpose of this guide is to:

- Promote coordination and communication between water sector utilities and their electric utilities; and
- Provide strategies to increase water utilities' resilience to power loss.

An extended power loss can have devastating impacts on drinking water and wastewater utilities and the communities they serve. Inoperable pumps at a drinking water utility can make firefighting difficult and cause local health care facilities and restaurants to close. A loss in pressure can result in contamination entering the drinking water distribution system from surrounding soil and groundwater. For wastewater utilities, losing pumps may lead to direct discharge of untreated sewage to rivers and streams or sewage backup into homes and businesses.



Seven areas in which water sector utilities can increase power resilience are:



1. **Communication** – Establish connections with electric providers, local agencies, and the public to help your utility respond more quickly and efficiently to a power loss.



2. **Power Assessments** – Learn how to conduct a power assessment to understand the energy needs of your essential infrastructure.



3. **Generators** – Learn how to select and maintain a generator for your utility.



4. **Fuel** – Develop plans to ensure you have enough fuel for your generator during a power outage emergency.



5. **Energy Efficiency** – Increase your energy efficiency to allow you to operate on back-up power longer during emergencies and reduce your electricity bills.



6. **On-site Power** – Consider options for generating your own power.



7. **Funding** – Learn about possible funding sources for resilience measures.

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Communication

Step 1
Contacts

Step 2
Key Information

Step 3
Prioritization List

Step 4
Training & Exercises

Step 5
Public Outreach

1. Communication

TOP TIP: Get your utility on the priority list for power restoration.

Good relationships and information sharing between water and electric utilities and local emergency response agencies are critical to getting power quickly restored after an outage. Depending on your local communication and response procedures, you may call your electric utility directly or you may need to coordinate through an emergency management agency (EMA). If you are uncertain about how to reach out to your EMA, see EPA's [Coordination of the Water and Emergency Services Sectors: An Important Step to Better Response](#).

It is important that you are familiar with your county's emergency protocols and how response decisions are made. This is particularly true with respect to the power restoration prioritization list. Depending on your county's emergency protocols, the order in which power is restored to local critical infrastructure, such as your water utility, may be determined by your electric power provider, the local EMA, or elected officials such as county commissioners. Your utility's placement on the prioritization list should be informed by details regarding your power needs and the consequences to the community should you have to cease operations due to a power failure. Be sure you know who makes the power restoration prioritization list for your community and take steps to share relevant information with them.

Did you know?

When an electric utility is restoring service after a major outage, it generally prioritizes transmission lines, substations, main circuits, critical customers, residential lines, transformers, and then individual houses.

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Step 1 – Make Contacts

- Get to know the key staff at your electric utility. When possible, have face-to-face meetings.
- Ask for 24/7 emergency contact information for the electric utility, the local EMA, and the local Emergency Operations Center (EOC).
- Ensure that your community’s emergency manager has your contact information in his or her cell phone so that when you call, your name will be recognized.



Did you know?

Many agencies and organizations share information and resources to support incident management activities at Emergency Operations Centers (EOCs). EOCs focus on the response to and the short-term recovery from an incident or natural disaster.

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Step 2 - Request Key Information

- Physical locations of critical assets.** Make sure the electric utility has the physical locations of all critical components of your water or wastewater system, as the physical address of your facilities can differ from your administrative address. Give the physical address when reporting an outage.
- Two-way radio capability.** Check if your electric utility is able to use two-way radios in case landline and cellular phone coverage are lost during an emergency. Be sure your radios are compatible with your response partners.
- EOC street address.** Know where your local EOC is so that you can go there during an emergency if needed.



Did you know?

Most EOCs have electric utility representatives. During a disaster, call the EOC if you have trouble contacting your electric utility. Better yet, obtain a seat for your utility at the EOC and you will be able to directly coordinate with the electric utility representative.

1 Communication

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Step 3 – Get on the Priority Power Restoration List

- Ask your electric utility who manages the power restoration prioritization list.
- Ask the agency or individual managing the list about your utility’s prioritization status.
- Inform the agency or individual managing the list of your “storm-ready” capabilities and be sure that they understand the consequences to the community of drinking water and wastewater service disruptions.
- Inform the agency or individual responsible for the list of the critical assets at your utility that rely on grid power.



Case Study:

Dominion Virginia Power has worked closely with local Emergency Operation Centers (EOCs) to identify the 10-20 most critical services in each of the EOC’s jurisdictions. Once identified, these critical facilities are further assigned Special Condition Categories, and water and sewage treatment facilities are considered “Critical Infrastructure.” These “Special Conditions” accounts are flagged so Dominion knows instantly when a water or wastewater treatment facility loses power. An intranet application allows Dominion Power to remain focused on these locations to ensure critical infrastructure accounts receive the highest restoration priority.

In addition, during large-scale power outages, Dominion Power establishes Electric Regional Operations Centers to better manage its response. Water utilities have a direct line to these centers and to representatives of Dominion Power.



Step 4 – Train and Exercise

Training and exercises allow water utility staff to learn, practice, test, and improve emergency response plans (ERPs) and procedures. Many times these plans and procedures involve response partners, so consider the following options to enhance your training and exercises:

- If your utility conducts planning activities or annual exercises, invite staff from your electric utility and local EMA.
 - EPA offers a [Tabletop Exercise Tool for Water Systems](#) to help utilities develop exercises for different scenarios.
 - EPA also developed [How to Develop a Multi-Year Training and Exercise \(T&E\) Plan](#) to help water utilities create successful training plans.
- Ask your electric utility if you can attend any exercises or planning activities it hosts.
- Ask your local EMA to include both your utility and the electric utility in its exercises.
- Share your emergency response plans with your electric utility and EMA and ask for information and updates on their plans.



Grid hardening - Activities such as tree-trimming help prevent weather related power outages. When talking to your electric utility, you can ask what grid hardening steps are being taken and what you can do to help. For example, do you have the resources to assist in tree-trimming? If your water utility has a remote pump station in the woods serviced by electric power from street lines, consider installing that service line underground along the access road. Although this is more expensive than typical pole installation, the service line will be better protected from tree falls.

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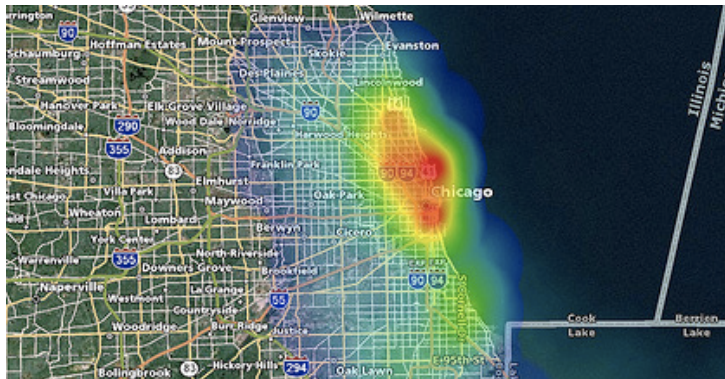
Step 3
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Step 5 – Communicating with the Public

- Appoint a communications manager or Public Information Officer who can assist in getting the right messages out to your customers before, during, and after emergencies. This helps your customers prepare for outages and know when services may be restored.
- Contact local news and radio stations to broadcast your messages or post on their mobile applications.
- Post signs near different community gates and on community bulletin boards at Town or City Hall.
- Ask the fire department, local EMA and municipal office to help with your public messages. They may already have emergency communication systems such as reverse 911 in place.
- Develop an automated system to send emails and text messages to customers. Some areas may already have an emergency texting service that you can use.
- Post frequent, time-stamped updates on your utility’s website.
- Utilize social media by posting updated information with a Facebook or Twitter account.



Eye on the Weather - Weather services can usually forecast storms 24 hours or more ahead of time. EPA’s mobile website [Water Utility Response On-the-Go](#) allows you to monitor and track all types of weather. For ice storms, you can also check the [Sperry-Piltz Ice Accumulation Index \(SPIA Index™\)](#), which gives a 0-5 ice accumulation and ice damage prediction index. The SPIA Index™ covers the continental United States and provides predictions days before a storm, including power outage duration possibilities.

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Power Assessments

Step 1
Assess

Step 2
Document

2. Power Assessments

TOP TIP: Enter your power assessment results into the Emergency Power Facility Assessment Tool (EPFAT) database to get a state or federally provided generator sooner in a regional emergency.

Power assessments determine the power requirements for critical equipment at your utility that are necessary to maintain water and wastewater services. A power assessment must be performed by a qualified electrician. The electrician will inspect all infrastructure assets at your utility. Critical infrastructure components will be unique at each utility, but usually include treatment processes and key pumping stations. This information is required to properly size an emergency generator(s).



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Power Assessments

Step 1
Assess

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Step 1. – Conduct a Power Assessment at Your Utility

- Conduct a Self-Assessment – Perform your own power assessment, with the assistance of a qualified electrician. EPA developed the [Is Your Water or Wastewater System Prepared? What You Need to Know about Generators](#) factsheet that helps utilities to better prepare for emergency generator needs, provides tips on running and maintaining generators, and includes an easy-to-copy form to determine and document backup power needs.
- Call Prime Power – The 249th Engineer Battalion, assigned to the U.S. Army Corps of Engineers (USACE), provides free electric power assessments for utilities. They can be reached at 800-243-3472 or 703-805-2562.
- When you upgrade your facilities or build new components, re-assess your power requirements to determine if you also need to add generator capacity.



Step 2. – Keep Records of Your Assessment


- Maintain a copy of all information from the power assessment with your emergency response plan (ERP), so you can easily locate it during emergencies. You should have a summary of the power requirements, siting requirements, and the location and capacity of any existing on-site generators at all critical infrastructure components. Use the form referenced in Step 1 above to capture this information.
- Input your generator information in the USACE database called the [Emergency Power Facility Assessment Tool](#) (EPFAT). States and the Federal Emergency Management Agency (FEMA) use this database during widespread power outages to quickly determine where and what kind of generators may be needed. Enrollment in EPFAT is free.
- Keep your power assessment information up to date. The EPFAT database will remind you every three years to review your data.

US Army Corps of Engineers

[Home](#) | [My Account](#) | [Help](#) | [Contact Us](#) | [Emergency Power - ENLink](#) | [EPFAT Tutorial Video](#)

Welcome to the Emergency Power Facility Assessment Tool

This web site offers you the opportunity to enter and store the information for your respective critical public facility generator requirements along with required connection materials. Having this data in the database will assist in expediting installations at your facilities following some type of event where commercial power is unavailable. This web site also offers you a permanent storage location for that information also allowing you the ability to update the information as facility requirements change. We recommend you review the "How-To-Guide" on this page for using this web site prior to entering your data.



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Step 6
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3. Generators

TOP TIP: Know what type of generators you need and where you would get them during a power outage.

Choosing a Generator

Once you know your generator requirements, you need to make a number of decisions to find the best one for your utility. As you compare generator options, check local, state, and federal regulations to make sure that your generator meets all specifications. For example, you may need to obtain a permit to emit exhaust from stationary generators. EPA's website provides additional information on the [federal regulations for stationary internal combustion engines](#).



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Step 1 – What size generator do I need?

The first step in choosing a generator for your utility is to determine the right size. Your power assessment can help you size your generator(s). In addition to knowing your equipment’s electricity requirements, consider the following when sizing your generator:

- If you are relying on a single, large generator (e.g., greater than 500 kW), think about installing two smaller generators in parallel to increase backup power reliability.
- Determine whether a portable or stationary generator will work best for your critical infrastructure assets. Portable generators would be best for smaller electric demands that do not require uninterrupted power. These generators can also be transported to multiple sites.
- If your electric demands are great, consider larger, stationary generators fueled by either natural gas or diesel. These generators can start-up within seconds of a power outage and provide uninterrupted power to critical equipment.



Video: Paralleling Generators

Starting Currents and Generator Sizing - Cross-line starts (as opposed to soft starts) of equipment require higher starting currents and therefore a larger generator. High and premium-efficiency motors also require higher starting currents and therefore a larger generator.

Did you know?

If your region is facing an extreme weather threat, FEMA will order and stage a “54-pack” of various sized generators in advance of a storm’s arrival. After the storm strikes, the generators are shipped to selected locations depending on the states’ needs and directions. This process may require several days.

Step 2 – Should I buy, rent or borrow a generator?

- Many private vendors sell or rent generators. If you plan to rent a generator, set up a contract with a vendor. Since many people may need to rent generators during a power outage, know where you stand in terms of priority with your generator vendor.
- Another option is to reserve a portable generator from a rental pool during storm season.
- Join your state’s Water and Wastewater Agency Response Network (WARN) to make it easier to borrow a generator and other resources during a regional emergency.
- Investigate what your state water sector associations and local emergency management agencies can offer to help. In Florida, both the Florida Rural Water Association and the Florida Division of Emergency Management maintain generator pools for distribution as needed. A good working relationship with your local emergency manager will be critical to accessing state or federally provided generators.
- Know what “type” of generator you need. You can learn more about resource typing from [AWWA’s Resource Typing Manual](#).

Generator	Pros	Cons
On-site (purchased)	<ul style="list-style-type: none"> • You know you have one • Reduced time to respond 	<ul style="list-style-type: none"> • Could be costly • You perform the maintenance • The disaster that strikes your utility could also damage your generator
Off-site (rented or borrowed)	<ul style="list-style-type: none"> • Multiple sources to get one – EOC, WARN, vendor • Someone else performs the maintenance • Costs less than buying 	<ul style="list-style-type: none"> • Travel delays to get it to your site • Your utility might not be high on the priority list to get a generator

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Step 3 – What type of fuel should I use to run my generator?

In addition to portability, fuel type is an important consideration for selecting a generator.

- Diesel generators are the most common and offer the largest selection, availability, and power range.
- Smaller utilities with lower power requirements and fewer resources might consider portable, gasoline powered generators.
- Smaller utilities can rotate several portable, gasoline generators between lift and pump stations as necessary. This method allows a utility to have backup power without buying a dedicated generator for each site.
- You could also consider bi-fuel generators to increase your fuel options during an emergency. These generators can switch between two different fuel types, such as natural gas and diesel. Usually this choice is automated and dictated by what fuel type is more efficient for the given conditions and needs, but the choice can also be made manually based on what fuel type is available. For example, if natural gas lines are broken or shut off during a disaster, diesel can be used.

Useful Tip:

If using multiple generators, try to select generators from the same manufacturer to make servicing the units easier.

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Step 3 – What type of fuel should I use to run my generator?

Fuel Type	Pros	Cons
Diesel	<ul style="list-style-type: none"> • Powers large generators • Lasts longer than gasoline • Readily available 	<ul style="list-style-type: none"> • Requires deliveries • Requires on-site storage • Risk of spills
Natural Gas	<ul style="list-style-type: none"> • Does not require truck delivery • Does not require on-site storage • Does not expire • Supply is relatively inexhaustible 	<ul style="list-style-type: none"> • Generator cost may be more expensive than a diesel version • If natural gas service is interrupted, there are limited back-up options • Risk of explosion
Propane	<ul style="list-style-type: none"> • Does not expire • Easily available in rural areas 	<ul style="list-style-type: none"> • Requires deliveries • Requires on-site storage • Leased storage tanks limit fuel provider choice • Risk of explosion
Gasoline	<ul style="list-style-type: none"> • Powers smaller, portable generators • Readily available 	<ul style="list-style-type: none"> • Typical shelf life is 2-3 months or less if stored in the equipment • Requires deliveries • Requires on-site storage • Risk of spills

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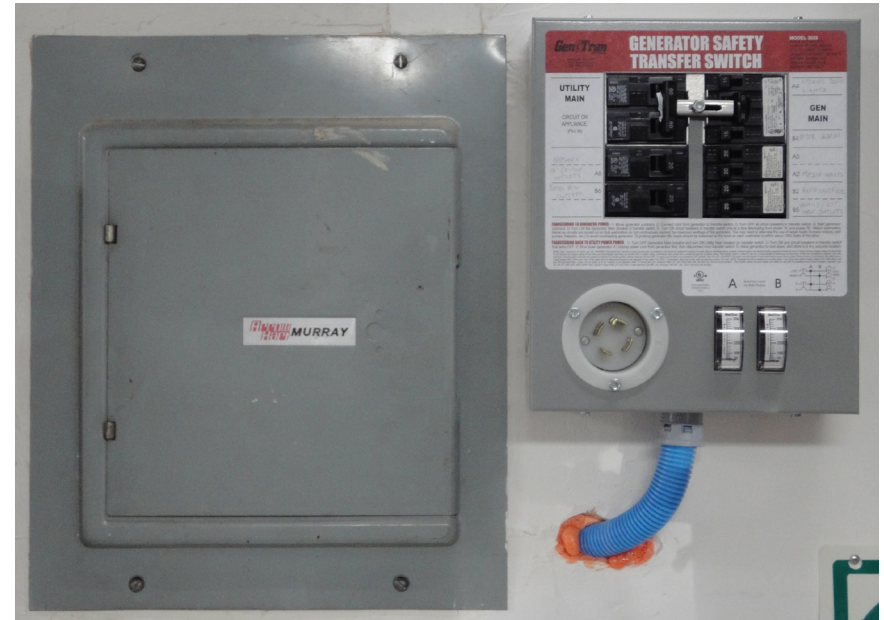
Step 6
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Step 4 – How will I connect a generator to my assets?

Generators require a special connection to rapidly hook to your facility’s equipment without accidentally back-feeding into electric lines, risking electrocution of line workers.

- Transfer switches allow you to easily switch back and forth between commercial and on-site generator power sources. These switches can be manual or automatic.
- You can install transfer switches ahead of time to decrease the time needed to connect a generator during an emergency.
- Install generator hook-ups at eye level to make them easier to connect in an emergency under poor weather and lighting conditions.



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Step 5 – Where will I keep a generator?

Make sure you keep your generator at a secure location. Some tips include:

- Locate generators and their fuel tanks above flood levels. A common height requirement for critical infrastructure is 3 feet above the 100 year floodplain. Check your local and state requirements.
- You can also consider installing a cement pad to provide a stable surface for a portable generator during an outage.
- Use weatherproof enclosures to protect generators.
- Get an enclosure large enough to provide easy access to the generator’s radiator, fuel tanks, air and oil filters, and charging system.
- Cover a generator with a roof to increase its life expectancy. Or position the generator pad so that a roof can be added later.
- Maintain three or four feet of clear space on all sides of the generator for adequate ventilation.
- Buy or rent a generator built with acoustical steel and sound insulation if it will be located in a residential area.



Video: Generator Placement

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Case Study:

In southern Monmouth County, New Jersey, a wastewater pumping station was redesigned to utilize a mobile trailer to house the pumping station's expensive primary electric equipment and controls. This way, the trailer can be moved out of danger during floods. Cables and plugs provide the connection between the pump station and the electric and control equipment in the trailer. When a storm threatens, the utility removes the trailer and mounts a cheaper secondary electric and control system at the site. The secondary system then powers and operates the pump station on either grid or generator power until after the storm, when the trailer can be safely returned to the pumping station. A mobile enclosure may seem costly, but it saved the South Monmouth Regional Sewerage Authority an estimated \$1.5 million in repair and recovery monies after Hurricanes Irene and Sandy.

Step 6 – How Should I Maintain a Generator?

If generators are not maintained, they will not function properly during emergencies. This could leave your utility without backup power when you need it the most. Maintenance requirements for generators vary, so be sure to have a contractor or trained utility staff perform scheduled maintenance as recommended by the manufacturer.

Generator Operation and Maintenance Tips

- Regularly run generators under required load for extended periods to test for any problems.
- Test the generator under load each time after it is serviced.
- Perform additional maintenance on a generator if it could be used for 10 days or longer.
- Record all maintenance activities to assess performance and operating costs and inform future buying decisions.
- When you change the oil in your generator, consider sending a sample to be tested for the presence of metals. Metals could indicate engine wear, which may indicate that other repairs are needed.

Did you know? During Hurricane Sandy, many generators failed after 24 to 48 hours because they had not been properly exercised and maintained.

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Generator Use Tips

Your utility can take basic actions to prepare for disasters that may include power loss. Below are tips for utilities using generators in emergency situations.

- For large scale “notice” incidents, such as category 3 and above hurricanes, go off the grid and use your generators in anticipation of a power outage. This can prevent operational disruptions and protect electric equipment.
- Go off the grid and switch to generators if there is poor power quality. Power fluctuations can damage equipment.
- Identify three-phase requirements. When power is restored, not all three phases may be available, which can damage three-phase equipment.
- Determine the need for protection against equipment failure caused by undervoltage or overvoltage.
- Conduct a facility-specific generator needs assessment. This can significantly reduce response time during an emergency.
- Give completed assessment forms to your local EOC or emergency management agency.
- Keep smaller generators on trailers for emergencies. The generators can be safeguarded during the incident, but easily transported to sites without power when needed.
- Keep basic maintenance supplies on hand (e.g., coolant, belts, oil, fuel filters) to quickly get a generator back in service if there is a breakdown.
- Plan for a “backup” to your backup power. One option is to reserve a portable generator from a rental pool during storm season.
- Conduct manual operation drills in case your SCADA system goes down during both a power and/or generator outage.

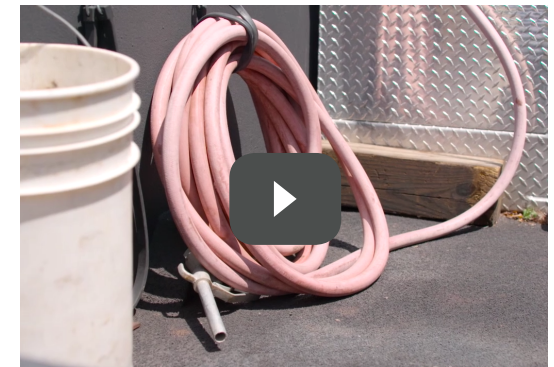
4. Fuel

TOP TIP: Have multiple ways to get and move fuel during an emergency.

You must maintain fuel on-site and have multiple ways to obtain additional fuel from vendors during emergencies. It may be difficult or impossible to get fuel from outside sources to keep your generators operating for an extended period of time. Your fuel suppliers may stop their operations due to the power loss, transportation difficulties, or other damage. If you lease propane fuel tanks, the supplier from whom you leased them is typically the only one who can fill them.

To keep your generators running during an emergency, you should develop a fuel plan that addresses:

- How much fuel you need to operate each of your generators for one day
- How many days you want to run your generators without refueling
- Total on-site fuel capacity
- How you will re-fuel your generators, including those in remote locations
- Contracts with multiple fuel vendors
- Multiple options to move fuel during an emergency



Video: Fuel

Fuel Tank Sizing - You do not want to run out of fuel during a power outage. One utility manager recommends storing sufficient fuel to run a generator at 70% load for five days. Typically, having this amount of fuel on hand enables this utility to run a generator for seven to nine days without running out of fuel.

Tips

- Check fuel storage requirements because regulations vary from state to state.
- Add fuel management into your generator maintenance schedule to ensure availability of clean, reliable fuel.
- Clean all fuel tanks at least every five years to avoid sludge build up.
- Use gel and fuel additives to reduce biological activity that produces fuel sludge.
- Use a portable fuel polishing unit.
- Refill fuel tanks before they are empty to avoid drawing up any fuel sludge accumulation.
- Have multiple vendors from different regions under contract so that you can maintain supplies if one vendor cannot deliver.
- Ask your vendor to store additional fuel for your utility during storm months.
- Be aware of limits on who can refuel leased fuel storage tanks. You can purchase your own tanks if necessary.
- Have filters (at least one complete filter set per generator) on hand because they will not be readily available during an emergency.
- Have a 1,000-gallon tank available and a truck on-site for local deliveries.
- Be prepared to move your own fuel without contractors. Trucks with mounted 100-gallon fuel tanks do not need HazMat placards. Generally, any tank over 119 gallons requires hazardous materials placarding and licensing.
- Reduce your energy consumption while using generators to make the most of the available fuel.

Case Study:

In 2012, the New Brunswick Water Utility in New Jersey was able to stay operational for an additional six days during Superstorm Sandy by reducing generator fuel consumption. Thinking creatively, the operators put the entire plant on gravity filters, shutting down the energy consumptive membrane filters. This operational change successfully reduced fuel consumption by approximately two-thirds (from 120,000 gal/day to 40,000 gal/day).



5. Energy Efficiency

TOP TIP: Install energy efficient equipment to reduce energy needs and increase power resilience.

Energy efficiency will help your utility save on annual electric bills and increase your resilience during power outages. If you decrease your energy use, you can run your generators longer with less fuel. For more information regarding energy efficiency for water utilities, see EPA’s [Ensuring A Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities](#).

You can also conduct an energy assessment at your drinking water or wastewater utility using the ENERGY STAR [Portfolio Manager](#)[®]. Following this initial assessment, you can conduct a more detailed audit to determine what energy efficiency projects would be most beneficial for your utility. Many electric power providers will conduct an energy efficiency audit to help you reduce your energy needs. Your municipal or local government may be willing to help pay for a portion of the audit’s costs.

Case Study:

Stockbridge Water in Massachusetts spent nearly one-third of its budget on electric costs and decided to look for ways to increase energy efficiency. The utility was able to reduce energy use by changing all lighting to electronic ballast lighting. In addition, by changing to heat pumps (keeping the older electric heat system as a backup), the utility saved 60-65% in annual electric costs.

Useful Tip: *The Database of State Incentives for Renewables & Efficiency (DSIRE) is a comprehensive source of information on incentives and policies that support renewable energy and energy efficiency in the United States. Funded by the U.S. Department of Energy, DSIRE finds programs and resources that can help you attain your energy goals.*

6. On-Site Power

TOP TIP: Generate power on-site to allow your utility to function during grid outages.

Another option to prevent power outages at your utility is to consider installing on-site power, known as distributed energy resources (DER). DER refers to self-sufficient power generation, power storage, and electric load control technologies that are located on-site at your utility and operated for your benefit. DER options include:

- Microturbines - wind mills
- Fuel cells - devices that convert the energy from a fuel into electricity through a chemical reaction
- Photovoltaic systems - solar panels
- Traditional internal combustion engines - engines that burn fuel to produce power, such as generators
- Combined Heat and Power (CHP) - simultaneous generation of electricity and heat from a source such as biogas.



Combined Heat and Power for Wastewater Utilities

CHP is the most applicable source of DER or on-site power generation for wastewater treatment plants (WWTPs). CHP is the simultaneous production of electricity and heat from a single fuel source (e.g., natural gas, biogas, or comingled gas), and can be 75% efficient. There is significant opportunity for CHP technology at WWTPs with anaerobic digesters, which produce biogas as a waste product. Benefits of CHP at a WWTP using biogas include energy cost savings, government and utility incentives, emissions reductions and enhanced reliability.

Microgrid

A central concept to DER is the microgrid, an interconnected network of DER that can function separately from the electric grid, enhancing your utility’s power resilience. During a power outage, you could switch to your own electric microgrid powered by a source such as solar panels and wind turbines. In the community, microgrids are often used to link critical public services and critical private businesses together in their own, larger microgrid. These key facilities could become “islands” of power during an outage.

DER and microgrids are emerging technologies, so be sure to talk to your electric utility before investing in these options. EPA has information about on-site power generation in [On-Site Renewable Energy Generation](#).

Three Massachusetts DER Examples:

1. *At the Greenfield Wastewater Treatment Plant, heat pumps that run off plant effluent also heat the disinfection and pump buildings, with electric heat used only as a backup.*
2. *The Greater Lawrence Sanitary District plans to accept up to 92,000 gallons of pre-processed food waste per day, or approximately 28% of the state’s anticipated diverted food waste from landfills and incineration as part of a CHP Project. The food waste will be used as a feedstock for their digestion system and will produce biogas sufficient to fuel a 3 MW cogeneration engine.*
3. *The City of Northampton is using grant funds received through the state’s energy department to upgrade its fire headquarters. The city will be installing a photovoltaic (PV) solar array so that the fire headquarters may generate its own power on-site when grid power is out.*

One Use for On-Site Power

As you consider the benefits of various types of DER at your utility, think about using solar or wind power for telemetry systems. Then your source of information about remote facilities would be independent from grid power.

7. Funding

TOP TIP: Use EPA's Fed FUNDS website to determine your eligibility for funding power resilience projects.

Power resilience may require an investment from your utility. This investment can reduce recovery costs and help to maintain operations during disasters. Utilities can implement some power resilience measures using internal funding. Other efforts may require capital investment through the utility's capital improvement plan and local government funding. Also, there is some external funding from state and federal agencies that is available to utilities depending on the type of utility and the measures that you are trying to fund. Examples of power resilience projects that have been funded successfully through external sources include:

- Purchase, rental, or upgrade of emergency generators and fuel supply facilities
- Electric connections (transfer switches) to receive emergency generators
- Elevation or protection of electric panels and generators from hazards
- Flood protection around an electric substation and transformers
- Purchase or subsidized costs of microgrid technology
- Energy efficiency measures

Federal Resources

EPA's tool Federal Funding for Utilities – Water/Wastewater – in National Disasters (Fed FUNDS) provides comprehensive information on funding programs from various federal agencies including FEMA, EPA, the U.S. Department of Agriculture (USDA), the U.S. Department of Housing and Urban Development (HUD) and the Small Business Administration (SBA). For example, the state administered Drinking Water State Revolving Fund (SRF) and Clean Water SRF support a wide range of infrastructure projects. Eligible projects could include resilience components such as energy efficient upgrades and alternative power sources. States establish priorities for using SRF funds and assistance is typically in the form of low-interest loans. To access Fed FUNDS, click the icon below.

Use Pre-Disaster



Use During a Disaster



Use Pre- or Post-Disaster



Sample Projects

To assist you in locating potential funding sources, the table below has been completed based on a broad interpretation of funding eligibility and policy. Individual utility projects will need evaluation on a case-by-case basis. Talk to your utility supervisor, local emergency manager, town manager, and state hazard mitigation officer to determine the availability of funding opportunities for your power resilience project.

Sample Power Resilience Project	Possible Funding Sources				
	EPA SRF	FEMA PA	FEMA HMG	HUD CDBG	USDA WEP
Repair generator or fuel tank		X			X
Elevate existing generators, electric equipment etc.	X	X	X		X
Purchase generators and fuel storage	X		X	X	X
Install electric wiring hookups (e.g., transfer switches) to accept generators	X		X		X
Develop and implement emergency power plan	X		X		X
Harden grid link or multiple independent feeds	X		X		X
Replace damaged equipment with energy efficient versions	X	X		X	X
Add power (e.g., dual fuel, cogeneration, solar, wind)	X	X	X		X

Table Key: SRF = State Revolving Fund; PA = Public Assistance; HMG = Hazard Mitigation Grant; CDBG = Community Development Block Grant; WEP = Water and Environmental Programs

