# Back-up Power: Keeping the Lights (and Other Stuff) On

## Why Back-up Power?

Utility professionals do a great job of keeping us spoiled, but sometimes things happen

* High winds in Northern Utah – September 2020
* Polar Vortex in Texas and the South
* Rolling Blackouts in California
* Other weather events – heat wave
* Earthquake – Something we are very prone to
* Cyber-attacks…hitting the news lately
* EMP – Natural or man-produced. Solar storm, High Altitude Nuclear Detonation
* Severe pandemic
* War, terrorism, sabotage – Metcalfe substation

## Where Do I Begin?

1. **Decide how much energy you need to run critical loads.** What is important for you? Usually need to be selective. Likely not electric heating, cooking, or air conditioning. Can run the fan on your furnace.
* Medical equipment?
* Fridge/Freezer?
* Lights?
* Communications?
1. **Calculate energy consumption**. How do I figure out how much energy they take?
* Labels on appliances/devices
* Online resources
* Power consumption meters

Remember to factor in start-up demand in addition to running demand

## What are My Options?

* **Fuel based** (gasoline, diesel, propane, natural gas)
* **Solar/Battery** based

Each has advantages and disadvantages, and comes in a variety of sizes.

## Fuel Based Generators

Decide which fuel works best for you

 **Gasoline** – most common, can get from cars, more dangerous to store

 **Diesel** – more energy per gallon, stores better, safer, but can gel

**Propane** – less energy per gallon, generally safer to store

**Natural gas** – less common, except for home based units tied to home

## Two Types of Fuel-Based Generators

1. **Standard** – generally larger, more powerful. Don’t adjust to load, more noise, power not as clean.
2. **Inverter** – Newer technology, more efficient, easy to maintain, quiet, clean wave form, very portable, scalable – add other units in parallel. More expensive, lower outputs.

**Advantages** of fuel-based generators - Generally more portable, greater power

**Disadvantage**s of fuel-based generators -Need to store fuel (legally and safely), carbon monoxide issues, noise.

**Maintenance** – These generators do require some maintenance. Should run them at least quarterly to check them out and to rotate fuel through them. I prefer to use stabilized fuel (STA-BIL. PRI, Etc.). I also like to have basic spare parts on hand.

## Solar/Battery Based Systems

**Roof-Top Solar** – typically not useful for back-up power. However, some companies do offer the option of including back-up power (one plug and/or battery storage).

**Solar Power System** – you can design and build yourself, or have a solar contractor do that for you. Systems include solar panels, charge controller, battery storage, and inverter.

**Portable Power Stations** – fairly new on the market. Typically uses lithium battery technology. Sizes run from 100 watt-hours up to 6000 watt-hours. Great option for portable power or running small loads at home.

* Charge controller, battery storage, and inverter are combined in compact unit.
* Solar is typically portable/non-permanent, but more permanent panels can be installed.

**Advantages** of solar/battery-based systems – No fuel to store, no carbon monoxide, quiet.

**Disadvantages** of solar/battery-based system – generally not as powerful, batteries weak point.

**Maintenance** – typically involves cleaning the solar panels occasionally. Lead-acid batteries require “irrigating” and equalizing charges. If you are depending on this system for a time of crisis, spare parts are good to have.