



# EMERGENCY GENERATORS

Emergency electrical generators, both portable and fixed, can be viable sources of power during an outage. Caveats and safety considerations that you should be aware of when selecting and operating a generator are noted below.



Good information and a guide to help you choose an emergency generator can be found at [www.electricgeneratorsdirect.com](http://www.electricgeneratorsdirect.com). Cost is dictated by power output, features and brand. Portable Honda generators, for example, have a great reputation as being durable and relatively quiet, but are more expensive than brands such as Powermate, Generac, etc, of similar output.

Fuel powered generators do pollute the air, and fuel storage may be a safety concern. For information on other backup power sources, refer to **Guide #20 – Backup Power Options**.

## SELECT THE RIGHT TYPE OF GENERATOR

There are two basic types of emergency generators that you can choose from – portable or fixed:

Portable generators, as their name implies, can be moved to where they are needed. Most portable generators are gasoline powered, but some may also run on propane and/or natural gas (dual/tri-fuel). The larger they are (more power they produce), the more fuel they use per hour. For gasoline generators you'll want to safely store enough fuel to last several days of intended use. You can also siphon gasoline from a vehicle (another reason to always keep your tank topped up), but make sure to leave enough gas in at least one vehicle for an evacuation.

Large home power generators are often fixed in place on a concrete pad. They can feature automatic starting and switching and are often enclosed for quieter operation. These typically run off propane and/or natural gas, which are cleaner burning and more convenient than gasoline – unless the gas line ruptures or the supply is turned off. These are more costly than portable generators and for most may be overkill, but that depends on your needs and budget.

## SIZE YOUR GENERATOR

To determine what size emergency generator you require, you need to calculate your power demand:

First, it's useful to understand power and energy. Electric power is the rate of doing "work." Common units of power are the watt (W) and kilowatt (kW) or 1,000 watts. Energy is power used over a time period. A common unit of energy is the kilowatt-hour (kWh), or 1,000 watts used for 1 hour.

For example, running a 10 watt LED light bulb for 100 hours would consume 1 kWh (10 \* 100) of energy.



Note that generators are sized by power output (watts), which they produce at a fairly constant and regulated rate as long as they are running.

Then, list every device and appliance that you want to operate at the same time during an outage, and note how much power each one uses. An electricity monitor like the "Kill-A-Watt" can measure how many watts each draws, or refer to the device label or owner's manual.

**Add these figures up, multiply by 1.5 (safety factor) and that's your rough power need.** Typically around 4,000 watts is sufficient for partial-house backup, but you can get by with a bit less if you don't run high-load appliances at the same time. 2,000 watts may be enough if all you want to power are a few LED lights, rechargers, laptop and a network router and intermittently cool your refrigerator.

## GET THE POWER TO DEVICES AND APPLIANCES

There are two typical ways to get power from your generator to your devices and appliances:

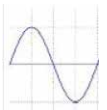
The simplest and cheapest method is to run temporary, heavy-duty extension cords from the generator operating outside to the appliances inside that you want to power – lamps, radio, refrigerator, etc. This may be fine for an emergency or the few occasions when power goes out. Use only heavy-duty (12 AWG min.) 3-prong/grounded extension cords in good condition that are rated for the wattage they will be drawing from the generator, and use the shortest cord(s) possible. Be careful not to trip over them and don't ever allow cords to lay in water.

A safer and more elegant way to connect your appliances is to wire the generator in to your house electrical panel. **This should only be done by a qualified electrician.** This requires a "transfer switch" (open transition) to isolate the generator power from the utility line power so that you don't back-feed the power grid and put PG&E workers at risk. A transfer switch typically allows 6, 8 or 10 household circuits to be easily switched over to the generator power.

## ENSURE APPLIANCES ARE GENERATOR SAFE

Better to be safe than sorry when connecting expensive devices to generator power!

Some (usually less expensive) generators may not produce completely "clean" and well regulated AC power, as from the power utility. Lights are usually ok with this, and most appliances should be fine too. However, sensitive devices like chargers, some appliances with electronic controllers and some digital devices may not operate properly or could even be damaged. It is best to check the owner's manual or contact the manufacturer to ensure that the device will operate safely under generator power.



An AC line conditioner or UPS backup device in-between the generator and appliance may help regulate the power, but add expense. Inverter generators produce cleaner ("pure sine wave") power at the expense of some efficiency. Note: regularly monitor the generator's fuel level – having it run out of fuel and slowly shut down may not be good for some plugged-in devices.

## AND ALWAYS BE SAFE!

A generator should be running and stable before plugging in cords (or flipping the transfer switches on) and turning on devices. Be sure to turn off all devices and unplug cords (or flip the transfer switches off) first before shutting off the generator. Always shut off the generator and let it cool before refueling. **Know that the AC current from a generator can easily electrocute, and treat generator power as carefully as that from household outlets.**



**Read your generator manual thoroughly and make sure that you follow all safety recommendations!** You may want to talk with an electrician about properly grounding your generator, especially if it is connected to a structure via a transfer switch.

**Always run a fuel-powered generator outdoors – never run a generator indoors or in a garage!** Locate it at least 15' from the house and never near vents or open windows or doors. Make sure you have operating carbon monoxide (CO) detectors in your house. And store fuel only in approved containers and away from any heat sources and open flames.