

You and an Electric Generator by Fred Kruger, Ph.D., K2LDC

There are times when a weather event or local “man-made” event can cause a loss of electric power..... sometimes lasting much more than a few hours. At these times, a relatively small electric generator can help to reduce stress and provide somewhat more normal home living. First, if you don't have them, purchase and connect AC powered Carbon Monoxide (CO) detectors with 9-volt battery back-up.

When you begin to shop for your generator, first prioritize your needs and make a list of the items you believe must operate in an emergency. Also write down answers to the following questions (to take with you as you shop).

- How much power is actually required: 1. to start each appliance, and 2. to run each appliance. Read the nameplate information on motors and appliances to determine power demands (Power in watts = Current (amps) x Voltage (volts)). Most generator manufacturers can provide brochures with typical power requirements for appliances, lights, and equipment to help plan your total power requirements.
- How much gasoline is consumed per hour?
- What size tank is on the generator?
- How much additional gasoline are you willing and able to safely store? (Before an emergency, be sure to fill your car gas tank. You may need some of it for your generator. But, always leave enough gas for emergency evacuation or other transportation needs.
- How will the generator be connected to electrical devices in your house – via separate extension cords or via a special wall connection and a transfer switch,? Never use an electric cable with male connectors (plugs) at both ends.

Then consider reality: A smaller generator may actually be better for you. Run time is a major concern. If most of your neighborhood is without power, there's a good chance that your local gas station(s) won't have power either! With no power, there's no way for them to pump gas. The gas supply you have in the generator and your storage containers must last as long as possible. Your priority consideration is to determine what things you actually need to power in an emergency. Remember, you can save gas by using appliances only as needed. If no appliances are running, shut off the generator. If you're just running a few lights, consider using a few battery powered lights to save gas (and money). Refrigerators may only need to run a few hours a day to preserve food. Using a refrigerator thermometer, aim to maintain 40 degrees in the refrigerator compartment and 0 degrees in the freezer. Use lower power requirement CFL lights.

All generator manufacturers rate their generator's fuel consumption based on running with a load that is 1/2 the rated capacity. It can be misleading, but they all do it! So make a list of what will need power; a few lights, a radio, your refrigerator, maybe your gas or oil heating system, etc. For example, my generator is rated for 1500 watts continuous load. It has a 1 gallon gas tank. It is a quiet model that slows down with reduced load---thereby further reducing gas consumption and noise, while maintaining **120 volts AC at 60 Hz**. If needed, a second of these small generators might be used to support the electric power needs of a gas furnace, while using very little additional gasoline per hour (Most 4-5 kilowatt generators consume almost 1 gallon per hour at half-load and are much noisier).

During Hurricane Irene, our 2000 watt/1500 watt generator ran our refrigerator, some lights, Amateur Radio equipment, weather and FM radios, and small device battery chargers; consuming about 1 gallon of gas every 13 hours, while supporting about a 700 watt load. I had approximately 9 gallons of gas available and that was sufficient for the 52+ hours we had no power. We had heavy duty extension cords running all over. While running, our generator was about 8 feet from the house. Extension cords were run through a window opening, which was carefully sealed (top and bottom) with foam and multiple layers of duct tape. Blue painters' tape was used to prevent tripping and to keep wires in place. **WARNING:** Always keep generators away from all open doors and windows – your's and your neighbors' - to prevent deadly exhaust fumes from entering. **Gasoline-powered generators produce deadly carbon-monoxide fumes.** You can't trust your senses for protection from carbon monoxide; this deadly gas is invisible and odorless. **When buying a generator, also buy an AC/battery-operated carbon-monoxide alarm. It works like a smoke alarm, sounding an alert if carbon-monoxide levels become dangerous.**

There are two basic connection options:

1. Use heavy-duty 3-prong outdoor rated extension cords to connect appliances and lamps directly into the generator's outlet. Follow the manufacturer's recommendations for grounding the generator.

Or:

2. Have a licensed electrician connect the generator to your house wiring using a "listed" transfer switch, which means it meets nationally recognized (and local) safety standards as indicated by the UL Listing Mark on the product. Having an electrician install the listed transfer switch will safely prevent your generator from back feeding utility lines, thus avoiding a safety hazard to you, your family, neighbors and utility workers, and preventing possible damage to your generator when utility power is restored. Never connect a generator directly to your home's wiring.

Remember:

- *You don't need to run everything at the same time; rotating larger items allows the use of a smaller generator, which costs less to buy, is easier to move and consumes less gasoline.*
- **Never operate a generator** inside your home, garage, crawlspaces, sheds, or similar spaces even if you plan to use a fan, an open door, or open windows for 'ventilation'.
- **Never refuel a hot generator** or one that is running; hot engine parts or exhaust can ignite gasoline.
- Turn off all connected appliances before starting your generator.
- Turn connected appliances on one at a time, never exceeding the generator's rated wattage.
- Read and follow the manufacturer's instructions that came with the generator, as well as those on their website.
- *Don't leave a running generator unattended; if possible, turn it off at night and when away from home.*

When you are not using your generator, fill its tank with fresh gasoline and add the proper amount of fuel stabilizer. Change the engine oil if needed. Drain the carburetor float bowl. Drain the sediment cup (if one is installed). Change the engine oil, if needed.

In Summary:

- Read, understand and follow the manufacturer's instructions.
- Operate outdoors in a clean, dry area.
- Generator must be properly grounded.
- After losing power, turn off main breaker or pull main fuse block.
- Generators that are directly connected to existing wiring systems must be connected through a double-pole, double-throw (DPDT) transfer switch; which assures that the generator is never connected to the outside power service lines. **NEVER directly connect your generator to your house wiring. It is very dangerous and introduces an electrocution risk to your neighbors and to utility workers who may be working on power lines to restore service.**
- All electrical connections must comply with the National Electric Code.
- Do not overload your generator with too many appliances.
- Use properly sized extension cords in good condition.
- Two small generators may be easier to move and use and more fuel efficient than one large one.
- You may be liable for damage or injury to people and property that may result from an improperly installed or operated emergency generator.

Finally:

Consider how much interaction you want with your back-up power system and how much you're willing to spend. Generators for home use range from small "pull start" and/or "battery start" portable units to large, fully automatic power systems. In this paper, we have discussed only the former. You can purchase a generator which will run from bottled gas (propane) and/or from the natural gas supplied to your home via underground pipes. There also are larger, semi- and fully automatic "standby" generators. These may be the subject of a future article.