

Notes From the Commish

Off the Grid

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As many of us in Charlton and communities to the north of town found out, living without commercial power for extended periods of time can be challenging. After about twenty four hours, the camping fun part wears off quickly. So what can be done to keep the essential comforts of home running?

Aside from running a large and heavy extension cord to the Millennium Power Plant, you could have a generator to feed your house. The first question is what size do you need? I can run all the essentials; that would be heat, well pump, sewer pump, some lights, refrigerators and freezer with a 3500 watt 220 volt gasoline powered generator. The five gallon fuel tank will last about 12 hours. I could run my whole house if we were careful about what we had turned on simultaneously.

There are three very important considerations about home generators.

First, generators produce electricity and electricity can kill or injure you, your family or line crews working on the power lines if installed incorrectly.

Second, **generators produce carbon monoxide in large quantities and carbon monoxide can kill or injure you and your family, if the fumes enter your home.** According to the Consumer Product Safety Commission, document #466 “Carbon monoxide (CO) is a deadly, colorless, odorless, poisonous gas. It is produced by the incomplete burning of various fuels, including coal, wood, charcoal, oil, kerosene, propane, and natural gas. Products and equipment powered by internal combustion engine-powered equipment such as portable generators, cars, lawn mowers, and power washers also produce CO.”¹

The third problem with generators is they can be noisy depending on the size, type of muffler and location. In addition, if run for a long period of time may need refilling with flammable or combustible fuels; which when poured into a hot machine can ignite the fuel vapors.

How do we address the problems, safety issues, size need, location and installation of a generator for your home?

First, you need to determine how many watts (size) your generator needs to be. Are you going to try and power the whole house or just the essentials?

There are various online tools to help you determine the wattage of generator needed, I Googled “home generator size” and came up with a plethora of hits and information.

Watts (W) of power is a function of the voltage and resistance of the device powered; the easiest to see is an incandescent light bulb is 60W or 100W. Motor on furnaces have wattage ratings stamped on the name plate. You can also look at the size of the circuit breaker that serves the appliance and multiply the ampere (A) rating of the breaker times the voltage (V), the product of $V \times A = W$ s for the load. For example my well pump has a 220V 15A breaker, so $220 \times 15 = 3300W$.

Motors have a higher wattage draw at starting, some up to five times, most three times the running requirement, this needs to be factored into the size of the generator used. Also some equipment such as electric ranges and air conditioning loads are so large it may not be cost effective to buy a generator to power those appliances.

Now to calculate the wattage of generator you need, add up all the running wattage of the equipment you want to run simultaneously, plus the starting wattage of the biggest motor that will come on, this total will be the wattage needed for your generator.

Here is a chart that may be helpful, that I took from Lowe's web site.²

Appliance or Tool	Running Wattage*	Startup Wattage
Furnace fan	1100	2000
Refrigerator/freezer	1200	3000
Sump pump	1700	3200
Clothes washer	1000	7500
Small refrigerator	500	2000
Light bulb	50	0
Home security	100	0
Television	400	0
Microwave	750	0
Toaster oven	1500	0

Wattage numbers are estimates. They will vary based on the wattage rating of the tool or appliance being used.

The connection of the generator to your home wiring should be done by a licensed electrician and include a transfer switch. It is not safe to back feed the generator power into an existing electrical outlet or breaker and is a violation of the electrical code.

The purpose of the transfer switch is to disconnect the commercial power and connect the circuits to generator power. The transfer switch also prevents the generator from back feeding power into the eclectic grid which can potentially energize the power lines on the street.

You could also have a portable generator in your yard and run the correct size extension cord to the portable appliances, but that would not address the permanently wired equipment.

The next issue to deal with when using a generator is the exhaust gas, as mentioned earlier, carbon monoxide is a by product of burning fuels.

Do not run a generator in an attached garage or garage under at any time, even with the doors open. Houses are under negative pressure and even with the door to the house closed and the garage totally sheet rocked, the poisonous CO will be drawn into the house. Likewise running a generator near an open bulkhead door, under a carport or crawl space or even windows will allow CO to enter the structure. Keep generator exhaust out doors and away from openings in the building.

During the December power outage, the Fire Department responded to numerous calls for CO detectors and CO poisoning symptoms. The homes with CO detectors had readings over 50 parts per million (ppm). The homes where there were no detectors and people with symptoms; headaches, tired, nausea and flu like symptoms, had readings of over 100ppm. All of the people involved recovered after a stay at the hospital, one was a near miss.

The Fire Department policy is that fire fighters go on supplied air at 9ppm, 35ppm is the maximum allowed by OSHA in an 8 hour period, and 400ppm over 3 hours can be deadly. Even low levels for long periods of time can lead to disability or death because CO will bind with the blood better than oxygen.

The last issue to deal with is noise and refueling the generator. Like many things you get what you pay for. A quality generator will be efficient, have a good muffler system and a large fuel tank making refueling less frequent. Or

you could buy a generator that runs off existing fuel at your home such as propane and hook it up permanently to the fuel and the electrical system. For more money you can have an auto start feature installed that will monitor for power failures and will start and stop the generator as needed.

In conclusion, things to keep in mind; be careful when using a generator, have working carbon monoxide detectors in your home at all times, one on each living level. If your power is out will the gas station have power to fill your gas can? By selecting when you energize circuits you can make a lower wattage generator do more. For example, let the well pump run and cycle off before starting the sewer pump, run the refrigerator for a few hours then the freezer.

Be careful with sensitive electronic equipment, the generator may not be putting out clean steady power, I do not think I would watch my LCD or Plasma TV on generator power.

I know my 3500W generator will not power an electric water heater, or an electric range, it will run my two boilers with hot water, three refrigerators, water pump, sewer pump, microwave, toaster and enough lights to be comfortable, not all at the same time. If we exceed the rating of the generator the circuit breaker trips out on it, I have to redistribute the load and life goes on.

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¹ <http://www.cpsc.gov/CPSCPUB/PUBS/466.html>; accessed January 18, 2009

² <http://www.lowes.com/lowes/lkn?action=howTo&p=BuyGuide/SelectGenerator.html#1>; accessed January 18, 2009