

Whole House Standby Generator Info

After losing power for a week in the freak Northeast 2011 October snow storm here in Connecticut I realized I needed a permanent long term emergency power solution. My house has well water, so when power is out I have nothing: no lights, water or heat. Plus I live in a heavily wooded area with above ground power lines on a long dead end street. When a tree falls over the street and power lines, not only do I have no power, I'm trapped from evacuating. Thus, in December 2011 I installed a 20kW standby generator. After the massive October 2012 Storm Sandy, yielding a peak power outage of 8.5 million, I have been receiving many questions about my generator setup. I figure the easiest way to address this deluge of questions is to document my installation. Hopefully this answers most of your questions.



My goals for this installation:

1. Continuous 24/7 uninterrupted power.
2. Automatic ON/OFF power transfer. (When utility power goes out, generator automatically starts and provides emergency power. When utilities come back ON, the generator automatically turns OFF and switches to normal utility service.) One purpose of the transfer switch is to avoid back-feeding power to the utility lines and creating a deadly hazard for utility workers and the general public. (Not to overlook that you'd be supplying free power to your neighbors and overload the generator in the process.) The power transfer happens so quickly that I don't even need to reset my alarm clock. So if utility power goes out or comes back while I'm sleeping, I don't even know it.
3. Provide power directly to the main panel without excluding any circuits with enough power to run all appliances. Important note: I have a new propane furnace and on-demand propane water heater so 20kW is more than enough for my situation. If you have electric heat you will need a substantially larger unit than 20kW. Here are a couple of tools to calculate your needs:

<http://www.generac.com/Residential/Sizer/>

<http://www.powerequipmentdirect.com/stories/46-How-to-Size-a-Home-Standby-Generator.html>

4. Final goal = maximum power output for lowest cost. My generator can run on either propane or natural gas. If you already have natural gas piped to your house, then that is currently the cheapest way to go. Since I don't have that luxury here, I run propane. During a power outage, with the generator running all day, it uses about 30 gallons of propane which at the current price of \$2.15/gal. = \$65 per day. It's certainly not the cheapest power available, but it sure beats taking cold showers and storing perishables in coolers with the never ending hunt for ice. Not to overlook the convenience of flushing the toilet. Your use will vary depending on size of unit and electrical demand.

My installation:



[Generac Guardian Series 5875 - 20kW Smart Circuit Standby Generator System](#) current price \$4497 + \$50 lift gate service (free shipping). Unless you have a raised loading dock at your house, you will need the lift gate service. Buy the required battery locally as you can get a better battery than they are offering for the \$100 they're charging. If you're in the Connecticut area, don't waste your money on the optional battery heater either. If the generator I purchased fits your power needs, be sure to get the one I linked to which comes with the transfer switch. They offer the generator without the transfer switch for \$500 less, but unless you're replacing an old generator you will need it and purchasing it separately will cost at least \$700.

Here's a link for more information and choices:

<http://www.powerequipmentdirect.com/stories/308-How-to-Pick-the-Perfect-Standby-Generator.html>

From this point it's like any construction project. You can choose to be the contractor and do the work that you're qualified for and enlist the help of qualified friends (Yes, you will need building permits for this). Or you can hire one company to do the whole project, in which case you do not want to buy the generator online. Let the company you hire provide everything so you don't miss out on any warranties. Though I did not use them for my install, for one stop shopping I recommend: <http://www.generatorsondemand.com/> in Old Lyme. They travel all over the state of Connecticut. I have not done in-depth research in this area, so there may be other equally qualified installers in your area. To find them, go to the generator manufacturer's website and search for authorized resellers/installers.

Propane:

If you don't currently use propane, and don't have access to natural gas, then I strongly recommend buying (owning) the propane tank. This will allow you to buy propane from any supplier as prices can vary greatly from one to the other. Plus, if you check the rental fee vs. purchase cost, you'll find that you've paid for the tank within 3 years. (The lifespan of a tank is 20 to 30 years.) It is illegal for a propane distributor to fill a tank that you rented from another distributor (there is a \$10,000 fine for this). In cases of emergency, the governor may overrule this law. Do not sign any commitment to buy propane from a specific dealer.

I had a 500 gallon tank installed underground so I wouldn't have to look at it. If you are not heating with propane, you will not need a 500 gallon tank. Let whoever you hire to do the propane to generator hookup determine the proper tank size for you. Even though I have a 500 gallon tank, it is considered full at 425 gallons (85%) to allow room for expansion. 85% figure applies to all tank sizes. Conversely, do not let the tank go below 20% as government regulations may require a leak test before filling. After getting several quotes from local Propane suppliers, I highly recommend [Daniels Propane](#) for hookup service and as a supplier (if they service your area).







Where to place the generator:

Each generator has its own placement requirements. Here's a link to mine:

<http://www.powerequipmentdirect.com/manuals/Install%20Guidelines.pdf>

See page 4 of the owner's manual for site preparation, here:

<http://www.powerequipmentdirect.com/manuals/Generac%20Install%20Manual%208-20kW-rev-6-29-2011.pdf>

I dug out the entire area for the generator and used pressure treated 4x4 lumber to build a frame. There are actually 2 layers of 4x4s in my frame. The first layer is underground and secured in 3 locations at each 4x4 by 4 foot long 1/2" Dia. rebar hammered flush to top of bottom 4x4 layer. The top layer of 4x4s are screwed to the bottom layer – overlapping the corners for strength. At this point you can either pour a cement slab or fill it with pea stone. I chose pea stone for its drainage ability and ease of installation. Pea stone must be tamped before placing generator. My pea stone bed is 8" deep. If you chose to pour a cement slab you will need to secure the generator to the slab to prevent it from moving due to vibration.

Where to place the propane tank:

Visit your town hall for this information, but generally they adhere to the rules specified here:

<http://www.amerigas.com/PDFs/AmeriGas-Installation-Brochure.pdf>

If you are burying a tank like I did, you will need an excavator who is experienced with this type of work as there are strict rules that must be followed (also detailed in the above brochure).



If you are assuming the role of contractor, you will need to provide the town hall with a sketch showing where you are putting the generator and propane tank. The easiest way to do this is to get a copy of your lot survey from the town hall and sketch your plan on it. You will also need to provide the town hall with the names of all the licensed contractors you are using and prices being charged. Talk to your contractors first to find out if they automatically get their own permits. If you use Daniels Propane, they always get their own permits. This doesn't mean you won't still need to get a permit for the electrician. I used <http://www.laliberteelectric.com/> from Old Saybrook, who does very nice work and is an authorized Generac installer.

Here's what everything cost me. Keep in mind that these are 2011 prices and I assumed the contractor role. You should expect to pay more if you opt for one stop shopping from a company that takes care of everything for you.

Generac Guardian Series 5875 - 20kW	\$4,365
Excavator to bury 500 Gal tank and provide pea gravel	\$1,600
Propane tank purchase (\$2,000), hookup & fill (400 Gals @ \$2.89 = \$1156)	\$4,087
Electrician: Generator/Transfer Switch Hookup	\$1,110
Electrician: Replace Meter Socket & Service Riser (**mine was very old)	\$1,050
(**you may not need your main service riser replaced)	
Pressure Treated 4x4 frame, rebar and screws	\$ 100
Permit Fees	\$ 107
Total	\$12,419