The EssentiaList

Feb 2, 2015

Bigfork's Essential Stuff Newsletter -- Bringing People Together
A Publication of the Essential Stuff Project, Bigfork, Montana

Cat's note:

The following article is by one of our members in Columbia Falls. You may remember our video slideshow about repurposing (see Gathering Summary: Repurposing & Other Innovations, September 21, 2011 (7)), and the segment on using cob to build an outdoor sauna and other projects; those photos and text were his. I want to thank him for this wonderful article.

Topics include:

1. One man's experience and learnings during super-storm Sandy;
2. Lessons learned;
3. Author's notes;
4. Sizing the generator;
5. Setting up the generator;
6. How to run your furnace, boiler or other heating units and stoves without grid-power.

18 Days of Getting-By in Aftermath of Super-Storm Sandy; and How to Prepare for Disaster or Prolonged Power Outage

By C. Win

Having had to roll out the generator to get our natural gas fired boiler back to heating the house during a blackout early this NW Montana winter, I was reminded of a conversation I had with a friend who went through a much more trying ordeal.

One man's story

This is the story told to me by my good friend, Dan who was living in New Jersey when Super Storm Sandy hit the east coast. Having lived in the area most of his life, Dan had seen quite a few power outages from ice storms and other causes. The grid was sometimes down for days throughout multiple states.

A year or two before Sandy hit, he went a week without power due to an ice storm. He took note of what he learned then and what he saw and heard of larger scale disasters such as Katrina, taking note of what items people gleaned from local stores and what they seemed to want or need from would-be rescuers and how long it took to get it.

When he traveled and had time to read he would pick up the latest disaster/end-of-the-world novel and consider the practical and possible. With that and the growing sense of our vulnerability to what seemed to be ever bigger natural disasters, and what terrorists were capable of on 9/11, just 50 miles from his home, he determined what he thought he needed to get by and for how long, without any outside help. The plan was to prepare for a one week event, while slowly growing his capability to an ultimate goal of 30 days self-sustained.

Dan's spouse (who had been out of town during the previous ice storm-caused outage) didn't think much of it and certainly didn't think it would happen again. She told him he read too many 'end of the world' novels and forbade him from spending more than 30 dollars a month on his preparations.

The budget was set then. Living in a suburban neighborhood, he casually acquired good, used camping equipment at yard sales.

- **Clean water storage**: He ordered what he refers to as a bathtub or hurricane bladder**.** It's an inexpensive thin plastic bladder that you place in your bathtub and fill with potable water just before the anticipated event. The tub provides strength and protection to the disposable bladder. These bladders come with a cheap hand operated pump to dispense the water. Most hold 50 to 80 gallons.
- **Power source**: A coworker was replacing his old generator with a newer, bigger one and gave my friend his 20 year old unit when he couldn't get it started. A little study on the internet along with the help of a how-to video on You Tube, and he determined the generator set ("genset") just needed a carburetor cleaning which he did himself; it started and ran fine.
- **Food, etc.:** Instant drink mixes and dried or freeze dried meals and snacks**,** which were storable in his unheated garage were all purchased on sale, a little at a time. Paper plates and disposable dining ware too. Washing dishes uses to much water.
- **Wood for heat:** He had a good chain saw and had acquired ample wood for the fire place by careful management of the large, over-mature trees on their property.

Most of these accumulated items were categorized and stored in separate, marked, plastic foot lockers in the garage, where it was out of the way, yet he

could lay hands on it easily and be confident it wouldn't be used for any other purpose.

- - -

The day before Storm Sandy hit he went to a large sporting goods store that was near-by to see if anything struck him as being necessary. He paused at the end of an isle that usually had countless, assorted types of batteries and flash lights. The shelves were bare. An employee passing by stopped and pointed to the shelves opposite the empty ones. They were still loaded with stoves, portable heaters and fuel for them. He said, "The day after Sandy hits, that side will be empty too, when all those people realize they can't cook a hot meal on a headlamp."

Next stop was a hardware store where my friend bought the biggest poly tarp they had, along with a mess of light rope to secure it if the expected winds tore some of the roofing off the house. He stopped by his parents house and told his mother to wash all her laundry and fill all her pots and pans with drinking water. He told her if the power was out for a week or more she would be ready. Nothing more to do but fuel the car and go home, fill the storage bladder in the bathtub and wait.

Sandy blows in.....

The winds were, in Dan's words, horrendous. "I don't know why the house wasn't torn apart". Trees were down all over the yard. The power and phone service was out. No running water, no central heating, no lights. The town went dark and quiet, and stayed that way. Somehow none of the trees had struck the house.

The new neighbors across the street had a tree down in the drive way; after the wind died down, Dan went over to see if they were all right. They had two small children at home and the car was blocked in the drive. They had no saw. Dan got his and cut the tree into manageable pieces while the man of the house moved them to the side. With a few questions, Dan learned they had no where to go, no friends or relatives in the area. They had some cases of bottled water, and some food, canned and fresh, but no way to cook. They could rough it for a few days.

Dan took a drive across town to his folks and saw at least a dozen power poles on the ground in less than a mile. From that alone he knew it was going to be a long time to get things back to normal.

Dan had fueled both cars and had 20 gallons of gas set aside for the generator which was used only a few hours in the morning and evening to operate a few lights, a microwave oven, refrigerator and a television. Heat was provided by a centrally located fire place. His wife stayed home and marveled at how well off they were compared to the countless masses on TV that had no water, lights, heat or hot food. (She later granted Dan an unlimited budget for the household's disaster preparedness program).

Dan checked in on an elderly neighbor; on finding she was doing okay other than not having a way of cooking, he gave her an easy-to-operate butane cartridge pack stove, and made sure she knew how to use it. The next night, he asked the new neighbors with the small kids over for supper and served them the first hot meal they'd had since loosing electricity. The kids were thrilled with the hot chocolate he served them. Dan sent the family home with the Coleman stove they'd used to cook the meal on along with fuel.

As the days wore on, Dan realized he hadn't accounted for the water used to flush the toilet once a day in his preparations. He kicked himself for only filling the bladder about half full, the day before the storm. He remembered thinking, "How bad could it really get?" Fuel for the genset ran low, and dirty laundry piled up. He had to make a run one-hour inland to get fuel, water and use a laundromat.

Eighteen days after Sandy struck the area, Dan's home had its utilities restored to normal. He'd learned a few things the hard way, but hadn't paid a terrible price for it. He had a new enormous supply of firewood in the downed trees in his yard and he had a few good experiences with his neighbors.

Lessons learned:

- Don't under estimate a storm.
- Don't over estimate recovery efforts.
- Completely fill the water storage bladder. It's the cheapest and most critical resource you'll need.
- Find a better water pump for the bladder. The ones they come with are okay for a few quarts at a time to meet cooking and drinking needs but if you want a large volume, it takes a long time to pump it. Flushing a toilet for example.
- Extra gear at yard sale prices for back up or loan out to others is priceless.
- A smaller generator uses less fuel.
- Dan only really needed a small 1000 or 1200 watt generator. Even though the 3000 watt was free, it required several times the fuel quantity to operate.
- If you have a water well, you will probably need a larger generator (most well pumps are 240 volt) check the volt and amp rating on the pump and the generator both.

How to Prepare for Disaster or Prolonged Power Outage

Author's notes

1. I am not an electrician, Just a “do it your selfer” who has learned from many others
2. Well pumps can be wired to plug into a generator in a similar fashion as the method described below for furnace/boilers. Just make sure the pump control system is included in the circuit.
3. Personal experience has proven to me that most forced air-furnaces and boilers that run on natural gas, propane or home heating oil, can usually be run without grid power on a small fuel-sipping 1000 watt generator. These will provide more than enough 120V electricity for this use. If you want to use your generator to provide power for other appliances as well, see Sizing a Generator, below.
4. If your heat source has a 240 volt supply wire to it, you will need to look for a generator rated for 240V. These are usually several times larger units, say 3000 to 5000 watt and larger….and they are **fuel hogs** that are best used for large loads with **very limited run times!**!!
5. Determine if your heating unit has 120V or 240V electric supply: Go to your **breaker box** and find the breaker for your unit (they are often labeled). Breakers can either take up one or two numbered spaces in your box. One space indicates 120 volts, and two spaces indicate 240V. Some 240V breakers have a DOUBLE-WIDE SWITCH on the DOUBLE-SIZE BLOCK; other 240V breakers have a SINGLE-WIDE SWITCH on the DOUBLE-SIZE BLOCK.
6. If you have a **fuse box** (instead of a breaker box), it will be more difficult to determine the voltage of the supply to your gas unit. Look on your furnace (a flashlight will be helpful) for a data-plate to see if it lists the volts and amps required for operation; or if you still have the installation instructions that came with the unit, that information should be there. Or you can search online by make and model of the unit, for the voltage information.

Sizing the generator

First determine which appliances you want to run on the generator, keeping in mind that you should only include those that are essential, as the higher the load, the larger the generator needed, and the more fuel required to run it. For example, you may wish to include:

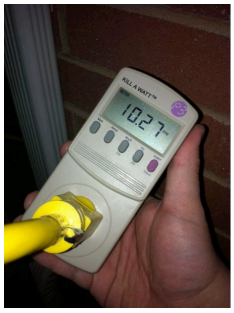
- Gas-fueled boiler/furnace with electric ignition, blower, etc.;
- Well pump;
- Gas range with electric ignition;
- Refrigerator;
- Freezer.

You may also want enough extra power to run a few light bulbs, etc., without working the genset too hard.

Next determine the power (wattage) requirements for each of those appliances, either from:

- their volt and amp ratings found on their data plates or owners' manuals (watts = amps x volts), or
- watt tables and calculators available on the web. For example, the Generator Sizing Guide (2) has tables of watt and amp ratings for common household appliances; Diesel Service & Supply (3) offers three helpful websites: Sizing a Generator (3) provides guidance on what data is needed; Power Consumption Chart (3) provides tables of data by appliance; and Electrical Power Calculators (3) provides calculators to determine wattage from the data.

You may also find the **Kill A Watt tool** useful in this task; See Wikipedia (5) for more, and a larger version of the photo, right. This tool is available on Amazon, and at most national do-it-yourself chains.



Once you have the wattage info for each appliance, add them together to determine the total load.

Setting up the generator

A generator should always be used outdoors. Store it where you don't have to carry it far. If you want to put it on a cart, it needs to be very sturdy and have solid wheels that will not deflate. You can repurpose an old lawn mower with a dead engine. Discard the engine and mount a small generator where the engine was. A little wood deck might be mounted first to set the generator on. Strap it or bolt it down.

Limit the cord length - no longer than you need for this purpose (from the generator to the house). Its wire size should be fairly large, at least 12 gauge (the smaller the gauge, the bigger the wire; most cords are 14 gauge, which is too small - not good for long runs or maximum loads).

In the average home, all that need be done is to have a set of standard 3-prong, 120 volt-rated male/female replacement cord ends inserted into the 120V supply wire that provides the electricity to the heater or other appliance (if it doesn't already have a plug). This should probably be done by a licensed person.

Make sure the male plug is on the end closest to the furnace.

Wiring options:

1. **Run the generator cord through a window** for the simplest installation, then plug the cord from the furnace/boiler into the cord from the generator, so that the plugs are inside the house.
2. **Install a dedicated emergency line** (from the appliance) by putting the cord through the wall. I would recommend just leaving a few inches of the **male (plug) end outside the house** (this could actually be an exterior outlet box containing a recessed male plug, as in photo, right, from vetco.net (6)); the other end should be run to within easy reach of the NEW furnace/ boiler plugs and marked or tagged so it's right there when you need it. Remember to keep the length of the interior cords to a minimum as well; cut off any excess and attach a new plug to the cut end.

   You could do the this with regular 12/2 house wire purchased by the foot at a building supply store, along with a weather proof exterior outlet. If you have to, use staples to attach the wire to a wall or ceiling to keep it out of the way. If a licensed person is doing it, they may insist on the wire being inside a wall or inside a conduit to protect it from abuse, kids or pets.
3. **Install a "transfer switch" device,** which allows you to switch your critical circuits (such as your furnace/boiler, refrigerator, etc.) from the grid to your generator during an emergency, then back to the grid when the emergency is over. One advantage of this method is that it prevents dangerous "backfeeding" onto the grid. However, this option is fairly expensive, for the equipment and labor to install. See *Your Guide to Transfer Switches; How to Connect your Generator to Home Wiring* (1) for more information. See Lowes.com (4) to get an idea of the different units and their cost.

How to run your furnace, boiler, other heating units and stoves without grid-power

In addition to the following heating appliances, you want enough extra power to run a few light bulbs, etc., without working the genset too hard.

Boiler unit:

HOW IT WORKS: When the new cord ends are connected together you, have a normal circuit tied to your normal power source. When you unplug them, the furnace with the exception of the fuel source is just an unpowered appliance like any other, (think refrigerator, washing machine, etc., except it may have a fuel source); the wire coming from it has the male plug on it just like them. To use it just plug it into the extension cord you have run to your generator.

- If you have an older unit, it probably has a pilot light.* YOU MAY HAVE TO RELIGHT THE PILOT LIGHT IF YOU HAVE AN OLDER HEATER.
- Electronic igniters have replaced pilot lights on most newer heating appliances and work automatically when electricity is supplied.
- Some heating units with pilot lights can be retrofitted with electric ignitors, generally saving you about 2 to 5 dollars a month in gas consumption your pilot used to burn.

Residential boilers heat water which is pumped around the house to warm it; the boiler needs electricity for the small electric pump, the thermostat on the wall and any zone valves which open and close to allow heated water to go only where a thermostat calls for it. You might have 2 or more zone valves. It doesn't matter though, because all of these are powered by the same wire going to the furnace and the combined electric load can easily be met by these small, quiet fuel-sipping generators.

You should have enough extra power to run a few light bulbs, etc. without working the genset too hard. Worst case: a safety breaker on the genset will switch off the electric flow so the generator is not worked to death. Switch off a few of the less critical appliances, reset the breaker on the genset, restart it if necessary and try again.

YOU ONLY NEED TO RUN POWER TO THE HEATER UNTIL THE HOUSE IS WARM. Then you can unplug the heater or turn the thermostat down low and use the generator to run a microwave or other appliance for a while or just shut it off to save gas until the temperature is annoyingly low again.

Forced-air heaters

These need 120V for the air blower and the thermostat. A 1000 watt genset can handle these if the blower is 120V. IF THE BLOWER MOTOR IS 240V you will generally need a bigger generator as the small ones (1000 to 2000 watt) usually only produce 120V electricity. See: Author's notes, above, for how to determine if your unit has a 120V or 240V supply.

Natural gas heating units and kitchen ranges

Natural gas supply failure around here is very rare and I think has never been associated with a weather event. So you may only need a small genset rather than a secondary heat source, like a wood stove. I like both.

Most modern gas ranges have electronic ignition rather than a pilot light. Some can still be lit with a match; others will require electric power.

Electric heat (baseboard, etc.)

If you only have electric heat, you're going to have big problems with an extended power failure in winter weather unless you have a huge generator and lots of fuel.

Stoves that don't require electricity

White gas fueled stoves

Camp and back-pack stoves that use white gas, a.k.a. Coleman Fuel, can be problematic with fuel spills, gummed up fuel valves and pumps, etc. Fine if you're handy and willing to deal with it, if and when need be. Store them completely drained of fuel for less gum-up.

Butane cartridge stoves

These are generally lighter, smaller and very easy to use, but the fuel is more costly and usually only found at sporting goods stores.

Propane-fired stoves

These are cheap to buy, easy to use, and require a more widely-available fuel which can be stored/refilled in either

- disposable one-pound cylinders found in any hardware or sporting goods store, or
- larger, but easily portable 20 pound cylinders with an adapter hose and regulator, racked up for exchange or refill at most gas stations.

Throw in an extra line adapter and a propane lantern and you have your kitchen set.

Best wishes!
CW

References

1. smps.us: Your Guide to Transfer Switches; How to Connect your Generator to Home Wiring (smps.us/transferswitch.html)
2. Generator Sizing Guide (pdf): eaton.com/ecm/groups/public/@pub/@electrical/documents/content/td00405018e.pdf
3. Sizing a Generator: dieselserviceandsupply.com/Sizing_A_Generator.aspx
4. Lowe's transfer switches: lowes.com/Electrical/Generators/Generator-Transfer-Switch-Kits/_/N-1z0x2n6/pl#
5. Wikipedia on Kill A Watt: en.wikipedia.org/wiki/Kill_A_Watt
6. Vetco.net, recessed male outlet: vetco.net/catalog/images/MID-4642-W-3.jpg and vetco.net/catalog/product_info.php?products_id=11860
7. Gathering Summary: Repurposing & Other Innovations, September 21, 2011 (essentialstuff.org/index.php/2011/09/29/Cat/gathering-summary-repurposing-and-other-innovations-092111)