



Buying Emergency Generators

Presented to the
Stamford Amateur Radio Association

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The subject is small, portable generators for emergency use

Target

Power failure in your home for up to 7 days.



Focus on essentials

You CANNOT live like you normally do

What do you need?

Furnace

Hot water heater

Sump pump (?)

Well pump (?)

Septic tank lift pump(?)

Refrigerator

A few lights at night

AM/FM radio

Cell phone charger

Computer/Internet

If you or someone in your home has a medical condition that requires electrical equipment, consult a licensed electrician!!!

Small, portable/emergency generators

\$400-\$1800

Typically under 10,000 watts

Gasoline or propane powered

Wheeled carriages

120 volt only, or 120/240 volts

- Most appliances use 120 volts AC
- Some appliances require 240 volts (e.g., furnaces, hot water heaters, sump pumps, septic equipment, water pumps)
- Be careful – make sure you get a 120/240 generator if you need both voltages



Do NOT run appliances on the wrong voltage – even for “just a little while”. You will permanently damage the appliance AND will probably cause a fire

Most ads specify “Startup” and not “Continuous” power

Output power
(a/k/a “Load”)

Amount of
power needed

Measured in WATTS
Kilowatt (KW) is 1000 watts

“Startup”
a/k/a “Peak”
a/k/a “Maximum”
a/k/a “Surge”
a/k/a “Starting”

*Maximum the
generator can deliver
for **a minute or two at
most***

Motors (e.g.,
refrigerators) take a lot
more power in the first
few seconds as they
start up

“Continuous”
a/k/a “Rated”
a/k/a “Running”
a/k/a “Steady State”

Maximum the generator
can provide for more than
a minute or two

For example, from Amazon

Listed as: 6,875 Watt 389cc OHV Portable Gas Powered Generator
Described as: Reliable 5,500-watt power supply; 6,875 surge watts

**Do NOT operate generator over “Startup” power
It WILL be damaged!!**

Keep at/below HALF LOAD if operating more than an hour or so

Half Load
1/2 of the RUNNING /
CONTINUOUS power

- 4000 watts starting/3250 continuous: 1600-1700 watts
- 8250 watts startup/7250 running: 3600-3700 watts

Not designed for the heat
generated at full
“Running” load

- **Generator likely to fail if operated above half load for more than an hour or so, especially in hot weather!!!**

Manufacturer fuel
consumption figures
based on “half load”

- Fuel consumption more than doubles at full load

Power needs for typical household items

Device	Start-Up (watts)	Running (watts)
Box Fan (20")	200	200
Clothes dryer (electric)	6750	5400
Clothes washer (electric)	1200	1200
Coffee Maker	600	600
Computer		
Laptop	100	100
Desktop	500	500
Computer Monitor		
LCD	30	30
Computer Printer	600	600
Dishwasher		
Cool Dry	540	216
Hot Dry	1200	1200
Electric Fry Pan	1500	1500
Electric Range	2100	2100
Furnace, gas or fuel oil		
1/8 HP	500	300
1/4 HP	1000	600
1/2 HP	2350	875

Watch Out for 240 VOLT EQUIPMENT!!

Device	Start-Up (watts)	Running (watts)
Garage Door Opener	1500	800
Hot Water Heater (electric)	4500	4500
Microwave		
650 watts	1000	1000
1000 watts	1500	1500
Radio	50-200	50-200
Refrigerator and Freezer	1800	600
Sump Pump		
1/3 HP	1300	800
1/2 HP	2150	1050
Television		
Tube	300	300
20" Flat	120	120
46" Flat	190	190
Toaster	1250	1250
Well Pump	1200	700
Window Air Conditioner		
5,000 BTU	1300	900
10,000 BTU	2200	1500

**Power needs vary by brand, model, and age of appliance
YOUR stuff may be better than these numbers or it may be worse than these numbers
CHECK CAREFULLY (or use a very generous estimate)**

Important to know how much power your appliances use



Kill A Watt

- Measures an appliance's power utilization
- Plug in-line with appliance

Other products

- Reliance Controls THP 103 AmWatt

Available at most hardware stores

Check your appliances BEFORE you buy your generator!!!

More powerful the generator, more gas you need

Are you going to be able to get enough gas to run the generator?

8,000 watt generator burns about 15 gallons of gas per day (*half load*)

- 6 - 2.5 gal cans per day
 - 42 - 2.5 gal cans per week
- Each 2.5 gal can weighs 15 pounds when full



One Day

It does not take much to drive up the power load

Device	Start-Up (watts)	Running (watts)
Refrigerator/Freezer	1800	600
Light Bulbs (5 x 60 watts)	300	300
Microwave, Coffee Maker, etc. (one at a time)	1200	1200
Air Conditioner (3 x 5000 BTU)	3900	2700
Stereo	200	200
Furnace (1/4 HP)	1000	600
Total	8400	5600

12 KW generator
12,000 watts peak
11,000 watts continuous

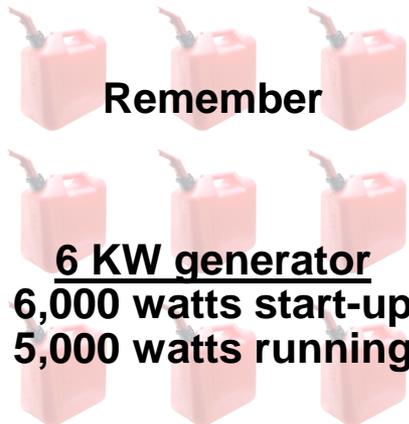
- Cost \$1500-\$1800
- 200+ pounds, 85+ decibels (VERY LOUD!!!)
- 22 gal per DAY (9 - 2.5 gal cans)
- 154 gal per week (62 - 2.5 gal cans)



One Day

Reduce the load through intelligent choices

Device	Start-Up (watts)	Running (watts)
Refrigerator/Freezer	1800	600
Light Bulbs (5 x 60 watts)	300	300
Microwave	1200	1200
Air Conditioner (3 x 5000 BTU)	3900	2700
Box Fans (4)	800	800
Stereo	200	200
Portable Radio	50	50
Furnace (1/4 HP)	1000	600
Total	3950	2350



- It IS an emergency

- Cost \$600 - \$900
- 180 pounds, 70-75 db (LOUD!!)
- 12 gal per DAY (5 - 2.5 gal cans)
- 84 gal per week (34 - 2.5 gal cans)



One Day

Control when appliances are on to further reduce generator size

Device	Running (watts)
Light Bulbs	300
Box Fans	400
Radio	50
Refrigerator OR Furnace	600
Total Running	1350

Device	Start-Up (watts)
Refrigerator	1800
-- OR --	
Furnace (1/4 HP)	1600
Special Startup	1800
Special Startup	1880
Total Running	1350
TOTAL SURGE	3230

Refrigerator

- Can be limited to 1 hour out of every 4 in summer

Furnace

- Can be off for 1 hour out of every 4 in winter

4 KW generator

4,000 watts start-up
3,250 watts running

- Cost \$400-\$600
- 78 pounds, 65 db
- 7.5 gals per DAY (3 - 2.5 gal cans)
- 52 gals per week (21 - 2.5 gal cans)



One Day

In some cases, can turn off generator for a few hours a day

Propane powered generators less common, but are available

3500 Start-Up / 3000 Running

- About 1 lb propane per hour at half load

Uses standard 20 lb tank (18 lb useable)

- 1.3 standard tanks per day
- About 9 standard tanks per week

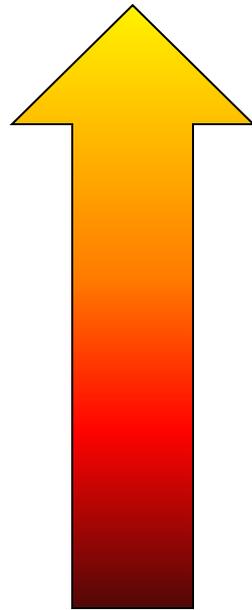
Propane storage better than gasoline

- 100 lb tanks available

Will propane be more or less available than gasoline in your area?

A few generators accept regular natural gas (the stuff used for stoves and home furnaces)

Sound level doubles every 10 db



80 db – Curbside on Busy Manhattan Street

70 db – Vacuum Cleaner

60 db – Normal Speech

50 db – Private Office

Think about what it was like trying to sleep in the aftermath of Irene or the Halloween Nor'easter with all the generators going

Do NOT feed the generator into one of your wall outlets

Called “backfeeding”

Room wiring cannot carry all the generator’s output

- **May set your house on fire!!!!**



You will forget to disconnect the master house breaker

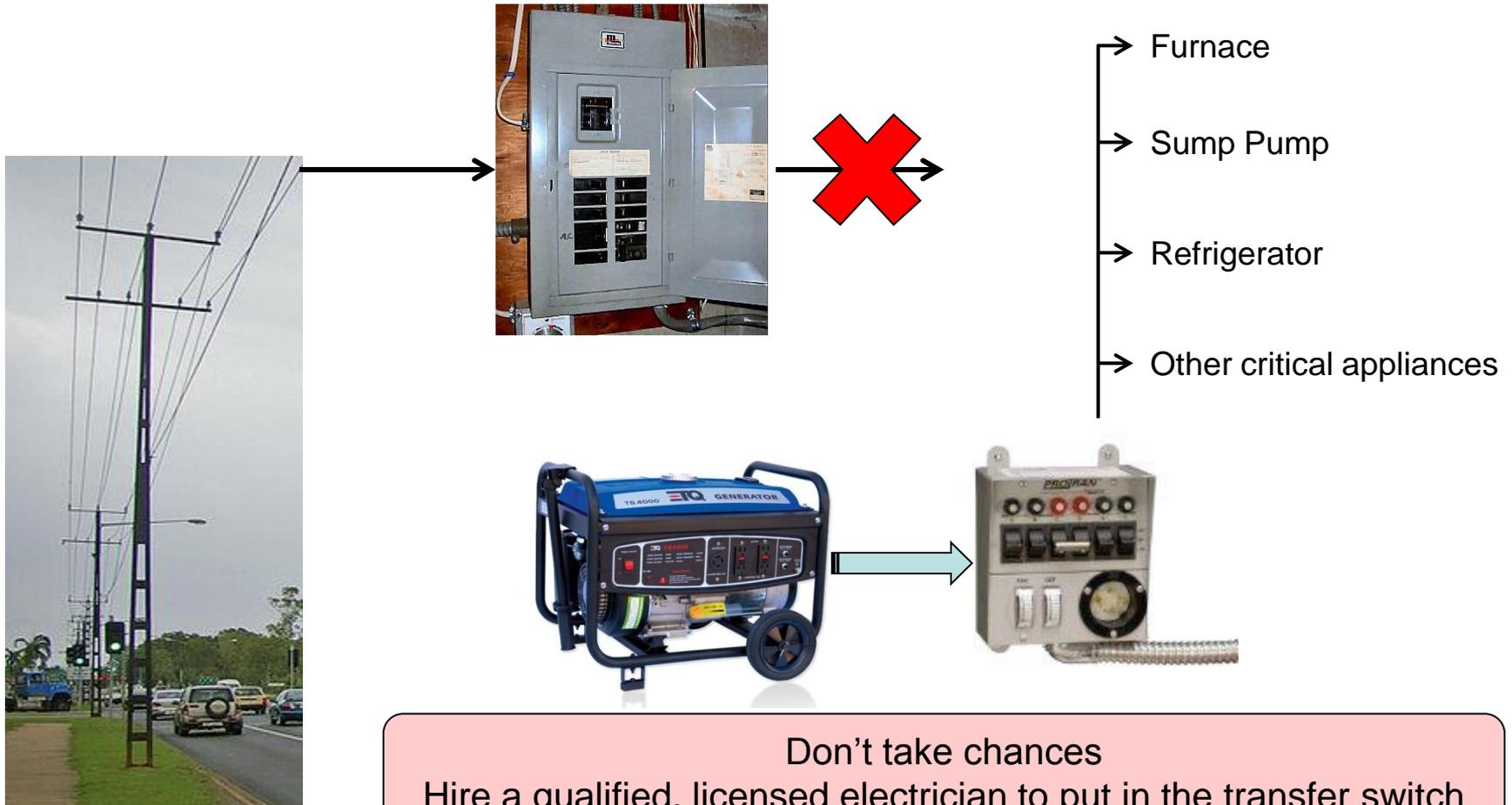
- Your power will feed back out of the house to the power grid
- **You will kill or injure a utility worker**
- Your power will go to your neighbors
 - Will love you for 20 minutes or so until your generator fails (permanently)
 - Will hate you because utility workers will not service your neighborhood due to danger you created!!!



1968 Pulitzer Prize; Rocco Morabito, Jacksonville Journal
Courtesy: Rocco Morabito

Have an electrician install a TRANSFER SWITCH

Connects generator to just those lines you need powered and disconnects those lines from the grid



Safety FIRST

Follow the manufacturer's safety/operating instructions

Generators should be grounded
-- Danger of electrocution

No smoking or flames near the generator
-- Danger of fire or explosion

Turn generator off and allow it to cool down before refilling
-- Danger of fire or explosion

Generators do NOT like rain, puddles, snow, snow drifts
-- Danger of electrocution

Do NOT operate inside house or garage
-- Danger of asphyxiation (**even with garage doors open!!!**)

Use the correct cables
-- Danger of fire



Generators and gasoline need MAINTENANCE

Gasoline *SPOILS*

- Fuel stabilizer (e.g., *Stabile*) in the gas can when you fill it
- Figure about one year storage life, even with stabilizer
- Cycle gas through lawnmower, snow blower, and CAR
- CAREFUL about gas-oil mix

Generators should be run at least *MONTHLY* (preferably *WEEKLY*)

- About 30 minutes per run
- Under load (e.g., leaf blower, hedge trimmer, spray painter, pool filter)

Change the oil

- Per manufacturer recommendation
- VERY important because you don't use it all the time!!
- VERY important because when you need it, it's an emergency

Just because it's on sale at doesn't mean it's a good deal for you

What do you need?

- Not too big, not too small
- 120 volt only, or 120 and 240 volt
- Good quality
- Good fuel consumption

How much fuel does it use?

- Most ads tell you how long the generator runs on a full tank at half load
- How big is the tank?
- Running 12 hours on a full tank is nice – but is it a 4 gallon tank or a 14 gallon tank??

Are weight or size or noise key factors for you?

Read customer reviews on Amazon, Home Depot, other retailer sites, Consumer Reports

- Look for models with a lot of reviews
- Every product will have a few bad reviews:
 - How many?
 - “Vital” problems (e.g., the crankshaft broke) vs. “annoying” problems (e.g., hard to put together)
 - How often did reviewers report “vital” problems?
 - How often did reviewers report the same “vital” problem(s)?

When a blackout hits ...

Turn off and unplug **EVERYTHING**

- Potential for damage to your utility wires when power comes back if all your appliances are still on
- You will be way at the bottom of the priority list for repair

Electric stoves and ranges will come back on when power restored

- If you are not home, there will probably be a fire
- The smoke from a food fire will do great damage
- The fire will do great damage
- The firemen will NOT be gentle in entering your house

Gas stoves and ranges will come back on (probably)

- Fire and smoke