EMERGENCY POWER OPTIONS

WAYS TO KEEP THINGS GOING WITH THE POWER IS OUT AND YOU ARE ON A **BUDGET!**



DISCLAIMERS

- These slides present a variety of ideas and options I have come across
- Many of the ideas and references come from Amateur Radio and Emergency Communications because that is what got me interested in emergency power sources for home.
- Equipment sources listed are just the ones I have looked at. It is not an exhaustive list
- I am NOT an expert
- Have a professional install any wiring or controls

GUIDELINES

- Estimate how much power your need and how often
- Choose a power source 25-50% bigger than you think because something else will come to mind later
- Think in broad terms... my current system was based on Hurricanes, but it came in handy for the winter storm of Feb 2021 too. Now I need to make a few adjustments so I can run the blower for my gas heater.

CAUTIONS

- Always have a professional install anything that connects directly to your home wiring or breaker box
- Some Solar panels and inverters can cause interference to amateur radio frequencies
- Not all generators are the same. Some create a lot of radio noise, and some do not make smooth enough power for computers...so add a UPS/power conditioner between the generator and sensitive electronic equipment (computers)

POSSIBLE SOURCES OF POWER

- Tiny loads... deep cycle battery (like for marine service or solar power)
- Small loads.... Solar panels with a battery or 2
- Bigger loads ... portable generator (gasoline or natural gas/propane)
- Whole house A bigger generator, perhaps permanent with automatic start and switch over
- Alternative power wind turbine generator

WHAT DO I USE

- Small loads or short time (like a camping trip or field day) 200 W of Solar panels with a battery or 2. This will run my radios full power all day and 3 hours after dark.
- My solar panel kit included a charge controller, 2 LED lights on long cords plus 2 USB charging ports
- Hurricane or other long term power outage... portable generator (gasoline powered). I have a special cord that will carry the full output of the generator to my tie in box. My tie in box will handle 8 circuit breakers and has a meter to show the load on each phase.

BATTERY

- If all you want to run is a fan or a portable radio, a battery will do the trick.
- A car battery will do (\$100), but can be damaged if you draw it down too much. Marine batteries (\$200) and those designed for solar panel use (\$60-\$200 depending on size) can take more abuse.
- You just have to plan on how to re-charge it. You can recharge from your car (uses gasoline) or from a small solar panel (\$20 to \$50)
- Recharging can be a nuisance if you will be needing it for a long time. About every 3 months I drain mine by driving a box fan or radio and then recharge them using a normal car battery charger.
- You will need an inverter to change the 12V DC of the battery to 110V AC. Get a good one that will do twice the power you think you need. A 100W budget unit is about \$40. I have a 400W that I snagged on sale at Harbor Freight for \$70.

SOLAR PANELS + BATTERIES

- Bigger loads , but still small, can be powered nicely by solar panels.
- I use 200W of solar panels + 2 batteries to power my radio transmitter during emergencies or camping trips. It draws about 10 watts on receive and 180W when transmitting.
- The batteries are designed for solar panel use and help smooth out the power changes from receive to transmit and give me about 3 hours of 50% power after dark.
- I have tested these batteries with a 400W inverter to drive a 22 inch box fan on half speed... using just one battery, it lasted all night and still had some power left.
- I caught them on sale....bought the panels + batteries+ charge controllers + inverter for about \$450 (HARBOUR Freight Tools)





PORTABLE GENERATOR

- Portable generators are available from 500W to 10KW (10,000W). They are available from Northern Tools, Harbor Freight tools, Lowes, Home Depot, Amazon. Good Brands I am familiar with include Honda, Champion, Briggs and Stratton
- They can be fueled by gasoline, propane or natural gas
 - Some can use multiple fuel types
 - Maintenance includes changing oil and air filter
- I had one that was rated 5KW (\$400), was on wheels, ran almost half my home including a small window unit A/C. It ran for 10 hours on 5 gallons of gasoline. I just ran extra heavy gauge extension cords through windows to the appliances & lights
- Now I have one that is rated for 8KW (\$800) and a special cord (\$75) and connector box (\$600) that allows me to tie directly to the house power for some circuits. It will drive my radios, half the house, a window unit A/C, Refrigerator, freezer and have some power to spare. Runs about 6 hours on 5 gallons of gasoline.







WHOLE HOUSE GENERATOR

- A whole house generator is sized to run everything, including the central air.
- In the Houston area they will range from 18KW to 24KW and have an automatic start control and special house tie in system.
- Typically run on natural gas
- This requires professional installation.
- \$8000 to \$15000 installed depending on the size of the unit.

WIND TURBINE GENERATORS

- Wind turbine generators are available that only need 10mph of wind to charge a battery.
- I believe they typically need to be above the level of local buildings to work effectively
- I am not familiar with these systems, but some information on the web at
 - Reviews and information
 - https://www.semprius.com/wind-turbine-generator/
 - Home Depot 400W to 2000W
 - NORTHERN TOOLS 2000w

HANDY REFERENCES

- Emergency Power for Emergency Communications \$25
 - http://www.arrl.org/shop/Emergency-Power-for-Radio-Communications/
- Energy Choices for the Radio Amateur \$30
 - <u>http://www.arrl.org/shop/Energy-Choices-for-the-Radio-Amateur/</u>
- Emergency Generator Buyer's Guide (on-line article)
 - <u>https://www.electricgeneratorsdirect.com/stories/34-How-to-Pick-the-Perfect-</u> Portable-Emergency-<u>Generator.html#:~:text=%20How%20to%20Pick%20the%20Perfect%20Portable%2</u> <u>OEmergency, instead%20of%20 just%20 survive,%20 consider%20 a...%20 More</u>

- Power sources are rated in watts or kilowatts (1000s watts)
- Decide between essential only or something with a little more comfort
 - Are you ok with a fan in warm weather or do you need an air conditioner
 - Can you isolate a room or two in your home or is it open concept
- Add up the power needed for everything you want to run
- Most appliances are rated at the MAXIMUM power they will consume. Average power may be only 1/3 of the value shown. (Air conditioners and refrigerators only run about 30% of the time.) But you have to plan on the maximum or plan to swap loads... run either the dishwasher OR the washing machine...not both at the same time.

- Typical power required (your appliance may be different):
- https://letsavelectricity.com/wattage-power-consumption-ofhousehold-appliances/
 - Refrigerator 250W
 - Freezer 400W
 - Electric oven 2200W
 - Electric stove 2000W
 - Dishwasher 1500W
 - Garbage disposal
 - Microwave oven (1100Watt) 1550W

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- Typical power required:
 - Each incandescent bulb for house lights 60W to 100W
 - Portable heater 1500W
 - Electric blanket 150 to 250W
 - Window a/c unit 1500 to 3000W
 - Central air 4000 to 7000W
 - Central heat gas (fan) 800W (1400W for 2 seconds at startup)
 - Central heat electric ???
 - 22 inch Box fan; high speed 90W
 - Water heater electric 3500W
 - Water heater gas 0 (no electricity needed)

- Typical power required:
 - Clothes washer 500 to 2200W
 - Clothes dryer gas 2000W
 - Clothes dryer electric 5000W
 - Ceiling fan (without lights) 80W
 - Big TV 100W
 - Desktop computer 400W
 - Game console 150 to 400W
 - Computer printer 30W
 - Hair blow dryer 1000 to 3000W

