THE BLACKOUT BINDER

Printable worksheets, logs and checklists for
The Blackout Ladder by Curtis Brannock

Print it, punch it, put it in a ring binder, and keep it with your Night Kit.

For general education only. Follow your equipment makers' instructions, local codes and your utility. Work inside an electrical panel or on house wiring belongs to a licensed electrician.

How to Use This Binder

1. Fill in the Home and Family pages first. Contacts, medical needs, breaker map. These are the pages you'll need in the dark.

2. Measure your loads with a plug-in watt meter and fill in the Energy Audit pages. Then fill in the One-Page Plan.

3. Print extra copies of the logs (outage, battery, generator, maintenance). Use one line every few hours during an outage.

4. Keep the binder with your Night Kit, and put a copy of the Emergency Shutdown sign next to your battery station.

5. Review it every season using the maintenance calendar in Chapter 15 of the book.

Household Contacts

Fill in now, while the lights are on.

Who	Name	Phone	Notes

Utility and Emergency Numbers

Service	Number / website	Account or reference no.

Ideas: electric utility outage line, gas utility, water, internet, electrician, plumber, propane supplier, well contractor, insurance, doctor, pharmacy, neighbors, local emergency management, warming/cooling centers.

Medical Devices and Medicines

List anything that needs power or cold storage. Ask your doctor or supplier for a backup plan.

Person	Device or medicine	Watts / storage temp	Hours per day	Backup plan

[ ] Utility told about medical needs (medical baseline / priority list) [ ] Doctor asked about a non-electric backup

Breaker Map — Panel Page 1

Turn off one breaker at a time and note what goes dark. Mark the circuits you want backed up with a star.

No.	Amps	What it powers	Backup?	No.	Amps	What it powers	Backup?

Breaker Map — Panel Page 2

Turn off one breaker at a time and note what goes dark. Mark the circuits you want backed up with a star.

No.	Amps	What it powers	Backup?	No.	Amps	What it powers	Backup?

Family Blackout Plan

Who checks on whom first:

_____

_____

Where the flashlights and headlamps live:

_____

_____

Where the Night Kit and power station live:

_____

_____

Who starts the backup / generator:

_____

_____

Order to plug things in (medical device first):

_____

_____

Which room we gather in for heat or cool:

_____

_____

Where we go if the house is unsafe (warming/cooling center, family):

_____

_____

Pets and their needs:

_____

_____

Who checks on elderly neighbors:

_____

_____

Home Energy Audit — Sheet 1

Measure each item for 24 hours (one night for a CPAP).

Item	Group A/B/C	Running W	Starting W	Hours/day	Wh/day

Home Energy Audit — Sheet 2

Measure each item for 24 hours (one night for a CPAP).

Item	Group A/B/C	Running W	Starting W	Hours/day	Wh/day

Home Energy Audit — Sheet 3

Measure each item for 24 hours (one night for a CPAP).

Item	Group A/B/C	Running W	Starting W	Hours/day	Wh/day

My Blackout Plan on One Page

Work down the list in order. Never skip a step.

Step	Formula	My answer
1. Daily Wh	from the audit	
2. Battery Wh	daily Wh × days ÷ 0.85 ÷ 0.80	
3. System voltage	12 / 24 / 48 V from inverter size	
4. Inverter continuous	running W × 1.25	
5. Inverter surge	biggest surge + running W	
6. Solar watts	daily Wh ÷ (winter sun hours × 0.75)	
7. Controller amps	solar W ÷ battery V	
8. Controller volts	string Voc × 1.25	
9. Main fuse	from battery and inverter manuals	
10. Budget	1, 2 or 3 (Chapter 4)	

Shopping List — Step 1 — The Night Kit

Tick each item as you buy it. Compare every item with your one-page plan.

Done	Item	What to check
☐	Portable power station, LiFePO4	Wh fits your plan; pure sine wave; continuous and surge ratings cover the fridge
☐	Plug-in watt meter	Shows watts and kWh
☐	Heavy-duty extension cords, 12 or 14 gauge, outdoor rated	One per big load, labelled
☐	Power strip with a switch	For router, modem and chargers
☐	Fridge and freezer thermometers	Easy to read at a glance
☐	LED lanterns and headlamps	One per person, plus spares
☐	Spare batteries for lights and alarms	Matching sizes
☐	Battery or hand-crank radio	For news when phones fail
☐	Battery-powered carbon monoxide alarms	One per level of the home
☐	DC cord for the CPAP, if the maker offers one	Maker-approved only
☐	Masking tape and a marker	For labels

Shopping List — Step 2 — The Sun Charger

Tick each item as you buy it. Compare every item with your one-page plan.

Done	Item	What to check
☐	Folding or rigid solar panels	Total watts within the station’s solar maximum
☐	Series or parallel adapter cables	Voltage plus 25% stays below the station’s limit
☐	Solar extension cable	Lets the station stay indoors
☐	Correct connector adapter for your station	Polarity checked with a meter
☐	Stakes, sandbags or straps	To hold panels in wind
☐	Compass or phone compass app	To face panels south

Shopping List — Step 3 — The Rolling Blackout Station

Tick each item as you buy it. Compare every item with your one-page plan.

Done	Item	What to check
☐	24 V LiFePO4 battery (or matched pair)	Low-temperature charge protection; BMS current rating
☐	Class T main fuse and holder	Size from battery and inverter manuals
☐	Battery disconnect switch	DC rated for system current
☐	Positive and negative bus bars with covers	Current rating
☐	24 V pure sine wave inverter with built-in outlets	Continuous and surge ratings
☐	MPPT charge controller	Amps and maximum input volts
☐	Branch fuses or DC breakers for controller and charger	Sized for each wire
☐	PV disconnect or DC breaker	Rated for panel voltage and current
☐	24 V LiFePO4 AC charger	Charge voltage matches the battery
☐	Shunt-type battery monitor	Current rating
☐	Cables: main, controller, charger, PV	Gauge from the tables below and the manuals
☐	Tinned ring terminals, heat-shrink	Correct gauge and stud size
☐	Hydraulic crimper, heat gun, cable cutter	Rated for your largest cable
☐	Insulated tools, multimeter, safety glasses	
☐	Cart rated 300 lb or more, plywood board, straps	
☐	ABC fire extinguisher, smoke alarm	

Shopping List — Step 4 — The Safe House Connection

Tick each item as you buy it. Compare every item with your one-page plan.

Done	Item	Who chooses it
☐	Written Must-Keep-On List and backup manuals	You
☐	Two or three written quotes	You
☐	Inlet box, cable and breaker	Electrician
☐	Interlock kit listed for your panel, or manual transfer switch	Electrician, with you
☐	Inlet cord matched to your backup	Electrician
☐	Permit and inspection	Electrician
☐	Laminated switch-over routine	You
☐	Call to your insurer	You

Shopping List — Step 5 — The Full Solar Backup System

Tick each item as you buy it. Compare every item with your one-page plan.

Done	Item	Who chooses it
☐	Critical-loads list with measured numbers	You
☐	Three written quotes showing blackout performance in summer and winter	You
☐	Hybrid inverter, split-phase if you need 240 V	Installer, with you
☐	Home battery, compatible with the inverter	Installer, with you
☐	Fixed array, roof or ground mount	Installer, with you
☐	Critical-loads panel and transfer equipment	Installer and electrician
☐	Generator input and auto-start, if wanted	Installer
☐	Permits, utility approval, inspections	Installer
☐	Warranty papers, monitoring app login	You keep them

The First Hour of a Blackout

Read the full routine in Chapter 11. The Audio Coach reads it aloud.

	Flashlights on, everyone checked
	Outage reported to the utility
	Big appliances and electronics switched off
	One lamp left on to signal power’s return
	Fridge and freezer closed, sign on the door
	Backup started, medical device first
	Generator outdoors only, CO alarms tested
	Water stored if the well pump is down
	Family gathered into fewer rooms for heat or cool
	Battery level written on the outage log
	Night plan decided

Before the Storm: 48-Hour Checklist

	Charge every power station, battery station, phone, laptop and power bank to 100 percent
	Test the generator, if you have one, and store fuel safely outdoors or in a detached shed
	Fill clean containers with drinking water: about 1 gallon per person per day, for several days
	Freeze plastic jugs of water to fill empty freezer space; they keep food cold longer
	Turn the fridge and freezer to their coldest settings a day ahead
	Refill prescriptions and check medical supplies
	Check flashlights, headlamps, batteries and a battery or hand-crank radio
	Bring in or tie down outdoor furniture and folding panels
	Make sure your car has fuel and get some cash, in case card machines are down
	Print or download your switch-over routine and family plan
	Check on elderly or vulnerable neighbors and share your plan

Switch-Over Routine (Inlet + Interlock)

Have your electrician confirm this routine for your exact setup, then tape a copy inside the panel door.

Switching to backup

	Turn off big loads you won't back up: AC, water heater, dryer, range.
	Turn the MAIN breaker OFF.
	Slide the interlock plate.
	Connect the cord to the backup and the inlet; start the backup.
	Turn the BACKUP breaker ON.
	Turn on critical circuits one at a time, most important first.
	Watch the backup's display; stay within its continuous rating.

Switching back to the grid

	Turn off the critical circuits.
	Turn the BACKUP breaker OFF.
	Slide the interlock back.
	Turn the MAIN breaker ON.
	Turn off the backup, then unplug the cord.
	Turn your circuits back on as normal.

My Backed-Up Circuits

Order	Breaker no.	Circuit	Running W	120 / 240 V

Food Safety in an Outage

Based on USDA food safety guidance. When in doubt, throw it out. Never taste food to decide.

Situation	Guideline
Closed refrigerator, no power	Keeps food safe about 4 hours
Full freezer, door closed	Holds temperature about 48 hours
Half-full freezer, door closed	Holds temperature about 24 hours
Fridge temperature	40 °F or below is safe
Frozen food with ice crystals or at 40 °F or below	Can usually be refrozen
Perishable food above 40 °F for over 2 hours	Throw it out

Temperature checks

Date / time	Fridge °F	Freezer °F	Action

Outage Log — Page 1

Date / time	Battery %	Solar / generator	Running	Notes

Outage Log — Page 2

Date / time	Battery %	Solar / generator	Running	Notes

Outage Log — Page 3

Date / time	Battery %	Solar / generator	Running	Notes

Outage Log — Page 4

Date / time	Battery %	Solar / generator	Running	Notes

Battery Log — Page 1

Record resting voltage and state of charge once a month and after every outage.

Date	Voltage at rest	Monitor %	Temperature	Notes

Battery Log — Page 2

Record resting voltage and state of charge once a month and after every outage.

Date	Voltage at rest	Monitor %	Temperature	Notes

Battery Log — Page 3

Record resting voltage and state of charge once a month and after every outage.

Date	Voltage at rest	Monitor %	Temperature	Notes

Generator Log — Page 1

Run it under load for 20-30 minutes every month or two. Outdoors only.

Date	Hours run	Fuel added	Oil checked	Notes

Generator Log — Page 2

Run it under load for 20-30 minutes every month or two. Outdoors only.

Date	Hours run	Fuel added	Oil checked	Notes

Maintenance Log — Page 1

Date	What I checked	Found / fixed	Initials

Maintenance Log — Page 2

Date	What I checked	Found / fixed	Initials

Maintenance Log — Page 3

Date	What I checked	Found / fixed	Initials

Equipment Record

Model and serial numbers help warranty claims, insurance and any professional who works on your system.

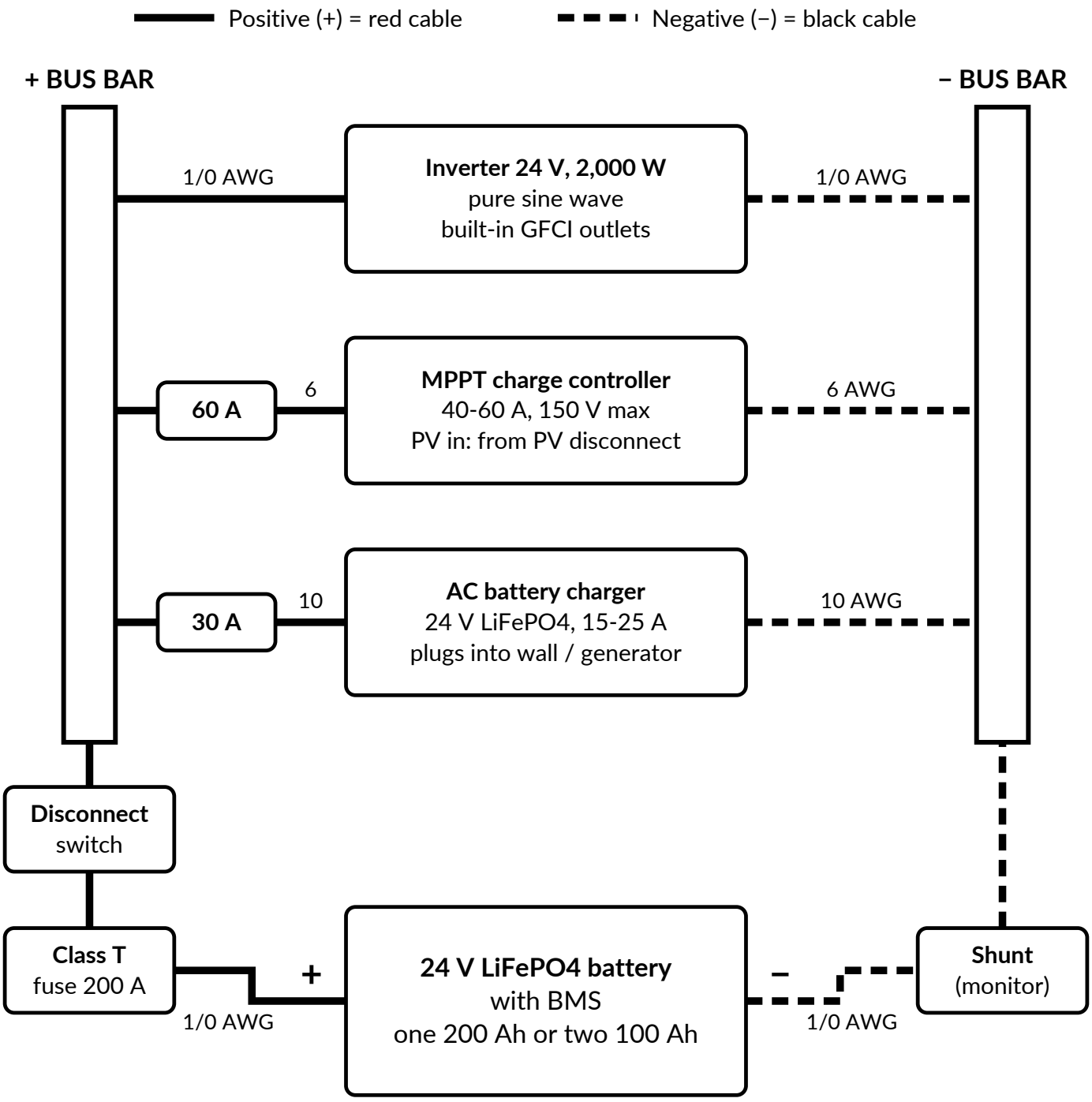
Item	Model	Serial no.	Bought (date / where)	Warranty

Formula Card

What you want	Formula
Power	Watts = Volts × Amps
Energy	Watt-hours = Watts × Hours
Battery size	Daily Wh × days ÷ 0.85 ÷ 0.80
Inverter size	Running watts × 1.25, and check the surge
Solar size	Daily Wh ÷ (winter peak sun hours × 0.75)
Controller amps	Solar watts ÷ battery volts
Controller volts	Panel Voc in series × 1.25 must stay below the maximum

Rolling Blackout Station — Wiring Reference

Solid = positive (+, red). Dashed = negative (−, black). Your manuals come first.



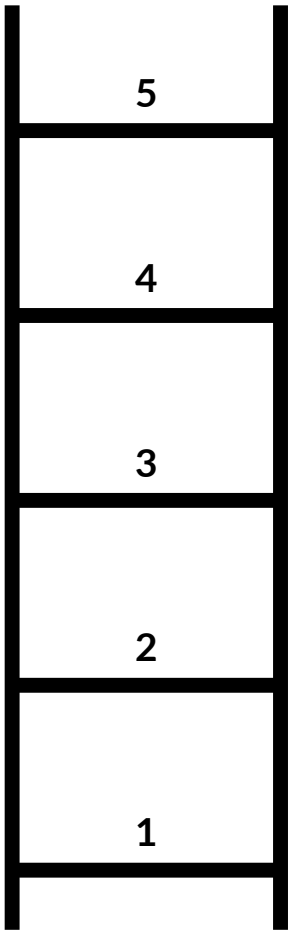
EMERGENCY SHUTDOWN

1. Turn the inverter OFF.
2. Turn the battery disconnect OFF.
3. Turn the PV (solar) disconnect OFF.

If there is smoke, fire or a swelling battery:

GET OUT and CALL 911.

Diagram: The Blackout Ladder



Step 5 The Full Solar Backup System
Fixed array, home battery, critical loads

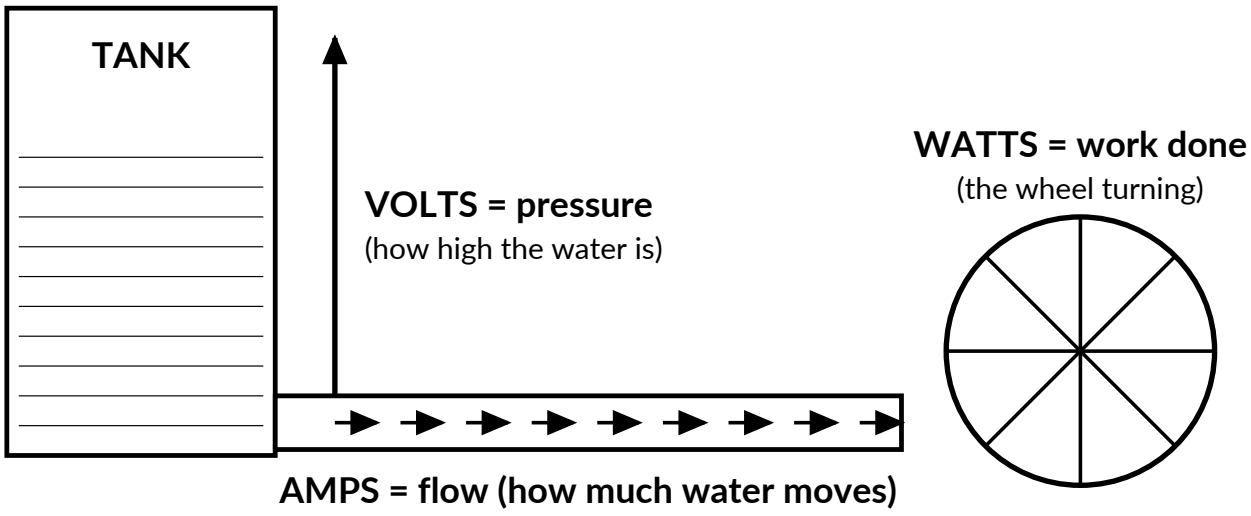
Step 4 The Safe House Connection
Inlet + interlock or transfer switch

Step 3 The Rolling Blackout Station
Your DIY battery station on a cart

Step 2 The Sun Charger
Add folding solar panels

Step 1 The Night Kit
Power station + the right cords

Diagram: Volts, Amps and Watts



Watts = Volts × Amps

Diagram: The Sizing Order

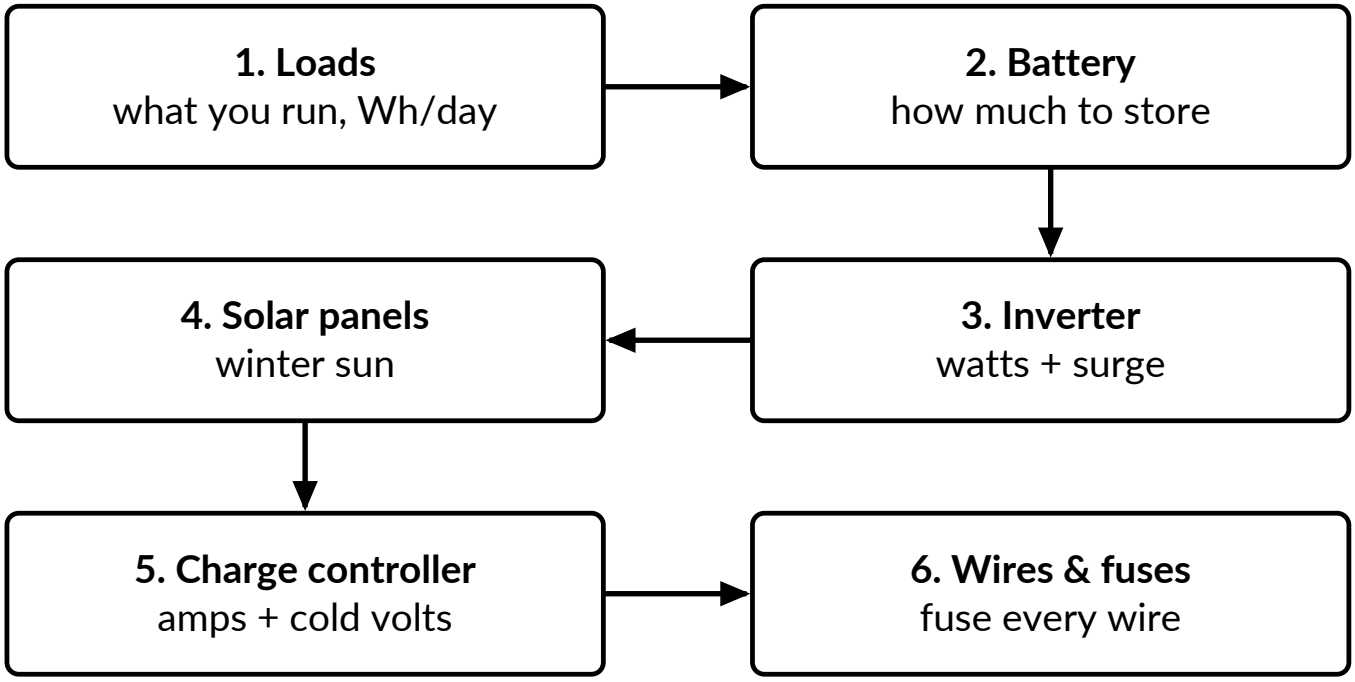


Diagram: Series and Parallel Panels

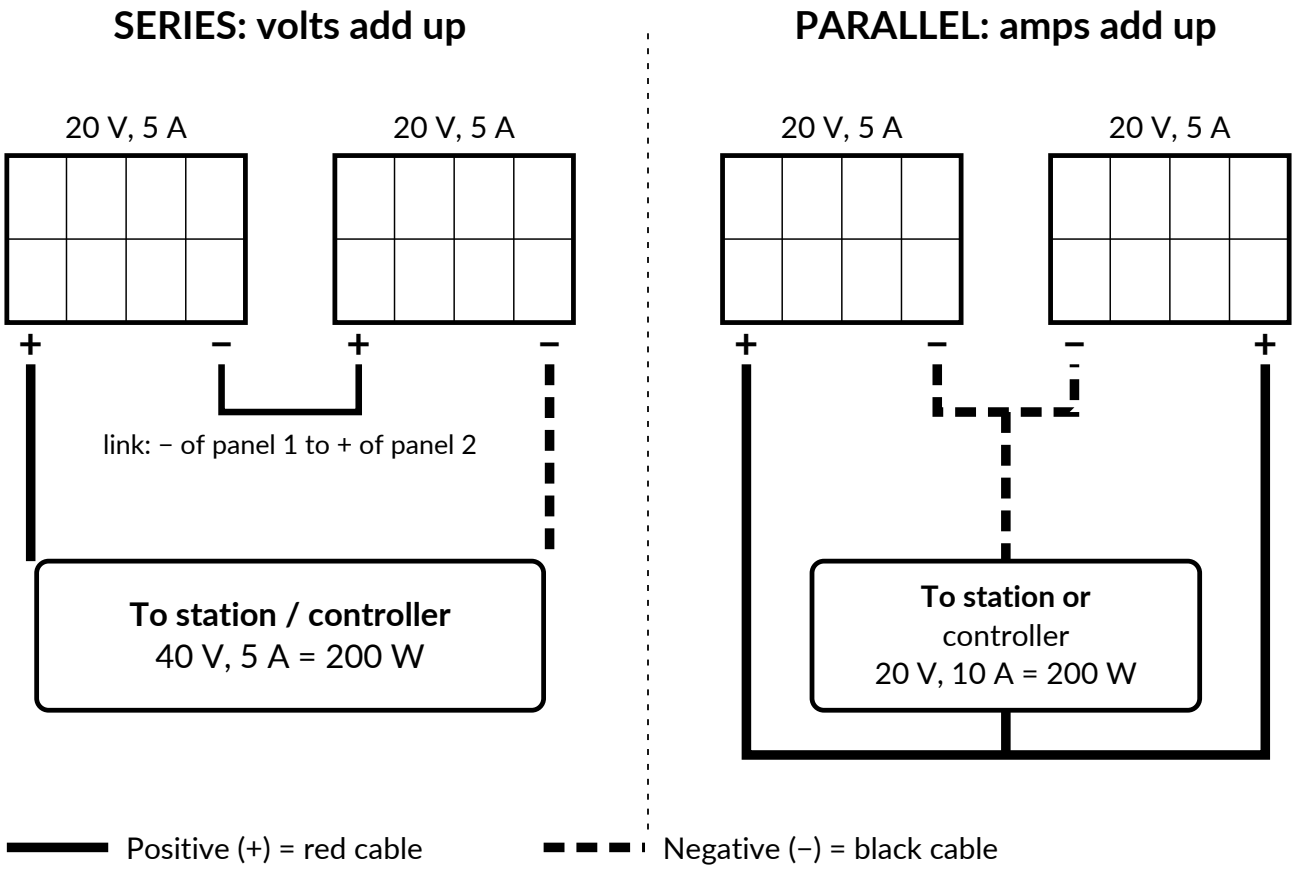


Diagram: Rolling Blackout Station

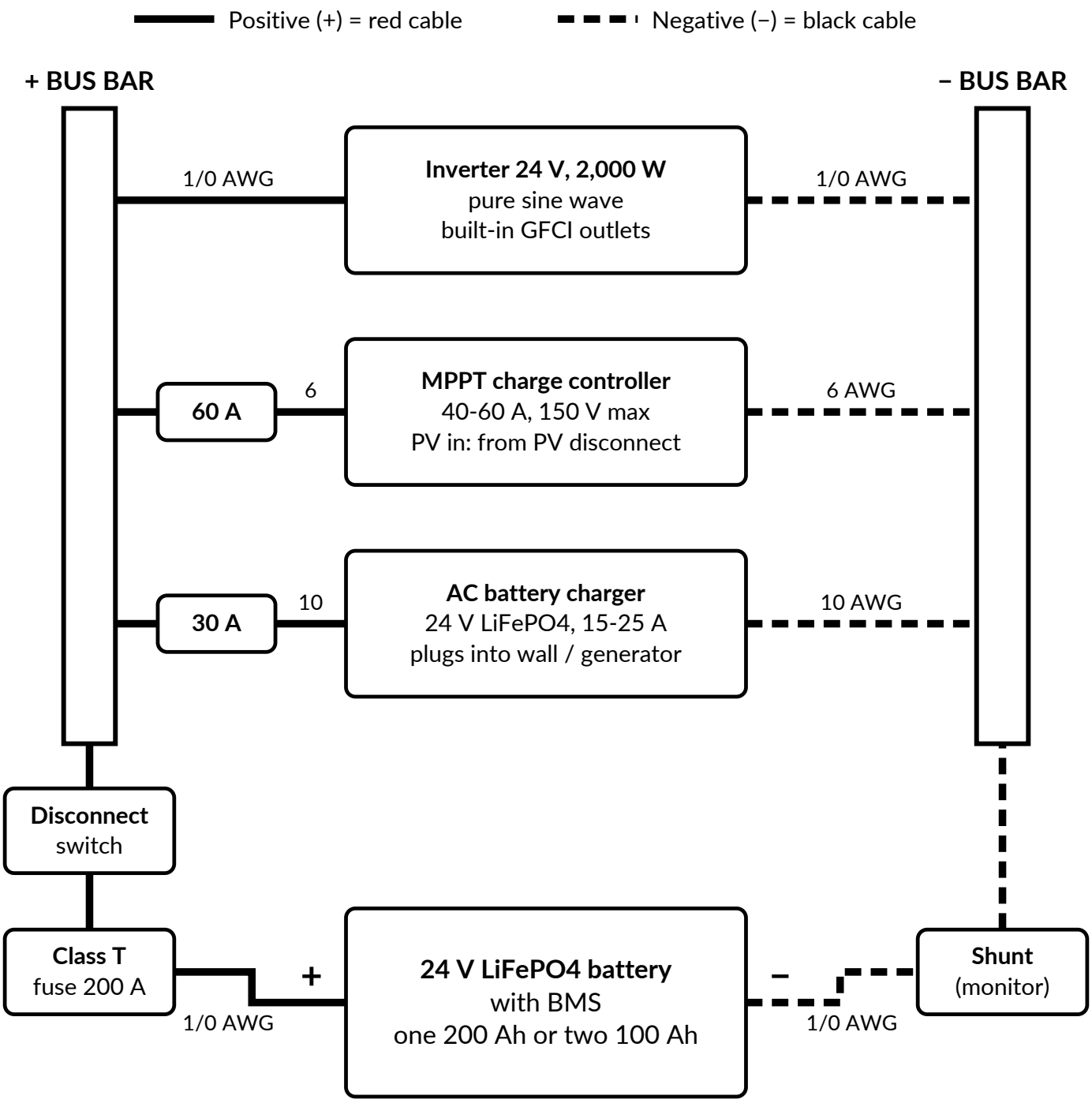


Diagram: Three Safe House Connections

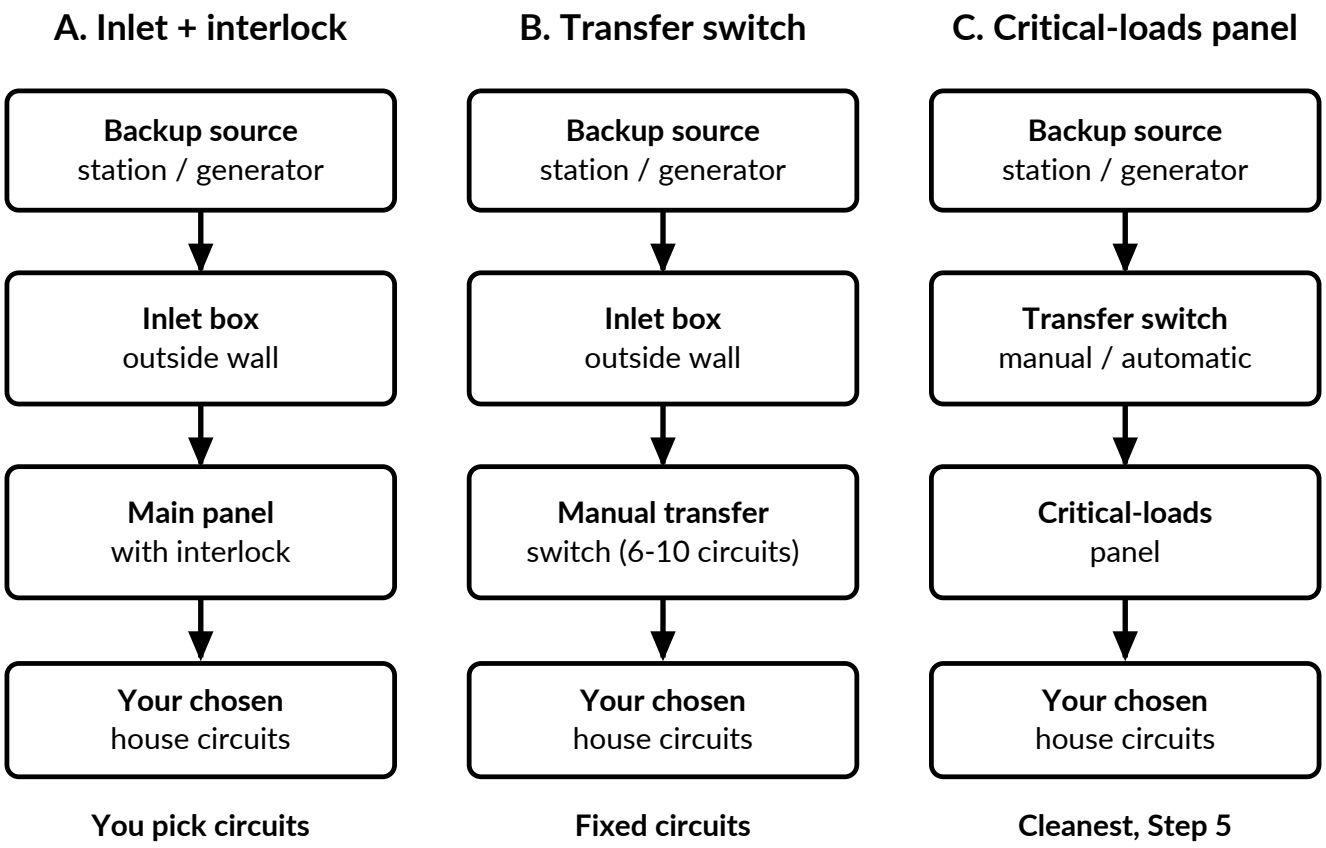
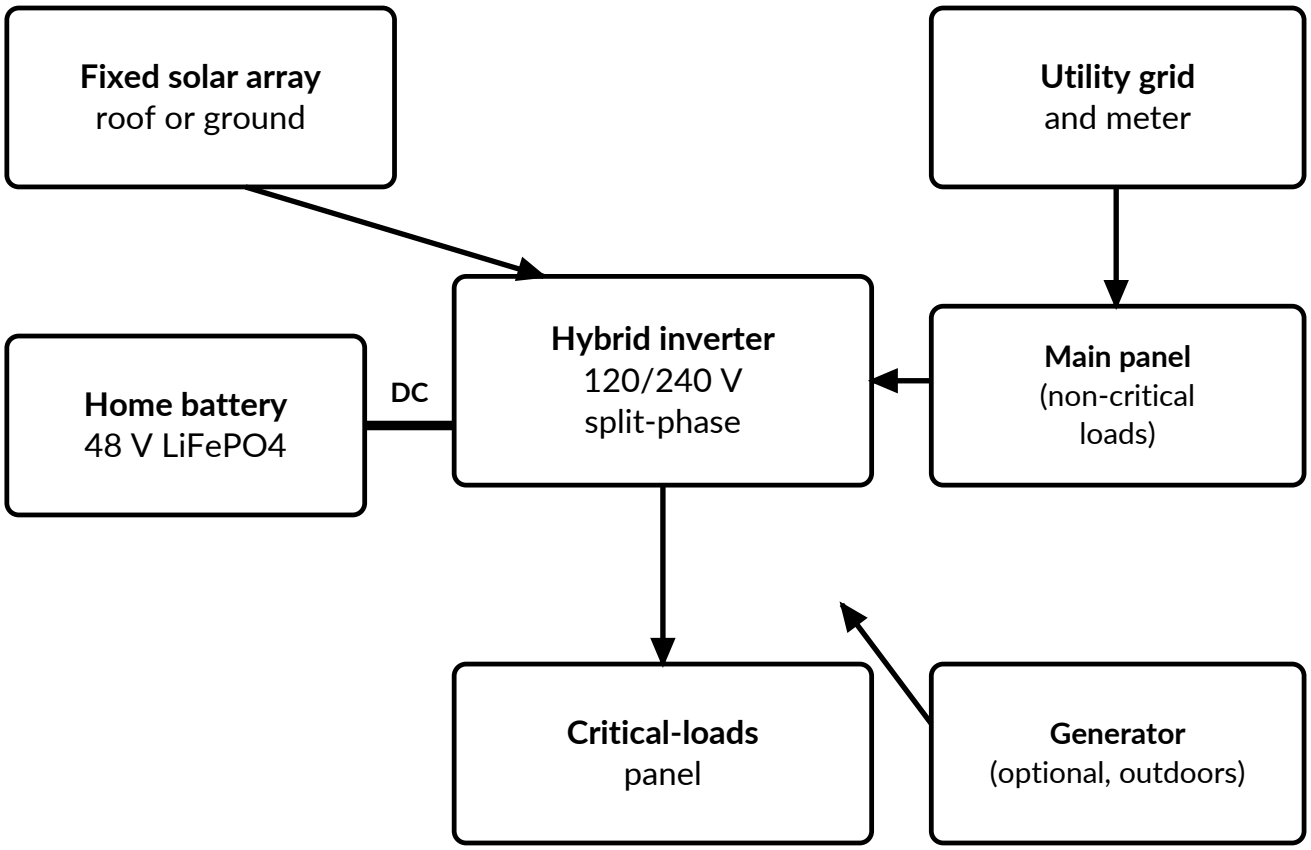


Diagram: Full Solar Backup System



In a blackout the inverter disconnects from the grid and runs the critical-loads panel.

Your Simple Maintenance Calendar

A backup system is like a fire extinguisher: you hope you won't need it, but when you do, it has to work the first time. The good news is that LiFePO4 batteries, inverters and solar panels need very little care. A few minutes a month and an hour or two each season are enough to keep your ladder ready for many years.

This chapter gives you a simple calendar. Copy the checklists into your Blackout Binder, or use the printable versions in your free bonus, and tick them off.

Every Month (about 10 minutes)

Done	Task
☐	Check the charge level of the power station and Rolling Blackout Station. Top up if needed
☐	Look at every cable and connection for damage, discoloration or corrosion
☐	Test the smoke alarm near your battery station
☐	Make sure flashlights and headlamps work
☐	Check that your cords, power strip and thermometers are still with the Night Kit
☐	On Step 5 systems, glance at the app or display for warnings

Every Season (about 1 hour)

Done	Task
☐	Charge all batteries to full before the storm season
☐	Run the "kill the main breaker" test for one to two hours
☐	Make sure batteries that must charge in winter are in a space above freezing, or have heaters
☐	Replace the furnace filter
☐	Test carbon monoxide alarms and replace their batteries
☐	Start and run the generator under load for 20-30 minutes; check oil and fuel
☐	Check that you have a soft roof rake for clearing snow from fixed panels
☐	Review the family blackout plan with everyone in the house

Done	Task
☐	Clean the panels with water and a soft brush or sponge, from the ground if they're on the roof
☐	Check that panel mounts and stands are tight
☐	Make sure inverters and chargers have clear space for cooling in the heat
☐	Check that you have tie-downs for folding panels before high winds
☐	Run the "kill the main breaker" test again
☐	Refresh stored drinking water

Every Year (about 2 hours)

Done	Task
☐	Turn off the system and check the torque on every battery, bus bar, fuse and inverter bolt
☐	Look at each crimp and heat-shrink for cracks or discoloration
☐	Update the battery monitor's settings and check its accuracy against a full charge
☐	Check firmware updates for inverters, controllers and stations, if the maker offers them
☐	Inspect all extension cords and replace any with cracks, cuts or loose plugs
☐	Check the date on the fire extinguisher, and have it serviced if needed
☐	Review your Must-Keep-On List. Did you buy a new fridge? Add a medical device? Update your plan
☐	On Step 4 and 5 systems, have the electrician or installer inspect the system if recommended
☐	Update the battery log and maintenance log in your Blackout Binder

Battery Care in Plain Words

LiFePO4 batteries are easygoing, but they do have preferences.

- **They like moderate temperatures.** Room temperature is ideal. Heat shortens their life, and they can't charge when it's freezing.
- **They don't like to sit empty.** If a battery runs very low, recharge it soon. Don't leave it empty for weeks.
- **They don't need to be "exercised" every day.** Unlike old lead-acid batteries, they don't suffer from sitting partly charged.
- **For long storage,** many makers recommend a partial charge, often around 50 to 80 percent. Check your manual. Charge to full before storm season.
- **They age slowly.** Expect a gradual loss of capacity over many years. A battery that holds 80 percent of its original capacity is still very useful.

Generator Care in Plain Words

- **Run it every month or two under load,** for 20 to 30 minutes, so it starts when you need it.
- **Use fresh fuel,** or fuel with a stabilizer, and follow the maker's storage advice. Old fuel is a common reason generators won't start.
- **Change the oil** on the maker's schedule. New generators often need an early first oil change.
- **Keep spare parts:** oil, a spark plug and an air filter.

Keeping Records

Your records tell you how your system is aging and help any professional who works on it later. Keep these in your Blackout Binder:

- The date you bought each part, with the model and serial number.
- Manuals for every device.
- Your battery log: date, charge level, and anything unusual.
- Your outage log: date, length, what ran, what ran out, what you learned.
- Your maintenance log: date and what you checked.
- Electrician and installer contact details, permit numbers and inspection dates.

The Ladder Is Never Finished

Your needs will change. Children grow up and move out. Someone starts using a CPAP. You buy a chest freezer for the garden harvest. You retire and spend winters at the cabin. Each time, take out your Must-Keep-On List, re-measure, and ask: do I still sit on the right rung? Maybe it's time to climb one more. Maybe the rung you're on is just right.

Either way, you're no longer the person fumbling for candles in the dark. You have a plan, you know how it works, and you know how to keep it working. That's what the Blackout Ladder was always about.

Appliance Power Chart

These are typical values for common household items in the US. Your own appliances may use more or less, often a lot more or less, so always measure yours with a plug-in watt meter or read the label. “Starting” means the short surge when a motor or compressor starts. A dash means the item has no significant starting surge. “Backup?” tells you whether the item usually makes sense on a small or medium backup: **Yes**, **Spells** (in short periods), **Big** (only with Step 4 or 5 and a large system), or **No**.

Kitchen

Item	Running watts	Starting	Typical use	Backup?
Refrigerator, modern full-size	100-200 W	3-5 × running	1-2 kWh/day	Yes
Refrigerator, older (15+ years)	150-300 W	3-5 × running	2-3+ kWh/day	Yes
Mini fridge	50-100 W	3-5 × running	0.5-1 kWh/day	Yes
Chest freezer	60-150 W	3-5 × running	0.7-1.2 kWh/day	Yes
Upright freezer	100-200 W	3-5 × running	1-2 kWh/day	Yes
Microwave	1,000-1,800 W	—	100-200 Wh for short use	Spells
Coffee maker, drip	600-1,200 W	—	100-200 Wh per pot	Spells
Single-cup coffee maker	1,000-1,500 W	—	50-100 Wh per cup	Spells
Electric kettle	1,200-1,500 W	—	100 Wh per boil	Spells
Toaster	800-1,500 W	—	50-100 Wh per use	Spells
Toaster oven or air fryer	1,200-1,700 W	—	300-600 Wh per meal	Spells
Slow cooker	150-300 W	—	1-2 kWh per meal	Spells

Item	Running watts	Starting	Typical use	Backup?
Electric pressure cooker	700-1,000 W	—	200-400 Wh per meal	Spells
Induction hot plate	1,200-1,800 W	—	300-600 Wh per meal	Spells
Blender	300-1,000 W	—	very small	Spells
Dishwasher (heated dry off)	1,200-1,500 W	—	0.8-1.5 kWh per load	Big
Electric range or oven	2,000-5,000 W	—	1-3 kWh per meal	No
Range hood fan	50-200 W	—	small	Yes
Garbage disposal	400-900 W	2-3 × running	very small	Spells

Medical and Personal Care

Item	Running watts	Starting	Typical use	Backup?
CPAP, no humidifier heat	30-60 W	—	0.3-0.6 kWh/night	Yes
CPAP with heated humidifier	60-130 W	—	0.6-1+ kWh/night	Yes
Oxygen concentrator, home	300-600 W	—	7-14 kWh/day	Big
Nebulizer	50-150 W	—	small	Yes
Powered wheelchair charger	100-300 W	—	0.5-1.5 kWh per charge	Yes
Electric toothbrush charger	1-5 W	—	very small	Yes
Hair dryer	1,000-1,875 W	—	100-300 Wh	Spells
Electric blanket	50-200 W	—	0.4-1.5 kWh/night	Yes

Item	Running watts	Starting	Typical use	Backup?
Heated mattress pad	50-150 W	—	0.4-1 kWh/night	Yes

Communication and Electronics

Item	Running watts	Starting	Typical use	Backup?
Internet router and modem	10-20 W	—	0.25-0.5 kWh/day	Yes
Mesh Wi-Fi unit, each	5-15 W	—	0.1-0.35 kWh/day	Yes
Cordless phone base	2-5 W	—	very small	Yes
Phone charging	5-20 W	—	10-15 Wh per charge	Yes
Tablet charging	10-20 W	—	20-40 Wh per charge	Yes
Laptop	30-90 W	—	100-300 Wh/day	Yes
Desktop computer and monitor	100-400 W	—	0.5-2 kWh/day	Spells
LED TV, 32-50 inch	30-100 W	—	100-400 Wh/day	Yes
LED TV, 55-75 inch	80-200 W	—	300-800 Wh/day	Spells
Streaming box or satellite receiver	5-30 W	—	50-300 Wh/day	Yes
Game console	50-200 W	—	varies	Spells
Radio, AC powered	5-20 W	—	small	Yes
Security cameras, each	3-10 W	—	70-240 Wh/day	Yes

Item	Running watts	Starting	Typical use	Backup?
Ham or GMRS radio base station, transmitting	50-300 W	—	varies	Yes

Lighting

Item	Running watts	Starting	Typical use	Backup?
LED bulb, standard	8-10 W	—	40-50 Wh for 5 hours	Yes
LED bulb, bright	12-18 W	—	60-90 Wh for 5 hours	Yes
LED shop light, 4 ft	30-45 W	—	small	Yes
Old incandescent bulb, 60 W	60 W	—	300 Wh for 5 hours	No — swap to LED
Outdoor flood light, LED	20-50 W	—	varies	Spells

Heating, Cooling and Air

Item	Running watts	Starting	Typical use	Backup ?
Gas or propane furnace blower	300-800 W	2-3 × running	2-6 kWh/day in cold weather	Big
Gas or oil boiler circulator and controls	100-300 W	—	1-3 kWh/day	Big
Pellet stove (fans and auger)	100-300 W	—	1-3 kWh/day	Yes
Window AC, small	500-900 W	2-3 × running	4-8 kWh/day	Big
Window AC, large	1,000-1,500 W	2-3 × running	8-12 kWh/day	Big

Item	Running watts	Starting	Typical use	Backup?
Central AC or heat pump	2,000-5,000 W	high	15-40 kWh/day	No
Portable electric space heater	750-1,500 W	—	12-36 kWh/day	No
Electric baseboard heat, per room	1,000-2,000 W	—	very high	No
Box fan	50-100 W	—	0.4-1 kWh/day	Yes
Ceiling fan	15-75 W	—	0.2-1 kWh/day	Yes
Dehumidifier	300-700 W	2-3 × running	3-8 kWh/day	Spells
Air purifier	20-100 W	—	0.5-2 kWh/day	Yes
Bathroom exhaust fan	10-40 W	—	small	Yes

Water

Item	Running watts	Starting	Typical use	Backup?
Well pump, 1/2 hp, 240 V	700-1,000 W	2-3 × running or more	0.5-1.5 kWh/day	Big
Well pump, 1 hp, 240 V	1,000-1,500 W	2-3 × running or more	1-2 kWh/day	Big
Shallow well jet pump, 120 V	600-1,200 W	2-3 × running	0.5-1.5 kWh/day	Big
Sump pump, 1/3 hp	300-600 W	2-3 × running	varies with rain	Yes
Sump pump, 1/2 hp	500-800 W	2-3 × running	varies with rain	Yes
Electric water heater	3,000-4,500 W	—	10-15 kWh/day	No
Tankless electric water heater	10,000-30,000 W	—	very high	No

Item	Running watts	Starting	Typical use	Backup?
Gas water heater, power-vented	50-300 W	—	small	Yes
Water softener	5-50 W	—	small	Yes
Heat tape for pipes, per 10 ft	30-80 W	—	varies	Spells

Laundry and Cleaning

Item	Running watts	Starting	Typical use	Backup?
Washing machine, cold wash	400-1,000 W	2-3 × running	0.3-0.5 kWh per load	Spells
Electric clothes dryer	2,000-5,500 W	—	2-5 kWh per load	No
Gas clothes dryer (motor only)	300-600 W	—	0.3 kWh per load	Spells
Vacuum cleaner	500-1,400 W	—	small	Spells
Clothes iron	1,000-1,800 W	—	small	Spells

Garage, Workshop and Outdoors

Item	Running watts	Starting	Typical use	Backup?
Garage door opener	350-600 W	2-3 × running	very small	Spells — or use the manual release
Power tool battery charger	50-300 W	—	50-150 Wh per charge	Yes
Circular saw	1,200-1,800 W	2 × running	short use	Spells
Drill, corded	400-900 W	—	short use	Spells
Air compressor, small	800-1,500 W	3 × running	short use	Spells

Item	Running watts	Starting	Typical use	Backup?
Electric chainsaw	1,200-2,000 W	—	short use	Spells
Aquarium heater and pump	50-300 W	—	1-5 kWh/day	Yes
Chicken coop heated waterer	50-150 W	—	1-3 kWh/day in winter	Yes
Livestock tank heater	250-1,500 W	—	high	Spells
Electric fence charger	1-10 W	—	very small	Yes
Electric vehicle, Level 1 charging	1,400-1,900 W	—	10+ kWh per night	No
Golf cart or e-bike charger	100-1,000 W	—	varies	Spells

Quick Reminders

- **Daily Wh = watts × hours used per day.** For things that cycle, like fridges, measure with a watt meter for 24 hours.
- **Add the running watts** of everything you'll use at the same time. Your inverter's continuous rating should be at least 1.25 times that.
- **Check the biggest starting surge** against your inverter's surge rating.
- **Anything marked "No"** belongs on a different plan: gas, wood, insulation, or simply waiting until the power comes back.

Plain-English Solar Glossary

AC (alternating current). The kind of electricity in your house outlets. It changes direction 60 times a second in the US.

Amp (A). A measure of how much electricity flows, like the amount of water moving through a hose.

Amp-hour (Ah). A measure of battery size. Multiply by the battery's voltage to get watt-hours. A 12.8 V, 100 Ah battery holds about 1,280 Wh.

Ampacity. The most current a wire can carry safely without overheating.

AWG (American Wire Gauge). The US system for wire thickness. The smaller the number, the thicker the wire. 1/0 AWG ("one-aught") is thicker than 2 AWG, which is thicker than 10 AWG.

Backfeeding. Pushing power backwards into the house wiring through an outlet with a double-male cord. Illegal, deadly, and never to be done.

Battery bank. Two or more batteries connected together to work as one.

BMS (battery management system). The small computer inside a lithium battery that protects it from overcharging, over-draining, short circuits and charging in the cold.

Bonded neutral / floating neutral. Whether a generator or inverter connects its neutral wire to its ground inside the unit (bonded) or not (floating). It matters when you connect to the house. Ask your electrician.

Breaker. A switch that turns itself off when too much current flows. Breakers for DC must be rated for DC.

Bus bar. A solid metal bar with studs, used as a tidy shared connection point for many cables.

Charge controller. The device that takes power from solar panels and charges the battery safely.

Class T fuse. A fuse designed to safely stop the very high currents a large battery can deliver in a short circuit. Used as the main battery fuse.

Continuous rating. The power an inverter or power station can deliver all day without overheating.

Critical loads. The few things you most need to keep running in an outage: fridge, freezer, medical devices, lights, router, furnace blower, well pump.

Critical-loads panel. A separate small electrical panel that holds only your critical circuits and can be fed by backup power.

Crimp. A permanent connection made by squeezing a terminal onto a cable with a special tool.

DC (direct current). Electricity that flows one way. Batteries and solar panels make DC.

DC-to-DC charger. A device that charges a house battery from a vehicle's alternator safely.

Depth of discharge. How much of a battery's capacity you use before recharging. We plan with 80 percent for LiFePO4.

Disconnect. A heavy-duty switch that cuts all power from the battery or from the panels.

Efficiency. How much power comes out compared with how much goes in. Inverters are often about 85 to 90 percent efficient.

GFCI (ground-fault circuit interrupter). An outlet or breaker that shuts off quickly if current leaks where it shouldn't, such as through a person. It has TEST and RESET buttons.

Grid. The utility's network of power lines.

Grid-tied. A solar system connected to the grid. Without a battery and the right inverter, it shuts off in a blackout.

Hybrid inverter. An inverter that manages solar, battery, grid and generator all at once.

Inlet box. A weatherproof socket on the outside of the house where you plug in backup power.

Interlock kit. A sliding plate on the main panel that makes it impossible to turn on the main breaker and the backup breaker at the same time.

Inverter. A device that changes battery DC into house-style AC.

Inverter-charger. An inverter with a built-in battery charger and often a built-in transfer switch.

kWh (kilowatt-hour). 1,000 watt-hours. Your electric bill is measured in kWh.

LiFePO4 (lithium iron phosphate, "LFP"). The safe, long-lasting battery chemistry recommended in this book.

Load. Anything that uses electricity.

MPPT (maximum power point tracking). A type of charge controller that gets the most energy from solar panels.

Multimeter. A handheld tool that measures volts, amps and continuity.

NEC (National Electrical Code). The set of electrical safety rules used across most of the US, often with local changes.

Nominal voltage. The "name" voltage of a battery, such as 12.8 V for a "12-volt" LiFePO4 battery.

Parallel. Connecting positives together and negatives together. Amps add up; volts stay the same.

Peak sun hours. The number of hours of full-strength sunlight your location gets in an average day. Often 2 to 4 in winter.

Power station. A portable box containing a battery, inverter, charger and outlets.

Pure sine wave. Clean AC power like the grid's. Safe for fridges, CPAP machines and electronics.

PV (photovoltaic). Another name for solar panels that make electricity.

PWM. An older, simpler type of charge controller. Less efficient than MPPT.

Running watts. The power a device uses once it is running.

Series. Connecting the positive of one panel or battery to the negative of the next. Volts add up; amps stay the same.

Shunt. A small device on the negative cable that lets a battery monitor measure current exactly.

Soft starter. A device that reduces a motor's starting surge, often fitted to well pumps and air conditioners.

Split-phase. The 120/240-volt power in US homes: two 120-volt legs that together make 240 volts.

Starting watts (surge). The short burst of extra power a motor needs to start.

Torque. How tightly a bolt is turned. Makers list the right torque for battery and inverter terminals.

Transfer switch. A switch that connects chosen house circuits to either the utility or the backup, never both.

UL listing. A mark showing a product has been tested to recognized safety standards.

Voc (open-circuit voltage). The highest voltage a solar panel makes when nothing is connected. It rises in the cold.

Volt (V). A measure of electrical pressure.

Watt (W). A measure of how hard electricity is working right now. Watts = volts × amps.

Watt-hour (Wh). A measure of energy over time. Watt-hours = watts × hours.

Watt meter. A plug-in device that shows how much power and energy an appliance uses.

Notes