



Generator Field Guide

Pick it, size it, run it safely, fix it, and fuel it.

Generated October 11, 2026. General education only, not professional advice. In an emergency, call 911 and follow official instructions. Sources are linked throughout; the web version at the site has live links.

Inside:

1. Generator Skills





BLACKOUT SKILLS

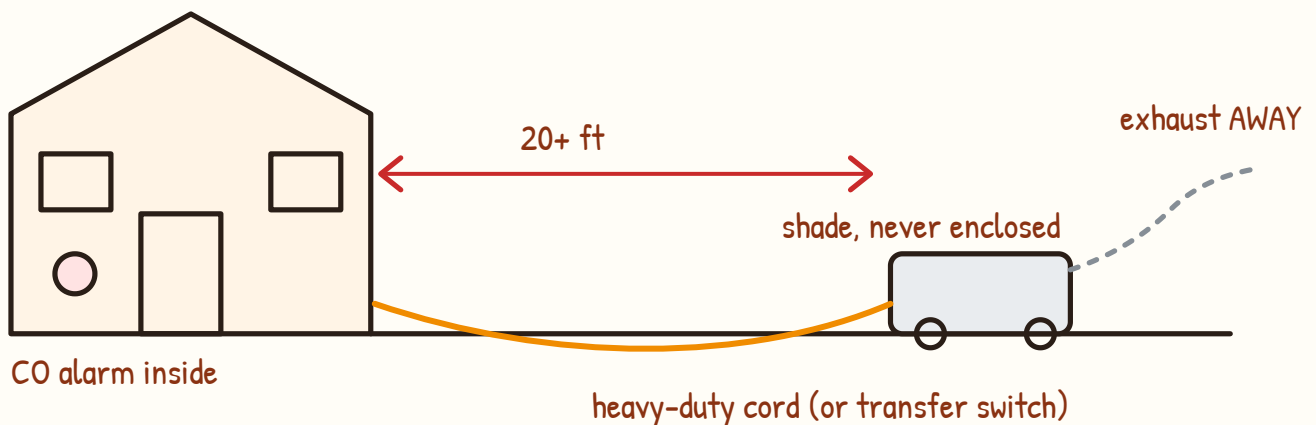
Generator Skills: Choose, Run, Fix, Stay Safe

A generator can keep a fridge, fans, medical devices, and phones going during a long outage. Used wrong, it can kill you with carbon monoxide or electrocute a line worker. Here's how to do it right.

The 3 deadly mistakes

1. **Running it indoors or too close to the house.** Never in a home, garage, carport, porch, or shed, even with doors open. Run it outside, at least 20 ft from the house, with the exhaust pointed away from doors, windows, and vents (CPSC, CDC). Install battery CO alarms on every level and outside sleeping areas.
2. **Backfeeding:** plugging the generator into a wall outlet or the panel without a transfer switch. This can energize utility lines and electrocute line workers and neighbors. Use a transfer switch or interlock installed by a licensed electrician (OSHA).
3. **Refueling while hot.** Shut it off and let it cool first. Fuel spilled on a hot engine can ignite (OSHA).

CO symptoms: headache, dizziness, nausea, weakness, confusion. **Get to fresh air and call 911.**



Outside, far from openings, exhaust away. In summer, give it airflow and shade but never enclose it.

Types of generators

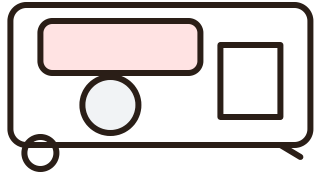
Type	Good for	Watch out for
Portable (open-frame, gas)	Most power per dollar; can run a fridge, fans, and a window AC	Loud, CO exhaust, "dirtier" power for electronics, fuel storage
Inverter	Quieter, more fuel-efficient, clean power for electronics and medical devices	Smaller output; overload lights trip easily on motor starts
Dual-fuel (gas/propane)	Propane stores for years without going stale	Lower output on propane; tanks still need safe outdoor storage
Standby (home, natural gas/propane)	Automatic, can run central AC, permanent installation	Costly; pro install and permits; natural gas supply can also be interrupted
Battery power station (+ solar)	Safe indoors with no fumes; quiet; great for CPAP, phones, fans, and lights	Limited capacity; can't run central AC; recharging needs sun or power

Look for portable generators certified to UL 2201 or PGMA G300 with a CO shut-off feature (CPSC). Prices: see Home Upgrades.

Most popular generators: budget, mid-grade & premium

We chose these from sales and review evidence as of **Oct 10, 2026**: retailer review counts, best-seller data, and major review roundups. We picked the most popular model in each price tier. Prices change often, so check before you buy. (Affiliate links may be added later; see our disclosure.)

Budget · under \$500



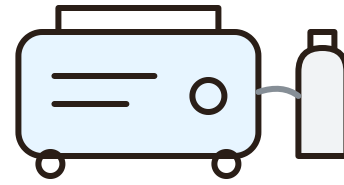
Champion 4375/3500-Watt Portable (201286)

- **Type:** open-frame gas portable (not an inverter), recoil start, CO Shield auto shutoff
- **Watts:** 4,375 starting / 3,500 running
- **Fuel:** gasoline, 4.7 gal tank; up to 12 hr at 50% load
- **Noise:** 68 dBA at 23 ft
- **Price:** \$479.99 at Lowe's / \$498 at Home Depot (as listed Oct 10, 2026)

Why it's popular: 4.8 stars from about 320+ reviews at each of Home Depot and Lowe's, the top-rated popular model under \$500 we found. Its sibling, the Champion 4375W dual-fuel, is Business Insider's 2026 "best budget" pick.

Fits: a fridge, fans, lights, and one window AC. It's louder, and its power is less clean for sensitive electronics, so use a battery or UPS for a CPAP.

Mid-grade · about \$500–\$1,500



Champion 4650-Watt Dual Fuel Inverter (201120)

- **Type:** dual-fuel inverter, electric start, CO Shield auto shutoff
- **Watts:** 4,650 starting / 3,650 running (gas); 3,285 running (propane)
- **Fuel:** gasoline (2.3 gal, up to 14 hr at 25% load) or 20-lb propane (up to 21 hr)
- **Noise:** 61 dBA at 23 ft
- **Price:** about \$867 at Home Depot (as listed Oct 10, 2026)

Why it's popular: about 2,880 Home Depot reviews averaging 4.8 stars, the most of any inverter in this price range we checked (Harbor Freight's Predator 3500 inverter is close behind, with about 2,667 reviews at \$799.99). Champion inverters are also Wirecutter picks for 2026. Propane stores for years, which helps in Phoenix heat where gasoline goes stale.

Fits: a fridge, fans, a 5,000–8,000 BTU window AC, and a CPAP (check starting watts).

Premium · \$5,000+ installed



Generac Guardian 24kW (7210)

- **Type:** permanent home standby with whole-house automatic transfer switch, Wi-Fi monitoring
- **Watts:** 24,000 running on propane (less on natural gas). Can run central AC with load management
- **Fuel:** natural gas or propane (≈3.9 gal/hr LP at full load)
- **Noise:** not listed on the product page we checked; runs a quieter low-RPM self-test
- **Price:** MSRP from \$7,399 (Generac, checked Oct 10, 2026), **plus** professional installation, permits, and gas work

Why it's popular: Generac holds an estimated 68%+ of the U.S. home standby market, and retail tracking of Lowe's, Home Depot, and Amazon (Jan–Aug 2026) ranks its 24kW air-cooled unit as Generac's #1 seller.

Fits: whole-home backup including central AC, the key need in a Phoenix summer outage. Requires a licensed electrician and plumber.

Also popular: the Honda EU2200i (\$1,199 MSRP) is a perennial top pick for quiet, clean power (Bob Vila and Business Insider 2026).

Evidence: Lowe's and Home Depot listings (review counts and prices as shown Oct 10, 2026) · Harbor Freight Predator 3500 · Honda EU2200i · Bob Vila 2026 · Business Insider 2026 · Wirecutter 2026 (top pick: Westinghouse iGen5000DFc, plus two Champion inverters) · Consumer Reports (updated Oct 8, 2026) · Home Depot product listing · Generac 7210 · Grips Intelligence retail data · standby market share (citing GM Insights). Drawings are our own doodles, not product photos. Not an endorsement. Any generator is only as safe as how you use it.

Sizing: running vs. starting watts

Running watts are what a device uses continuously. Motors (fridges, AC compressors) need extra **starting watts** for a moment when they kick on. Add up the running watts of everything you'll run at once, then add the single biggest extra starting surge. Always check the label on your own device.

Use	Device	Running W	Starting W
☒	Refrigerator	150–400	800–1,200
☐	Window AC, 10,000 BTU	900–1,200	1,800–2,400
☐	Window AC, 5,000 BTU	450–600	900–1,200
☒	Box/window fans (up to 2)	50–200 each	none
☐	CPAP with heated humidifier	60–120	none
☐	Oxygen concentrator (typical; check yours)	≈350	≈600
☒	Phone/laptop charging	20–100	none
☒	4 LED bulbs	8–15 each	none
☐	Internet modem/router	10–20	none

Running: **760 W** · Peak (with biggest start): **1,560 W** · Suggested generator (≈20% headroom; hot-weather derating noted below): **1,900 W**

Wattages use the high end of the ranges in Champion's wattage chart. The oxygen concentrator figure is a typical value from sizing guides, so confirm with your device's label or supplier. Medical devices should have a battery backup plan too.

Safe setup

- **Placement:** outdoors on level ground, 20+ ft from the house, exhaust away from openings, never under a carport or porch (CPSC).
- **Connecting:** plug appliances directly into the generator, or use undamaged, heavy-duty, 3-prong (grounded) outdoor extension cords rated for the load. Thin cords overheat. For longer runs or bigger loads, use a heavier gauge (lower number, e.g., 12 AWG instead of 16). Use GFCI protection per the manual (OSHA grounding fact sheet).
- **House wiring:** only through a **transfer switch or interlock installed by a licensed electrician**. When connected to a structure through a transfer switch, the generator must be grounded per code (OSHA).
- **Grounding:** follow the manufacturer's instructions for your model.
- **Phoenix heat:** output drops in heat and at altitude. Honda manuals say engine power falls about 3.5% per 1,000 ft of elevation (Honda manual). Generac's GP-series manual cites about 1% per 10°F above 60°F, so at 110°F expect roughly 5% less. Shade the generator from direct sun if you can, but leave plenty of open airflow, and never put it in an enclosure that traps exhaust.
- **Noise & theft:** chain it to something solid, and be considerate of neighbors at night. Inverter models are much quieter.

Fuel & heat

- Gasoline can start to degrade in as little as 30 days. Add fuel stabilizer to stored gas, and run the engine a couple of minutes so treated fuel reaches the carburetor (Briggs & Stratton). Avoid E15 in small engines.
- Store fuel only in approved, vented containers, **never indoors**, away from living spaces and ignition sources (OSHA). Phoenix heat speeds evaporation and builds pressure, so keep cans in shade and open them slowly. Store only modest amounts and rotate them.
- Propane stores longer but must be kept outdoors and upright, away from heat.

Moving fuel safely (siphoning)

Never siphon by mouth. It's easy to cough or choke, and even a tiny amount of gasoline or diesel inhaled into the lungs can cause chemical pneumonia, respiratory failure, coma, or death (Poison Control, MedlinePlus, CDC/ATSDR). If someone swallows fuel and coughs, chokes, or vomits, call Poison Control at 1-800-222-1222 or 911. Don't make them vomit.

- **Use a hand pump or a self-priming "jiggle" siphon hose**, sold at hardware and auto stores, to move fuel between containers or from a mower or generator tank.
- Work **outdoors**, away from flames, pilot lights, sparks, and running or hot engines. No smoking. Keep a fire extinguisher nearby.
- Fill only **approved, labeled fuel containers** set on the ground (not in a truck bed or car), and wipe up spills.
- Many modern cars have anti-siphon screens and rollover valves in the filler neck, so a hose often won't reach the tank. That's a safety feature. Don't try to defeat it, and use a different source.
- **Take fuel only from vehicles and containers you own or have permission to use.**

Gas or diesel? How to tell, and what to do with the wrong one

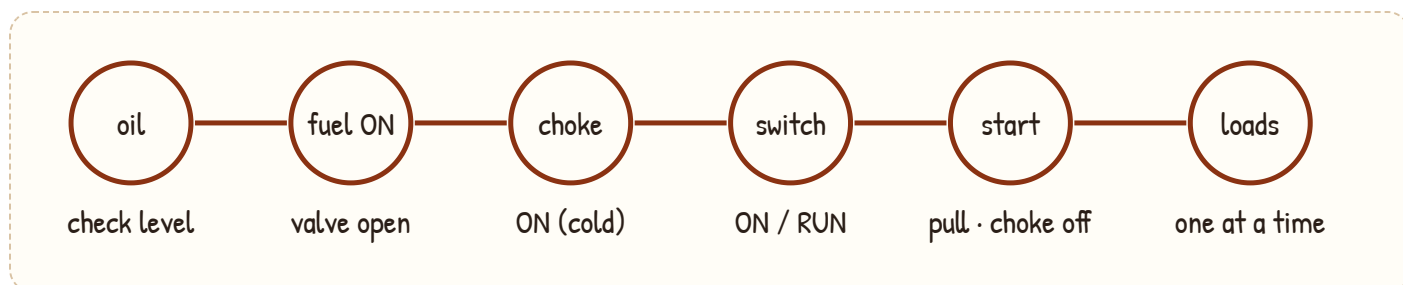
Check	Gasoline	Diesel
Smell	Sharp, solvent-like (like paint thinner)	Heavier, oily (like kerosene or heating oil)
Look	Clear to pale straw, thin like water	Clear to amber or yellow-green, thicker. Off-road diesel is dyed red (IRS-required Solvent Red 164; for nontaxable off-road use only)
Feel	Evaporates fast and feels cold and dry	Oily, slippery, and lingers
Paper test	A few drops on white paper evaporate with no stain	Leaves a greasy, translucent spot
Cans & nozzles	Common convention: red can = gasoline, yellow = diesel, blue = kerosene . Diesel pump nozzles are often larger, sometimes green-handled. Colors vary by brand and station , so always read the label.	

Skin contact: wear gloves, wash with soap and water, and do the paper test outdoors away from flames. Sources: IRS Publication 510 (dyed diesel), Justrite safety-can color coding, Poison Control.

- **Diesel in a gasoline generator** (the common case, since most portables are gasoline): it won't vaporize and ignite properly. Expect hard or no starting, smoke, misfires, and fouled spark plugs. **Don't keep trying to start it.** Drain the tank and carburetor bowl into an approved container, refill with fresh gasoline, and replace the spark plug if it's wet or fouled. If it ran for a while, have a small-engine shop flush it.

- **Gasoline in a diesel engine** is worse. Gasoline lacks diesel's lubricity and can damage high-pressure fuel pumps and injectors. **Do not start it.** If it already ran, shut it off and have the fuel system drained and inspected (manufacturer service bulletin via NHTSA).
- Label every can, and never store fuel in drink or food containers.

Step by step (typical portable; follow your manual)



1. **Pre-start check:** on level ground outside; oil at the full mark; fresh fuel; air filter clean; nothing plugged in; check cords for damage.
2. **Start:** fuel valve ON, choke ON (cold engine), engine switch ON, then pull the cord smoothly (or press electric start). Ease the choke OFF as it warms.
3. **Connect loads one at a time**, starting with the largest motor (fridge or AC) and then smaller items. Don't exceed the rated running watts.
4. **Shut down:** unplug or turn off loads, let it run a minute, engine switch OFF, fuel valve OFF. Let it cool before refueling or covering.

Maintenance schedule (typical; your manual rules)

- **Monthly:** start it and run it under a light load for 15–20 minutes. Check the oil.
- **First oil change** after the break-in period in your manual (often about 20–25 hours), then at the manual's interval. Change more often in heat, dust, or heavy loads (Honda).
- **Air filter:** inspect often in dusty Phoenix conditions (haboobs!). **Spark plug:** inspect and replace at the manual's interval.
- **Storage:** stabilized fuel and a short run, or a fully drained carburetor, to prevent gummed jets.

Troubleshooting

Symptom	Likely cause	Try this	Call a pro if...
Won't start	Fuel valve or engine switch off, low oil (shutdown sensor), stale fuel, choke wrong, fouled plug	Check switch, valve, and oil; use fresh fuel; choke on when cold; inspect or replace the plug	it still won't start with fresh fuel and a good plug
Starts, then dies	Choke left on or off too soon, low oil, clogged fuel vent or filter, stale fuel	Adjust choke, top up oil, open the tank vent, replace fuel	it keeps dying (likely carburetor)
Surging / "hunting"	Partly clogged carburetor jet (stale fuel), dirty air filter, very light load	Fresh stabilized fuel, clean filter, add a small load	surging continues; the carburetor needs cleaning
Runs, but no power output	Tripped breaker, bad cord, overload; on brush-type units, loss of residual magnetism	Reset breakers, test with a known-good device and cord	still no output. "Flashing the field" with a battery is a manufacturer-specific procedure that can damage the unit or shock you, so follow your manual or have a technician do it
Low-oil shutdown	Oil low, or the unit isn't level	Level it, check oil, top up	oil is full but it still shuts down
Breaker trips / overload	Too many watts, motor start surge	Remove loads; start the biggest motor first	it trips with a light load

Symptom	Likely cause	Try this	Call a pro if...
Inverter overload light	Start surge too big for the inverter	Unplug, restart, add loads one at a time; consider a soft-start for AC	it overloads with small loads
Smoke	White/blue: burning oil (overfilled, tipped over); black: too rich (choke on, dirty air filter, altitude)	Check oil level and choke, clean filter. Shut down if the smoke is heavy or smells electrical	smoke persists, or there's any electrical burning smell
Runs rough	Fouled plug, dirty filter, water or stale fuel	Replace plug, clean filter, drain and refill fuel	no improvement
Hard to pull	Load plugged in, engine damage, oil overfilled	Unplug everything and check the oil level	the cord won't pull with no load
Electric start dead	Battery discharged	Charge the battery, or use the recoil pull start	the battery won't hold a charge

Biodiesel and plant oils: the honest version

First, the big caveat: almost every portable generator sold for homes runs on **gasoline** (or propane). Gasoline engines **cannot** use biodiesel or vegetable oil. Plant-oil fuels only matter if you have a **diesel** generator or engine.

What real biodiesel is

Biodiesel is made by **transesterification**: reacting vegetable oil or animal fat with an alcohol (usually **methanol**) and a **lye catalyst** (sodium or potassium hydroxide). The reaction splits the oil into fuel (methyl esters) and a glycerin byproduct (Penn State Extension). At an overview level, Penn State's small-scale guide describes these stages:

1. **Oil prep:** filter used oil and remove water.
2. **Titration:** test the oil's free fatty acid content to work out how much catalyst it needs, then run a small test batch before any larger one.

3. **Reaction:** warm the oil, mix it with a methanol-catalyst solution, and stir.
4. **Separation:** let the glycerin settle out and drain it off. It must be handled and disposed of properly.
5. **Washing and drying:** gently wash the fuel to remove soap, catalyst, and methanol, then dry it thoroughly.
6. **Quality testing:** poorly made fuel can damage engines. Commercial fuel must meet ASTM D6751.

This is chemistry with serious hazards. Methanol is toxic (it can cause blindness or death, including through skin absorption) and highly flammable, with a nearly invisible flame. **Lye** is caustic and causes severe burns, especially to the eyes. You need real ventilation, chemical-resistant gloves, splash goggles, a face shield, a fire extinguisher, and no ignition sources. Local fire codes, zoning, and waste rules apply to storing methanol and disposing of glycerin and wash water. We don't publish recipes. If you're serious, start with Penn State's *Biodiesel Safety and Best Management Practices* and local training.

No safe "primitive" shortcut exists. You can't make true biodiesel without an alcohol and a catalyst, and improvised methods mean handling toxic, flammable chemicals without proper equipment. In a real emergency, that's a way to get burned, blinded, or poisoned.

Realistic low-tech alternatives, and their limits

- **Straight vegetable oil (SVO)** can run some older, mechanically injected diesel engines if it's carefully filtered, dewatered, and **heated**. It's far thicker than diesel and gels when cool. Usual setups start and stop on diesel and switch to heated oil once warm. The DOE warns that SVO causes carbon buildup and dilutes engine oil over time, even at 1% blends, which shortens engine life. Modern common-rail engines and emissions systems are especially vulnerable (DOE: SVO as a Diesel Fuel?, Penn State/eXtension SVO fact sheet).
- **Growing your own oil means low yields.** Farm trials found roughly **66–200 gal/acre** of sunflower oil, **44–132 gal/acre** of canola, and **88–176 gal/acre** of soybean oil, plus pressing equipment (Penn State/eXtension). A generator burning about 0.5 gal/hr for 8 hours a day uses about 120 gallons a month, roughly a full year's oil from one acre. Wild desert seeds yield far less.
- **Cooking oil you already have** is better used as food.
- **Where to get biodiesel legitimately:** see the Resource Map layer "Fuel & biodiesel resources" for public B20+ stations nationwide (DOE AFDC), production plants (EIA), and farm supply stores. For used cooking oil, ask restaurants with UCO recycling programs. Buy, trade, or get permission.

Which generators can use biodiesel blends?

- **B5** (up to 5% biodiesel) meets the normal diesel spec (ASTM D975) and is approved for any diesel engine, including **diesel generators**. It's often in pump diesel without a label (DOE AFDC).

- **B6–B20** must meet ASTM D7467 and works in many diesel engines, but **check your engine maker's approval and warranty** (AFDC Biodiesel Handling & Use Guide).
- **Standby diesel generators:** some makers advise against biodiesel blends because fuel sits for months and degrades. Cummins recommends B0 for standby gensets (Cummins white paper).
- **Gasoline and propane generators** (like the three picks above): no biodiesel, no vegetable oil.

Sources: CPSC Safety Alert, CDC, OSHA 3286, Ready.gov Power Outages, Honda owner's manuals, Briggs & Stratton, and Champion. Always follow your generator's manual. Electrical work on house wiring requires a licensed electrician.

Related: Blackout guide · Home Upgrades



Emergency numbers

- **911:** emergencies (heart stroke, fire, crime in progress). Text 911 where supported if you can't call.
- **211:** Arizona community resources, cooling and shelter info
- **988:** Suicide & Crisis Lifeline (call or text)
- **1-800-222-1222:** Poison Control (scorpions, snakebites, toxic plants)
- **511:** Arizona road conditions (az511.gov)
- **APS outages:** 602-371-3680 (metro) / 855-688-2437 · downed lines: 911, then 602-371-7171
- **SRP outages:** 602-236-8888 / 800-258-4777 · power emergencies 602-236-8811 (911 first for medical)
- **Gila County Emergency Mgmt (Payson):** 928-402-8789 · **Coconino County (Flagstaff):** 928-679-8311
- **Red Cross shelters:** 1-800-RED-CROSS (1-800-733-2767)

People to call

Name	Relationship	Phone

Out-of-state contact (everyone checks in here):

Medications & medical needs

Person	Medication / device	Dose / settings	Pharmacy / doctor

Person	Medication / device	Dose / settings	Pharmacy / doctor

Allergies:

Meeting points

Near home (e.g., a neighbor's door):

In the neighborhood (e.g., library, school):

Out of town (e.g., a relative in Payson or Flagstaff):

Home & utilities

Electric utility (APS outage 602-371-3680 (metro) / 855-688-2437 (other areas); SRP outage 602-236-8888 / 800-258-4777; other):

Water shutoff location:

Neighbors I check on / who check on me:

Pets (vet, microchip #):