



BACK-UP POWER FACT SHEET (SOLAR PLUS BATTERY STORAGE AND GENERATORS)

Due to PG&E's need to mitigate wildfire risk through Public Safety Power Shutoff (PSPS) events, customers may experience outages more frequently. Solar photovoltaic systems coupled with battery storage and generators can provide residents with additional control over powering their home, allowing them to keep at least essential devices (such as medical equipment, refrigeration, air conditioning, electric heating, lighting, electric well pumps) powered during outages. Each option has strengths and challenges homeowners should consider before making any purchase.

Solar Plus Battery Storage

Most residential solar systems are "grid tied," meaning that when power is shut off in the area even homes with solar panels lose power (with the exception of some solar systems that include backup capability for an emergency circuit). Adding battery storage to a home with solar allows that home to retain power during a grid outage.

Added Benefits of Solar Plus Battery Systems

- **Energy Arbitrage:** under a Time of Use Utility Rate, battery systems can charge at times of the day when electricity is cheap, and power the home when energy is more expensive. This enables a battery system to pay for itself over time.
- **No Fuel Required:** in the event of a multiple-day power outage, a home with solar and a battery system will charge the battery during the day and use the stored energy at night. With a proper load design, and sufficient sunlight, this cycle will repeat itself each day.
- **No greenhouse gas (GHG) emissions, noise, or required regular maintenance** (as compared to generators).

Costs, Sizing, and Other Considerations

- **Incentives:** when combined with solar, battery systems can be eligible for tax breaks (check with your tax advisor) and a rebate from the California Self-Generation Incentive Program: www.selfgenca.com.
- **Sizing for Your Home, Cost, Critical Loads:** The ultimate cost of a battery system depends on the capacity needed and variables related to your specific installation. The average single-family home has an electrical load of 18.5 kWh per day. Depending on your needs and budget, a battery system can be sized to service the entire home, or only "critical loads" (refrigerator and a small office, as an example).

Permit Requirements

- **Marin County Mechanical Permit Required**
- **Scaled Site Plan:** illustrating proposed location of equipment in relation to the property lines and existing structure(s).
- **Manufacturer's Equipment Information**
- **Electrical Line Diagram**

Portable Batteries

Portable backup batteries do not require a building permit and are more affordable than mounted battery systems. The cost of portable batteries is a function of their capacity; higher capacity batteries can power large home appliances and can range from \$1,000 to \$3,000. For example, a 1,045 Wh rated portable battery can power the average refrigerator for 17 hours.

Emergency Back-Up Generators

Temporary (Portable) Generators

A building permit is generally not required for use of portable generators when powering household appliances using an outdoor-rated extension cord. A building permit **is required** for a portable generator connected to the house wiring directly via a transfer switch.

Additional Considerations (Portable Generators)

- California Fire Code states that no more than 10 gallons of fuel should be stored onsite in a Department of Transportation-approved container.
- Generators should be used in well ventilated outside areas and away from all doors, windows and vents.
- Never use a generator in an attached garage, even with the door open.
- Make sure to install carbon monoxide (CO) alarms in your home. Follow the manufacturer’s instructions for correct placement and mounting height.
- Turn off generators and let them cool down before refueling. Never refuel a generator while it is hot.
- FACT: deaths due to CO poisoning associated with generators have spiked in recent years as generator sales have risen.

Residential Permanently Mounted Generators

A building permit is required for the installation of any permanently mounted generator. Submittal requirements:

- Scaled Site Plan: demonstrating proposed location of equipment in relation to the property lines and existing structure(s), and including location of an exterior emergency shut-off that will isolate the generator from the residence
- Manufacturer’s Equipment Information
- An electrical schematic and plumbing schematic for the gas line.
- If the property is located in the flood zone, additional requirements may apply.

Comparison of Backup Options

	Battery	Portable Generator	Permanent Generator
Cost	\$1,500 - \$15,000 ¹	\$500 - \$2,300	\$5,500 - \$7,000
Potential Loads	Essential loads ²	Essential loads	Whole house
Lifespan Est.	10 years (MWh or Cycles)	1 – 3 Years	5 years
Noise	None	Yes	Yes
Added Value	Under Time of Use Rate – can sell power back to the grid when not need for back-up – Depends on the equipment selected	None	None
Fuel	None – if charged from a PV system or from the Grid (\$)	Gasoline/Diesel/Propane (\$\$\$)	Diesel/Propane/Natural Gas (\$\$\$)
Maintenance	None	Must be run periodically; Oil change every year (\$)	Must be run periodically; Oil change every year (\$)
Emissions	None	Yes	Yes

¹ Does not include the cost of solar PV equipment.

² Critical loads can include lights, refrigerator, some outlets.