In the event of PG&E Public Safety Power Shutoffs (PSPS) or during an emergency such as a wildfire or earthquake, the power grid may be unavailable for an extended period-of-time. Several reasons to obtain partial- or whole-house backup power include:

**HEAT** Even gas-powered furnaces require power to operate. Infants, sick, and the elderly will struggle if a disaster hits in the winter when temperatures are very low.

**SAFETY** Candles are a common root cause of fires and should only be used in rooms where an adult is present and awake. Alarm systems, security cameras and other safety devices may have backup batteries, but these rarely last for more than a few days.

**REFRIGERATION** Many medicines and milk for children require being kept cold. Ice bags could be difficult to obtain and only last a few days.

**WORKING FROM HOME** Many people work from a home office, and being unable to work for several days can become a financial burden.

**OPTIONS** There are 3 common partial- or whole-house alternative power sources:

- **gasoline/natural gas generators**
- **large storage batteries**
- **solar panels with large storage batteries**

**CALCULATE ENERGY NEEDS** To determine which of the above options is best for you, and what size system you require, you first need to calculate your energy demand.

**Energy is measured in kilowatt-hours (kW-h)**

1 kW-h is equivalent to a power consumption of 1,000 watts for 1 hour

For example, operating a 100 watt light bulb for 10 hours takes 1 kW-hs (100 * 10)

**List every device that you want to operate at the same time during an outage.** For **plug-in devices**, use an electric monitor like a Kill-A-Watt to measure how much energy each consumes, or refer to the manufacturer’s information. For **light bulbs** use the example to the left and multiply the wattage times the number of hours/day that you would use it. **This is a good time to consider changing all your light bulbs to LEDs if they aren’t already.** LED bulbs use far less energy than incandescent and they last longer.

**Add these figures up, multiply by 1.5 (safety factor) and that’s your rough energy demand.** Typically, 5 - 10 kW-hs is sufficient for whole-house backup, but you can often get by with less if you don’t run high-load appliances, such as a refrigerator and furnace, at the same time.
POWER OPTION 1 GASOLINE/NATURAL GAS GENERATOR

The cheapest and most-common source of backup power is a gas-powered generator.

PROS
+ Cost is typically less than $3,000
+ Replenishable fuel (you can siphon gas from a vehicle in an emergency, although you may have to stand in line at a gas station and stations may eventually run out of fuel)
+ Durability—brand names (i.e. Honda) will last for decades

CONS
- Only provides power while it’s running, some models can be quite loud
- Supplies power regardless of demand, although some models have an Eco mode
- Must be run outside using electrical cords or a transfer switch to connect to inside devices
- Regular maintenance required, fuel storage may be a safety issue
- For additional information refer to the OCP&R Guide #21 – Emergency Generators

POWER OPTION 2 VERY LARGE STORAGE BATTERIES

A new entrant to the field is the large storage battery with outlets. These are charged while the grid is operational and can power devices during outages. GoalZero is an example battery.

PROS
+ No maintenance
+ Only supplies power when it is demanded

CONS
- Higher cost (currently $3,500 for a 3 kW-h battery) and efficiency degrades over time
- New type of product, minimal track record, unknown durability

POWER OPTION 3 SOLAR PANELS & STORAGE BATTERIES (i.e. Powerwall)

The best long-term solution that provides immediate, clean power during an outage.

PROS
+ A properly sized system can power an entire house indefinitely during a power outage
+ Little maintenance required over the life of the system
+ >40% cheaper than PG&E over a 20-year time-frame

CONS
- Highest upfront cost ($15,000 - $30,000 based on size)
- Power production can be impacted by rain, clouds and shade over the solar panels

Thanking Vivek Bhatia for his contribution to this content. Version 1.0 2/11/20