BD ELECTRICAL & SOLAR

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How long will a home battery last?

A practical guide to keeping your home running during a power outage.



BD PROJECT PHOTOGRAPH / FRANKLIN BATTERY & CONTROLLER

Start with what you need to keep on.

Essentials may run for a day in our example. Heavy electric use can reduce that to hours. See the assumptions on page 2.

What could stay on?

The same stored energy can last a day—or only a few hours.

These examples compare 12 kWh and 24 kWh available to your home. A kilowatt-hour (kWh) measures stored energy. The examples start fully charged and assume no solar or other recharging.

Example use during an outage	12 kWh available	24 kWh available
Gas-heated essentials Fridge, selected lights, internet, small electronics, gas furnace and occasional sump pumping.	About 24 hours	About 48 hours
Cold, wet conditions The same essentials, with the furnace and sump pump running much more often.	About 9 hours	About 19 hours
Summer essentials + central AC Small loads and sump pump, plus central AC running half the time.	About 5 hours	About 10 hours
Essentials + heavy heat-pump use Small loads and sump pump, plus a heat pump running heavily; no electric resistance backup heat.	About 3½ hours	About 7 hours

What does “one battery” mean?

Battery sizes differ. For these examples only, we allow 12 kWh of delivered energy for one 13.5-kWh-class battery, and 24 kWh for two. This is a planning assumption—not a product rating or a guaranteed minimum. The Franklin equipment pictured is not the basis of these calculations. [1]

EV charging, electric water heating, ovens, dryers and other large loads are excluded. Your equipment must also pass a separate power and motor-starting check. Full calculation details are on page 5.

Can it run? For how long?

A good backup plan needs both answers.

POWER = what can run

Power, measured in kilowatts (kW), is how much electricity the system can supply at one time. Think of the size of a water tank's outlet.

ENERGY = how long it runs

Energy, measured in kilowatt-hours (kWh), is how much electricity is stored. Think of the amount of water in the tank.

12 kWh ÷ 0.5 kW = 24 hours

In the essentials example, the home averages 0.5 kW. If it uses twice as much on average, the same stored energy lasts about half as long.

Large appliances need a closer look

A properly sized system can run central AC or a heat pump. But motors may need a brief burst of extra power to start. BD should check your actual equipment and what else may be running. [2]

Adding storage can extend runtime without increasing the amount of equipment the system can run at once. For example, Powerwall 3 Expansion adds energy capacity, not additional backup power output. [3]



Essential-load panel from the same BD project. Photos show equipment, not measured runtime.

What changes your runtime?

Weather, starting charge and household choices all matter.

How full is the battery?

Less energy at the start means less backup time. With half as much energy available and the same use, runtime is roughly halved. Tesla’s Backup Reserve saves energy for outages; that reserved energy is available during an outage, subject to system limits. [4]

How is your home heated?

A gas furnace still needs electricity for its fan and controls, but gas supplies the heat. A heat pump uses electricity to move heat. Some systems add electric resistance backup heat, which can greatly increase demand. The heavy-use example is not a prediction for every heat pump. [5]

Can solar recharge it?

Solar can extend backup when the system is configured to operate during an outage. Household use takes some or all of that production, so the battery may still drain in daylight. Clouds, shade and snow can reduce solar production. [6–8]

Bring BD your must-have list

Tell us what must stay on and for how long. Share energy-use records and accessible equipment model labels; do not open electrical equipment. Ask for both an everyday estimate and a cold, wet-weather estimate.

For life-sustaining medical equipment, arrange an independent emergency plan with your care team. Powering a router does not guarantee internet service.

The numbers behind the examples

Illustrative household use—not measurements from the photographed home.

Small everyday loads total 4.2 kWh per day, or 175 watts on average: fridge 1.8 kWh; lights 0.48 (60 W × 8 hours); internet 0.60 (25 W × 24 hours); electronics 0.60 (100 W × 6 hours); other small loads 0.72 (30 W × 24 hours). These are chosen assumptions, not appliance ratings.

Scenario	Added equipment assumptions	Total average use
Gas-heated essentials	800 W furnace × 25% of time; 1,000 W sump pump × 12.5%	500 W (0.5 kW)
Cold, wet conditions	800 W furnace × 75%; 1,000 W sump pump × 50%	1,275 W (1.275 kW)
Central AC	4,000 W AC × 50%; 1,000 W sump pump × 12.5%	2,300 W (2.3 kW)
Heavy heat-pump use	3,000 W average heat-pump use; 1,000 W sump pump × 12.5%	3,300 W (3.3 kW)

Runtime = available energy ÷ average power

For 12 kWh: 24.0, 9.4, 5.2 and 3.6 hours. For 24 kWh: 48.0, 18.8, 10.4 and 7.3 hours. Page 2 rounds these for readability. Percentages describe assumed equipment cycling—not instructions to turn off heat or a sump pump.

Why use 12 kWh? Tesla lists Powerwall 3 nominal energy as 13.5 kWh AC under stated test conditions. We chose a lower delivered-energy allowance for these examples; it is not a standard efficiency or reserve deduction. Actual available energy depends on starting charge, age, temperature, operating limits and system consumption. All examples assume supported circuits, available heating fuel, sufficient starting power and no recharge. [1–4]

Build a plan for your home

Choose the equipment and runtime you need, then size the system.

What would you want to keep running?

BD Electrical & Solar can help turn that list into a backup plan.
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Sources and technical checks

1. Tesla — Powerwall 3 datasheet
   Energy rating and test conditions.
2. Tesla — What Can Powerwall Back Up
   Appliance support and runtime depend on the system and use.
3. Tesla — Backup Loads Supported per Powerwall Quantity
   Motor starting and expansion-unit limitations.
4. Tesla — Backup Reserve
   Stored energy reserved for power outages.
5. PNNL / DOE — Traditional Split Heat Pumps
   Heat-pump operation and supplemental heat.
6. DOE — Solar and Resilience Basics
   Solar requires a compatible outage-capable configuration.
7. DOE — Solar Photovoltaic Hardening: Winter Weather
   Winter-weather impacts on solar.
8. Tesla — Best Practices During Power Outages
   Managing energy and solar during an outage.

Reviewed October 22, 2026. Calculations are illustrative planning examples, not a performance guarantee. This guide covers hours of backup during an outage, not battery lifespan or warranty. Photo captions follow the supplied BD draft.