

## WHAT IS HOME BATTERY STORAGE?

Battery storage allows you to capture and store electrical energy for use at another time. The battery is charged by an onsite power source—typically a rooftop solar photovoltaic (PV) system—or by drawing energy from the utility grid. Stored energy can be discharged to supply your home, or it can be used to help support the grid. Residential storage systems and services are available from some electric utilities, battery manufacturers, and solar installers, as well as other trained energy professionals and technicians.

## WHY CONSIDER BATTERY STORAGE?

At your home, battery storage could

- Supply backup power during electrical outages
- Create opportunities for electric bill savings
- Generate income by supporting the utility grid

These functions are not mutually exclusive. However, battery systems configured and controlled for one purpose (e.g., backup power) may have limited potential for others.

## DOES STORAGE MAKE FINANCIAL SENSE?

Many homeowners desire a backup power source, but value depends on needs and preferences. The potential to generate electric bill savings and income by operating home battery storage is just beginning to emerge. Diverse site-specific factors and varying policies, regulations, and incentives will impact whether investing in home energy storage pays off financially. Costs include the price paid for hardware and installation, as well as the cost of ownership. This may include financing costs, maintenance and warranty costs, and battery recycling and disposal costs at end of life. Where available, costs may be offset by federal, state, and utility program incentives.

## RESIDENTIAL BATTERY STORAGE APPLICATIONS AND POTENTIAL BENEFITS

### 1. Backup Power Supply

Battery storage can allow your home to maintain some level of power supply during outages:

- The energy storage capacity of a home battery system limits how many appliances can be supplied with backup power—and for how long. Combining battery storage with PV may extend the duration of backup during an outage.
- Most home battery systems are configured to back up only a few electrical circuits, such as those supplying the refrigerator, area lighting, and computer/internet services. Gas heating systems may be supported as well.
- Typically, electric heating, water heating, and air conditioning systems are not backed up due to high power and energy demands. Larger storage systems or add-on “soft start” devices may enable battery backup of these loads.
- Relying on battery backup for critical equipment such as medical devices requires special care. The switch from grid to battery power may not always be seamless, and batteries have limited storage capacity.

### 2. Electric Bill Savings

Battery storage can help reduce your home’s electric bill under some circumstances:

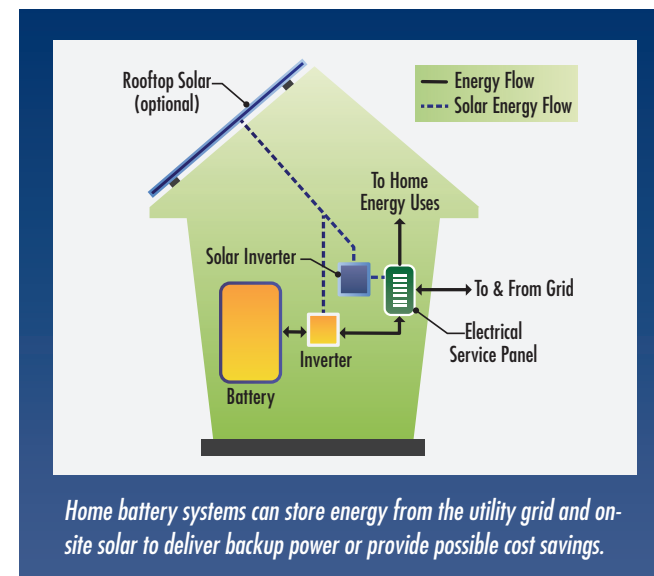
- For customers with time-varying electric rates, battery systems can be configured to charge with power from the grid when energy prices are low, such as during overnight hours. Stored energy can be discharged and used later to provide bill savings—often during peak late afternoon and early evening periods when prices are higher.
- For customers with PV, batteries can be configured to store solar energy when onsite generation exceeds demand. Using stored energy when needed later can result in cost savings

in areas in which (1) the credit available for feeding excess energy to the grid is lower than the retail rate for electricity; or (2) sending excess energy onto the grid is not allowed.

### 3. Grid Support Income

Battery storage can generate income under some circumstances by helping support grid operation:

- Home battery storage can serve as a utility grid resource by delivering energy on demand and helping with grid issues and disturbances.
- Some utilities are developing programs to help customers install storage systems and share their control to support societal needs, such as reducing electricity costs and improving electric reliability.
- Homeowners may receive incentives or payments by allowing the battery to be managed to charge or discharge at times that provide value under certain grid conditions.



## RELIABILITY CONSIDERATIONS

- Battery storage providers typically offer warranties or performance guarantees for 10 to 15 years.
- Lifetime and performance are impacted by a number of factors, including how the battery is operated and the temperature and other conditions in which it is operated.
- Some degradation in charge/discharge efficiency or storage capacity may be expected over a battery's lifetime.
- Battery manufacturers and other storage providers should provide information and data related to the reliability of the technology being offered based on its intended use.



## ENVIRONMENTAL CONSIDERATIONS

- The environmental footprint of battery storage systems, as with other energy technologies, depends on impacts across all life-cycle stages. These include material extraction, manufacturing, and battery use and disposal.
- Batteries do not produce energy. Accordingly, the environmental impacts of using an individual battery depend on its source of stored energy, its efficiency, and how and when it operates.
- Storing energy generated by sources that do not release emissions (such as solar and wind), and using that energy later, may help to reduce emissions of fossil power plants.
- Home battery systems generally are not suitable for disposal as household waste. Recycling and disposal costs may be incurred at end of life.



## SAFETY CONSIDERATIONS

- As with other types of home energy systems, battery storage can create shock, electrocution, and combustion hazards due to faulty or damaged components. Proper installation, maintenance, and protection from external risks are important for maintaining battery health and safety.
- Safety risks can be mitigated by
  - Ensuring that the battery system has passed independent, nationally recognized safety testing certification (such as UL-listed products).
  - Consulting local building and permitting departments.
  - Using trained, licensed electricians and technicians for installation and maintenance.
  - Installing and operating the system within manufacturer specifications and in compliance with applicable National Electric Code (NEC) requirements.
  - Protecting against physical damage, extreme conditions, and other possible hazards.
- Safety literature from the battery manufacturer should document all risks and appropriate safety practices, including restrictions on installation and operation.
- The National Fire Protection Association (NFPA), International Fire Code (IFC), and others are working to further incorporate battery storage into their safety standards.
- State and local authorities may have their own fire safety, ventilation, and other requirements.

*Home energy battery systems come in a variety of configurations including integrated cabinet-style units (left) and separate wall-mounted components (right).*