WHAT TO KNOW ABOUT HOME BATTERY STORAGE

By Dennis Allen

The Santa Barbara County Office of Emergency Services advises being prepared for five to seven days of power outage. Because of ever more frequent and intense natural disasters, people are wanting backup for blackouts.

Home Battery Storage

Battery storage is the perfect partner for solar electrical generation. It keeps power flowing to the home during outages--the main reason people want batteries—as well as by helping save on utility bills (for solar systems that provide less than 100 percent of electricity). California has time-of-use billing, where customers pay more for electricity during high demand times (evenings and summer afternoons). With a solar + battery system, software automatically switches to stored energy during high demand/high-rate periods and draws from the grid during low demand times, thereby reducing utility bills.

Understand that a grid-linked solar array provides no power during a blackout. A photovoltaic (PV) system is required to shut down automatically during an outage to ensure that it does not “backfeed” the grid and risk injuring workers repairing lines.

California and its public utilities appreciate home batteries, for when aggregated, they flatten out demand curves. This means fewer power plants just for peak periods, ones that are expensive for limited use and pollute more than non-intermittent power plants.

Battery Options and Hardware

The most common situation is an existing or planned PV array tied to the utility grid (called “net-metering”). For an existing solar array, the battery choice is usually an alternating current coupled system. The panels produce direct current electricity which is converted via an inverter to AC that can be used in the home or fed back to the grid. When a battery is added (most typically a lithium-ion battery), it also needs an inverter to covert the DC stored power into AC. Some batteries such as Tesla Powerwall 2.0 incorporate this second inverter into the battery.

The second grid-tied option—a DC coupled system—is chosen when the battery and solar array are installed together (both use DC). Cost is reduced somewhat by needing only 1 inverter. Sonnen and Enphase batteries, other popular options, offer one or both coupling choices. Both have numerous sizing possibilities by being able to create battery banks.

Sizing and Cost

The average US home uses about 30 kilowatt-hours (kWh) per day. The Tesla Powerwall 2.0 provides 13.5 kWh of storage and, together with supporting hardware and installation, costs around $11,000. When fully charged, this would provide 45 percent of the average family’s usage.

Figuring out critical circuits, often called “survival circuits” is important to determine the minimum you want to power during an outage. Lights (especially LEDs), computers, radios/TVs, and refrigerators do not draw a lot of current. Electric cookers, whole house air conditioning systems and any appliance with resistive heating elements draw a lot of power. Motors and well pumps draw a big surge of power during startup, sometimes more than a battery can supply. More storage can be added, but because of expense, few people purchase the amount required to fully power their normal patterns. Enphase and Sonnen are more expensive per kwh of storage capacity than Powerwall but are longer lived.

Rebates and Tax Incentives

The federal tax credit for residential solar arrays, currently 22 percent, also covers home batteries. It terminates December 2022. California has enacted the Self-Generation Incentive Program (SGIP) to continue incentivizing home battery installations. The average cost covered is 25 percent but can go a lot higher in high fire areas. California’s mandate to achieve a clean energy grid by 2045 will have to rely heavily on solar generated electricity and battery storage. Home systems will need to be a big component.

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