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Home Battery Sizing for Critical Loads: How Many kWh Do You Need?

A practical way to size inverter power, usable battery energy and backup circuits for a household.

The fast answer Start with the loads that must stay on, not the whole appliance list. Then size simultaneous W, motor-starting peak and usable kWh.

Use this guide for all-in-one home storage and fixed battery-inverter systems.

Critical-load planning table

Load group	Typical examples	Sizing question
Always-on electronics	Router, modem, CCTV, alarm	How many hours and what is the adapter rating?
Lighting and fans	LED lights, ceiling or standing fan	Which circuits run together?
Cold storage	Refrigerator or freezer	What is compressor starting demand?
Water and motor loads	Pump, booster, washing machine	Can the inverter supply the starting peak?
Comfort loads	TV, computer, small appliances	Are they essential during the outage?
High-power loads	Water heater, cooker, air conditioner	Should they be excluded from the backup panel?

Use the exact model, document and supply route for the final quotation.

Two first-pass formulas

Use usable energy, not only the battery's nominal kWh. Include inverter efficiency and the reserve policy in the project calculation.

Sizing formulas Required inverter power >= simultaneous running load + motor-starting margin.
Required usable battery energy >= average critical load x backup hours.

What to record before quoting

- Critical-load panel and simultaneous running load.
- Backup hours and expected daily outage pattern.
- Battery voltage, continuous current, BMS communication and expansion plan.
- Inverter phase, EPS output, generator input and export limitation.

Need a product match? CVC can help match product models, technical parameters and supply routes to the project requirement.

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Prepared as a concise sourcing reference. Confirm exact model, certificate scope, compatibility and warranty responsibility for the final quotation.