OFFLINE RESILIENCE GUIDE // UK EDITION

Power Budgeting for Essential Electronics

Turn watts, watt-hours and real device measurements into a calm daily energy plan before you size a battery or solar panel.

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LAYER 1 // ACT

FIELD CARD

Immediate actions first. Then read the conditions and limits below.

FIRST ACTIONS

- List the devices that genuinely matter: communications, lighting, medical/support equipment and one computing device.
- Read or measure each device’s average power in watts; do not size from guesswork when you can measure.
- Multiply watts by hours used per day to get watt-hours (Wh/day), then add the loads together.
- Keep a separate margin for conversion losses and cloudy/low-generation days instead of pretending the arithmetic is exact.

DO NOT

- Do not confuse watts (instantaneous power) with watt-hours (energy over time).
- Do not assume a battery’s headline Wh is all usable at the socket.
- Do not prioritise resistive heaters, kettles or other high-power loads when the objective is communications and information.

IF THIS HAPPENS

- If a device has only volts and amps on the label, estimate watts as volts × amps; treat that as a ceiling unless you measure real use.
- If a load cycles on and off, measure or estimate its average over a representative period rather than using peak power all day.

WHAT YOU NEED

- A written load list
- Device labels or a plug-in power meter where appropriate
- Hours-per-day estimates
- Battery/inverter efficiency assumptions written down

BOUNDARY
This is a practical reference aid. Current official instructions, emergency services, competent professionals and product documentation take priority where they conflict.

Start with the two quantities that matter

Power is the rate at which a device is using energy. It is measured in watts (W). Energy is the amount used over time and is commonly measured in watt-hours (Wh). A 10 W device running for 5 hours uses about 50 Wh. A 60 W laptop used for one hour and a 10 W router used for six hours both use about 60 Wh, even though their power draw is very different. This distinction is the foundation of every sensible backup-power plan.

Volts, amps and the label on the device

Voltage is the electrical “pressure” and current is measured in amps. For a simple DC load, watts are approximately volts × amps. A label marked 12 V, 1 A therefore describes up to about 12 W at that input. Power-supply labels often show a maximum rating, not the device’s normal draw. USB-C chargers may advertise 65 W or 100 W because that is what they can supply, while the connected laptop may use much less for long periods. Measure the actual device where practical.

AC versus DC — avoid unnecessary conversions

Batteries store DC energy. Many portable electronics also ultimately use DC, while a household wall socket provides AC. An inverter converts battery DC to AC and loses some energy in the process. If a device can safely be powered through a manufacturer-approved USB-C PD or DC input, avoiding an extra DC→AC→DC conversion can reduce losses. Never invent a connector or voltage: matching plug shape does not prove electrical compatibility.

Build a daily load table

Write one row per essential device: average watts × hours per day = Wh/day. Add the rows. For example only, a household might measure a router at 9 W for 12 h (108 Wh), a laptop averaging 40 W for 3 h (120 Wh), two 5 W LED lamps for 5 h (50 Wh), a radio averaging 2 W for 4 h (8 Wh), and phone charging totalling 20 Wh. That illustrative total is 306 Wh/day. Your own equipment may be substantially different, so use this as a method, not a shopping number.

Typical small-load ranges are clues, not specifications

As a rough sense-check, phones often need only tens of watt-hours for a full recharge; LED lamps may use single-digit watts; home routers are often in the single- to low-double-digit watts; laptops can range from low tens of watts to much higher under heavy load; small monitors may use tens of watts; radios and low-power single-board computers can be only a few watts. These are examples only. The measured value for your device should win.

Account for usable capacity and losses

A 500 Wh battery does not mean 500 Wh will arrive at every load. Battery management may reserve capacity, cold temperatures can reduce performance, and conversion electronics consume energy. If you expect 85% end-to-end delivery, divide the required delivered energy by 0.85. A 300 Wh/day load would therefore need about 353 Wh from the battery for one day before adding any resilience margin. Label this as an engineering estimate, not a guarantee.

Prioritise loads by function

A useful order is life-safety/medical continuity first, then communications and information, then light, then essential computing. Comfort loads come later. Heating water, cooking electrically and space heating can consume more energy in minutes than small communications loads use in hours. If the objective is to keep a phone, router, radio and laptop working, define that boundary explicitly.

Measure, revise, repeat

Run a normal-day test before disruption. Record the battery percentage or Wh used, note which devices were actually needed and identify waste such as leaving screens, inverters or network equipment running overnight. A good power budget is a living document: measured behaviour replaces optimistic assumptions.

Verify / learn

These references are resolved from GPN’s central source registry so authority, coverage and source changes can be managed in one place. If a current official source conflicts with this guide, follow the current official source.

> **TECHNICAL / REFERENCE SOURCE**
> **Energy Saving Trust: battery storage**
> Consumer guidance for installed storage; not an electrical design specification or emergency-power guarantee.
> https://energysavingtrust.org.uk/advice/battery-storage/

> **PRIMARY / AUTHORITATIVE SOURCE**
> **UK Government Prepare**
> Preparedness guidance, not a live incident feed.
> https://prepare.campaign.gov.uk/get-prepared-for-emergencies/

Editorial review date: 30 September 2026. Next scheduled review: 28 January 2027.

INFORMATION CHECK✓ CURRENT REVIEW

REVIEWED	NEXT REVIEW DUE	REGISTERED REFERENCES
30 Sep 2026	28 Jan 2027	2 sources

Source availability is not hazard status. Offline reference material must never be interpreted as a live all-clear.

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