OFFLINE RESILIENCE GUIDE // UK EDITION

Solar + Battery Power for Essential Electronics

A practical low-voltage planning guide for keeping a phone, router, laptop and basic communications running — without pretending portable solar is guaranteed.

OFFLINE REFERENCE | UPDATED 30 SEP 2026 | UK FOCUS

> PDF edition generated 13 October 2026 from the GPN website release v12.21.16. The individual guide editorial review dates appear below. This is a saved reference, not a live safety warning or a fresh independent source verification. When online, check current official advice.

LAYER 1 // ACT

FIELD CARD

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

FIRST ACTIONS

- Define the daily load in Wh before choosing a battery or panel.
- Keep the system concept simple: solar panel → charge controller → battery → protected output → load.
- Prefer manufacturer-approved low-voltage DC/USB-C paths for suitable electronics when they avoid unnecessary inverter losses.
- Keep fixed mains wiring, house back-up changeover equipment and high-current installation work within competent professional design/installation.

DO NOT

- Never backfeed a house through a socket or improvised lead.
- Never exceed a battery/power station solar-input voltage, current or power limit.
- Never bypass fuses, battery-management systems or over-current protection.
- Do not treat a sunny-day panel rating as guaranteed daily energy.

IF THIS HAPPENS

- If the forecast is cloudy or winter light is poor, reduce the load first; more battery cannot create solar energy.
- If cables, connectors or batteries become unusually hot, disconnect safely and investigate before continuing.

WHAT YOU NEED

- Daily Wh load estimate
- Battery rated Wh and usable-capacity assumption
- Panel/controller electrical limits
- Correct fusing/protection and manufacturer-approved cables
- A dry, ventilated, protected location

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

The whole system in one line

Think in blocks: the panel turns light into DC electricity; a charge controller manages what reaches the battery; the battery stores energy; protected outputs feed the load. In an all-in-one portable power station the controller, battery, protection and inverter may be inside one enclosure, but the electrical limits still exist. Read the manual for maximum solar input voltage, current and power.

Panel watts are a rating, not a daily promise

A 200 W panel is rated under defined test conditions. Real output changes with season, cloud, shading, angle, temperature, dirt and controller limits. Daily energy is roughly panel watts × effective full-sun hours × system efficiency. “Full-sun hours” is an energy-equivalent planning input, not the number of daylight hours. Write the assumption next to the result and use a pessimistic case for winter resilience.

Battery Wh is easier to compare than Ah

Watt-hours put batteries and loads in the same unit. If a battery is specified only in amp-hours, nominal Wh is approximately volts × amp-hours. A 12.8 V, 100 Ah battery is about 1,280 Wh nominal. Usable energy is less than nominal and depends on chemistry, battery management and the manufacturer’s limits. Do not assume that two batteries with the same Ah store the same energy if their voltages differ.

Chemistry: consumer-level distinctions

LiFePO4 batteries are popular in portable and stationary systems because they can offer long cycle life and stable behaviour when used with the correct battery-management system. Other lithium-ion chemistries can provide high energy density. Lead-acid remains common in some applications but is heavy and generally offers less usable energy for a given headline Ah if long life is the goal. The safe charge voltage, temperature limits and protection are chemistry-specific: follow the product documentation rather than generic internet settings.

Controllers: MPPT and PWM in plain language

A solar charge controller prevents a panel from being connected directly to a battery without regulation. PWM is a simpler approach and can be appropriate in correctly matched systems. MPPT controllers electronically track a panel operating point and can often harvest energy more effectively when panel voltage is above battery voltage or conditions vary. Neither technology overrides the controller’s maximum input limits.

Inverters and direct DC

An inverter creates mains-like AC from a DC battery, which is useful when a device only accepts AC. It also consumes energy. For phones, many laptops and some networking gear, a properly specified USB-C PD or regulated DC solution can be more efficient. Use only outputs that match the device’s required voltage/protocol and polarity. Never modify fixed household wiring or improvise mains connectors.

Fuses, cable losses and heat

Higher current means more heating and voltage drop in undersized cables. Over-current protection should be sized and positioned according to the equipment manufacturer/system design, especially close to battery sources capable of delivering very high fault current. Keep connections secure and protected from accidental short circuits. If you are building a separate-battery system rather than using an integrated power station, competent low-voltage design matters.

Weather margin and autonomy

Separate two questions: how long can the battery run the load without charging, and how much energy can the panel replace on a poor day? A two-day battery does not make a two-day solar system if the panel cannot refill what you use. Reduce loads, add generation within equipment limits, increase storage, or accept shorter operating windows. Resilience usually comes from using less energy as much as from buying more hardware.

Planning calculator: battery + solar

This calculator is deliberately transparent. Enter your daily delivered energy need, desired battery-only autonomy and planning assumptions. It is an engineering estimate, not certified electrical design.

Daily load (Wh/day)

300

Battery autonomy (days)

2

Usable battery fraction (%)

80

Battery-to-load efficiency (%)

85

Effective full-sun hours/day

2

Solar system efficiency (%)

70

CALCULATE PLANNING SIZE

DAILY REQUIREMENT**300 Wh/day**

RATED BATTERY ESTIMATE**883 Wh**

PANEL RATING ESTIMATE**215 W**

Assumptions: battery estimate = daily Wh × autonomy ÷ usable fraction ÷ delivery efficiency. Panel estimate = daily Wh ÷ effective full-sun hours ÷ solar-system efficiency. These inputs are user-controlled planning assumptions; real weather, temperature, controller limits and device behaviour can be worse.

Professional boundary

This guide is about portable/low-voltage planning. Fixed solar installations, consumer-unit work, transfer switches, batteries integrated into household electrical systems and any arrangement that can energise fixed mains wiring require appropriate professional design and installation. Do not backfeed the grid or a household circuit from a portable inverter.

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.

GET PREPPED NOW // ORIGINAL GUIDE

Source page: https://getpreppednow.co.uk/guides/solar-battery-essential-electronics.html
Editorial update: 30 September 2026 · © 2026 Get Prepped Now
Personal household printing and offline saving are permitted. Keep this attribution and the guide's source/review information with the copy. Copyright & permitted use