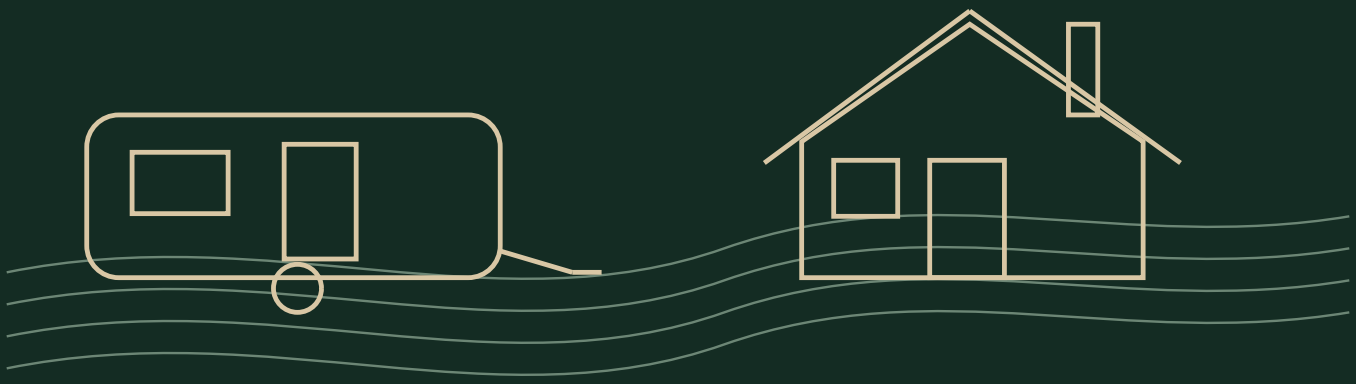
THE SANCTUARY
PROJECT

THE SANCTUARY LIBRARY / FIELD GUIDE 001

OFF-GRID HEATING IN BRITAIN

A practical guide to staying warm, safely and economically, through a British winter.



DIESEL / LPG / WOOD / INDEPENDENT POWER

FREE TO USE. FREE TO SHARE.

Edition v1.0 • 26 November 2026

sanctuaryproject.uk/library

ACQUIRE. ESTABLISH. DEMONSTRATE. EXPAND.

01 / EMERGENCY & EVERYDAY VEHICLE LIVING

Start with what you have

Living in a car or work van, whether by choice or necessity? Start with warmth, dryness and comfort. Build from there.

If life has changed unexpectedly, or you have chosen to live more simply, you may be more resilient and resourceful than you think. You do not need a finished campervan or expensive equipment to make progress. Whether you are living this way for a few nights or longer, our free guides can help you improve your setup at your own pace.

Keep the warmth you already have

Start with an insulated mat beneath your sleeping area. A foam camping mat helps separate you from the cold floor, while a dry sleeping bag, duvet and blankets trap body heat. Wear layers, a warm hat and dry socks. A removable insulated window cover can help reduce heat loss; leave ventilation and exits clear. In a van, a suitable thermal curtain can make a smaller sleeping area easier to keep warm.

Make a small budget go further

Look in charity shops, local reuse groups and clothing banks for coats, fleeces, blankets, bedding and mats. Use what you already own before buying more. Keep a spare dry set of clothes and socks. A hot water bottle, used according to its instructions, or rechargeable hand warmer can provide personal warmth for very little energy.

Create a comfortable daily routine

Choose a safe, lawful place to park, check the weather and keep your phone charged. Make time to air bedding, dry clothes and refill drinking water. A regular place for washing, showers and laundry can make vehicle living much more manageable.

> **A few essential safety points**
> Do not sleep with the engine running or heat the vehicle with a camping stove, barbecue, candle or unflued gas heater. If you cannot stay warm, seek a heated place. Confusion, slurred speech or unusual drowsiness in the cold can indicate hypothermia: call 999 if suspected.

Support if you need it: Citizens Advice and your local council can advise on housing, benefits and practical support.
Housing help | NHS cold-weather emergency advice | Fire service vehicle safety

© 2026 The Sanctuary Project | Free to use. Free to share.

01 / EMERGENCY & EVERYDAY VEHICLE LIVING

Stay dry. Build from there.

A warmer, drier vehicle is the foundation for a more comfortable off-grid setup.

Bare metal and glass get cold quickly. Moisture from breathing and wet clothes turns into droplets when it touches those surfaces. Left unchecked, it can soak bedding, cause musty smells and rust, and encourage mould that can aggravate breathing problems. The answer is a combination of insulation, airflow and drying things out.

Let moisture escape

Keep existing vents clear. Where safe and weather permits, open windows slightly to let air flow through, and air the vehicle when you can. A small ventilation fan running from an independent battery may help. Wipe wet windows and metal in the morning, and dry the cloth away from your sleeping space.

Separate yourself from cold surfaces

Use a removable insulated mat on the floor and suitable insulated covers on windows. Keep bedding away from bare metal. Lift the mattress or sleeping mat regularly so air can circulate beneath it. If you decide to line the van, use vehicle-suitable insulation and avoid trapping damp behind it. Keep wet clothes apart from bedding and cook outdoors away from vehicle openings.

Introduce reliable warmth when you are ready

A suitable battery-powered heated blanket or heated clothing can help with personal warmth; follow its instructions, especially for sleep, and avoid draining your starter battery. A purpose-designed external diesel air heater is another option: the unit sits outside and sends warm air in through its duct. Choose equipment approved for that use, keep exhaust away from windows, vents and air intakes, and use a vehicle-rated carbon monoxide alarm. A suitable fixed diesel system is a next step for a van conversion.

> **Your next step: choose a heating system**
> Start with dry bedding and ventilation, then build up independent power and reliable heat as your budget allows. The comparison table on the next page will help you choose what suits your vehicle or future accommodation. You do not need to do everything at once.

Further guidance: Damp and mould health advice (housing context) | External diesel heater example and instructions (not an endorsement). See page 12 for the numbered references used elsewhere in this guide.

© 2026 The Sanctuary Project | Free to use. Free to share.

02 / CHOOSE YOUR SYSTEM

Choose for your circumstances

First choices prioritise useful heat, running cost and suitability. The best option depends on your fuel supply, accommodation and safe installation.

Our definition: no mains gas and no mains electricity. Independent fuel supplies, batteries, solar, wind and generators may form part of the system. These options are starting points, not installation approvals.

Accommodation	First choice	Alternative	Additional option
Emergency car	Dry insulation and bedding	Suitable battery personal warmth	Heated accommodation
Unconverted van	Insulation and ventilation	Purpose-designed external diesel*	Installed diesel*
Touring caravan / campervan	Diesel air heater	Existing flued propane	Specialist wood stove*
Static caravan / park home	Suitable flued propane	Suitable diesel system	Specialist wood stove*
Fixed cabin / smallholding	Wood stove if dry fuel is affordable	Building-suitable diesel	Flued propane
Narrowboat / liveaboard	Marine solid-fuel stove	Marine diesel heater	Marine flued LPG*
Yurt / shepherd's hut	Suitable stove* if structure permits	Suitable diesel system	Flued propane*
Ordinary tent / awning	Insulated sleep system	Suitable battery personal warmth	Specialist external heat only*
Larger off-grid rural home	Wood / biomass where viable	Oil boiler with independent power	Bulk LPG with independent power
Heating or power failure	Existing independent safe heater	Dry thermal bedding / warm one room	Relocate if warmth cannot be maintained

* Specialist assessment only; not a routine recommendation. Never use combustion equipment inside ordinary tents or awnings. See "Beyond the caravan". Additional options are not necessarily independent backups.

> **The Sanctuary approach**
> Retain heat first. Choose a safe heater and compare useful heat costs. Plan for fuel shortages and power failure: two heaters on the same flat battery are not independent.

© 2026 The Sanctuary Project | Free to use. Free to share.

03 / MOBILE LIVING

Diesel air heating

A strong first choice for many touring caravans and campervans without mains electricity.

A diesel air heater separates combustion from the air being warmed. In a correct installation, combustion air and exhaust are routed outside. This avoids releasing combustion moisture into the living space.

Real-world fuel budgeting

Allow for variation between heaters. At an illustrative diesel price of £1.90 per litre, use these planning ranges for continuous running:

Operating level	Per hour	10 hours	24 hours
Low	20–30p	£2–£3	£4.80–£7.20
Moderate	30–50p	£3–£5	£7.20–£12
High	50–95p	£5–£9.50	£12–£22.80

Rounded planning estimates, not measured performance or guaranteed costs. Actual use depends on heater size, settings, insulation, weather and runtime.

Lower-cost imported units may be less fuel-efficient, but price alone does not prove efficiency. Compare reliable specifications, reviews and safety documentation; monitor your own fuel use over several days. [12]

What a documented 2 kW heater uses

One manufacturer quotes 0.10–0.24 L/h and 10–29 W running draw (about 0.8–2.4 A at 12 V). Startup and shutdown require additional electricity. Larger heaters can consume more. [1]

Thermostat or fixed heat setting?

Some thermostats modulate output; others stop and restart. Frequent restarts activate the glow plug again and may increase battery demand. If battery capacity is limited, a suitable steady manual heat setting (often 1–10, where fitted) may be preferable. Monitor fuel and battery use. [23, 24]

Repeated short cycles or prolonged low-output running may encourage carbon buildup. Follow the manual for servicing and any recommended higher-output operation. Never cut power during normal shutdown. [24, 25]

Limitations: battery dependence, noise, fuel storage and exhaust integrity. Choose the right heater size and check equipment suitability and safety alerts. [12]

> **Field note / lived experience**
> In a touring caravan, running costs of around 35p/hour were estimated in everyday use. A cold-night battery failure also stopped the heater. These are personal observations, not controlled tests; budget for fuel and independent backup warmth.

© 2026 The Sanctuary Project | Free to use. Free to share.

04 / PERMANENT AND MOBILE

Wood and LPG

Two established heating methods, with different fuel logistics and dependencies.

Wood-burning and multifuel stoves

A correctly sized log stove can be an excellent first choice for a fixed cabin or smallholding with affordable dry wood. A simple stove needs no electricity; pellet and some biomass systems do.

Strengths. Radiant warmth, electricity independence and potential for low-cost local fuel. A multifuel stove can provide flexibility with fuels approved for that appliance.

Limitations. Manual tending, ash, chimney sweeping, dry storage, emissions and fire clearances. Use untreated dry logs (aim for 20% moisture or less); check local smoke-control rules, building requirements, and permissions to source timber. [2, 3]

Why not a log burner in every campervan?

Some specialist conversions use compact stoves. They can provide power-independent warmth, but limited space, combustible walls, movement, flue integrity, insurance, fuel storage and overheating make them a specialist rather than routine option. Obtain assessment for the specific vehicle, appliance and installation before proceeding.

LPG: propane and butane

An existing correctly installed flued LPG heater may be the most practical choice, particularly if it also heats water. Propane performs better in freezing conditions than butane. [4]

A documented 4 kW-class combi unit uses 160–335 g/h: at £45.50 per 13 kg, roughly 56p–£1.17 per operating hour. This is not an equal-output comparison with the 2 kW diesel example. [13]

Strengths. Convenient cylinder exchange and shared fuel for cooking, hot water and heating.
Limitations. Varying cylinder prices and availability, compatible storage/regulators, and often a 12 V dependency.

> **Never improvise indoor heat**
>
> Do not heat a caravan, motorhome or ordinary tent with a camping stove, barbecue, outdoor heater or portable unflued gas heater. [5, 6, 14]

© 2026 The Sanctuary Project | Free to use. Free to share.

05 / INDEPENDENT POWER

Keep the heat running

Off-grid electricity is a limited resource. Protect the energy needed by your heating system before considering electric space heating.

Electricity supports heating; it rarely supplies it

A diesel air heater produces heat from fuel, using electricity for the fan, pump, ignition and controls. Many LPG heaters also need electricity. A simple wood stove can provide heat without a battery.

Ten hours of continuous operation	Electricity
Diesel heater at 29 W running draw [1]	0.29 kWh / about 23 Ah at 12.8 V
60 W heated throw	0.60 kWh / about 47 Ah at 12.8 V
500 W electric space heater	5 kWh
2 kW electric space heater	20 kWh

A 100 Ah, 12.8 V lithium battery stores 1.28 kWh nominally. A 2 kW electric heater would use that in about 38 minutes in theory; real runtime is lower and the battery/inverter may not support the load. Startup and shutdown loads are additional for fuel heaters.

Plan charging for a British winter

Solar output is seasonal; do not size a heating battery from summer results. Allow for other loads, reserve capacity, cold-weather charging limits and several poor-generation days. Wind or other generation may help where suitable. [7]

A generator can recharge batteries when renewable output is low, but consumes fuel, needs servicing and must run outdoors away from openings. Never run one inside or use it as an improvised exhaust heat source. [9]

> **Personal warmth uses less energy**
> Use appropriate low-power heated clothing or bedding only as instructed, especially regarding sleeping use. Preserve dry insulation and a non-electrical fallback. Do not plan overnight warmth around an untested battery.

© 2026 The Sanctuary Project | Free to use. Free to share.

06 / SPECIALIST & EMERGENCY USE

Beyond the caravan

Choose equipment for the structure and the people using it, not just the fuel price.

Tents and temporary shelters

Start with a winter-rated sleeping bag, insulated mat, dry layers and protection from wind and rain. Suitable battery-powered personal warming may help when used as directed, but must not replace adequate insulation. [14]

External heat. Specialist indirect-air equipment exists for temporary shelters. Only consider a complete system expressly intended for the shelter and application, with professional advice on exhaust separation and fire risk. Do not adapt a vehicle heater or assume an outdoor casing makes it safe.

Hot tents. Stove-equipped canvas shelters exist, but introduce substantial fire, burn and CO risks. They are specialist equipment, not a recommendation to use a stove inside an ordinary tent. Never rely on an alarm to make an unsafe installation safe.

> **Ordinary tents and awnings**
> Never bring a barbecue, camping stove, fuel-burning heater or generator inside. If you cannot maintain warmth safely, move to heated accommodation. [14]

Boats, yurts and other small structures

Marine solid-fuel stoves and marine diesel heaters can suit liveaboards; marine LPG may also be appropriate. Follow Boat Safety Scheme guidance and use marine expertise. [15] In yurts and huts, consider structural clearances, ventilation, weather, flue support and fire protection.

Larger permanent homes

A wood or multifuel stove may cover a main living area. Where whole-home heating and hot water are required, consider an oil, bulk LPG or biomass boiler with a properly designed independent electricity supply for controls and circulation. Pellet systems usually also need power. Delivered fuel availability and winter access matter. [8]

© 2026 The Sanctuary Project | Free to use. Free to share.

07 / FUEL ECONOMICS

Compare like with like

Indicative costs per useful kWh of heat. Replace the example fuel prices with your own local prices.

System	Illustrative price and performance	Cost / useful kWh
Dry logs (low price)	£150/t; 4 kWh/kg; 75% efficiency	5p
Dry logs (higher price)	£360/t; same energy and efficiency	12p
Heating oil boiler	£1/L; 10 kWh/L; 85% efficiency	12p
Diesel air heater [1]	£1.90/L; 0.24 L/h at 2 kW	23p
Bottled propane (13 kg)	£45.50/13 kg; 12.8 kWh/kg; 85%	32p
Bottled propane (6 kg)	£32/6 kg; same energy and efficiency	49p

Illustrative inputs, not price quotations. Fuel energy and efficiencies are approximate and should use a consistent calorific-value basis. Excludes delivery, equipment, maintenance and auxiliary power. Self-sourced wood still requires lawful access, labour, drying and storage.

Compare diesel with bottled propane

At these example inputs, diesel costs about 23p per useful kWh. Propane would match that at around £2.48/kg, or £32 for a 13 kg refill, assuming 85% efficiency. Your actual fuel prices and appliance performance may change the result.

Compare wood with diesel

At 4 kWh/kg and 75% stove efficiency, each kilogram of dry logs delivers about 3 kWh of useful heat. At the diesel example price, wood breaks even at roughly £690 per tonne. Low-cost dry logs can be very economical in a suitable fixed dwelling.

Work out your own budget

Hourly fuel cost = consumption × local price. Useful heat cost = hourly cost ÷ heat output in kW. For a stove or boiler, divide price per fuel unit by useful kWh per unit (fuel energy × efficiency).

> **Example: eight hours of diesel heat**
> 0.18 L/h × £1.90/L × 8 hours = £2.74. Log actual fuel use and operating hours; do not assume maximum output all night.

© 2026 The Sanctuary Project | Free to use. Free to share.

08 / SAFETY

Carbon monoxide & fire

Safety is non-negotiable. Carbon-based fuel-burning equipment can produce carbon monoxide (CO).

CO is invisible and odourless. It mixes with surrounding air; a low-level alarm beside the heater is not automatically the safest position. Install suitable audible alarms in appliance rooms and consider extra coverage where people sleep or spend time. [5, 10]

Placement. In an appliance room, guidance generally favours a high wall or ceiling position, 1–3 m horizontally from the source where feasible. Separate sleeping rooms may need breathing-height placement. Follow the alarm instructions for your specific layout; do not position directly above heat, in draughts or in cupboards.

Suitability. Look for BS EN 50291-1 for domestic alarms and BS EN 50291-2 for caravans, motorhomes and recreational craft. Consider independent battery-powered alarms and a second correctly located alarm for redundancy; test and replace per instructions. [10]

Ventilation and exhaust. Keep permanent vents, combustion air routes and flues clear. Inspect for damage and snow or obstructions. Operate generators outdoors, well away from openings and with exhaust directed away from accommodation; never in a tent, awning or enclosed space. An open window or alarm cannot make an unsuitable appliance safe.

Fire protection. Maintain suitable smoke alarms, clear escape routes, separation from combustibles and appropriate fuel storage. Arrange appliance servicing and chimney sweeping as required. [6, 11]

> **If a CO alarm sounds or exposure is suspected**
>
> Get everyone, including pets, into fresh air immediately. Stop the appliance only if safe without delaying escape. Seek urgent medical advice if exposure is suspected; contact NHS 111. Call 999 for severe symptoms such as breathing difficulty, collapse, sudden confusion, weakness or chest/muscle pain. Do not re-enter until you have obtained appropriate advice that it is safe. [5]

Headache, nausea, dizziness and unusual tiredness can be warning signs. Do not wait for symptoms or dismiss an alarm. If there is a fire: get out, stay out and call 999.

© 2026 The Sanctuary Project | Free to use. Free to share.

09 / PRACTICAL RESILIENCE

Prepare before the cold

The cheapest heat is often the heat you do not lose. Plan for a shortage of fuel, independent power or safe accommodation.

Retain heat without compromising ventilation

Use suitable insulation, thermal curtains, dry bedding and layers. Reduce unintended draughts without blocking permanent vents. Manage condensation and moisture, and take particular care of vulnerable people and pets.

Winter readiness checklist

□ Primary heater is suitable, serviced and working correctly.

□ Backup has been tested and does not share all primary-heater dependencies.

□ Fuel reserves, safe storage and winter resupply routes are checked.

□ Battery reserve, charging plan and cold-temperature limits are understood.

□ Smoke and CO alarms tested; expiry dates checked.

□ Permanent ventilation, flue and exhaust routes unobstructed.

□ Dry bedding, layers and safe personal warming are available.

□ Forecast checked; phone charged; fallback heated location identified.

> **Buying equipment**
> Quality, safety and reliability vary widely by manufacturer, supplier and import source. Price alone is not proof of quality. Check independent reviews, manufacturer safety documentation, relevant conformity, warranties and supplier reputation. Search official safety alerts; if uncertain, seek qualified advice. [12]

Before committing: Can I obtain fuel reliably? Can the heater run safely overnight as instructed? What happens if the battery fails, the generator breaks down or the fuel delivery is delayed?

© 2026 The Sanctuary Project | Free to use. Free to share.

10 / EVIDENCE

Sources & further reading

Click the source titles for original guidance. Manufacturer examples are not endorsements. Review date: 26 November 2026.

[1] AUTOTERM – Air 2D technical data — Heat output, fuel use and running power.

[2] Defra – Burn Better, Breathe Better — Dry wood, smoke and air quality.

[3] GOV.UK – Smoke control area rules — Local restrictions and exemptions.

[4] Liquid Gas UK – Propane versus butane — Cold-weather fuel characteristics.

[5] NHS – Carbon monoxide poisoning — Symptoms and emergency action.

[6] Humberside Fire & Rescue – Caravan safety — Vehicle heating and fire precautions.

[7] Energy Saving Trust – Renewable energy — Independent generation options.

[8] Energy Saving Trust – Boiler types — Fixed-property fuel alternatives.

[9] HSENI – Portable generator safety — Outdoor operation and CO precautions.

[10] FireAngel – BS EN 50292:2023 guidance — Alarm placement; manufacturer summary.

[11] HETAS – Carbon monoxide guidance — Solid-fuel appliance safety.

[12] OPSS – Product safety alerts and recalls — Check models and safety notices.

[13] Truma – Combi 4 technical data — Illustrative LPG fuel consumption.

[14] Camping and Caravanning Club – Camping safety — Tent, awning and caravan safety.

[15] Boat Safety Scheme – Solid-fuel stoves — Marine installation and fire risk.

[16] Camping and Caravanning Club – Gas for caravans — LPG safety and equipment.

[17] GOV.UK – Keeping warm in extreme weather — Safe warmth and emergency precautions.

[18] NHS – Hypothermia — Cold injury signs and emergency action.

[19] GOV.UK – Help if you are homeless — Council support and national routes.

[20] Citizens Advice – Housing help — Advice and local bureaux across Britain.

[21] UK Government – Damp and mould health risks — Health effects and moisture control; housing context.

[22] AUTOTERM – Portable outdoor diesel systems — Manufacturer example; not an endorsement.

[23] AUTOTERM – Comfort Control manual — Operating modes and cycling.

[24] AUTOTERM – Air heater operation manual — Ignition and servicing.

[25] Tigerexped – Diesel heater soot guidance — Low output and short cycling.

© 2026 The Sanctuary Project | Free to use. Free to share.

11 / THE SANCTUARY LIBRARY

Knowledge belongs in use

Free to use. Free to share. We ask for nothing in return.

The Sanctuary Project is building a free practical knowledge library to serve Britain, preserve our heritage and culture, and strengthen communities through independence and resilience. If this guide helps you, please pass it on.

Explore and share the library
Find field guides, toolkits and field notes. Share the library with someone who might benefit.

Follow on Facebook
Share resources with your community and follow the project.

Follow on Instagram
Follow practical knowledge and project progress.

Voluntary donations
Visit the website for current arrangements. Giving is always optional.

Contribute knowledge or corrections
Experienced practitioners and readers can help improve future editions.

Copyright and sharing

© 2026 The Sanctuary Project. All rights reserved except as expressly permitted. This guide may be downloaded, printed and shared in full, unaltered and free of charge, with attribution and copyright notice retained. No resale, modification, rebranding or commercial republication without written permission. Third-party material remains subject to its respective rights.

Important disclaimer

General educational information, not installation instructions or a substitute for professional advice. If unqualified or uncertain about selecting, installing, operating or maintaining any heating system, consult a suitably qualified professional. Follow manufacturer instructions and applicable regulations. Requirements vary across Britain and accommodation types. This edition has not undergone independent professional technical safety review; consult a qualified specialist before relying on it for a specific installation.

No equipment sales links or paid recommendations are included. Any future commercial relationship will be disclosed.