Inspiré

Hempcrete — The Material

Its properties, performance and use cases in refurbishment projects

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www.inspirenordic.com

MANIFESTO

We're not just building houses. We're building homes where *people thrive.*

The air doesn't just feel different

Hempcrete walls actively regulate humidity, maintaining a natural 45–65 % range. The air inside feels fresh and balanced — not dry, not damp.

No off-gassing into your home

Zero volatile organic compounds. Zero synthetic binders. Every breath you take is as clean as the materials around you.

Quiet, warm and alive

Exceptional thermal mass and acoustic absorption. Walls that breathe, insulate and silence — performing year-round without mechanical systems.

Designed for human well-being

Buildings that don't just shelter you — they support your health. Lower stress, better sleep, improved cognitive function. Spaces that care.

Each claim on this page is grounded in peer-reviewed research — see following slides.

REFURBISHING WITH HEMPCRETE

The advantages of hempcrete

Why hempcrete is optimal for refurbishment

- **Breathable walls with continuous insulation**
- **No thermal bridges** (#1 source of efficiency loss)
- **Perfect adaptability to the shapes of old building** (irregularity of the walls)
- **Mechanical or manual application**
- **Outdoor and indoor use**
- **Very high fire resistance. Validated for ERP** (without recovery)
- **Avoids the cold wall effect, which causes over consumption in heating**
- **Insensitive to rodents and termites**
- **Can receive any type of breathable finish**

SIX PILLARS

Six things hempcrete does — at the same time

No other building material on the market combines all six.

Carbon-storing

Stores up to 100 kg CO_2/m^3.
Locked in for the lifetime of the wall.

Vapour-open walls

Diffusion-open, not air-leaky. Walls let water vapour pass — not draughts.
Indoor humidity stays in the 45–65 % range.

Fire-safe

Rated A2-s2,d0.
Non-combustible. Limited smoke.

Healthy indoors

Zero VOCs. No synthetic binders.
No fibre particles in the air.

Pest & mould resistant

Lime keeps mould and rodents out.
No chemical treatments needed.

Regenerative & circular

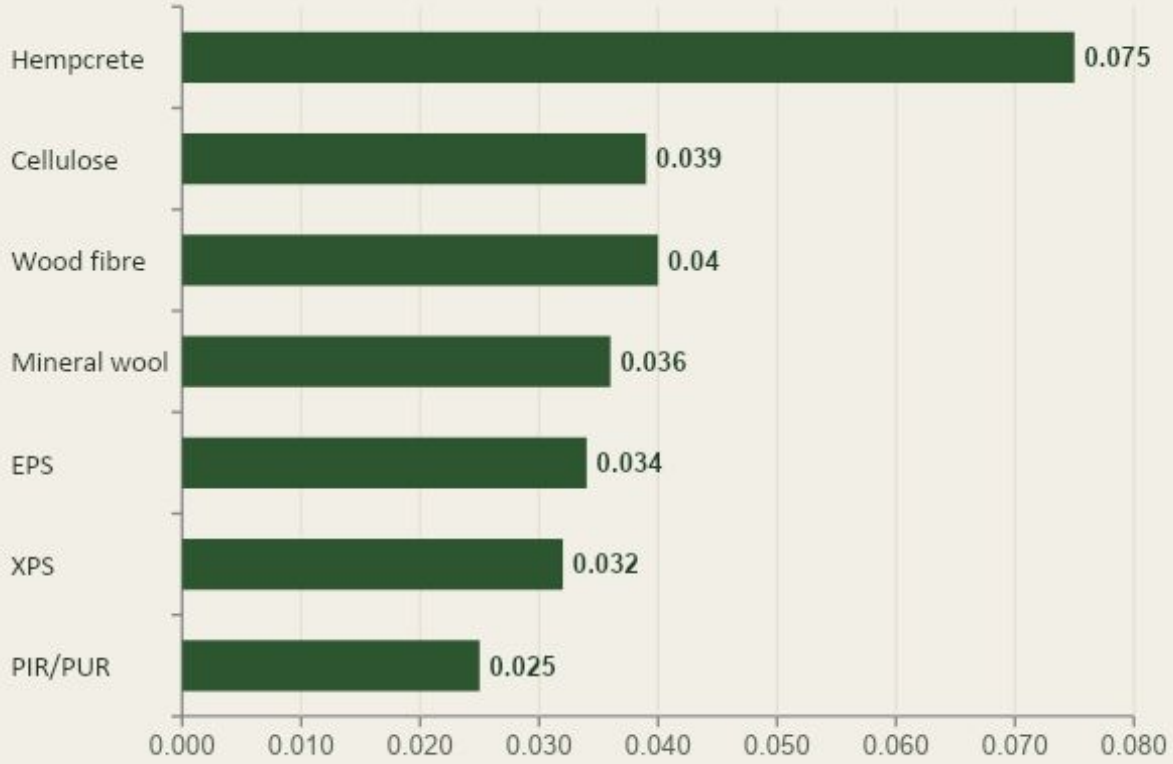
New harvests every year.
Reusable at end of life.

THERMAL

Thermal performance — the honest picture

Higher λ than mineral wool — but the wall does more than insulate.

λ-value (W/m·K) — lower is better



Reading the numbers

Hempcrete λ ≈ 0.065–0.085 W/m·K

Mineral wool λ ≈ 0.032–0.040 W/m·K

Per centimetre, hempcrete insulates roughly half as well as mineral wool. *On its own, that sounds like a disadvantage.*

But, hempcrete is not just insulation. It is the wall itself — structure, insulation, moisture buffer, thermal mass and finish all in one. **And that changes everything (next slide).**

RESEARCH

The proof: walls outperform their U-value

CEREMA WUFI® modelling on a 100 m² R+1 building with 30 cm hempcrete walls.

The finding

Up to

−70%

heating energy demand

compared to a conventional wall of equivalent U-value.

Why the U-value underestimates hempcrete

Standard U-value calculations assume the wall is a static sheet of insulation. They ignore three things hempcrete actually does:

Coupled heat & moisture transfer

Phase changes in absorbed water vapour transport energy through the wall. WUFI® modelling captures this — standard U-value calculations don't.

Thermal mass dampening

Hempcrete stores heat during the day and releases it at night, smoothing the temperature curve and cutting peak heating loads.

Hygrothermal regulation

Stable indoor humidity (45–65 %) means the air feels warmer at lower temperatures. Occupants set the thermostat 1–2 °C lower without noticing.

Source: CEREMA — Modelling of the heating and cooling needs of a hempcrete building (2021). Further validation work ongoing.

MOISTURE

Diffusion-open walls — moisture buffering

Indoor humidity self-regulates between 45–65 % year-round.

To be clear: “breathable” does not mean draughty. A hempcrete wall is fully airtight to the wind — it just lets water vapour pass through. Hempcrete is hygroscopic: it absorbs water vapour when indoor air is humid, and releases it back when the air is dry. The wall acts as a humidity flywheel.

Better for the body

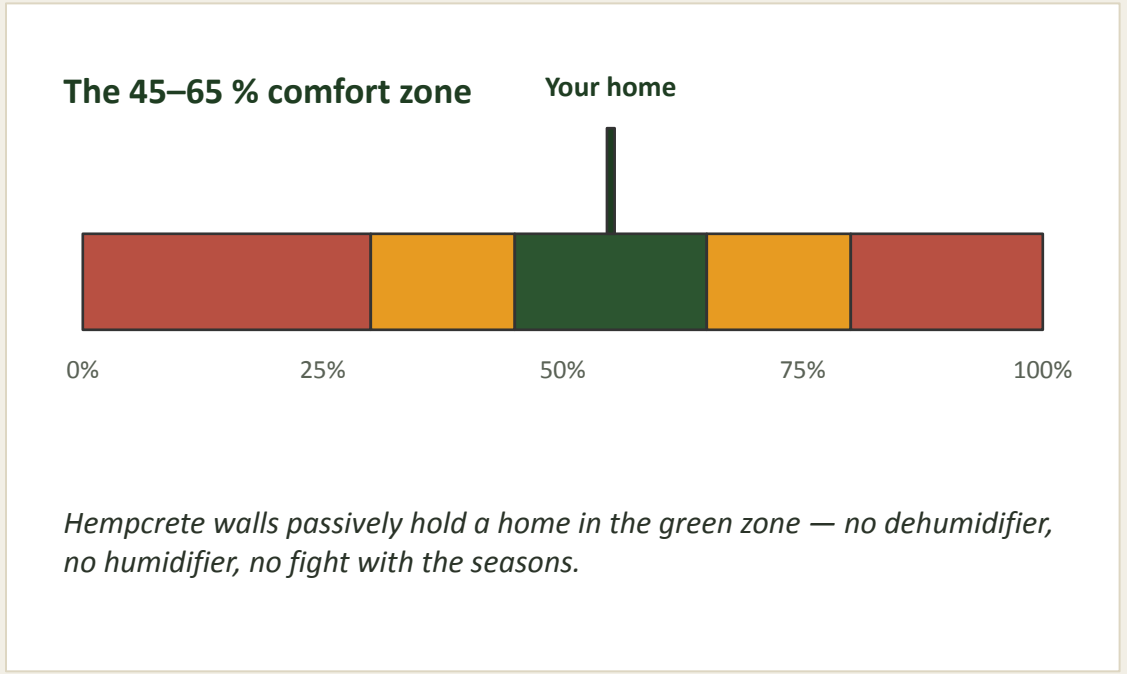
45–65 % humidity is the sweet spot for the human immune system. Less dry skin, fewer respiratory issues.

Protects the building

No condensation hidden in walls, no mould feeding on damp insulation. The wall manages its own moisture.

Less mechanical ventilation

The wall does part of the work that an HRV unit otherwise does. Lower energy use, simpler buildings.



Hempcrete walls passively hold a home in the green zone — no dehumidifier, no humidifier, no fight with the seasons.

FIRE

Fire performance — A2-s2,d0

Lime is the binder. Lime does not burn.

Euroclass

A2-s2,d0

Limited combustibility · limited smoke · no flaming droplets

No synthetic flame retardants

Performance comes from the chemistry of the lime — not from added bromine, phosphate or chlorine compounds.

Doesn't melt or drip

Unlike polystyrene insulation, hempcrete doesn't liquefy or release burning droplets.

Forms a protective char

Surface chars under fire load, slowing further burn-through and protecting structure behind.

Low smoke production

The s2 rating means smoke generation stays low — critical for occupant escape times.

PEST & MOULD

Inhospitable to pests, hostile to mould

The lime is the defence. No chemical treatment required.

Lime-rich surface — alkaline, dry, mineral.

High pH (12+)

Lime creates an alkaline environment that mould spores and bacteria can't establish in.

Low equilibrium moisture

Hempcrete keeps itself dry. Mould needs sustained moisture above 80 % to grow — hempcrete walls don't get there.

No nutrient base

Mineralised hemp shives and lime offer nothing for fungi to feed on, unlike paper-faced gypsum or cellulose.

Mice and insects avoid it

Lime irritates rodents and chewing insects. They simply don't tunnel into the wall.

No biocides needed

Performance is structural, not chemical. Nothing to leach out, nothing to wear off over time.

BENCHMARK

Hempcrete vs. the alternatives

Full-spectrum comparison against the four most-used wall systems.

	Mineral wool	PIR foam	Wood fibre	Hempcrete ✱
Thermal (λ W/m·K)	0.036	0.025	0.040	**0.075**
Moisture buffering	Low	None	Good	**Excellent**
Fire rating	A1	B/C	E	**A2-s2,d0**
VOC emissions	Possible binders	Isocyanates	Low	**Zero**
Pest & mould	Resistant	Resistant	Treatment needed	**Naturally resistant**
Loose fibres in air	Yes — irritant	No	Minor	**None**
CO_2 footprint (kg/m³)	+ 80	+ 120	− 60	**− 100**
Carbon storage	No	No	Yes	**Yes — long-term**
End-of-life	Landfill	Difficult	Compostable	**Reusable / compostable**

✱ *Per centimetre, hempcrete has a higher λ — see slides 8–11 for how a hempcrete wall still reaches and exceeds modern energy targets.*

REFERENCES

Hempcrete is already at work across Europe

Proven across Europe's full climate range — from oceanic damp to Alpine extreme.

Versailles · Île-de-France

Petite Écurie du Château

1681 royal stables · mild humid climate

The 17th-century royal stables — designed by Jules Hardouin-Mansart, now home to the École nationale supérieure d'architecture — were renovated in 2024 with 20 cm IsoHemp hempcrete blocks. Selected by the Chief Architect of Historical Monuments to manage humidity in heritage stonework without trapping moisture at material interfaces.

Loos-en-Gohelle · Nord-Pas-de-Calais

Reha-Future Engineer's House

1920 brick villa · humid mining basin

An instrumented eco-renovation on a 1920 mining engineer's villa, jointly run by Maisons & Cités and CD2E. Five years of comparative monitoring against four other bio-materials in a damp temperate climate (winters to −10 °C). Hempcrete identified as the most suitable for traditional brick housing — indoor RH stabilised in the 50–60 % range year-round.

Bessans · French Alps (Savoie)

Bessans Alpine Chalet

1,700 m altitude · −20 to +25 °C range

A timber-framed chalet at 1,700 m elevation, built by Jim's Alpine Building with 30 cm hempcrete blocks and cast hempcrete. The thermal mass and phase-shift behaviour protect against bitter Alpine winters and dampen warm-summer overheating — without active climate systems. 30 cm walls typically deliver R ≈ 4.0 m²K/W and 18–23 h phase shift.

Across temperate, humid and Alpine climates: λ 0.07 W/m·K · vapour permeability μ ≈ 5 · phase shift 18–23 h · operational range −25 °C to +35 °C.

REFERENCE PROJECT

Maisons & Cités — Europe's largest deployment

France's leading social landlord chose hempcrete after a five-year materials study.

Cité Barrois, Pecquencourt — mining-era brick housing under renovation

64,000
homes managed
Largest social landlord in Hauts-de-France

€2.4 B
rehabilitation budget
24,000 homes over 10 years

1,000
with hempcrete
Within 3 years (target)

Why hempcrete won

From 2015 onward, Maisons & Cités tested **five different bio-based insulation materials** on real mining-era brick homes — sheep's wool, cellulose wadding, flax, métisse, and hempcrete — through the Réhafutur and Rénochanvre programmes. **After more than five years of comparative monitoring, hempcrete was identified as the most suitable material for the region's traditional brick housing.**

The reason: most heritage homes in the Nord Pas-de-Calais mining basin are listed and **cannot be insulated externally**. They are also damp. Hempcrete's vapour permeability and thermal mass solved both — without the condensation risks of synthetic interior insulation.

FAQ

Frequently asked questions — the material

Six things buyers ask first.

Q What is hempcrete?

A bio-composite of three natural ingredients: hemp shiv (the woody core of the plant), a lime-based binder, and water. It sets and petrifies over time, drawing CO_2 from the air as it cures. Acts as structure, insulation, moisture buffer, and finish substrate in one.

Q Is hempcrete loadbearing?

No — but the wall is. Hempcrete is installed around a timber or steel frame which carries the vertical load of roof and upper floors. Hempcrete provides racking strength to the frame, but the frame is what holds the building up.

Q How thick should the walls be?

For Nordic residential applications, 300–400 mm is typical. Past 30–35 cm, additional thickness gives diminishing thermal returns — better to invest in roof insulation and triple-glazing.

Q How long does hempcrete last?

Modern hempcrete was developed in France in the 1980s, and the underlying chemistry — plant material bound in lime — has been used in European buildings for centuries. The high pH of the lime binder preserves the hemp shiv and the lime continues to carbonate, so the wall gets stronger with age. As long as it stays dry, the lifespan is anticipated in centuries rather than decades.

Q How does it compare to concrete?

Different categories of material. Concrete: 2,400 kg/m³, structural, no vapour permeability, high CO_2 emissions. Hempcrete: 280 kg/m³ (8× lighter), non-structural, fully breathable, carbon-negative. Hempcrete is paired with a structural frame; concrete is the structure.

Q Is it fire-resistant?

Yes. European Euroclass A2-s2,d0 — limited combustibility, limited smoke, no flaming droplets. Australian fire testing achieved FRL 73/73/73 (over 73 minutes resistance). The performance comes from the lime binder chemistry — no synthetic flame retardants needed.

FAQ

Frequently asked questions — building & living

Six things buyers and owners ask next.

Q Can it be used in renovations?

Yes — and this is one of its strongest applications. Hempcrete was originally developed in France in the 1980s to repair medieval timber-frame buildings. About half of UK Hempcrete's work is heritage. English Heritage and SPAB both recognise it for thermal upgrades to architectural heritage.

Q Will it work in cold/Nordic climates?

Yes. Used successfully in projects across France, Belgium, Germany, the UK, Czech Republic and Scandinavia. For very cold climates, designers typically increase wall thickness to 350–400 mm and combine with high-performance roof insulation and triple-glazing.

Q Is it insurable / mortgageable?

Yes. Hempcrete is approved by Zurich Insurance and complies with low/zero-carbon technical standards. In the UK, hempcrete buildings have been mortgageable since the early 2010s. Premiums may actually be lower than conventional construction due to fire and pest resistance.

Q What finishes can be applied?

All finishes must be vapour-permeable. Internal: lime plaster, clay plaster, lime/clay paint, limewash. External: lime render (typical), stone or brick cladding with lime mortar, timber cladding with vented air gap. Avoid: acrylic/vinyl/latex paints, cement render, vapour barriers.

Q Can I hang things normally?

Yes. Pictures, shelves, TV brackets, kitchen cabinets — use standard wall plugs sized for the panel thickness. Hempcrete is solid and rigid once cured, no different from drilling into masonry.

Q How do I maintain it?

Annual visual inspection of exterior render. Refresh exterior lime wash every 10–15 years. Touch up hairline cracks early using the same lime-based render. Avoid plastic-based paints, vapour barriers and cement render for any repair work.

Have a question we haven't answered? Get in touch — we love talking about hempcrete.

Inspiré

Building with nature

Reach out to know more or to discuss your project!

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Carbon-negative construction

Hemp-based bioindustry

Circular bio-economy

Regenerative processes

Industrialized building systems

Integrated material-to-building systems