

Hempcrete

Hempcrete is composed of the dried woody cores of hemp fibers, lime, and water. While some innovative load-bearing applications are being explored, the material is best suited as insulation or infill for walls.

Hazard Resilience

Wildfire



Fire-resistant
(1+ hours of exposure)

Rain and Floods



Breathable and resilient to mould

Windy



Typically used as infill, so has less influence on wind resilience

Extreme temperatures



High thermal efficiency and moderate insulation

Seismic



Flexible and lightweight, leading to seismic resilience

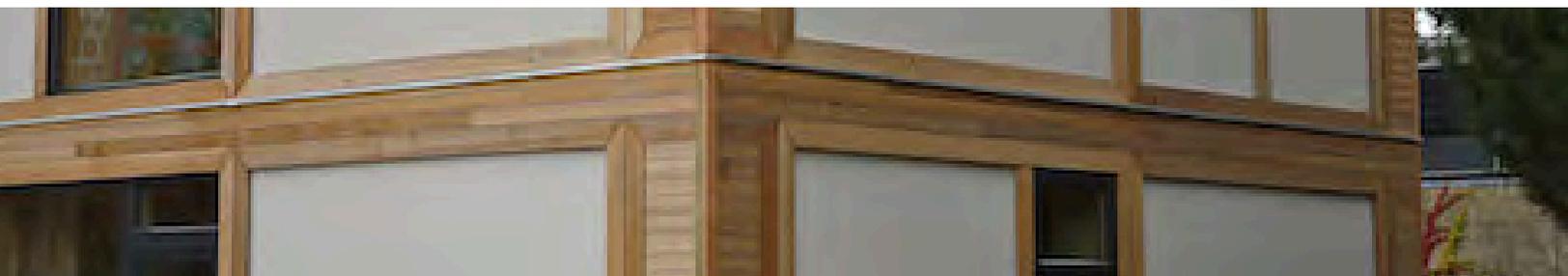
Unlike wood, hempcrete is pest-resistant. Hempcrete also has the unique ability to sequester carbon, meaning that it can be net-negative in embodied carbon emissions. The productivity of hemp crops, as well as their abundance in BC, further highlight the materials potential as a sustainable and climate resilient option. However, due to its low compressive strength, the material remains feasibly limited in its application to insulation or infill. Some builders also mention hempcrete has a social stigma associated with it. Finally, its absence in the Building Codes and Regulations further complicates its use.

As of 2025, recent and credible public estimates of costs were not available. Estimates may be available through local suppliers. Hempcrete may be more expensive than standard infill options.



Climate Resilience

Component	Straw Bale
Fire	<p>✔ High fire resistance. Hempcrete achieves a ~1-hour fire rating per 4 inches of thickness when exposed to temperatures around 1700 °F (927 °C). Its lime binder and low organic volatility prevent combustion, and it does not release toxic fumes.</p>
Floods	<p>✔ Moderate flood resilience. Hempcrete can absorb and retain water when submerged, but it generally dries out without structural damage if allowed adequate ventilation. Its high-pH lime binder resists microbial growth and decay. For flood-prone areas, breathable exterior finishes and raised foundations are recommended.</p>
Moisture	<p>✔ Highly vapor-permeable and mold-resistant. Prolonged direct contact with water should still be avoided, and breathable protective coatings are recommended in damp climates.</p>
Extreme Temperatures	<p>✔ Excellent thermal performance. Hempcrete has significant thermal mass, allowing it to moderate indoor temperature swings. Good freeze-thaw durability when properly detailed (lime binder, drainage, breathable coatings). ⚠ Thermal insulation is moderate but thicker walls enhance performance.</p>
Wind	<p>n/a - Because hempcrete is generally non-load bearing, performance depends primarily on the supporting frame.</p>
Seismic	<p>⚠ Lightweight and flexible. Hempcrete's low density reduces seismic inertia loads, and when cast around flexible timber frames, it can absorb minor movements without cracking. However, overall seismic performance depends primarily on the engineering of the structural frame rather than the hempcrete infill itself.</p>



Benefits & Risks

Aspect	Benefit of Hempcrete	Risk of Hempcrete
Environmental	Made from (renewable) hemp cores combined with lime binder, forming a low-carbon, carbon-sequestering material. Hemp absorbs significant CO ₂ during growth, and the lime binder reabsorbs CO ₂ as it cures, making hempcrete carbon-negative over its life cycle. Non-toxic, recyclable, and contributes to healthy indoor air quality.	Limited domestic hemp processing may also necessitate long-distance transport, increasing embodied emissions.
Durability	Long-lasting and resistant to mold, pests, and rot. Can dry out after moisture exposure without structural damage. Good freeze-thaw durability when properly detailed with breathable coatings.	Prolonged water exposure or poor detailing can lead to moisture accumulation and surface degradation. Requires careful design to avoid water ingress and ensure proper drying.
Energy Efficiency	Excellent thermal regulation. Combines insulation and thermal mass, maintaining stable indoor temperatures and reducing heating/cooling demand.	Insulation value is moderate compared to conventional insulations, so thicker walls are needed for equivalent R-values. Improper wall design can reduce efficiency if moisture barriers block breathability.
Economic	Can provide long-term energy savings and reduced lifecycle costs through lower heating/cooling demand. Materials are locally sourced where hemp is grown, reducing transportation emissions	Labor-intensive, with long building and drying times. Local soil and sand quality may require supplementation. Permitting and approval can be a challenge.
Social		Negative social perception & stigma due to misconceptions about the plant's legality and connections to marijuana.
Regulation & Codes	Increasing recognition and adoption in alternative building communities and others.	Still an 'alternative solution' (i.e., not formally recognized in the BC Building Code or National Building Code of Canada), requiring an engineer to sign off on its use.

Technical Feasibility

Materials:

Hempcrete is primarily composed of hemp hurds (the woody core of the hemp plant) and a lime-based binder. Lime is used for its compatibility with hemp's rapid water absorption, widespread availability, and relatively low carbon emissions compared to traditional cement. Other additives and binders such as hydraulic lime, pozzolans, or Roman cement may be incorporated to improve strength and durability for specific applications. Hempcrete can be cast in situ, formed into bricks, or used as loose fill, and is typically employed as insulation or infill in framed structures.

Lifespan:

Hempcrete buildings exhibit notable durability when properly constructed, particularly due to the antimicrobial and mold-resistant qualities provided by the lime binder. The material's vapor permeability ensures excellent indoor moisture regulation, while its resistance to pests and fire further contributes to longevity. Hempcrete's flexibility and lightweight nature also contributes to seismic resilience so long as there is suitable framing. Proper installation, drying, and detailing – such as limiting prolonged water exposure and ensuring ventilation – are crucial for maximizing lifespan and preventing durability issues.

Barriers: Building Codes & Limited Applicability

Hempcrete construction is still considered an 'alternative solution', thus requiring more extensive structural analysis and approval from engineers through the BC Building Code alternative solutions pathway. Ongoing research – such as experimental load bearing hempcrete structures and bricks – aims to expand its use, but most current applications are within infill or insulation frameworks.

Construction Methods

Hempcrete may be used as:

Non-load bearing infill Hempcrete is used as insulating, non-load bearing infill within timber, steel, or concrete frames.	Frame insulation and enclosure Hempcrete cast around or inside framed walls creates highly insulated, vapor-permeable building envelopes.	Prefabricated hempcrete blocks/panels Hempcrete can be factory-formed into pre-made blocks or panels for rapid wall assembly, often bonded with lime-based mortar.
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Compared to other building materials, hempcrete is accessible to newer builders, as its components are easy to mix and handle. However, precise techniques for batch mixing, layering, and curing are key to ensure proper strength, moisture control, and finishing. Lime binder requires careful selection and mixing; hempcrete walls must be allowed to dry thoroughly before finishes are applied, which can extend construction timelines. It may be beneficial to include a ventilated rainscreen to protect the wall base from rain and splash.

Construction can take weeks to months, depending on drying conditions and wall type. While material cost can be competitive with mid-range insulation systems, labor requirements are higher due to the need for staged mixing, casting, and curing. Advances in prefabrication and use of integrated blocks are reducing onsite labor, improving speed and quality control.

Structural & Supply Limitations

- Despite promising experimental approaches, mainstream uses remain limited to insulation or non-structural infill. Hempcrete's low compressive strength means it generally cannot be used for load-bearing applications and should be paired with a structural frame such as timber or steel.
- As an emerging material, hempcrete may lack established and consistent suppliers, leading to supply chain challenges and higher upfront material costs in some locations.
- Hempcrete is considered a non-conventional building method, so builders may face complex permitting requirements.
- Moisture management remains critical: although highly vapor-permeable, improper detailing, prolonged liquid water exposure, or use of non-breathable finishes can result in long-term durability issues or reduced performance.

Example: BaleHaus@Bath

BaleHaus @ Bath is a two-storey project made from straw and hemp cladding panels that were locally manufactured in a factory and then delivered to the site. The University of Bath's BRE Centre for Innovative Construction Materials monitored the house for two years and found it maintained heat through frigid winters, stayed dry, and had good sound insulation.

More information about BaleHaus can be found on the [ModCell website](#) and the University of Bath's [feature](#) of the building.

Note Space: *Community & Personal Knowledge*



Photo credit: Agile Property and Homes Ltd and ModCell.