Hempcrete 101: Back to the Future for Natural, Carbon-Beneficial Buildings
Thursday, June 18, 2020

The Webinar Will Begin At 1:00pm

Brought to you by: NESEA
Hempcrete 101 – Back to the Future with natural, carbon-beneficial buildings

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Co-author of The Hempcrete Book: Designing and building with hemp-lime

Tom Rossmassler, Chief Embodied Officer, HempStone
CEO of Energia
NESEA Lifetime Member, BPA/BPI, USHBA, IHBA, USGBC
Hemp hurd + Lime-based binder + Water

= Hempcrete, or Hemp-lime
“Hempcrete” / “Hemp-Lime” / “Hemp concrete”

A bio-composite walling and insulation material

(not hemp fiber insulation or lime-hemp plaster)

Bio-aggregates – Hemp, rice husk, sugar cane, coconut fiber, sunchoke, etc.

Binders – hydraulic/air lime, natural limes (NHL), formulated limes (PHL), earth binders
Hempcrete Density

Roof ~200kg/m³
(~13 lb/ft³)

Walls ~300kg/m³
(~19 lb/ft³)

~500kg/m³
(~31 lb/ft³)
Figure 4. A building with high thermal mass ‘buffers’ daytime and night-time temperature variations, maintaining a steady internal temperature and thus reducing the costs of heating or cooling the building.
Simple Cast-in-Place Hempcrete Assembly

- Wood Framing
- Hempcrete
- Plaster Base
- Plaster Finish
Simple Cast-in-Place Hempcrete Cladding Assembly

Wood Framing
Hempcrete
Air Tightness Layer
Furring Strip
Cladding
Simple
Pre-cast
Hempcrete Block*
Assembly

*Block detail based on Just BioFiber Interlocking Blocks
Poll: Pick your top 3 criteria for a construction material or assembly:

- Durability/Resilience
- Low Toxicity
- Fire resistance
- Ease of installation
- Deters insects and vermin
- Low embodied carbon eCO2
- Thermal performance
- Humidity control
- Mold resistance
- Cost
Development of the North American Hemp Building Industry

Regulatory / Permitting
Hempitecture

ASTM E84 - Flame Spread & Smoke Development Indices

Development of the North American Hemp Building Industry

ASTM Subcommittee D37.07 Industrial Hemp

WK70549 Applicability of Current Methods

WK70550 R&D Protocol Specific for Hempcrete

Just BioFiber

ASTM E119, CAN/ULC S101 Fire Resistance Rating

CAN/ULC S102 Flame Spread and Smoke Development Values

CAN/ULC S135-04 Non-Combustibility

ASTM E2357 Air Leakage

ASTM C426 Linear Shrinkage

ASHRAE 160 Mold Growth Index

Certifications: ASTM Testing+
Development of the North American Hemp Building Industry

R-Value (Static):

Hempstone Hot Box testing with UMass Amherst
## Costs & Carbon

<table>
<thead>
<tr>
<th>Costs per SF of Net Wall Area (Estimated/Rounded)</th>
<th>Conventional (2x6,Fiberglass)</th>
<th>Conventional (2x6,Cell+Polyiso)</th>
<th>HP (Double 2x4, Cellulose)</th>
<th>Hempcrete Cast 12&quot; (2x4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Sheathing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Siding (Hardie)</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Insulation</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Drywall</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Trim (Interior &amp; Exterior)</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Painting (Interior Only)</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Tapes and Membranes</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Hempcrete</td>
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<td>X</td>
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<tr>
<td>Plaster</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$20.75</strong></td>
<td><strong>$24.25</strong></td>
<td><strong>$28.50</strong></td>
<td><strong>$34.00</strong></td>
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<tr>
<td><strong>R Value (Static)</strong></td>
<td><strong>R19</strong></td>
<td><strong>R33</strong></td>
<td><strong>R40</strong></td>
<td>‘R24’</td>
</tr>
<tr>
<td><strong>Effect on Embodied Carbon (lb-CO\textsuperscript{2}e/ft\textsuperscript{2} habitable space)</strong></td>
<td><strong>+4.9</strong></td>
<td><strong>+3.3</strong></td>
<td><strong>-0.2</strong></td>
<td><strong>-1.65</strong></td>
</tr>
</tbody>
</table>

*Building calculated at 1,000ft\textsuperscript{2} (92.9m\textsuperscript{2}) using Builders for Climate Action Beta Calculator, Version 8, Analyzed by HempStone. X – BfCA beta calculator does not currently include CO\textsuperscript{2} figures for tapes/membranes, trim (wood or composite), or paint.
Resources
USHBA Established Regions

1 – WA, OR
2 – CA, NV
3 – ID, MT, WY
4 – UT, AZ, CO, NM, NE, KS
5 – ND, SD, MN
6 – OK, TX, AR, LA
7 – IA, MO, WI, IL, MI, IN, OH
8 – VT, MA, NH, CT, RI, ME, Upstate NY
9 – NY, PA, NJ, DE, MD, DC, VA
10 – KY, TN, MS, AL, GA, SC, NC
11 – FL
HEMPCRETE II

NESEA BuildingEnergy Boston Conference

AUGUST 12-14, 2020 (exact time TBD)

POLL: What more do you want to know?
Design and Construction Details
Sourcing and Supply
Cost Comparison
Carbon Calculations
US Case Studies
Testing and Certification
Regulatory / Permitting
What are your burning questions?

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