Truly Sustainable Materials

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www.hempitecture.com
Buyhempwool.com
Who we are

Hempitecture develops, manufactures, and distributes truly sustainable building materials.

Including our flagship product: HempWool® insulation.

A registered Public Benefit Corporation

“A public benefit corporation is a corporation created to generate social and public good, and to operate in a responsible and sustainable manner.” - Cornell Law School
Biocomposite Thermal Envelopes

US pioneer of this European building system.

1st Commercial “Hempcrete” build in US.

20+ projects completed to date.

No longer building with Hempcrete but can provide the materials for these projects.

Fiber Composite Insulation

1:1 Conventional insulation replacement.

Development of US raw materials supply and domestic manufacturing line.

Research and development of future products and offerings.
U.S. Facility Development

This facility is powered by 100% Renewable Energy Resources and is capable of producing over 20m sqft of HempWool/year. This factory is a blueprint that can be replicated regionally in hemp growing communities across the United States.
Climate Action & Buildings
The Problem:
The Building Sector has some issues...

- Emits 40% of greenhouse gas emissions.
- **Embodied Carbon** - Building materials require enormous amounts of energy to produce, transport and install.
- Health impacts on people and the planet - outdoor air pollution & Indoor Air Quality

Our future deserves better & healthier options!
Types of Carbon in Buildings

**Embodied Carbon**
The emissions from manufacturing, transportation, and installation of building materials.

**Operational Carbon**
The emissions from a building’s energy consumption.
Climate Action & Buildings

Leadership: Net Zero Carbon Buildings Commitment (businesses & organisations)
By 2030, existing buildings reduce energy consumption and eliminate emissions from energy and refrigerants.
By 2030, new developments and major renovations will also achieve maximum reduction in embodied carbon. Where necessary, compensate for residual emissions.

Mainstream: All buildings globally
By 2030, all new buildings, infrastructure and renovations will have at least 40% less embodied carbon with significant upfront carbon reduction.
All new buildings must be net zero operational carbon.

Advancing Net Zero Whole Life Carbon

Operational Carbon
- 1. Reduce and optimise energy demand
- 2. Generate balance from renewables
- 3. Compensate for residual emissions
- 4. Plan for deep decarbonisation

Embodied Carbon
- 1. Prevent
- 2. Reduce and optimise
- 3. Plan for the future
- 4. Compensate for residual emission

Advocate through business activities for all buildings to be net zero whole life carbon by 2050.
By 2050, all new buildings, infrastructure and renovations will have net zero embodied carbon.
All buildings, including existing buildings, must be net zero operational carbon.

2030
2050
Climate Action & Buildings

Total Carbon Emissions of All Global New Construction from 2020-2050
Business as Usual Projection

- Embodied Carbon: 80%
  - By time value @2030
- Operational Carbon: 20%

Billion kg CO₂:
- 2020: 100
- 2025: 200
- 2030: 300
- 2035: 400
- 2040: 500
- 2045: 600
- 2050: 700

hempitecture
Carbon Impact of our Materials

CO₂ per 4’x8’ wall panel at R-28

1040.60 lb CO₂ emitted

- High Density Spray Foam
- Med. Density Spray Foam
- Extruded Polystyrene (XPS)
- Expanded Polystyrene (EPS)
- Mineral Wool Batt
- Fiberglass Batt
- Denim Batt
- Wool
- Dense Pack Cellulose
- Cork
- Hemp Fiber Batt
- Hempcrete
- Straw Bale

INGREDIENTS VARY

1. Material Extraction
2. Manufacturing
3. Transit
4. Use
5. End of Life

EMISSIONS INFLUENCED LARGELY BY SOURCE ENERGY TYPE
The AEC community is now evaluating the broader impacts materials have on our environment:

- Although recognized as a more “sustainable” material, mineral wool takes a large amount of resources (i.e., extraction and heat energy) to manufacture.
- The embodied carbon impact of MW is significantly higher than other insulation.
- **Bio-based materials** sequester carbon & can have a negative carbon footprint

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**Why Hemp?**

**Wall Cavity & Attic Insulation**

- Aerogel blanket R 9.6/inch: 4224 kg CO₂e/m²
- Closed cell spray foam (HFC blowing agent) R 6.6/inch: 3013 kg CO₂e/m²
- Closed cell spray foam (HFO blowing agent) R 6.6/inch: 380 kg CO₂e/m²
- Mineral wool batt R 4.0/inch: 608 kg CO₂e/m²
- Open cell spray foam R 4.1/inch: 380 kg CO₂e/m²
- Wool batt R 3.6/inch: 296 kg CO₂e/m²
- Fiberglass blown-in R 2.6/inch: 154 kg CO₂e/m²
- Fiberglass batt R 3.6/inch: 154 kg CO₂e/m²
- Hemp fiber batt R 3.7/inch: -182 kg CO₂e/m²

Insulation emissions based on 100 m² (at R-13)
The Solution:
U.S. grown and manufactured, plant-based building materials that address both embodied energy (carbon) and operational energy (carbon).

While at the same time...

- Creates local manufacturing & agriculture jobs
- Shortens supply chains
- Cleans the soil, air & water
Why Hemp?
Biomass fibers from rapidly-renewable industrial hemp is our key ingredient.

- High yield/acre
- Low fertilizer & water use
- Inexpensive & abundant natural fiber
- Regenerative to soil
- Multiple value add-products
- Suited to American farming climate

Industrial Hemp Offsets up to 9.8 tons of CO₂ / acre
(Or approx. 2+ cars’ emissions)
Meet HempWool®

A healthy, natural fiber batt insulation that contributes to high performing, energy efficient habitats. Made from 90% industrial hemp fiber, HempWool has a low carbon footprint, is safe to handle, and is extremely durable. Installing HempWool is simple, making it even easier to choose health and high performance for your next project.
Why HempWool?

**NO VOC's. NO TOXINS.**

Your healthy home starts right here with HempWool®. Insulation is one of the last things on your mind when building your home, and this leads to unhealthy, toxic materials being snuck into your walls. Be proactive and don’t settle for the competitors, get the healthiest insulation money can buy.

**SAFE TO TOUCH**

If you wouldn’t touch a product with your hands, why would you cover all of your home with it? HempWool is 90% hemp fiber and 10% binder. Due to its simple composition and non-toxic additives, it is safe to touch and handle without gloves, while giving you peace of mind.

**BETTER PERFORMANCE**

The pressure fit system that keeps HempWool in place with no slumping or sagging means better overall performance. HempWool will help reduce your heating and cooling costs. the high thermal inertia of HempWool makes it a phase-shift resistant material, keeping the home comfortable all year round.
## Why Hemp?

<table>
<thead>
<tr>
<th>R Value</th>
<th>Depth</th>
<th>Panel Length (In)</th>
<th>Panel Width (In)</th>
<th>Price per SqFt</th>
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</thead>
<tbody>
<tr>
<td>R7</td>
<td>2&quot;</td>
<td>48&quot;</td>
<td>15.25&quot; (16&quot; OC) / 23.25&quot; (24&quot; OC)</td>
<td>$0.89 / sqft</td>
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<tr>
<td>R13</td>
<td>3.5&quot;</td>
<td>48&quot;</td>
<td>15.25&quot; (16&quot; OC) / 23.25&quot; (24&quot; OC)</td>
<td>$1.19 / sqft</td>
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<tr>
<td>R20</td>
<td>5.5&quot;</td>
<td>48&quot;</td>
<td>15.25&quot; (16&quot; OC) / 23.25&quot; (24&quot; OC)</td>
<td>$1.69 / sqft</td>
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<tr>
<td>R28*</td>
<td>7.5&quot;</td>
<td>48&quot;</td>
<td>15.25&quot; (16&quot; OC) / 23.25&quot; (24&quot; OC)</td>
<td>$2.39 / sqft</td>
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</table>

Hemp insulation is a 1:1 replacement for traditional insulation.
Distribution & Warehousing

5 Distribution warehouses across the US, including our Idaho Manufacturing Facility. There are more to come!

HempWool can be purchased directly from buyhempwool.com or through our sales team sales@hempitecture.com
## Technical Data Sheet
(Soon to be updated!)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Property</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C209</td>
<td>Density of insulation</td>
<td>2.18lbs/ft³ / 35Kg/m³</td>
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<tr>
<td>ASTM C518</td>
<td>Thermal Resistance</td>
<td>R3.7/in</td>
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<tr>
<td></td>
<td>Thermal Conductivity</td>
<td>0.040W/m.K</td>
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<tr>
<td>ASTM E1354</td>
<td>Vapor Permeability</td>
<td>0.647 Perms / 37ng/Pa.s.m²</td>
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<tr>
<td>ASTM E96-E96M</td>
<td>Water Vapor Transmission Performance</td>
<td>Not a vapor barrier (Above 60ng)</td>
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<tr>
<td>ASTM C1338-19</td>
<td>Microbiological Resistance to Fungi</td>
<td>No fungi growth</td>
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<tr>
<td></td>
<td>Ignition Time</td>
<td>6.67 sec.</td>
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<tr>
<td></td>
<td>Average Heat Release Rate</td>
<td>5.74 (BTU/s/ft²)</td>
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<tr>
<td></td>
<td>Total Heat Release</td>
<td>642.8 (BTU/s/ft²)</td>
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<tr>
<td></td>
<td>Heat Release Maximum Rate</td>
<td>10.98 (BTU/s/ft²)</td>
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<tr>
<td></td>
<td>Total Smoke Release by Surface Unit</td>
<td>217.26 (ft²/lb)</td>
</tr>
<tr>
<td>ASTM E84</td>
<td>Surface Burning: Smoke Developed / Flame Spread</td>
<td>350 / 315 (index)</td>
</tr>
</tbody>
</table>

[Image: USDA Certified Biobased Product]
Research & Development

TEST REPORT FOR HEMPITECTURE INC
Report No.: 105075333SAT-001
Date: May 31, 2022

SECTION 2
SUMMARY OF TEST RESULTS

Specimen I.D.: HempWool – FR27

ASTM E84 Test Results

<table>
<thead>
<tr>
<th>FLAME SPREAD INDEX</th>
<th>SMOKE DEVELOPED INDEX</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>110</td>
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</tbody>
</table>

*See Section 8 for additional information and commentary

SECTION 3
TEST METHOD

The specimen was evaluated in accordance with the following:
ASTM E84-21a, Standard Test Method for Surface Burning Characteristics of Building Materials

There were no deviations from the requirements prescribed in ASTM E84-21a.
split wall test between fiberglass and hempwool wired up with humidity, temperature, and heat flux sensors. The HempWool side had less energy escaping through the wall. A fuller case study with the data published is forthcoming!
PlantPanel is a continuous insulation sheathing material used to eliminate or reduce thermal bridging in exterior building material envelopes.

It is clad to the exterior of a new or existing structure. Made with 60% plant based content, this product is ideal for retrofitting homes or buildings. It can be used alone or in conjunction with HempWool insulation.

PlantPanel is a new product addition to Hempitecture’s product line. It is treated with biobased fire retardants to improve fire resistance.
Product line development

PlantPad

PlantPad is a natural fiber carpet underlayment material.

This material is made at a contractor grade density with no added chemicals, is VOC free, and Red List Ingredient Free.

It is used to replace conventional carpet pad materials that are made with synthetic foams.

Over time, synthetic foam material breaks down and becomes airborne, causing indoor air pollution. PlantPad is a sustainable, biobased alternative.

Coming soon
FiberFill is a product that Hempitecture has developed in conjunction with funding from NYSERDA. This loose fill insulation material is 100% plant based. Consisting of virgin and recycled plant fiber, it is in a blowable form that is ideal for attic retrofits.

FiberFill will be commercialized in 2023 with a new location in New York State as the primary production facility for FiberFill.

The material is treated with biobased fire retardants to improve resistance to fire, while remaining nontoxic and high performing.
Installing Hemp Insulation
How to Install HempWool®
Installing Hemp Insulation
Installing Hemp Insulation
Installing Hemp Insulation
Healthy Materials belong in our Buildings

Research and Incentives for energy efficiency improvements through the Inflation Reduction Act & Beyond
IRA Resources Database

This database is intended to serve as a resource hub for non-federal actors looking to understand and access the climate provisions of the Inflation Reduction Act (IRA).

Updated regularly, the database collects in one place helpful summaries, guidance, tools, and analysis created by the federal government and climate community pertaining to the multitude of tax credit, grant, and loan opportunities in the IRA. Structured searching and filtering allow for quick navigation.

Access this database here.
How You Can Save Money

From making home weatherization and efficiency upgrades, to installing new electric appliances, to purchasing an electric vehicle or rooftop solar system – learn how the Inflation Reduction Act will help cover the costs and save you money each month on your bills.

Hover over each circle to learn about the upgrades available, and scroll down for details on how these rebates and tax credits can be applied during each tax year.
Federal Income Tax Credits and Incentives for Energy Efficiency

EnergyStar provides information about federal tax credits for energy-efficient home improvements, such as insulation, windows, and HVAC systems. It outlines the eligibility requirements, the amount of the tax credit, and the expiration dates for each category of qualifying improvements. The page also includes links to additional resources and guidance for homeowners who want to take advantage of these tax credits:

Click here to learn more.
Renew America's Nonprofits

The Renew America's Nonprofits program—referred to in President Biden's Bipartisan Infrastructure Law as the Energy Efficiency Materials Pilot Program—will reduce carbon emissions and lower utilities costs at buildings owned and operated by 501(c)(3) nonprofits, allowing critical funds to be redirected to mission-focused work.

Learn more here.
BETTER BUILDINGS INITIATIVE

The Better Buildings Solution Center is a resource for building owners and operators to find energy-efficient solutions for their buildings. It offers case studies, best practices, and technical assistance to help organizations reduce energy consumption and save money:

Learn more here.
Additional Resources to learn more about Healthy and Carbon Smart Materials:

- Parsons New Schools (NY)
  [Healthy Materials Lab](#)

- Rocky Mountain Institute (RMI)

- [EMBODIED CARBON CITIES POLICY TOOLKIT](#)
EPA put out an RFI for Sustainable Marketplace/Environmentally Preferable Purchasing Program (Due May 1st)

Request for Information (RFI) to Support New Inflation Reduction Act Programs to Lower Embodied Greenhouse Gas Emissions Associated with Construction Materials and Products

Posted by the Environmental Protection Agency on Jan 25, 2023

Access the RFI Here
Climate Action & Buildings

Passive House — A Record of Success

- Average NYC MF Building
- 2012 IECC
- 2015 IECC
- 2018 IECC
- Passive House

Energy Use Intensity (kBTU/sf/yr)

Colorlegend:
- Yellow: Lighting & Appliances
- Red: Heating
- Gray: Ventilation
- Blue: Cooling
- Pink: Hot Water

data analysis: Steven Winter Associates

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