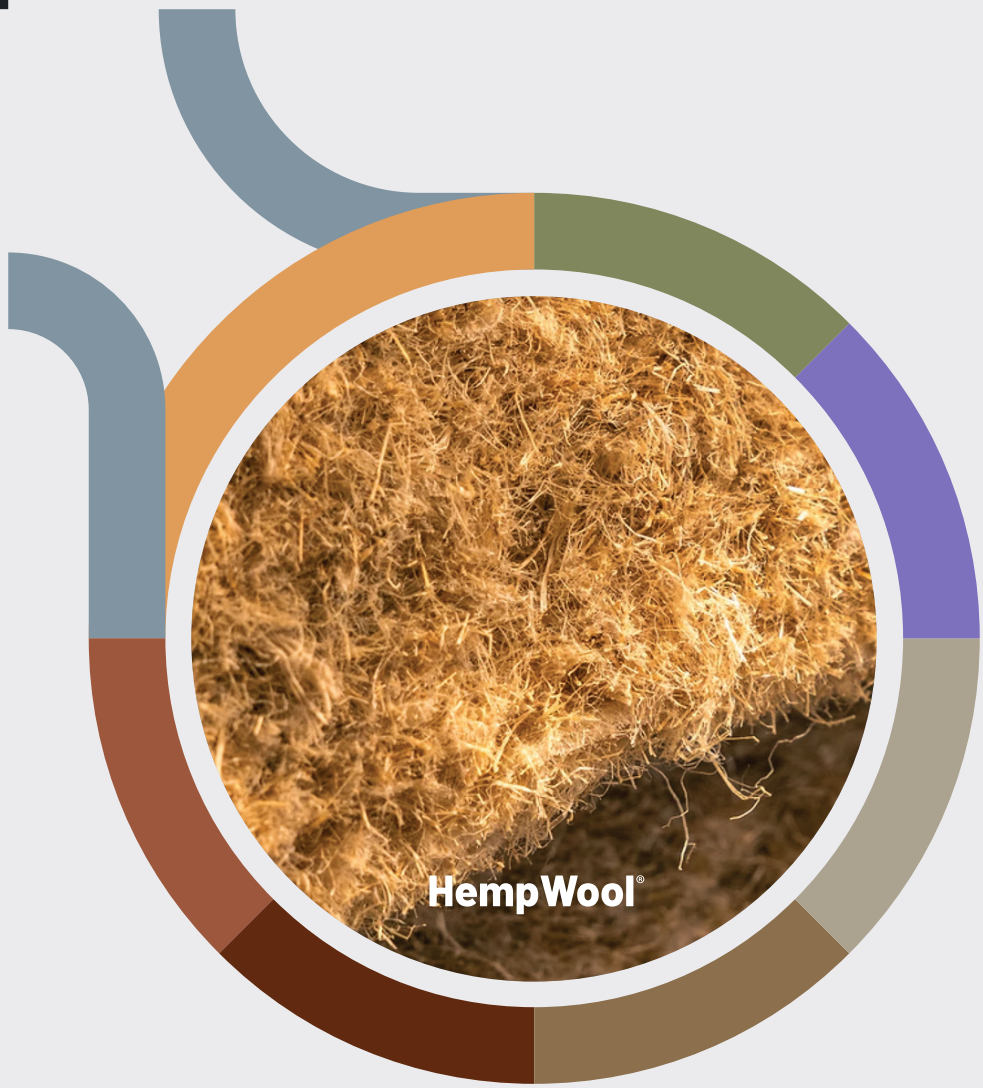


HEMPITECTURE.COM

hempitecture®

LIFE CYCLE ASSESSMENT

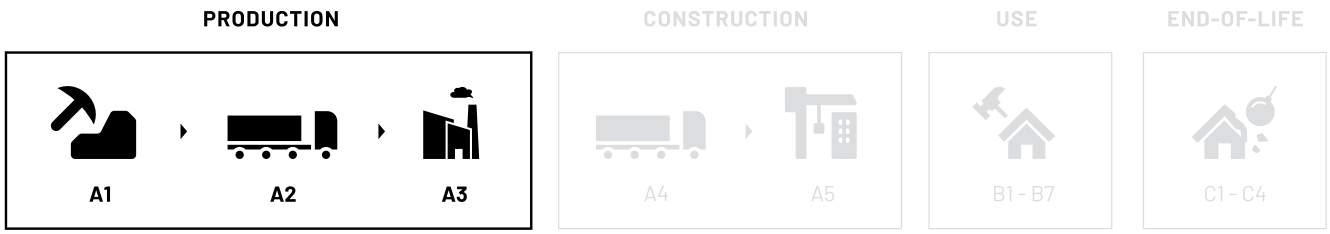
by **Integrated Design Lab - University of Idaho**
Farnaz Nazari, PhD

Product name: HempWool®
Declared product: Thermal Insulation bat, Density 40 kg/m3
Declared unit: 1 m2 of HempWool® insulation batt with a thickness providing RSI-1 (m^2·K)/W
In accordance with: ISO14040, 14044, EN 15804 + A2, and ULC 703.
Software tool: OpenLCA 2024
Background data: Ecoinvent v 3.10
Foreground data: Hempitecture Inc.

Introduction

This report provides detailed documentation of the methodology, procedures, and technical information used, offering a transparent Life Cycle Impact Assessment of Hempwool® to obtain an Environmental Product Declaration (EPD). The LCA is based on the product being produced during June 2023- May 2024 at Hempitecture facility located at 421 E 500 S Ste 100, Jerome, ID. The product is 92% Industrial hemp fiber and 8% low melting polymer as a binder.

This LCA is conducted at the Integrated Design Lab, University of Idaho. In line with Hempitecture's mission to promote environmentally responsible decision-making and transparency, a summarized version of this LCA will be publicly available. OpenLCA software tool, combined with the Ecoinvent v 3.10 database are utilized for this LCA, ensuring compliance with ISO 14040, ISO 14044, EN 15804: 2012+A2:2019/AC:2021, and ULC 703 standards.



System Boundary

This LCA utilizes Cradle-to-Gate system boundary, which encompasses the initial phases of HempWool's lifecycle, specifically, A1 to A3. This includes the cultivation of hemp, post-harvest processing of hemp fibers, production of the polymer binder, transport of these input materials to the manufacturer site, manufacturing the insulation batts, and lastly packaging.

The reported impacts include both fossil fuel based and biogenic carbon with the -1/+1 approach following EN 15804 +A2 calculation method and are reported separately.

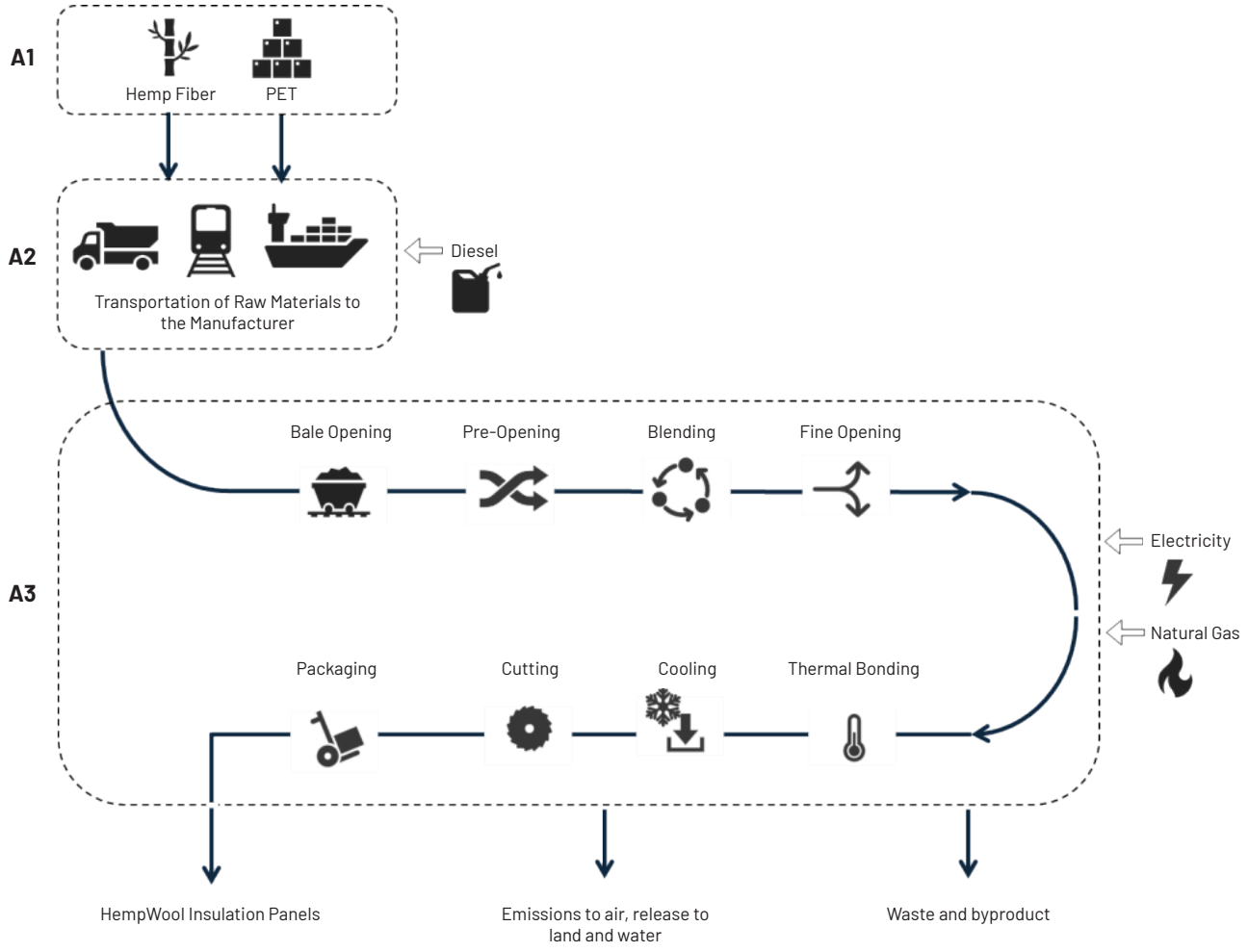
The energy (electricity and natural gas) required to transform the input materials into the output Hempwool® product is the average annual values from June 2023 to May 2024 and is captured under Stage A3 according to their source. Additionally, the energy usage used for post-harvest processing of hemp is taken into account.

Life Cycle Inventory Analysis

Inventory data are taken from the Ecoinvent v 3.10 database, and the allocation at the point of substitution (APOS) is selected to align with the rules specified in EN 15804. The foreground data, including agricultural inputs and outputs, as well as manufacturing details, are obtained from the hemp supplier and Hempitecture technicians, and are supplemented with bibliographic sources when necessary.

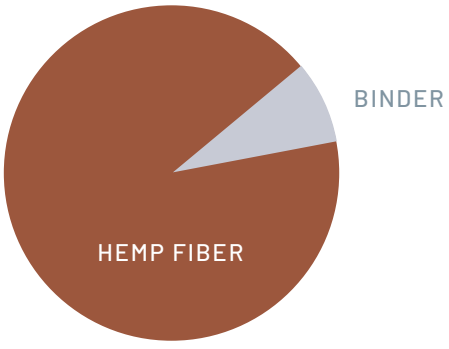
Product System

For a better understanding of the considered flows and processes a schematic of the product system is provided.



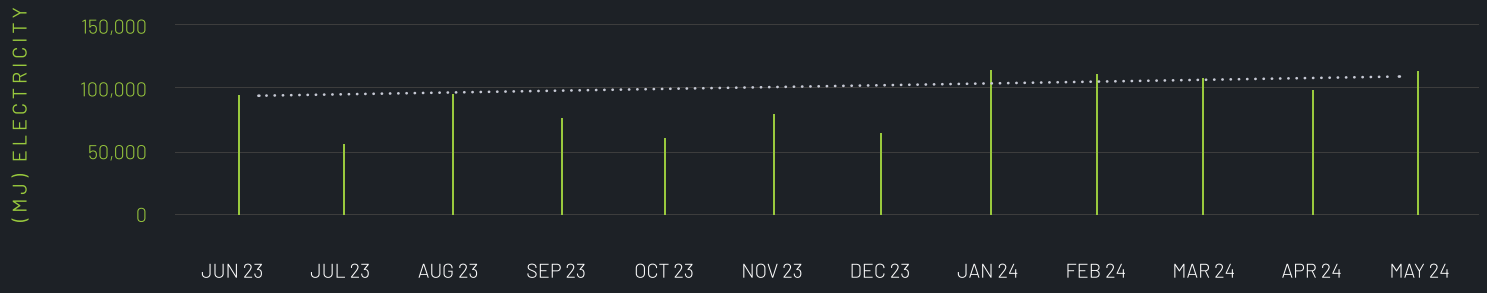
Material Composition and Transportation

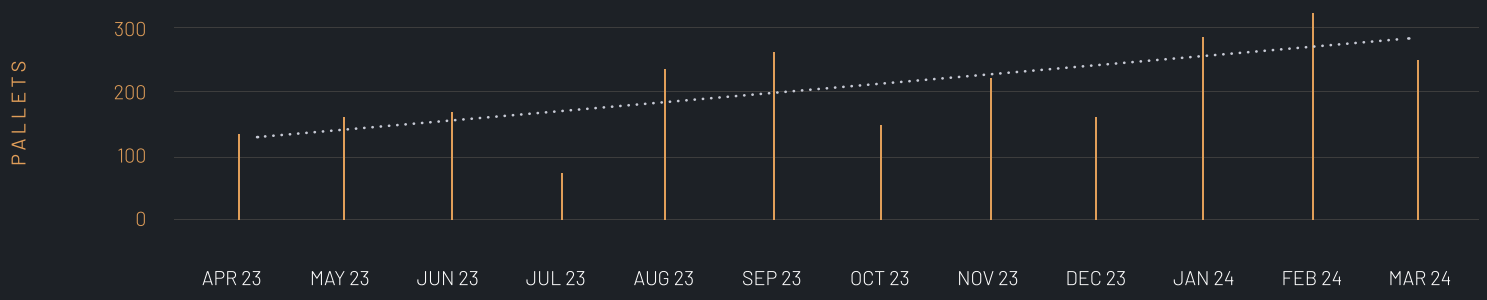
The material composition includes 92% hemp fiber, with the supply sourced equally from Montana and Idaho, each contributing 50%, and 8% PET.



Biogenic Carbon Storage

A key factor in enhancing carbon capture within Hempitecture's A3 Cycle is boosting operational efficiency. By producing more product per shift without significantly increasing energy usage, Hempitecture captures more carbon. Our operational efficiency is steadily improving, leading to greater biogenic carbon storage.



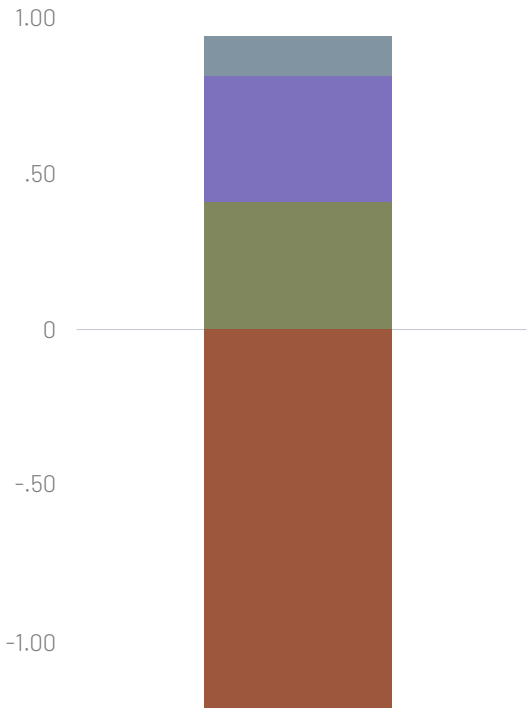


MATERIAL COMPARISON FOR GLOBAL WARMING POTENTIAL

Comparatively, hemp insulation is one of the greatest opportunities to reduce embodied carbon in thermal insulation that is commercially available today. Expanded Polystyrene (EPS) has nearly a **500% increase** in carbon emissions over HempWool insulation.

HempWool Thermal Insulation is conclusively Carbon Negative.

1m² of HempWool @ 1 RSI = -.251343 Kg / m² of CO^2 stored



.108023
Packaging

.422294
Transportation

.425181
Manufacturing Natural Gas

-1.206841
Hemp Cultivation

With our Sustainability Action Plan, Hempitecture intends to achieve **Net Zero**, and will continue to expand upon the carbon drawdown figure through sustainable agriculture practices, operational efficiency, and proximity principle raw material sourcing.