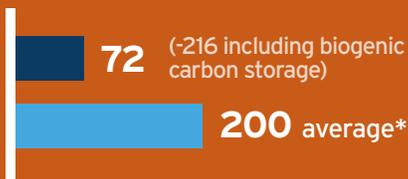


Case Study: Cross Cabin

Inspired by Michael Pollan's Food Rules, the Cross Cabin is a project that was inspired by a mission to build with real materials, not too many, mostly plants. The project is a 1,000SF two-bed, two-bath home with a structural and thermal enclosure built entirely from plant-based materials: cross-laminated timber, insulating cork cladding, and hemp batt and wood insulation. The emphasis on natural, plant-based materials dramatically improved the home's carbon impact, and, beyond carbon, these materials created a home that looks different, smells different, sounds different, and simply feels different than a conventional home. Equally notable with the house are the materials not present: no concrete, no drywall, no fiber cement siding or stucco, no foam insulation, and no latex paint.

Embodied Carbon

Cradle-to-gate, kg CO2e/m²



*Average based on report from 2022.

Reduction Strategies



Use of steel helical pile foundations to eliminate need for concrete



Exclusively used carbon storing bio-based insulation



Utilizing bio-based materials that can serve more than one purpose

Carbon Storage



Amorim MDF facade
Cork Insulation



HempWool Batt
Insulation



Rigid Wood Fiber
Insulation Board



Cross-laminated
Timber Panels

30 tons of CO₂ stored



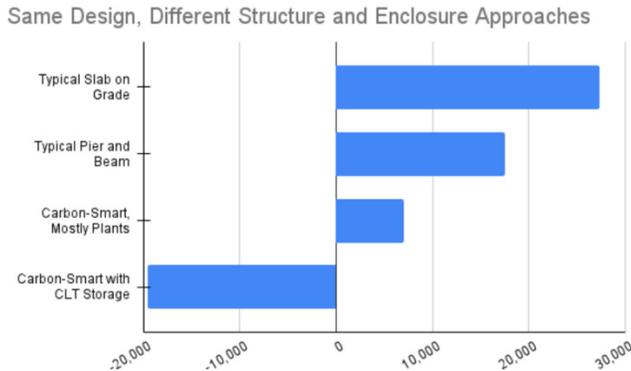
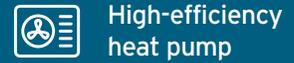
Image credit: © Casey Woods Photography



Natural, plant based materials can transform both the carbon impact and sensory experience of a home. Carbon-smart homes smell great!

Greg Esparza, Homeowner or Founder, Cross Cabin Build & Supply

Operational Carbon | Our operational carbon strategy included the following: Utilizing all electric appliances and heating systems including a heat pump washer/dryer combo, and a high efficiency heat pump AC. Installing a self-adhered air barrier and continuous insulation around the entire enclosure eliminated thermal bridges and improved air tightness for a resulting home's air tightness result of 1.5ACH.



MATERIAL CARBON RESULTS			
	MCE		MCI (Conditioned)
Net Project Emissions	27,369 kg CO ₂ e		295 kg CO ₂ e/m ²
MCI by Area Type	Metric	Imperial	Storing Great Good Avg High
Total Area	242.3	49.6	
Conditioned Area	294.6	60.3	
	kg CO ₂ e/m ²	lb CO ₂ e/ft ²	≤-100 0 100 200 300s
	MCE		MCI (Conditioned)
Net Project Emissions	17,543 kg CO ₂ e		189 kg CO ₂ e/m ²
MCI by Area Type	Metric	Imperial	Storing Great Good Avg High
Total Area	155.3	31.8	
Conditioned Area	188.8	38.7	
	kg CO ₂ e/m ²	lb CO ₂ e/ft ²	≤-100 0 100 200 300s
	MCE		MCI (Conditioned)
Net Project Emissions	7,060 kg CO ₂ e		76 kg CO ₂ e/m ²
MCI by Area Type	Metric	Imperial	Storing Great Good Avg High
Total Area	62.5	12.8	
Conditioned Area	76.0	15.6	
	kg CO ₂ e/m ²	lb CO ₂ e/ft ²	≤-100 0 100 200 300s

The motto was simple: build with real materials, not too many, & mostly plants.

The team pursued a Carbon Smart Approach where many design and material choices reduced carbon emissions and increased carbon storage. Compared to a baseline building with typical slab on grade with concrete pier foundations, steel helical piles were used which eliminated the need for concrete on the project. The total material carbon footprint was reduced even further by choosing carbon-storing biobased materials like cork insulation, hempwool batt insulation, rigid wood fiber insulation board, cross laminated timber panels, and natural wood flooring. Even more, the bio-based materials that can serve multiple functions (e.g. CLT as structure and exposed as the ceiling, cork cladding as insulation and interior finish) reducing the need for additional finishes and coverings. The total material emissions including biogenic carbon storage resulted in a net carbon-storing building at -19,592 kg CO₂e.



Lessons Learned

1. Sticking exclusively with plant-based insulation materials significantly reduces a building's carbon impact.
2. A panelized construction approach like CLT, has advantages relative to speed of construction.
3. Steel helical piles can increase the speed of installation and minimize or eliminate concrete making a huge difference in overall embodied carbon intensity.

Project Information

Project name: Cross Cabin
Location: Austin, TX
Builder: Moontower Design Build, Cross Cabin Build & Supply
Year Built: 2023
Typology: Single Family Home
Size: 1,000 SF CFA / 1,240 SF GFA / 2 bed / 2 bath
Cost: \$250,000 - \$500,000

Image credit: Greg Esparza