

Why We Like Hempcrete

The goal of environmentally conscious building design is to create buildings that create a healthy indoor environment while supporting a healthy outdoor environment. The best way to accomplish this goal is through combining cutting edge building science with what are commonly called “natural building” practices.

High performance building science allows us to create buildings that use almost no energy to run, therefore reducing the size and price of the renewable energy system required to produce on site all the energy required to run the building. The natural building perspective helps us utilize natural, local, and site-harvested materials that have a very low embodied energy, therefore lowering the carbon and pollution footprint of the building during construction. Together, these two strategies allow us to reach the threshold of carbon neutrality, a building that does not contribute to our current climate change problems.

On the natural building side, we feel that earthen mixes don't have adequate thermal performance while the vulnerability of straw bales to water damage concerns us. On the high-performance commercial side, we are skeptical of the long-term durability of SIPS walls and feel that double stick frame systems are too complex and prone to air infiltration weaknesses. These and other problems have been solved by what to us is a new material: Hempcrete.

Hempcrete is a mixture of industrial hemp shiv and lime-based binder. When used in walls, it is either spray applied or placed in forms in or around a skeletal structure, such as a timber or steel frame. The resulting wall system has many of the benefits of common natural building applications, such as straw bale or clay-slip straw, with the quality control of mass-production and the durability provided by coating cellulose with lime. Some of the benefits of Hempcrete for our application are:

1. **High thermal resistance.** The normal Hempcrete mix has an R-value of 2.4 per inch. This is superior to straw bale construction and any earth and straw mix. Due to reduced thermal bridging, it is also most likely superior on a per inch basis to conventional stick frame systems with cellulose or fiberglass insulation.
2. **Adjustable thickness.** Though Hempcrete is presently not considered a structural material it is strong enough to constitute the interior and exterior substrate for finishing materials. This means that the thickness of a Hempcrete wall is adjustable independent of the thickness of structural wall members. Therefore, a Hempcrete wall can be adjusted to meet the thermal requirements of any given climate.
3. **Low air infiltration.** Hempcrete is a relatively dense material that either surrounds or sits in front of or behind the structural system of a wall. This means that a Hempcrete wall will be inherently quite air-tight. Low air infiltration is a pivotal component of our performance strategy.
4. **Hygroscopic characteristics.** In building, a “hygroscopic material” is

something that can absorb water. Lime and Cellulose, in this case Hemp Shiv, work together to create a wall that can take on and give off water in response to changing humidity levels in the air. This is called a “breathable wall” system and is a great boon to indoor air quality and wall durability. Plastered straw bale walls are “breathable” in this way. The lime in Hempcrete will protect the hemp from molding, therefore creating a breathable wall that can be part of a healthy indoor air strategy in a humid climate.

5. **Substrate for lime and earth plasters.** Hempcrete is a great substrate for earth and lime plasters. No manufactured laths or synthetic vapor barriers are required. This greatly simplifies construction, reducing labor and material costs for plastering.
6. **Accommodates different structural systems.** Our preference is to build structures that will last many hundreds of years. Our approach for doing this is to create a post and beam structure using masonry columns and wooden beams. This system requires an insulation material that wraps the exterior of the structural members and therefore must be able to stand up on its own. Hempcrete can do this. At the same time, this structural system is more expensive, so for smaller budgets we need to be able to use a simpler structure. Hempcrete also works well with the simplest structural system around: the wooden stick-frame.
7. **Durable and Recyclable.** Hempcrete will create a very durable wall. However, when the building lifecycle has finally come to an end, Hempcrete can be re-used, either as a building material or perhaps a soil amendment. Regardless, there will be no reason to take it to a land fill; something that can't be said for most modern materials.
8. **Beauty.** Most people respond very positively to thick walls and rough plastered finishes. It seems to us that this combination is an aesthetic archetype. Hempcrete delivers this aesthetic not as an add-on or afterthought, but as an inherent part of its form.