CARBON NEGATIVE & SUSTAINABLE

HEMPCRETE
HEMPCRETE OR "HEMP-LIME" – A RECENT DEVELOPMENT

- The rediscovery and use of hempcrete (1986 France) follows from discoveries on European structures hundreds of years old.
- Hempcrete is formed from 3 fundamental constituents - hemp hurds (4 parts), lime (1 part NHL) and water (1 part).
- Hemp hurds uniquely concentrate silica. Lime has an affinity for binding with silica.
- Hempcrete does not "set" like cement but pulls carbon from the air (Carbonation) for decades as the lime turns back to stone.
HEMPCRETE - ESSENTIAL QUALITIES

- Carbon negative
- Mold resistant & Hygroscopic - Affinity for water
- Fire and Pest resistant
- Locally sourced & 100% Recyclable
- Healthy indoor air environment
- Versatile formed construction method
- Thermal mass & acoustic dampening
- R value > 2 per inch achievable!!
**HISTORY & STATUS OF HEMP**

- Important crop in colonial America and particularly Pennsylvania for fiber and seed
- Critical to hundreds of products & found in tens of thousands
- Curious path to illegality in 1937 improperly tied to Marijuana. Hemp is < 0.3% THC vs 7+%
- Hemp Products legal today but hemp cultivation illegal pushing hemp jobs overseas & raising raw prices in the US
- US imports > $500 million in hemp products from Canada
- PA about to open door to hemp cultivation again. SB 50 & HB 967

University of Bath - Hemp Hurd Xylem
HEMP IN AGRICULTURE

- Fast growing & dense - suppressing weeds
- No pesticides/herbicides required
- Conventional farm equipment
- Suitable as a cover crop or in rotation - soil friendly
- Yields oil seeds, fiber & hurds with thousands of uses. Profitable $
- Food, fiber, medicine, bio-oil uses

Hemp Hurds
HEMP AS A BUILDING MATERIAL

- Hemp sequesters Carbon for the life of the structure.
- Each cubic meter of Hemp-Lime sequesters up to 150 kg of CO2.
- 12" monolithic walls can have an R-28+ value depending on the mix.
- Cast in forms on-site, sprayed or factory pre-formed off-site
- Interior & exterior finishes should be breathable. Direct application of plasters and stucco simplifies construction.
- Slow curing hempcrete can be reworked or patched over days.
- Issues/Concerns - Not structural (for now) & requires time to cure
HEMPCRETE

LIME AS A BUILDING MATERIAL

- Lime production uses about 1/3 the energy required for Portland cement but remains Carbon positive. (Portland cement production alone = 5% worldwide greenhouse gas pollution)
- Purely natural - Lime based plasters, paint, stucco
- Mold resistant due to high pH (12)
- Fire retardant and durable - UV damage immune
- High porosity & high permeability means structures breathe avoiding condensation
- Minimizes moisture, bacteria, mold and mildew from the building envelope
- Self-healing - small cracks resolve on their own

The Lime cycle
WHAT IS THE FUTURE?

- PA legislative approval required for hemp.
- Push back comes from the Law Enforcement Associations and the “For Profit” prison systems.
- Access to seed and guidance from PSU
- Hemp processing facilities re-established
- Building code updates and more real world experience. We need hempcrete houses in PA.
- Continued development and refinement of the mixes and methods

Questions!
TOP TEN : HEMP HOUSE IN NUMBERS (partially edited from “Bringing It Home” by Booker & Johnson)

1 - One hemp house = 10 acres of trees. One hemp house can sequester the same amount of carbon as ten acres of trees.

14 - Number of weeks it takes to grow enough industrial hemp on 2.5 acres to build a 1,250-sq-foot house

22 - Number of feet thick a stone wall would have to be to equal the R-value of a 12” Hemp-Lime wall

60% - Amount former Asheville Mayor Russ Martin and his wife Karen Korp saved on their homeowner’s insurance after moving into their hemp house

$100 - Cost of Martin-Korp House energy bill for a 3,400 sq ft home in the winter in the mountains of NC

$133 - Cost per square foot to build America’s First Hemp House in Asheville, N.C. Domestic production could cut the price tag in half.

500 - BILLION. Estimated potential of the current market for Industrial Hemp. When you buy or sell hemp products, you help make this a reality.

700 - Number of years the average Hemcrete building is expected to last.

2,500 - Lbs. of industrial hemp are needed to produce the same amount of THC found in one marijuana cigarette.