

# CIRCULAR BUILDING WITH HEMP

architecture:  
Werkstatt (Eindhoven, NL)  
www.werkstatt.nu

contractor:  
Agricola Bouw (NL)  
www.agricolabouw.nl

hemp advisor & supplier:  
Hemp Eco Systems (SUI)  
www.hempandlime.com

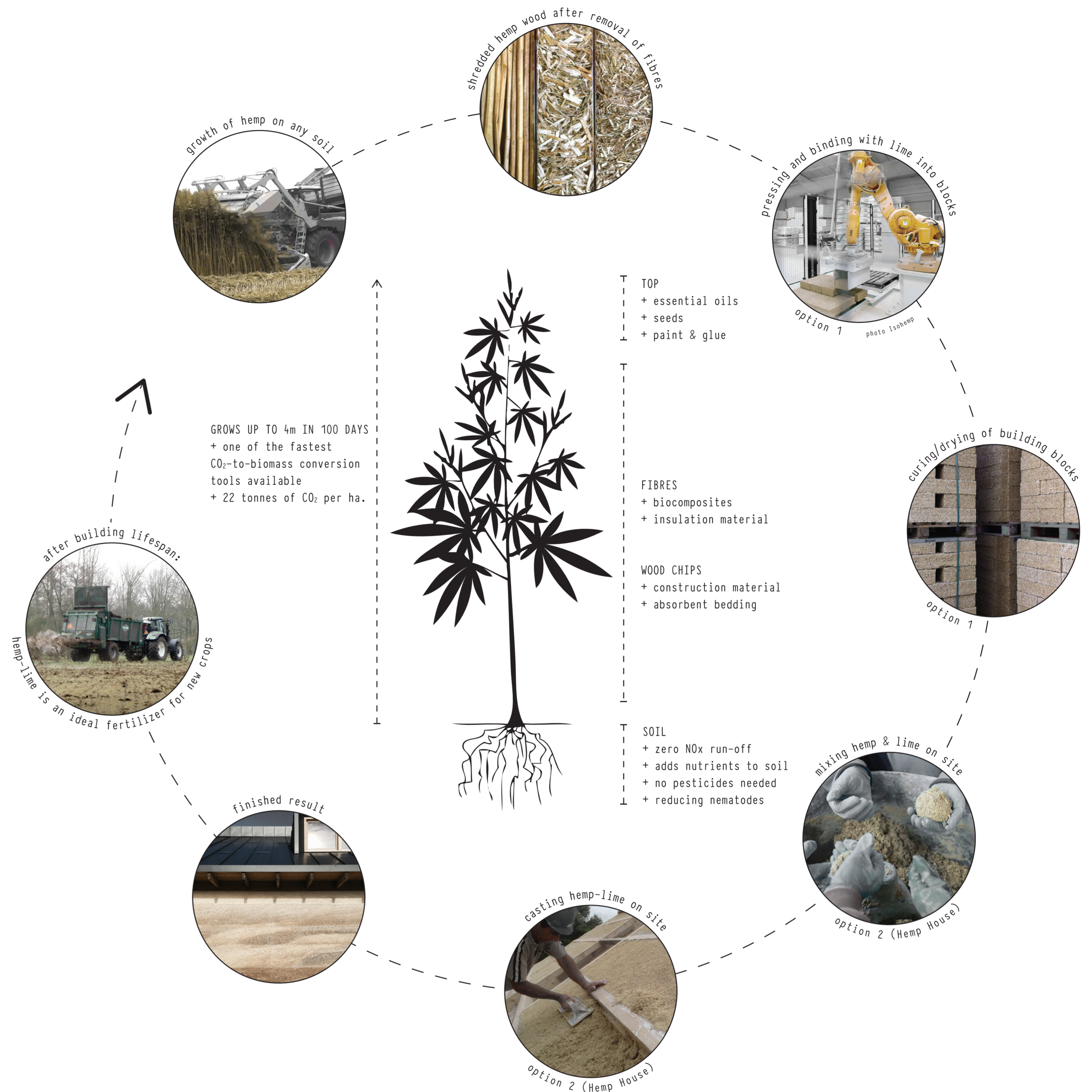
technical installations:  
Bekkema Installatietechnik (NL)  
www.bekkema.nl

clay & lime finish & floor:  
Daan Ooms / Eigensinn (NL)  
www.daanooms.nl  
www.eigensinn.nl

oak structure:  
H. Oude Hengel-GmbH (NL/DE)  
www.oude-hengel.nl


The 'Hemp House' is the first building in the Netherlands completely built with hemp lime. This biobased construction method takes up more CO<sub>2</sub> than it emits over the entire production chain, from crop to construction to demolition. No less than two-thirds of the CO<sub>2</sub> output of a building is caused by construction and materials, just one-third is caused by the use of a building (e.g. heating). Biobased materials like hemp lime therefore contribute significantly to climate goals. Hemp lime creates a healthy and comfortable indoor climate due to its unique breathability and regulating qualities. The mix of hemp wood with lime creates a form of insulating 'hempcrete' which is fully circular. At the end of the building's lifespan shredded hemp lime proves to be an excellent fertilizer for the growth of new crops. Werkstatt has developed a unique architecture and detailing for this material, wherein tactile and visual qualities stay exposed.

This exhibition was made possible by: Hemp Eco Systems, Omniextract, Agricola Bouw, Ekoplus Bouwstoffen



  
**100% NATURAL & RECYCLABLE**

Hemp-lime structures consist of selected hemp hurds of different sizes, pure hydrated lime and an ingenious blend of natural minerals, all are non toxic building materials. This makes 100% circularity possible. After the building's lifespan, the material can be shredded and spread out on agricultural fields. It provides an excellent fertilizer for new crops.

  
**CARBON NEGATIVE**

Industrial hemp has been scientifically proven to absorb more CO<sub>2</sub> per hectare than any forest or commercial crop and is therefore the ideal carbon sink. It even compensates for the carbon output of the production of hydrated lime, transportation and construction. Applied as a building material, hemp-lime continues to bind CO<sub>2</sub>, purifying the indoor air.

  
**HEALTH IMPROVING**

Hemp-lime walls absorb moisture from the air when humidity is high and release it again when humidity levels drop. This ensures that water vapour can pass in and out of the wall rather than becoming trapped and causing damp problems. The regulation of humidity has been shown to inhibit the spread of viral and bacterial infections, allergic reactions and respiratory conditions, allowing for truly healthy homes.

  
**ENERGY EFFICIENT**

Hemp-lime walls do not only insulate, they regulate temperature and humidity. Heat accumulation inside the material cushions sudden changes in temperature, creating a stable indoor climate. Like church walls, they keep summer heat out, reducing the need for energy-guzzling air conditioning. The ability to regulate humidity furthermore reduces the need for powered air filters and ventilation systems.

  
**FIRE RESISTANT**

Hemp is naturally fire-retardant and pest-resistant. Because of these properties, there is no need to add the chemicals which are usually added to building materials, including formaldehyde and volatile organic compounds (VOCs). Formaldehyde is a known carcinogen and VOCs have been implicated in both asthma and allergies. The omission of these chemicals obviously contributes to the health of the occupants of the house.

  
**SOIL IMPROVING**

Hemp grows in diverse soil types and conditions, needing very little water and no fertilizers or herbicides. It improves soil structure and adds nutrients, while also protecting and binding soil. Hemp can be included as part of a farm's crop rotation with positive effects on overall yields of follow on crops. Hemp cleans toxins from the ground by a process called phytoremediation. It was even used in Russia to remove radioactive elements following the Chernobyl disaster.