



The ISOBIO project proposes an innovative strategy that brings **bio-based** construction materials into the mainstream market. It involves the development of pre-treated bio-based aggregates and binders that are combined together to form highly insulating, eco-friendly, moisture buffering and water repellent bio-based panels and renders.

Silica based Treatment

Key to improve water repellence and delaying ignition time

A novel silica particle treatment has been developed to improve the water and fire resistant properties of ISOBIO's bio-based materials.

Using silica nanoparticles functionalised with specific organic ligands showed exceptional results in enhancing the surface roughness and hydrophobicity of the hemp shiv. In addition to that, the coating delays mould growth and acts as a heat shield thus delaying the ignition time.

Lastly, the treatment itself requires a quicker drying time and lower curing temperature thereby reducing its energy consumption.



THE CONSORTIUM



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NATURALLY HIGH
PERFORMANCE
INSULATION



**A radical approach to natural
construction materials at scale**

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NEW BUILDING WALL PANEL

Carbon negative construction for new buildings

- Elements:*
- Hemp-lime render
 - Rigid hemp insulation board
 - Hemp fibre insulation between timber studs
 - OSB panel
 - Vapour control & airtight membrane
 - Hemp fibre insulation between timber battens
 - Compressed Straw Board
 - Clay plaster

- Benefits:*
- Highly insulating
 - Low embodied energy
 - Sequesters carbon
 - Moisture buffering



Key facts

- Thickness: 332mm
- GWP: 43.2 kg CO₂ eq. per m²



ISOBIO new-build panel
U = 0.18 W/m2K

| ISOBIO new-build | Improvement |
|---------------------|-------------|
| vs. UK new-build | 36 % |
| vs. Spain new-build | 87 % |

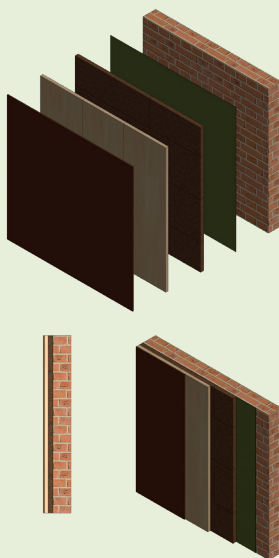
Hemp Insulation Board

- Description:*
- Rigid panel for internal or external insulation
 - Innovative bio-based binder Substrate for plasters and renders
 - 50mm thickness
 - Tongue and groove system for easy installation



Internal Retrofitting System

- Elements:*
- Clay mortar
 - Rigid hemp insulation board
 - Compressed Straw Board
 - Clay plaster
- Benefits:*
- Highly insulating
 - Easy fixing to existing wall
 - Moisture buffering
 - Improves indoor air quality
 - Sequesters carbon

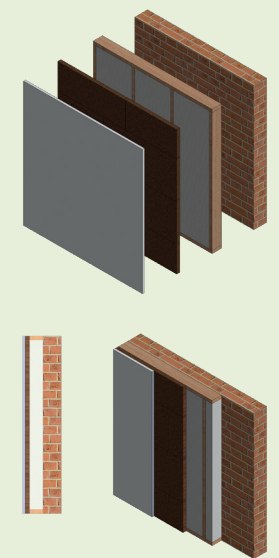


Key facts

- Thickness: 108 mm
- GWP: 17.2 kg CO₂ eq. per m²

External Retrofitting System

- Elements:*
- Hemp fibre insulation between timber studs
 - Rigid hemp insulation board
 - Hemp-lime render
- Benefits:*
- Highly insulating
 - Fire resistant
 - Water resistant
 - Easy fixing
 - Sequesters carbon



Key facts

- Thickness: 220 mm
- GWP: 15.1 kg CO₂ eq. per m²



Hemp-lime plasters and render

- Description:*
- Incorporates hemp aggregates
 - Internal or external use
 - Easy application by spraying
 - Can be applied to old or new substrates
 - Adheres well to bio-based substrates



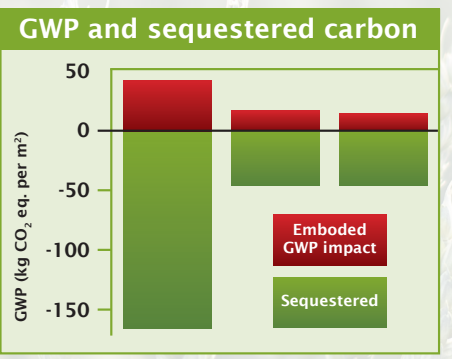
Novel clay plasters

- Description:*
- Ready to use mixtures Incorporate hemp aggregates
 - For internal use Up to 15mm thickness per layer
 - Can be combined with coloured finishing plasters



Positive environmental impact

Life Cycle Assessment was performed on the 3 ISOBIO panels, namely, structural, external retrofit, internal retrofit. Their Global Warming Potential impact and stored sequestered atmospheric carbon* were calculated separately and the overall analysis clearly shows that all panels have a positive environmental impact as more carbon dioxide equivalents are stored in the biogenic content of the panels than is emitted during the panels' entire production phase.



* Atmospheric carbon is stored in the biogenic materials during the process of photosynthesis. In terms of carbon dioxide equivalents, 1kg of stored atmospheric carbon is equivalent to 3.67 kg of atmospheric carbon dioxide.