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.
**ISOBIO new-build panel**

**U = 0.18 W/m²K**

### ISOBIO new-build Improvement

**vs. UK new-build**
- **36 %**

**vs. Spain new-build**
- **87 %**

### Key facts

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

### 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

### 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

### 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.

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### Hemp-lime plasters and render Description:
- Incorporates hemp aggregates
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- Easy application by spraying
- Can be applied to old or new substrates
- Adheres well to bio-based substrates

### ISOBIO new-build panel

**U = 0.18 W/m²K**

### Key facts

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

### Key facts

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

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