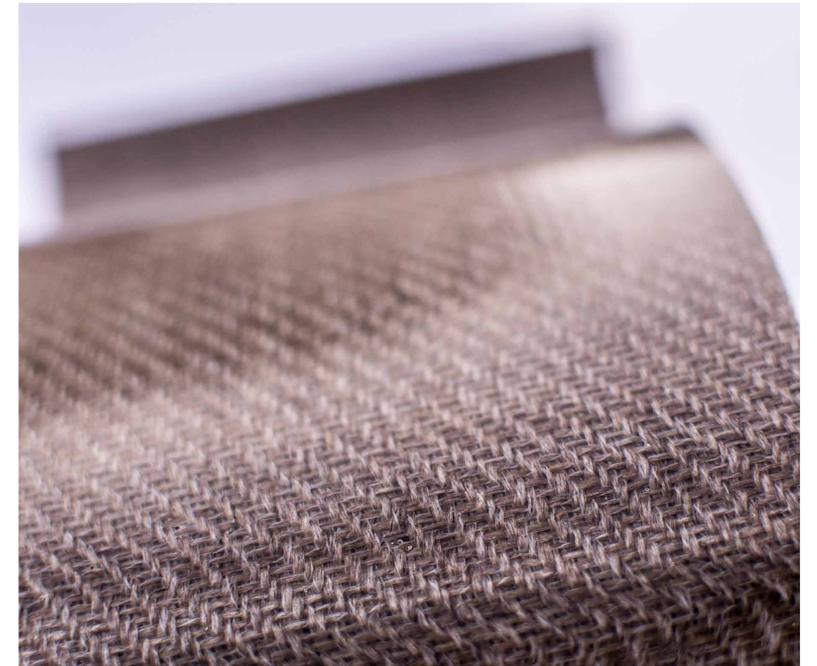


Bio Build



Project overview

BioBuild is a collaborative project part-funded by the European Commission. It has 13 partners from seven European countries and a total budget of nearly €7.7m. The project has a duration of three-and-a-half years, and will end on 31 May 2015.

The aim of the BioBuild project is to use biocomposite materials to reduce the embodied energy in building-façade, supporting-structure and internal-partition systems by at least 50% over current materials, with no increase in cost. This will lead to a step-change in the use of sustainable, low-carbon construction materials, by replacing aluminium, steel, fibre-reinforced polymers (FRPs), brick and concrete in new-build and refurbished structures.

Biocomposite materials

Biocomposite is a term for a fibre reinforced polymer where either the reinforcement or matrix or both is substantially derived from biological sources. For example, composites comprising natural fibres, such as flax, jute or hemp, in a polymer matrix derived from agricultural wastes, vegetable oils or corn starches. The low embodied energy of biocomposite materials offers significant potential for reducing the environmental impact of building products.

The specific mechanical properties of natural fibres are competitive with those of glass fibres. Flax and other natural fibres also have excellent resistance to fatigue, and good vibration- and acoustic-damping characteristics, compared with glass and carbon fibres.

Although biocomposites offer many characteristics equal to or better than conventional composite materials, in the service conditions of many building components their durability is currently too low. The BioBuild project has addressed this through the development of fibre treatments and bio-resin formulations, to provide resistance to moisture absorption and other degrading agents. These treatments also enhance other characteristics, such as fire performance.

Biobased resins

Polyfurfuryl Alcohol Resin (PFA)

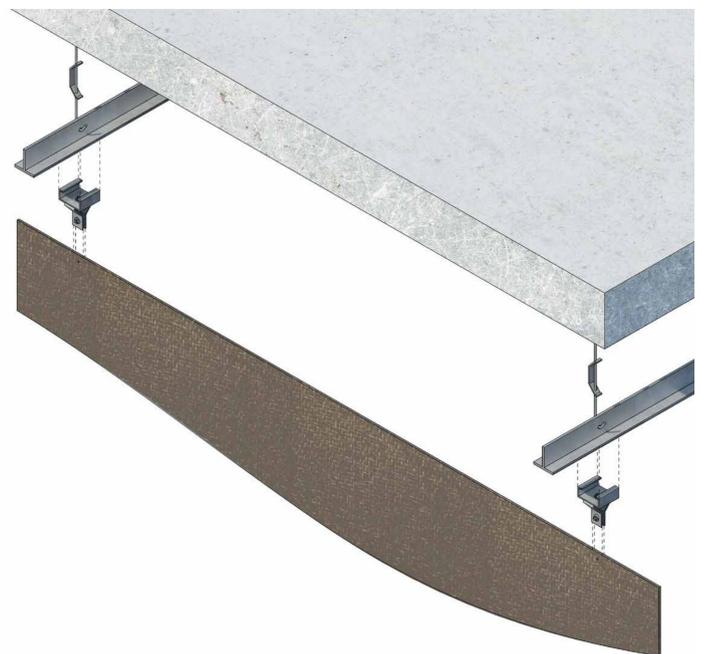
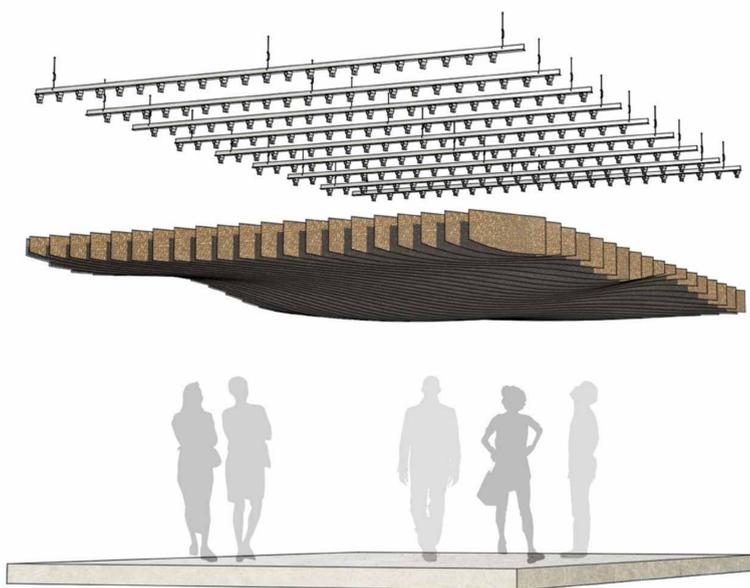
PFA resin is derived from sugar cane bagasse. After the sugar is extracted from the cane the waste is acid digested and the resulting liquor distilled to produce furfural which is the starting chemical for the resin. The resin is thus 100% biobased and has no impact on food supply. The embodied energy of a PFA resin is much lower than that of traditional polyester or epoxy resins.

Biopolyester resins

Biopolyester resins are made in the same way as traditional unsaturated polyester resins but the precursor chemicals are derived from agricultural sources such as vegetable oils.

LCA info here.... from Elisabeth @ TNO.





Suspended Ceiling Kit

The Suspended Ceiling Kit consists of bicomposite lamella suspended from a structural ceiling. The general function of the Suspended Ceiling Kit is to provide a cohesive architectural surface and acoustic

damping while allowing for technical installations to be routed in the space above it. The lamella consist of a biopolyester resin reinforced with a jute fabric.

AMANAC – Advanced Material & Nanotechnology Cluster for Energy Efficiency in Buildings



“Embodied Energy” Thematic Area

The main objective of the “Advanced Material & Nanotechnology Cluster” is to join efforts in order to promote synergies and fields of cooperation among projects whose activities focus on energy efficiency in the building environment. The AMANAC Cluster will allow the involved projects to be more productive, competitive, successful, and support them to establish a broader social and industrial impact. AMANAC currently represents **26 European** projects and about 255 projects partners of which 63% are enterprises. The projects have been grouped in the following six Thematic Areas:

Nano-Insulation: AEROCOINs, COOL Coverings, NANOINSULATE, HIPIN, NanoPCM, StorePet

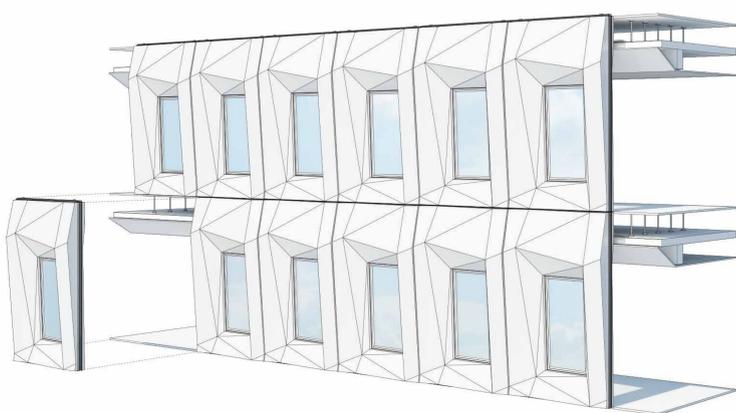
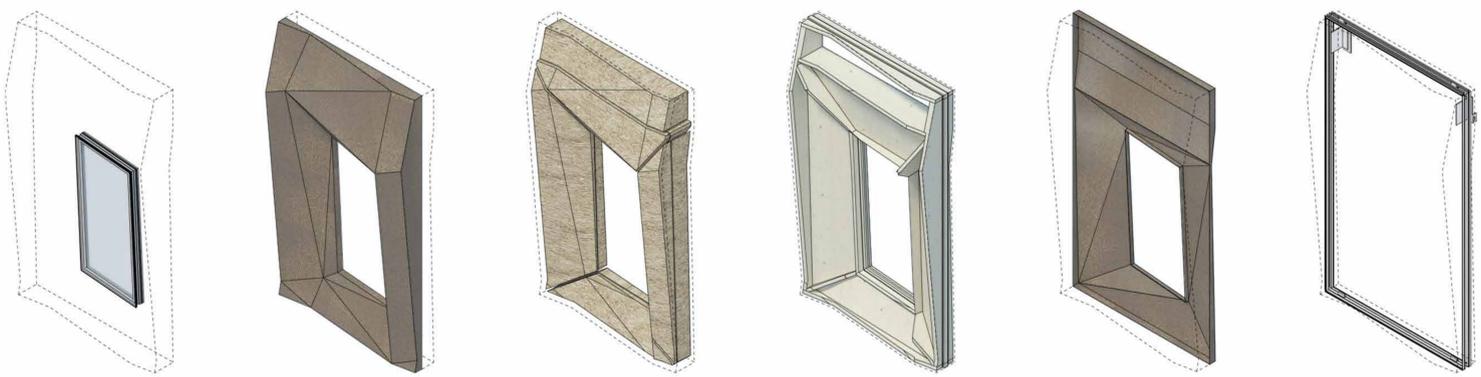
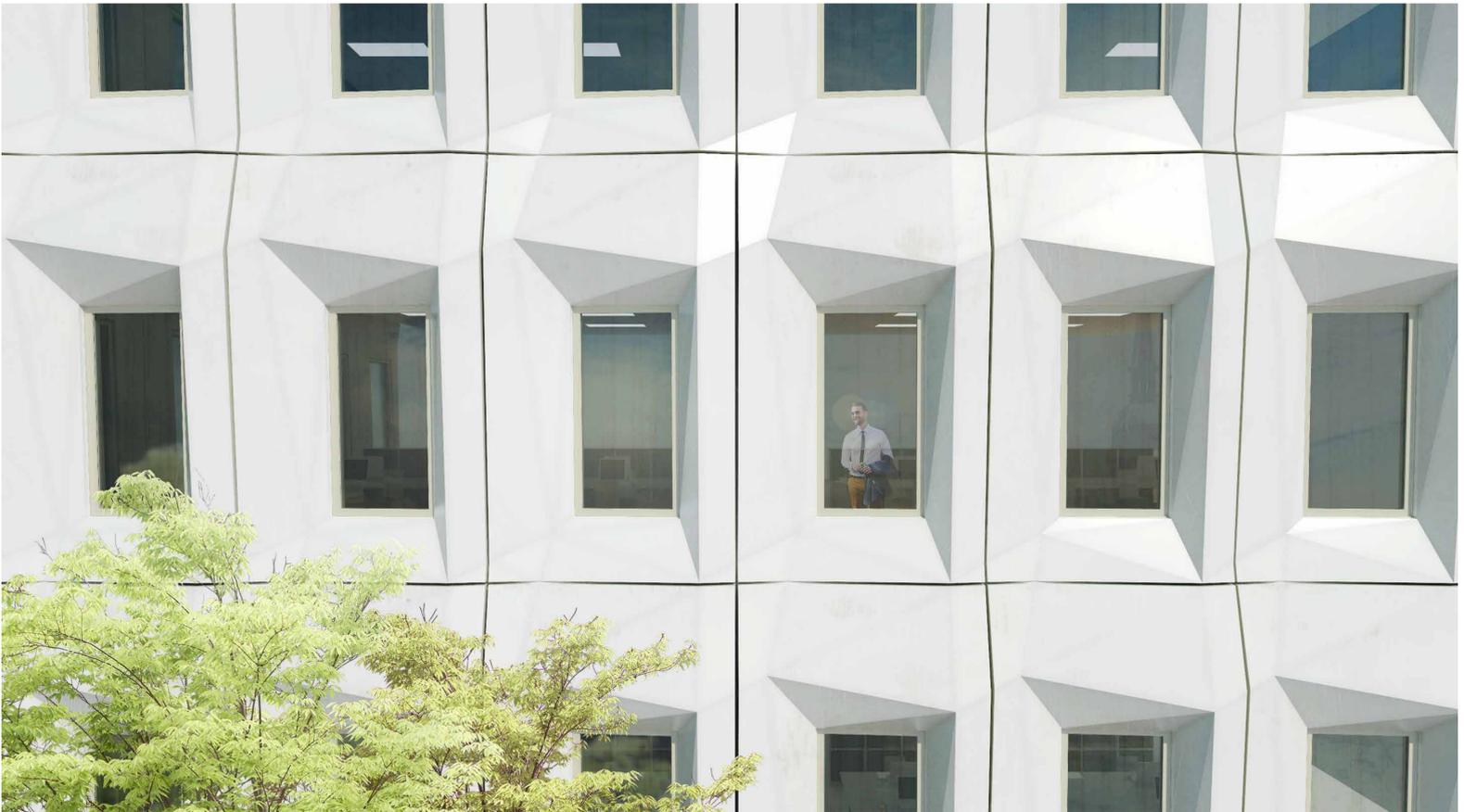
Embodied Energy: SUS-CON, LEEMA, BioBuild
HVAC-Heating, Ventilating and Air Conditioning: EnE-HVAC, NANOCOOL, NANO-HVAC

Smart Windows: EELICON, HarWin, MEM4WIN, SmartBlind, Winsmart

Lightweight Components: ADAPTIWALL, ELISSA, MF-Retrofit, SESBE, FOAM-Build

Indoor Air: Brimee, Eco-SEE, H-HOUSE, OSIRYS





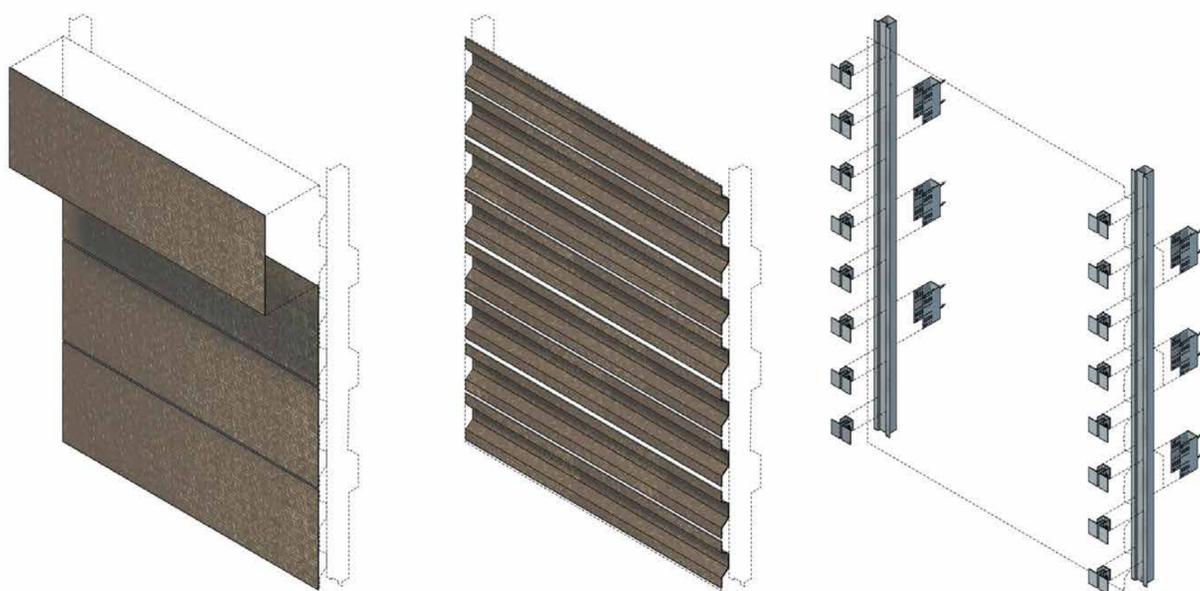
External Wall Panel

WINNER: JEC Europe 2015 Innovation Award for Construction

This External Wall Panel is part of the building envelope, separating the interior from the exterior climate. It is a self-supporting wall element with internal and external architectural finishes. This panel consists of skins of biopolyester resin reinforced with flax fabric. The frame is wood and the cavity

is filled with insulation so that the system achieves $U < 0.8 \text{ W/m}^2\text{K}$. A key feature of the design is that the window does not lie in a vertical plane. This is a design aspect which is more easily achieved using composites than conventional building materials.



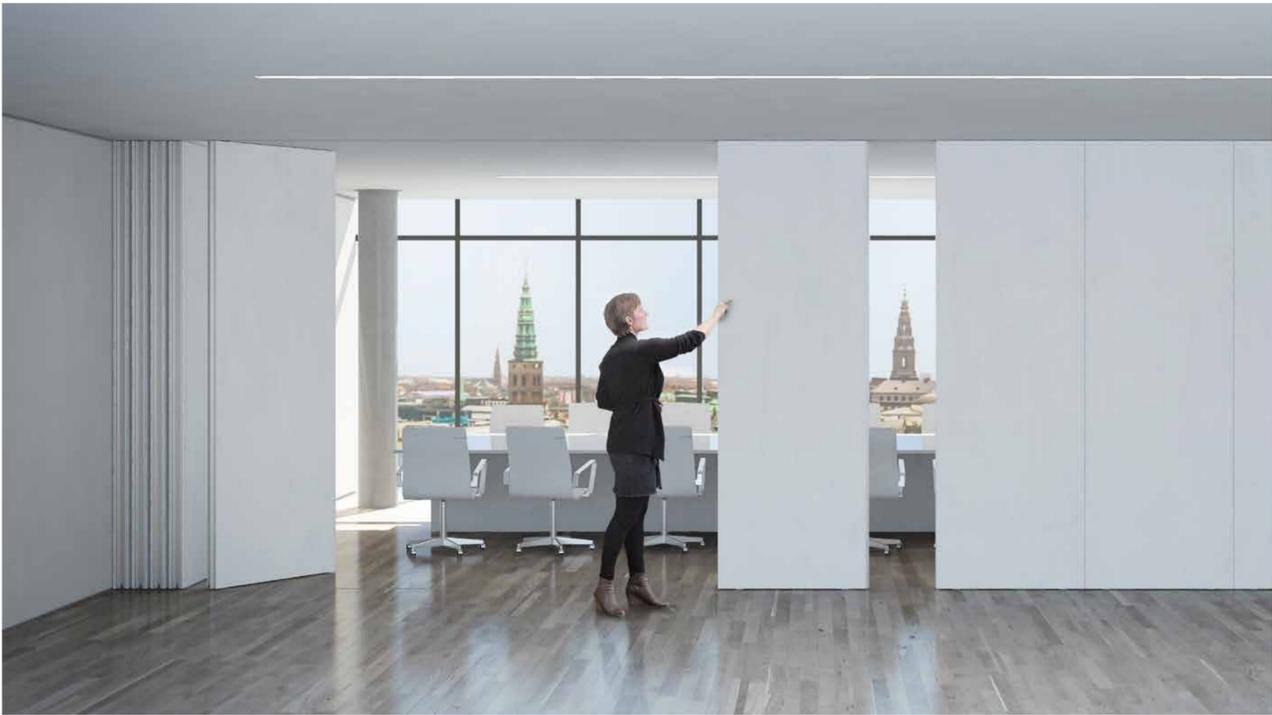


External Cladding Kit

The External Cladding Kit is a system with no load-bearing function and is intended for vertical or near-vertical building envelopes. The general function of the External Cladding Kit is to protect the wall area behind it from direct contact with the exterior environment (rain, snow, wind, impacts).

The ECK is made from flax-PFA panels. The box section has been created by bonding a shaped profile to a flat face. This provides stiffness and ensures that the outer face remains flat. The profile is bolted to an aluminium substructure which in turn is bolted to the structure of the building. The aluminium could be replaced by biocomposite pultrusions which will reduce thermal bridging from the ECK to the building wall as the biocomposite pultrusion is not a good thermal conductor.





Internal Partition Kit

The Internal Partition Kit is a self-supporting, non-load-bearing, vertical structure element used to subdivide a given floor space visually and acoustically. It consists of skins of jute-PFA (polyfurfuryl alcohol). These were chosen for their low embodied energy and low cost. PFA resin was used as it is intrinsically flame retardant and is 100% biobased. As the resin is naturally dark brown one panel has been painted for aesthetic reasons.

Correct choice of paint provides an additional layer of fire protection. The frame is wood, although composite pultrusions could be used. The interior of the panel can be filled with a variety of insulating materials.

