

Press release

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SUSBIND consortium capitalises on excellent results for biobased binders for furniture at the project end

SUSBIND, a European collaborative project consisting of eleven partners from both research and industry, set out in 2018 to develop, produce and test bio-based binders as an alternative to formaldehyde binders currently used for wood-based panel boards in furniture mass products. Funded by the Biobased Industry Consortium Joint Undertaking (BBI-JU) under the European Union's Horizon 2020 Programme, the SUSBIND project was successfully finished on 31 August, 2022.

As the climate changes, the furniture of the future will have to be sustainable, multi-functional and efficient. Nowadays, the wood board industry relies mostly on fossil-based binders that contain formaldehyde. With the circular economy in mind, there have been many initiatives to produce binders from renewable resources, but a bio-based binder at a large industrial scale does not yet exist.

SUSBIND's collaborative partnership consisting of six research and five industry partners was able to develop a bio-based binder for the manufacture of interior particleboards (PB) and medium density fibreboard (MDF). The SUSBIND binder is made of 80% renewable materials, it is formaldehyde-free and has a lower impact on human health. The SUSBIND project sets the collaboration framework and the technical solution for the future of bio-based binders for furniture.

Major scientific results

SUSBIND researchers developed a binder that is 80% renewable and based on sugar and only 20% based on a crosslinker that is synthetic. SUSBIND partners experimented with crops such as natural side streams, surplus carbohydrates, plant oils and fats to convert them into a bio-based chemical composition binder.

The scientific work focused on developing: enzymatic technology for epoxidizing complex mixtures of fatty acids obtained from vegetable oils and a carbohydrate-based pathway for binder production.

Carbohydrates have proven to be the most effective green raw material for reactive intermediates. The most promising binders comprise fructose, hydroxymethylfurfural (HMF) and hexamethylenediamine (HMDA) and bis-hexamethylenetriamine (BHT) as amine crosslinkers.



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The binder was further tested at a lab-scale for binder characteristics such as viscosity, solid content and pH, bonding strength development, pressing times and temperatures.

SUSBIND-bonded boards were validated at IKEA by producing a prototype furniture box. The sustainable prototype box "SUSKET" was inspired by the IKEA's famous EKET.

Most important technical results suggest the following:

- PB boards are comparable to Urea-formaldehyde (UF) -bonded ones in terms of internal bond strength and press time.
- The SUSBIND particleboards surpassed the requirements of the European standard EN312, class P2
- MDF optimisation was possible even with 8% binder and was in line with European regulations in terms of density, flexion, elasticity, internal bond, humidity resistance and deflection resistance need further optimisation in the formulation.

The SUSBIND project sets the collaboration framework as well as the technical solution for the future of bio-based binders for furniture. Up to 80% of the bulk of the SUSBIND binder is made up of renewable materials. It has a lower impact on human health and it is formaldehyde-free.

The SUSBIND renewable binder is expected to lead to lower emissions and improve the air we breathe in our houses and offices. Health impact is expected to be about 40 to 55% lower than that of UF boards. Further reduction of 5% in carbon footprint is envisaged, which should improve the quality of our environment and life on the planet. It is also very likely that further research could achieve even more carbon footprint reduction.

A Way into the future

According to the SUSBIND Scientific Coordinator, Massimo Bregola of Cargill, the SUSBIND project can be summed up in three words – *supply chain success*. He comments further "we follow our dream together in the SUSBIND consortium to deliver something sustainable for future generations. To do that we need to stand and keep our dream alive despite the adversities. We have come a long way to make our dream a game changing reality in the future."

After four years of research and cooperation between industry and science the SUSBIND partners were able to develop a binder that is made of 80% renewable materials. It is formaldehyde-free and has a lower impact on human health. The SUSBIND project sets the collaboration framework and the technical solution for the future of bio-based binders for furniture. Now is Europe's chance to capitalize on the exciting untapped potential shown by the SUSBIND results.



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Figure 1: SUSBIND Value Chain

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