SUSBIND is a collaborative European research & innovation project addressing the need for more sustainable bio-based binders used for wood-based panel boards in the European furniture industry. The SUSBIND Consortium develops, produces and tests bio-based binders as an alternative to fossil-based binders currently used in furniture mass products.

SUSBIND

Sustainable bio-binders for wood-based panels from renewable resources

CHALLENGE

- The wood board industry depends on the use of fossil-based binders that are mainly fomaldehyde-based.
- Upcoming regulations foresee reduced formaldehyde emissions from furniture due to its effects on indoor air-quality.
- Alternative binders from renewable resources able to compete at industrial scale with incumbent chemicals do not exist yet.
- Increasing global consumption and climate change call for innovative products that reduce greenhouse gas emissions and dependency on fossil resources.

OBJECTIVES

- Substitute fossil-based chemicals with those from renewable resources.
- Make use of surplus feedstock from European biorefineries including sugars and lipids.
- Reduce carbon footprint of furniture products to help mitigate climate change.
- Strengthen the European furniture industry through novel, cost-efficient eco-products.

IMPACT

- Increase market demand of bio-based furniture
- Help mitigate climate change
- Benefit public health

SOLUTION

Develop and produce low VOC (volatile organic compound) emission bio-based binders for furniture mass production by:

- Substituting fossil-based chemicals with those from renewable resources.
- Using surplus feedstock sourced from European biorefineries.

Test and validate bio-based binders with leading wood board manufacturers for two product types:

- P2 particle board and
- medium density fibreboard

OUTCOME

Novel bio-based binders from renewable resources for:

- **P2 particle board**
- **medium density fibreboard (MDF)**

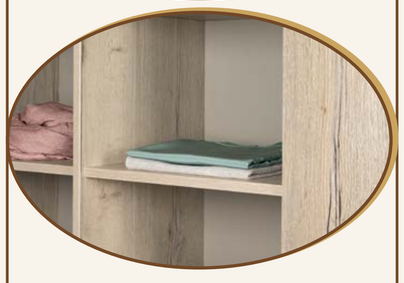
APPROACH

1 Selection of the sustainable feedstock

from existing European starch-based and vegetable oil-based bio-refineries will provide the raw materials for producing the thermoset resins. Where necessary pre-treating of the carbohydrates and vegetable oils used for producing carbohydrate binders and ingredient for epoxy oils/fatty acids binders will be conducted.

2 **Lab-scale studies on chemical and enzymatic synthesis of the most promising furfural and epoxy type binder components; Pilot assays for resin production.**

The chemical syntheses for producing the carbohydrate-based amino-plastic, and other, wood resin systems will be developed co-condensing urea and other intermediates and derived from high-purified carbohydrates. This allows investigation of the reactions of the carbohydrates during resin synthesis and to test other modification reactions, which should deliver precursors suitable for using as bio-based binders for wood board production. Resins can be produced on laboratory scale to investigate properties and the most promising candidates are upscaled to pilot level to allow them to be validated as binders.
A new enzymatic technology to produce epoxides from unsaturated plant fatty acids and oils has been developed. Specifically, research has focused on screening for unspecific peroxygenases and their engineering towards more selective lipid epoxidation at laboratory-scale and the evaluation of these epoxidised lipids as ingredients for the above-mentioned bio-binders. This has enabled the up-scaling of epoxidation with the best enzymes and, finally, the pilot-scale evaluation of the final epoxy lipid.



3 Industrial testing of new bio-based wood board binders and subsequent products.

The new bio-based binders produced will be tested and validated in an industrially-relevant production environment for particle boards and medium-density fibre boards. This will allow the project to capture the comparable mechanical properties and lower emission profiles than current state of the art boards. The pilot boards produced will also be tested by a board end-user customer.

4 Economical & environmental sustainability assessments

This will ensure that the project meets its objective of producing a binder system with a smaller carbon footprint and less human health impact than the current fossil-based binder systems while meeting relevant market and regulatory requirements.

SUSBIND in a nutshell

Start: 1st May 2018
Duration: 4 years 4 months
Budget: € 5.5 Million
BBI-JU funding: € 4.1 Million
Consortium: 11 partners

CONTACTS

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