



DEVELOPMENT AND PILOT PRODUCTION OF SUSTAINABLE BIO-BINDER SYSTEMS FOR WOOD-BASED PANELS

Deliverable 1.1

Feedstocks from the Starch-based Bio-refineries

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1 Publishable summary

The selection of the renewable feedstock for the synthesis of binders, alternative to formaldehyde-based binders for wood board production, must address the two important issues:

- similar or lower cost in use than incumbent alternatives to formaldehyde free solution,
- large availability (around 4 million tons of dry substance per year in EU).

These two characteristics seem somewhat related: a product largely available can be considered as commodity and then its cost should be low; in reality largely available renewable products, such as: lignosulfonates, hemicellulose, exhausted vegetable oils, are indeed available but not yet used as alternative to incumbent binders for wood boards because their inherent chemical complexity does not allow to efficiently use the modern technologies able to deliver the suitable binding system. Both chemical and enzymatic catalysis work indeed more efficiently on "clean" substrate rather than complex systems and the final cost in-use of the bio-based alternative is a compromise between the cost of the feedstock and the cost of the enabling technology.

In conclusion, the selected renewable feedstock should be largely available but also as chemically pure as possible.

Modern bio-refineries, already present in Europe, are able to deliver large volumes of cost competitive renewable and "clean" feedstocks. Particularly, starch-based bio-refineries and the vegetable oil-based bio-refineries deliver products which can be used as feedstock for wood board binders.

The selection of feedstock from these factories is meaningful not only with regards to the expected volume and price but also because it mitigates the effects of the end of the sugar quota regime (2017).

Work package 1, **WP1**, expects to select the suitable feedstock, as such or after pre-treatment, from both starch based and vegetable-oil based bio-refineries in the EU.

Specifically, **Deliverable 1.1**, "*Feedstocks from the Starch-based Bio-refineries*", expected to assess the best carbohydrates as suitable candidates for the synthesis of wood binders with respects to the following criteria:

- I. Economic considerations
- II. Technical applicability
- III. Sustainability
- IV. Ease of use
- V. Reactivity

The applications of the criteria above to the large number of possible carbohydrates led to the following selection:

- A. Fructose Solution, FF95
- B. Glucose Solution, GU95
- C. Maltodextrin, MDX17

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