

## Karelian Bio Tech Oy

### Our strategy

- Pioneers of the modern biorefinery concept, that can use any fibre material to produce bio-based material.

### Commitment

- Committed to EU forest and climate targets and to create climate friendly industry.
- Support companies' green transition to reduce production emissions and response to climate change.
- Reduce forest logging below forest growth by replacing wood usage with side streams from forest, food and feed industry, agriculture and households.
- Support forest's resilience against climate change by modifying the forest's tree diversity and aging and improve forest biodiversity and ecosystems by new "reforesting plan".
- Support local production and this way create economical growth locally and effect to employment inside EU.
- Create new technological revolution and encourage industries to innovate new fossil free products.

### Road map

- Year 2025 - pilot plant
- Year 2026 - investment decision for the production facility

## **Wood!<sub>KA</sub> process background and effects**

### **Wood!<sub>KA</sub>**

Wood!<sub>KA</sub> is a 3-generation biorefinery concept that can utilize fibre-based side streams excluding raw materials used in food or feed production.

The Wood!<sub>KA</sub> concept enables the fibre-based material to be broken down into four biocomponents: fibre based material (cellulose), hemicellulose (sugar), lignin and extractives (pine oil, turpentine, other extractives).

These four main components are the main fractions of the wood / fibre-based material that the process separates and recovers.

### **Raw material**

The raw material can be used as is, including bark, leaves, branches, roots, fruits and flowers.

The raw material is forest side streams, garden waste and bio and other fibre-rich fractions such as straw, flax stalks, corn stalks, lupine, algae and hemp. In addition, non-utilizable waste streams from food and feed production can be used as raw material (Karelian Bio Tech - Raw material).

The process has been tested with different raw materials and it has proven to be a working concept.

### Wood!KA target products

Regarding the end products, the bio components mentioned above can be utilized:

- For paper and pulp products
- For food and feed production
- For pharmaceutical industry products
- For textile production
- For cosmetics products
- For chemical products
- For biofuels (for aviation and shipping)
- For bio-ethanol production (transportation)
- Future products

Separation of raw materials and further processing is an existing technology that can be used for further processing (Karelian Bio Tech - Business Plan).

Targeted utilization of final products - Reference document TEM, LVM, YM -  
Increase in transport distribution obligation level, VN/13807/2021 | 102003133

The EU has described the industrial usability of bio-components in the "What a tree can do" circle.

<https://eustafor.eu/uploads/What-a-tree-can-do.pdf>

## The main components of the process

The process always produces four main sections, the use of which is clarified below.

### Fiber-based material (cellulose)

As one stream of the process, fibre-based material is created, which as such corresponds to the cellulose coming from the current pulp mill. The significant difference is that the cellulose is produced from, for example, logging or garden waste or garden waste, instead of using fibre wood from the forest.

The process makes it possible, for example, to increase the fibre length from the current fibre length of 15...25 mm to at least 30-70 mm. Regardless of the raw material, all materials can be broken down into fibre material.

Long fibre material can be used to produce, for example, fibre material like yarn, which differs from, for example, new pulp-based textile yarns in that fibre wood is not used for its production.

The material can also be bleached to make it suitable for food use.

- Raw material independent and more competitive raw material procurement compared to, for example, a pulp mill
- Environmentally friendly and deforestation-reducing effect
- Enables the production of environmentally friendly products from side streams, for example packaging materials, cardboard containers, threads based on natural fibres, new food products, MCC, etc.

Cellulose can be turned into ethanol by a separate further processing process, which enables the production of bio-based ethanol from a side stream

- Ethanol production by hydrolysis – fermentation process

### Hemicellulose

Hemicellulose stands out as its own fraction from the process.

Hemicellulose can be used in the food, pharmaceutical and chemical industries. In addition to that, as a fraction of sugar, it can be converted into ethanol by fermentation.

## Lignin

The lignin in the fibre material can be separated from the process, which can be separated from the process into its own fraction.

Lignin's material is a diverse material, the uses of which will expand in the future. It can be used to convert, for example, fuels, bitumen substitutes, drilling fluids, fillers and thermal insulation materials, radiator material, carbon fibre material, food flavourings or cosmetics and pharmaceuticals.

- Lignin separates as its own side stream of the process, which facilitates its further use

## Extracts

From the different stages of the process, extractives can be separated, which are separated from the process in either liquid or gas form. These include, for example, turpentine, softwood pine oil and other extractives.

Extracts are a significant part of the raw materials of the food and chemical industry, from which different types of products can be produced, from sweeteners to bio-based products that replace synthetic products.

Depending on the raw material, vanilla stands out in the birch bases, while in the pine bases, the scent of tar is distinguished, respectively.

The cosmetics and pharmaceutical industry uses extracts in the production of cosmetics and medicine, and the growth of nature-based products is reflected in new products coming to the market. Salicin, which is the raw material of aspirin, can be extracted from willow.

- The extractives can be separated from different streams with existing technology

**Attachments** (included in zip-file):

Picture 1 – Fiber material bleached kraft

Picture 2 - Natural yarn prepared of lily leaf's

Picture 3 -Kraft pulp

Picture 4 - Mix biowaste

Picture 5 - Cup made from garden waste (proto - biodegradable)

Picture 6 - Lilly leaves

Picture 7 - Pulp from lake reed

Picture 8 - Hemicellulose and extract fraction separated from soft wood

Picture 9 - Separated lignin

Karelian Bio Tech - Business Plan

Karelian Bio Tech – End product

Karelian Bio Tech - Raw material