

## Unit 4. Circular economy

### Forest bioeconomy and circular economy in Finland

#### Description

Forests play a central role in Finland's bioeconomy: they provide wood and non-wood materials and a wealth of social and cultural ecosystem services. Besides different wood-based products, recreation, nature tourism and game are a crucial part of forest bioeconomy. Carbon sequestration and ecosystem services are also included to the concept of forest bioeconomy.

Pulp, paper, packaging materials and sawn wood are the traditional products of the forest industry and they account for over 20 per cent of Finland's export revenue. During last ten years, the Finnish forest industry has been transforming into bioproduct industry and traditional forest industry mill sites are in process of becoming bioproduct mills.



*The concept of circular economy in forestry. Source: MetsäGroup*

Wood raw materials contain ingredients that have only recently been detected and developed for new uses e.g. in chemical and medical industry. Wood, wood fibres, biopolymers and molecules can replace synthetic, unsustainable or diminishing materials.

Wood can replace fossil materials in many end products. Examples of new wood-based products include microfibrils, nanocellulose, formable plywood, thermoformable paperboard and biocomposites, which combine wood and fibres with other materials. Wood material and fibres are also used for medicines, functional foods, plastics and cosmetics. Wood-based textiles are currently being developed in several Finnish projects. Wood-based textiles may at least to some extent replace cotton in the future and thus free cotton fields to food production globally.

Wood as a material for construction and interior decoration has long traditions in Finland, but new

innovations are gaining ground also in wood construction. There are new solutions for using wood as the main building material in e.g. multi-storey housing buildings and office buildings. The development of fire-resistant structural elements of timber and pre-fabrication of wooden blocks of flats enable the breakthrough of multi-storey wooden buildings, which would also benefit carbon sequestration.



*Potential of bioeconomy: all these products are made from wood*

In Finland different sidestreams and residues of wood processing and forest management have been used for energy production already for decades. A quarter of Finland's energy production is based on wood fuels, which are mostly sidestreams of forest industry (black liquor, sawdust, bark). Currently the sidestreams and residues are used also for production of wood-based biodiesel and bio-oils. Biofuels serve as a renewable alternative to fossil fuels and are an important solution to reduce greenhouse gas emissions from transport sector. Existing products are expected to be joined by new applications

Forest bioeconomy can be seen as a systemic change, where wood and different ingredients in wood are refined into new end products. Wood lignin can replace in many ways fossil materials in various end products and has currently big potential e.g. in battery technology.

#### Source

Finnish Ministry of Agriculture and Forestry  
<https://mmm.fi/en/bioeconomy/green-bioeconomy>