



BioCircleToZero

**R&D program for technological
breakthroughs in Finland**

ANDRITZ



New R&D program unites companies, research, and universities for technological breakthroughs in Finland

ANDRITZ continues to innovate new ways of increasing the value of wood at pulp mills, ultimately aiming to create biorefineries. With the recently launched BioCircleToZero program, funded by Business Finland, the company aims to take a giant leap forward in efforts to double the value of wood.

It is said that “necessity is the mother of invention” and this certainly applies to wood use in Finland. The situation in Europe in recent years has led to rising costs of raw material while wood harvesting in Finland is approaching sustainable limits. As a result, the focus is shifting toward maximizing the value extracted from each stream without increasing forest use.

Johan Engström, Chief Technology Officer, ANDRITZ Pulp & Paper says, “We simply have to get more value out of the wood being used at pulp mills. One of the most straightforward ways to address this challenge is to burn less wood-based material in the process, increase the pulp yield, utilize side streams, such as lignin and biomethanol, or increase the value by high-value products like man-made textile fibers. In reality, biomass will always be burnt to some stage, but technologies

for the biogenic CO₂ together with green hydrogen can be converted to, for example, eFuels. To meet these challenges, we have launched the BioCircleToZero initiative and with a lot of intense, combined innovation and effort, we can realistically see doubling the value of wood in the future.”

BUILDING A STRONG PARTNER ECOSYSTEM FOR TECHNOLOGICAL BREAKTHROUGHS

Doubling the value of wood sounds like a highly ambitious task; however, there is a lot of interest and support for the program. The five-year BioCircleToZero program was launched in early 2025 by ANDRITZ and supported by Business Finland, the country’s agency for trade and promotion, with a grant of 10 MEUR. Led by ANDRITZ, the initiative has been set up to encourage cooperation and R&D efforts with companies, research institutes, and universities working

in the field of forest product industries, energy, climate, and environmental sectors. Expecting some 100 members, the initiative has already secured big-name supporters in the forest products industry as partners, including companies, research institutes, and universities. Business Finland has also provided an additional 20 MEUR to partners contributing to the program.

Kari Tuominen, CEO of ANDRITZ Finland, says of the program, “This is an extremely important initiative. At ANDRITZ we have always been known for developing innovative new technology that is well received by our customers. Although we have had many successes in joint developments for the forest product industries in the past, with the BioCircleToZero program we are building a large ecosystem where it is not only us bringing new technology to market.



"As a technology supplier to the pulp, paper, and bioproducts industries, the program is exciting for us as this initiative will benefit the complete wood value chain and therefore many different industries around the globe."

KARI TUOMINEN
CEO ANDRITZ Finland

We are leading the initiative, but our partners are also key in any new development that enables the creation of added value from wood."

PIONEERING INTO ALL AREAS TO BENEFIT THE COMPLETE WOOD VALUE CHAIN

One of the examples of innovation as part of the program is the better use of wood at chemical pulp mills. Currently, approximately half of the wood going into a chemical pulp mill ends up being burned for energy as process residues. Engström says, "This can, and must, be reduced. Burning such a valuable raw material should be minimized as much as possible, especially if a commodity product is being made. There is so much more that can be done to add value to the wood instead of simply burning it."

To address this, the program focuses on developing added-value products from the process side streams that would otherwise be used for energy. Engström continues, "We have already developed successful solutions for making new products out of the side streams from pulp mills and, in some cases, we have created solutions that seemed impossible to begin with. This is what the BioCircleToZero program has been designed for; building ecosystems that will enhance and optimize the utilization of all areas of pulp mills, innovating and proving the feasibility of pioneering new products."

TARGETING FOR MORE RESOURCE-EFFICIENT INDUSTRIES

The BioCircleToZero initiative focuses on four main streams with each stream having its own set of tasks and goals:

Stream 1: Biorefinery supercharged – Concentration on biorefinery process improvements and connections to enable emission-free production processes.

Stream 2: Biorefinery interconnected – Focusing on enabling the ecosystem growth around biorefinery processes by opening the materials, services, and side streams flows to third parties. This stream will also evaluate and develop new business models for biorefinery ecosystems, for instance, business models that enable growth creation from negative emissions.

Stream 3: Process solutions with zero emissions – This stream focuses on turning biogenic carbon flows into high-value renewable fuels and products by combining green hydrogen and P2X technologies with biorefinery processes.

Stream 4: High-value products – This stream develops new processes and high-value products to create more value from pulp, such as man-made cellulosic fibers (MMCF) for the textile industry and chemicals from biobased feedstocks. Moreover, the streams encompass ANDRITZ's key capabilities in biorefinery technologies and P2X.

"One of the clear directions ahead is that we must utilize all waste at pulp mills and make as many products out of the wood as we possibly can before burning it," says Engström. "From the burnt biomass, we can collect biogenic CO₂ emissions to enable even more products to be made, for instance, fossil-free fuels for aviation or marine applications."

Engström continues, "We at ANDRITZ lead the BioCircleToZero program, and our valued partners in the ecosystem are the contributors that follow along on our journey towards doubling the value from wood without harvesting more trees. In the initiative, we set goals for the journey. Our task is to build a complete, effective ecosystem, which develops pioneering solutions to achieve our ambitious and exciting aim of doubling the value of our precious wood supply."

Tuominen concludes, "This is not only about pulp and paper, but we are also pioneering into all areas of how value can be added to wood, including the production of textiles, biochemicals, biofuels and e-fuels, recycling and reusing materials and energy, and the environment. As a technology supplier to the pulp, paper, and bioproducts industries, the program is exciting for us as this initiative will benefit the complete wood value chain and therefore many different industries around the globe."

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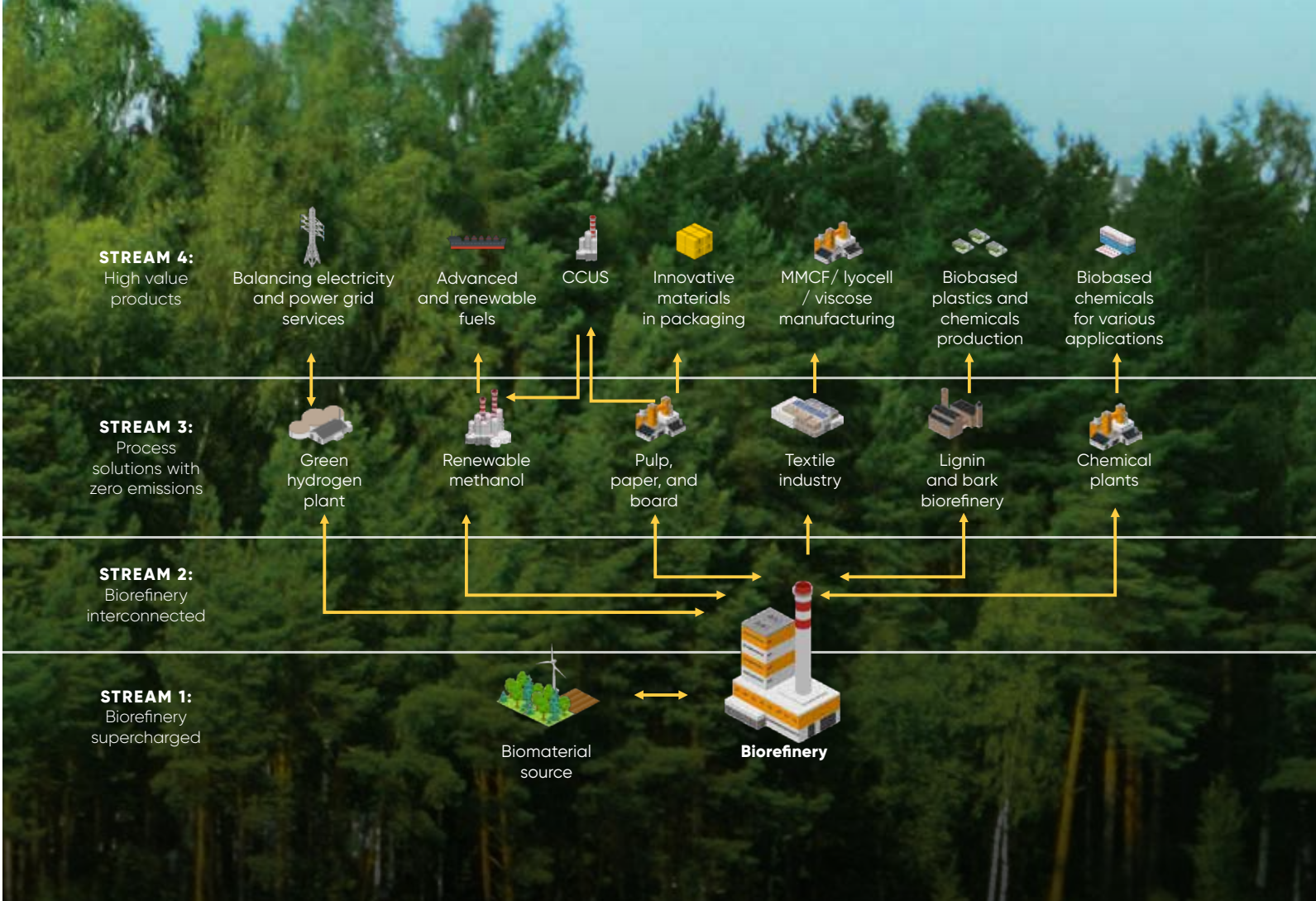
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JOHAN ENGSTRÖHM
Chief Technology Officer, ANDRITZ Pulp & Paper



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