CircleToZero is a global ANDRITZ initiative with the goal of achieving zero emissions and zero waste at the same time as creating financial growth for customers. For pulp and paper producers, this means eliminating unused industry side streams, turning them into new value-added products and achieving zero emissions and zero waste production.

ANDRITZ is inviting customers, partners, and the research community to join a shared journey towards a more sustainable society and to meet the industry growth demands set by the transition into a fossil-free circular bioeconomy.

Pulp and paper production creates multiple gaseous, solid, and liquid side streams. Their elimination, reduction, purification, and conversion are a continuous challenge, requiring new technologies and solutions with clear environmental and financial payback.

The journey towards this has already started. ANDRITZ is currently helping its customers to use less fresh chemicals and water as well as reducing industrial emissions and waste. It is doing this by increasing resource and operational efficiency and turning traditionally unused side streams into new commercial products. In addition, these actions dramatically reduce pollution to air, land, and water as well as reduce traffic and logistics around the mill.

WHAT IS CircleToZero?
The pulp and paper industries play a key role in the transition and transformation towards a fossil-fuel free circular bioeconomy. By developing circular operations to eliminate unused side streams, and creating new value-added bio-based products, it can be the global leader in zero emissions and zero waste industrial processes.

CircleToZero brings together the continuous development and improvement of existing ANDRITZ technology solutions to achieve this leadership position with clear environmental and financial benefits.

CircleToZero is a collaboration-driven process, where we share innovations, develop new solutions, and contribute to the positive financial returns and environmental impact of the whole industry – together with our customers, research institutes, and other partners.

WHY CircleToZero?
The pulp and paper industries are growing. Growing while achieving zero emissions and zero waste together with higher overall resource efficiency is the main driver for sustainability of the industry. Regulations, capital and customer demand all
require solutions to resource scarcity, mitigating climate change, and the need to create more added value while using less natural resources. Pulp and paper production creates multiple gaseous, solid, and liquid side streams. These side streams include, for instance:

Gaseous side streams: Nitrogen oxides, sulfur dioxide, odorous gases, and carbon dioxide

Solid side streams: Drags and grits, sludge, ash and gasifier bottom ash, reject fibers, and lime mud

Liquid side streams: Filtrates, raw methanol, condensates, sulfate rich streams, and crude sulfate turpentine

Currently, the ANDRITZ A-Recovery+ concept unlocks the economic potential of the many traditionally unused side streams. These include purifying raw methanol into commercial quality bio-methanol, the on-site production of sulfuric acid, and recovery of trash lignin.

CircleToZero OPPORTUNITIES

CircleToZero opportunities for developing both circular operations and new products in the pulp and paper industry are:

1. Circular operations. CircleToZero is achieved by applying higher efficiency and closed loops throughout the mill-wide production. Future opportunities include reducing fresh water usage by increasing the recyclability of used water – towards a Zero Liquid Discharge mill, process wide capturing of biogenic CO2, and further utilization of captured carbon dioxide in the creation of new products.

2. Value added products. There is a significant opportunity for CircleToZero in replacing fossil-based products with new wood-based products and materials by utilizing the existing side streams in a better and more efficient manner. The replaceable materials include plastics, composites, textiles, industrial bio-chemicals, and biofuels. Also, ANDRITZ fiber processing technologies make it possible to produce new value-added bioproducts from wood fiber itself, including dissolving pulp and microcrystalline cellulose.

Looking at the current side streams, ANDRITZ has identified several CircleToZero opportunities for elimination, reduction, and further use in and outside the mill.

GASEOUS SIDE STREAMS

Nitrogen oxides • NOx reduction technologies
Sulfur dioxide • SOx removal technologies
Odorous gases • Odorous gas handling and treatment
Carbon dioxide • BiOCO2 utilization with hydrogen to produce biomethanol

SOLID SIDE STREAMS

Drags and grits • Source of alkali
Sludge • Conversion into pellets
Ash and gasifier bottom ash • Purification and re-use outside the mill
Lime mud • Purification and re-use and Source of alkali

LIQUID SIDE STREAMS

Filtrates • New strategies to handle filtrates
Raw methanol • Purification and re-use in and outside the mill
Condensates • Reuse of condensates
Sulfite rich streams • Extraction of sulfate to reduce the fresh water usage
Crude sulfate turpentine • Purification and re-use outside the mill

ANDRITZ recognizes that creating economic and environmental value is not without its challenges. Alongside customers and partners, CircleToZero aims to change this.

Turning CircleToZero into reality will be fueled by achieving immediate bottom-line savings, identification of new business and investment opportunities, and the ability to comply with tightening regulations. CircleToZero can solve the age-old problem where an investment set out purely to reduce emissions is rarely financially feasible.

CircleToZero IN ACTION

ANDRITZ has strong customer support and partnerships to turn CircleToZero solutions into a reality. Collaboration will be crucial to grasp the wealth of opportunities at stake and develop innovative business models together. Building on technology expertise, ANDRITZ will provide its customers with gap analyses and recommendations for existing mills to adapt and is also able to demonstrate a payback time close to zero for new projects, if properly planned ahead with the CircleToZero approach.

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