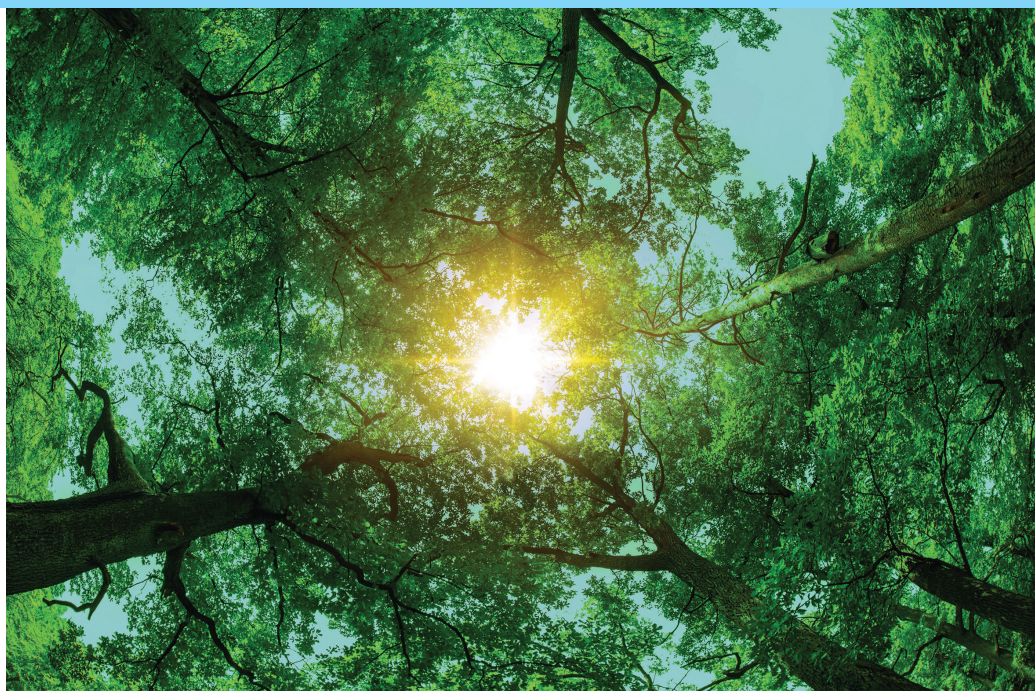


# Innovating for tomorrow: How the pulp and paper industry is turning the page for a sustainable future

*Stefano Cinquina, Business Line Manager for Pulp and Paper, ABB Process Industries*

## INTRODUCTION:

As industries worldwide contend with the need to decarbonize and shift away from fossil-based materials, the pulp and paper industry is equipped to take the lead in driving change. By leveraging its renewable raw materials and commitment to circularity, the industry has the potential to transform not only its own processes but also the broader economy and shape a more sustainable future.



**Figure 1: The pulp and paper industry is turning the page for a sustainable future.**

In the digital era, the pulp and paper industry faces both challenges and unprecedented opportunities. While digitalization has reduced demand for traditional paper products like newsprint, it has fueled growth in other segments such as e-commerce packaging.

The story of pulp and paper is one of continuous evolution and innovation. Tracing its roots back to the ingenuity of the Ancient Egyptians and the refined techniques of Chinese paper pioneer Ts'ai Lun in 105 CE, papermaking has always been intertwined with resourcefulness and sustainability. Early paper production was characterized by the reuse of available materials, such as fishing nets and old textiles, embodying the principles of recycling long before it became a global priority.

Today, the industry's commitment to sustainability is stronger than ever. Unlike other industries, pulp and paper production starts with a natural resource – wood – that is inherently renewable. Coupled with the industry's long-standing expertise in recycling, the pulp and paper industry sets the example for circularity.

However, modern challenges call for modern solutions. To meet sustainability targets, the industry must address its significant environmental footprint, where it is the fourth largest industrial energy consumer and significant generator of wastewater, byproducts and material waste. Achieving this requires a shift to renewable energy sources and greater efficiency in energy and water use. Importantly, the industry has demonstrated its ability to adapt, as seen in its shift in focus from declining graphic paper production to new growth areas like packaging, tissue, textiles and bio-based innovations.

Research from McKinsey underscores this evolution, noting sustained industry growth driven by population expansion, economic development, and rising consumer preferences for environmentally friendly products.

Through this transformation, the industry has positioned itself as a key player in the transition from fossil-based to renewable materials. This role extends beyond paper, influencing adjacent areas such as textiles, biofuels, and sustainable packaging.

## Collaborating for real progress

The journey toward a more sustainable future is not one the pulp and paper industry can take alone. It requires collaboration across sectors, leveraging advanced technology and expertise to address shared challenges like decarbonization and resource efficiency. ABB's Real Progress campaign highlights the role of automation, electrification, and digitalization in accelerating progress in the process industries.

With its extensive history of supporting industries to reduce emissions and increase efficiency, ABB's contributions reflect a broader movement towards aligning sustainability with productivity. Within the pulp and paper industry, efforts focus on innovative applications and solutions that enable mills to meet ambitious environmental targets while remaining competitive.

This article covers the first in a three-part series of industry papers exploring real progress in the pulp and paper sector. Future papers will dive deeper into the themes of decarbonizing operations and improving resource efficiency, highlighting how companies are tackling these pressing issues with ingenuity and collaboration.

### **Sustainability as a business imperative**

Sustainability is no longer just a compliance requirement or a strategy to conserve resources – it has become a fundamental business imperative and a driver of innovation within the pulp and paper industry. Leaders in this space recognize that their success lies in maintaining the balance between environmental responsibility and financial performance.

ABB's industry paper on innovations within sustainability in the pulp and paper industry highlights how companies are embedding these principles into their core strategies, using innovation to align environmental stewardship with business growth. This perspective is echoed by Tracy Wessels, Group Head of Sustainability and Investor Relations at Sappi, who states: "We have integrated sustainability into all parts of our business – it's part of our value proposition."

This ethos is not new to the industry. Historically, pulp and paper companies have championed responsible forestry and pollution reduction, laying a strong foundation for today's achievements. However, there is a noticeable shift in perspective: sustainability is now seen as an opportunity, not an obligation. Companies are proactively embedding it into their core operations, not only to meet government regulations but because it aligns with long-term business growth and societal impact.

Central to this progress is the industry's commitment to innovation. Achieving net-zero papermaking requires collaboration across supply chains, developing technologies to reduce energy use and emissions. At the same time, companies are investing in value chain innovations to improve fiber recycling, explore alternative materials and optimize processes.

These efforts illustrate a critical point: sustainability is not a constraint – it is the gateway to pioneering new approaches, diversifying products, and meeting the expectations of environmentally conscious consumers. By doing so, the pulp and paper industry can lead the charge toward a circular economy and a low-carbon future.

### **Paper-based packaging as a plastic substitute**

As environmental concerns about plastic waste escalate, the pulp and paper industry has emerged as a key player in developing sustainable alternatives. Paper-based packaging, with its renewable and biodegradable properties, offers a solution to the global reliance on single-use plastics. Yet this innovation comes with its own set of challenges.

Jurgita Girzadiene, Sustainability and Better Planet Packaging Director at Smurfit Westrock, highlights the complexity of developing paper alternatives:

"The main challenge in developing paper-based alternatives is that paper would acquire some properties given by plastic, but would remain renewable, recyclable, and biodegradable. That means, if we give paper a property of barrier to water by applying coating, that coating should not hinder the recyclability at the packaging end of life."

This challenge underscores the importance of collaborative innovation. ABB's technologies, such as energy efficient drives and process optimization solutions, are enabling mills to enhance productivity while developing paper-based alternatives that meet both environmental and performance standards.

And industry players are making progress. Finland's Metsä Group, for example, has pioneered its Muoto™ 3D fiber line, leveraging molded pulp technology to create lightweight yet durable packaging solutions. These innovations demonstrate that paper-based products can match the strength and functionality of traditional plastics while operating on renewable energy.

**Figure 2: Paper-based packaging, with its renewable and biodegradable properties, offers a solution to the global reliance on single-use plastics.**



Meanwhile, Smurfit Westrock's Better Planet Packaging Initiative aims to redefine packaging as a sustainable, circular solution. Examples of this innovation include:

- AgroPaper™: A degradable paper alternative to plastic film in agriculture, which can enrich the soil post-use.
- TopClip™: A recyclable alternative to shrink wrap for multipack beverage cans, popular among breweries.
- Paper Pallet Wrap: Stretchable paper that can replace plastic stretch film in logistics.

These solutions illustrate how the industry is not only addressing consumer demand for environmentally friendly packaging but also driving the broader transition toward a circular economy. By combining advanced technology with sustainability principles, the pulp and paper industry is paving the way for a future where packaging leaves no trace for future generations.

#### **Dissolving pulp: a renewable alternative for the textile industry**

The global textile industry faces mounting pressure to find sustainable solutions to combat the environmental impact of synthetic fibers like polyester and nylon, which are derived from fossil fuels. These synthetics dominate the market but are among the most environmentally damaging fibers. In contrast, dissolving pulp (DP) has emerged as a renewable alternative to support the transition toward a circular economy.

DP is a versatile raw material derived from wood cellulose, which can be transformed into regenerated fibers like viscose, lyocell, and modal. These MMCFs are increasingly sought after by the textile industry due to their ability to replace non-renewable synthetics while maintaining similar performance and versatility. The global impacts of fast fashion, including excessive waste generation – equivalent to a garbage truck's load of clothes sent to landfills every second – underscore the urgency of transitioning to renewable materials.

Many global pulp and paper companies are expanding DP production to meet the textile industry's demand. Innovations in blockchain technology are also enhancing the traceability of DP solutions, a growing priority for the fashion sector. Sappi, for instance, has collaborated with customers to track the geolocation of forests used for DP production. This allows consumers to verify that garments made from DP originate from sustainably managed and deforestation-free sources.

#### **OnceMore®: recycling blended fabrics into high-quality pulp**

Among the most notable advancements in the circularity of textile fibers is Södra's OnceMore® initiative. This innovative large-scale recycling process combines textile waste with responsibly sourced wood fibers to create virgin-quality dissolving pulp. By closing the loop on 2,000 tons of textile waste in 2024, OnceMore is setting a new benchmark in sustainable textile production, with ambitions to scale up to 50,000 tons annually.

The process targets blended fabrics, such as polycotton blends (30% polyester and 70% cotton). It separates polyester from cotton, reusing the cotton to create OnceMore pulp while incinerating the polyester to generate energy for its operations. This approach not only reduces textile waste but also ensures that the resulting pulp maintains the purity and quality necessary for textile manufacturing.

The initiative also highlights the importance of collaboration across the value chain. Partnerships with upstream suppliers of textile waste and downstream consumers of DP have been crucial to its success. Through certification under the Recycled Claim Standard (RCS), OnceMore supports manufacturers in meeting tightening regulatory requirements around recycled content and recyclability. OnceMore represents a paradigm shift – not just in technology but in the systems required to scale textile recycling.

**Figure 3: The global textile industry faces mounting pressure to find sustainable solutions to combat the environmental impact of synthetic fibers like plastic.**





### Beyond paper: bio-based innovation

As the world's largest producer of bioenergy and biomaterials, the pulp and paper industry represents the most significant biomass utilization system derived from wood. The concept of a pulp mill functioning as a biorefinery is not new within the sector. These mills convert biomass into energy and various valuable byproducts using technologies such as biomass boilers, gasification, biodiesel, and ethanol production.

Integrating bio-based production into conventional pulp and paper mills is central to achieving environmental and financial sustainability. By utilizing renewable technologies, the industry plays a vital role in decarbonization, including applications for hard-to-abate sectors like aviation through biofuel production.

### Collaboration for circularity

The transition to a bio-based economy requires robust collaboration across industries and value chains. Side streams, or production waste, are increasingly being leveraged as raw materials for new products. Thinking beyond individual mills and organizations to discover opportunities that drive innovation is central to this transition.

For instance, at Smurfit Westrock's Rethel paper mill in France, plastics inadvertently introduced through recycled waste streams are redirected to a sister facility in Germany. There, the plastics are melted down and converted into bioenergy for the mill's boilers, showcasing how waste can be transformed into energy solutions.

The pulp and paper industry is demonstrating that bio-based innovation is not just about replacing fossil fuels but also about reimagining waste as a resource, creating sustainable solutions that benefit both the environment and the economy.

### Looking ahead

The pulp and paper industry has made significant strides in sustainability, driven by innovation across its value chain. From upstream advancements in fiber technologies to downstream

**Figure 4: The pulp and paper industry is demonstrating that bio-based innovation is not just about replacing fossil fuels but also about reimagining waste.**

solutions that replace fossil-based, non-renewable products, the industry has much to celebrate and offers a promising outlook for the future.

There is no understating how fundamental innovation is to achieving sustainability goals, and the pulp and paper industry is positioned to play a pivotal role in supporting the global transition to a circular economy and a net-zero future. Sustainability is a critical challenge that requires practical solutions, bold innovation, and collaborative action across industries. Future papers in this series will provide detailed insights into decarbonization and resource efficiency, offering stakeholders across the pulp and paper value chain strategies to implement meaningful, measurable progress. By leveraging these insights, the industry can advance its sustainability goals in a way that benefits both the global economy and the environment.



**Figure 5: The author Stefano Cinquina, Global Business Line Manager for Pulp and Paper, ABB Process Industries.**

Learn more at:

