

FROM RISK TO RESILIENCE: ALTERNATIVE PAPER PACKAGING OPPORTUNITY

THE PROBLEM: WOOD FIBRE DEMAND IS LEADING TO SUPPLY CHAIN RISKS AND PRESSURE ON FINITE GLOBAL FORESTS

Forests are the lifelines of our planet, providing a myriad of ecosystem and community services while playing an essential role in carbon sequestration and tackling climate change. At the same time, 3.1 billion trees are used for paper packaging annually, and this number continues to grow. This increasing demand for forest-based packaging, coupled with tightening regulatory standards, geopolitical instability and climate-related disasters, are turning what was once a sustainability issue into a core supply chain and cost challenge.

DEMAND IS OUTGROWING RESPONSIBLE FIBRE SUPPLY

SHRINKING WOOD FIBRE SUPPLY

- **Rising demand, rising costs:** Growing wood demand from the paper, construction, and energy sectors is expected to put increasing pressure on supply, pushing prices up from \$588/tonne in 2021 to a projected \$854/tonne by 2050 (USD, excluding inflation).¹
- **Climate-related disasters:** Extreme fires are predicted to increase globally by up to 14% by 2030 compared to 2022.² A staggering 393–667 million tonnes of roundwood have been lost to wildfires between 2001 and 2021.³
- **Essential conservation:** Necessary forest protection commitments, such as the Kunming-Montreal Global Biodiversity Framework (COP15), further limits global wood fibre supply.

REGULATORY AND GEOPOLITICAL RISKS

- **Competition for responsibly sourced fibre:** Competition is growing for credibly certified, sustainably sourced wood due to current and emerging regulations and geopolitical events (i.e. EUDR, EPR schemes, voluntary disclosures, tariffs, and duties).
- **Market volatility:** The evolving geopolitical landscape is fueling supply chain volatility and pushing costs higher (e.g. global tariffs and EU/China anti-dumping duties are driving up the costs of imported goods).

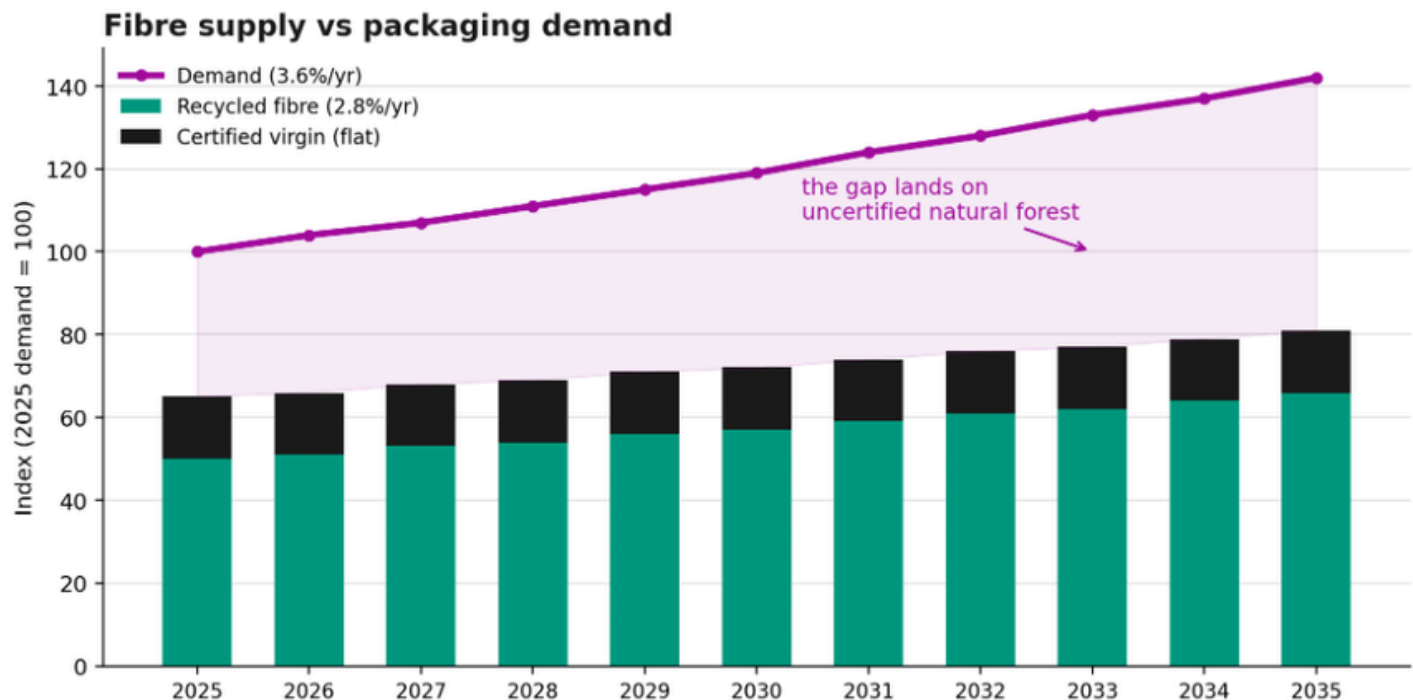
ENVIRONMENTAL AND REPUTATIONAL RISKS

- **Public sourcing controversies:** Reports like “Killed by Cardboard” by Greenpeace exposed the links between the logging of Ancient and Endangered Forests and the paper and pulp supply chains, many of which were linked to major consumer goods companies.⁴
- **Climate and extinction crises:** Ancient and Endangered Forests and terrestrial habitat critical for conserving species continue to be degraded and destroyed. Logging in Ancient and Endangered Forests and the expansion of forestry plantations into key habitats exacerbate the threat to planetary boundaries.

RECYCLED FIBRES CANNOT MEET GROWING DEMAND

- Recycled fibre remains an essential and low impact option to virgin wood, yet its availability and price is becoming more volatile and constrained in some regions.
- Fibres typically survive only five to seven recycling loops before quality deteriorates, presenting an inherent ceiling.

PACKAGING FIBRE DEMAND VS. RECYCLED AND CERTIFIED SUPPLY, 2025–2035



Index, 2025 demand = 100. Growth rates from footnotes 5 and 6. Supply shares illustrative.

THE SOLUTION: DIVERSIFY THE FIBRE BASKET WITH ALTERNATIVE FIBRES

To improve the resilience of supply chains, refine performance, and relieve pressure on forests, an effective solution is to incorporate regionally available **alternative fibre feedstocks**. These are non-wood feedstocks including agricultural residues such as wheat straw, industrial residues like sugarcane bagasse, and sustainably sourced fibre crops like hemp and miscanthus. These fibres present a variety of benefits:

PERFORMANCE BENEFITS

- The cellulose fibre lengths of cereal straws give it similar properties to hardwoods.
- Flax, hemp, and other bast fibre plant stalks are well suited to replace, and can even outperform, softwoods.
- Agricultural residues such as wheat straw and bagasse have been successfully integrated in many varieties of paper packaging, demonstrating benefits ranging from lightweighting to stiffness and strength.

ENVIRONMENTAL BENEFITS

- Carbon and biodiversity benefits from avoiding deforestation and forest degradation.
- Potential lower energy and water usage (particularly with the application of optimized technology).
- No land use trade-offs, fibres do not compete with food production.
- Recyclable as wood fibre, aligning with most Extended Producer Responsibility (EPR) schemes⁷; (Based on Canopy's initial research on existing EPR systems in Europe and North America, in almost all schemes, non-wood fibre (from agriculture residues like wheat straw) in paper packaging is not distinguished from wood-fibre, and thus is considered recyclable.)

SOCIAL BENEFITS

- Supplemental source of income for growers/farmers.
- Reduction of health impacts from air pollution tied to field burning of agricultural residues.

ECONOMIC BENEFITS

- Long-term hedge against virgin pulp volatility and tightening regulation.
- Modelled production costs for wheat straw pulp sit below current NBSK spot prices, which supports partial displacement at low blend rates.
- Zero EUDR compliance overhead (agricultural residue is outside EUDR scope).

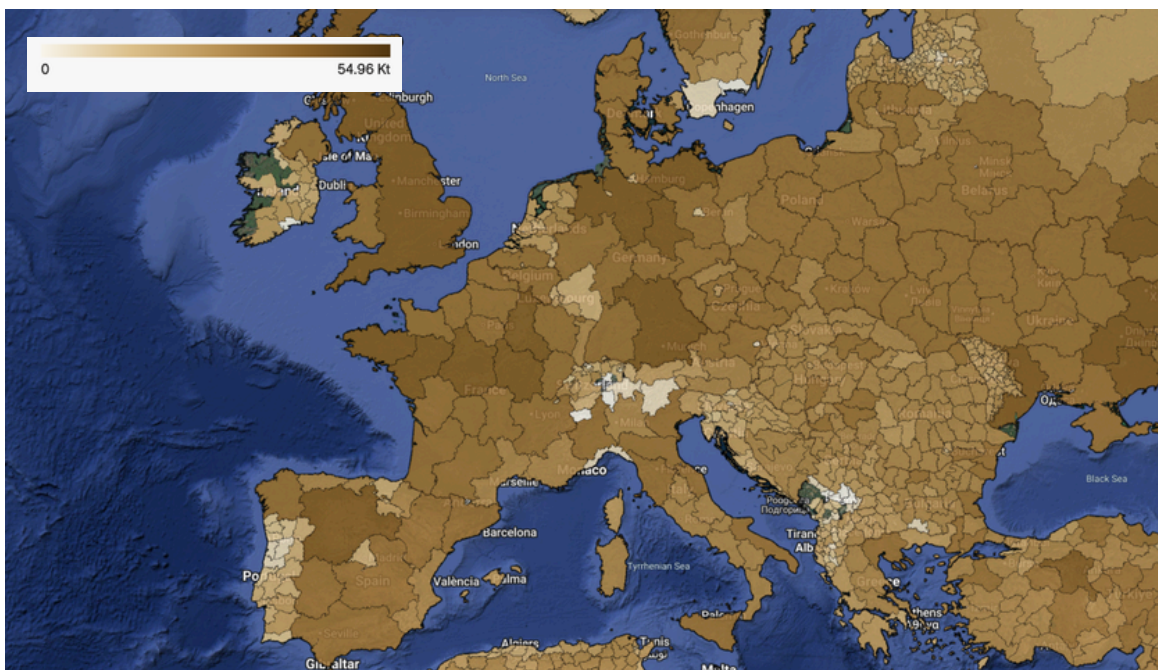
STABLE, RELIABLE SUPPLY

- Alternative fibres are a consistent, competitively priced option that can insulate against trade and price shocks in virgin wood markets.
- Regional sourcing reduces transportation and shipping costs.
- Potential performance improvements when supplementing recycled fibre content.
- Reduction of exposure to regulatory pressures (such as EUDR).

AGRICULTURAL FIBRE AVAILABILITY – A FOCUS ON EUROPE

- Today, the largest amount of biomass of alternative fibres globally is from wheat and rice straw, followed by sugarcane bagasse and barley straw. Research by Wageningen Environmental Research and Wageningen Food & Biobased Research found significant available volumes of wheat straw and barley straw availability globally and across Europe.⁸
- Wheat straw is the largest alternative fibre opportunity globally, with an estimated 1.08 billion tonnes of dry mass produced per year.⁸ Countries like France, Germany, Poland, Spain, and Italy are among the European countries with the largest wheat straw potential. Well-established practices for storing wheat straw allow it to serve as a feedstock for paper production year-round.

WHEAT STRAW PRODUCTION IN EUROPE, BY PROVINCE/STATE



Map generated by Canopy's Forest Mapper. Wheat Straw data sourced from footnote 8.

THE OPPORTUNITY: PRODUCT DEVELOPMENT PROJECTS

Canopy is supporting companies to explore the availability, applicability, and viability of alternative fibre packaging in key sourcing regions, building conditions for a consistent supply of pulp and paper packaging product(s) containing alternative fibre content.

OPPORTUNITY 1: CONTAINERBOARD/CORRUGATE OPPORTUNITY

- Canopy is currently supporting a large FMCG and a major pulp and paper packaging supplier to test percent blends of wheat straw to make containerboard (corrugate).
- Preliminary results have been promising; commercial testing phase in progress.

OPPORTUNITY 2: FOLDING BOXBOARD/PAPERBOARD OPPORTUNITY

- Explore pathways to develop a folding boxboard/paperboard product with alternative fibre content with a current paperboard supplier.
- Collaborate with other CPG players that are similarly seeking to diversify their feedstock inputs for paper packaging.

NEXT STEPS: HOW TO PARTICIPATE

Ready to move from risk exposure to resilience? Here's how to get started:

1. Choose a champion: Nominate someone on your team to lead this effort and serve as Canopy's main point of contact. They'll coordinate the steps below.
2. Identify your need: Tell us which of the opportunities above match your sourcing needs and packaging formats (corrugated, paperboard, or both).
3. Share a snapshot: Provide a high-level view of your packaging footprint: sourcing regions, rough volumes, and key suppliers and converters. Canopy will use this to suggest which active cohort(s) might fit.
4. Join a scoping call: Canopy will set up a short call to walk through supplier connections, timelines, and what a Letter of Intent would cover.

WHO IS CANOPY?

Canopy is an award winning, solutions-driven nonprofit that works with leading companies to transform unsustainable supply chains and protect the world's forests, species, and climate. For more than 25 years, Canopy's model of change has leveraged market collaboration to reduce the environmental impact of sourcing decisions and accelerate the transition to smarter, lower-impact alternatives. Through this approach, Canopy has partnered with more than 1,000 brands, innovators, and producers to adopt and implement ambitious, time-bound sourcing policies that keep Ancient and Endangered Forests out of supply chains and accelerate the uptake of fibre alternatives.

1. Global Forest Product Model, Buongiorno et al. Base year 2021. Demand is price responsive and model does not account for significant technological improvements.
2. Spreading like wildfire: the rising threat of extraordinary landscape fires. UNEP. 2022.
3. Substantial and increasing global losses of timber-producing forest due to wildfires. Bousfield et al., 2023.
4. Killed by Cardboard: How Old-Growth Forests in Sweden End up as Boxes for Global E-Commerce. Greenpeace Nordic. 2024.
5. Smithers via Metsa Board, The Global Packaging Market.
6. Mordor Intelligence, Recovered Paper Market.
7. Recyclability of Next Gen. Canopy. 2024
8. Canopy funded feedstock assessment by Wageningen University (2026). Wageningen University Research.