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Circularity concepts in the pulp and paper industry

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Setting the Stage for Circularity in the Pulp and Paper Industry

Source: UNECE/FAO

Circularity and sustainability in the pulp and paper industry

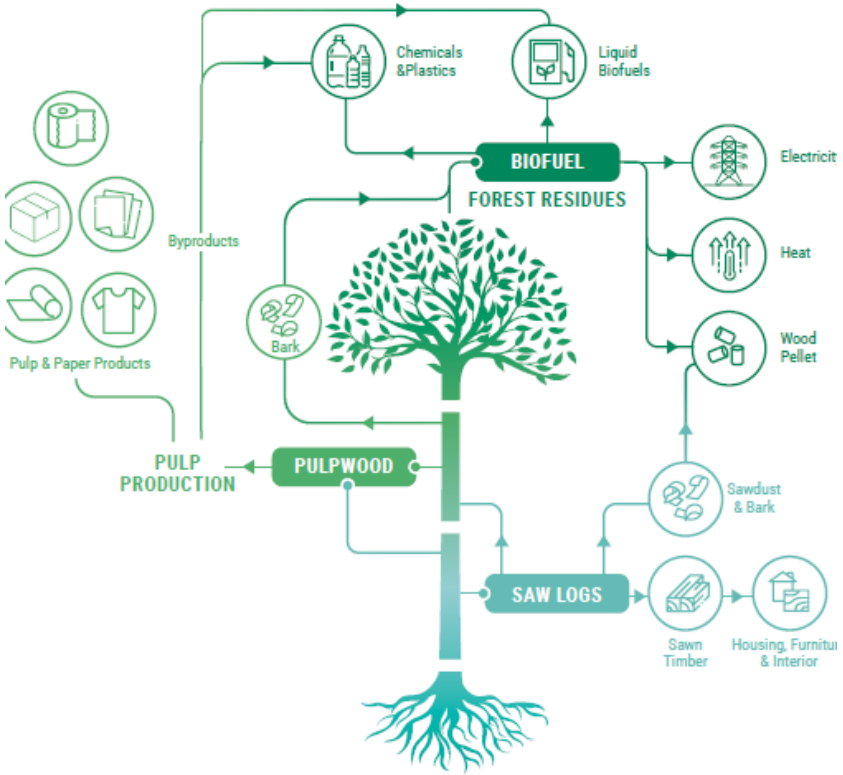
- Three core principles: reducing waste by design, retaining materials in circulation, and restoring the systems from which resources are extracted.
- Circularity of paper products broadens the availability of renewable raw material for all forest-based products to allow for a growing bioeconomy substituting fossil material and energy

Key Circularity Features of the Pulp and Paper Industry

Source: UNECE/FAO

- High recycling rates and recycled content: e.g. in the US, 80% of mills use recovered paper, in the EU, 83.2% of paper packaging is recycled
- Cascading use of wood: sawmill by-products and forest residues end up as feedstock to pulp mills.
- Innovative use of side streams: producing bio-based alternatives in biorefineries

Innovation from Biorefineries



Source: UNECE/FAO adapted from Metsä

Biorefineries built on pulp and paper mills side streams

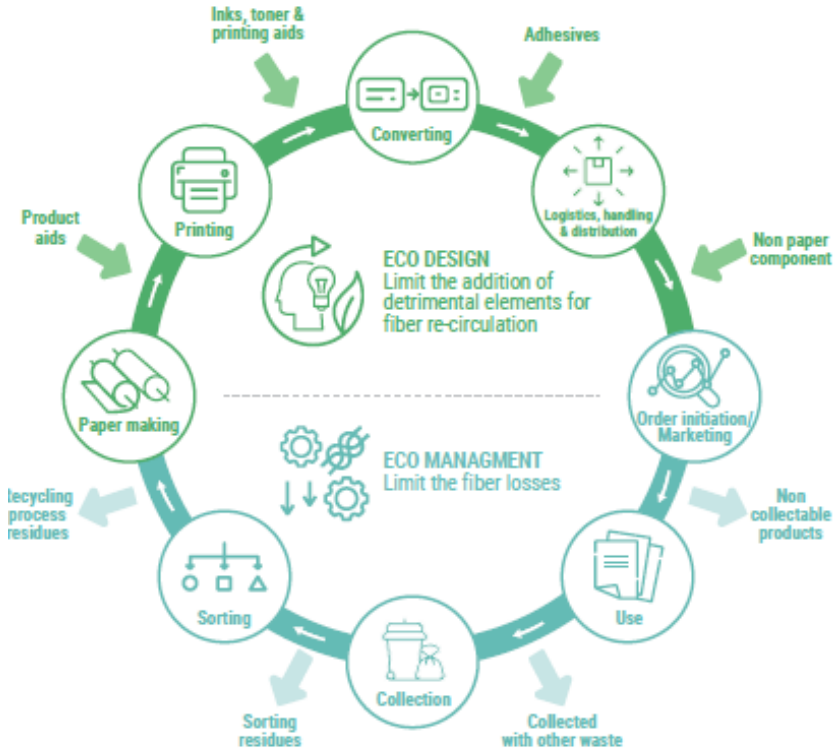
- Materials, chemicals, food, feed, pharmaceuticals and cosmetics
- Their production is based on chemical pulping, on paper production or other processes
- Interesting example: lignin, a by-product of pulping, is repurposed as bio-based chemicals.
- Applications include adhesives, carbon fibers, and renewable fuels.

Sustainability in Resource Management

Source: essity

- Efficient use: reduced energy, water, and material consumption
- Besides high rates in paper recycling, many mills also reuse 90-95% of water used during paper production.
- Increased use of on-wood fibers: bamboo, hemp reducing virgin wood reliance.
- Increased use of residues and by-products: straw, textile waste
- Lightweighting products: enhanced material efficiency.

Recycling: Key Circularity Feature in the Pulp and Paper Industry



Source: UNECE/FAO adapted from WEF

Design for recycling:

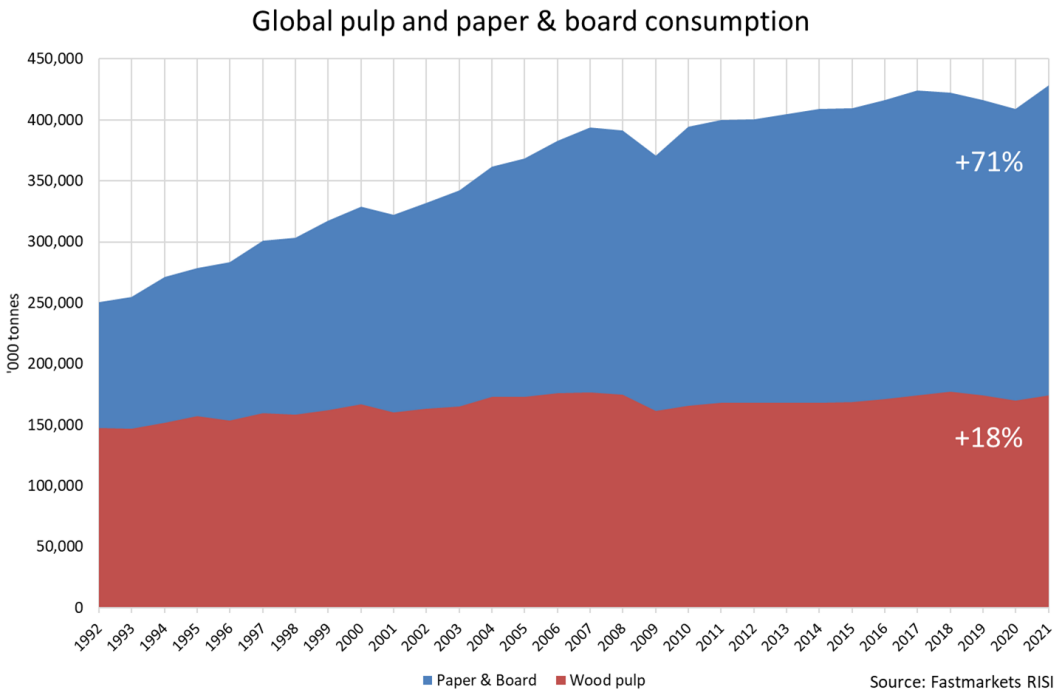
- the high recycling rate of paper products at the end of their lives is largely facilitated by the design
- paper products as an example of short-lived commodities extend the lifespan of cellulose fibers through a repeated recycling and reuse with the industry
- Standardized and widely applied recycling processes facilitate designing products “for recycling”

Sustainability in the End-of-life Management

Source: ImpactPaperRec

- Separate paper collection
- The importance of citizens' buy-in
- The existence of sorting infrastructure
- Standardized grades of paper for recycling
- Paper for recycling a locally, regionally and globally sought-after commodity
- The existence of a market pull facilitates more collection and circularity

Environmental benefits and trade-offs



Virgin and recycled materials

- Increasing paper recycling reduces the amounts of paper incinerated or landfilled
- Recycling reduces the need for fresh wood fibers in papermaking, which diminishes the pressure on forests
- Use of LCAs can help weighing trade-offs in other environmental parameters (e.g. energy, water) on a case-by-case basis
- Paper recycling and use of virgin fibers contribute to one system and broaden the raw material base of the circular bioeconomy

Sustainability and circularity considerations

- While recycling rates can be further increased, a steady inflow of virgin fiber will be needed.
- Products designed for recycling must include sorting instructions for the end-consumer.
- Science-based environmental footprint information helps making products reliable and comparable for the consumer. They need to be publicly available.
- Paper mills have a potential to become more energy self-sufficient by producing renewable energy onsite using e.g., waste and residues for bioenergy in line with the cascading use of biomass. This needs to be encouraged.
- For the remaining energy needs, access to affordable clean energy is crucial to increase the synergy between increasing circularity and efforts to mitigate climate change.

Policy consideration

- Continue support to and communication on sustainable forest management.
- Promote recycled fibers to widen the raw material base for renewable products, substituting fossil ones.
- Promote valuable waste/raw material streams diversion from landfills and other disposal options.
- Collect paper and paperboard separately, including from other recyclables

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Thank you

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