Innovating for balance

Wood-based cellulosic fibers

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Wood-based cellulosic fibers
for nonwoven and textile applications
Agenda

- Fiber market and challenges
- Sustainability approach and innovations in wood-based cellulosic fibers
- Dissolving wood pulp as sustainable business foundation, Lenzing’s strategic next step for future growth
Demand for textile and nonwoven fibers growing

Source: Fiber Year 2018, Smithers Apex, team analysis, Euromonitor, ICAC (update as of September 2018)
Textile Industry has serious challenges

Source: A new Textiles Economy: Redesigning Fashion Future: Ellen MacArthur Foundation

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Nine million tons of plastic waste end up in the ocean every year.

The total fashion waste in 2030 is anticipated to reach 148 million tons

Source: Global Fashion Agenda & BCG Inc. – Pulse of the Fashion Industry
Botanic nets made from Lenzing™ fibers
LENZING™ ECOVERO™ fibers

- Use of certified and controlled wood
- Sustainable production process proven by third parties
- Innovative identification system allows everyone in the supply chain transparency in all processing steps
LENZING™ Lyocell fibers

- Define new standard of sustainability and new comfort
- Closed loop process with only one solvent, which gets recycled close to 100%
TENCEL™ Luxe filaments

- Award winning lyocell process extended to filament production
- TENCEL™ Luxe filaments redefine the landscape of luxury fashion
TENCEL™ lyocell fibers with REFIBRA™ technology

- Contribution to circular economy in pre-consumer waste
- Upcycling of cotton and reduction of cotton scraps in garment production
Independent ranking of fiber impact on environment

Developed by the Sustainable Apparel Coalition, the Higg Index is a suite of tools that enables brands, retailers, and facilities of all sizes — at every stage in their sustainability journey — to accurately measure and score a company or product’s sustainability performance. The Higg Index delivers a holistic overview that empowers businesses to make meaningful improvements that protect the well-being of factory workers, local communities, and the environment.

Source: Higg MSI Scores

Generic Viscose / Rayon
Generic Modal
Generic Lyocell
Cotton fiber, conventional production
Sheep wool type (coarse, medium, fine wool)
Silk, raw, from silkworm
LENZING™ fibers are best-in-class

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Lenzing’s sustainability strategy based on three pillars

**Partnering for change**

Focus areas:
- Partnering for systemic change,
- Empowering people,
- Community wellbeing

**Greening the value chain**

Focus areas:
- Sustainable innovations,
- Water stewardship,
- Raw material security,
- Decarbonization

**Circularity**

Naturally positive
Circularity of overall business model

Wood sourcing
Forests & plantations

Biorefinery & pulp production

Fiber production
Lyocell
Viscose & Modal

End of life
Compostability/biodegradability
Recycling
Incineration

Biobased materials and co-products

 Manufacturing steps
Textiles | Value chain: Spinning, Knitting, Weaving, Dyeing, Finishing, Garment making
Nonwovens | Value chain: Roll-good producer, Converter

Energy & chemicals from suppliers

External pulp suppliers

Consumer use
Brands/retailers
Biorefinery with pulp production central core
Dissolving wood pulp market is relatively concentrated with significant link to paper pulp market

DP for WBCF supply, 2017, mt

Capacity distribution, 2017, %

- Merchant
- Integrated

- Birla: 21%
- Sappi: 10%
- Lenzing: 10%
- RGE: 15%
- Sun Paper: 5%
- Rayonier: 4%
- Jari: 3%
- Hunan Juntai: 28%
- Other: 6%

Forecasted capacity, mt

- Total: 7
- Other (CLP, other): 1
- DWP: 6

2017: 6
Additional: 2
2022: 8

~80%
~30%
~20%

Note: DWP – dissolving wood pulp, WBCF- wood based cellulosic fibers, CLP – cotton linter pulp, DP – dissolving pulp, PP – paper pulp

www.lenzing.com
Debottlenecking of existing sites as first step to increase backward integration to future 75 %

Pulp mill in Lenzing, Austria
- 300 kt/a DWP based mainly on beech
- Sulfite technology

Pulp mill in Paskov, Czech Republic
- 275 kt/a DWP based on spruce
- Sulfite technology

Debottlenecking programs ongoing to increase capacities by total 35 kt/a
Lenzing’s biorefinery – unique product portfolio

- Pulp is used for fiber production
- Biobased materials generate revenue
- Bioenergy supports independence in supply
Major strategic step: Pulp mill in Brazil - excellent project progress

- JV with Duratex for 450 kt DWP mill
- No. 1 cost position
- Plantations ensure sustainable wood supply
- Operation ramp-up planned for 2022
Partnering up for a systemic change

- **Investors**
- **NGO's**
- **Certification bodies**
- **Suppliers**
- **Brands & Retailers**
- **Governments**
- **Multi-stakeholder initiatives**
- **Raters**

Innovative by nature
Thank You for your attention!