

# Innovative by nature

## **Bioraffinerie und mehr: Aus der Praxis der Lenzing Gruppe**

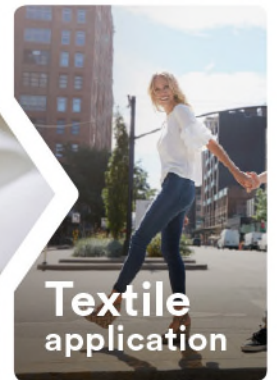
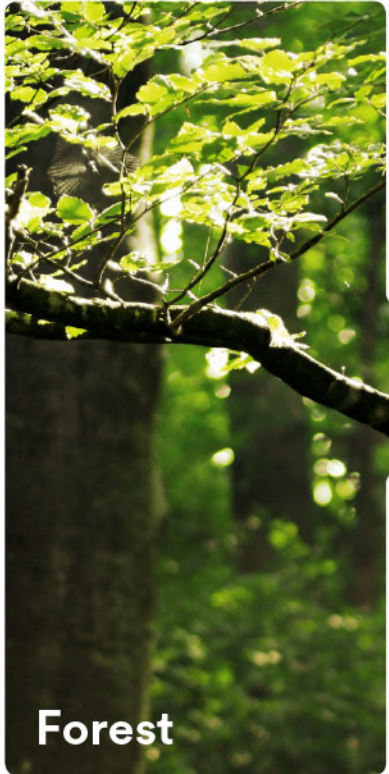
Dr. K. Christian Schuster  
Fachdialog Bioökonomie, Wien, 14. Mai, 2019

# Innovative by nature

## **Biorefinery and more: Practical bioeconomy in the Lenzing Group**

Dr. K. Christian Schuster  
Fachdialog Bioökonomie, Vienna, 14. May, 2019

# LENZING™ fibers produced from the raw material wood



# LENZING™ fibers field of application

## Textiles

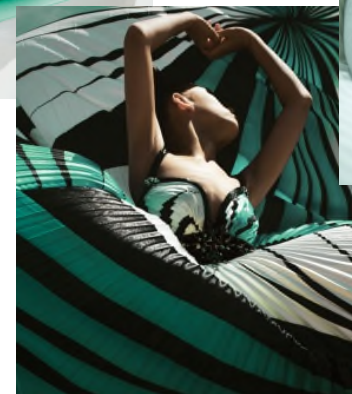


Denim

## Active



Intimate



Luxe



Home

# LENZING™ fibers field of application

## Nonwovens

Body



Beauty



Intimate

Surface



# LENZING™ industrial applications

## Industrials



Agriculture

Workwear



Protective Wear



Packaging



Engineered Products

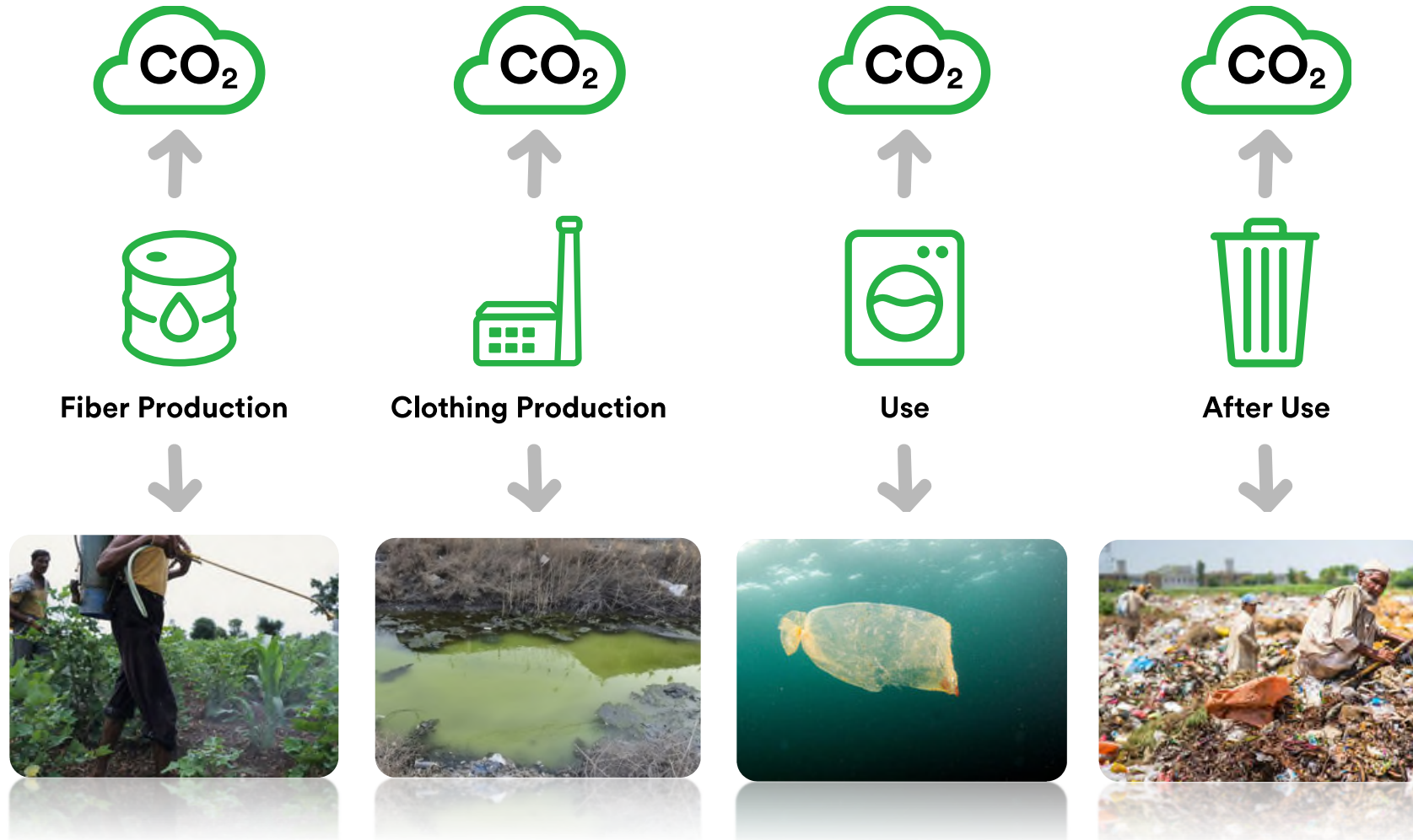


Footwear

Biorefinery Products



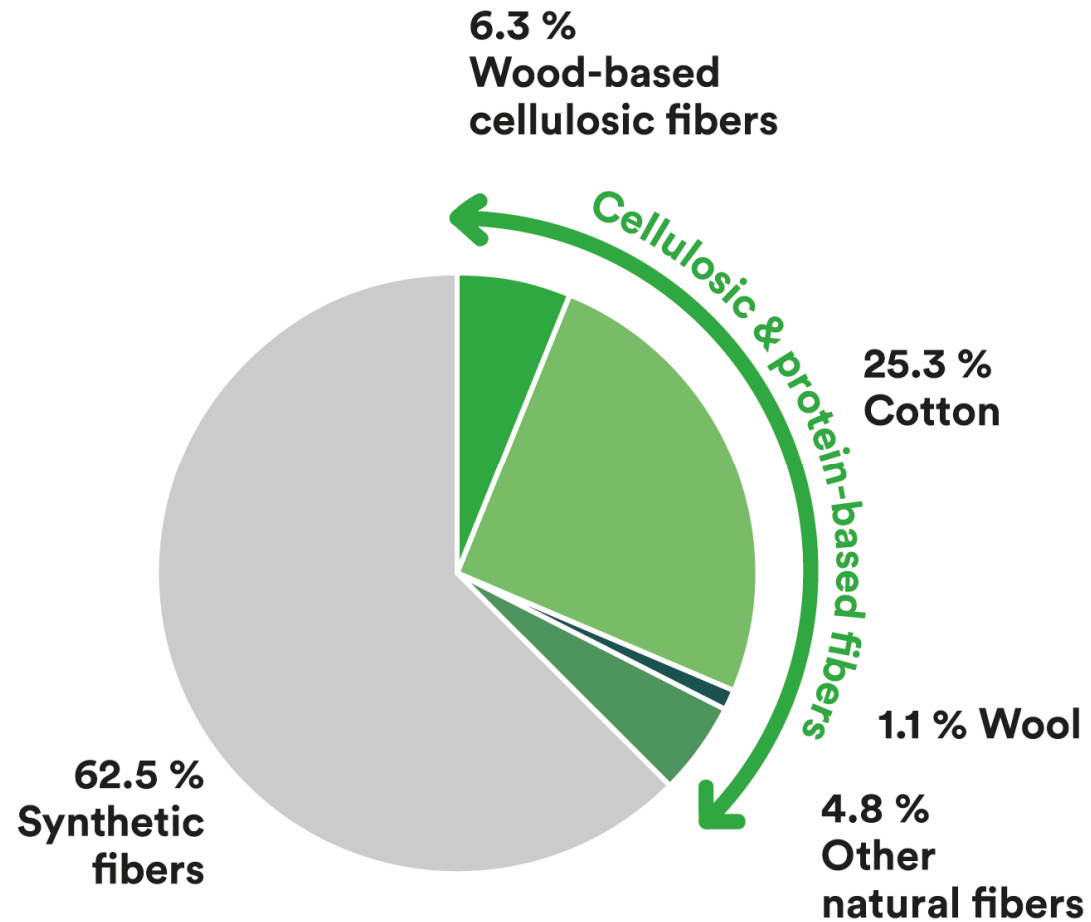
# Textile industry has serious issues



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

# Global fiber consumption in 2018<sup>1</sup>

Worldwide consumption  
= 106 mn. tons

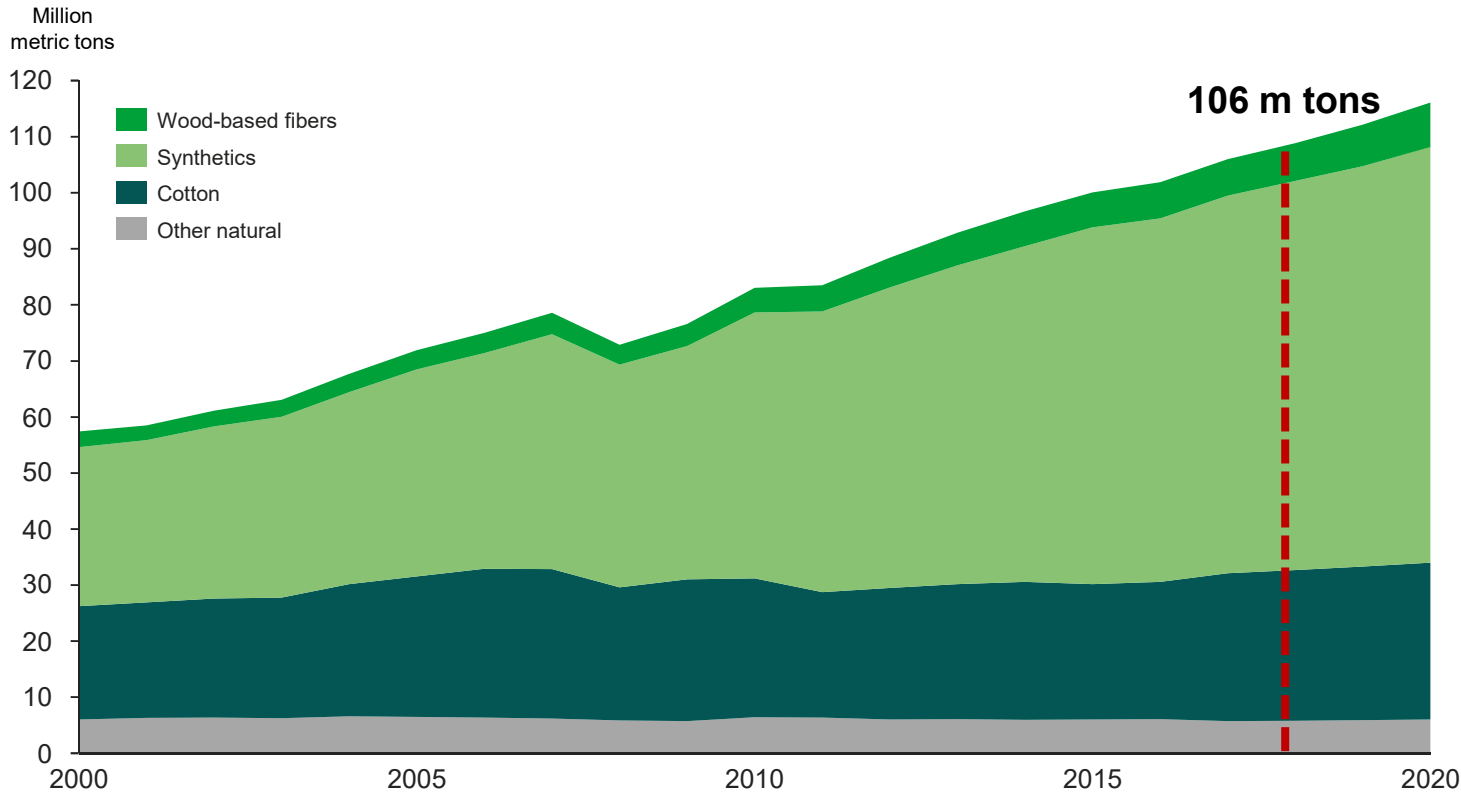


1) Sources: ICAC, CIRFS, TFY, FEB, Lenzing estimates



# Fiber demand growing at 3-4 % p.a.

## Expected growth of global fiber demand until 2020



	CAGR (2015e – 2020p <sup>2</sup> )
● Wood-based fibers <sup>1</sup> (6%)	5-6% p.a.
● Synthetic fibers (64%)	3-4% p.a.
● Cotton (25%)	1-2% p.a.
<hr/>	
Total fiber market	3-4% p.a.

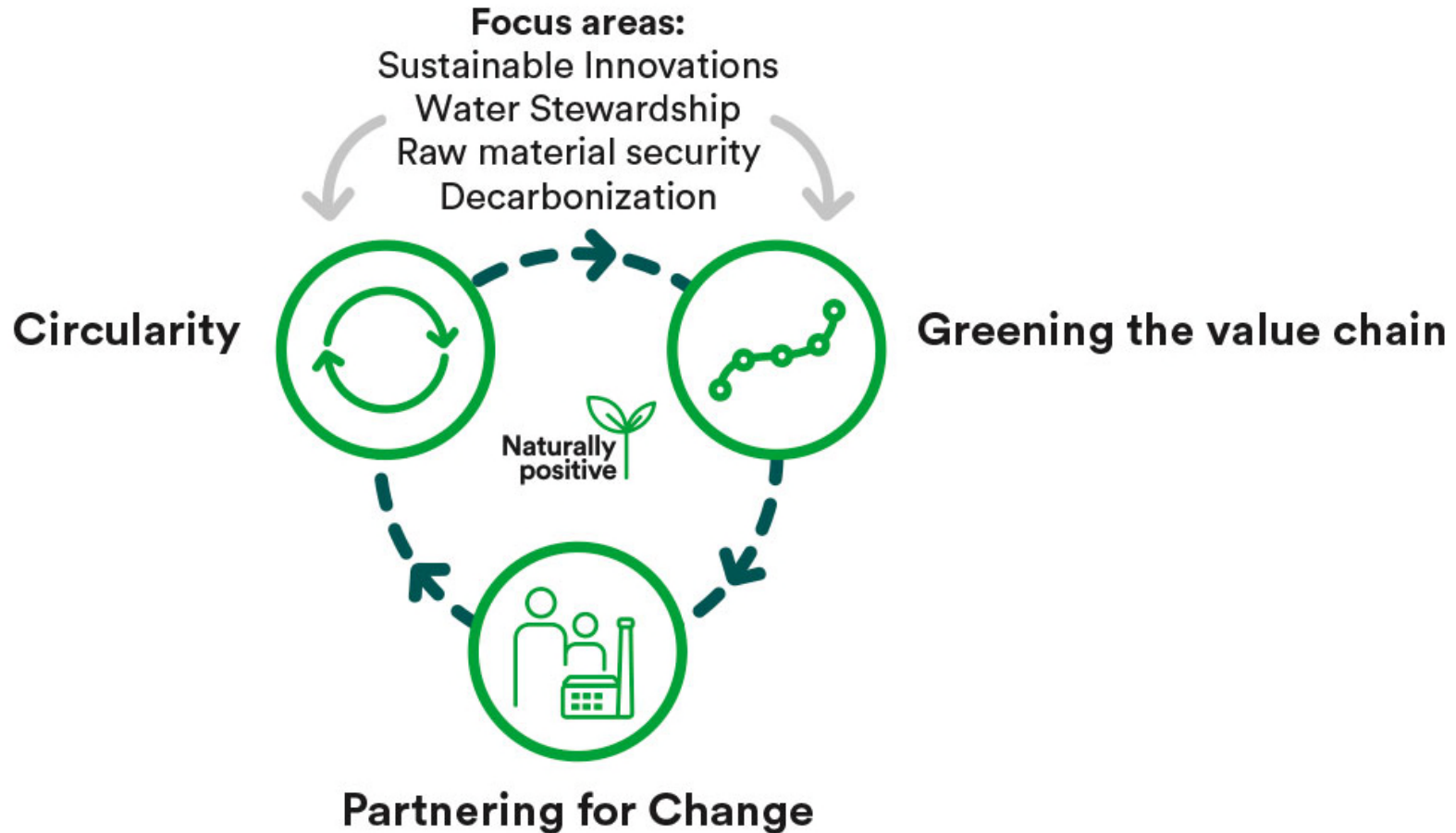
<sup>1</sup> Wood-based and cotton linter-based cellulose fibers - Viscose, Modal, Lyocell and other (acetate, cupro) both staple fiber and filament

<sup>2</sup> Projected

Sources: ICAC, The Fiber Year 2018, Lenzing data

# Lenzing's sustainability strategy

Naturally Positive



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

# Renewable raw material wood

- The raw material for Lenzing fibers is dissolving wood pulp from beech, spruce, eucalyptus and several other types of wood
- 2–3% of industrial pulp produced worldwide is used by the fiber industry
- This equals 0,5% of total wood used
- Dissolving wood pulp has specific requirements compared to paper pulp



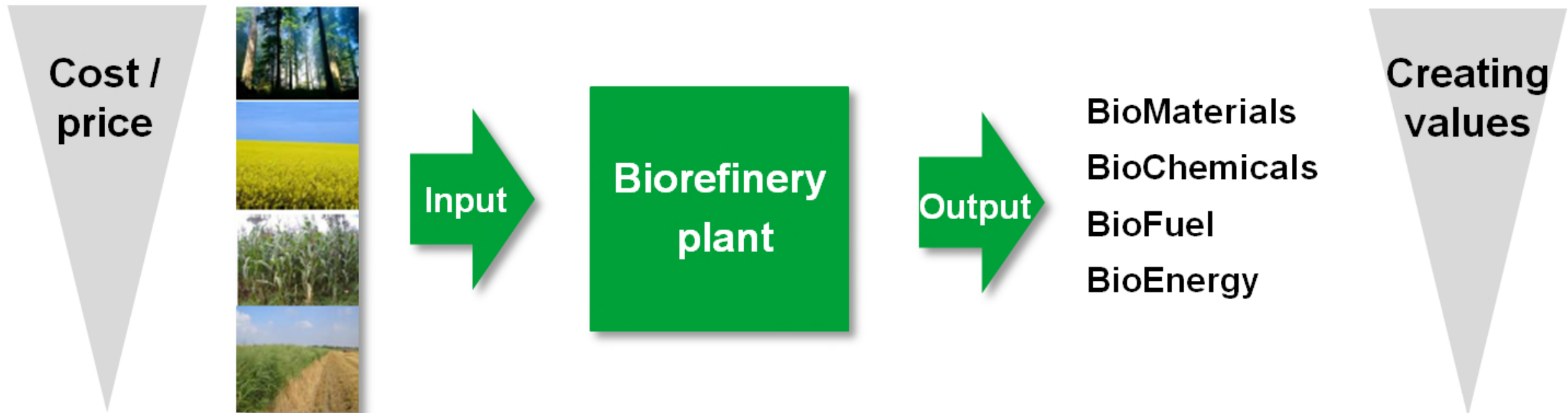
# Responsible wood and pulp sourcing

- Lenzing has a strict wood and pulp sourcing policy in place
- Lenzing does not source any wood or dissolving wood pulp from ancient and endangered forests as well as high conservation value areas.
- Lenzing is committed to sourcing wood and dissolving wood pulp exclusively from non-controversial sources, assured by FSC<sup>®</sup> and PEFC<sup>™</sup>.
- All Lenzing production sites are FSC<sup>®</sup> (Chain of Custody) certified.
- The wood processed in Lenzing (Austria) and Paskov (Czech Republic) is procured by a team of experts who are educated and well-trained foresters with reliable long-term relationships to the suppliers.

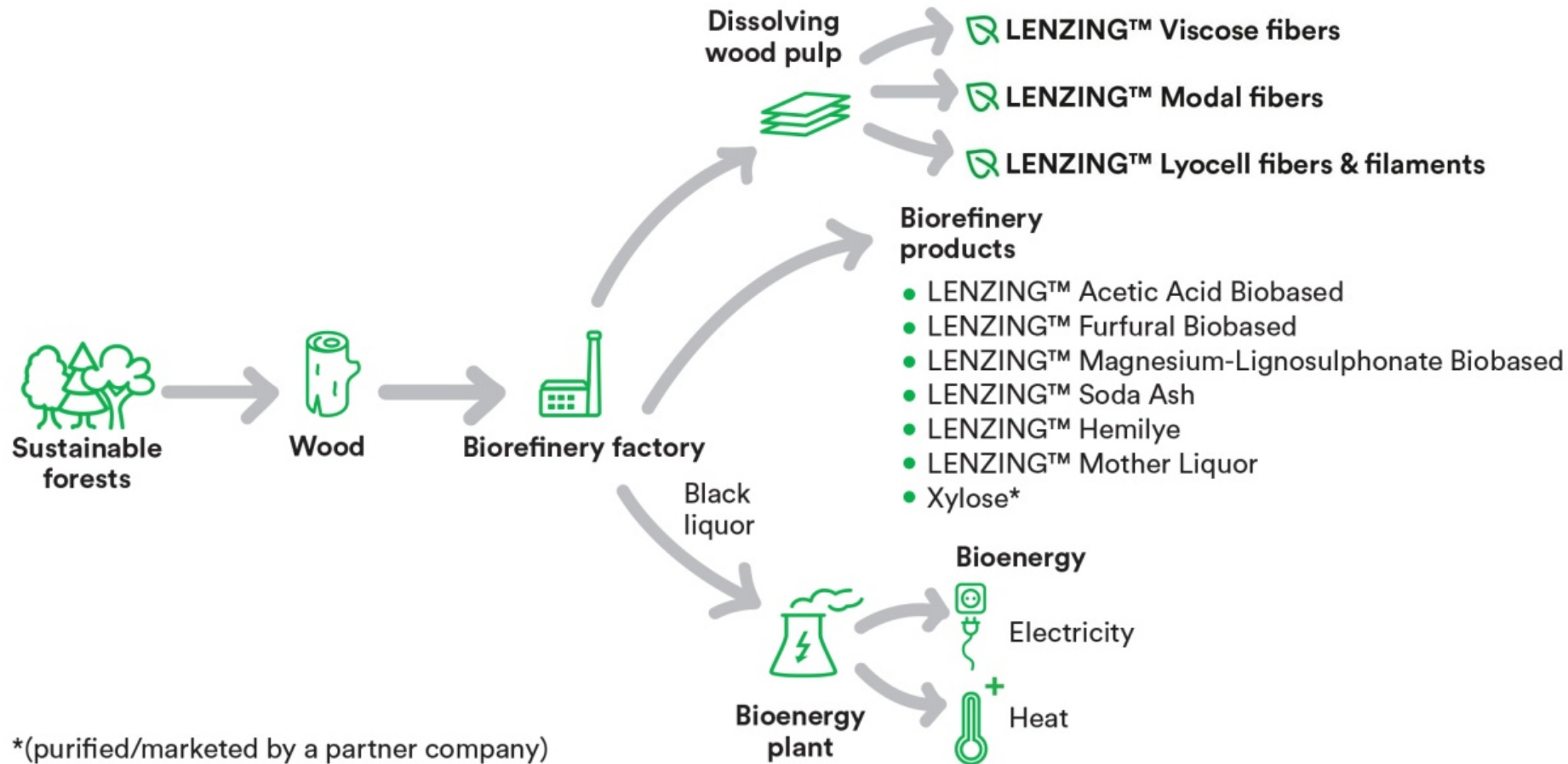


# Economic considerations on biorefineries

- Sustainable processing of biomass into a spectrum of marketable products (food, feed, materials and chemicals) and energy (fuels, power, heat)



# The biorefinery concept in Lenzing, Austria



# The biorefinery concept of the Lenzing Group

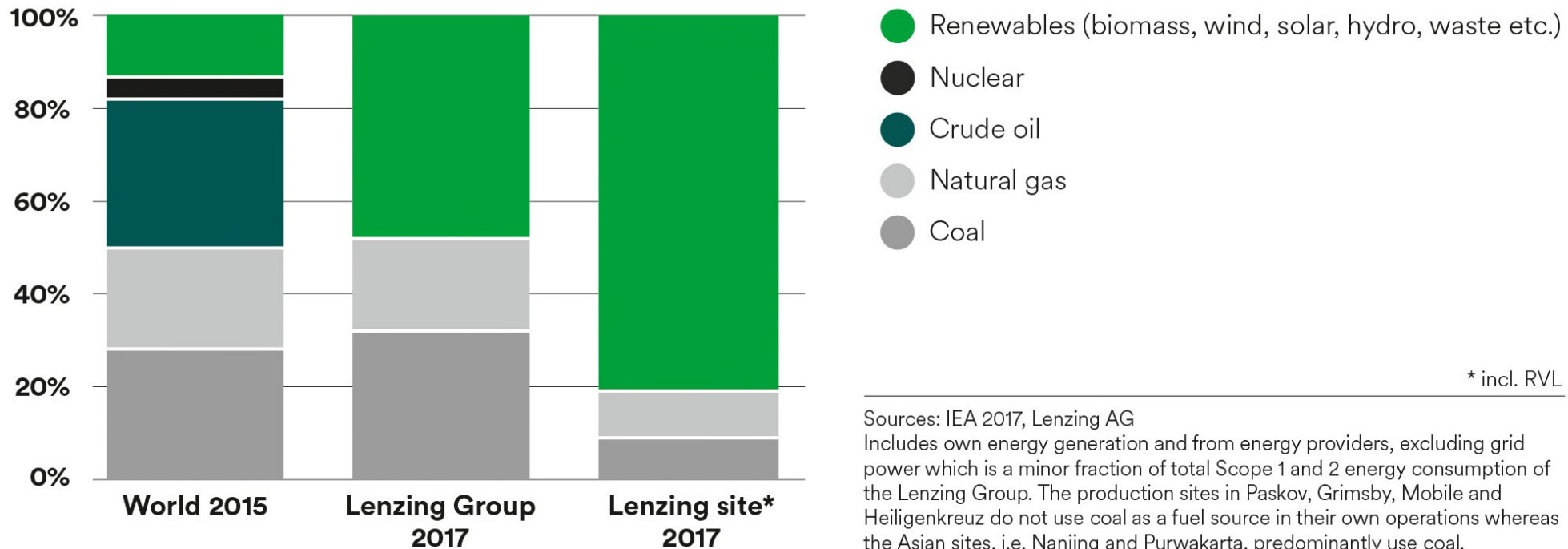
**100 % of wood constituents are used to produce fibers, biobased chemicals, and bioenergy**  
→ **Maximum value creation from an economic and environmental perspective.**

The key principles of Lenzing's biorefinery concept are:

- Cascading wood use and circular economy
- Use wood and its constituents as substitutes for oil-based products (recarbonization).
- Use wood constituents multiple times along the value chain.
- Produce biobased chemicals, such as acetic acid, furfural and xylose, to help increase the total material yield from wood as well as value creation.
- Recover and reuse process chemicals, which is a key contributor to sustainable success and profitability.
- Create useful products that are recyclable and therefore bind CO<sub>2</sub> as long as possible.

# Lenzing Group: 50% renewable energy

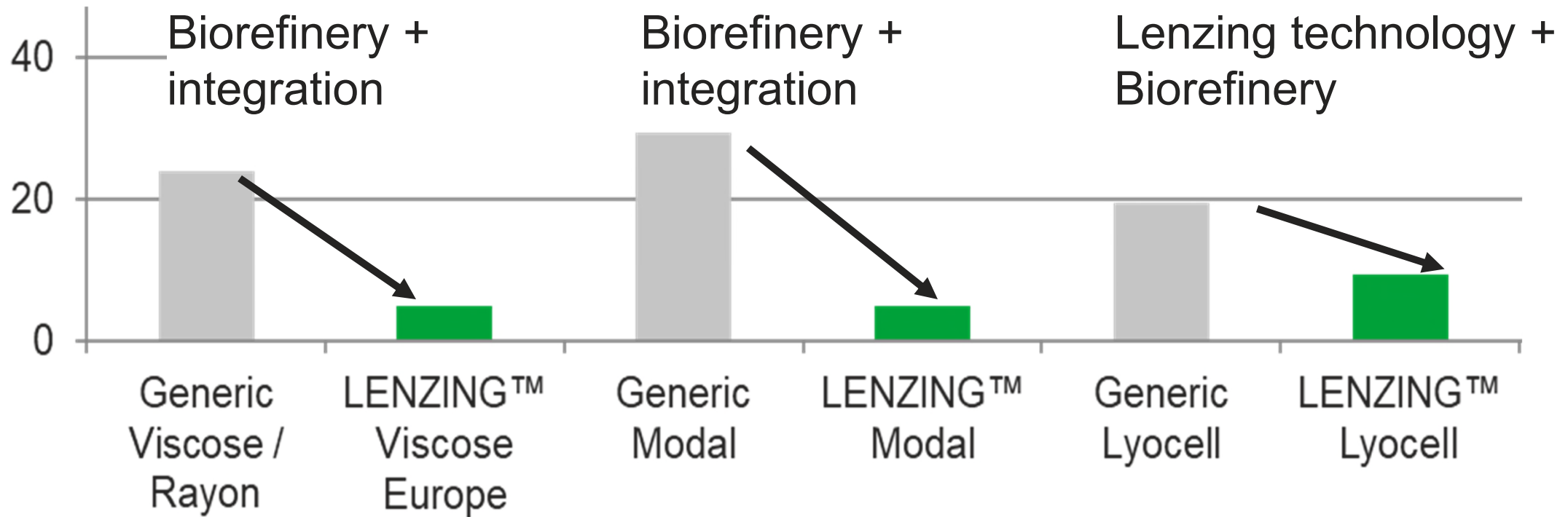
Energy sources of the world, Lenzing Group & Lenzing site\*





# LENZING™ fibers are best-in-class

## Higg MSI Total score by Sustainable Apparel Coalition



Source: Higg MSI Scores/own calculation

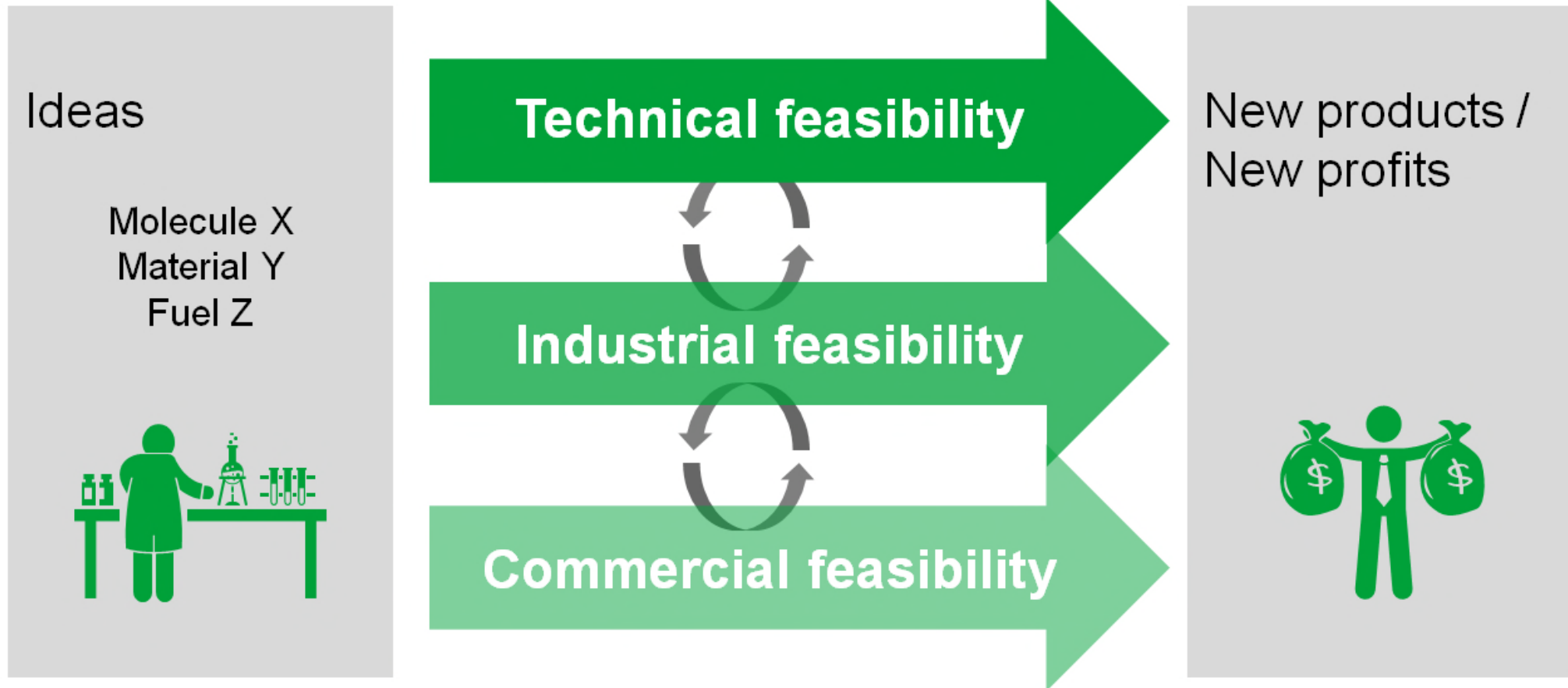
Developed by the Sustainable Apparel Coalition, the Higg Index is a suite of tools that enables brands, retailers, and facilities of all sizes — at every stage in their sustainability journey — to accurately measure and score a company or product's sustainability performance. The Higg Index delivers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

# Industrial feasibility – xylose/xylitol

- Xylose from spent cooking liquor is extracted at site in Lenzing by partner DuPont (former Danisco)
- Crystalline xylose is produced which is further hydrogenated to xylitol in Finland – commercially available as „Birkenzucker“
- Residual liquor is burnt by Lenzing to recover thermal and electrical energy, and the cooking chemical Mg-Bisulphite



# Biorefinery expansion: From ideas to new products



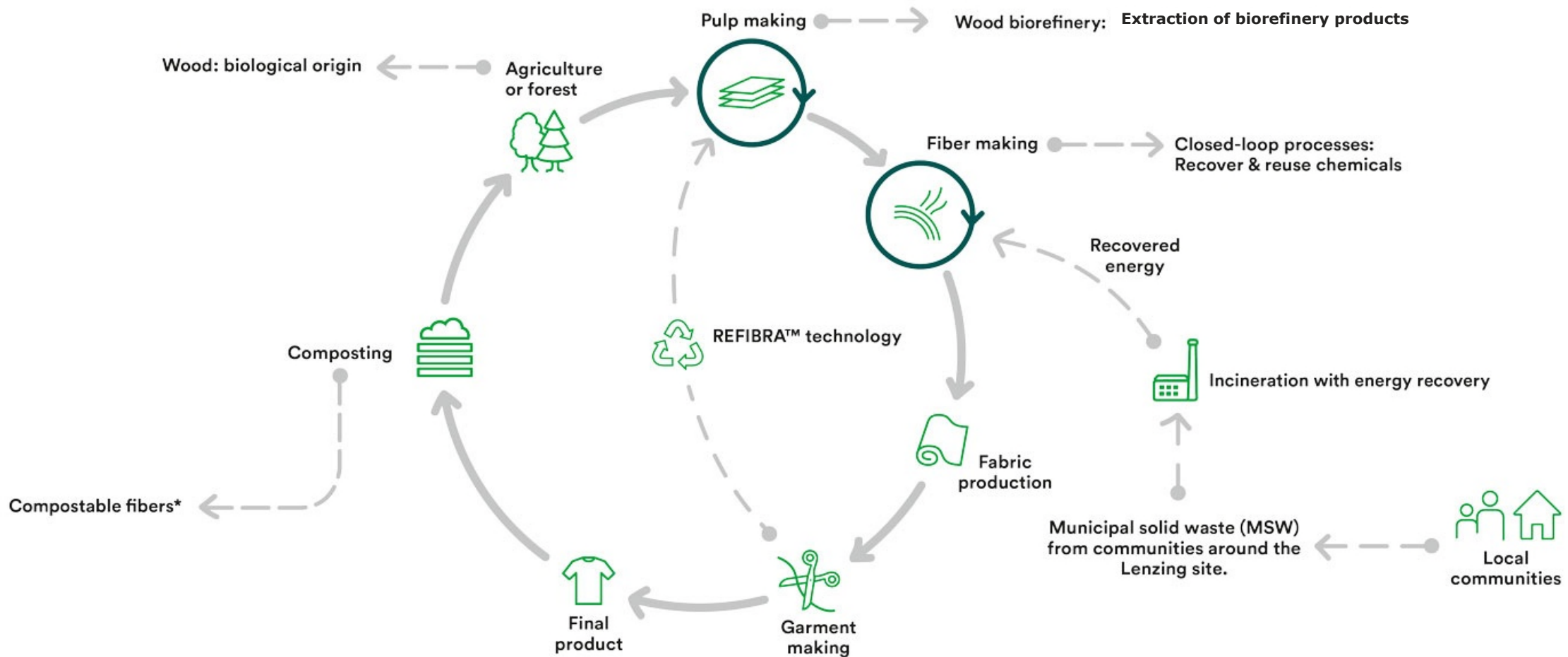
# Innovation: Lenzing's ambition for new biorefinery products

- Perfection the use of cellulose
  - Specialisation
  - Performance
- Further upgrade hemicellulose derivatives
  - Extraction
  - Downstream processes
- R&D on lignin
  - Which value chain?
  - Technology and application development

# Innovation: New fiber applications and forward solutions

- Applications
  - New markets, technical - agriculture, aquaculture, packaging
  - Performance materials from combined fibers
- Circular economy / recycling solutions
  - REFIBRA™ technology
  - Biodegradable and compostable materials applications
- Forward solutions
  - Filament: TENCEL™ Luxe
  - Spunbond nonwoven: TENCEL™ Web

# Circular economy – a systemic change



\* All standard fibers from Lenzing are compostable and biodegradable in marine and soil conditions. However, the compostability of textile and nonwoven products depends on the material composition (fiber blend) and processing in the value chain steps.

# Summary

## **Lenzing's business model has been „bioeconomy“ for decades**

- Following the Biorefinery concept, the biomaterial fibers, biochemicals, and bioenergy are produced

## **Core market: Wood based cellulosic fibers**

- Significant share of co-products on revenues

## **Production of bioeconomy products is determined by technical, industrial and commercial framework conditions**

- Energy integration on site is one important pillar for a sustainable biobased production
- Site-specific
- Partnering can be of advantage (as practiced with xylose)

## **Sustainability advantages from biorefinery concept**



# Biorefineries at the core of Lenzing Group's sustainability

## Circularity

- **Renewable raw material base – wood from sustainable forests and plantations**
- **Products from the biodegradable polymer cellulose replacing plastics**

## Greening the value chain

- Energy integration and biorefinery product utilization leads to low footprint of products compared to alternatives

## Partnering for systemic change

- Industrial symbiosis – waste of one company is raw material for another company
- Transparency
- Willingness to co-operate. Only joint effort brings progress and success
- What are the needs in terms of financing and capital to address the technological and business challenges related with developing biorefinery further?





Thank You



**for your  
attention!**

