

Textile Circularity: A Complex Systemic Challenge

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How to tackle complex problems?

- **Define the Problem**
- **Quantify the Problem**
- **Understand the dynamics of the problem (over time)**
- Generate ideas for solutions
- Build knowledge & a toolbox of technologies
- Design interventions
- Pilot test & assess interventions (trial & error)
- Scale solutions that deliver the intended outcomes (without generating worse secondary effects)

Textile Sustainability: A Problem Definition

The global textile sustainability challenge is
to **decouple growing demand for clothing and textiles**
from intensive **use of virgin resources, fossil energy, hazardous
chemicals, water, and land**
while sharply **reducing waste and emissions**
across the value chain.

Textile Sustainability: Quantifying the Problem

- The EU consumes **18.6 Mt** of textile materials per year
- EU represents about **12-15%** of global textile material consumption
- EU apparel consumption (consumer + professional) = **7.7 Mt**, represents about **110 Gt of GHG emissions** (0.28% of global GHG emissions 2024)
- Total EU post-consumer **waste from textile products = 11 Mt** (52% technical & home textiles, 48% apparel), 8-9 mln tons incinerated or landfilled
- EU post-consumer **apparel waste 5.2 mln tons** (11.5 kg per capita), **2+ mln tons separately collected**
- 50-60% of separately collected waste is re-used (mostly outside EU), the rest downcycled & incinerated, **textile-to-textile recycling is <1%**

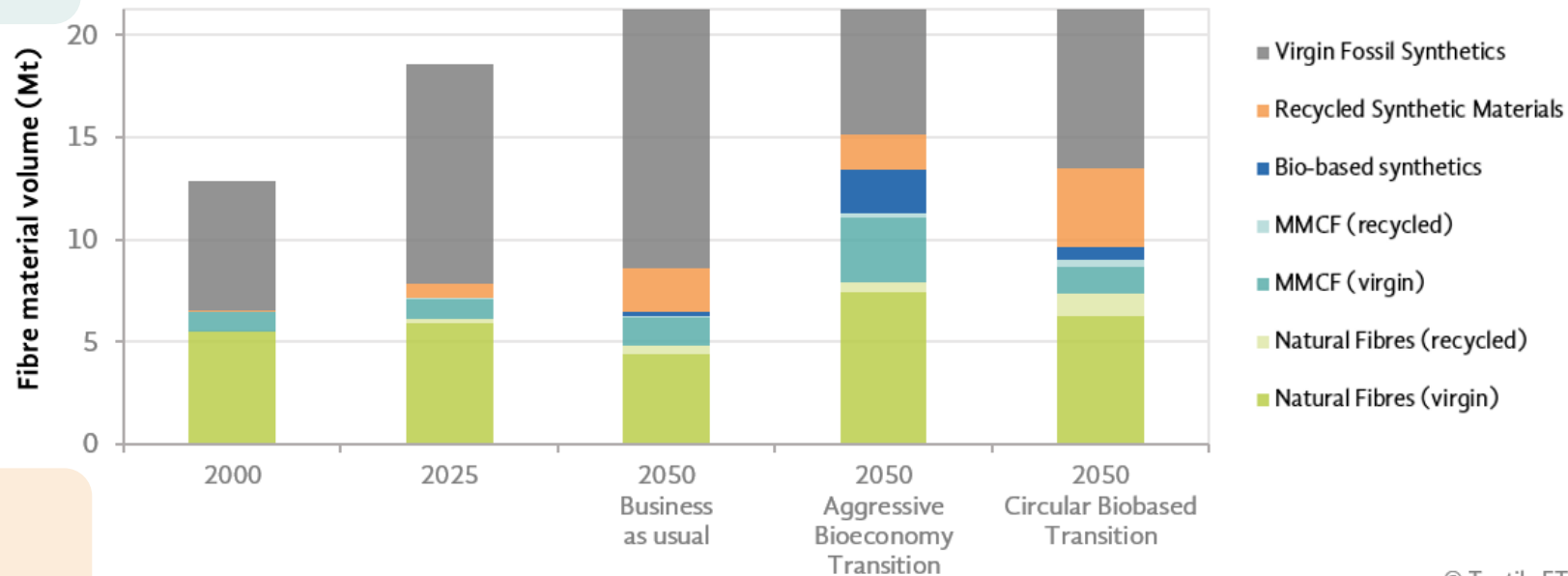
Understanding the Dynamics of the Problem

Evolution of EU Textile Fibre Consumption

2000

~50% biobased
~50% fossil-based

Fibre composition of EU end market consumption of textiles



2050 ?

B.A.U.

Only 30% biobased
10% recycled
60% fossil-based

Aggressive Bioeconomy Transition

63% biobased
8% recycled synth.
29% fossil-based

Circular Biobased Transition

45% biobased
18% recycled synth.
37% fossil-based

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2025

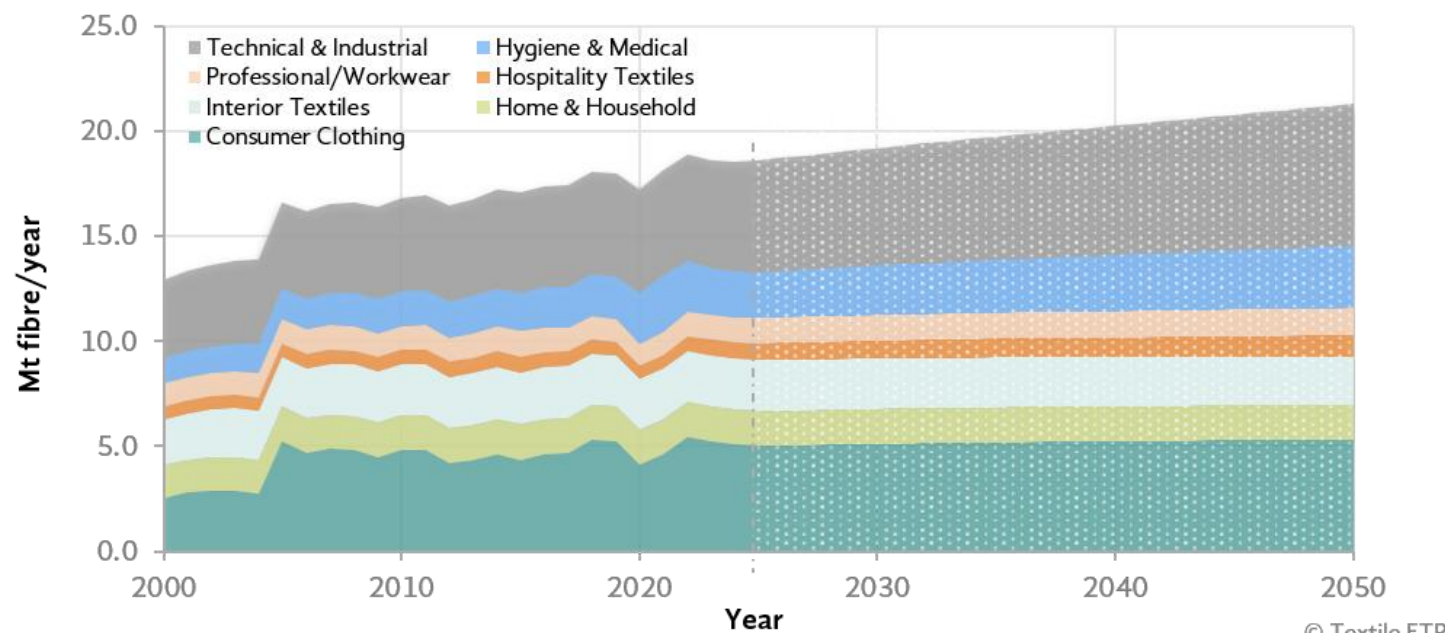
~38% biobased
~62% fossil-based
(<5% recycled bottle rPET)

Understanding the Dynamics of the Problem

Evolution of End Markets for Textile Fibres

2025 share • volume • forward CAGR

EU-27 textile fibre consumption by end market, 2000–2050



Technical & industrial

Transport – Construction – Filtration – Packaging – Agriculture – Outdoor...

28.5% • 5.3 Mt • 1.0%

Consumer clothing

Outer wear – underwear – sports & outdoor wear

27% • 5.0 Mt • 0.3%

Interior textiles

Carpets – upholstery – mattresses – curtains

13% • 2.4 Mt • -0.2%

Hygiene & medical

Diapers & female care – wipes – medical protection – wound care – etc.

11.8% • 2.2 Mt • 1.2%

Home & Household

Residential bed – bathroom – kitchen – table – cleaning textiles

9.0% • 5.0 Mt • -0.1%

Professional/Workwear

Image wear – uniforms – protective clothing & equipment

6.5% • 2.4 Mt • 0.6%

Hospitality Textiles

Professional linen supply to hotels, restaurants, hospitals & care facilities

4.3% • 2.2 Mt • 0.9%



Circular &
Biobased Textiles
Innovation Hub

How to Tackle the Complex Systemic Challenge of Textile Sustainability?

Textile Circularity A Potential Solution?

Circular Economy pioneer **Walter Stahel**: “The reprocessing of goods and materials generates jobs and saves energy while reducing resource consumption and waste.”

Ellen MacArthur Foundation: “Redesigning how textiles are made, used, and circulated can meet people’s needs while reducing dependence on virgin resources and preventing waste and pollution.”

Textile Circularity

The Logic Seems Sound...

- Redesigning textiles for longer use
 - Reusing textiles after first use
 - Repairing textiles for longer use or reuse
 - Recovering materials/recycling
- = less resource consumption for new production

Textile Circularity

...but there are complex drivers

Economics:

- If producing & purchasing new textiles is cheaper than collecting, repairing, preparing for reuse & recycling, circular economy concepts struggle

Human Psychology:

- If consumers value newness and make emotional purchasing decisions, the rationality of circular economy principles can't prevail.

Physics:

- If collection, separation, decontamination & recycling uses more energy/resources than use of virgin material, then material circularity is a suboptimal solution

Building knowledge & tech toolbox

ECOSYSTEX: The European Community of Practice for a Sustainable Textile Ecosystem

Goal: create a permanent expert community and central knowledge hub for practical application of EU-funded science, technology, and skills development for textile sustainability and innovation

Total projects' budget: ~550 € million

Activities:



Interproject
collaboration



Engagement with
policymakers



Dissemination

Key Figures



Launched in
January 2023



101 member
projects



470+ registered
experts



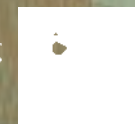
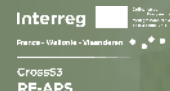
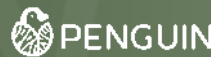
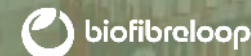
8 working
groups



Bi-monthly
public webinars



Annual
conferences



Scale what works – for specific products in specific markets

Natural fibres & similar biobased materials for close to skin textiles

Biosynthetics and recycling for large-volume technical textiles

Repair & reuse for expensive, complex products

Use **science & technology** to improve material production & processing, product assembly & supply chain management for on-demand delivery, sorting & recycling operations for end of life

Use **economic incentives** and **behavioral interventions** to better align consumer purchasing & use

Use **differentiated strategies** in mature economies vs. emerging markets

Conclusion

Textile Sustainability is nobody's fault.

It is a complex systems problem that needs systemic solutions that align science & technology with economics and human psychology.

Thank you for your attention Questions?



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