



# Beyond Recycling: How biobased chemicals help de-fossilize a Circular Plastics Economy

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March 2026

Recycling solved  
yesterday's  
packaging  
problem...

Fossil carbon is  
tomorrow's!



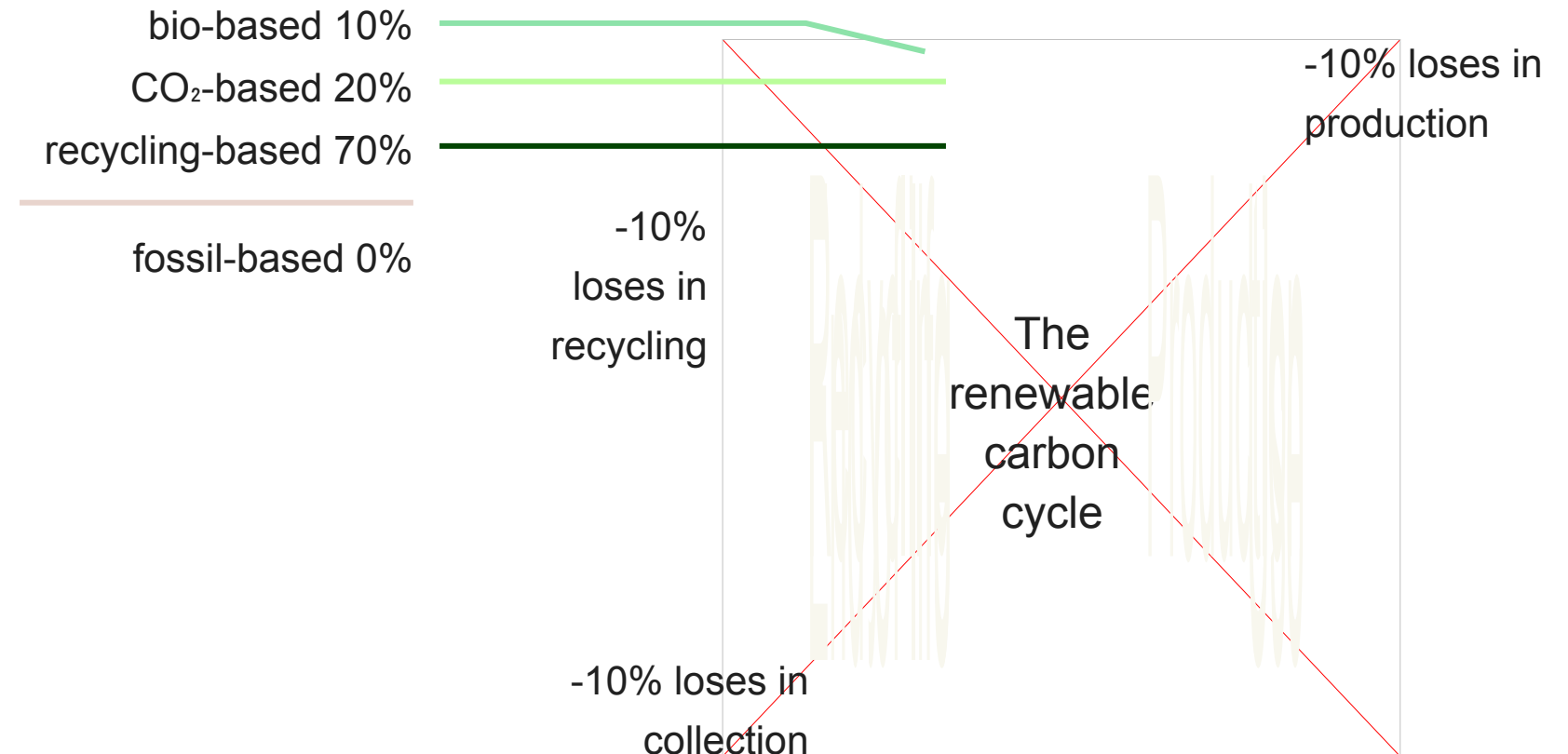
1. Recycled plastic quality & food-grade constraints are structural, not temporary
2. PPWR + PEF will expose residual fossil content in packaging
3. Brands will run out of “easy wins” by 2027



# The future of plastics in 2050: Bio-based raw materials complement PCR, to fully de-fossilize packaging.



## Scenario for the plastic industry 2025



source: [www.renewable-carbon.eu/graphics](http://www.renewable-carbon.eu/graphics)



UPM built Europe's largest biorefinery in Leuna to industrialize renewable carbon for chemicals and packaging

# Pioneering sustainable chemistry, transforming industries

- **Investment & production volume**

- > 1,200 million € & 220,000 t

- **Products**

- Industrial Sugars
- Bio-Monoethylene Glycol (bio-MEG)
- Bio-Monopropylene Glyco (bio-MPG)
- Biorefinery lignin
- Renewable functional fillers (RFF)
- Circular renewable black (CRB)

- **Start of first commercial production**

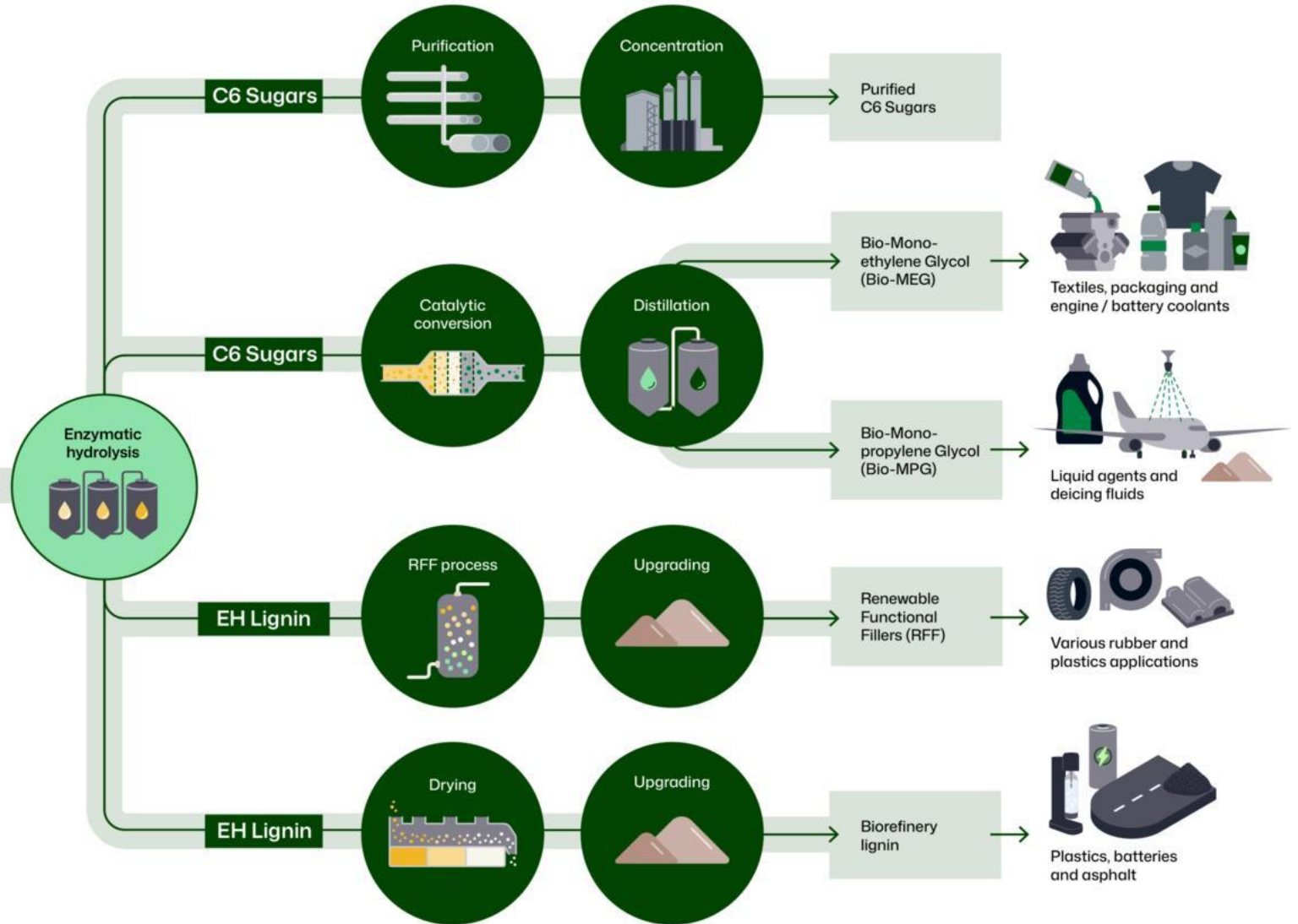
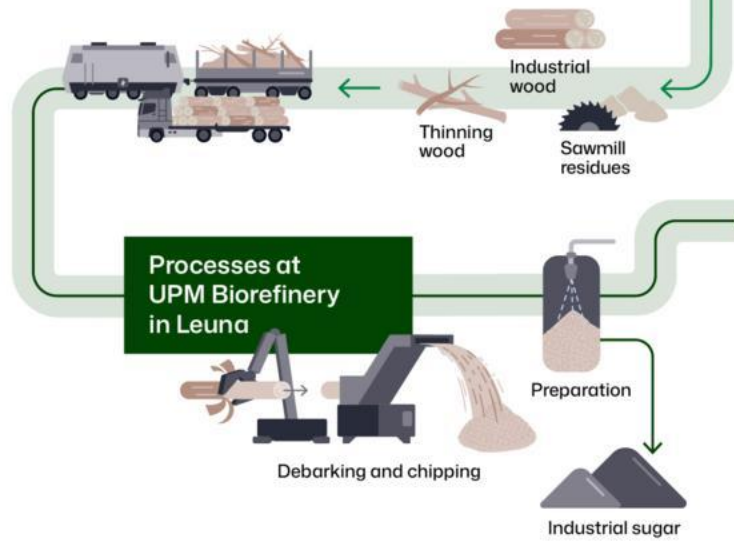
- End of 2025
- further commercial products H1 2026

UPM biorefinery in Leuna, Germany

# Unique technology converting wood to biochemicals



## Biomass from sustainable managed forests



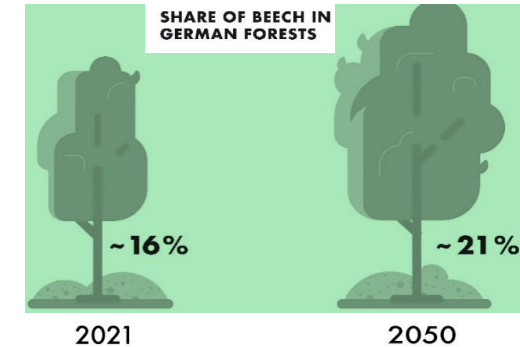
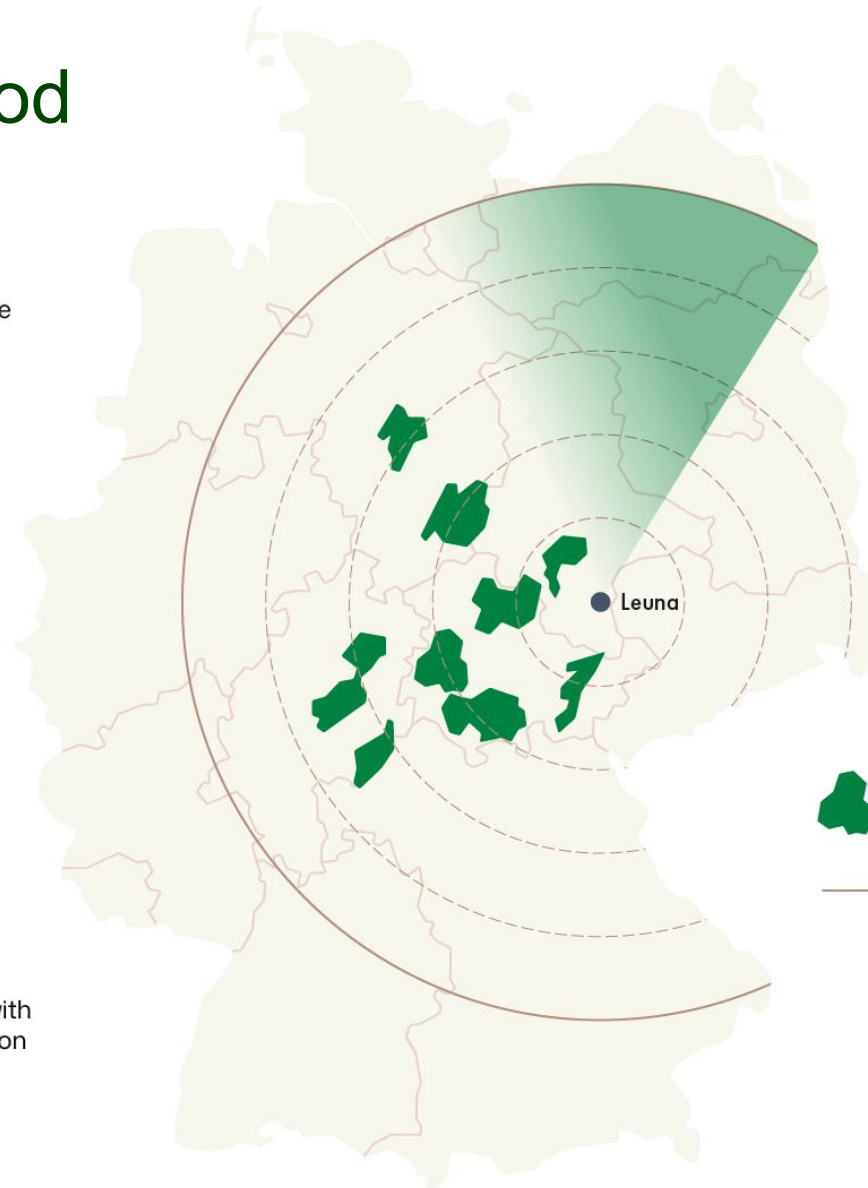
Our Raw Material:  
Wood from regional sustainable  
managed forests



# UPM Biochemicals

## The origin of our wood



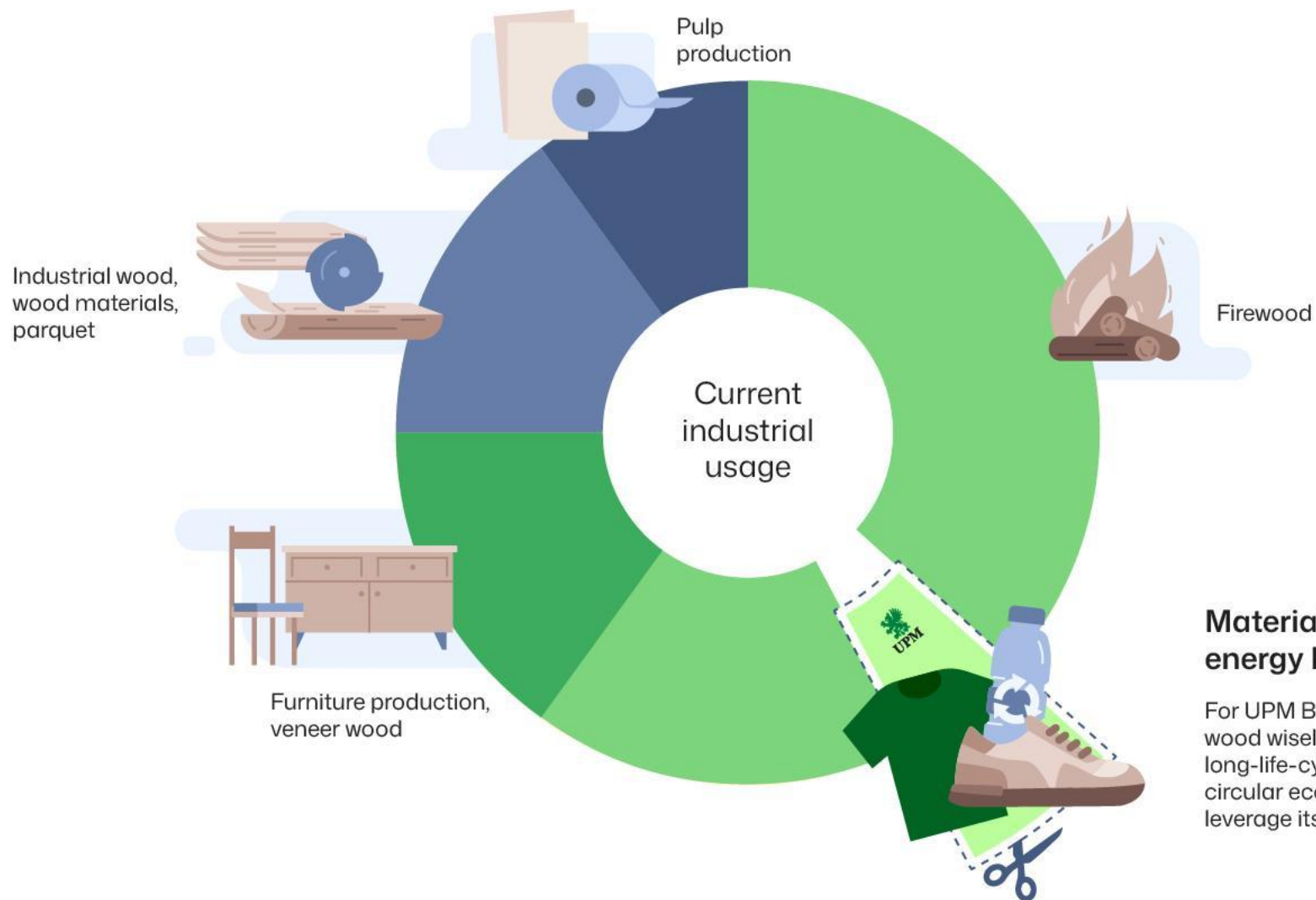
-  Beechwood from forest management in federal, state and private forests
-  Residues from sawmills and other wood producers
-  100% of the wood is FSC® and PEFC certified
-  Full chain of custody and traceability
-  Transparent supply chains with regional partners and focus on emission-optimized transportation modes



-  Primary sourcing focus
-  Extended sourcing areas

- **2<sup>nd</sup> Gen. Feedstock**
- **Zero Deforestation!**

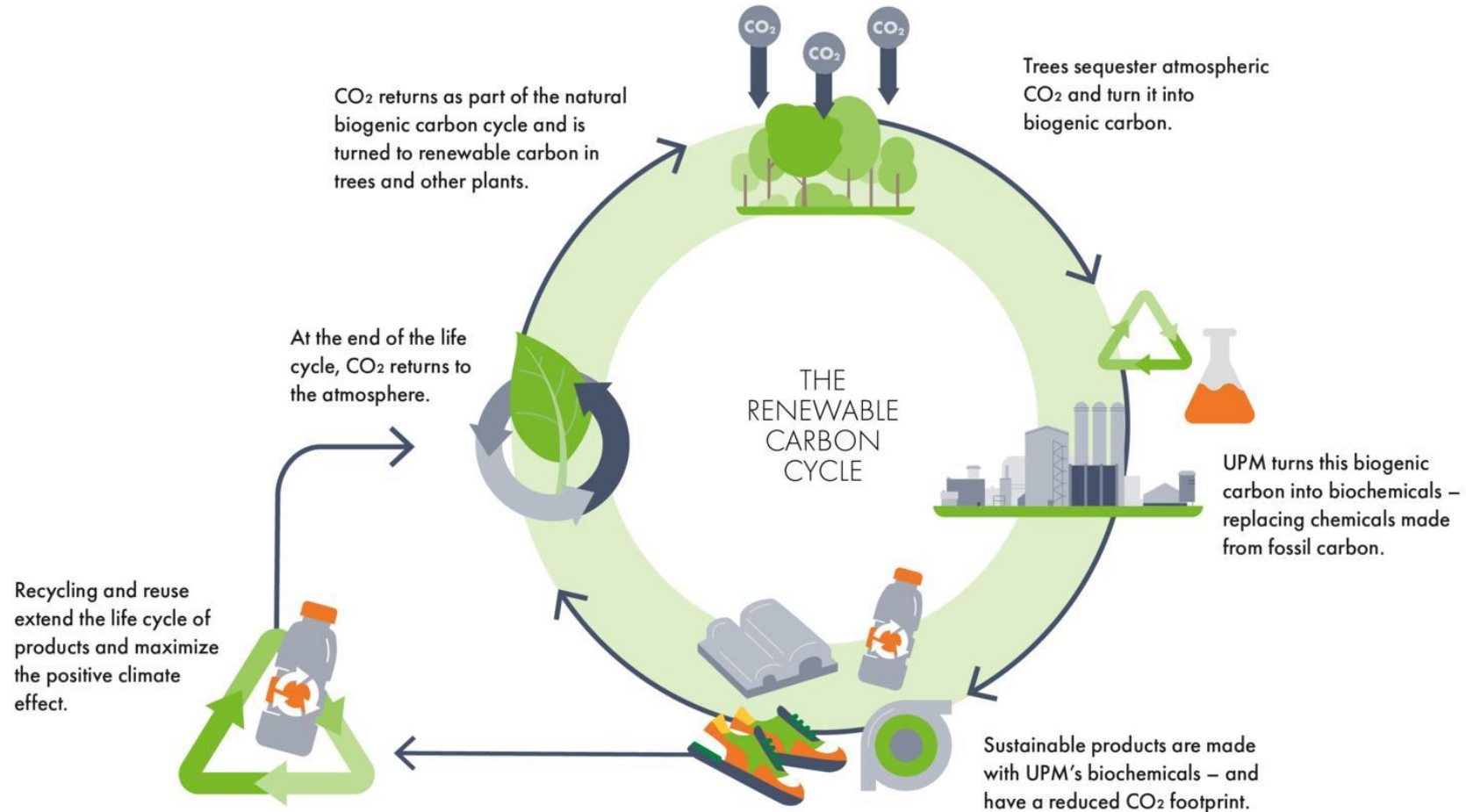
# Valuing renewable carbon



## Material benefit over energy benefit

For UPM Biochemicals using wood wisely means using it in long-life-cycle materials and circular economy end uses to leverage its climate benefits.

# Making the best use of valuable biomass: The renewable carbon cycle



# Our Products: Solutions for everyday packaging

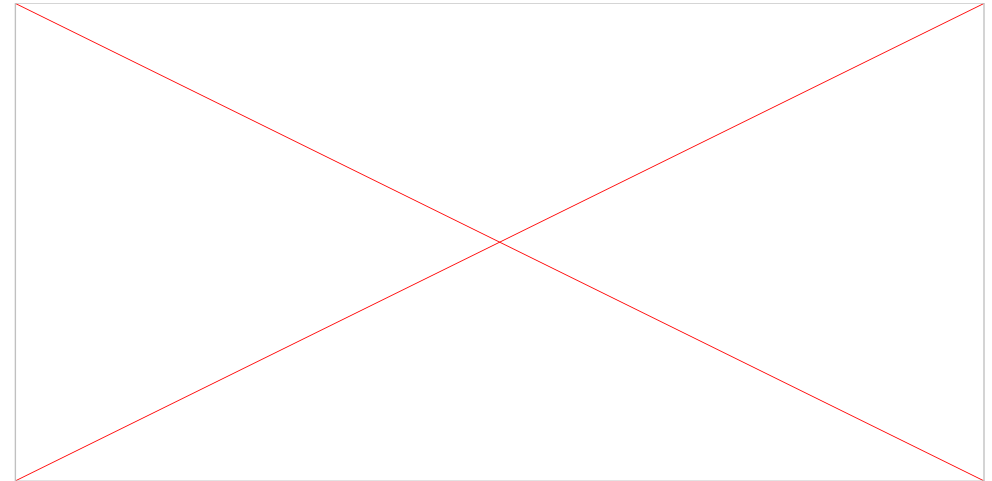


**Solutions don't just grow on trees.**

**UPM 100% wood-based PET  
Packaging Renewed.**

# Quick re-cap: PET definition and market

- PET = Polyethylene Terephthalate = "Polyester"
- PET is widely used in beverage bottles, packaging film, food trays, beauty cream jars, liquid soap containers and pharmaceutical blisters.
- Global Polyester market size:
  - Ca. 120 MT, of which 80MT textile and 40MT packaging
  - Recycling rate below 10% on a global scale!
- PET consists of two monomers:
  - Monoethylene Glycol (MEG)
  - Purified Terephthalic Acid (PTA)



**We can do both from wood!**

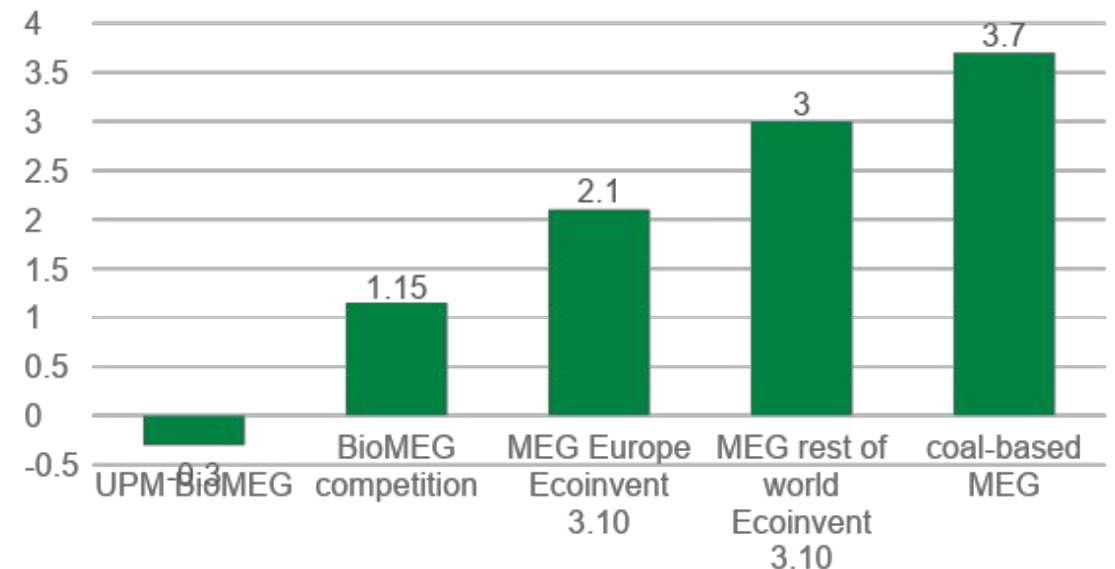


# BioPura BioMEG: This is the first place where renewable carbon actually enters your PET



- Drop-in solution:  
No CAPEX!
- Carbon-negative\*
- 2nd Gen feedstock, no food conflict debate!
- Regional raw material
- 100% bio-based carbon (ASTM 6866):  
audit-proof!
- FSC or PEFC or ISCC PLUS certification available

Global Warming potential 'carbon footprint' in kg CO<sub>2</sub>e / kg

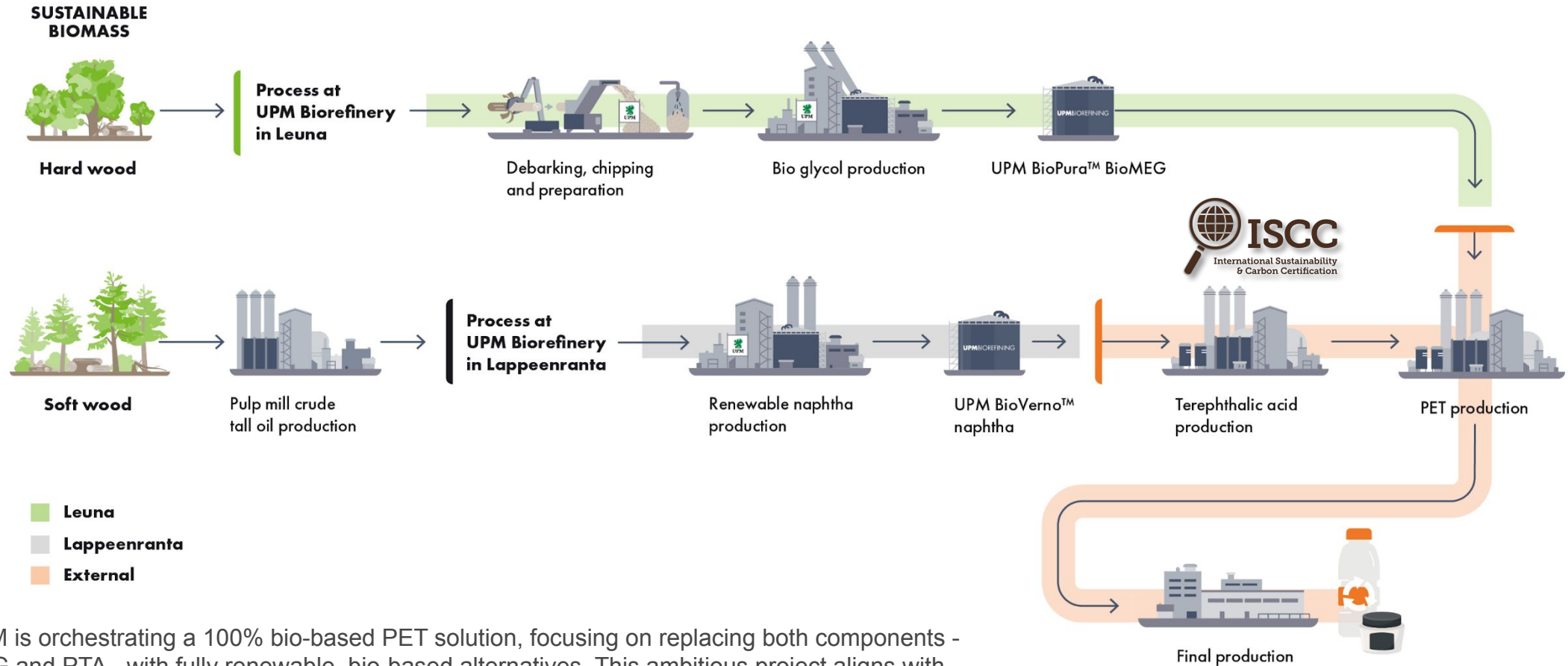


\* 3rd party validated LCA, cradle to gate, incl. biogenic carbon and green electricity

# UPM BioPTA from our sister company UPM BIOFUELS

UPM Lappeenranta  
Biorefinery  
July 2025

# UPM enabling 100% BioPET – available in 2026

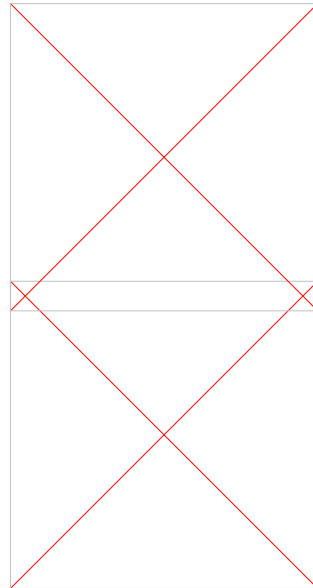


UPM is orchestrating a 100% bio-based PET solution, focusing on replacing both components - MEG and PTA - with fully renewable, bio-based alternatives. This ambitious project aligns with our vision of a fossil-free future for plastics.

# I use recycled PET already. Why add UPM BioPET?

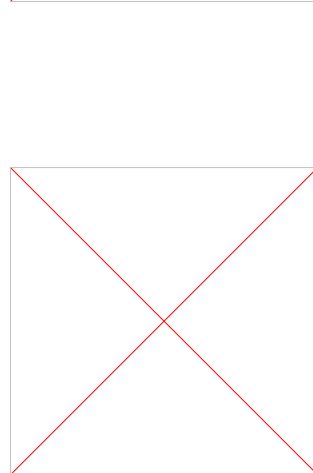


Typical rPET grey colour



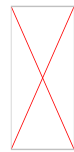
## Superior Quality

UPM BioPET matches virgin PET quality - unlike rPET, which can degrade above 50% usage.



## Crystal-Clear Appearance

UPM BioPET avoids the grey tint common in rPET (see rPET example here):



25 %



30 %



50 %



75 %



100 %

## Reliable Supply & Sustainability "Story"

Our BioPET is readily available and offers a compelling sustainability story by capturing CO<sub>2</sub>.

# Why UPM 100% wood-based PET?



UPM

UPM BioPET enables brand owners to safely **replace residual fossil virgin PET** ...

with a **certified, wood-based, fully recyclable, drop-in** alternative ...

without compromising **regulatory compliance** or packaging **performance**.

□ **EU Bioeconomy Strategy, PEF Review 2026** and **PPWR Review 2027** will even drive **bio-content mandates**. Putting pressure on the packaging supply chain.



# Black is back. For good.

UPM Circular  
Renewable Black™  
Black plastic renewed.

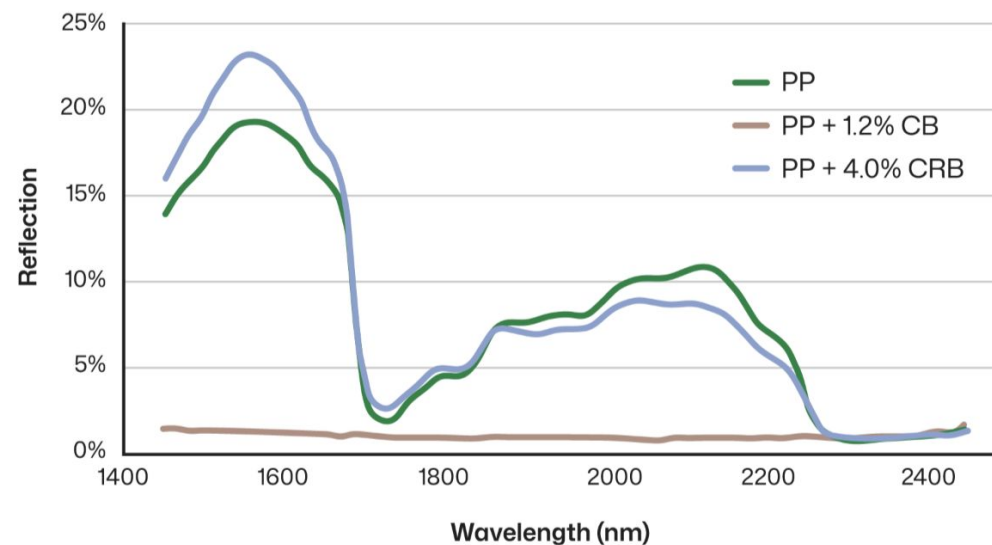


# Detectibly different.

## UPM Circular Renewable Black™ key features:

- Allowing for NIR detectability of the base polymer, thus enabling sorting & recycling of black-colored plastic products
- Excellent thermal stability during recycling confirmed by melt flow index (MFI) and oxidation induction time (OIT)
- Significantly improved carbon footprint of masterbatch compared to masterbatches using fossil additives and pigments
- Ability to also be used in higher loadings as functional filler in thermoplastic compounds with unique properties such as reduced carbon footprint and lightweight.

Near infrared (NIR) reflection spectra of pure and black-colored plastics



	L* - value	a* - value	b* - value
4.0wt% CRB in PP	19.2	0.6	0.4

# The Key benefits of UPM Circular Renewable Black™



## ❑ Premium aesthetics

Deep, rich black coloration that meets the highest standards for luxury packaging and premium products.

## ❑ True circularity

Engineered for NIR detection in standard recycling streams, ensuring your packaging can be properly sorted and recycled.

## ❑ Sustainable source

Made from responsibly sourced beech wood, reducing dependence on fossil resources.



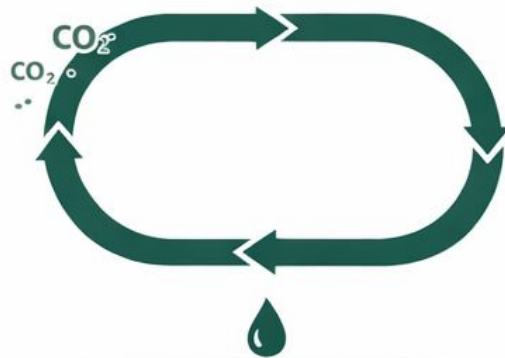
Black is back. For Good.

# The Next Packaging Transition: Packaging will remain circular. The carbon source will change.



## Current system

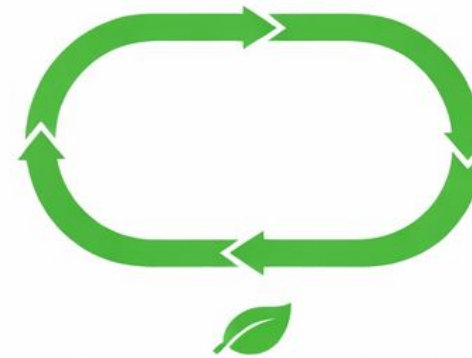
Fossil-fed circularity



Carbon source: **Fossil**

## Next system

Renewable-fed circularity



Carbon source: **Renewable**

Regulation, CO<sub>2</sub> targets, and brand expectations are shifting the carbon source.

CO<sub>2</sub> ↓ / Regulatory exposure ↓ / Claim credibility ↑

*Compatible with existing recycling systems.*

# Excited to lead your company towards sustainable solutions?



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Business Development  
Packaging

