UPM BioMotion™ **Renewable Functional Fillers (RFF)**

A new and innovative material class for sustainable rubber end-use applications

Dr. Florian Diehl

Rubber Day 2025, Milano

This is UPM:
We create a future beyond fossils!

- **Sales 2023: 10.5 bn €**
- **Headquarter: Helsinki, Finland**

Wood-based raw materials

Low-emission energy

BUSINESSES:

- UPM FIBRES
- UPM ENERGY
- UPM RAFLATAC
- UPM SPECIALTY PAPERS
- UPM COMMUNICATION PAPERS
- UPM PLYWOOD
- UPM BIOREFINING

54
production plants

16,600
employees in 43 countries

RENEWABLE AND RECYCLABLE PRODUCTS FOR:

- PACKAGING
- LABELLING
- TRANSPORTATION
- ELECTRIFICATION
- CONSTRUCTION
- COMMUNICATION
- TISSUE AND HYGIENE PRODUCTS
- MANUFACTURING
- BIOPLASTICS
- BIOMEDICALS

11,000
customers

180
million end-users globally

Leader in responsibility

Member of
Dow Jones Sustainability Indices
Powered by the S&P Global CSA

MSCI ESG RATINGS
AAA
CCC | B | BB | BBB | A | AA | AAA

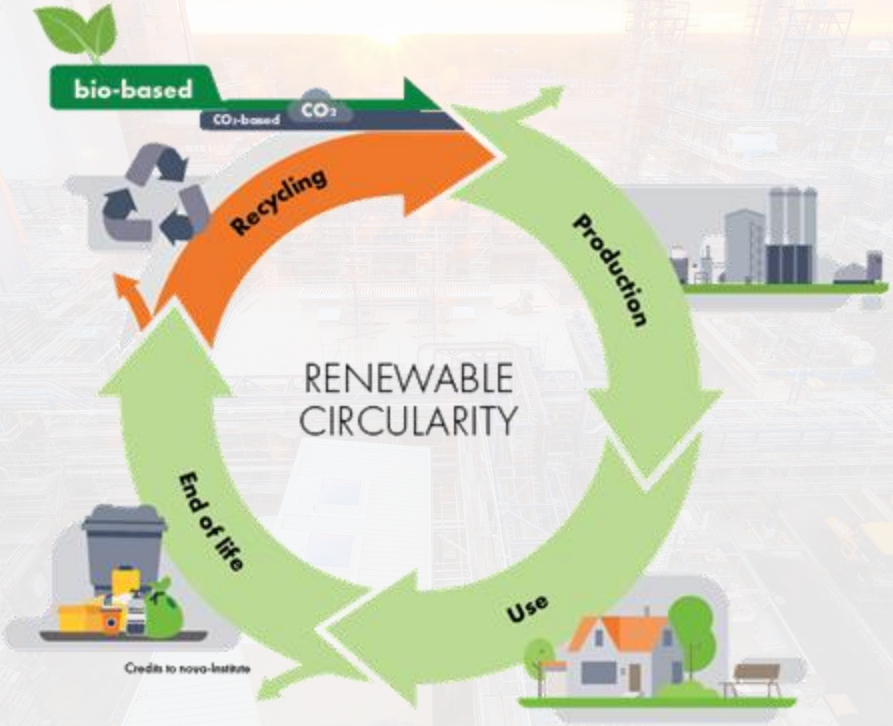
CDP
DISCLOSURE INSIGHT ACTION
A LIST 2023
CLIMATE FORESTS

PLATINUM Top 1%
2023
ecovadis
Sustainability Rating

Bloomberg
Gender-Equality Index
2023 Member

World Benchmarking Alliance

UPM Biochemicals‘ view on a perfect circular economy: Towards net zero by replacing fossils with biomass



UPM biorefinery in Leuna, Germany: Pioneering sutainable chemistry, transforming industries

1,180 million €
INVESTMENT

PRODUCTION VOLUME:
220,000 T
per year

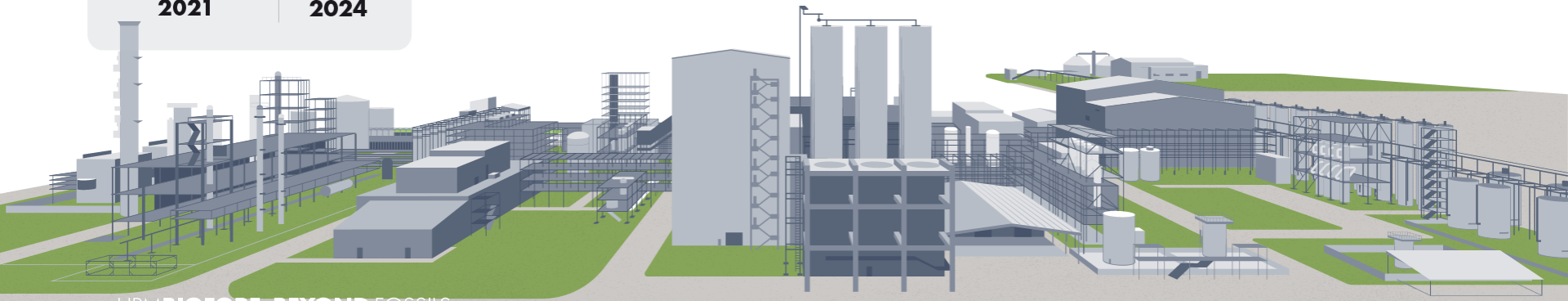
> 100
EMPLOYEES
at the Leuna site

Start of construction
January
2021

Production ramp-up
2024

Beechwood-based products:

- Bio-Monoethylene Glycol (BioMEG)
- Bio-Monopropylene Glycol (BioMPG)
- Renewable Functional Fillers (RFF)



Beech wood from regional, 100% sustainably managed and FSC™/PEFC certified forests with verified chain of custody

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Renewable feedstock

Climate neutral feedstock. Biomass accumulates carbon during plant growth, by sequestration of CO_2 from air.

Sustainable forestry

No deforestation, ever! No use of rainforests!

Preservation of all forest ecosystem services.

Non-food

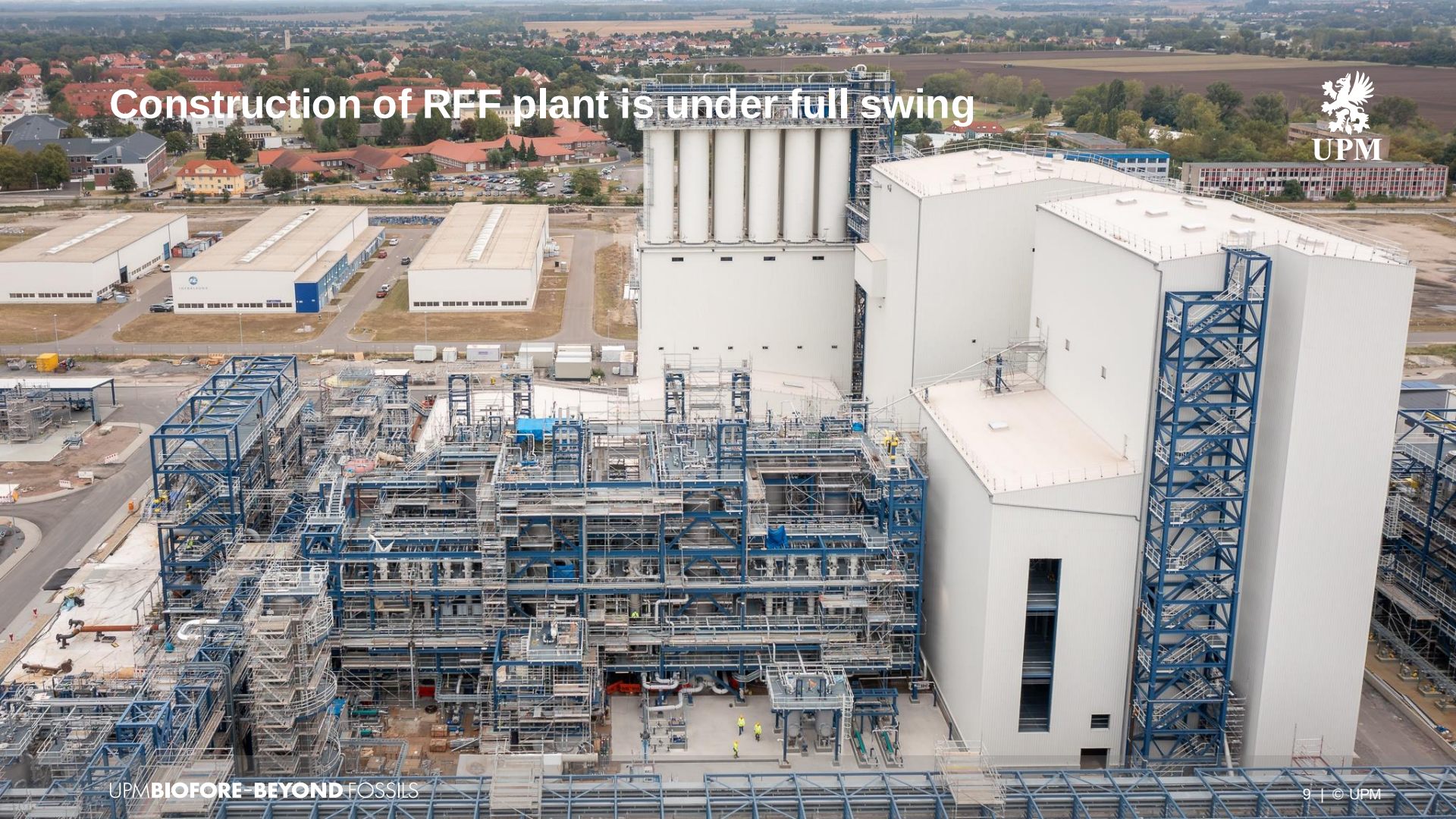
Wood as a second-generation biomass does not compete with food production and does not require fertilization.

(FSC N003385, PEFC/02-44-41)

UPM Biochemicals is getting ready!

Commissioning of wood handling area & debarking/chipping unit successfully completed

Construction of RFF plant is under full swing



UPM BioMotion™ **Renewable Functional Fillers (RFF): A step-change in sustainability for rubber industry**

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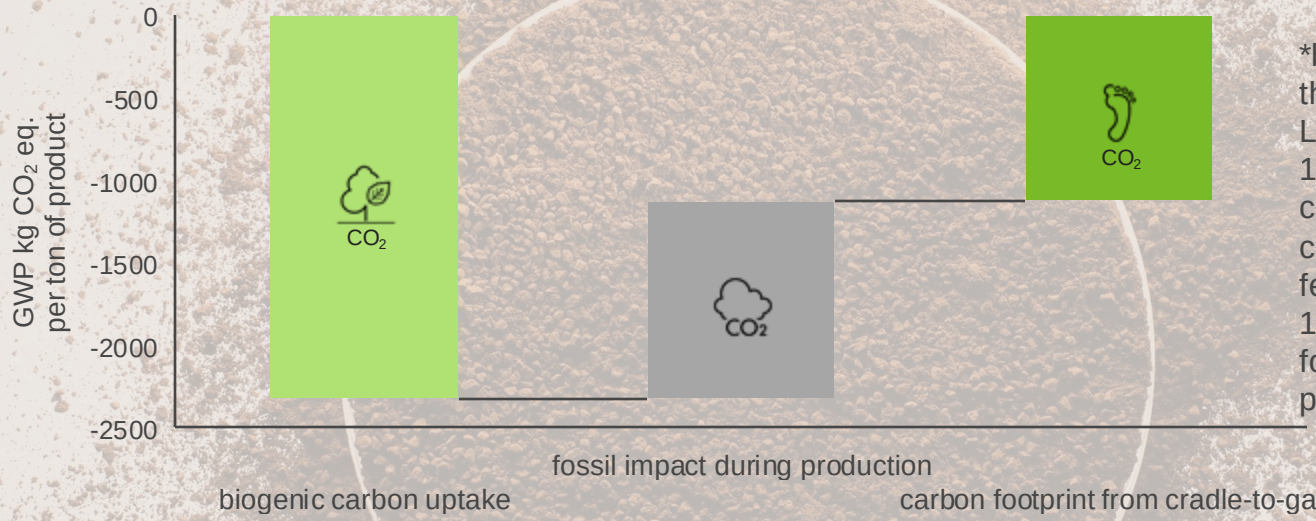
- **Negative carbon footprint** from cradle-to-gate*
- **100% bio-based carbon content** certified by DIN CERTCO (Registration No. 8C237)
- **Light-weight** ensured by low material density (1.3 g/cm³)
- **100% electrical insulating**
- **High purity:** free of PAHs and very low sulfur-content

*according to ISO 14040 and ISO 14044 considering biogenic carbon from our feedstock and buying 100% green electricity

UPM BioMotion™ **RFF features a negative carbon footprint from cradle-to-gate***

- RFF has stored more biogenic CO_2 than greenhouse gases were released during its production



*based on revised third-party validated LCA according to ISO 14040 and ISO 14044 considering biogenic carbon from our feedstock and buying 100% green electricity for the production process via GOs**

** As the biorefinery is still under construction, the current life cycle assessment (LCA) is based on supplier designs, process simulations and pre-commercial trials. The LCA will be gradually updated with primary data from production and purchased raw materials as soon as they will become available.

Current solution portfolio* of UPM BioMotion™ RFF

Preliminary specifications	UPM BioMotion™ X10	UPM BioMotion™ X20	UPM BioMotion™ X40
Specific Surface Area	**11 m²/g**	**23 m²/g**	**40 m²/g**
pH Value	6 - 10	6 - 10	6 - 10
Sulfur Content	< 0.2%	< 0.2%	< 0.2%
Benzo[a]pyrene	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
each of 22 FDA PAHs	< 1 ppm	< 1 ppm	< 1 ppm
Loss on Drying	< 3%	< 3%	< 3%
Bulk Density	> 250 kg/m³	> 250 kg/m³	> 250 kg/m³

* product range expansion under current development

UPM BioMotion™ RFF: numerous application possibilities in various markets

ELASTOMERS

THERMOPLASTIC ELASTOMERS (TPE)

THERMOPLASTICS

OTHERS

- Automotive
- Transportation
- Building & Construction
- Consumer
- Agriculture
- Packaging
- Personal Care
- Electronics

UPM BioMotion™ **RFF: unlimited possibilities of successful rubber applications**

TOWARDS NET ZERO

with Renewable Functional Fillers.

#noexcuses

Contact us: RFF@upm.com
www.upmbiochemicals.com/renewable-functional-fillers/

UPM BIOFORE
BEYOND FOSSILS