



PYRUM



# Pyrum Innovations AG

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Investor Presentation 16.05.24

## Disclaimer

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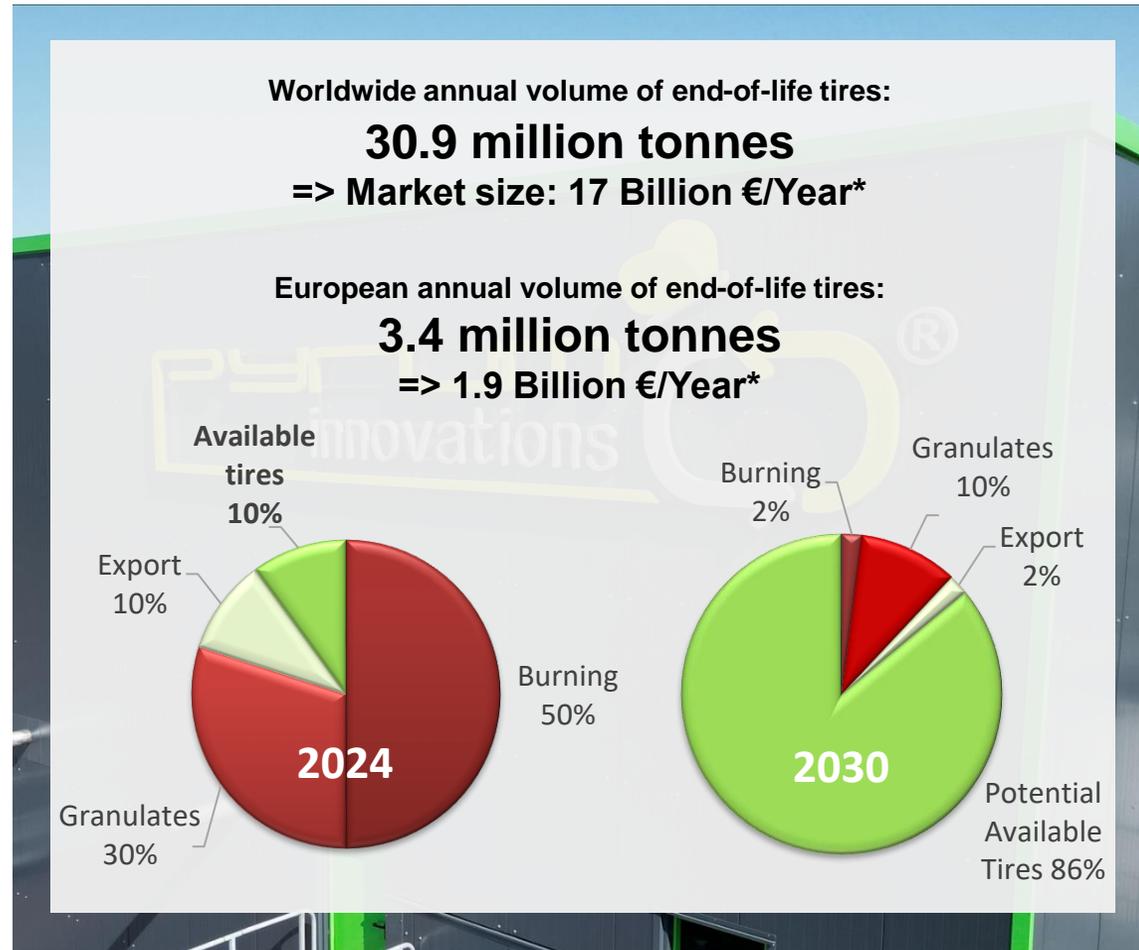
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# Global End-of-Life-Tire (ELT) market accounts for approx. 30.9 mt p.a.

... as tightening regulatory environment forces countries and corporates to take action

## Global ELTs in 2019



## Tightening regulatory environment

- Landfill Ban**  
 The landfill of End-of-Life-Tires and shredded tires is prohibited  
 EU Flag
- Ban on incineration**  
 Prohibition of burning rubber products  
 Prohibited the use of shredded tire granulate outdoors  
 Belgium, Norway, Sweden, Finland
- Ban of Rubber granulates**  
**Summer 2023:** EU has decided to forbid the use of rubber granulates for certain uses (microplastics) => 30 % of used tires are used for this purpose  
 NEW
- OEM Audits are requiring circularity grades**  
 The market is pushing for new raw materials  
 EU Flag
- Increasing cost of CO<sub>2</sub>**  
 Burning tires becomes more and more expensive  
 EU Flag

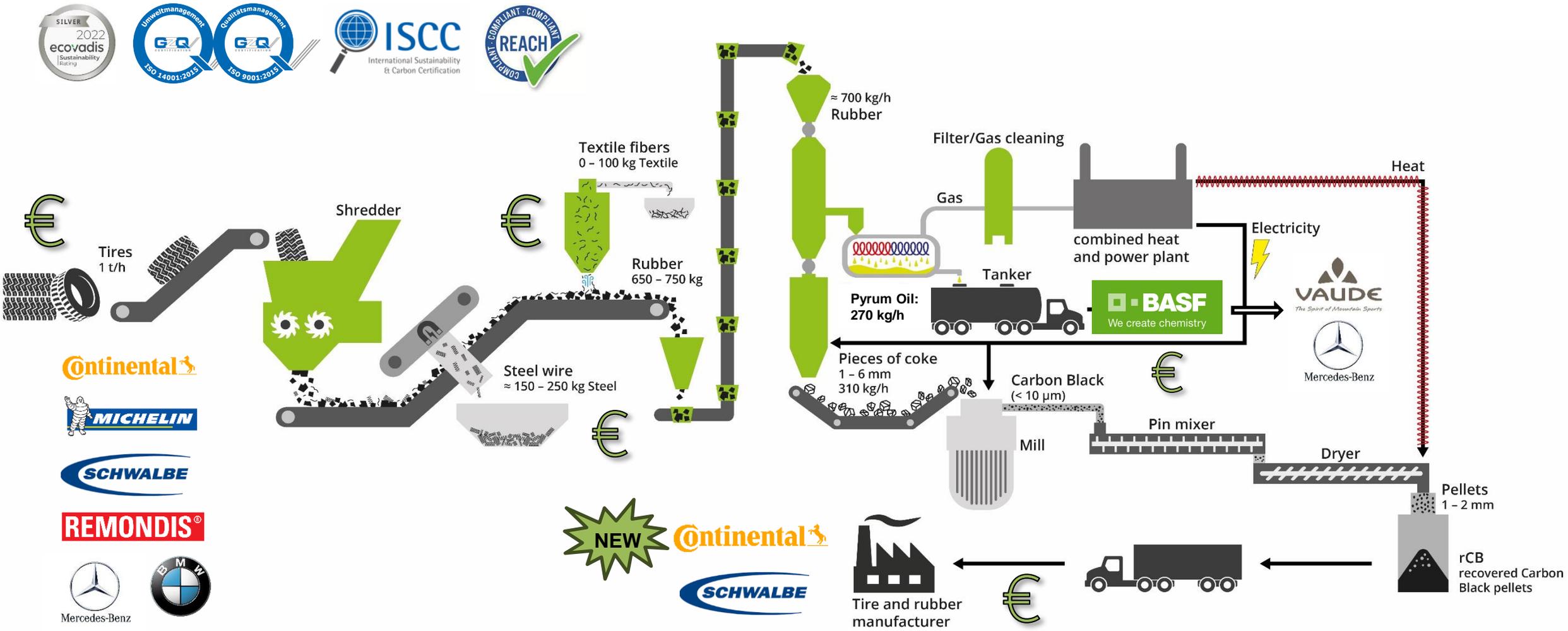
\* Base on 100 €/ton Gatefee, 250 €/ton Steel, 4 €/ton textile, 450 €/ton Pyrum Oil and 850€/ton rCB



# Pyrum offers patented technology with strong value proposition...

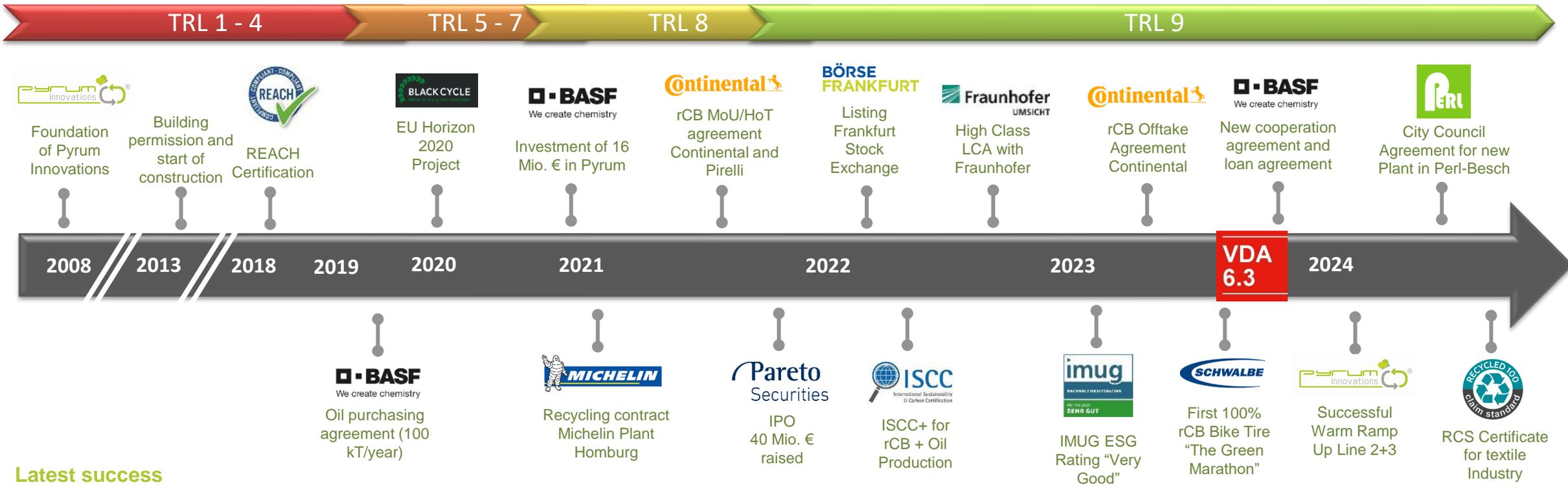
... converting rubber into several high value chemical products – thermolysis oil, carbon and gas

## How Pyrum creates value



# Our history in short with TRL (Technical Readiness Level)

## Key milestones



## Latest success

**Continental** Offtake signed with Continental

**BASF** 50 Mio. € new Loan Agreement for Roll Out financing

**Schwalbe "The Green Marathon"** first 100% rCB Tire

**VDA 6.3** Transformation from Start-Up to Automotive Supplier



# The last important Milestone to close the loop: rCB

No rCB can be sold to the market without those certificates

Pyrum was transformed from a Start-Up to a certified Automotive supplier in 1 year!



• Received certificates and changes in the last 12 months:

- Ecovadis: Silver Status
- VDA 6.3: Continental, Pirelli, Hankook, Mercedes, BMW
- ISCC+ for Oil and rCB
- ISO 9001, ISO 14001
- Completely new Company structure and staffing



• Milestone:

- First official rCB delivery in April 2023
- First „in Spec“ production since July 2023
- Stable „in Spec“ production since August/September 2023
  - **ESSENTIAL for Order of new Line!**
  - **Price drop from 12 Mio. € to 6 Mio. € (incl. Supplier Guarantees)**



# Important rCB Milestones, Quantity increase required

*rCB is ready, we just need more of it!*

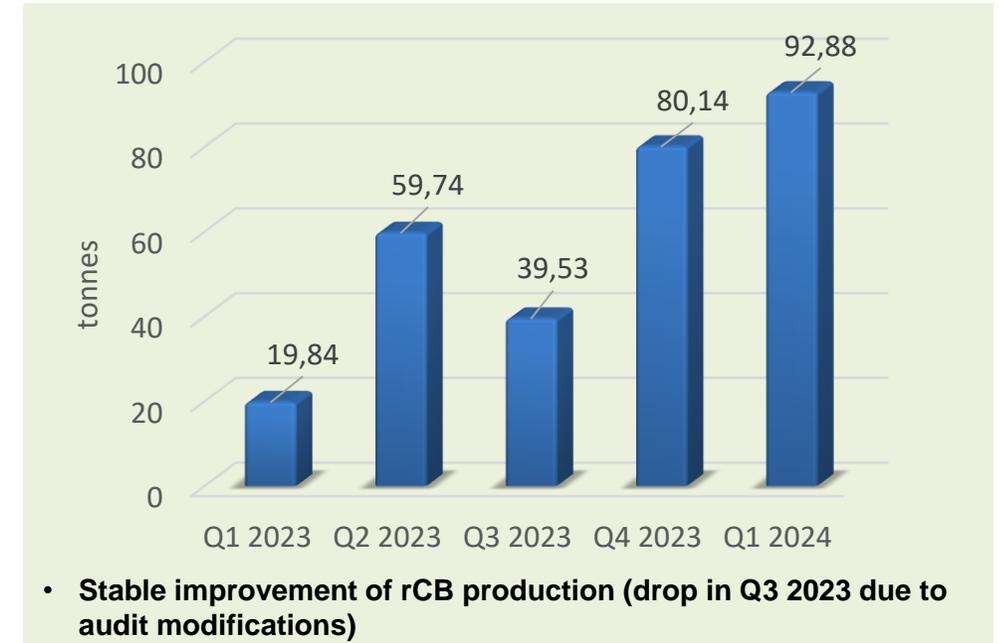
## Turnover importance per product stream

Turnover Type	Turnover/ Plant	TAD 1 capacity <sup>1</sup>	TAD 2 Capacity	
			Today <sup>1</sup>	Est. 2025 <sup>1</sup>
Gate fee	19 %	65 %	80 %	100 %
Steel	10 %	65 %	80 %	100 %
Oil	18 %	65 %	80 %	100 %
Textile	1 %	65 %	80 %	100 %
rCB	52 %	20 % <sup>3</sup>	0 % <sup>2</sup>	100 %

<sup>1</sup> Technically possible hourly capacities, compared to Pyrum Serial Line , <sup>2</sup> Under Construction. <sup>3</sup> Capacity limit reached

- ⇒ The rCB sales represent more than 50% of the revenues of a plant
- ⇒ Turnover will only increase significantly once higher rCB volumes can be produced => **New line is ordered**

## rCB Ramp Up from Mill and Pelletizer 1 (Q1 23 – Q1 24)



- **Stable industrial deliveries to Continental and Schwalbe since 2023**
- First real products have entered the market in 2023 and demand is strongly rising
- **The existing Technology, developed in the last 2 years together with Continental, runs stable, reliable and produces automotive quality products BUT should reach its capacity limits with max 70 - 80 tons per month = It just needs to be bigger!**
- New Mill and Pelletizing is designed according to facts = **new Pin Mixer is > 5 times bigger**
- **Long term rCB Offtake Agreements are under negotiation**



# Real applications of circularity

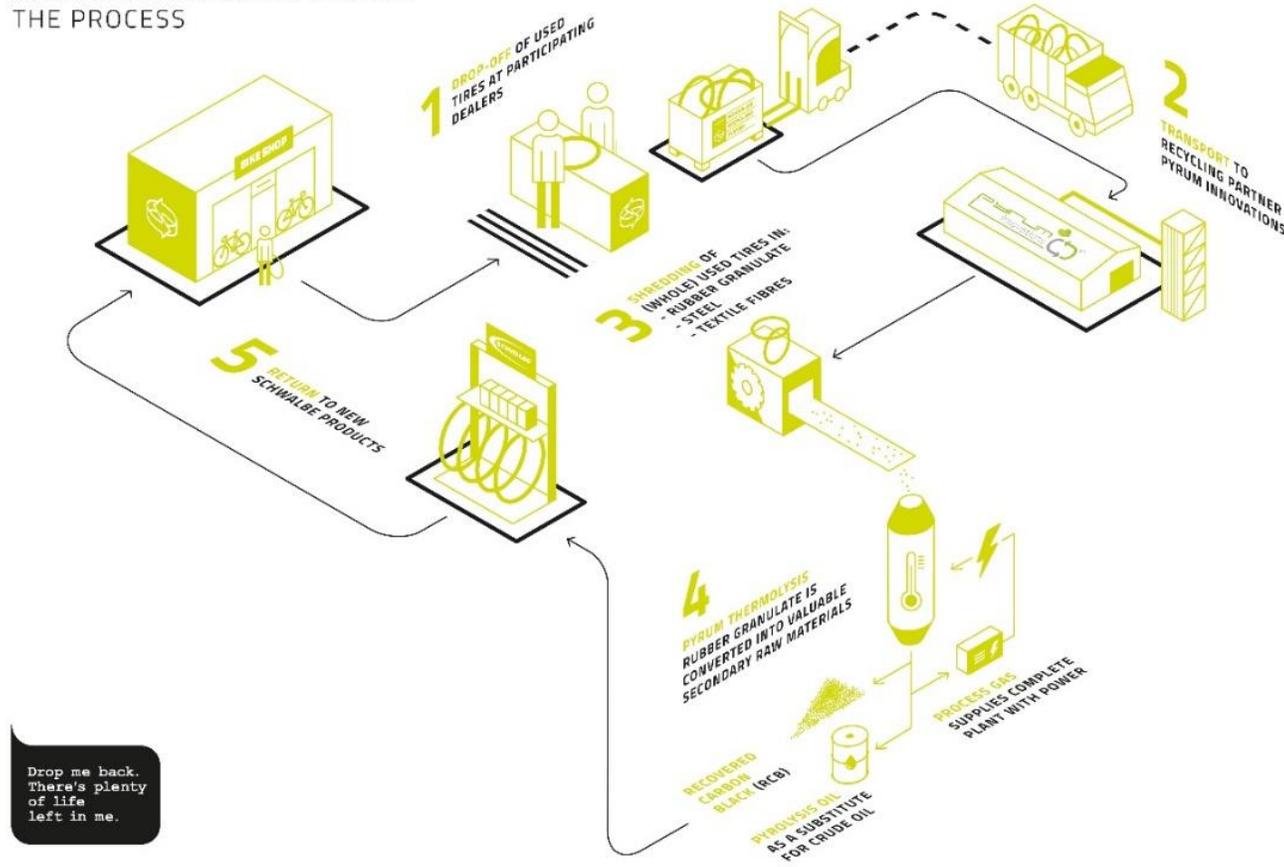
... areas of use that are already in operation

Schwalbe Recycling System and „THE GREEN MARATHON“



PYRUM

## SCHWALBE RECYCLING SYSTEM THE PROCESS



- Already 1.850 bike stores in Germany are participating = almost 1/3 of German market.
- The first 100% Pyrum rCB tire was released at the EUROBIKE in June 2023
- New Products will be presented at EUROBIKE 2024

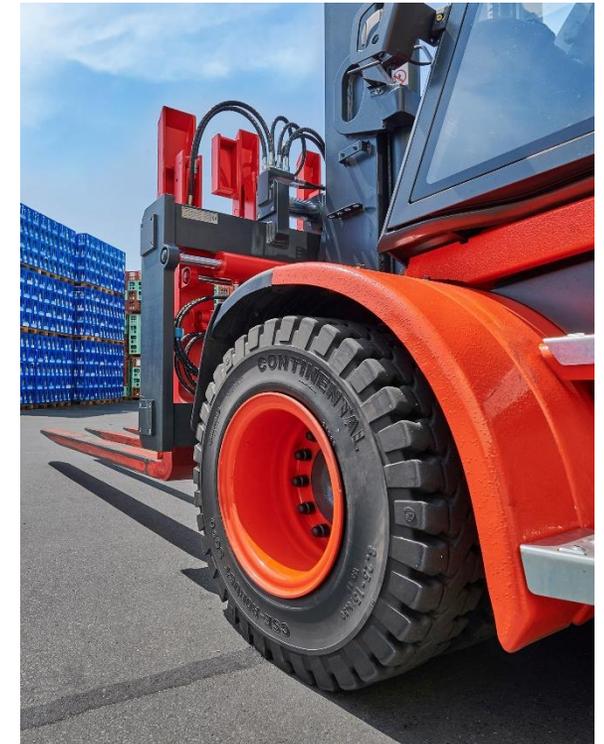


# Real applications of circularity

... areas of use that are already in operation

Continental Tires since September 2023

- Solid tires from Continental's tire plant in Korbach now contain recovered carbon black from end-of-life-tires
- By 2050 at the latest, Continental aims to use 100 percent sustainable materials in its tire products
- Solid Tires produced since Calendar week 23 2023 contain Pyrum rCB



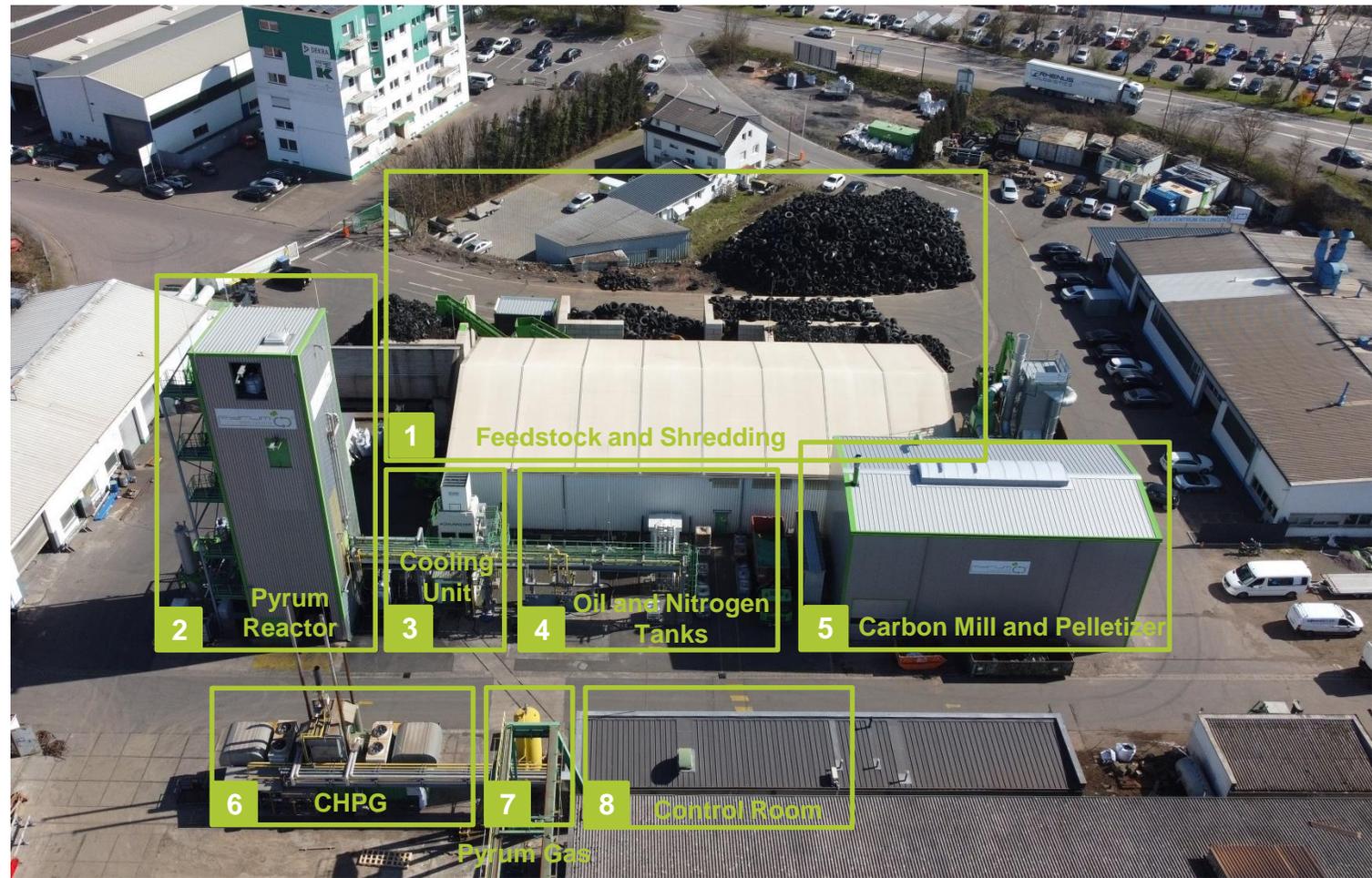
Source: Continental Press Release 12.09.2023



# Dillingen plant was one industrial production line for end-of-life-tires...

... and has been running on industrial scale since May 2020 with commercial sales

## Overview of the operational unit<sup>1</sup>



## Comments

- 1 ▶ **Feedstock (end-of-life-tires) and shredding unit:** granulating whole tires and separating rubber from steel and textile fibers
- 2 ▶ **Pyrum reactor:** patented<sup>2</sup> main part of the Pyrum process. 25-meter-high tower transforming rubber granulates into pyrolysis oil, carbon and gas
- 3 ▶ **Standardized cooling unit** to cool the whole process and all end-products
- 4 ▶ **Oil tanks (40,000 liters underground) and pumping station:** to fill trucks with Pyrum oil + nitrogen
- 5 ▶ **Carbon mill and pelletizer:** to transform raw carbon to commercially recovered Carbon Black (rCB)<sup>3</sup>
- 6 ▶ **Gas generator:** generation of power for the Pyrum plant thanks to the produced gas from the process
- 7 ▶ **Storage and cleaning of pyrolysis gas:** before it enters the gas generator
- 8 ▶ **Control room:** controlling the entire plant with 2-3 persons only

Notes: (1) Current capacity of 5,600 tons p.a.; (2) Patents are owned by Pyrum Innovations International S.A.; (3) In Full operation since April 2023



# Building Site of Pyrum Unit 2 and 3 in Dillingen

*Impressions*

Status quo lines 2 + 3 (22.11.2023)



# Building Site of Pyrum Unit 2 and 3

## Impressions

### New Power Plant and Pyrolysis Unit



### Details about Pyrum Unit 2 and 3

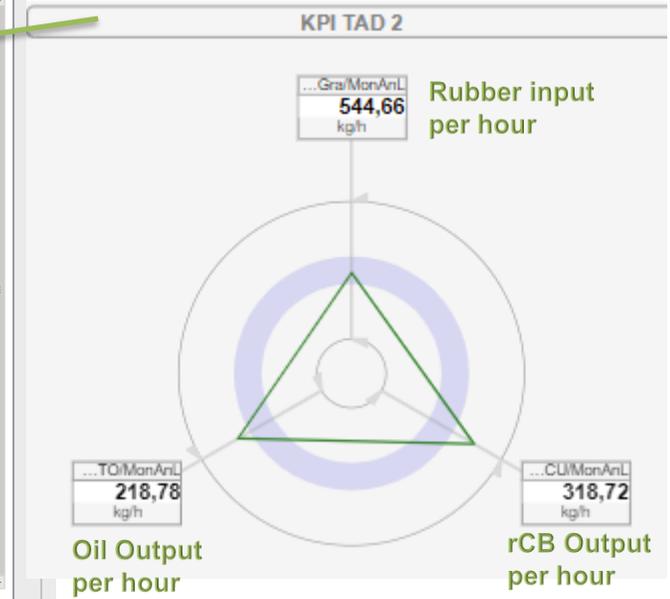
- **Start of Building** : November 2021
- **Size of Building site:** 8.000 m<sup>2</sup>
- **Production Capacity:** up to 6 Tons of used tires per hour (10.000 tires per day)
- **Finished Parts of the Consturction:**
  - Buildings: Finished since 11.2022 ✓
  - Power, Water and Energy Supply: Finished since 01.2023 ✓
  - Control Room and Social Building: Finished since 04.2023 ✓
  - Shredding Plant for 6 to/hour: Finished since 04.2023 ✓
  - Construction of Pyrolysis Unit 2+3: Finished since 04.2023 ✓
  - End product Storage: Finished since 04.2023 ✓
  - Cabling and controls Unit 2+3: Finished since 05.2023 ✓
  - Power Plant (Gas to Energy): Finished since 09.2023 ✓
  - Cold ramp up: Finished since 10.2023 ✓
  - Start of warm ramp up: Started in Nov. 2023
  - New Mill and Pelletizer: 2024 / 2025
- **Building time:** 23 months (Planned 18 months)
- **Delay:** 5 months (under the current supply chain conditions + COVID 19)



# Details of the first 12 hours stable production Plant 2 in Dillingen

Screenshots from the new plant

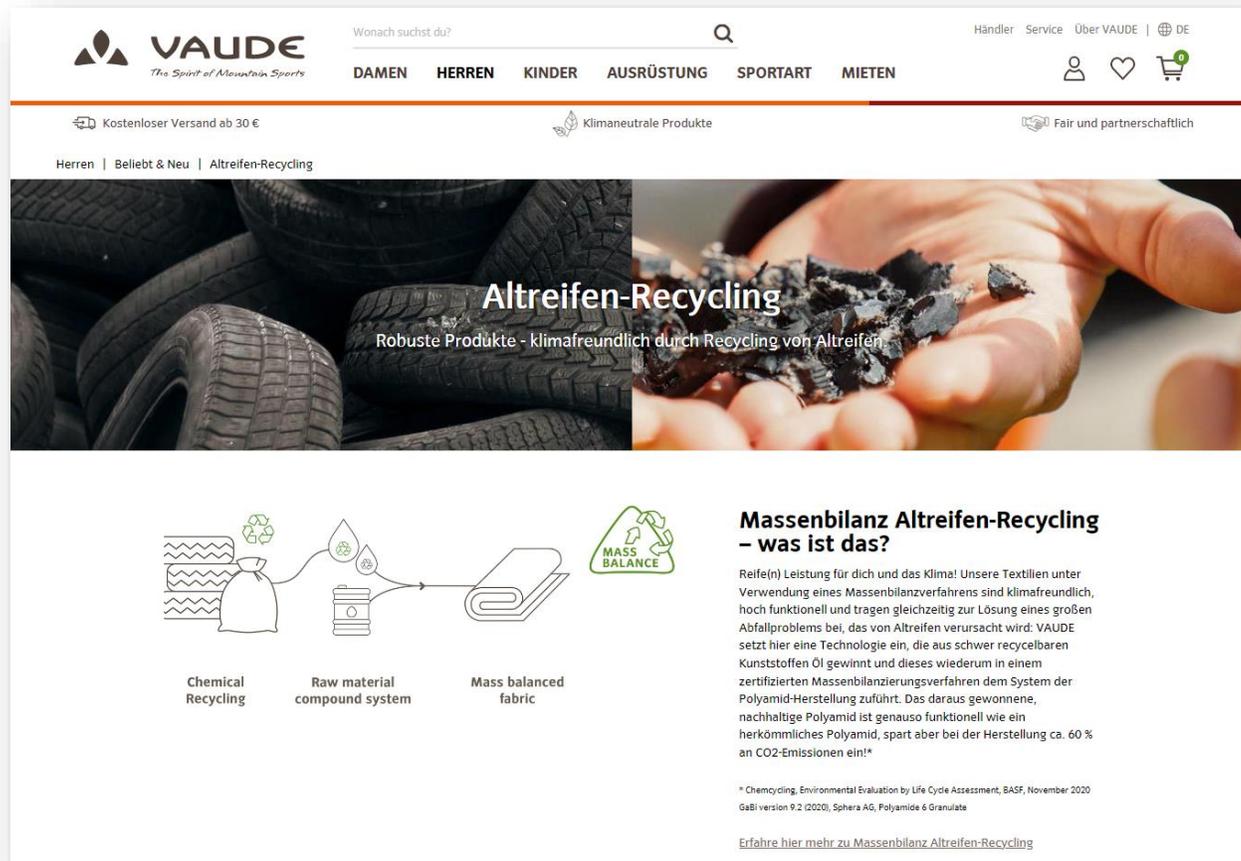
Extrem stable production with filling intervals of 4 minutes



# Real applications of circularity

... areas of use that are already in operation

VAUDE Outdoor Equipment and Clothing



VAUDE The Spirit of Mountain Sports

Wonach suchst du?

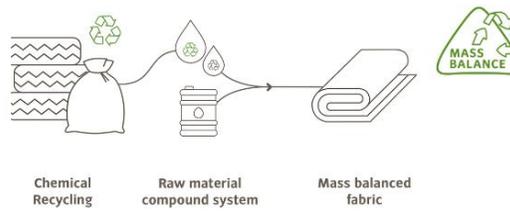
Händler Service Über VAUDE | DE

DAMEN HERREN KINDER AUSRÜSTUNG SPORTART MIETEN

Kostenloser Versand ab 30 € Klimaneutrale Produkte Fair und partnerschaftlich

## Altreifen-Recycling

Robuste Produkte - klimafreundlich durch Recycling von Altreifen

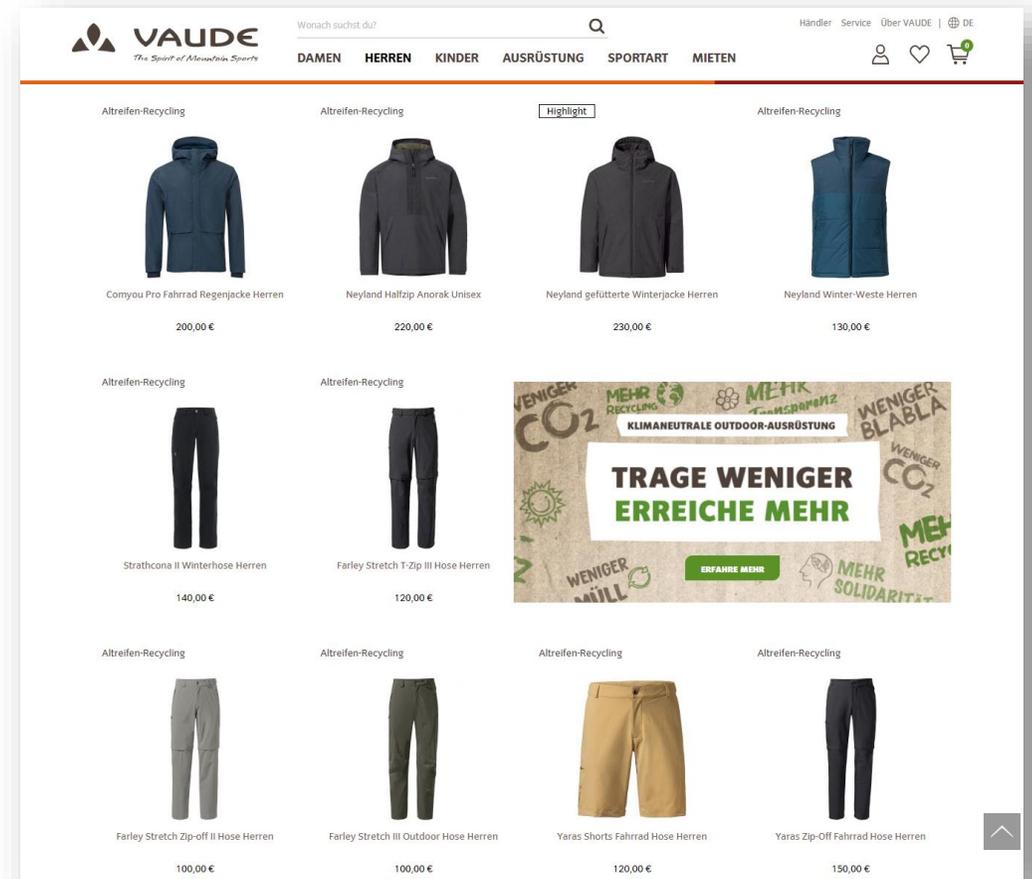


**Massenbilanz Altreifen-Recycling – was ist das?**

Reife(n) Leistung für dich und das Klima! Unsere Textilien unter Verwendung eines Massenbilanzverfahrens sind klimafreundlich, hoch funktionell und tragen gleichzeitig zur Lösung eines großen Abfallproblems bei, das von Altreifen verursacht wird. VAUDE setzt hier eine Technologie ein, die aus schwer recycelbaren Kunststoffen Öl gewinnt und dieses wiederum in einem zertifizierten Massenbilanzierungsverfahren dem System der Polyamid-Herstellung zuführt. Das daraus gewonnene, nachhaltige Polyamid ist genauso funktionell wie ein herkömmliches Polyamid, spart aber bei der Herstellung ca. 60 % an CO<sub>2</sub>-Emissionen ein!\*

\* Chemycling, Environmental Evaluation by Life Cycle Assessment, BASF, November 2020  
GaBi version 9.2 (2020), Sphera AG, Polyamide 6 Granulate

[Erfahre hier mehr zu Massenbilanz Altreifen-Recycling](#)



VAUDE The Spirit of Mountain Sports

Wonach suchst du?

Händler Service Über VAUDE | DE

DAMEN HERREN KINDER AUSRÜSTUNG SPORTART MIETEN

Altreifen-Recycling

- Comyou Pro Fahrrad Regenjacke Herren 200,00 €
- Neyland Halfzip Anorak Unisex 220,00 €
- Neyland gefütterte Winterjacke Herren 230,00 €
- Neyland Winter-Weste Herren 130,00 €
- Strathcona II Winterhose Herren 140,00 €
- Farley Stretch T-Zip III Hose Herren 120,00 €
- Farley Stretch Zip-off II Hose Herren 100,00 €
- Farley Stretch III Outdoor Hose Herren 100,00 €
- Yaras Shorts Fahrrad Hose Herren 120,00 €
- Yaras Zip-Off Fahrrad Hose Herren 150,00 €

**TRAGE WENIGER ERREICHE MEHR**

KLIMANEUTRALE OUTDOOR-AUSRÜSTUNG

WENIGER CO<sub>2</sub> WENIGER BLABLA WENIGER CO<sub>2</sub> MEHR RECYCLING MEHR SOLIDARITÄT

Source: <https://www.vaude.com/de-DE/Herren/Beliebt-Neu/Altreifen-Recycling/>

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# Real applications of circularity

... areas of use that are already in operation

## Mercedes-Benz door handles



Source: Mercedes Benz Group AG

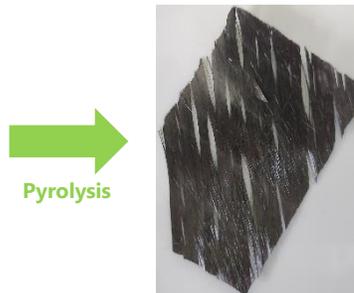
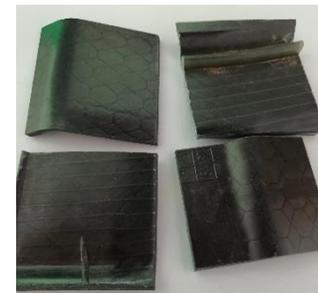


# Research & Development

Result overview from completed projects



- Project duration: Jan '21 – Jun '23*
- Basic & detail engineering of a continuous and automated demonstration plant for recycling of carbon-fiber-reinforced plastic (CFRP)
  - Installation of an operating container incl. machine, lock and control room
  - Successful commissioning and operation of the demonstration plant
- ➔ First time holistic recycling of CFRP



➔ Pyrolysis

- ✓ Perfect separation of the fiber matrix
  - ✓ High proportion of recycling
  - ✓ Sustainable supply of rCF due to substantially lower CO<sub>2</sub> emissions compared to new production
- ➔ Already in this plant size

Funded by Bundesministerium für Wirtschaft und Klimaschutz



**Technology Arts Sciences TH Köln**

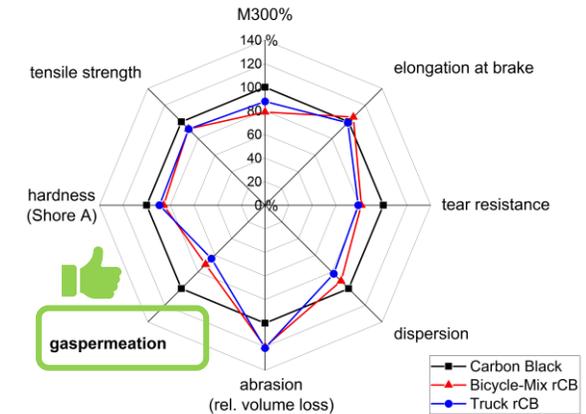
Funded by AIF Projekt GmbH

The project aims at creating, developing, and optimizing a full value chain:

- Setup of the **first collection system** for bicycle tires
- Optimization of **bicycle tire pyrolysis**
- Implementation of bicycle-rCB into **inner tubes**

**Major milestones since July 2022:**

- Optimization of the **pyrolysis** process conditions
- Optimization of the **rCB refining process**
- Introduction of **new rCB type** in rubber compounds
- Performance test of **inner tube** demonstrator



➔ Pyrolysis



- ✓ Lower gaspermeation
- ✓ Less use of fossile resources
- ✓ More sustainable



# Extensive project pipeline due to attractive framework conditions

*Demand is higher than capacity; projects are partly far advanced or have been started procedurally*

## Project status

	Project Nr.	Country	Partner/Site	General Terms Agreed / LOI	Contract / Pre-Engineering signed	Building site Secured / identified	Capital partly secured	Authorisation in process	Operative Company created	
100 %	1	Germany	Saarland	✓	✓	✓	✓	✓	✓	
SPV	2	Greece	Athen „Thermo Lysi SA “	✓	✓	✓	✓	✓	✓	
SPV	3	Cech Republic	Sokolov	✓	✓	✓	✓	✓		
SPV	4	Germany	Bremen	✓		✓	✓	✓		
EXT	5	UK	SUEZ UK	✓	✓	✓	✓	✓		
SPV	6	Germany	Revalit GmbH, Bayern	✓	✓		✓		✓	
SPV	7	Germany	Emleben	✓		✓	✓	✓		
100 %	8	Germany	Hessen oder NRW	✓						
SPV	9	...								
SPV	10	DE & Europe	Unitank 2-10	✓						
SPV	11	Sweden	Billingsford	✓	✓	✓			✓	

Remarks:

(1) The list of projects represents a selection, not the complete project pipeline.

(2) The order of the projects represents the currently planned realisation sequence. Changes over time are possible within the framework of the individual approval procedures.



# Attractive plant economics is the enabler for the rapid roll-out

## Estimated plant economics – operating at 20,000 tonnes p.a. capacity

<b>1</b>	<b>Total revenues, end-products and gate fee</b>			<b>EUR ~ 11.5 m</b>
	Gate fee	EUR 110/ton	⊗ 20,000 tons	EUR ~ 2.2 m
	Steel (+100%, 2021)	EUR 300/ton	⊗ 4,000 tons	EUR ~ 1.2 m
	Oil (+60%, 2021)	EUR 400/ton	⊗ 4,650 tons	EUR ~ 1.9 m
	rCB (+31%, 2021)	EUR 850/ton	⊗ 7,350 tons	EUR ~ 6.2 m
	Gas	used	⊗	
	Heat / Energy	used	⊗	
	<b>Direct costs</b>			<b>EUR ~ 1.6 m</b>
<b>2</b>	<b>OPEX</b>			<b>EUR ~ 3.1 m</b>
<b>3</b>	<b>EBITDA</b>			<b>EUR ~ 6.8 m</b>
<b>4</b>	<b>Investment<sup>1</sup></b>			<b>EUR ~ 40 m</b>
<b>4</b>	<b>Payback EBITDA</b>			<b>~ 5,9 years</b>
<b>3</b>	<b>basis</b>			

(1) Excluding infrastructure, contingency and commissioning

The forward-based information on this slide is shown as an example of a possible future development and is therefore solely for illustrative purposes. Such figures are based on multiple assumptions and there are no agreements entered into to support development illustrated. Such figures are not estimates or forecast and should therefore not be relied upon. Actual figures may therefore deviate materially.

## Roll Out breakthrough:

### NEWS: NEW CONTRACT WITH BASF signed 15.11.2023

- **Goals of the contract:**
    - Support the Pyrum Roll Out plan
    - New guaranteed prices for Oil and rCB
  - BASF Grants Pyrum a **Loan of up to 50 Mio. €**
  - **25 Mio. € of the Loan:** are directly available
  - **25 Mio. € or the Loan:** are available as soon as Pyrum gets 50 Mio. EUR investment in new Pyrum plants.
  - **What counts in these 50 Mio. € that Pyrum needs to acquire to unlook the 2<sup>nd</sup> tranche of 25 Mio. € from BASF?:**
    - Loans from Banks or Investors
    - Bonds
    - Capital increase
    - Investment from partners in SPVs. Ex.: If Remondis invests 30 Mio. EUR in a Pyrum plant, these 30 Mio. € count in the 50 Mio. €
- Enables to invest **100 Mio. €** in Plants in the next 3 year!
- Goal is that Pyrum becomes bankable and receives Project financing in the next step



# Pyrum Consolidated Income Statement 2023 financial year

## Results - Overview

KPI	2023	2022	Δ EUR PL	Δ % PL	Estimates 2024
<b>Revenues</b>	<b>1,147</b>	<b>982</b>	<b>165</b>	<b>16.80%</b>	<b>EUR 3.0 - 4.0 m</b>
Increase/decrease of finished goods	-60	277	-337		
Other own work capitalised	11,712	17,810	-6,098	-34.24%	
<b>Total output</b>	<b>12,799</b>	<b>19,069</b>	<b>-6,270</b>	<b>-32.88%</b>	<b>EUR 25 - 30 m</b>
Other operating income	715	1,318	-603	-45.75%	
Expenses for materials	11,420	17,653	-6,233	-35.31%	
Personnel expenses	5,405	4,184	1,221	29.19%	
Other operating expenses	3,733	3,581	152	4.24%	
Other taxes	43	31	12	39.16%	
<b>EBITDA</b>	<b>-7,087</b>	<b>-5,061</b>	<b>-2,026</b>	<b>40.02%</b>	
Depreciation, amortisation and write-downs	2,086	2,554	-468	-18.32%	
<b>EBIT</b>	<b>-9,173</b>	<b>-7,615</b>	<b>-1,558</b>	<b>20.45%</b>	<b>EUR (11) - (13) m</b>
Income from non-current loans	0	0	0		
Interest and similar income/expenses	338	192	146	75.90%	
<b>Result before taxes</b>	<b>-9,511</b>	<b>-7,808</b>	<b>-1,703</b>	<b>21.82%</b>	
Taxes on income and profit	0	0	0		
<b>Result after taxes</b>	<b>-9,511</b>	<b>-7,808</b>	<b>-1,703</b>	<b>21.82%</b>	<b>(-)</b>



# Pyrum consolidated balance sheet (short) 2023 financial year

## Overview

TEUR	2023	2022	Share in capital 12M 2023
<b>Non-current assets</b>			
Non-current intangible assets	5,638	6,492	11.1%
Property, plant, and equipment	39,458	28,759	77.5%
Non-current financial assets	30	37	0.1%
	<b>45,126</b>	<b>35,288</b>	
<b>Current assets</b>			
Inventories	446	389	0.9%
Receivables and other current assets	803	1,406	1.6%
Cash at hand and in bank	4,483	12,726	8.8%
	<b>5,732</b>	<b>14,520</b>	
Deferred expenses	68	49	0.1%
<b>Equity</b>	<b>22,380</b>	<b>31,891</b>	<b>43.9%</b>
thereof accumulated losses	-32,932	-23,421	
Provisions and Accrued Liabilities	3,188	3,114	6.3%
Liabilities	25,358	14,852	49.8%
Total equity and liabilities	<b>50,926</b>	<b>49,857</b>	
<b>Equity capital ratio</b>	<b>43.9%</b>	<b>64.0%</b>	



# What is needed and what we have...

*We can tick all the boxes*

## Summary

Milestones	Achieved	Comments
<b>Industrial Pilot plant in Operation</b>	X	24/7 Operation since Mai 2020
<b>Serial Engineering of all Parts finished</b>	X	Finished since End of 2023 – Last part was Pelletizer for rCB
<b>Building of Industrial Serial Plant</b>	X	Serial Production started in Week 2 of 2024
<b>Ramp up of Serial Industrial Plant</b>	X	80% hourly capacity achieved after only 6 days of ramp up! Plan was 6 Months
<b>Long time guaranteed oil Offtake</b>	X	BASF offtake for up to 300.000 tons per year => 200 Pyrum Lines
<b>Long time guaranteed rCB Offtake</b>	X	serial rCB sales since August 2023. Hard offtake agreement for existing volumes.
<b>Securing Market risks</b>	X	ELT Gate Fee Premium paid on Oil and rCB to compensate Gate Fee evolution
<b>Roll Out plan</b>	X	Projects and building sites secured! Most projects are already in permitting process and hundreds of thousands have been invested by partners.
<b>Team to realise the roll out</b>	X	Team is ready and trained. 93 highly qualified Team members are working.
<b>Financed roll out plan</b>	50%	We are looking for the 2. half .... That all what is left.



# Investment highlights

*Pyrum addresses global environmental problems with revolutionary scalable technology*



- I Addressing the global tire waste problem with a patented pyrolysis solution, recycling rubber into high value products – oil, carbon, gas
- II The Dillingen Plant running on an industrial scale since May '20. Quality of Pyrum`s Oil and Carbon proven with thousands of tons of delivered oil. rCB finally in serial production since July/August 2023
- III Industrial partnerships with BASF (shareholder and long-term offtaker of oil), Michelin, Continental (Shareholder and offtaker of rCB), Schwalbe, Siemens, BMW, UNITANK provide verification and secure basis for rapid growth
- IV Two-pillar business model. Recurring revenues from plant ownership and revenues from sale of plants to other operations.
- V Revenue target 2024: EUR 3 million to EUR 4 million, before rCB production increases substantially in 2025

