Pyrum Innovations AG

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Investor Presentation 16.05.24

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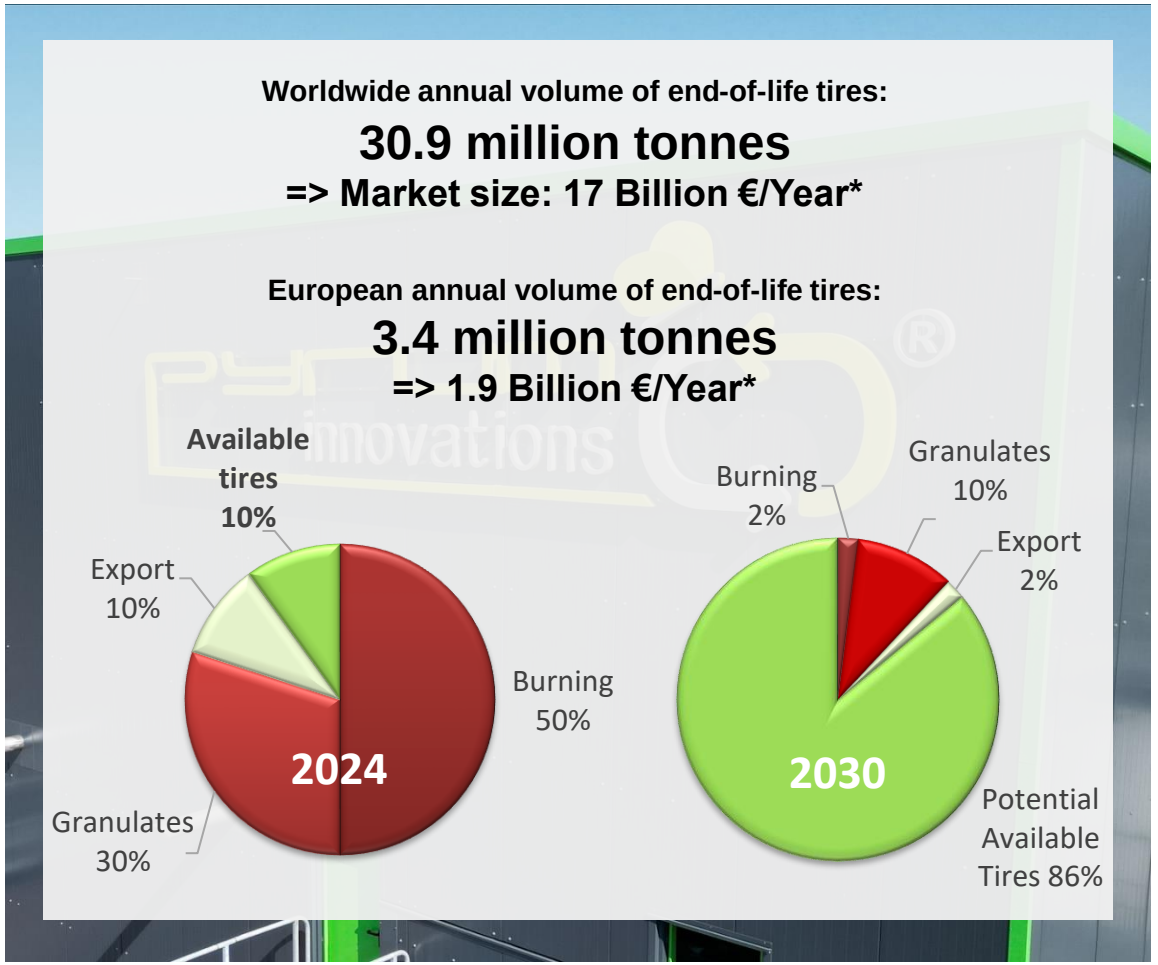
Global End-of-Life-Tire (ELT) market accounts for approx. 30.9 mt p.a.

… 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

Ban on incineration

Prohibition of burning rubber products
Prohibited the use of shredded tire granulate outdoors

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

Increasing cost of CO_2

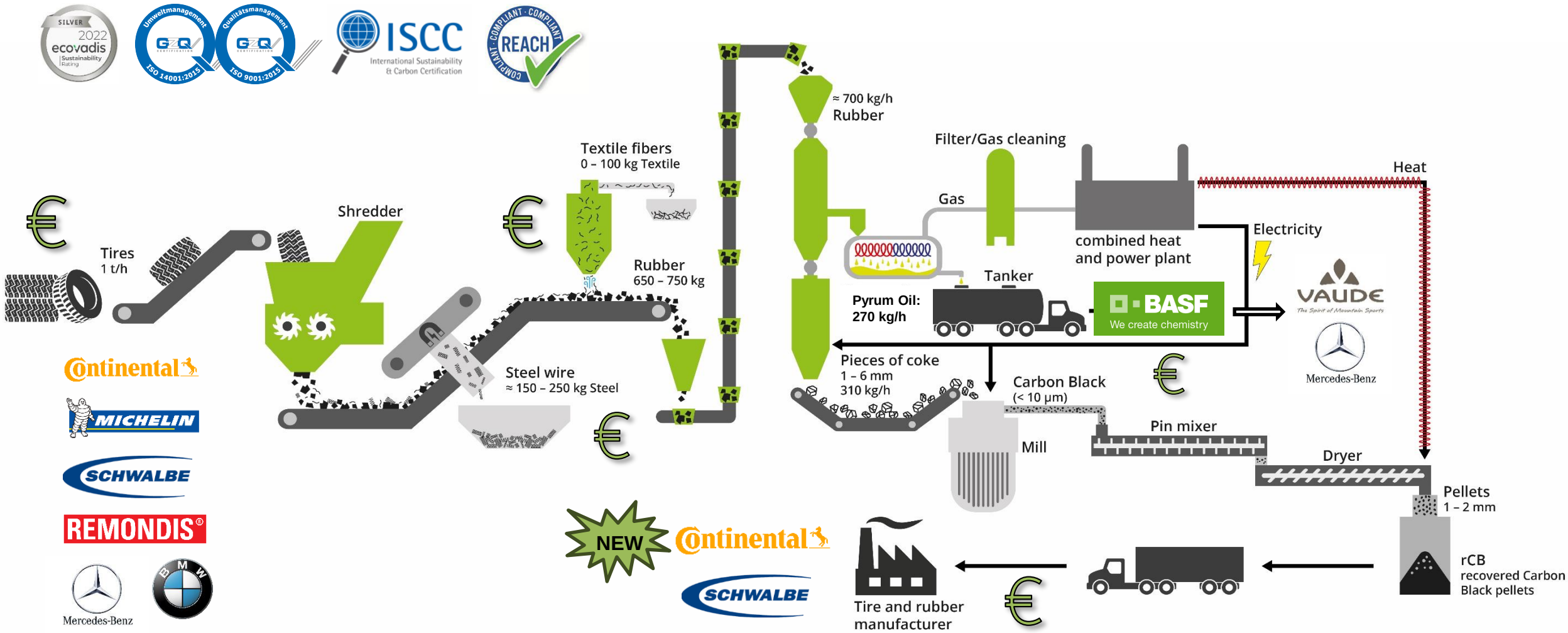
Burning tires becomes more and more expensive

** 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…

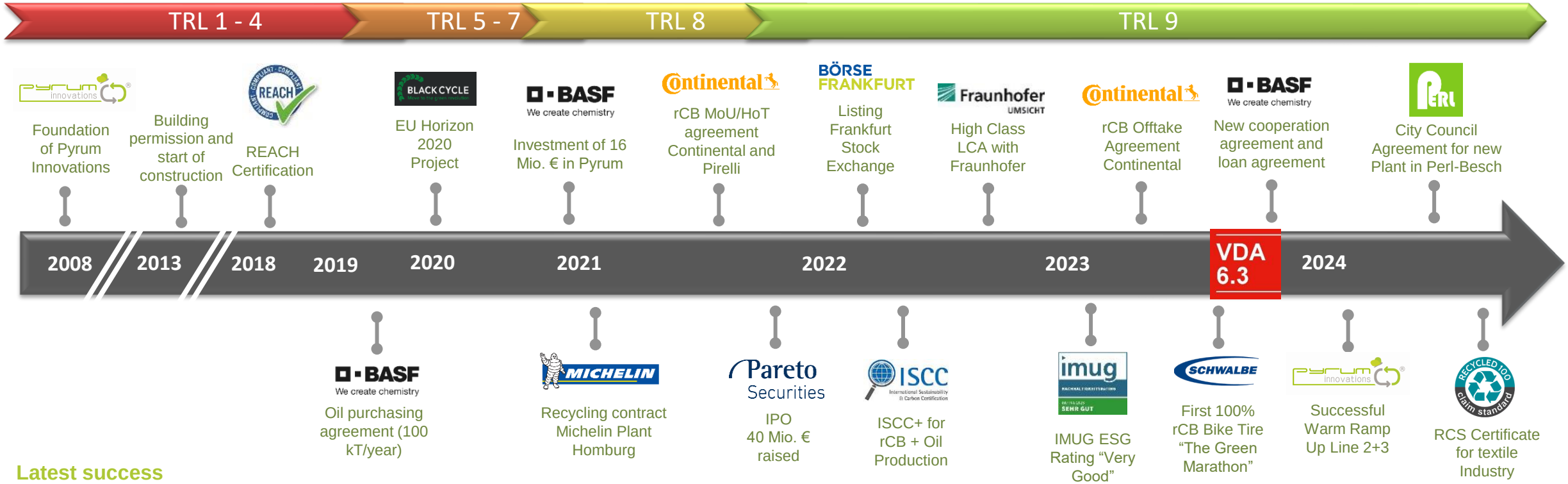
… converting rubber into several high value chemical products – thermolysis oil, carbon and gas

How Pyrum creates value



Our history in short with TRL (Technical Readiness Level)

Key milestones



Latest success

JDA and rCB Offtake signed with Continental

50 Mio. € new Loan Agreement for Roll Out financing

Schwalbe "The Green Marathon" first 100% rCB Tire

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 Automative 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
  - Completly 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)**

milling

pelletizing

Carbon (TCU)
0,5 - 5 mm

Milled rCB
10 - 14 µm

rCB
0,8 - 2 mm
Hardness 35 – 50 cN

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 [1]	TAD 2 Capacity	
			Today[1]	Est. 2025[1]
Gate fee	19 %	65 %	80 %	100 %
Steel	10 %	65 %	80 %	100 %
Oil	18 %	65 %	80 %	100 %
Textile	1 %	65 %	80 %	100 %
rCB	52 %	20 % [3]	0 % [2]	100 %

[1] Technically possible hourly capacities, compared to Pyrum Serial Line , [2] Under Construction. [3] 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)

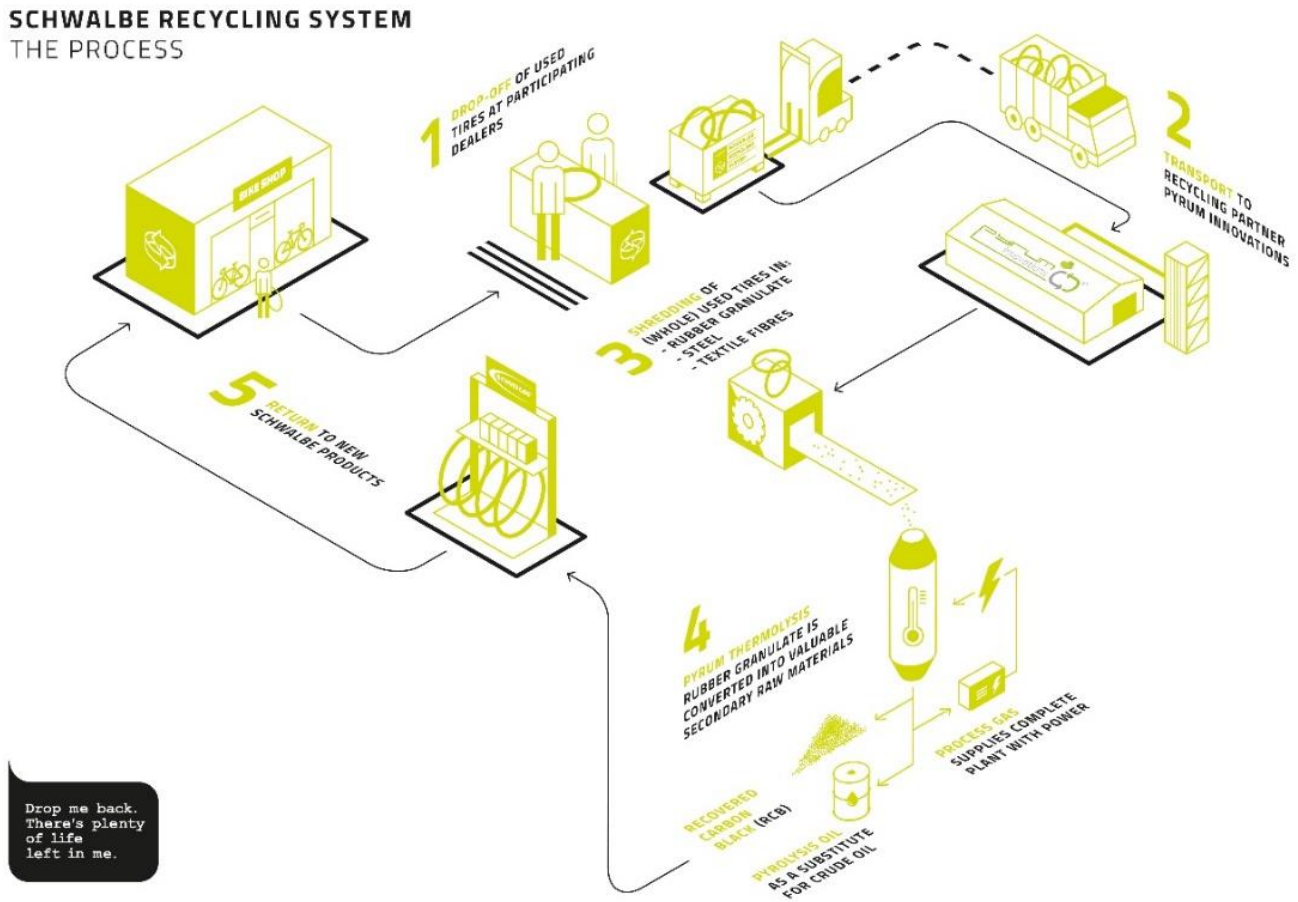
- **Stable improvement of rCB production (drop in Q3 2023 due to audit modifications)**

- **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 Recycing System and „THE GREEN MARATHON“



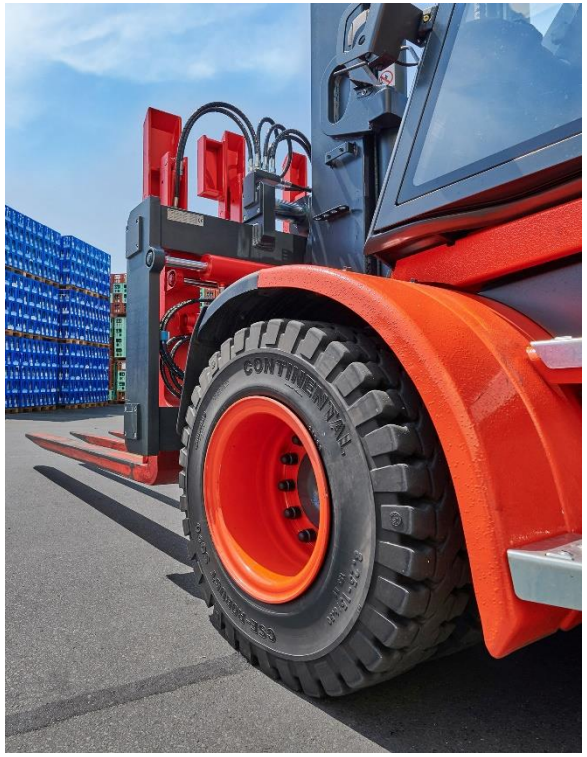
- **Already 1.850 bike stores in Germany are participating = almost 1/3 of German market.**
- **The first 100% Pyrum rCB tire was released at the EUROBIKE in June 2023**
- **New Products will be presented at EUROBIKE 2024**

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 <u>100 percent sustainable materials</u> in its tire products**
- **Solid Tires produced since Calendar week 23 2023 contain Pyrum rCB**

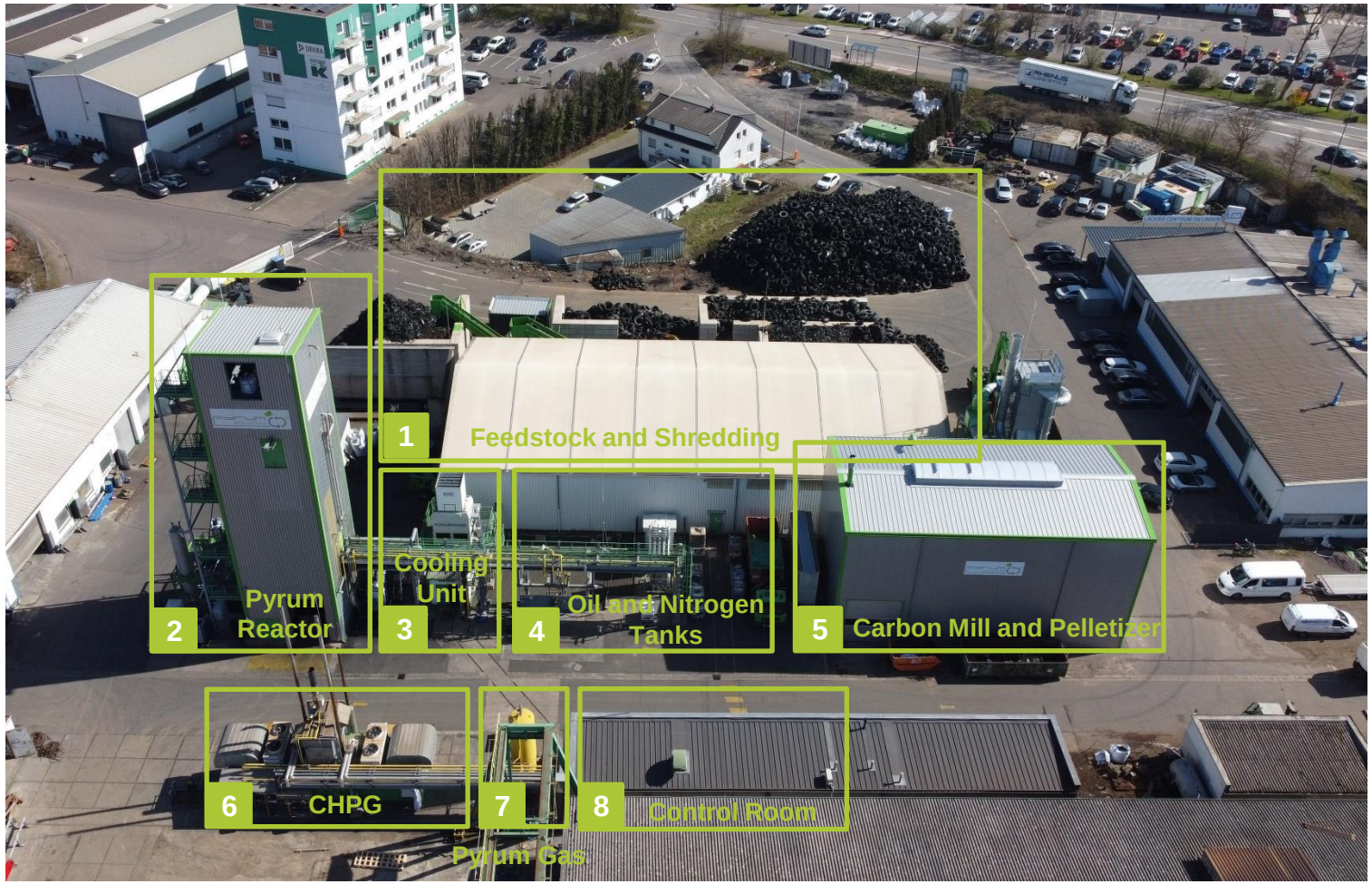


Source: Continental Press Release 12.09.2023

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[1]



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[2] 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)[3]
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 m²
- **Production Capacity:** up to 6 Tons of used tires per hour (10.000 tires per day)
- **Finished Parts of the Consturction**:

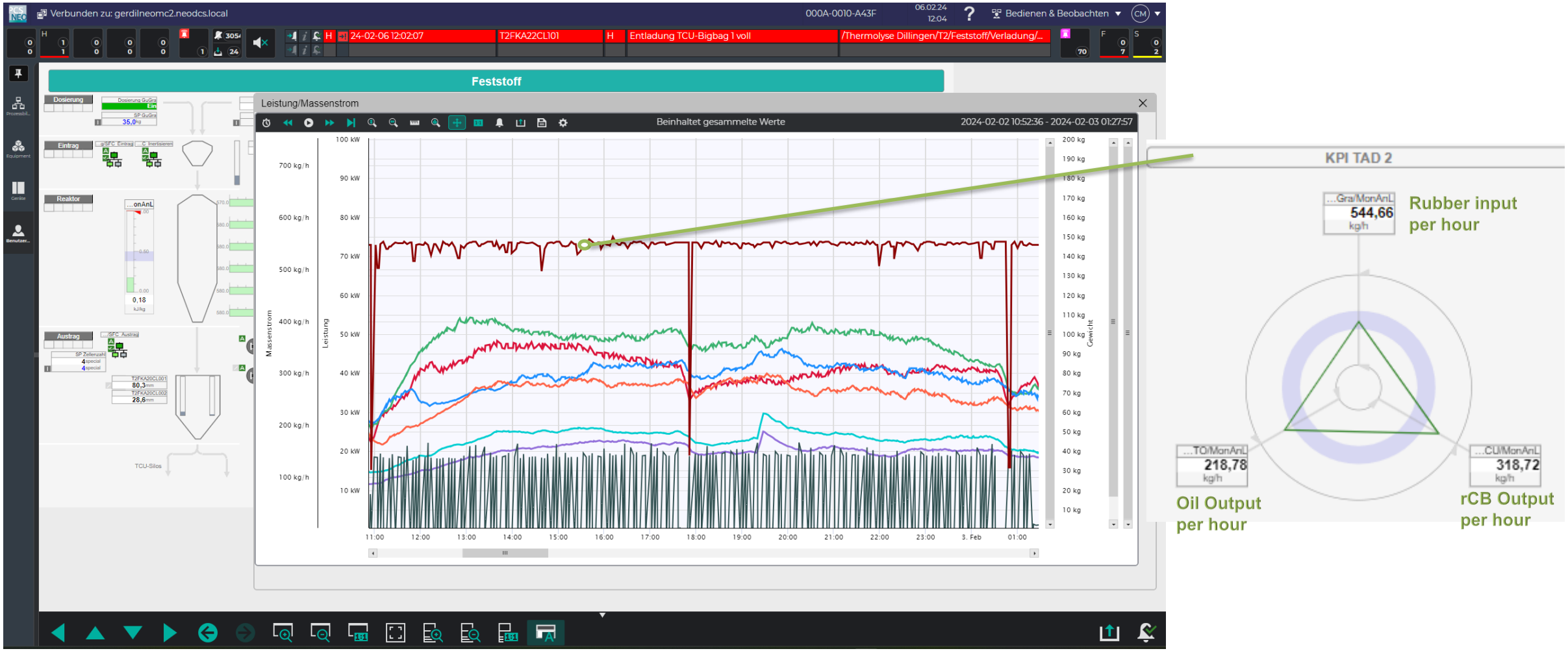
– Buildings:	Finished since 11.2022
– Power, Water and Energy Supply:	Finished since 01.2023
– Control Room and Social Building:	Finished since 04.2023
– Shredding Plant for 6 to/hour:	Finished since 04.2023
– Construction of Pyrolysis Unit 2+3:	Finished since 04.2023
– End product Storage:	Finished 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

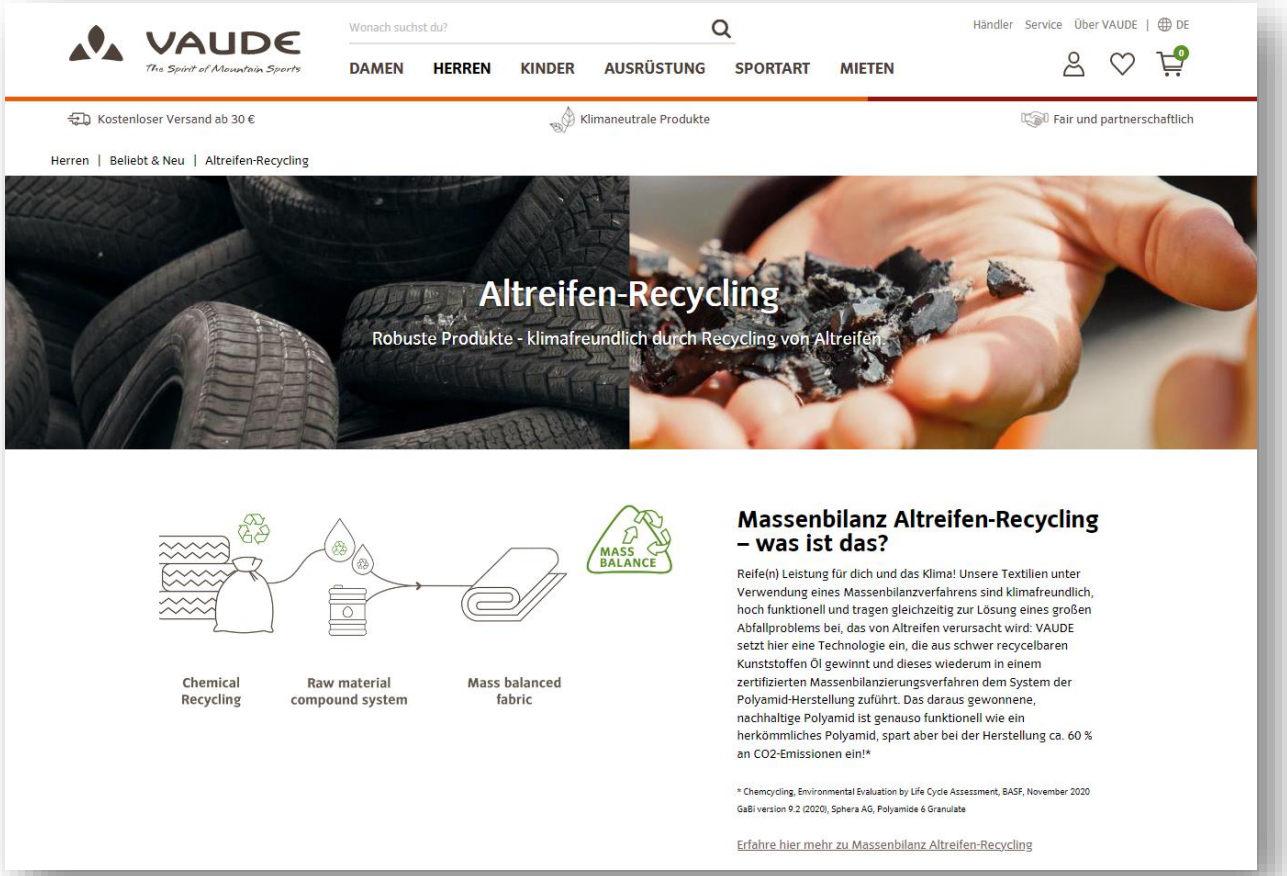
Extrem stable production with filling intervals of 4 minutes



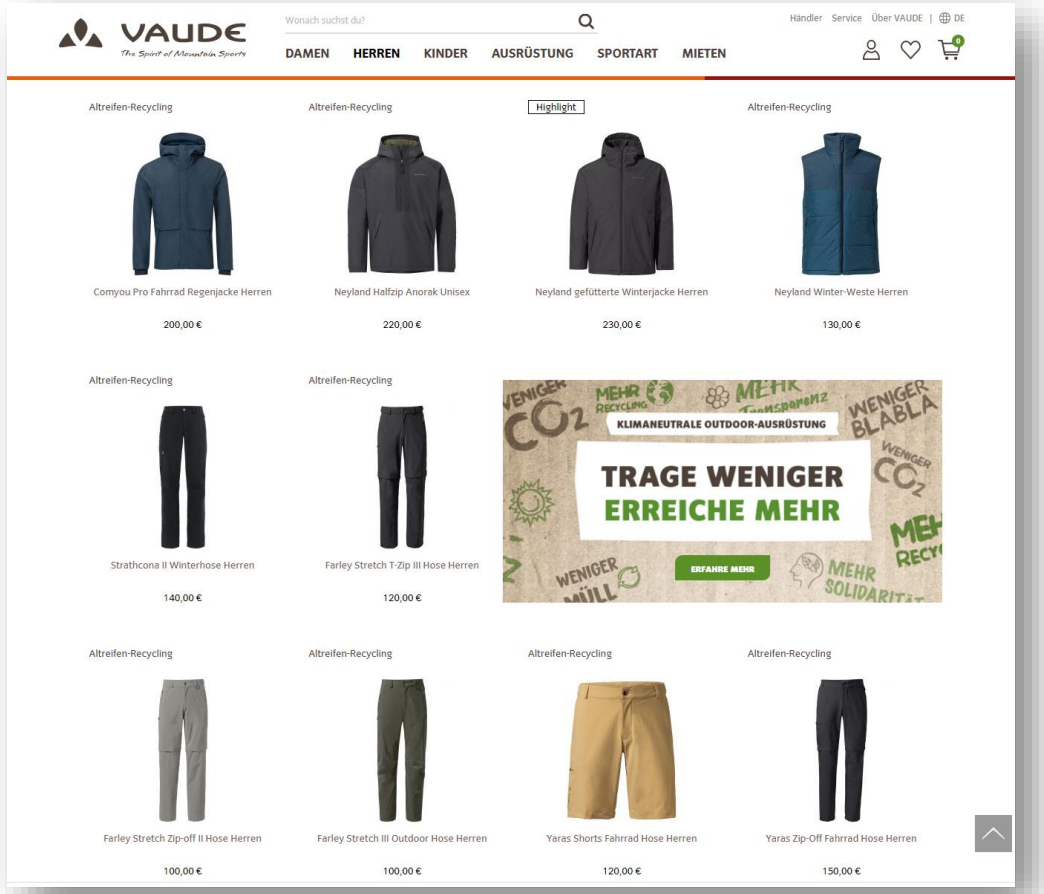
Real applications of circularity

… areas of use that are already in operation

VAUDE Outdoor Equipment and Clothing



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



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

Real applications of circularity

… areas of use that are already in operation

Mercedes-Banz door handles

Source: Mercedes Benz Group AG

Research & Development

Result overview from completed projects

CFRP Recycling

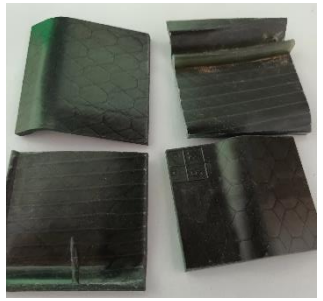
Project: **Infinity**

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**

Funded by Bundesministerium für Wirtschaft und Klimaschutz



CFRP from car

Pyrolysis

recycled carbon fiber (rCF)

- ✓ **Perfect separation of the fiber matrix**
- ✓ **High proportion of recycling**
- ✓ **Sustainable supply of rCF due to substantially lower CO_2 emissions compared to new production**
  - ➡ **Already in this plant size**

Bicycle tire recycling

SCHWALBE

Technology
Arts Sciences
TH Köln

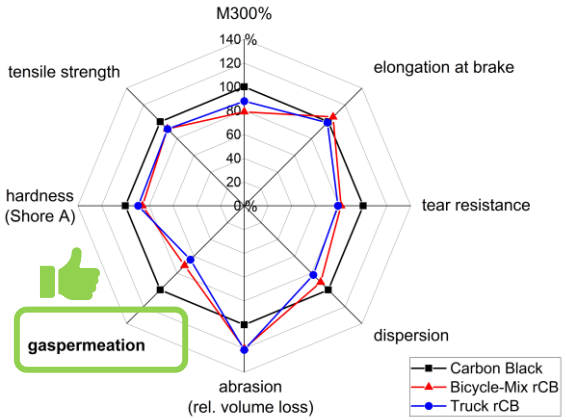
Funded by AiF Projekt GmbH

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 fossil 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

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

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 unlock the 2nd tranch 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

(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.

Pyrum Consolidated Income Statement 2023 financial year

Results - Overview

KPI	2023	2022	Δ EUR PL	Δ % PL	Estimates 2024
Revenues	**1,147**	*982*	**165**	***16.80%***	**EUR 3.0 - 4.0 m**
Increase/decrease of finished goods	-60	*277*	-337		
Other own work capitalised	11,712	*17,810*	-6,098	*-34.24%*	
Total output	**12,799**	**19,069**	**-6,270**	***-32.88%***	**EUR 25 - 30 m**
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%*	
EBITDA	**-7,087**	**-5,061**	**-2,026**	***40.02%***	
Depreciation, amortisation and write-downs	2,086	*2,554*	-468	*-18.32%*	
EBIT	**-9,173**	**-7,615**	**-1,558**	***20.45%***	**EUR (11) - (13) m**
Income from non-current loans	0	*0*	0		
Interest and similar income/expenses	338	*192*	146	*75.90%*	
Result before taxes	**-9,511**	**-7,808**	**-1,703**	***21.82%***	
Taxes on income and profit	0	*0*	0		
Result after taxes	**-9,511**	**-7,808**	**-1,703**	***21.82%***	**(-)**

Pyrum consolidated balance sheet (short) 2023 financial year

Overview

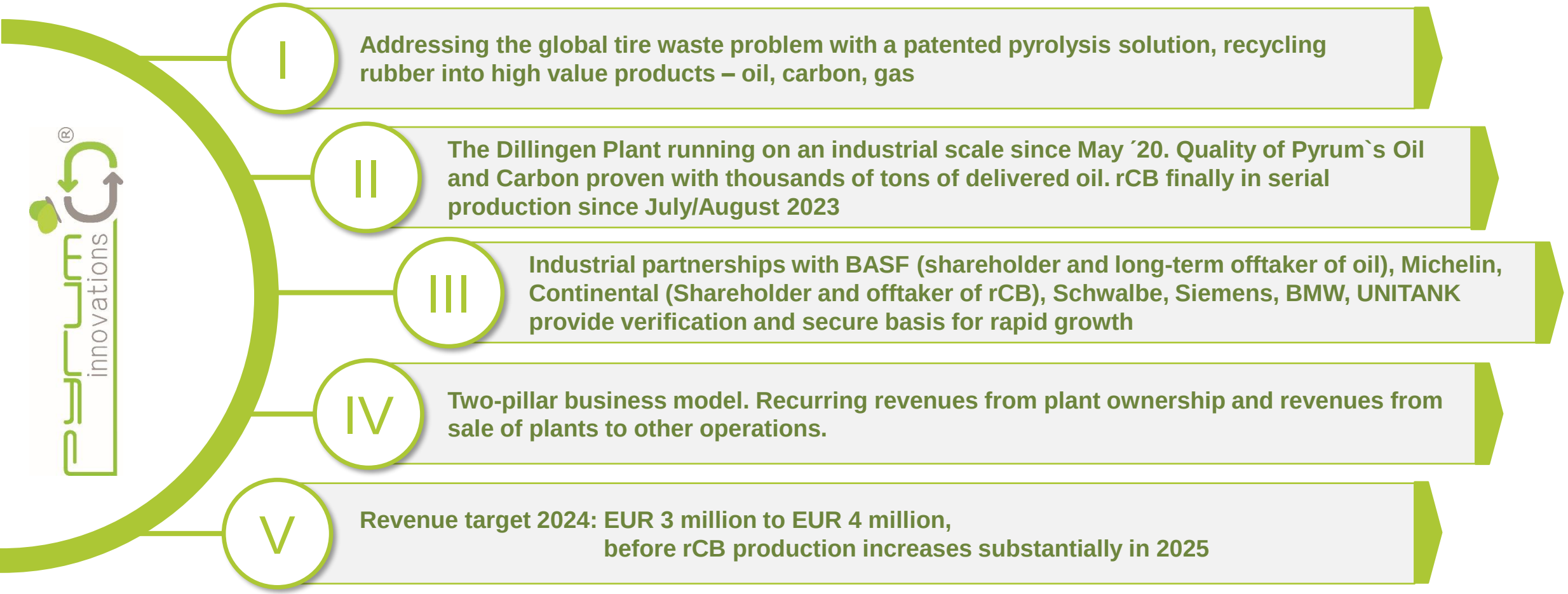
TEUR	2023	2022	Share in capital 12M 2023
Non-current assets			
Non-current intangible assets	5,638	6,492	*11.1%*
Property, plant, and equipment	39,458	28,759	*77.5%*
Non-current financial assets	30	37	*0.1%*
	45,126	**35,288**	
Current assets			
Inventories	446	389	*0.9%*
Receivables and other current assets	803	1,406	*1.6%*
Cash at hand and in bank	4,483	12,726	*8.8%*
	5,732	**14,520**	
Deferred expenses	68	49	*0.1%*
Equity	**22,380**	**31,891**	***43.9%***
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	**50,926**	**49,857**	
Equity capital ratio	**43.9%**	**64.0%**	

What is needed and what we have…

We can tick all the boxes

Summary

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

Investment highlights

Pyrum addresses global environmental problems with revolutionary scalable technology