Innovation Factbook

March 2025

EVONIK
Leading Beyond Chemistry

Contents

R&D at Evonik at a glance 2024

Approx. €440 million R&D spend

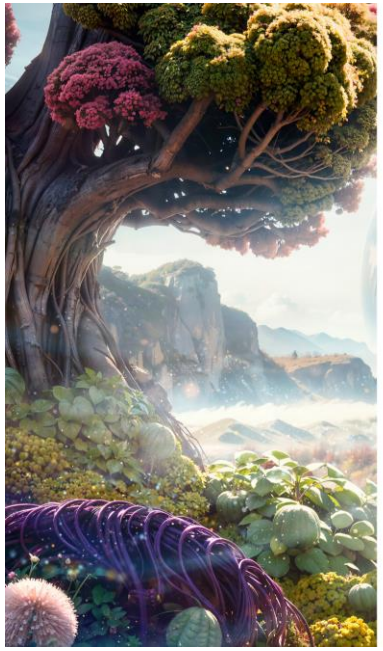
2.9% R&D ratio

>2,700 employees[1]

Approx. 23,000 patents[2]

100% sustainability-integrated

Evonik‘s Innovation Growth Areas



Advance Precision Biosolutions

Enable Circular Economy

Accelerate Energy Transition

1 RD&I, Application Technology, some Process Technology | 2 Patents and pending patents

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RD&I steers innovation based on clear alignment and continuous exchange across the entire Evonik organization

Research, Development & Innovation

Divisional R&D

- Specialty Additives
- Nutrition & Care
- Smart Materials

Business incubation

- Creavis

Venturing

- Venture Capital

Consistent focus on Evonik's strategic direction

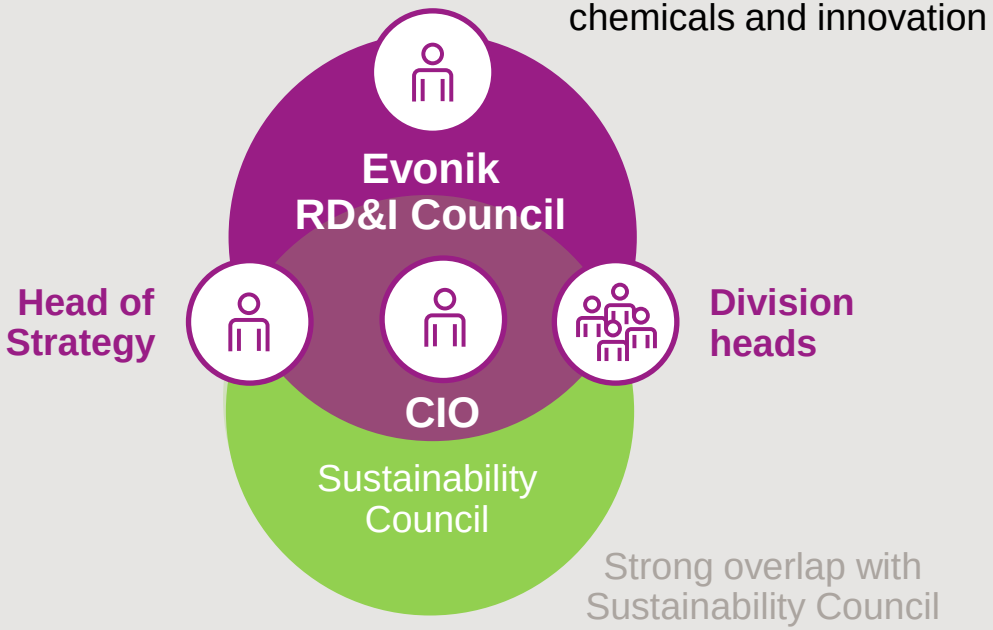
Knowledge sharing and use of different technology platforms

Efficient use of resources and competencies; flexible setup of interdisciplinary project teams

Full integration of sustainability criteria into decision making and allocation of resources

Sustainability is fully integrated into innovation portfolio steering

RD&I Council manages the company-wide innovation portfolio …



… using clear steering criteria

Qualitative	Strategic fit	Market/industry
Quantitative	Growth potential	Necessary resources
Sustainability	NEXTGEN Solutions	
	NEXTGEN Technologies	

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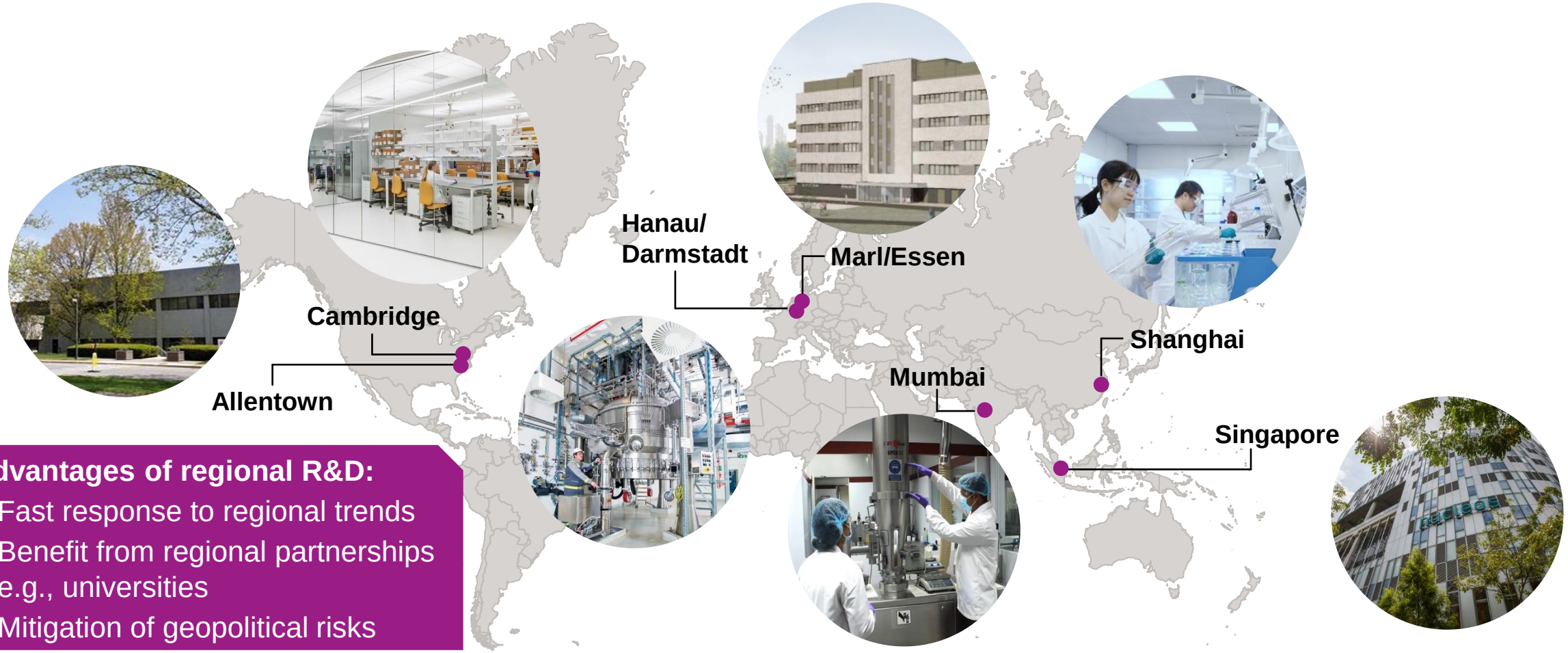
Regional innovation hubs enable access to local ecosystems for R&D and business development and increase proximity to customers and markets



Advantages of regional R&D:

- Fast response to regional trends
- Benefit from regional partnerships e.g., universities
- Mitigation of geopolitical risks

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New Innovation Growth Areas – €1.5 bn additional sales targeted

Addressing our most relevant sustainability trends

Previous Innovation Growth Fields

Advanced Food Ingredients

Additive Manufacturing

Sustainable Nutrition

Cosmetic Solutions

Membranes

Healthcare Solutions

- Introduced in 2016
- Targeted €1 bn additional sales by FY 2025
- €650 m achieved by year-end FY 2023 with EBITDA margin well above Group average
- Further growth in FY 2024 despite difficult macroeconomic conditions

New Innovation Growth Areas

Advance Precision Biosolutions

Leveraging biotechnology to enhance human health and quality of life while protecting our ecosystems

Enable Circular Economy

Helping to close material cycles and paving the way for a sustainable future for our customers

Accelerate Energy Transition

Addressing emission reduction and the capture, utilization, and storage of CO_2

€1.5 bn additional sales by 2032[1]

1 Vs. reference base: 2023

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Advance Precision Biosolutions: Leveraging biotechnology to enhance human health and quality of life while protecting our ecosystems

WE GO BEYOND TO ADVANCE PRECISION BIOSOLUTIONS

Harness the power of living systems and modern science to address the complex demands of today's world

- **Cutting-edge technologies**: Producing advanced RNA-based medicines, enhancing cell culture performance, and creating innovative biosurfactants and cosmetic actives
- **Sustainability**: Moving away from fossil-based feedstocks and utilizing renewable resources through fermentative production processes
- **Leading expertise**: Pioneering role in industrial-scale biotechnological manufacturing

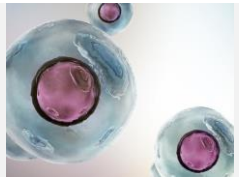
High-performance solutions that transform the pharmaceutical, biotech, and personal care industries

WE GO BEYOND TO ADVANCE PRECISION BIOSOLUTIONS

Nucleic Acid-Based Medicines & Drug Delivery Systems

We provide best-in-class solutions to engage in fast-growing innovative pharmaceutical markets

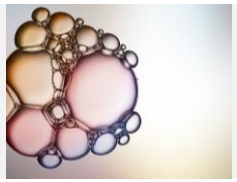
→ Enabling the next generation of **therapeutics**



Cell Culture Solutions

We empower pharmaceutical and biotech companies

→ Enabling the production of **innovative therapeutics** and **biotechnological processes**



Biosurfactants & Biofunctional Ingredients

We leverage safe, precise and low-energy fermentation processes based on renewable raw materials

→ Achieving **superior performance** & environmental benefits

Cosmetic Actives & Delivery Systems

We help our customers enhance their cosmetic formulations

→ Meeting **consumer demand** for effective, natural, and scientifically-backed cosmetic products

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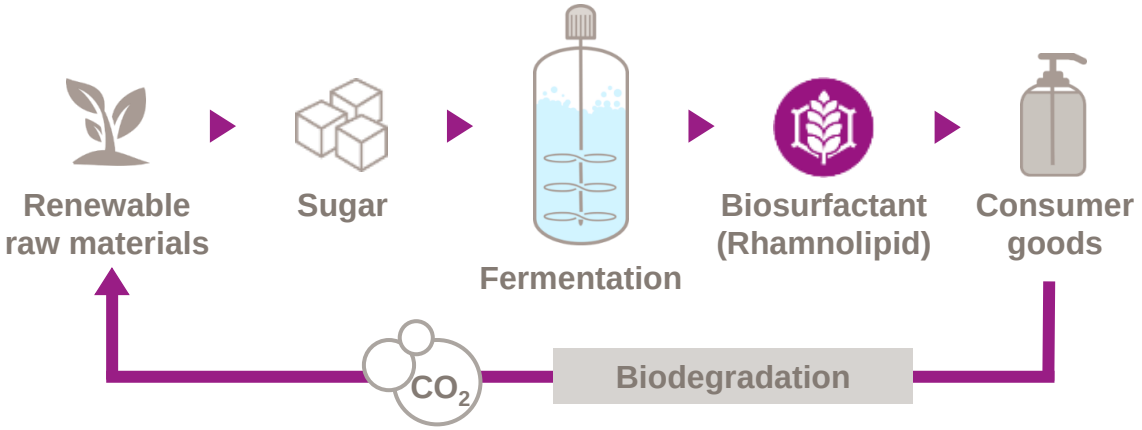
Evonik already delivers biosurfactants to the market thanks to the first industrial production facility and is considered a pioneer in this field

Advance Precision Biosolutions | Biosurfactants & Biofunctional Ingredients

Biosurfactants for existing and new applications



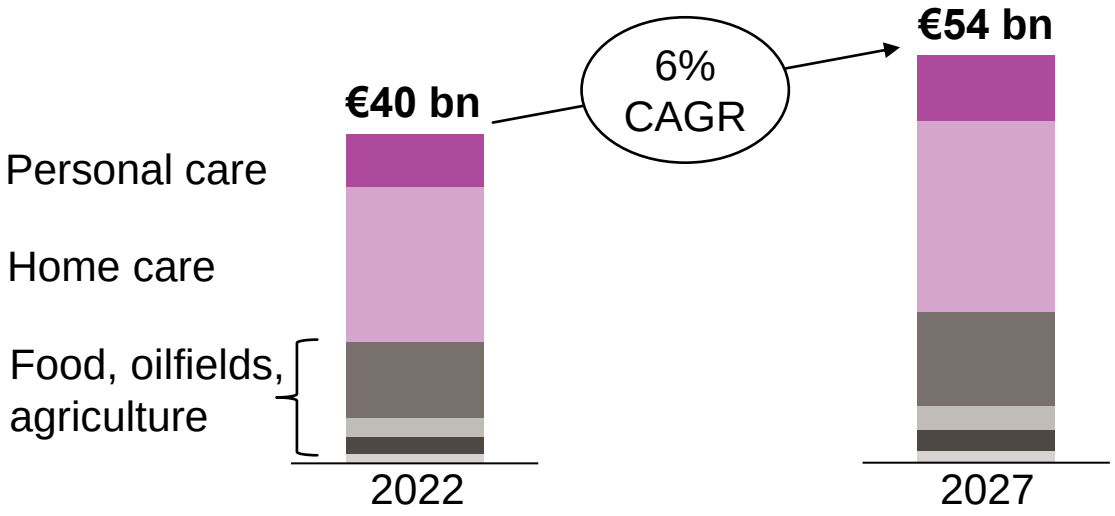
Existing applications

Cosmetics	Industrial applications	Home care

New applications

Agriculture	Animal nutrition	Additives for coatings	Pharmaceutical ingredients

Size of surfactants market



Biosurfactants market potential 2032: >€1 billion

→ Evonik aims to achieve a leading market position in this new market

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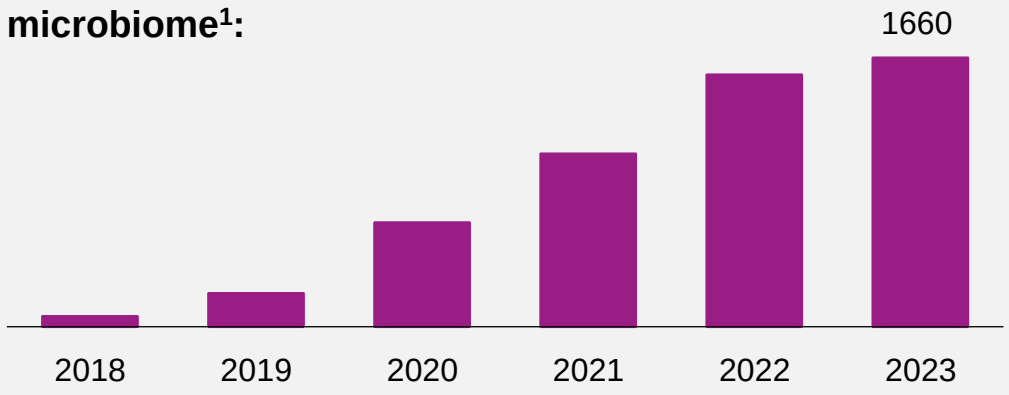
Our science-based predictive SkinMicrobes™ model enables us to develop ingredients and formulations for microbiome-friendly cosmetics

Advance Precision Biosolutions | Cosmetic Actives & Delivery Systems

Challenge

The demand for microbiome-friendly cosmetics is expected to continue to grow.

Number of global product launches that target the microbiome[1]:



But: Testing "microbiome-friendly" is challenging:
Ingredients should not have a significant impact on the qualitative and quantitative composition of the skin microbes.

Evonik SkinMicrobes model

New solution for microbiome testing

Our unique and predictive SkinMicrobes™ model enables the **evaluation of ingredients and formulations with regard to their effect on the skin microbiome.** It closes the gap between simple laboratory tests and complex clinical studies.

- Microbiome effect evaluated by measuring:

Community proliferation[2]

Community composition

- Ingredients can be scientifically assessed as:
  - **Microbiome-friendly**
  - **Microbiome-promoting**

1 Source: © 2024 Mintel Group Ltd (Note that Mintel adds together product launches in different countries) | 2: Community proliferation: multiplication of the bacterial community

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Enable Circular Economy: Helping to close material cycles and paving the way for a sustainable future of our customers

WE GO BEYOND TO ENABLE CIRCULAR ECONOMY

- **Focus**: Minimizing waste and maximizing resource utilization by increasing the use of recycled and renewable feedstocks.
- **Innovative approach**:
  - Rejuvenate catalysts and inorganic materials
  - Create value from waste by harnessing the potential of renewable and recovered raw materials
  - We focus on principles of circular design to promote sustainable practices in design and manufacturing
- **Regulatory frameworks**: Globally, governments and associations drive the transformation towards a circular economy and increase restrictions on fossil-based raw materials.

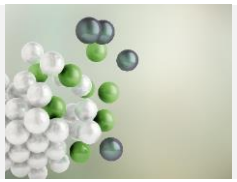
Our innovative approach goes beyond traditional plastics recycling and aims to rejuvenate catalysts and inorganic materials

WE GO BEYOND TO ENABLE CIRCULAR ECONOMY

Enable Plastic Recycling

We enable effective recycling to drive the **transformation of the plastics industry**

→ Replacing fossil raw materials with circular ones



Enable Catalyst and Inorganics Recycling

We **recover and repurpose** critical catalysts and metals, reduce waste, and conserve natural resources

→ Reducing reliance on finite resources

Renewable or Recycled Raw Materials

We transform our processes & products to **replace fossil raw materials** with renewable or recycled alternatives

→ Creating a competitive advantage for us & our customers

Design for Circularity

We support our customers to create a circular economy

→ Generating **less waste**, extending product's lifetime, facilitating **repair & reuse** of products & their components

EVONIK
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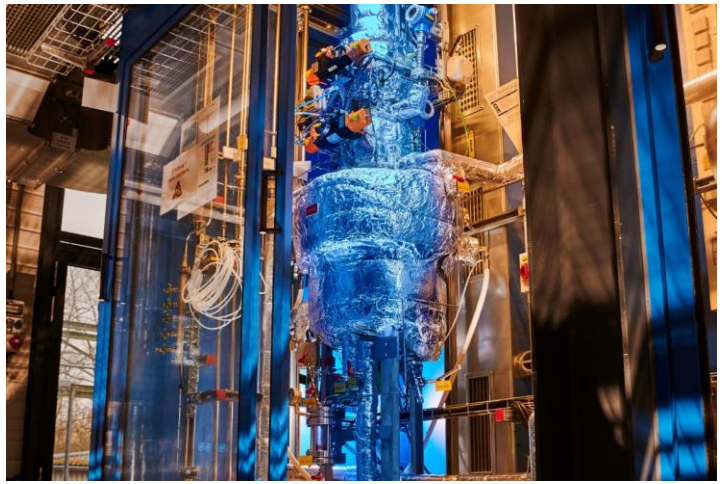
Innovative PU additives and newly developed processes enable the chemical recycling of PU from mattresses and other sources

Enable Circular Economy | Enable Plastic Recycling

Evonik‘s solutions | **Evonik enables circular PU value chain** | **Evonik pilot plant**

1. **Customized Evonik PU additives** to increase the application possibilities of recycled PU components

2. **New, IP-protected hydrolysis process for chemical PU recycling** to obtain high-quality input materials



PU depolymerization and destillative purification of **recycled PU inputs**

EVONIK Leading Beyond Chemistry

Rubber devulcanization enables higher recycling content in new car tires

Enable Circular Economy | Enable Catalyst and Inorganics Recycling

Challenge

- >90% of used tires end up in downcycling applications or energy recovery
- Currently, share of old tires in production of new tires is very small

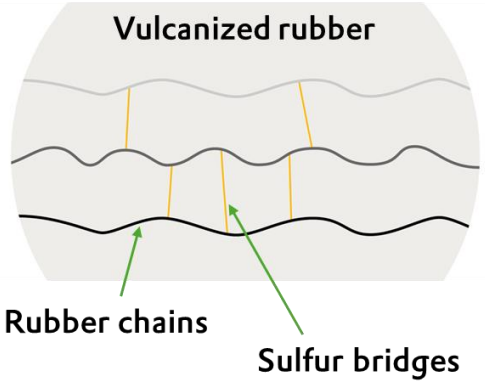
Tire recycling

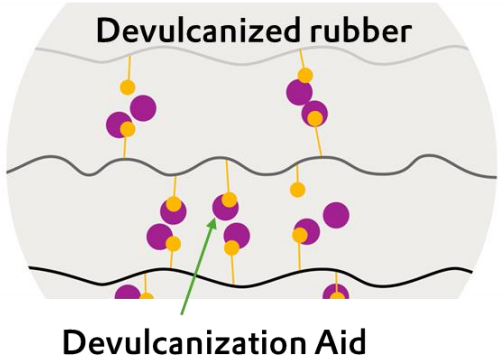
- To enable tire-to-tire recycling, the chemical sulfur bridges in the rubber molecules have to be cleaved (devulcanized)
- Current technologies for devulcanization have limitations

Evonik devulcanization aids

- Special devulcanization aids (silanes) are more selective and result in devulcanized rubber with better material properties

→Allowing higher recycling rates in tire-to-tire recycling





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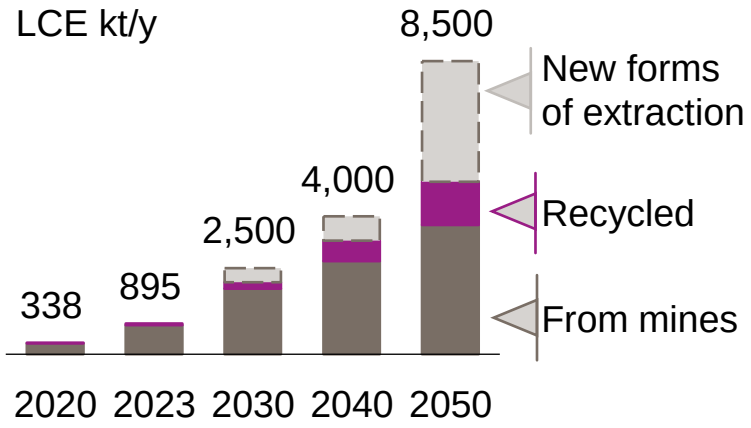
Our ceramic membranes enable direct extraction of high-purity lithium in battery recycling

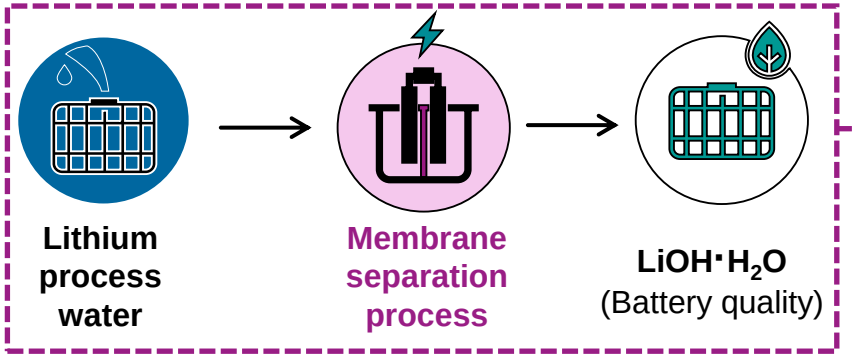
Enable Circular Economy | Enable Catalyst and Inorganics Recycling

Challenge

- **Regulatory requirements** (EU recycling to be targeted: >50% in 2028 (2023: <10%)
- **Increased demand for lithium** for electromobility

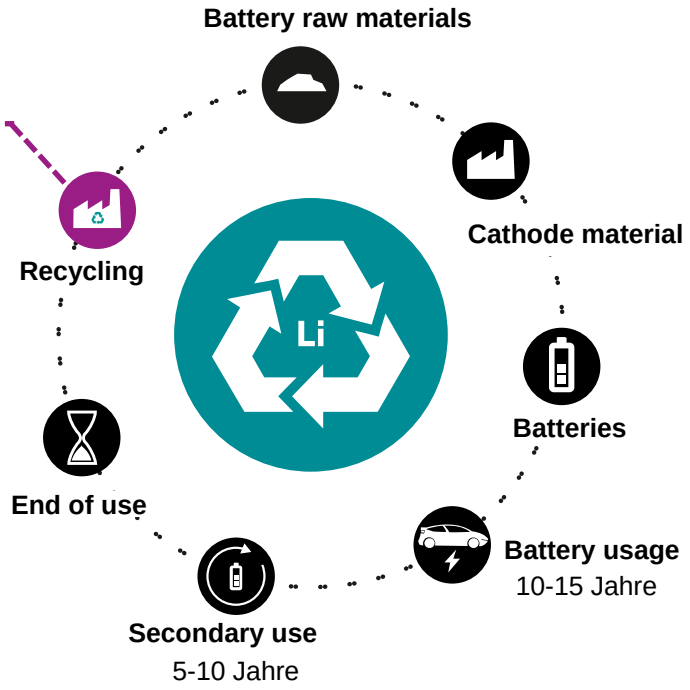


Evonik's solutions



- **Electrochemical, selective lithium extraction process** with an ion-selective ceramic membrane
- **High-purity** lithium can be directly isolated and returned to the battery cycle

Lithium cycle



Source: Wood Mackenzie 2023, Benchmark 2023 | LCE: Lithium Carbonate Equivalents

EVONIK Leading Beyond Chemistry

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Accelerate Energy Transition: Leveraging our advanced capabilities in materials science & chemistry to lead the global transition to a greener future

WE GO BEYOND TO ACCELERATE ENERGY TRANSITION

- **Focus**:
  - Reducing the impact of fossil-based energy
  - Fostering solutions for energy savings
  - Enabling alternative energy production
- **Competences**:
  Our innovative material solutions and specialty additives make a decisive contribution to the energy transition.
- **Innovative approach**:
  We offer materials and procedures to reduce carbon footprints and energy consumption, build lightweight materials for the automotive and aviation industries to minimize fuel consumption, and develop materials to increase the efficiency and service life of renewable energy technologies.

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Accelerate Energy Transition: Addressing emission reduction as well as the capture, utilization, and storage of CO_2

WE GO BEYOND TO ACCELERATE ENERGY TRANSITION

Membranes, Hydrogen Generation and Transport

We leverage our expertise in polymer & material design
→ Pioneering the future of the **hydrogen economy** and separation technologies for renewable natural gas

Future Mobility and Battery Solutions

We enhance the performance of batteries, tires, and lightweight materials
→ Powering the next generation of **electric vehicles**

Carbon Capture and Storage

We enable direct CO_2 removal from the air or from point sources like gas power plants
→ Contributing to reach a true **net-zero scenario**

Renewable Energy and Energy Efficiency

We provide additives for wind turbines, solar cells, & insulation
→ Accelerating the **expansion of renewable energy** and the **reduction of emissions from buildings**

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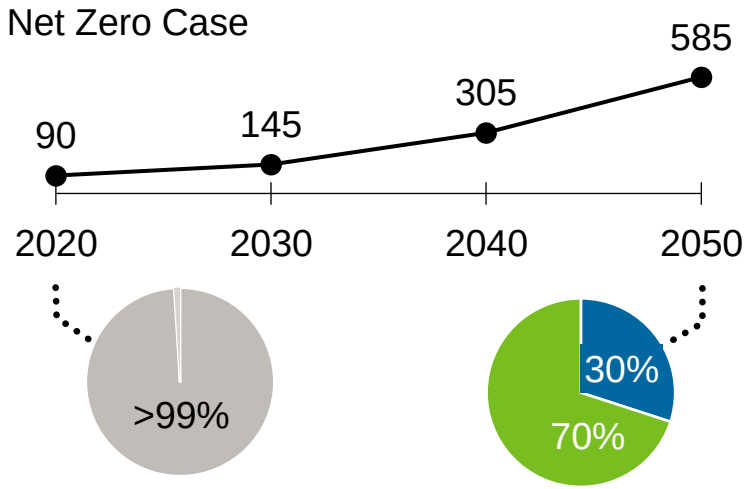
The new Anion Exchange Membranes for water electrolysis offer significant advantages in the production of green hydrogen

Accelerate Energy Transition | Membranes, Hydrogen Generation and Transport

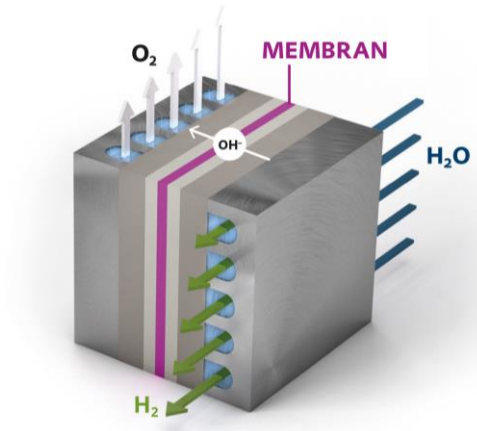
Challenge

Global hydrogen demand (megatons)



- H_2: Natural gas-based without CO_2 capture
- H_2: Natural gas based with CO_2 capture
- H_2: From electrolysis with green electricity

Anione exchange membrane (AEM)



- Good **mechanical stability**
- Long-term **chemical stability**
- High **ion conductivity**

Evonik pilot plant

- AEM **pilot plant** implementation and **product commercialization** ongoing
- Additional development of **electrocatalysts** and **binders**

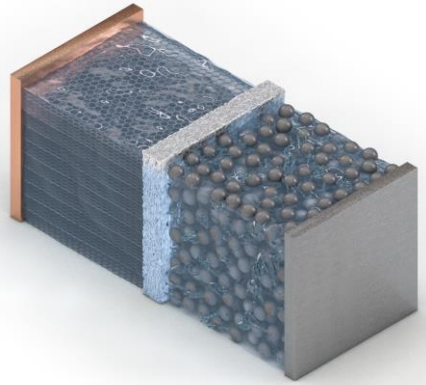
Source: Global Energy Perspective 2023: Hydrogen outlook (McKinsey & Company) | Hydrogen for Net-Zero (Hydrogen Council, McKinsey & Company)

EVONIK Leading Beyond Chemistry

Our additives enable the next generation of solid-state batteries with improved fast-charging ability and safety

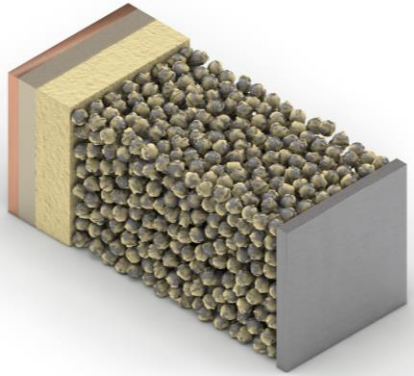
Accelerate Energy Transition | Future Mobility and Battery Solutions

Current lithium-ion battery technology



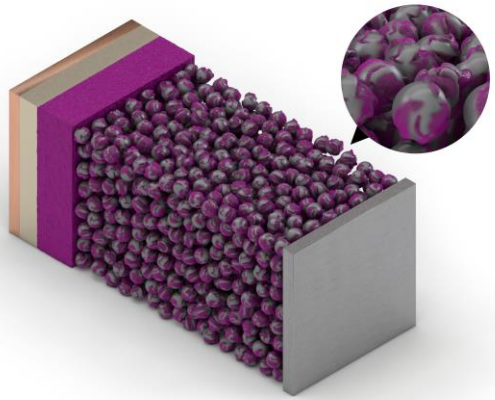
- Lithium-ion batteries are **approaching their energy density limits** due to incompatibility with high-energy density anode materials
- Liquid electrolytes present **safety risks** due to their volatility and flammability

NextGen solid-state battery



- Energy **density** and **safety** can be vastly improved by replacing liquid electrolytes with solid electrolytes
- Solid polymer electrolytes are the most advanced option with fewer upscaling challenges, but they still face **issues** with faster **charging speeds** and do **not yet guarantee absolute safety**

Enabling additives from Evonik



Specialty additives and **functionalized particles** in solid-state-batteries can enable

- **Faster charging speed**
- **Improved safety**

Evonik is well positioned with specialty chemicals and technologies for the capture and use of carbon dioxide

Accelerate Energy Transition | Carbon Capture and Storage

Evonik Solutions

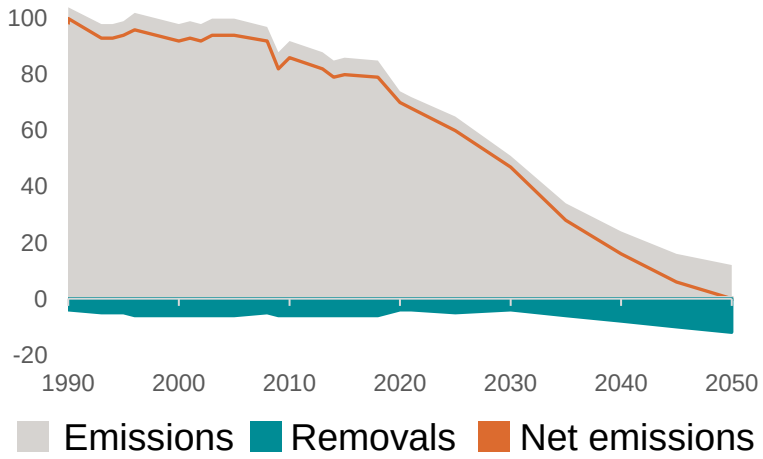
Challenge

Carbon dioxide dapture
(Accelerate Energy Transition)

Carbon dioxide utilization
(Enable Circular Economy)

Capture and usage of CO_2

- Reducing emissions only reaches a minimum level
- Climate neutrality can only be achieved with CO_2 capture



CO_2 capture at point sources

Specialty amines for the defossilization of gas power plants and certain industries, e.g., cement industry

CO_2 capture directly from the air

Combination of carrier materials, e.g., silica, with amines and polyamines

Rheticus

- **New platform technology,** pilot scale implemented with continuous production in the single-digit ton range
- Production of specialty chemicals or artificial fuels directly from carbon dioxide

Source: Factsheet – Certification of carbon removals, *Nov. 2022*, European Commission

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The Innovation Growth Areas address the most pressing challenges of our time where Evonik can make a difference

WE GO BEYOND TO ENABLE THE GREEN TRANSFORMATION

Advance Precision Biosolutions

Enable Circular Economy

Accelerate Energy Transition

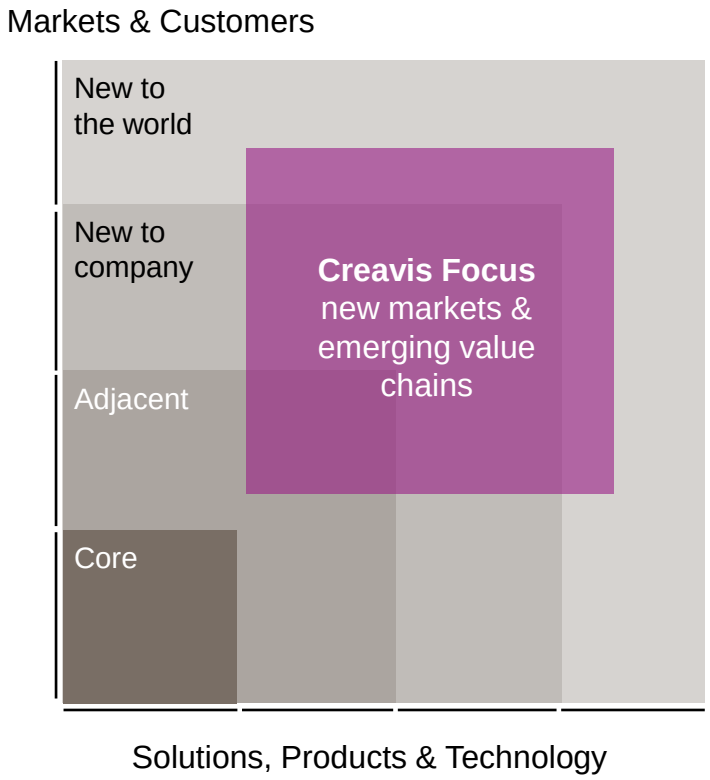
Develop new products and solutions that will stand out on the market and have a positive influence on society and people's everyday lives

- **Sustainability**: Solutions for a bio-based, energy-efficient, and circular society
- **Resilience**: Strong growth potential, above-average margins
- **Focus**: Majority of R&D resources allocated to Innovation Growth Areas
- **Acceleration**: Supported by Creavis, Evonik Venture Capital, and regional innovation ecosystems

Sales increase 2023 to 2032: **€1.5 billion**

The Creavis approach focuses on new markets, evolving value chains and innovation opportunities in the three Innovation Growth Areas

Creavis' focus



New/Transformational

New solutions for new markets and evolving value chains (disruptive, "new to the world")

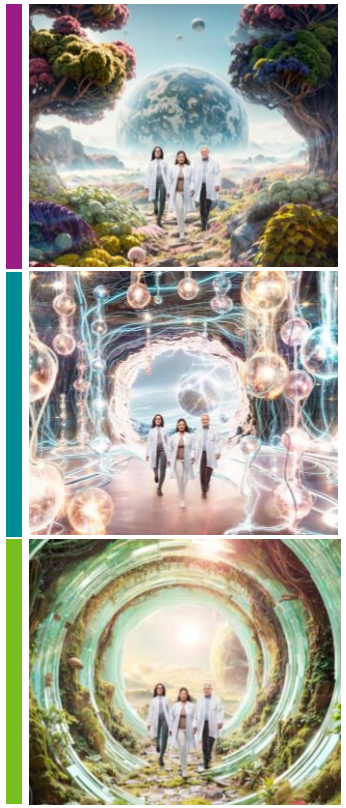
Adjacent

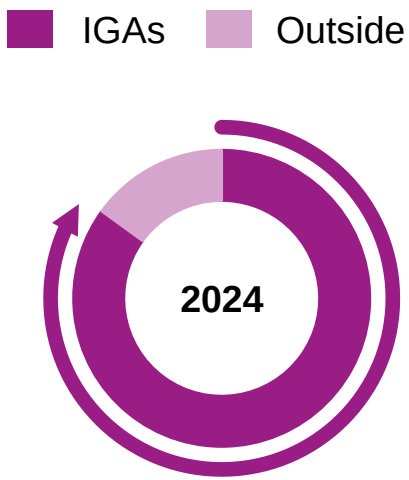
Expanding into "new to the company" businesses

Core

Optimizing existing offerings (incremental)

Creavis' R&D program budget





Majority of R&D program budget used to support new IGAs

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The investments by Evonik Venture Capital's Sustainability Tech Fund are aligned with the Innovation Growth Areas

>1,000 startups
annual deal flow

55 investments
in startups/funds since 2012

Approx. 25 cooperations
between startups & Evonik p.a.

Sustainability Tech Fund
Funding **€150m**, launched in May 2022

Evonik Venture Capital – Investment focus driven by new IGAs

Innovation Growth Areas		Examples of VC investments
Advance Precision Biosolutions		ABOLiS BIO-SYNTHESIS ARCHITECTS — Bio-production processes for chemical molecules by fermentation of biomass
Accelerate Energy Transition		CARBON SUPER 海洲新材 合肥市海洲新材料科技有限公司 — Graphene materials for high-performance lithium-ion batteries
Enable Circular Economy		INTERFACE POLYMERS — Additives enabling the processing and recycling of mixed plastics

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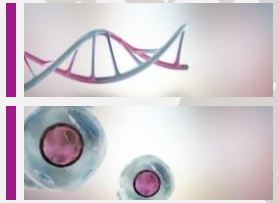
Regional innovation hubs enable access to local ecosystems for R&D and business development and increase proximity to customers and markets

Advance Precision Biosolutions
Enable Circular Economy
Accelerate Energy Transition

Boston



Allentown

Hanau/ Darmstadt

Essen/Marl

Greater Mumbai

Shanghai

Singapore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