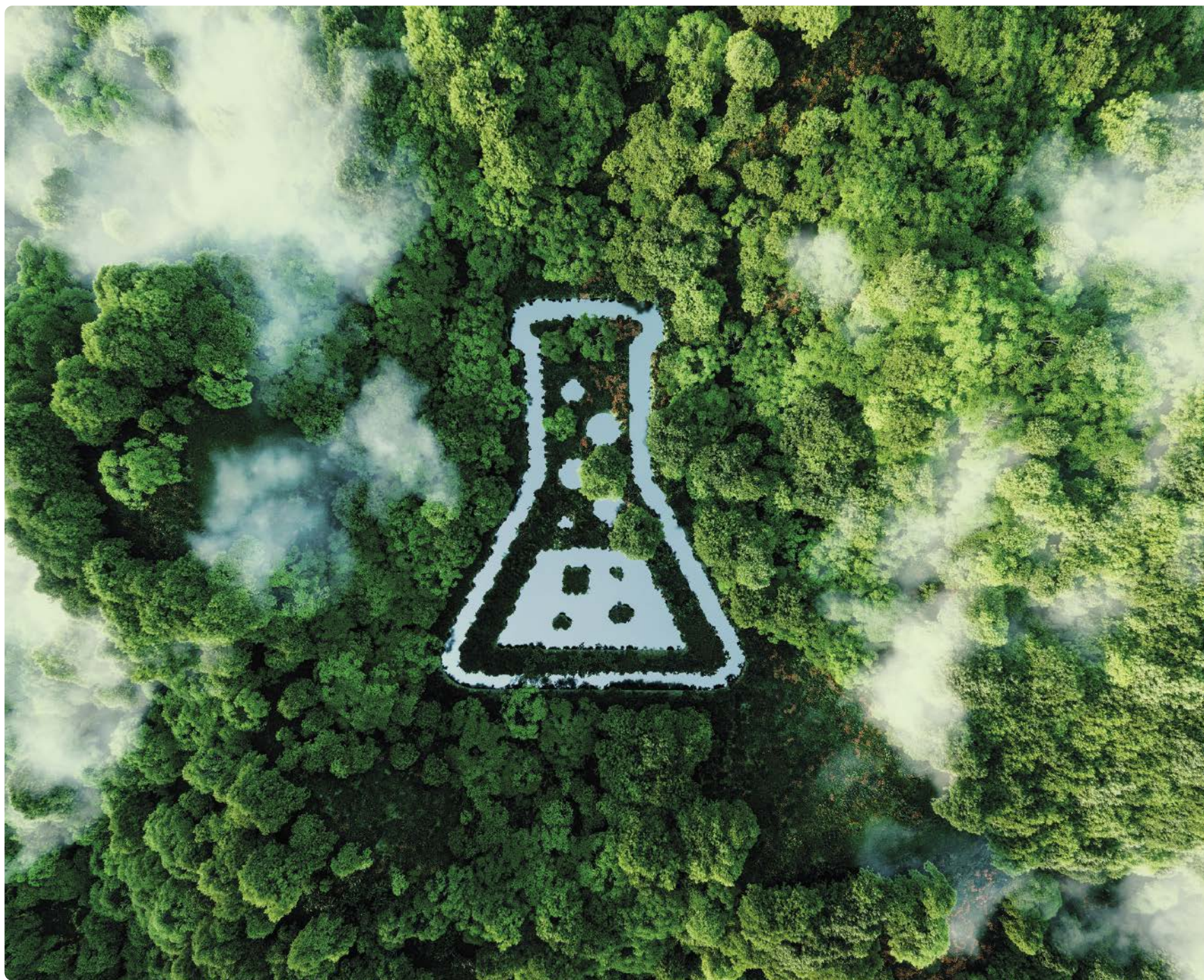


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## Markets & Economy

Capitalization on Sustainability-Driven Growth; Green Chemistry Innovations; Prospects for Chemical Distributors; Carbon Reduction in the Value Chain

## Fine & Specialty Chemicals

Push for Sustainability in the Surfactant Industry; Catalysts: Pioneers and Drivers of Sustainability; Packaging Industry Drives Circular Economy

## Innovation

Chemical R&D with AI and Molecular Modeling; Platform Enables Virtual Formulation Development; Lab Automation with Visual Lab Intelligence Platform

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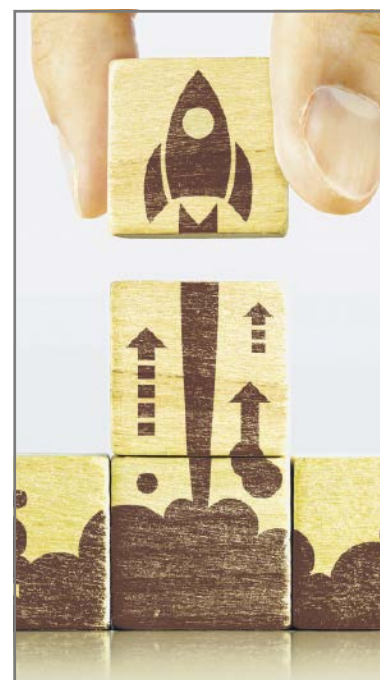
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## MARKETS & ECONOMY

### Preparing for Sustainability-Driven Growth 4

Chemical Companies Must Take Steps Now to Capitalize on a \$200 Billion Opportunity  
*Bernd Elser, Accenture*

### Carbon Footprinting as a Competitive Advantage 6

Seizing the Opportunity for Carbon Reduction Along the Value Chain  
*Monica Gassmann and Michael Sambeth, SAP*

### Unleashing CDMO Growth through Effective Pricing 8

Staying Ahead of the Market through Value-Driven Pricing  
*Kaan-Fabian Kekec, Omar Ahmad and Niklas Fossum, Simon-Kucher*

## CHEMICAL DISTRIBUTION

### Positioned for Growth 10

The New Age of Winning for Chemical Distributors  
*Adam Rothman, Tobias Mahnke, Madjar Navah and Christian Hoffmann, BCG*

### The Chemical Distribution Industry 14

Shaping a Future-Proof and Sustainable Transformation  
*Interview with Lars Wallstein, FECC*

### Creating Opportunities Through Innovation 16

Azelis Continues Its Growth Course under New Leadership  
*Interview with Anna Bertona and Hans Joachim Müller, Azelis*

## FINE & SPECIALTY CHEMICALS

**Innovations in Surfactant Sustainability**  
Surfactant Industry's Quest for Environmental Responsibility  
*Neil A. Burns*

**From Linear to Circular**  
Packaging Industry Drives Circular Economy through Science, Innovation and Consumer Insights  
*Monika Kleczek, Nova Chemicals*

**The Green Power of Catalysis**  
Catalysts are Pioneers of Sustainability and Crucial for the Transformation of the Industry  
*Interview with Sanjeev Taneja, Evonik*

**Fostering Green Start-up Success**  
Unleashing Sustainable Innovation, Navigating Business, and Pioneering a Greener Future  
*Interview with John C. Warner and Martin Rahmel, GreenChem*

## 18 INNOVATION

**Accelerating Chemicals Innovation** 28  
Molecular Modeling and Artificial Intelligence for a More Efficient R&D  
*Interview with Monica de Mier and Stephan Mohr, Nextmol*

**Solving the Toughest R&D Challenges** 30  
Accelerate Chemical and Material Development  
*Interview with Filip Auksztol and Kacper Kielak, Quantum Boost*

**Making Lab Automation Actually Work** 32  
Augmenting Scientists with Transformative Technology  
*Interview with Silas Adekunle and Chris Beck, Reach Industries*

**EVENTS/INDEX/IMPRINT** 34



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# Preparing for Sustainability-Driven Growth

## Chemical Companies Must Take Steps Now to Capitalize on a \$200 Billion Opportunity

*Rising demand for sustainability-related products will create a huge growth opportunity for chemical companies. However, the industry may struggle to keep up with this demand, creating an obstacle to growth. To capitalize on this opportunity, chemical companies can take several key steps now to ensure that they have access to the resources, technologies and knowledge they will need to meet this rising challenge.*

The increasing focus on sustainability is prompting change in the chemical industry, and chemical companies are responding. According to our research, over the last five years there has been a fivefold increase in the number of sustainability-related project and product announcements made by chemical companies and their customers, as companies work to adapt to and thrive in this new environment.

At the same time, however, increased regulation around sustainability sets a high bar and drives up costs. This has prompted many in the industry to ask a basic question: Can chemical companies really make money and find significant value as they shift to sustainable products and processes?

The answer is yes, they can. Over the next five years, sustainability-related offerings will account for nearly one-third of industry growth, according to Accenture research, creating a potential \$200 billion opportunity for chemical companies. Demand will grow for both sustainability-enabling products, such as materials for wind turbines and solar panels, and products involving sustainable production, including bio-based products or those made from recycled materials.

However, this growth prompts another key question: Will the chemical industry be able to keep up with burgeoning demand? It depends. To take full advantage of this opportunity, chemical companies will need to take steps to prepare themselves for a new era.

### The Growing Demand for Sustainability-Related Offerings

The industry's numerous sustainability-related announcements over the

last few years have included initiatives focused on new plants and offerings, new partnerships and collaborative agreements, and operational changes in existing plants to increase efficiency and reduce greenhouse gas (GHG) emissions. While government mandates are certainly a driver for

*“Demand for sustainability-related chemical offerings is growing rapidly.”*

these investments, there are also sound business cases behind them.

Demand for sustainability-related chemical offerings is growing rapidly. Our research indicates that the market for such offerings, which stood at approximately \$300 billion in 2022, should reach about \$500 billion by 2027. This translates to a compound annual growth rate of 11% through 2027, compared to a 2% rate for “traditional” industry products. Thus, sustainability-related offerings will be an especially attractive opportunity (see fig. 1).

About two thirds of this growth will come from existing products and markets related to sustainability – insulating materials for buildings, plastics for electric vehicles, polyurethane foams used in wind turbine blades, etc. To a great extent, these offerings will take advantage of existing infrastructure, and thus involve relatively low levels of investment and risk.

However, about one third of the growth will come from new markets and offerings, including new electric battery materials, carbon-capture materials and bio-based inks and coatings. Altogether, this broad mix of traditional and new offerings means that sustainability is creating growth opportunities for companies across the chemical industry.

### Keeping Up With Demand

An analysis of company announcements shows that over the last five years, the chemical industry has invested an estimated \$60 billion to \$90 billion in new plants that produce sustainability-related products (see fig. 2).

That estimate does not include start-ups or investments in GHG reductions at existing plants.

These new plant investments are focused on products that are core to the industry, rather than new or niche products. They include investments in naphtha alternatives, such as chemically recycled, bio-based or mass-balanced products, mechanically and chemically recycled standard polymers and bio-based intermediates and polymers.

Despite these investments, the industry will still find it difficult to meet



Bernd Elser, Accenture

growing demand. Already, customers are looking for more sustainability-related offerings than the industry can supply. Some new chemical plants that are not yet up and running are reported to be sold out or nearly sold out – an unprecedented development in the industry.

High demand is likely to continue. Chemical companies' customers from across industries have made commitments and set targets for recycled content and increased sustainability – but they are falling short in meeting those commitments. In part, this lack of progress is due to the fact that they often find it difficult to get the sustainability-related chemical industry offerings they need.

### Planning For Success

Taking advantage of the growing demand for sustainability-related offerings will require more than scaled-up operations. The drive for sustainability will continue to reshape entire value chains, and chemical companies can take steps to occupy “sweet spots” in future value chains and solidify their positions in those chains. These steps include:

- Ensure access to sustainable feedstocks. There is a shortage of the



Fig. 1: Projected demand for sustainability-related chemical offerings.



raw materials that will be needed for sustainability-related offerings, and chemical companies may have to cast a wide net to find these key resources.

- Forge value chain partnerships. The ability to meet and exceed customer requirements for sustainability-related offerings – reliably, efficiently and at scale – will depend on close collaboration with partners across the value chain, from raw-materials suppliers to end customers.
- Secure IP and proprietary knowledge. Chemicals with sustainability-related properties will require new production processes, assets and equipment. Thus, chemical companies that focus on securing IP and proprietary knowledge will have an opportunity to gain competitive advantage.
- Develop compelling and credible sustainability narratives. Sustainability is an increasingly important driver of share price and enterprise value. That means that chemical companies should shape their sustainability-related narratives for

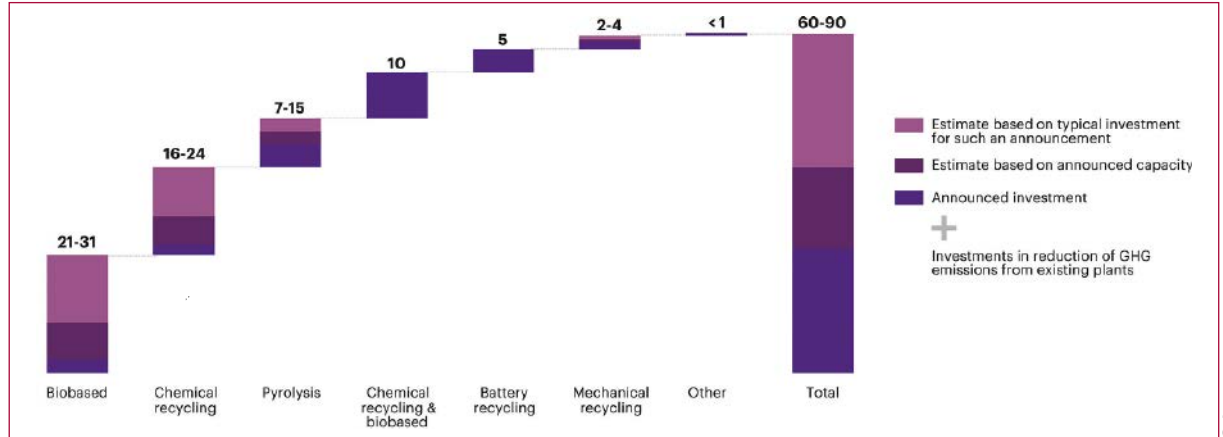


Fig. 2: Sustainability-related new chemical plant investments. [Notes to this figure are available in the online version.]

investors and other stakeholders to build ongoing support for sustainability-related initiatives.

The race to occupy the chemical industry value chain's key hot spots can be expected to accelerate – and companies that don't act soon are likely to find themselves being left behind. Fortunately, the shift to sustainabil-

ity plays to the chemical industry's strengths – its ability to use efficient large-scale core operations to build quality products, coupled with its long history of successful, ongoing innovation. Chemical companies that draw on those strengths to reinvent themselves around sustainability will be in position to achieve significant profitable growth for decades to come.

**Bernd Elser, a Senior Managing Director and Global Chemicals Lead, Accenture, Frankfurt am Main, Germany**

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WHEN IT MATTERS



# Carbon Footprinting as a Competitive Advantage

## Seizing the Opportunity for Carbon Reduction Along the Value Chain

*If you ever wondered why the chemical industry is often referred to as a hidden champion in the global effort to transform to a sustainable economy, simply ask yourself: What do industry sectors like discrete manufacturing, life sciences, construction, or consumer products have in common? They are all dependant on the chemicals industry, to produce their products. The impact of this is immense, with some reports estimating that over 95% of all manufactured goods rely on some form of industrial chemical products.*

Now combine this initial situation with the rise of legislation on carbon emissions worldwide, like the European Commission's European Climate Law that sets a legally binding target of net zero greenhouse gas emissions by 2050. Moreover, the EU Corporate Sustainability Reporting Directive (CSRD) will require companies with over 250 employees to report GHG emissions including value chain emissions (Scope 3). This increase in regulations will go hand in hand with increased audit and assurance requirements that typically do not lend themselves well

to homegrown tools or simplified calculators. Having this in mind, it is critical that chemical companies are not only able to measure and improve the carbon footprints of their products, but also to report and share them along the downstream value chain.

### Current Challenges of Carbon Accounting

To reach this target state, two prerequisites need to be fulfilled: data quality and data access. Regarding qual-

ity data, companies currently largely rely on averages and secondary data instead of using primary data from their operations and suppliers when assessing carbon footprints. This hinders them to truly understand where their own emission hotspots are and how they can improve them. There is also a challenge referring to how the data itself is being accounted. Currently, there are standards and protocols (with GHG Protocol Corporate Accounting and Reporting Standard most widely used) as well as sector guidelines (e.g., the various Environmental Product Declaration types) that companies can voluntarily adopt. Initiatives like the Partnership for Carbon Transparency (PACT) at World Business Council for Sustainable Development (WBCSD) criticize that the inconsistent use of such methodologies results in insufficient accounting, reporting and exchange of emissions data. SAP joined WBCSD in 2021 as an innovation partner for PACT to join forces in defining a uniform standard that can be used regardless of industry.



Monica Gassmann, SAP



Michael Sambeth, SAP

When it comes to data access, it is important to stress that this does not only refer to having access to a companies' own operations data (Scope 1 and 2 emissions). More and more companies are extending the scope of their climate commitments to their value chains (Scope 3). For most, this is where 80% or more of emissions can be found. For chemical companies — that are at the start of the value chain — this means they also need to focus on being able to share their carbon

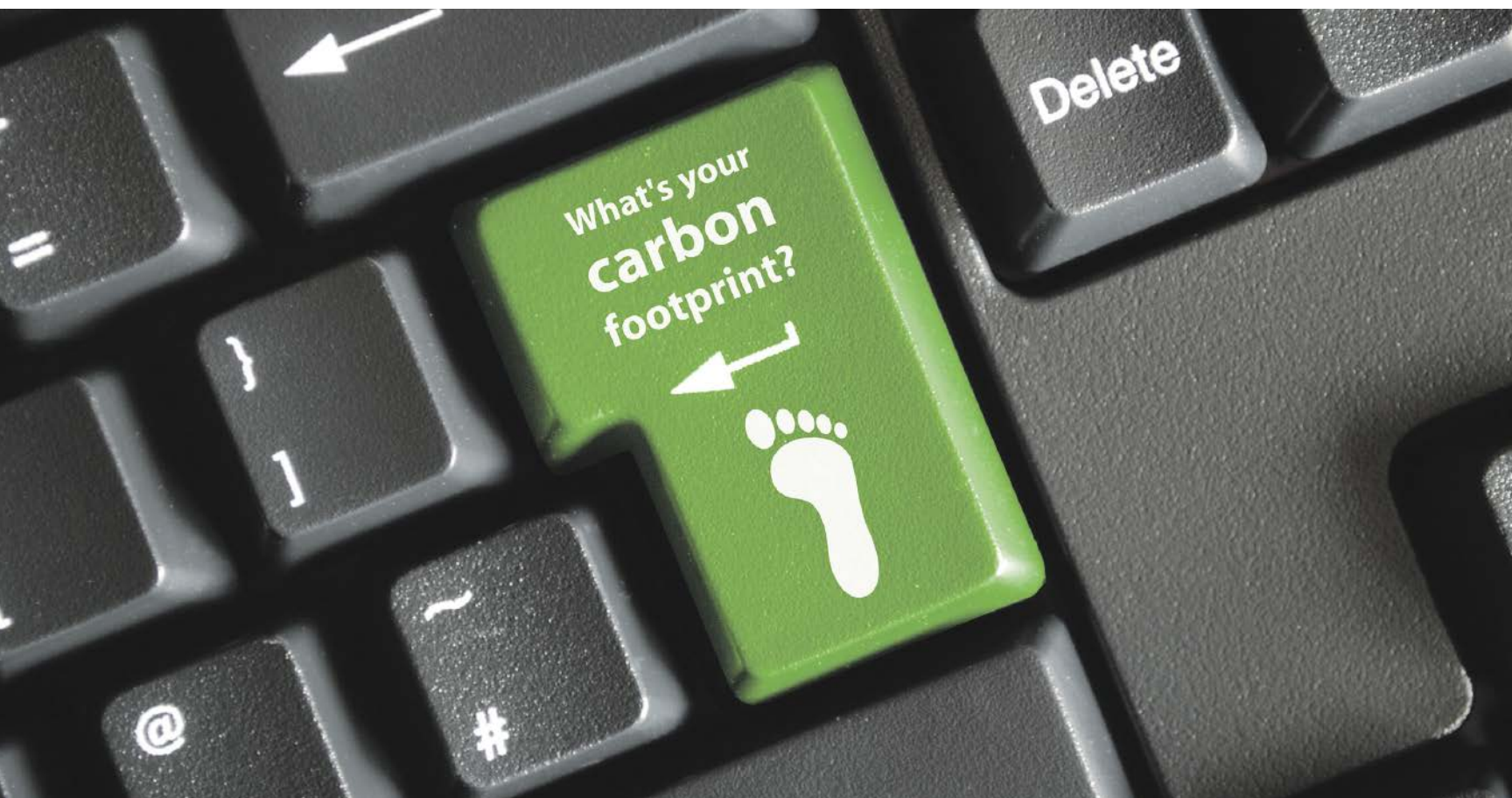




Fig. 1: Industries along the value chain.

data with their downstream ecosystem. In order to calculate their product footprint, they also need reliable data from their suppliers. This is where the complexity lies. Many suppliers are not sophisticated enough and there is a lot of manual work involved. Data needs to not only be reliable but also comparable to other suppliers as well as auditable.

Industry networks like the Catena-X Automotive Network are already early

indicators of what the future holds in terms of both data quality and data sharing along the value chain. Catena X started with the goal to provide an open and collaborative data ecosystem along the entire automotive value chain, one of its use cases is dedicated to the standardised measurement of real carbon data that can be shared with all network participants. With the automotive industry being an important customer, it is no wonder to see

global players like BASF and Henkel on the list of members.

But chemical customers are not only participating in the networks of other industries — they are also working on creating their own methodologies and carbon data networks through industry consortia like Together for Sustainability (TfS). The TfS calculation guideline, published in September 2022, is being considered by many chemical customers as a way to calculate and compare Scope 3 data from suppliers.

### It Takes a Holistic and Integrated Approach

SAP developed a platform application that enables organizations to share product carbon information with their customers and vendors, empowering them to measure and reduce their carbon footprint while promoting transparency throughout the supply chain. This is all done while keeping in mind that suppliers need a very low barrier of entry to participate as well as a platform that is able to scale across one or more industries. Being involved in networks like Catena-X from the start gives SAP a deep expertise in carbon data exchange.

The product footprint data can either be calculated in SAP Sustainability Footprint Management or from another calculation tool. This data can then flow through to customers downstream using technology such as SAP's newly launched Sustainability Data Exchange (SDX). With SDX companies can exchange product carbon footprint

(PCF) data while also complying with global standards. Having a standardized format to record and share data helps companies move from estimated sustainability values to actual and accurate product-level data. Hereby accelerating their journey toward net zero by providing them standardized audit-ready sustainable values.

### Reinventing the “R” in ERP

The current situation, where carbon accounting is often done using spreadsheets and global averages instead of actuals for carbon footprints, needs to evolve towards precise and holistic transactional accounting. WBCSD and SAP have joined forces calling for a transformation of the carbon accounting system. A green ledger as part of a company's ERP will allow customers to account emissions in the same fashion as financials and goods movements. The information provided by a green ledger will enable deep insights and effective decision-making. This approach is complemented through integrations with SAP solutions which calculate footprints. Hereby embedding footprint into backend business processes as well as business steering while managing carbon flows management and exchanges along the value chain. Standardized data formats including common data semantics facilitate the implementation and grant for scalable adoption. Emissions on both corporate and product level are consistently managed alongside financial data to achieve profitable trade-offs between cost efficiency and resource use.

**Recurring process for supplier PCF data request**

- 1 Calculate emissions with available data to identify largest emission sources on product and supplier level
- 2 Collect PCF information from suppliers via SAP Sustainability Data Exchange
- 3 Improve calculation based on actuals in SAP Sustainability Footprint Management
- 4 Report PCF to customers via SAP Sustainability Data Exchange

## Transactional Carbon Accounting | Electric Vehicle Case Study [cont.]

Collect and Manage your Supply Chain scope 3 data

**SAP Sustainability Data Exchange**

Fig. 2: Product carbon footprint (PCF) information exchange via Catena-X network.

### The Sustainable Business Imperative

To be future-proof, chemical companies will need to continue to transform their business with sustainability at the core of their strategy. With both regulators and customers increasingly expecting them to be able to measure and report their carbon footprints, operating sustainably will be one of the decisive competitive advantages going forward.

*Monica Gassmann, Global Head of Sustainability in Industries, and Michael Sambeth, Enterprise Architect for Process Industries, SAP, Walldorf, Germany*

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# Unleashing CDMO Growth through Effective Pricing

## Staying Ahead of the Market through Value-Driven Pricing

*In the rapidly evolving industry of contract development and manufacturing organizations (CDMOs), a well-defined pricing strategy is essential to drive growth and profitability. Here's how to achieve it.*

The CDMO market is primed for growth. The emergence of novel modalities, groundbreaking innovations in established therapeutic areas, evolving regulatory landscapes, and increasing demand for personalized medicine offer CDMOs ample opportunities to drive growth.

However, along with opportunities, CDMOs face several commercial challenges, ranging from technological advancements and stringent regulatory requirements to post-merger integration of acquired sites. Another complex issue: pricing projects effectively.

When pricing projects, CDMOs must take various factors into account, including the type of service and customer, project complexity, scope of work, and timeline.

The problem? Many CDMOs rely on a non-transparent and unstructured cost-plus approach, characterized by spending significant time on accurate costing before simply adding a theoretical, one-size-fits-all margin target on top to generate the ultimate price. This black box approach neglects customers' value perceptions and individual requirements, hindering companies to unlock their full growth potential.

The solution? To stay ahead and participate in the expansion of the market, CDMOs need to transition to a structured value-based pricing approach that considers customer value, complexity, and specific needs.

Learn more about how to offer prices that are competitive, profitable, and in line with client demand, unlocking significant growth while upholding



Kaan-Fabian Kecec, Simon-Kucher



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Niklas Fossum, Simon-Kucher

customer satisfaction and competitive advantage:

### Why an Optimized Pricing Approach Is Essential

Improving their pricing approach is vital for CDMOs to ensure long-term

success in the pharmaceutical and biotech industries. Better pricing drives profitability by capturing full value, increases sales success with customer-perceived value alignment, and improves operational efficiency.

Embracing value-based pricing empowers companies with a competitive advantage and sustainable expansion.



Fig. 1: The pricing strategy should be well documented to guide pricing as well as other commercial decisions.

Fig. 2: A standardized costing methodology with sufficient granularity facilitates consistency across multiple sites.





Fig. 3: Considering different approaches and aspects for the value pricing methodology will enable smart and structured value extraction.

sion in a dynamic market. Here’s how to achieve it in four steps.

### Four Steps toward Value-Based Pricing

**1. Define your pricing strategy.** A clearly formalized pricing strategy is the foundation of effective pricing. Ensuring that all commercial stakeholders share the same vision and strategic ambition is crucial. This strategy should be detailed, encompassing the vision, positioning, and execution, with each statement articulated as an ambition.

The vision may not be fully reflected in operations but serves as a guiding principle. Defining and documenting all

*“The CDMO market is primed for growth.”*

aspects of the strategy will enhance consistency and direct commercial efforts.

**2. Harmonize your offer and cost structure.** Achieving companywide consistency in offer and cost structure is vital. Similar to the imperative for CDMOs to get a clear offer hierarchy in place, it is equally crucial for them to adopt a standardized costing methodology. This entails aggregating costs into categories across sites and distributing them across work packages and, if possible, even more granular service elements.

Identifying different cost centers, breaking down hours required for projects, and having a shared overview of standard and one-off costs, resources, and customized offerings increases

process efficiency and enables easy comparison and cost forecasting for current and future projects.

**3. Infuse value-based pricing principles.** Shifting from a cost-plus pricing mindset to a value-based approach is essential for CDMOs seeking to maximize profitability. Defining relevant price drivers and using data to determine value-based markups ensures that prices reflect the value provided to clients.

A structured methodology involves categorizing price drivers into molecule factors (e.g., complexity of manufacturing process), client factors (e.g., client segment, urgency of request), and delivery factors (e.g., current capacity utilization). Here, the relevance of price drivers can differ by modality or client size: Assuming a novel modality, for example, a large pharma company places higher value on large installed capacity, while a small biotech focuses more on the ability to address timeline urgency quickly.

By validating price points with historical benchmarks and using objective data (KPIs) to anchor prices to value, CDMOs are able to increase profitability and consistency in pricing.

**4. Utilize value pricing tool support.** CDMOs who really want their developed pricing strategy and methodol-

*“CDMOs need to transition to a structured value-based pricing approach.”*

ogy to take off need to streamline their pricing processes with a user-friendly and well-integrated pricing tool. This

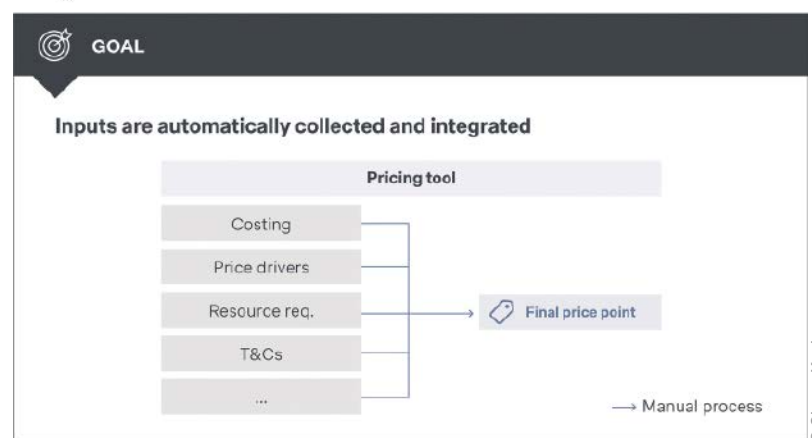
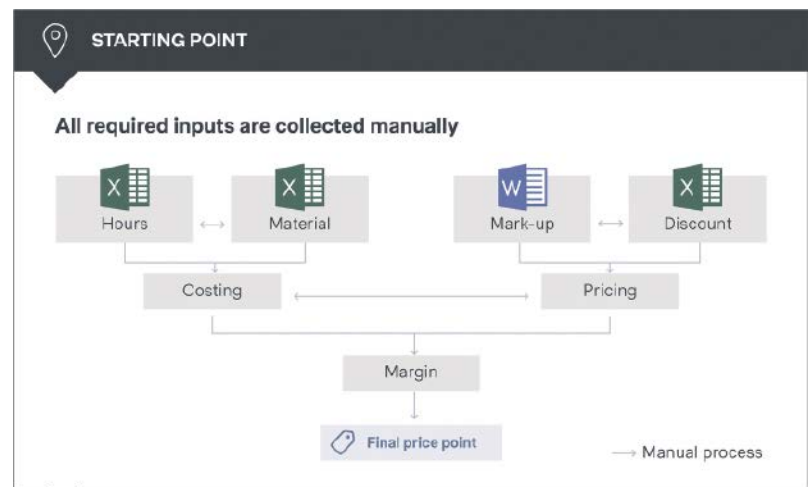


Fig. 4: An easy-to-use and integrated value pricing tool supports and facilitates the entire pricing process.

tool serves not only for setting new project prices but also as a centralized repository to store price opportunities. The integration and documentation of past price decisions can contribute to future price analysis and benchmarking.

*“A well-structured, value-based pricing approach is key for CDMOs seeking sustainable growth in today’s dynamic landscape.”*

Whether opting for a standalone Excel tool, fully automated software, or a hybrid solution – a well-designed pricing tool enhances pricing quality through benchmark comparisons, fosters alignment across stakeholders, and reduces manual work in calculating final prices.

### Navigating the Complexities of Better Pricing Is Key

A well-structured, value-based pricing approach is key for CDMOs seeking

sustainable growth in today’s dynamic landscape. By embracing value-based pricing, adopting customer segmentation, exploring innovative pricing models, and implementing dynamic pricing strategies, CDMOs can keep ahead in the expanding market and unlock the potential for significant growth.

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# Positioned for Growth

## The New Age of Winning for Chemical Distributors

*The 2023 chemical distribution survey shows recent trends and evolving principals' expectations. It reveals a notable rise in third-party distributor usage across regions and chemical sectors. Principals require diversity in distributors and maintain the upward trend from previous years. They now demand higher distributor standards while being less tolerant of performance issues. These findings emphasize the need for adaptable chemical distributors. By enhancing offerings, ensuring performance, managing costs, and embracing sustainability, distributors prove as essential partners for long-term success amidst evolving challenges.*

More than 300 global chemical principals and 20+ senior executives from leading distributors were surveyed to analyze market dynamics and chemical distributor performance and outlook. They represent all major regions as well as commodity and specialty companies. These results, building on BCG's earlier reports on chemical distribution in 2018 and 2021, reveal six key findings about the industry's current state and future.

### 1. APAC Is Key Driver for Positive Market Outlook

The chemical distribution market is expected to grow to €500 billion with a

compound annual growth rate (CAGR) of 2.4% from 2022 to 2027. Rebounding from the Covid-19 pandemic, the chemical distribution market surged by 31.0% in 2022. 80% of this was driven by higher prices instead of volume resulting from tight product availability and supply chain disruptions, implying that future growth rates will normalize as price volatility stabilizes. However, we expect a slight decline of -0.5% in 2023, caused by overall lower demand for chemicals due to destocking among end customers especially in Europe and North America. After 2023, the global chemical distribution market is anticipated to recover with 1.4% growth in 2024 and a CAGR of 3.5% from 2025 to 2027, outpacing global

GDP. We expect overall stronger growth for specialty vs. commodity chemical distribution.

APAC, representing around half the market, is poised for significant expansion of 3.1% CAGR from 2022 to 2027 and anticipated to catch up to the Western market in the next decade as rapid growth and industrialization in this region have led to improvements in local chemical distributors' professionalization, supply reliability, service portfolios, technical know-how, and regulatory support.

Europe and North America have lower expected CAGRs of 0.9% and 1.5%, respectively, due to market maturity and saturation. Nevertheless, outsourcing trends are expected to persist, implying that the chemical distribution market outgrows the underlying chemical market.

### 2. Significant Increase in the Use of third Party Distributors

76% of all principals expect a substantial increase in their reliance on third-party distributors over the next three years, reflecting their ambition to establish strategic partnerships that leverage distributor expertise and networks for growth. Hence, the outsourcing trend, though slightly lower than



Adam Rothman, BCG



Tobias Mahnke, BCG



Madjar Navah, BCG



Christian Hoffmann, BCG

2021 (84%), continues to gain momentum with regional differentiation.

In China, 91% of respondents anticipate increased outsourcing, as do 84% in APAC. Asian principals seem to be using third-party distributors to expand globally, countering potential sales declines in their home markets. At the same time, we see shares of 75% and 68% of respondents in North



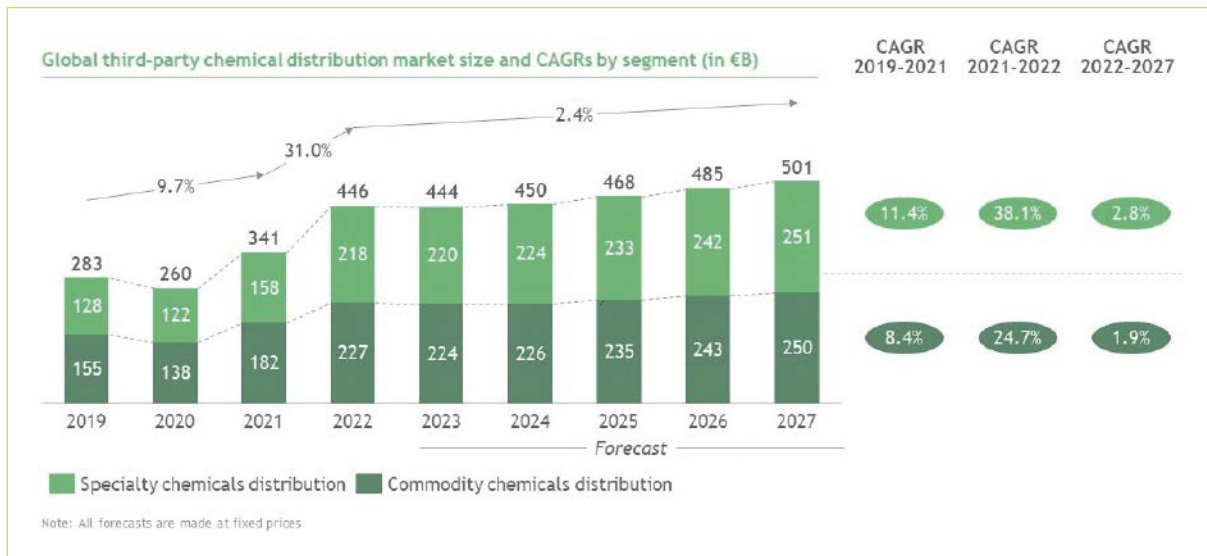


Fig. 1: Outlook on chemical distribution market.

America and Europe, respectively, that compare lower vs. 2021 signaling a potential refocus on direct sales but remain nevertheless high.

Despite recent disruptive events blocking relevant trade flows and inflationary pressures, approximately half of respondents maintained consistent outsourcing levels, demonstrating their unwavering confidence in the outsourcing model's resilience.

### 3. Rising Outsourcing Share Heightens Principal Expectations

Over the past decade, the primary drivers for principals using third-party chemical distributors have remained the same: expanding geographic reach, focusing on core business, and reaching small customers.

*"Principals perceive reliability and market access as even more important for their chemical distributors today than it was 2 years ago."*

Expanding geographic reach has increased in importance, as principals recognize the need for local expertise to navigate new markets successfully. Partnering with local third-party distributors allows them to establish a strong market presence, expand into untapped markets, and enhance customer satisfaction while focusing on their core business.

Interestingly, cost-to-serve reductions have become less prevalent in recent years, dropping from being perceived as a key driver by 63% of

respondents in 2018 to 46% in 2023. The top drivers in 2023 overall signify a shift towards a more strategic approach, emphasizing the value and synergies distributors offer over cost savings.

### 4. Principals Push for a Diversified Distributor Portfolio

A rising tendency among chemical industry principals is the diversification of their distributor base. 61% of all respondents expect further diversification over the next three years, tripling the past share. Principals seek to reduce reliance on a few distributors to promote competitive pricing and service quality while mitigating market instabilities across regions.

73% of commodity principals (vs. 51% of specialty principals) expect an increase in diversification, compared to 38% in 2021. The motivation for diversification varies: Commodity principals target different customer segments in various markets due to high volumes and limited differentiation, while specialty principals focus on leveraging distributors' specialized expertise in specific niches, including application-specific knowledge accumulated over years.

### 5. Principals Expect Excellent Distributor Performance and Are Willing to Switch their Distributors

As chemical industry principals expand their distributor portfolios, they are redefining expectations for distributor performance. "Performance issues of distributors" and "lack of value-added services" are

top concerns. Key performance factors for distributors encompass sales target achievement, financial management, service quality, and valuable market insights. Recent crises underscore the importance of adaptability, financial stability, and supply chain resilience. Additionally, princi-

*"Principals push, but more importantly the customers, i.e., big customer accounts, start to set the standards"*

pals seek out value-added services like logistics simplification, regional access, customer support, and product formulation support. In a competitive environment, principals also expect cost competitiveness, data transparency, customer data utilization, collaboration, open communication, responsiveness, and target commitment. Services like legal or regulatory support on sustainability matters also boost value and trust. In cases where distributors fail to live up to agreed standards, principals show increasing willingness to switch distributors if it advances their growth ambitions.

### 6. Sustainability Gains Traction in Chemical Distribution

Sustainability is gaining ground in chemical distribution, with 41% of principals aiming for more sustainable distributor product portfolios. However, only 10% of distributors actively push for it revealing room for improvement

and greater commitment to sustainability.

Furthermore, sustainability targets are a must-have for distributors for 46% of principals. However, there's a lack of clear guidelines, possibly due to the diverse nature of sustainability goals, allowing flexibility among distributors. Interestingly, 13% of all respondents rank sustainable return logistics as the second most important must-have, recognizing distributors' unique role in reducing environmental impact through effective return management and potential in driving sustainability efforts beyond product-related concerns.

### Chemical Distributors Must Enhance Relevance to Principals

Based on the survey findings, there are four imperatives for chemical distributors to boost their bond with principals.

**Rigorous data management:** In today's digitally driven world, efficient data management is a critical factor setting chemical distributors apart. To achieve best-in-class status, distributors must have harmonized data systems and tools, facilitating seamless data flow for tasks like inventory management, compliance, and cloud-based transactions. Additionally, the ability to commercially leverage data is essential, allowing distributors to conduct customer data analyses for valuable insights and proactive responses to market trends. Harmonizing and leveraging data is crucial for adopting advanced technologies like Generative AI, which is making its way into chemical distribution. Early adaptation and exploration of use cases are necessary to gain a competitive edge, as principals increasingly favor innovative technologies.

**Cost competitiveness:** Global cost pressures impact both, principals and chemical distributors. Distributors must control major cost items, implementing efficiency measures in sourcing, logistics, headquarters, and sales teams to offer cost-effective solutions. Resource allocation to value-added activities is essential for competitiveness. Cost-competitive services will be crucial as customers prioritize cost-effectiveness in decision-making.

Continued Page 12 ►

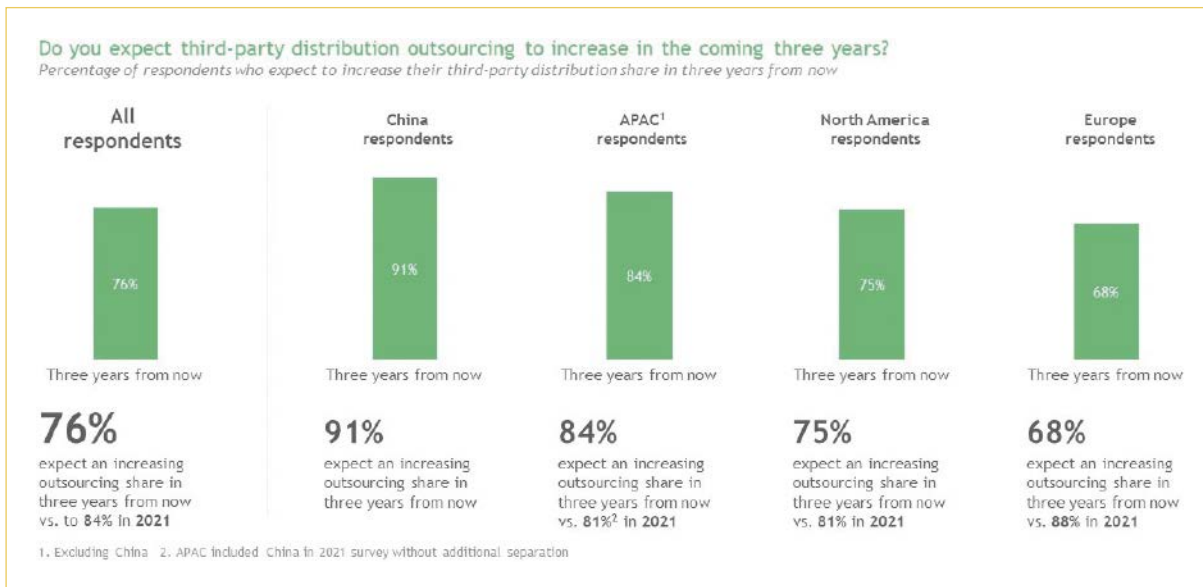


Fig. 2: Large majority expects to increase use of third-party chemical distributors.

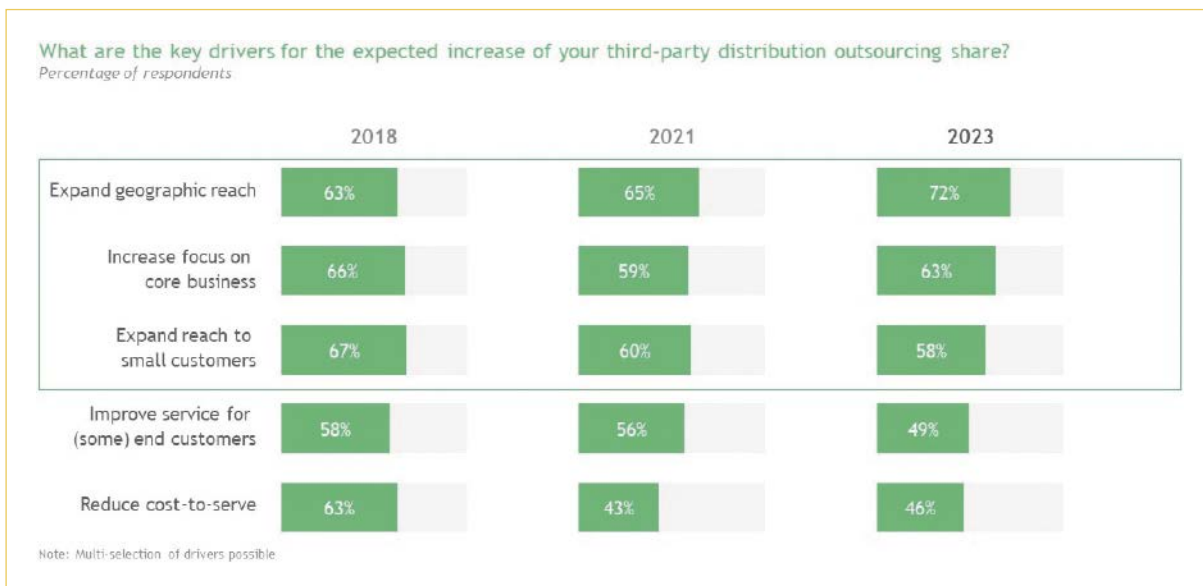


Fig. 3: Over the past decade, the top-three drivers to work with a distributor have been stable.

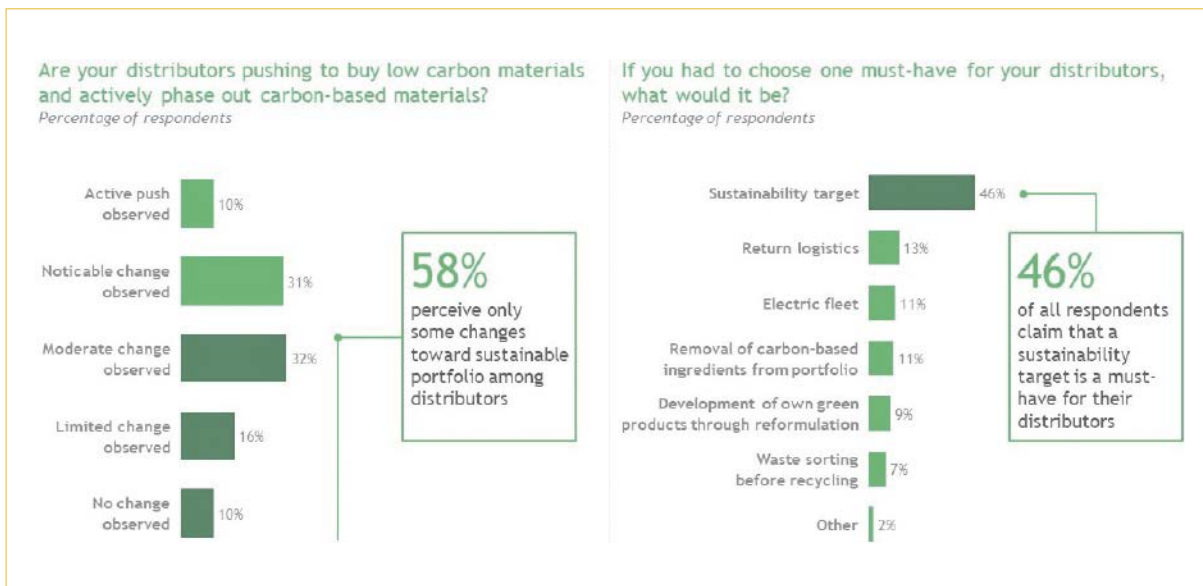


Fig. 4: Sustainability has arrived in chemical distribution, yet only small efforts are being made.

**Value-added services and capabilities:**

In 2023, principals prioritize “reduction of logistics complexity” as the most important distributor attribute, followed by “access to new regions” and “customer support.” However, the overall importance of these attributes has decreased since 2021. In line with the overall trend, specialty principals still emphasize “reduction of logistics complexity” as the most important value-adding attribute, while commodity principals now focus on “access to new regions” to drive growth and expansion. Additionally, principals value distributors with top-tier laboratories, as they contribute to customer-centric and innovative solutions, elevating distributors beyond intermediaries to collaborative partners in process development for chemical principals.

**Sustainability:**

In the current business environment, sustainability is paramount for principals, and they expect their distributors to align with their sustainability goals. Achieving this alignment is challenging due to differing business models, but distributors can use sustainability targets as a unique selling proposition. Through adjusting their product portfolios, conducting sustainability assessments, providing carbon footprint data, offering recycling solutions, promoting circularity, and assisting customers with sustainability regulations, distributors play a vital role in ensuring environmental friendliness throughout the supply chain.

Chemical distributors, who have navigated recent challenges are positioned for growth. Adapting to changing dynamics and prioritizing customer needs while aligning with principals’ expectations will be key to sustained growth in evolving global markets.

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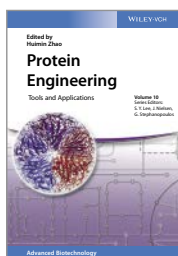


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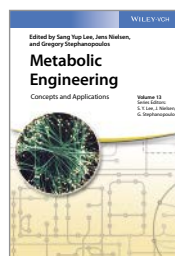
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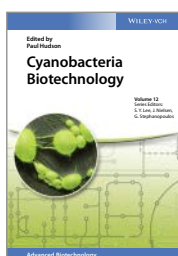
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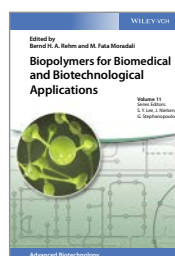
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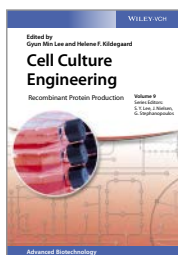
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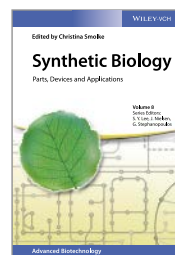
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# The Chemical Distribution Industry

## Shaping a Future-Proof and Sustainable Transformation

The chemical distribution business is a diverse industry that provides customized solutions for important sectors such as pharmaceuticals, paints & coatings, agriculture, cosmetics, food & feed, and automotive. At the center of the supply chain sit a critical partner for both global corporations and SMEs: distributors. Distribution's role has become particularly relevant over the last three years as the global supply chain faced unprecedented challenges brought on by the coronavirus. But the supply chain did not face these alone; distributors also struggled in the aftermath of the pandemic. Ralf Kempf asked Lars Wallstein, IMCD's Managing Director Germany, who was elected in September as President of FECC — the European Association of Chemical Distributors — about the current market trends and the organization's vision for the sector's future.

**CHEManager:** Which developments, both among your customers and the distributors themselves, do you see as challenges for the sector — and which as opportunities?

**Lars Wallstein:** There is a silver lining to the recent challenges we've all faced in the chemical industry. When times were tough during the pandemic, distribution stepped in to prove their enormous value, seamlessly linking all partners along the value chain to keep things moving.

That said, in 2023, the chemical industry faced new challenges that trickled down the value chain. It started with low demand. Throughout the year, we've watched Europe struggle with a lack of consumption and investments, and, at the moment, we still don't have neither China nor US picking up the slack. As a result, we saw destocking in epic proportions in the first part of the year; luckily, we see early signs of recovery. At the same time, most of the industry struggled with price erosion, while watching structural costs increase rapidly due to inflation. To make things more complicated, we see a heightened regulatory burden and rise costs of CO<sub>2</sub> abatement, all while the wars in Ukraine and Israel sit on our doorstep. To say the least, our world, and chemical distribution, has become more complicated and divided.

Now, we see major chemical manufacturers and customers revisiting

their global manufacturing footprints with aims to strategically adapt to a lower demand and higher cost in Europe. Nevertheless, chemical distribution plays a critical role in the conversation. We are enablers of global trade. Unlike chemical producers, our members are comparatively asset light and adaptable, offering arbitrages and added-value services whilst enabling product development and innovation. Mid-term, the biggest opportunity lies in digitalization, where most sit on a goldmine of data that can be utilized to our advantage. Combining this knowledge with our hand-on approach to distribution, we will be able to provide any product, formulation, and service in a more sustainable and circular way.

**The 2023 chemical distribution survey by BCG [see pp. 10-12] considers the outlook for the chemical distribution market to be positive. Where do you see the possible main drivers for this development?**

**L. Wallstein:** Although BCG predicts lower growth rates than in previous years, several factors can be identified for more positive development. One significant driver is certainly the trend of outsourcing. It is simply more effective and efficient to service the vast number of chemical downstream users with a broader span of products from several sources, especially when it



Lars Wallstein, Managing Director, IMCD Germany, and President of FECC

comes to b- and c-type customers that are geographically dispersed.

Typically, our members prioritize closer relationships, allowing for more touchpoints, value-added logistics, and other regulatory, formulatory, and financial services. Chemical manufacturers, however, have different pri-

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*“The European Green Deal requires effective partnerships along the value chain.”*

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orities on their agendas. Today, they are increasingly focused on simplifying their manufacturing, re-tooling and electrifying their asset base, decarbonizing their products, managing their risk of product obsolescence, and making strategic asset allocations. Despite this, we remain customer driven which ultimately best serves our partners at both ends. We keep our focus on offering our partners smarter solutions, like flexible sales cost, lower working capital, lean processes, optimized warehousing, and efficient supply chains. Additionally, diversification of sales channels is crucial in any go-to-market strategy to allow for flexibility in dynamic and ever-changing market conditions.

**According to BCG, principals are willing to diversify their distributor base, but they expect excellent distributor performance. What requirements do chemical distributors face?**

**L. Wallstein:** In the end, the chemical distribution business is a people business. Our people are our assets. Chemical distributors must understand customer requirements to offer customized solutions and we must be prepared to be agile and quick in response to changing market conditions. At the same time distributors need to tie into their suppliers go-to-market-strategies. In-depth market, industry, and customer knowledge is essential for this. The broader the regional coverage and deeper the application expertise the better. At the same time, first-class service delivery matters. Offering product know-how, technical expertise, efficient logistics solutions, and sizeable inventory levels is just the tip of the iceberg. It's equally important to offer flexible financing and payment options, on-time delivery, and transparency at every step of the way to prove a reliable supply chain. Additionally, the use of digital technologies and pro-active sustainability initiatives are increasingly important. This enables chemical distributors to build and maintain long-term partnerships, with customers and suppliers alike, often on an exclusive basis.

**Sustainability has become an important factor in chemical distribution. What adjustments are distributors making to their portfolios and activities?**

**L. Wallstein:** Amongst other regulations, the European Green Deal requires effective partnerships along the value chain. The sustainability challenge is bigger than any single company can face alone. However, sustainability is not just an obligation; it's an opportunity for differentiation. Our members are required to meet the highest standards and need to comply with Responsible Care. Newer certifications, like Ecovadis or mass balancing systems such as ISCC+ and RedCert, are increasingly important to reassure partners of self-sustainability and to help create supply chain transparency. Chemical





distributors are an essential market intelligence resource for their principals and developers. Our high-quality market feedback, captured from hundreds of thousands of downstream users enables the development of novel products and innovative solutions.

*Everyone is talking about digitalization, but many industrial sectors are still not as advanced as expected. What is the situation in chemical distribution with regard to the use of digital solutions?*

**L. Wallstein:** Yes, I agree. A very long fuse and — so far — no big bang. Digitalization in our sector seems to be an evolution and not a revolution. I think we are seeing all elements of a successful digital transformation, certainly amongst the sector leaders, but also, amongst our startup members with new innovative approaches to digitalization. Those two elements need to come together. Today, we already see our member companies rapidly advancing towards cloud-based, safe and secure, state of the art, ERP and CRM systems — ideally in the form of global platforms to connect as much data as possible in all corners of the world. Product information management, data organization, and AI readiness are all hurdles as well as we look at sharing information about tens of thousands of products, many of which are highly regulated. Having a fancy website with great content and some product search functionality is a given these days; however, transforming the entire customer journey in a fully digital way is challenging in our industry. Whilst the interaction model has already changed, with features like online product search, platform transactions, and video calls, both customers as well as suppliers still prefer the personal interaction in what remains a complex, relationship-based, people business.

*Amid economic and geopolitical challenges, chemical distributors face investment uncertainties. In which areas do you think investment is nevertheless essential?*

**L. Wallstein:** There are several fields for investment. The obvious ones are the investments into the tangible assets, like offices, labs, warehouses, trucks, and trailers. Many of our family-owned members own such assets, sometimes for decades. They have a direct need to invest into sustainability. The asset lighter distributors must select and opt for those third party logistic/service pro-

viders with the most sustainable offering. Investments into digitalization is also critical not only to ensure data safety and security but also because suppliers and customers expect a best-in class digital experience. Fueled by new technology, like AI, data will soon

*“Sustainability is not just an obligation; it’s an opportunity for differentiation.”*

play a key role in offering more sustainable solutions and services, and you need to be ready for it. It’s also important to not overlook investments in people. The commonly referred to ‘war for talent’ is over; the talent has won. Being a science-based industry, expertise in chemical distribution is built over many years, and a loyal and always-learning workforce is essential. After all, we are in the people business. Finally, the geopolitical challenges require more robust and secure supply chains, and, partic-



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ularly after a year of heavy destocking, need working capital investments. That, however, is obvious, and we know our members are well prepared.

*As change is everywhere, how does the FECC as an association providing advocacy, educating and supporting for their members adapt to the changing market environment?*

**L. Wallstein:** FECC does a great job supporting its members to keep pace with the latest trends and developments in all relevant areas, such as regulation, digitalization, and sustain-

ability. As a lean, European trade association based in Brussels, it provides easy-to-understand access to all relevant industry information, technical support, and networking opportunities. This includes a continuous flow of information on market and downstream user trends, developments in the chemical supply chain, geopolitical aspects, and international trade issues. Of course, we also focus on regulatory terms and conditions, and it is worth to mention that FECC also serves as a platform for small- and medium-sized chemical players, giving them a voice in Brussels.

We are particularly proud of our ‘early warning system’ for upcoming regulations. Through intensive monitoring and an extensive network, FECC can outline possible scenarios ‘ahead of the wave’ and develop guidelines to prepare the industry for changing framework conditions at an early stage.

The important pillar of personal networking is also promoted through regular webinars and the FECC Congress, which has established itself as the central platform for the entire chemical supply chain. Our main task

is to help our members to remain or become fit for the future.

*Chemical distributors will also be increasingly confronted with a shortage of skilled workers in the future. Are there any initiatives by the FECC to support its member companies in finding and, above all, retaining qualified employees?*

**L. Wallstein:** All FECC members naturally have their own strategies and activities for recruiting talent based on their respective needs and service portfolios. Many work closely with

schools and universities. However, we all know that we are competing with the major chemical manufacturers for the best talent. FECC is therefore specifically committed to giving the chemical distribution industry a face and positioning it as an attractive and future-orientated field of work. For this reason, the topic of ‘attracting and retaining young talent’ is regularly at the top of the agenda at FECC congresses, to which we invite young participants as part of young talent competitions. It is very important to us not only to talk about the topic, but also to start a dialogue with young talent and create a platform for exchange.

As a further development of this, we will be introducing the “FECC Young Talents Forum” next year; a pan-European network for young people from FECC member companies to network, gain specific insights and work in multicultural, multilingual, and cross-company project teams on certain topics of overall relevance.

*What is your vision of the future for chemical distributors? How can they play to their strengths even better in the future to further expand their role as a key partner to the chemical and pharmaceutical industry?*

**L. Wallstein:** It is a complex world we live in today. The challenges and opportunities that arise in this global reality require transparency and effective cooperation between all partners along the entire value chain. Chemical distribution plays a central role due to its important function within the supply chain. As the link between suppliers and customers in the chemical and pharmaceutical industries, distribution recognizes the requirements of all parties and focuses on smooth supply chains and effective supply. In addition, it actively contributes to solving the major sustainability issues. Here, chemical distribution can play a pioneering role by focusing on sustainable practices and promoting the development of environmentally friendly products. And finally, it is an important driver of innovation by intelligently sharing data between customers, suppliers, products, and applications, thereby creating a comprehensive solution space for the entire value chain.

Note: The complete interview is available on [www.chemanager-online.com/en](http://www.chemanager-online.com/en)

[www.fecc.org](http://www.fecc.org)

# Creating Opportunities Through Innovation

## Azelis Continues Its Growth Course under New Leadership

Founded in 2001 through the merger of Novorchem and Arnaud, chemical distributors in Italy and France respectively, Azelis has evolved over two decades into a leading innovation service provider for specialty chemicals and food ingredients. Headquartered in Antwerp, Belgium, the group generated sales of more than €4 billion in 2022 with over 3,800 employees. Azelis became a publicly listed company following its IPO in September 2021. At the turn of the year, there will now be a change in management at Azelis: on January 1, 2024, Anna Bertona will take on the role of Group CEO. She succeeds Hans Joachim Müller, who will retire after serving more than 11 years in that role. Ralf Kempf asked Hans Joachim Müller and Anna Bertona about the foundations for the group's continued success and plans for its future strategic direction.

**CHEManager:** Azelis successfully managed to navigate the challenges and ongoing market disruptions. What do you see as the main reasons for this resilience?

**Hans Joachim Müller:** The supply chain disruptions that followed the Covid crisis affected the whole industry, and we are proud of the support we provided to our customers and principals throughout. That, in turn, reinforces our long-term mission of becoming the reference innovation service provider in our industry. Undoubtedly, our people have been and continue to be the most crucial element of our resilience. Our colleagues leverage our technical capabilities, which include the network of 70+ Azelis labs spread around the globe, to provide solutions for our customers and principals. In addition, the diversity of our portfolio and the depth and breadth of our lateral value chain allows us to mitigate the challenges in some markets. Eventually, our industry-leading digital tools and platforms make it easier for our customers and principals to do business, and give us the agility to respond quickly to market trends.

**The 2023 chemical distribution survey by BCG reveals a notable rise in third-party distributor usage across regions and chemical sectors. But the increasing outsourcing share comes along with a set of expecta-**

**tions toward distributors. How have the requirements and expectations of your principals changed in recent years?**

**Anna Bertona:** During the Covid crisis, one of our main challenges was to guarantee the supply of specialty chemicals and ingredients to our customers. Inflation then increased sharply, and since the second half of 2022, market dynamics have changed drastically. Faced with the changing expectations of our principals, we strive to reduce the complexity of getting products to customers, we use our technical expertise to develop applications for their needs, we ensure compliance with ever-increasing regulations, and we promote a sustainable industry. To track the needs of our customers and principals and drive continuous improvement, we run a satisfaction survey every two years.

**Innovation is a key growth driver in the specialty chemicals market. How can distributors effectively support innovation on both the supplier and the customer side?**

**A. Bertona:** It is Azelis' core mission to support our customers with innovative formulations, where our tagline, 'Innovation through formulation', takes on its full meaning. Operating over 70 application laboratories in 27 countries,



Anna Bertona, CEO & President EMEA, and Hans Joachim Müller, group CEO, Azelis

our knowledge-sharing efforts are ongoing, both between fields of application and between the regions. We bring value to our customers and principals through the cross-fertilization of ideas and possibilities, and we use our extensive lateral value chain to propose an increasing number of new formulations to meet our customers' needs, all the way down to the final product.

**By driving innovation, Azelis has evolved from a distributor to an innovation service provider since its inception. What are the group's value-added services?**

**H. J. Müller:** Azelis excels as an innovation service provider through technical expertise, regulatory support,

sustainability initiatives, and supply chain optimization. We provide support for new product introductions, market information, and technical training. On top of that, segments are more and more intertwined, and a great example of the teams' collaboration is the Serum Booster, developed in our Personal Care lab in Mexico. The lines between personal care and pharmaceutical products are increasingly blurred, with innovation between the two market segments going hand-in-hand. The challenge for our team was to develop an easily disintegrable tablet that could turn into a serum holding the concentrated actives. The Pharma team is highly knowledgeable on tablet development and was able to help. Such initiatives have led us to win numerous innovation awards, exactly 31 since





2015. Just in the last few weeks, we received the Gold award in the hair care category at in-cosmetics Asia 2023, and the 2023 Cosmébio Ingredient Trophy for Personal Care in France.

*Sustainability topics are gaining prominence among principals and customers and are increasingly influencing their decisions as to whom they partner with. What importance does sustainability have at Azelis and how is this reflected in the corporate strategy?*

**A. Bertona:** Since 2021, our sustainability strategy, 'Action 2025', contains ambitious targets and reflects our commitment to engrain sustainability in everything we do, through four pillars: People, Products & Innovation, Governance, and Environment. Through our Together for Sustainability membership, we also have policies in place to evalu-

which we have always overcome thanks to a team working with a common purpose: improving the societies where we do business by developing innovative and sustainable formulations, supported by state-of-the-art digital tools, to be a partner of choice. I am convinced we have the right strategy in place and that we will continue to constantly improve ourselves. I feel particularly excited about the future of Azelis and honored to be taking over.

*Mr. Müller, under your leadership, Azelis has transformed from a decentralized European business into an integrated global group. Given this considerable legacy, how do you feel about handing over the reins to Mrs. Bertona?*

**H. J. Müller:** I feel the time has come to hand the business I have been steer-

ing until now into other, capable hands, and a compelling driver of value creation. Since 2015, we have completed 50+ acquisitions, significantly strengthening our lateral value chain and benefiting all our stakeholders. The market is still very fragmented,

and many smaller distributors have difficulties to follow the developments in innovation, regulatory and digital. We remain committed to pursuing strategic growth opportunities, including via M&A, and leverage our continuously increasing scale to become the reference innovation solutions provider in our industry.



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*"Azelis has achieved many milestones to become the industry leader it is today."*

Hans Joachim Müller, group CEO, Azelis

*Beyond M&A, what other elements are part of or influence your growth strategy?*

**A. Bertona:** Our foremost focus is on driving organic growth with our customers and principals; M&A works to

complement this growth. Increasing the share of wallet with our customers and finding new ones is a fundamental aspect of growing our market share, and we will continue to improve customer intimacy through personalized technical services and an effective lateral value chain, our one-stop-shop, combined with our innovative capabilities. Also, we aim to expand our cooperation with blue-chip principals by demonstrating strong performance and develop trustful relationships. The combination of these two strategic drivers is strengthened by several other key elements, like digital transformation, sustainability initiatives, and talent development.

■ [www.azelis.com](http://www.azelis.com)



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*"M&A remains one of our strategic growth pillars, and a compelling driver of value creation."*

Anna Bertona, CEO & President EMEA, Azelis

ate our suppliers and their environmental practices. I have been the Sustainability sponsor at Azelis since many years, to promote the efforts made in the four pillars and make Azelis a leading innovation solution provider of sustainable and safe products and services in our industry. In doing so, we ensure that our growth goes hand-in-hand with our care for the environment and social well-being, including ambitious targets on diversity and ethics.

*Mrs. Bertona, you started at Azelis in 2013 as head of strategy and were instrumental in helping shape the strategy of the group. How do you intend to further develop Azelis as a reliable partner for your clients and customers in the future amidst evolving challenges?*

**A. Bertona:** My journey at Azelis has indeed evolved considerably during the last ten years, with a special turning point when I became CEO for the EMEA region in 2016. We have grown significantly in recent years, entering the Middle East & Africa region and market, to name but one example. And this rapid development has been accompanied by many challenges,

ing until now into other, capable hands. I am deeply grateful for the last 11 years spent as Azelis Group CEO. We, Azelis, had an incredible journey and confirmed my fundamental belief that — almost — everything can be accomplished by a team working closely towards a common goal. With the power of its great team, Azelis has achieved many milestones to become the industry leader it is today. Anna Bertona has not only witnessed but has been instrumental in that development. She was involved in our expansion in new regions and countries, to new market segments, and our listing on the Brussels stock exchange. However, we still have high ambitions for the future of Azelis. But I am confident that with Anna's excellent business acumen and leadership skills, she will guide and continue building the business from strength to strength.

*Since its founding, Azelis has expanded both its product portfolio and the group's geographical footprint through acquisitions. Do you want to continue on this growth path?*

**A. Bertona:** Yes, absolutely. M&A remains one of our strategic growth pil-

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# Innovations in Surfactant Sustainability

## Surfactant Industry's Quest for Environmental Responsibility

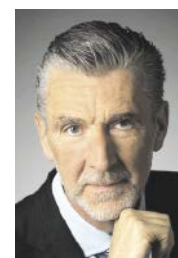
*Surfactants, a portmanteau of “surface” and “active” agent, play a pivotal role in various industries. These molecules are designed to work at interfaces, with the most common interface being the boundary between oil and water. They are instrumental in cleaning, constituting a significant portion of the surfactant market, which amounts to roughly \$40 billion. This market encompasses household cleaning (especially laundry), personal care products, industrial and institutional cleaning, as well as a range of other industrial applications in sectors like agriculture, oil and gas drilling, metalworking, construction, food production, healthcare, mining, paints and coatings, transportation, and firefighting.*

What defines a molecule as a surfactant is its amphiphilic nature. In simple terms, surfactants have both hydrophilic (water-attracting) and hydrophobic (water-repelling) components. Typically, a hydrophobic tail, often an alkyl or alkyl-aryl moiety, is connected to a hydrophilic head, which could be a sulfate, sulfonate, or ethoxylate. This combination gives rise to the familiar tadpole-shaped representation of surfactant molecules.

■ **Sustainability Challenge:** Surfactants face a considerable sustainability challenge, echoing similar issues in various markets. The sustainability of surfactants can be analyzed using the acronym EMUD, which stands for extraction, manufacture, use, and disposal. The environmental impact of surfactants hinges on their sources, production methods, usage patterns, and disposal options. Let's delve into each of these phases:

■ **Extraction:** Over 90% of surfactants today originate from either petrochemical feedstock derived from oil and gas fields or oleochemical feedstocks obtained from palm plantations. These sources have raised concerns regarding their environmental impact, including their carbon footprint. The growing use of palm products, especially in Western Europe, has also raised biodiversity concerns in regions where oil palm trees are cultivated. These concerns have spurred the search for an alternative supply chain that is neither petrochemical nor oleochemical.

■ **Manufacture:** The manufacturing technology in the surfactant supply chain is typically mature and efficient in terms of yield, energy consumption, emissions, and capital cost. Well-established engineering companies and chemical giants dominate this sector. Regulatory scrutiny is present, as exemplified by the US EPA's recent proposal to strengthen emissions standards for chemical plants, focusing on ethylene oxide. This has led to increased interest in



Neil A. Burns,  
Neil A. Burns LLC

co-located pipeline supply arrangements for ethoxylation used in surfactants.

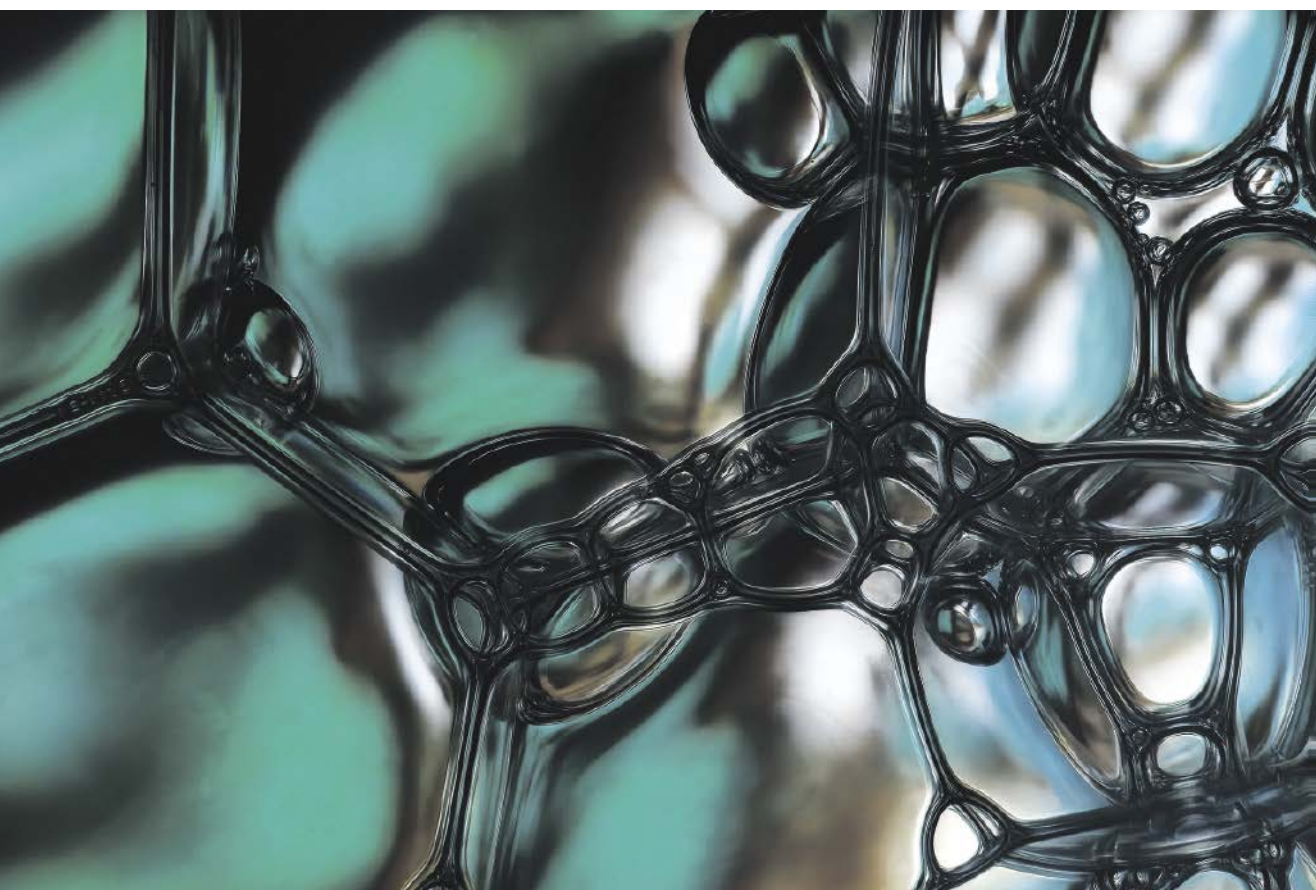
- **Use:** The largest environmental impact of surfactants is realized during the use phase, which primarily occurs in homes. Whether in washing machines, showers, or bathtubs, surfactants are prevalent. Studies have shown that laundry detergent and shampoo, both significant users of surfactants, have a substantial carbon footprint. Factors such as energy consumption for heating water, detergent dosage, and wash temperature play a crucial role. An essential recent development to improve sustainability has been the increased adoption of cold-water washes in household laundry.
- **Disposal:** After use, surfactants, along with the consumer products in which they are formulated, often find their way down the drain. Biodegradability is a significant concern

*“The environmental impact of surfactants hinges on their sources, production methods, usage patterns, and disposal options.”*

in this context. Most surfactants used today are biodegradable in aerobic conditions, and since 2005, all surfactants used in detergents in the EU must demonstrate ultimate biodegradability.

**Driving Forces for Change:** The push for sustainability in the surfactant industry is driven by consumers, regulators, and companies:

- **Consumers:** have become increasingly curious about the products





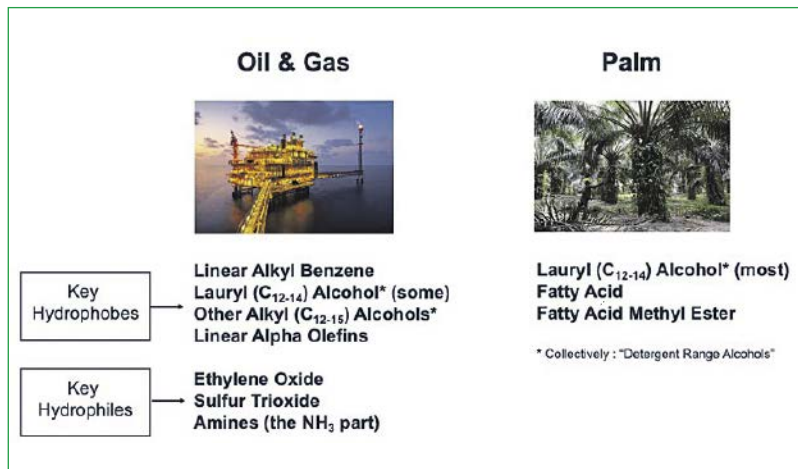


Fig. 1: Derivation of hydrophobes and hydrophiles

they buy and their environmental impact. The market for sustainable products, including those in laundry, haircare, bath & shower, and cosmetics, has continued to grow. A study found that products with sustainability-related claims experienced higher growth rates.

- **Regulators:** have responded to consumer trends by passing laws aimed at forcing sustainability improvements. For instance, New York State has implemented legislation to limit the presence of dioxane in various household cleaning, personal care, and cosmetic products. Dioxane is a known contaminant in surfactants.
- **Companies:** particularly in the retail and consumer goods sectors, have voluntarily imposed their own sustainability standards, impacting the surfactant supply chain. Large companies like Walmart and Unilever have taken steps to eliminate certain ingredients from their products and replace fossil-derived carbon with renewable or recycled sources.

#### Responses to the Sustainability Challenge: The surfactant industry has responded to the sustainability challenge through various innovative approaches:

- **Biobased Feedstocks:** There has been a shift towards using biobased feedstocks in surfactants, with a focus on sustainability. This transition began in the early 1990s with the increased adoption of biobased alcohols as hydrophobic components. The palm-based products in this category have seen substantial growth in the past three decades.
- **Fermentation:** In the mid-2000s, companies explored fermentation as a means to develop alternative feedstocks for surfactants. The goal

was to create hydrophobes from sugars, avoiding the use of petrochemical or oleochemical sources. While this approach faced initial cost challenges, it has recently seen renewed interest, particularly in the field of biosurfactants.

- **Carbon Capture:** Technology for capturing and utilizing carbon dioxide (CO<sub>2</sub>) emissions has been explored as a way to reduce environmental impact. Companies like LanzaTech specialize in carbon capture and utilization (CCU) technology, converting CO<sub>2</sub> and waste gases into products, including surfactants. This approach has gained traction in the industry.
- **Circularity:** The concept of circularity involves reusing products or waste streams in the production of goods, minimizing waste. While waste streams in surfactants have found limited use, some companies are starting to utilize inedible mate-

rials like molasses and sugar-cane residues.

- **Biosurfactants:** These surfactants are produced by living organisms, distinct from plant-based bio-surfactants. The most developed class of biosurfactants includes glycolipids, which have both hydrophilic and hydrophobic components. Companies like Evonik, Holiferm, and Jeneil are actively engaged in commercial activity in this field.
- **Bio Mass Balance (BMB):** BMB allows the use of renewable resources, such as biomass or bio-naphtha, as a feedstock in the chemical industry. This approach replaces a portion of the fossil raw materials with renewable ones, reducing the carbon footprint. Thus, the end-products have the same quality and performance as their fossil counterparts, but with a lower carbon footprint and a higher share of mass-balance certified biobased content. Major companies in

*“The push for sustainability in the surfactant industry is driven by consumers, regulators, and companies.”*

the surfactant industry have adopted BMB methods to improve sustainability. For example, CEP SA recently launched NextLAB, a BMB version of Linear Alkyl Benzene, which has been converted to LAS and used by Unilever in various cleaning prod-

ucts under the Persil, Sunlight and Cif brands. In January of 2023, Shell and Henkel signed an agreement in which Shell would use BMB methods to make surfactants from 200,000 MT of renewable feedstocks, which Henkel would then use in cleaning brands such as Persil, Purex and All. BASF has a well-developed BMB program across a number of value chains, including surfactants, as has Ineos for ethylene oxide.

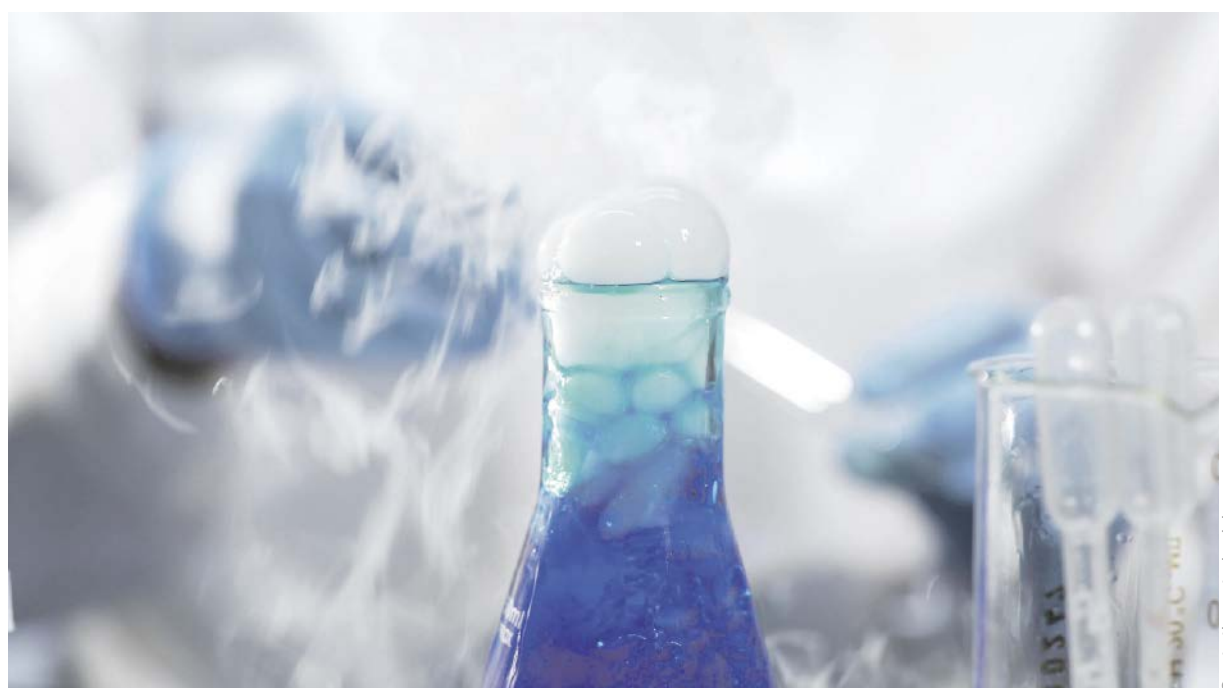
#### What's Next

In response to the sustainability challenge, the surfactant industry will continue to witness developments:

- Biosurfactants are expected to gain further ground in the market, with large companies investing in this sector.
- The adoption of Artificial Intelligence and Machine Learning methods for innovation in surfactants is likely to increase, with major players in the industry already investing in this area.
- Overall, innovation remains a driving force in the surfactants industry, offering solutions to sustainability challenges. We look forward to a lot more of it in this dynamic global market.

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# From Linear to Circular

## Packaging Industry Drives Circular Economy through Science, Innovation and Consumer Insights

*The concept of a circular economy, where materials are recycled and reused, is becoming increasingly important in consumer packaging, driven by regulatory requirements and customer interest.*

Modern technical advancements make it easier to think of today's goods and products as the resources of tomorrow. One such product is plastic.

### Material Differences

Polyethylene (PE) is the most commonly produced plastic worldwide because of its durability and versatility. While non-polymer-based packaging materials such as paper and glass have experienced growth, the comparison in environmental impact and performance vary case-by-case and depend on usage. For example, paper is much more biodegradable than plastic, but looking at its life cycle assessment, it requires more water for pulping than is used to produce PE. Paper is also often laminated with resin or

other coatings when used for packaging, making it harder to recycle.

Misconceptions exist about plastic and its environmental impact compared to other packaging materials. Studies show that the environmen-

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*“51% of respondents ranked ‘ability to recycle the package’ as the first or second most crucial sustainability feature of packaging.”*

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tal cost of plastic in consumer goods is 3.8x less than alternative materials. Due to its composition and ability to limit food waste, plastic packaging

contributes up to 4x fewer greenhouse gases than other material alternatives, such as glass or metal.

Those benefits aside, when not disposed of responsibly, unlike glass and metal, lightweight plastic floats and becomes a long-lasting problem. For many people, waste in the environment equals plastic waste.

This visibility and increased education about climate change fuel consumers' appetite for recyclable and recycled packaging.

### Customers' Greener Demand

According to 2022 Nova Chemicals consumer research, 51% of respondents ranked “ability to recycle the package” as the first or second most crucial sustainability feature of packaging. Almost half (45%) had deliberately bought products specifically because the plastic packaging was “made from recycled materials,” up from 29% in 2020. Consumers aged



Monika Kleczek, Nova Chemicals

44 and under are especially willing to pay for this attribute.

Consumers want to learn be part of the solution. Brand owners can create more opportunities for consumers to be involved in recycling by designing their packaging for recyclability and communicating with consumers on how to do it.

Additionally, federal and state governments have stepped in to ensure that manufacturers recognize sustainability and recyclability as not only ethical, but also a legal requirement.

### North American Recycling Regulations and Legislation

Extended producer responsibility (EPR) legislation differs from region to region and mandates that producers manage the end-of-life disposal of their products and packaging. EPR is based on the idea that product manufacturers have the greatest control over product design and are responsible for reducing waste.

Currently, only four states have implemented EPR packaging legislation in the US, including Oregon, Colorado, and Washington. Plastics, paper and cardboard, metal, and glass are

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*“Studies show that the environmental cost of plastic in consumer goods is 3.8x less than alternative materials.”*

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the only packaging materials covered under the law. EPR regulations include collection and recycling requirement standards, though fees for violating these vary. Some regulations focus on







eliminating single-use plastics, while others focus on advanced recycling and plastic reuse programs.

California has the most advanced directive to cut plastic pollution and increase reuse and recycling in North America. A law that came into force in 2022 requires that by 2032, consumers cut single-use plastics by 25%, recycle 65% of single-use plastics, and make 100% of single-use packaging and plastic food ware recyclable or compostable. Producers will ensure that the packaging and plastic food ware sold in California is recyclable or compostable.

Canadian provinces that currently have adopted packaging EPR legislation include British Columbia, Manitoba, Ontario, Quebec, and Saskatchewan. Under applicable laws, companies must submit the amount of packaging and paper materials they bring onto the market, including glass, cardboard, aluminum, plastics, steel, and more. The Canadian Council of Ministers of the Environment (CCME) has prepared a Canada-wide Action Plan for Extended Producer Responsibility, though it has not been enacted into law yet.

The plastic industry in North America has committed to making 100% of plastic packaging recyclable or recoverable by 2030 and 100% of it reused, recycled, or recovered by 2040.

## Brand Owner Commitments

The above regulations drive brands to purchase and create their products differently; brand owners have committed to the Ellen McArthur Foundation (EMF) and joined national plastics pacts to work towards achieving new goals in recyclable plastic packaging and incorporation of recycled content by 2025.

**A few of the companies making significant investments and goals toward circularity include:**

- **Unilever:** through their Climate & Nature Fund to invest €1 billion by 2030 in meaningful climate, nature, and resource efficiency projects, to transform the way their products are made and reach end of life.
- **Adidas:** launched their 'Three Loop Strategy' consisting of three interrelated initiatives involving recycling plastic waste, designing shoes that can be remade and regenerated, using biodegradable materials.
- **Coca-Cola Co, PepsiCo, Keurig Dr. Pepper:** have all continued to increase their usage of post-consumer resin across their packaging portfolios.

Scientific data is the link that guides manufacturing and brand companies



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alike as they make sustainability decisions.

## Science and Mechanics

Mechanical recycling remains the most efficient and environmentally friendly recycling method for plastics. Its carbon footprint is the lowest of all recycling options and is even favorable to prime PE production. With mechanical recycling, Nova's three-pronged approach is the key to achieving

In addition to being recyclable, circular packaging must contain recycled content. Smart choices in packaging design and improvements to the recycling infrastructure are vital enablers in achieving a high-quality and consistently available supply of post-consumer recycled plastic material.

With innovations like the Syndigo family of recycled polyethylene (rPE) resins, Nova is focused on delivering lower-emission, recycled solutions to converters and brands that have sustainability goals to achieve.

## Planning for a Wasteless Future

Plastics manufacturers, brands, film producers, converters, and others in North America are working collaboratively on industry-backed initiatives, such as the Alliance to End Plastic Waste to improve plastic and end plastic waste in the environment.

Nova anticipates investing \$2–4 billion by 2030 to reshape plastics for a better, more sustainable world and become North America's leading sustainable PE producer. These investments will support growing a recycling business to achieve 30% of sales, reducing its carbon footprint 30% and growing sustainability-linked new products. The company continuously

high-quality end use applications. It involves using quality recovered plastic, designing virgin resins to allow for high incorporation of recycle, and uniquely combining the company's resins in application development to maintain high physical performance.



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strives towards a plastic circular economy by focusing on:

- Source reduction and lightweighting
- Design for recyclability
- Post-consumer recycled content incorporation

Plastics manufacturers have made substantial progress against the first pillar over the past 20 years. Many rigid formats have been lightweighted, packages have transitioned from rigid to flexible, and flexible packaging has become increasingly thinner while improving performance.

To make thinner packages even lighter, there is a need for resins and processes that do the heavy lifting. Some of Nova's resin product lines enable further structure optimization and lightweighting in applications that include food packaging, heavy-duty sacks, and rotomolded parts.

Innovations in PE are also making products more malleable, condensed, and more easily recyclable. One such advancement is Nova's biaxially oriented high-density PE (BOPE-HD) resin. It is specifically designed to run in the tenter frame process, for the production of BOPE-HD film creating a fully recyclable alternative to traditional, non-recyclable, mixed material films for flexible packaging.

In 2020, Nova partnered with Enerkem to explore turning non-recyclable and non-compostable municipal waste into ethylene, a fundamental building block of plastics. Through partnerships like this, sustainability goals can be met. Most recently, Nova announced a feasibility study with Plastic Energy to explore the possibility of building a pyrolysis-driven advanced recycling facility in Ontario, Canada.

## The Future Looks Bright

While organizations across the globe are doing their part to meet recycling and waste reduction goals, North America lags behind the much more comprehensive, aggressive, and established European Union legislation.

Companies like Nova are preparing for what comes next. The future of PE and other plastic innovations remains strong. Though circular economy needs and initiatives differ by location, collaboration across the value chain and internationally is essential for business success and sustainability.

**Monika Kleczek,**  
Team Leader Circular Products R&D,  
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# The Green Power of Catalysis

Catalysts are Pioneers of Sustainability and Crucial for the Transformation of the Industry

*With more than 80% of all chemical products manufactured using catalytic processes, catalysts are the number one value generator in the chemical industry. But even more, catalysis is — and has always been — a major enabler of green and sustainable chemistry. With the transformation of the chemical industry to climate neutrality and circularity the importance of catalysis is even increasing. Evonik has been a leader in the catalyst industry for more than 75 years and remains at the forefront of catalyst chemistry. Michael Reubold asked Sanjeev Taneja, head of Evonik's Catalysts business line, to explain the importance of catalysts for the green transformation of many industry segments.*

**CHEManager:** *Mister Taneja, catalysts pave the way to more sustainable technologies and processes with greater resource efficiency. When has the mega trend of sustainability become a major market and growth driver for the catalysts business?*

**Sanjeev Taneja:** The desire to reduce energy demand and waste while driving up output in petrochemical production has been the focus of catalyst development already for decades — linking back to the function of a catalyst to reduce reaction enthalpy and steer selectivity. Take for example the HPPO process which has been developed in the 1990's and started com-

mercial scale operation first time in 2008. This direct epoxidation of propylene with environmentally friendly hydrogen peroxide is still a best-in-class example of energy efficiency and elimination of harmful precursors and byproducts. In the existing petrochemical value chains, sustainability and cost efficiency most times go hand-in-hand, as for example the energy saved in a process hits your competitiveness and profitability just as it reduces the carbon footprint of your operations. What has dramatically increased more recently is the number of commercialized or near commercialization processes building on renewable or circular raw materials. But also processes



Sanjeev Taneja, head of Catalysts business line, Evonik

that still depend on fossil feedstocks are striving to become as sustainable as possible.

The major impact of the industry transformation towards sustainability and climate neutrality is yet to come. Therefore, Evonik Catalysts heavily invests in research and development for recycling, regeneration and sustainability since many years, individually and in cooperations. Innovation is the backbone of our growth expectations, and the strong business impact will show up in the next decade.

**Climate neutrality has a lot to do with the shift away from fossil feedstocks. When has the defossilization factor appeared on the horizon of catalysis?**

**S. Taneja:** We cooperate with industrial and academic partners for more than a decade in catalytic and adsorptive defossilization technologies. In recent years, more and more of these technologies prove to be not only ecologically meaningful but as well commercially attractive.

We have seen a tremendous uptick in development projects contributing to the defossilization of value chains over the last five years. Today, almost half of our development projects, which we typically do together with partners on different levels of integrated catalyst and process know-how, focus on novel conversions specifically for defossilized value chains. This includes different steps required for the production of sustainable aviation fuels, valorization of CO<sub>2</sub> into chemical building blocks, hydrogen generation and storage technologies, and purification of circular raw materials.

In the life sciences and fine chemicals segment, we see since some years a greatly increased consumer awareness and a corresponding industry push for sustainable products based on natural, renewable, often plant-based raw materials. This applies, for example, to cosmetics, cleaning agents and food supplements.

**In which markets or applications do you expect the greatest growth effects from the sustainable transformation of value chains?**

**S. Taneja:** The largest market with already existing technologies today is in sustainable aviation fuels — SAF. The volume which this market can absorb is huge, given that there are no real alternatives to hydrocarbon combustion systems in the midterm. We also expect several technologies for the production of SAF to coexist for a longer period of time.

Hydrogen generation and storage is another market which has an even higher growth potential, however, relevant catalyst technologies for generation and storage are less clearly defined, so it still remains unclear who will be the main contributors to this new ecosystem.

Beyond this, we see a variety of new conversions from renewable and recycled feed streams to chemical building blocks evolving to decouple typical petrochemical products and polymers





from petroleum sources to fulfill regulations on the one hand and customer needs for circularity on the other.

*Could you mention a few success stories of catalysts supporting or enabling the shift from conventional to green chemistry?*

*S. Taneja:* Almost all of our catalysts are enablers for leading-edge processes in terms of resource efficiency and thus, sustainability. We constantly contribute to energy savings and waste reduction, recycling of catalyst materials, and reduction of active metal contents, as well as shift to less hazardous materials. The HPPPO process is the ‘greenest’ available route to propylene oxide and is changing the industry landscape sustainably; one application of our hydrogenation catalysts is to reduce chloro-organic byproducts in the production of vinyl chloride, and we manage that with the lowest precious metal content on the market. And as a custom catalyst manufacturer we are supporting methacrylate manufac-

*“The major impact of the industry transformation towards sustainability and climate neutrality is yet to come.”*

turer Röhm to launch an entirely new process for MMA synthesis which is currently being built in commercial scale at Bay City, Texas, and will have a lasting impact on the methacrylate value chain in terms of cost competitiveness and sustainability.

A remarkable success in enabling defossilized value chains is the co-development of a catalyst for the Hummingbird process together with Technip. The technology for conversion of ethanol to ethylene is successfully used in the LanzaJet process for conversion of CO<sub>2</sub> to jet fuels. With the first demonstration plant starting up this year at Freedom Pines, Georgia, this route will further underline its superiority and take a fair share of the SAF in the coming years.

*At the beginning of 2023, Evonik’s alkoxides business was integrated into the Catalysts business line. What does the addition of the portfolio of homogeneous catalysts mean for your overall offering?*



Evonik has a broad toolbox of different methods to generate structures and combine the structures with the respective active centers, e.g. in metal foam catalysts. The underlying technology has been licensed by Alantum Europe.

*S. Taneja:* Alkoxides are an essential catalyst for many applications globally. Many customers, e.g. in the oleochemical or life science industry, are utilizing alkoxides and other products of the business line Catalysts in their processes. Integrating the Alkoxides business into the Catalyst product portfolio strengthens our market position, further expands our innovation pipeline and enables us to differentiate more against our competitors in offering our customers a complete package solution.

Alkoxides are being predominantly used to produce biofuels today, and in the future we are additionally targeting the application of chemical recycling of plastic waste. Hence, the Alkoxides portfolio is another valuable contributor to our business line’s strategy to support and drive the green transformation and to Evonik’s target to generate more than 65% of its sales from NextGen solutions by 2032.

*You recently completed the relocation and expansion of the precious metal powder catalyst plant at the Shanghai Chemical Industrial Park — SCIP. How do you expect the Chinese market to develop given the decreasing growth rates of the economy?*

*S. Taneja:* According to recently released economic data, China is projecting a GDP growth of 4.9% in Q3 2023, stronger than the median forecast. Consumption and industrial activities were also more robust than expected, suggesting that the Chinese macro economy may have bottomed out in Q3.

A number of new policies and measures have been launched to boost growth in multiple sectors. It is imperative that we leverage the strengths of our local presence: local production, local RDI and technical support as well as the local commercial team that is close to our customers, work closely together to ultimately achieve business growth in the wake of China’s growth.

*Where are your major R&D hubs and how do you enable and encourage know-how transfer between them?*

*S. Taneja:* Our R&D hubs are close to customers and markets, this means that we develop catalysts in Asia, Europe and the Americas. We believe that providing timely, customized support to our global customers is only possible with a local presence. However, for Evonik as a global player, know-how transfer is of major importance, not only between regions but as well between the different competence centers. Our innovation activities are mainly organized in cross-functional and multinational project teams, whatever the individual topic demands. This fosters information exchange.

*What is your overall innovation strategy to develop novel catalysts? Which instruments or tools do you use? Do you have examples?*

*S. Taneja:* The core of our innovation strategy is “close to markets and close to customers”. We need to maintain

and further develop an innovation portfolio pipeline with projects of a diversified profile concerning technology readiness level, risk and financial potential profile. Digital tools are everywhere: They penetrate information management like laboratory data management, innovation portfolio management, IP-, competitive- and market analysis, but are as well of significant importance in the design of experiments, simulations or data visualization. This supports our teams in overall efficiency and predictability of laboratory development and scale-up.

*The sustainable transformation requires that value chain partners collaborate to develop new approaches to manufacture products. Evonik is a partner in several consortia and R&D cooperations. Could you mention a few of them related to green chemistry or sustainable feedstock/energy generation?*

*S. Taneja:* In recent years we were very active in the Carbon2Chem consortium, which targets converting flue gases from e.g., steel mills into chemicals; or we participated in the SherLOHck project to develop improved catalysts for LOHC — liquid organic hydrogen carriers — applications. The vast majority of our research cooperations are not publicly funded but between industrial partners, such as the earlier mentioned Hummingbird catalyst development with Technip.

■ [www.evonik.com/catalysts](http://www.evonik.com/catalysts)



# Fostering Green Start-up Success

Unleashing Sustainable Innovation, Navigating Business, and Pioneering a Greener Future

*In today's world, where environmental sustainability is at the forefront of global concerns, green chemistry stands as a beacon of hope. This field focuses on inventing sustainable solutions that mitigate the harmful impact of traditional chemical processes. Translating these innovative ideas into successful businesses, however, can be a daunting task. That's where the John Warner Center for start-ups in Green Chemistry — Chemical Invention Factory (CIF) and innovation ecosystem GreenChem step in. At this ecosystem for green chemistry visionary scientists find the necessary infrastructure as well as support to evolve chemical inventions towards innovations. John C. Warner, the eponym of CIF, is one of the founders of the field of green chemistry and a passionate advocate for green chemistry start-ups. Together with Martin Rahmel, Managing Director of CIF and GreenChem, they hope to change the chemical industry landscape. Christene Smith spoke with John and Martin to hear more about the challenges of tech transfer in the green chemistry space.*

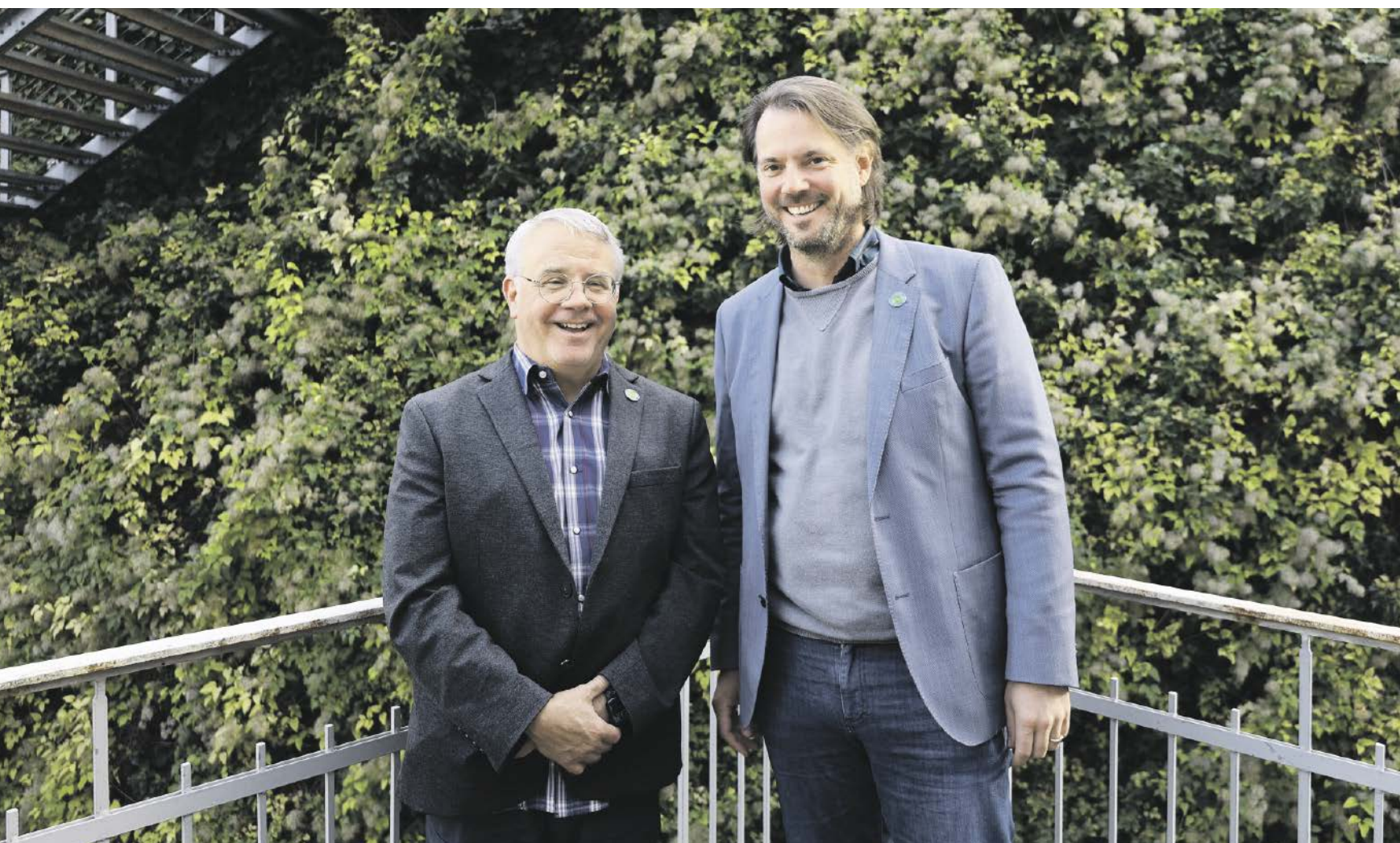
***CHEManager: Green chemistry is often described as a transformative approach to chemical design and production. In your view, what does green chemistry entail and what is an example of how it has revolutionized traditional chemical processes and products in recent years?***

*John C. Warner: Green chemistry enhances chemists' skills with essential knowledge to create safer, eco-friendly materials. It shifts the focus from cleaning up problems created by the use of harmful materials to designing products that do not have the harmful materials in the first place. Most universities lack training in toxicology and environmental mechanisms, making it challenging to ask scientists to produce non-toxic or biodegradable products. Green chemistry integrates this knowledge, helping chemists meet various*

*criteria while aligning with regulations and societal pressures for ethical and profitable industry practices. While progress has been made, there's still much to achieve in the field. I estimate that 60 – 70% of necessary innovations are not yet being invented!*

***How has the chemical industry's perspective on sustainability and environmentally friendly practices evolved over the years, and how does the concept of green chemistry fit into this evolution? What is the difference between overall sustainability and green chemistry?***

*J. Warner: Initially, scientists both created and studied things. Then, in the mid-1800s, the chemical industry emerged, splitting scientists into makers of materials and knowledge seek-*



John C. Warner and Martin Rahmel, GreenChem





ers. Making materials became a lucrative business while making knowledge received less funding. Around 1950 – 1960, the modern environmental movement began, and the makers of knowledge embraced it. The maker of materials did not reject environmentalism, they just were not part of it. The aim of green chemistry is to unite the makers of knowledge and the makers of materials so that we can make products that are safe for humans and the environment. It differs from sustainability, which focuses on measuring and quantifying eco-friendliness. Green chemistry is more about inventing and creating environmentally friendly technology, filling the gap in sustainability.

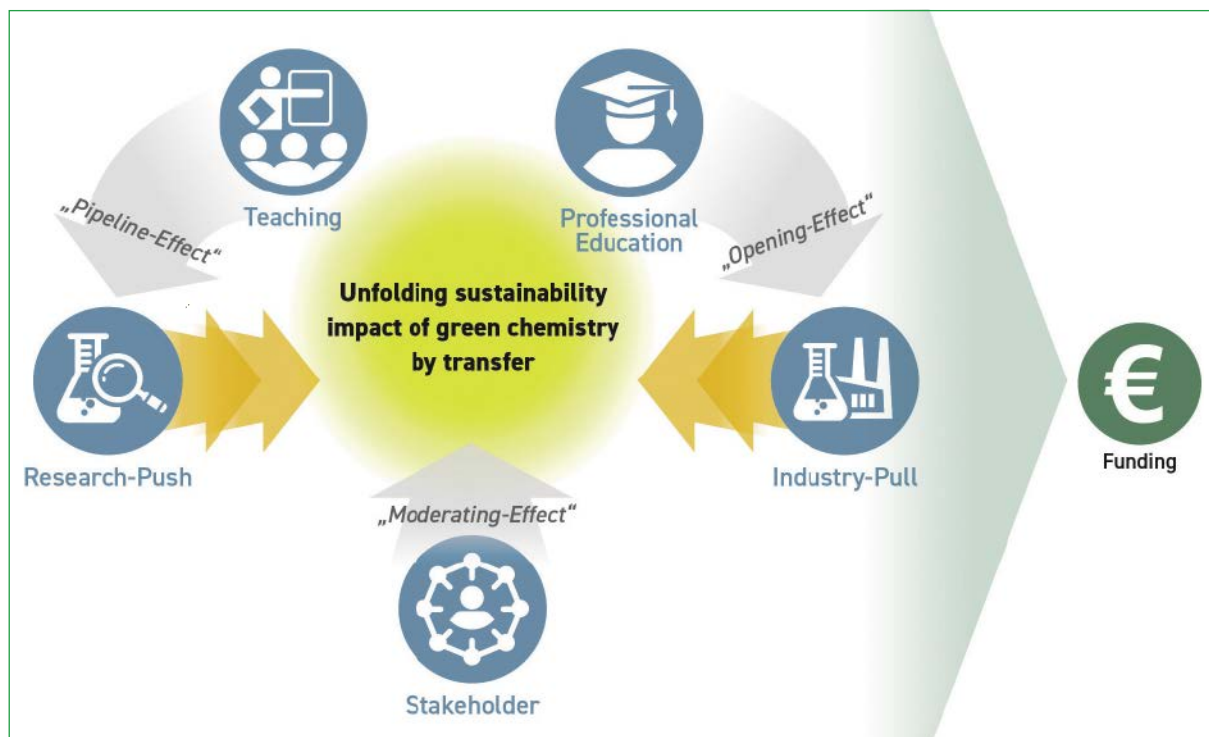
*Martin Rahmel:* Achieving sustainability is undoubtedly the primary goal. However, our current material-based scientific practices, coupled with our excessive resource consumption – 1.7 planets according to world overshoot day –, show we're far from being sustainable. Green chemistry is the path to achieve desired sustainability, offering chemists the principles and strategies to make this crucial shift.

**What is necessary to accelerate the green chemistry transformation — and what are the obstacles, is it the lack of technologies or the lack of willingness?**

*J. Warner:* We face various challenges, including untapped technologies and the need for both entrepreneurial and technical expertise in fields like green chemistry. The gap between industry's shift away from fundamental research and academia's emphasis on publishing metrics has created difficulties in technology transfer. Current efforts, while well-funded, often yield a high failure rate of successful commercialization, (around 90 – 95%). It's crucial to focus on improving technology transfer to provide better outcomes, as society deserves.

*M. Rahmel:* I totally agree. While new technologies still must be developed, I specifically in Germany see a shortage on the human factor, that is people who want to bring new technologies to market. Technologies have no value whatsoever without the persons doing something with it.

**Start-ups are seen as critical innovation partners by big chemical companies. What role does industry pull play in fostering start-up creation, and how does this collaboration ben-**



Holistic transfer approach of GreenChem: 5+1 target areas and its mission in the center.

**efit both established companies and start-ups?**

*M. Rahmel:* There is nothing more practical than a good theory! Disruptive innovation theory teaches us, that disruptive change is led by newcomers, not established corporations. In the chemical industry we are at the beginning of a disruptive transformation.

*“The aim of green chemistry is to unite the makers of knowledge and the makers of materials so that we can make products that are safe for humans and the environment.”*

Hence, start-ups must play a significant role in industrial policy. Large corporations increasingly understand and see the needs as well as the benefits of partnering with start-ups, of practising open innovation measures to secure their future with external innovations. However, this is a challenging task due to differences in speed, risk-taking, culture and many more aspects. The purpose of GreenChem and CIF is to bridge these gaps, offering a neutral playground for successful and effective collaboration between start-ups and corporates. Our guiding belief is, that success in innovation requires a shared

vision of sustainability combined with a culture of mutual respect.

**What role does the Chemical Innovation Factory (CIF) play in promoting innovation and collaboration within the chemical sector, and what makes it unique?**

*J. Warner:* In the GreenChem innovation ecosystem, we collaborate across three Berlin universities, targeting five key areas to transform the chemical industry through innovation. What sets us apart is our holistic approach, addressing multiple challenges simultaneously. Moreover, our uniqueness lies in the blend of people, technology, and essential infrastructure, including cutting-edge laboratories. I've traveled to over 75+ countries and even more cities and can say that Berlin is genuinely unique. Its creative, excellence-driven, and sustainability-focused culture, especially among its youth, is apparent. Berlin really seems to be the perfect overlap of all these three things that we need to bring these green innovations to market. It's really unique!

**Could you share some success stories of start-ups that have emerged from the ecosystem and their contributions to the industry?**

*M. Rahmel:* Certainly I could, but I don't want to in terms of being unfair towards teams I couldn't mention. In Berlin, we currently have a diverse

community of over 38 teams at different stages of development in various chemistry fields. While the numbers might seem large, there's still room for growth. A recent study compared the number of chemistry spinouts to those in other fields and found that we could have ten times more if chemistry were on par with the average. This order of magnitude highlights the untapped innovation potential in our industry. Lots of great work ahead of GreenChem.

**The new CIF building, set to open in 2026, to be named after John Warner, is generating excitement. What are the key features of this new facility, and how will it support innovation?**

*M. Rahmel:* Being the flagship-building of the GreenChem ecosystem, the Chemical Invention Factory has several key features. First of all, it's a brand new building, which will provide laboratory space for at least 12 start-up-teams. The location in the center of Berlin on the campus of TU Berlin is unique giving teams' access in walking distance to both, scientific infrastructure like analytics and knowledge as well as the innovative vibe of Berlin in general. Moreover, we will welcome spinout teams in their pre-foundation stage from all over the world with only two selection criteria: (1) their technology and business-idea must be based on a positive impact for our planet and (2) our infrastructure and ecosystem must have a positive impact on their success.

*John, can you share your personal involvement and contributions to the CIF, and how your expertise in green chemistry has influenced its initiatives?*

*J. Warner:* I would like to label my position as the “Chief Cheerleader” or the “Number 1 Fan” of GreenChem and CIF. I’ve had the pleasure of meeting with young start-ups, providing mentorship, and giving technological suggestions and ideas on where to go next.

*“Green chemistry is the path to achieve desired sustainability, offering chemists the principles and strategies to make this crucial shift.”*

Their energy is just great! Hence, I learn, I get inspired and I get fulfilled by supporting and encouraging the innovators that come through these initiatives.

*Martin, as the managing director of GreenChem and CIF, what trends or innovations in the chemical industry are you excited about, and how are you positioned to embrace them?*

*M. Rahmel:* Right now, I see a few major trends that need immediate action. Number one of course is eliminating

*“I would like to label my position as the “Chief Cheerleader” or the “Number 1 Fan” of GreenChem and CIF.”*

the use of fossil carbons in exchange for renewable carbon sources. This “defossilization” needs to happen if we want to master climate crisis. Another is focusing on the loss of biodiversity, which has the potential to cause more harm than excess CO<sub>2</sub>. Accordingly, biodegradability as well as circularity are the major concepts chemistry as to integrate into innovative solutions. How are we positioned? Just one word: unique! If only looking at the needed infrastructure, GreenChem enables us to combine different infrastructure in a complementary fashion: IRIS at HU Berlin, CIF at TU Berlin and the Scale-up Lab at FU Berlin — the accompanying analytics not being mentioned yet. Together with the benefits of Berlin as a start-up, sustainability, research and creativity hotspot, we are perfectly positioned to unfold the im-

portant potential of green chemistry inventions.

*Green chemistry encompasses a wide range of industries and sectors. In your opinion, which areas within the field offer the greatest potential for new start-ups?*

*J. Warner:* Again, for me, it’s not necessarily about what specific sector or something like that but ensuring that starting with education that all chemists get the tools to think about their processes with green chemistry. We want to start young so that when these students make it to industry, they can incorporate these principles directly into their work. So that a researcher in batteries or in another area can start developing products that are inherently more sustainable because they understand the process and what to keep in mind when innovating.

*Looking ahead, what are the long-term goals and aspirations for your two initiatives, and how do you envision their role in shaping the future of the chemical sector?*

*M. Rahmel:* In my vision I clearly see GreenChem being the European ecosystem of innovation in Green Chemistry, where numbers of start-ups have

multiplied. In the CIF innovative minds from industry, universities and start-ups regularly discuss and meet at an eye level and creating a huge impact with innovations.

*J. Warner:* I really see organizations like GreenChem popping up around the

*“How are we positioned? Just one word: unique! If only looking at the needed infrastructure, GreenChem enables us to combine different infrastructure in a complementary fashion: IRIS at HU Berlin, CIF at TU Berlin and the Scale-up Lab at FU Berlin...”*

world. I imagine having one in south America, one in Australia, one in Asia, around the world. All work and network with each other, but also have a little competition. That would not only show that the concept really works. Furthermore, having competition is a really great thing for innovation, and innovation is key for mastering the current transformation.

■ [www.unisyscat.de/career/transfer/greenchem](http://www.unisyscat.de/career/transfer/greenchem)

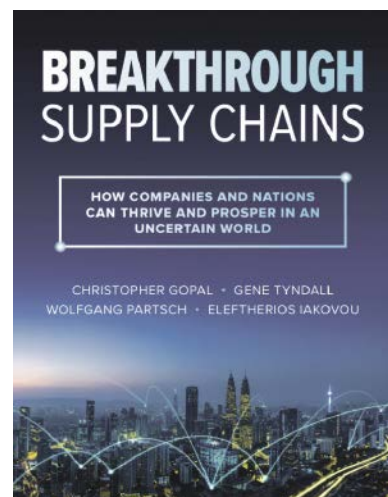
## Breakthrough Supply Chains

Goods, information, and capital travel around the globe through different cultures and languages. Supply chains have therefore become very complex, and terms have different meanings in different languages. Therefore, they are often “lost in translation”, and are defined in different ways and,

most important, their dynamics from end to end are often misunderstood. This book sorely needed to define and re-define the supply chain in this new technologically driven, multi-national and “weaponized”, talent-focused and sustainability environment. That is the main reason why four proven experts have written this book, one being the co-founder and pioneer of Supply Chain Management, one specializing in industry and trade, one specializing in government and defense, and the fourth representing the academic side.

The book is essential reading to understand the future of supply chains and clarifies, among other things, what supply chains really are and why we need them.

■ Breakthrough Supply Chains  
Christopher Gopal, Gene Tyndall, Eleftherios Iakovou and Wolfgang Partsch  
McGraw-Hill 2023  
326 pages, €31,99  
ISBN: 978-1-264-98966-9



## Convincing Political Stakeholders

In the new edition of his standard work, Klemens Joos, bundles experience acquired over more than three decades to form a scientific theory on governmental relations. It focusses on the insight that, in view of the increas-

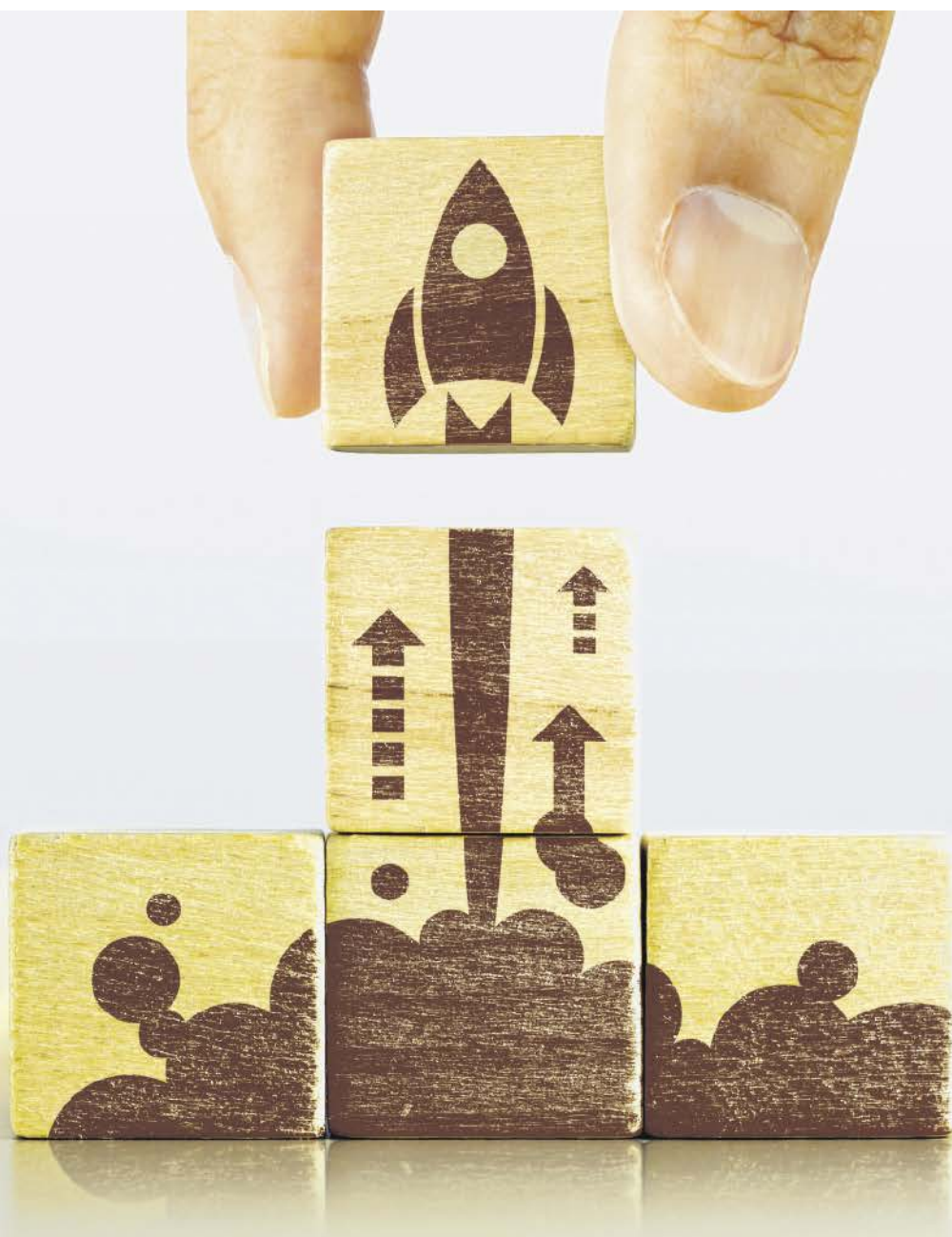
ingly complex decision-making structures of the EU, the most precise possible knowledge of decision-makers and decision-making processes is at least equally as important to success as the content aspects of interest representation. In a new chapter, the author sets out the formula for science-based interest representation developed by him from his practical experience: The likelihood of success can be increased exponentially if success is achieved, firstly, in committing to the concern of an affected party through a change of perspective such that the positive effects on the common good are shifted into the foreground and, secondly, in successfully integrating the concern into the crucial decision-making processes at the political level.



■ Convincing Political Stakeholders  
Klemens Joos  
Wiley-VCH, 2. ed., September 2023  
624 pages, Hardcover, €42.00  
ISBN: 978-3-527-51137-2



# INNOVATION PITCH



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#### Computational Chemistry

Accelerated Chemical R&D with AI and Molecular Modeling

#### Formulation Development

Platform Simplifies Complex Data Analysis and Experimental Design

#### Lab Automation

Analysis of Experiment Data with Visual Lab Intelligence Platform

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# WILEY

# Accelerating Chemicals Innovation

## Molecular Modeling and Artificial Intelligence for a More Efficient R&D

The Spanish computational chemistry start-up Nextmol (Bytelab Solutions), a spin-off from the Barcelona Supercomputing Centre, offers a software-as-a-service (SaaS) platform that accelerates research and innovation in sustainable specialty chemicals through “in silico” experiments using molecular modeling and artificial intelligence (AI). Its cloud-based lab enables molecules and formulations to be characterized directly on the computer, reducing the time and cost of chemical research and development by a factor of five. In an interview with CHEManager, Nextmol’s CEO Monica de Mier and Scientific Director Stephan Mohr talk about their revolutionary technology for the specialty chemicals industry.



Monica de Mier, CEO, and Stephan Mohr, Scientific Director, Nextmol

### *CHEManager: What was the starting point and motivation for founding Nextmol?*

**Monica de Mier:** The motivation for founding Nextmol was to help the chemical industry in its green and digital transition. With our solutions, we enable a faster development of sustainable chemicals to meet Green Deal goals, comply with environmental regulatory frameworks, and fulfill current consumer demands. We also help in the digitalization of industry by democratizing the use of computational approaches to companies of all sizes through an easy-to-use platform in the cloud. The final purpose is to contribute to the development of safer and more sustainable chemicals for society.

### *What problem does Nextmol’s technology specifically solve, or what previously untapped opportunities does it open up?*

**Stephan Mohr:** Nextmol’s technology solves the problem of the long and costly R&D processes in the experimental laboratory. Chemical research is based on a trial-and-error approach that requires a large number of tests before arriving at the molecule with the desired properties.

Nextmol’s platform is a computational laboratory to characterize chemical molecules directly on the

computer, without synthesizing them. Molecular modeling simulations allow to investigate the behavior of molecular systems on an atomistic level, and to study the fundamental interactions that govern them. These simulations are complemented with data-driven approaches, in particular machine learning, which characterize the molecules solely based on their molecular structure and are therefore well suited to quickly analyze thousands of possible new candidate chemistries. Both techniques can be used to predict the performance of molecules and rank them, and are already being successfully used for the computational study and design of chemicals in many fields.

### *Who are your customers and in which markets do you find them?*

**M. de Mier:** Our customers are specialty chemicals companies with R&D activities, from chemical majors to SMEs and CDMOs. The platform is best suited for polymer and surfactant chemistries, and allows to study numerous properties and phenomena such as the characterization of biobased polymers and polymer blends, additive migration, adsorption affinity at surfaces / interfaces, synergistic and antagonistic effects, or collective effects — like anti-agglomeration, dispersion, friction reduction — of formulations.

### *How has the response from the industry been so far?*

**S. Mohr:** The chemical industry is aware of its sustainability and competitiveness challenges, and the transformations that need to be undertaken. For example, we see that the chemical industry unfortunately lags behind in the digitalization of the data they produce in the laboratory. It is urgent to start generating and storing molecular data in a format that can be later leveraged by data-driven approaches.

Our platform is having a very good response from industry as it makes it possible to characterize a large amount of molecules and formulations at a much lower cost than in the experimental laboratory, automates the trial-and-error stage, and identifies the most promising molecules that have certain physico-chemical properties. In this way, our platform guides and complements the experimental work, making the innovation process much more efficient. We go hand in hand with our customers to ensure a successful integration of our platform in their R&D operations.

### *What will be the next key steps in the development of the company?*

**M. de Mier:** The next steps are to launch new features of the platform,

## PERSONAL PROFILE

**Monica de Mier** is co-founder and CEO of Nextmol. She holds a Bachelor in Mathematics, MSc in Computational Mechanics, PhD in Engineering, and a Master in Business Administration. She has over 15 years of experience in helping organizations in the adoption of computational techniques in their R&D.

**Stephan Mohr** is co-founder and Scientific Director of Nextmol. He holds a MSc and PhD in Physics (University of Basel, Switzerland). Postdoc at CEA Grenoble (France) and Barcelona Supercomputing Center (Spain). He has large experience in atomistic modelling (molecular dynamics and DFT), algorithmic development, scientific programming, and high-performance computing.

such as our polymer builder, predictive machine learning models for polymer properties, or high-throughput screening capabilities. We are rapidly increasing the complexity of the molecules, formulations, and applications that the platform can solve. Our goal is to be the trusted computational partner of all chemical companies developing polymers and surfactants.





## BUSINESS IDEA

### Towards a Digital Chemical R&D

Nextmol's platform is a computational laboratory to characterize chemical molecules directly on the computer (i.e. without having to synthesize them) and thus obtain deep insights about the behavior and mode of action of the molecules. It makes it straightforward to reproduce conditions that are hard to reach experimentally (such as high pressures or temperatures). The platform offers the end-to-end computational characterization of molecules: from the creation of the molecule(s) to study, building of the system, using predefined workflows or creating new ones, running calculations, and analyzing the results. Its main features are summarized here:

- Modeling and calculation of numerous physico-chemical processes and descriptors such as adsorption, agglomeration, surface tension, interfacial tension, glass transition temperature, radius of gyration, persistence length, solubility, and density, among others;
- Modeling based on molecular dynamics;
- Several force fields available;
- Construction of homopolymers and copolymers (block, random) of any size, ionic, branched, cross-linked;

- Wide range of thermodynamic conditions;
- Calculations run in the cloud with the latest GPU hardware;
- Computations can be conducted by non-expert users in computational chemistry;
- Catalog of ready-to-use molecules and workflows;
- Especially suited for polymer and surfactant chemistries.

High-throughput calculations generate large datasets of accurate and consistent results that can be used to train ML models for the fast prediction of properties. Nextmol offers access to ML models for the prediction of, for instance, glass transition temperature (T<sub>g</sub>) and solubility parameters of polymers (including biopolymers). Its computational lab can characterize complex formulations of polymers and surfactants, composed of several million atoms. Furthermore, our technology allows to study a wide range of surface and interface phenomena, such as adsorption affinity at interfaces, formation of self-assembled surface films and micelles, collective effects of adsorbed molecules (dispersion, anti-agglomeration, detergency, etc.), competition for the surface, or synergistic / antagonistic effects.

- Nextmol (Bytelab Solutions), Barcelona, Spain
- <https://www.nextmol.com/>



## ELEVATOR PITCH

### Computational Chemistry

Nextmol is a deep tech startup dedicated to the development of advanced molecular modeling and artificial intelligence tools to accelerate R&D in the chemical industry. It is a spin-off company of the Barcelona Supercomputing Center, the national supercomputing facility in Spain.

Since its creation in 2019, Nextmol has done projects for several multinational companies, both in the form of services and via its software-as-a-service (SaaS) platform for molecular characterization, and has been granted numerous prestigious national and international grants and awards.

Nextmol is an R&D-intensive company, with a total of 40 years of research experience and more than 60 peer-reviewed publications in high-impact journals among its team members. The company's scientific activity focuses on the development of algorithms and tools for the design of best-in-class and more sustainable chemicals for different applications, including oilfield chemicals, fuel additives, lubricants, detergents, or cosmetics.

Nextmol's mission is to help the chemical industry in its green and digital transition by making the R&D processes much faster and more efficient.

#### Milestones

##### 2017 – 2019

- Industrial projects at the Barcelona Supercomputing Center

##### 2019

- Creation of Nextmol

##### 2021

- Developed capabilities for surfactants modeling

##### 2022

- South Summit award to Best Industry 5.0 start-up

##### 2023

- Carried out successful high-throughput screening of bio-based polymers
- Software platform launched

#### Roadmap

##### 2024

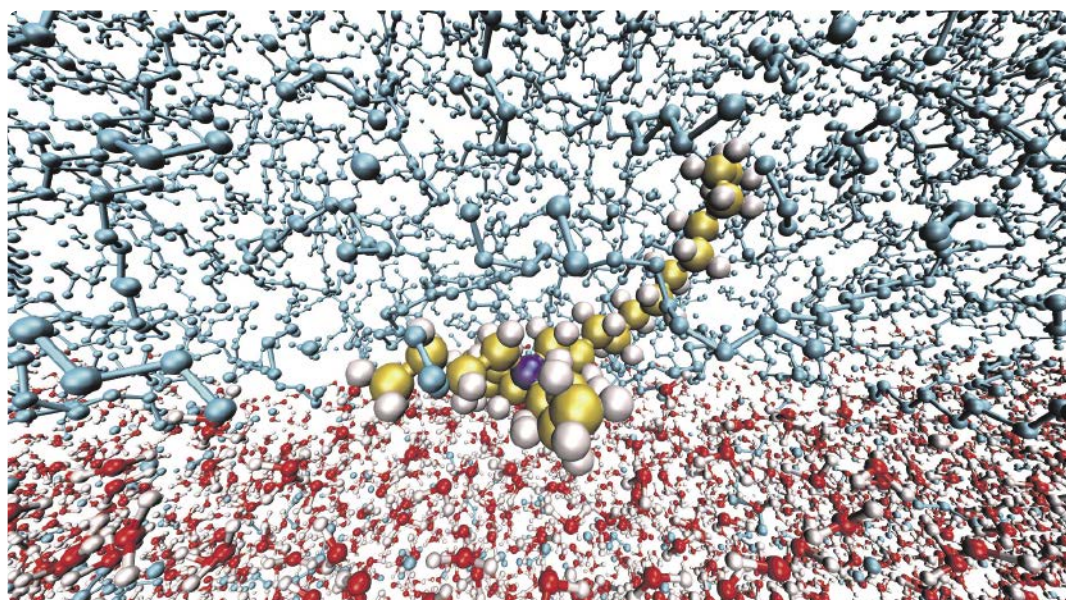
- Advanced Polymer builder and predictive ML models for polymer properties

##### 2025

- Expansion to new geographies

##### 2026

- Safety and sustainability features



Visualization of a molecular simulation

Nextmol's platform, chemistries and applications

# Solving the Toughest R&D Challenges

## Accelerate Chemical and Material Development

Process manufacturing companies waste almost \$100 billion globally every year while formulating novel materials and chemicals due to the trial-and-error approach to R&D and the lack of tools to leverage the experimental data in real-time. The London, UK-headquartered start-up Quantum Boost tackles this by applying the power of modern machine learning to help R&D teams design and run more targeted experiments to get to relevant insights more efficiently. Their formulation development platform enables customers to accelerate the R&D process and save up to 50% of experimental resources. CHEManager wanted to know from Filip Auksztol, CEO, and Kacper Kielak, CTO of Quantum Boost, what makes the company's technology so special and what its plans are for further development.

### **CHEManager:** How can researchers save so much time using your formulation development platform?

**Filip Auksztol:** Traditional approaches like design of experiments — DoE for short — and trial-and-error rely on pre-determined patterns or a researcher's instinct, which can lead to extensive and time-consuming experimentation. For instance, classical DoE has a static approach and initial randomness in selecting points within the factor space. This often reduces its ability to consistently identify and execute the most impactful and efficient experiments. Our technology, on the other hand, pinpoints the most critical factors and interactions from the start. As a result, our platform reduces the need for many iterations, enabling researchers to achieve their objectives with significantly fewer experiments — often reducing the number of experiments performed threefold compared to conventional methods.

### **How does Quantum Boost's technology differ from standard DoE software?**

**F. Auksztol:** Quantum Boost's technology deviates from standard DoE software by incorporating Bayesian optimization, which allows it to learn and adapt from each experiment's results. This method is much more dynamic and efficient compared to the rigid, exhaustive approach of DoE, which often requires testing all possible variable combinations. Quantum Boost's smart algorithms optimize the experimental journey, significantly reducing unnecessary tests.

Our platform features an intuitive interface designed to align with the user's workflow. It handles the statistical complexities in the background, allowing users to focus more on the experimentation and less on the computational intricacies. This thoughtful combination of easy-to-use design with advanced computational strategies makes Quantum Boost stand out as a great tool for navigating future material and chemical development challenges.

### **What is Quantum Boost's business model?**

**F. Auksztol:** Our business model is built around a subscription-based platform as a service, offering various tiers to suit different needs and budgets. Clients can sign up for a free 14-day trial to experience our intuitive AI-powered graphs and advanced machine-learning capabilities firsthand. After the trial, they can choose our Starter Pack at \$95 a month, which continues to provide access to our dynamic formulation development platform. For larger organizations requiring a more bespoke approach, we offer an Enterprise tier, which is custom-tailored to align with the company's specific requirements. This tiered structure ensures flexibility and scalability for businesses of all sizes, allowing them to leverage our technology for efficient and effective R&D.

### **Are you already working with clients on specific projects?**



Filip Auksztol, CEO, Quantum Boost



Kacper Kielak, CTO, Quantum Boost

**F. Auksztol:** Absolutely, Quantum Boost has collaborated with clients on specific projects across a range of applications, like 3D ink formulation, coatings and lubricants. The feedback from the specialty chemicals industry has been overwhelmingly positive.

### **What specialist expertise is represented on the company's team?**

**Kacper Kielak:** My co-founder, Filip Auksztol, brings his Oxford-honed expertise in material science alongside our team of seasoned data scientists and engineers, all well-versed in industry needs through collaboration with formulation scientists, ensuring our platform aligns advanced machine learning with practical industry applications.

### **What are your plans for the future of Quantum Boost?**

**F. Auksztol:** The company is on a trajectory to democratize access to advanced AI-driven R&D tools. We started as an exclusive platform, but our vision has evolved. Now, with a free tier available, we're opening the doors for all levels of formulation scientists, from professionals to enthusiasts, to experience the benefits of our algorithms and accelerate their research and development.

Looking ahead, our focus is on nurturing a shift in the industry towards the widespread adoption of artificial intelligence. We're not just offering

## PERSONAL PROFILE

**Filip Auksztol**, an Oxford alum with a rich background in materials science, leads Quantum Boost as CEO. His expertise in pioneering AI tools for material and chemical discovery is grounded in his deep-tech business development experience and quantum technologies research. At Quantum Boost, he leads the charge in applying AI to transform R&D, enhancing industry practices and encouraging innovative partnerships.

**Kacper Kielak**, CTO of Quantum Boost and a Trinity College Cambridge dropout, is a machine learning specialist whose work has been cited by leading AI research labs including Google Brain, Microsoft Research, and Meta AI Research. With a diverse background that includes roles at Amazon and JPMorgan, he is a pivotal figure in driving innovation and artificial intelligence at Quantum Boost, focusing on groundbreaking efficiency in material and chemical discovery.

a superior platform; we're leading a movement to redefine how research is conducted in the chemical and material sciences. By continually enhancing our software and making AI tools more accessible, we aim to empower scientists to make breakthroughs more efficiently and precisely. Quantum Boost's future is about innovation and inclusion.





## BUSINESS IDEA

### Formulate Products 5x Faster with AI

Process manufacturing companies waste almost \$100 billion globally every year while formulating novel materials and chemicals due to the trial-and-error approach to R&D and the lack of tools to leverage the experimental data in real-time.

Quantum Boost, founded in Singapore in 2019, tackles this by applying the power of modern machine learning to help R&D teams design and run more targeted experiments to get to relevant insights more efficiently. This approach not only enhances productivity but also fosters innovation in developing new materials and chemicals. We deliver a formulation development platform that enables any formulator, hobbyist or industrial expert, to accelerate the R&D process and save on valuable experimental resources.

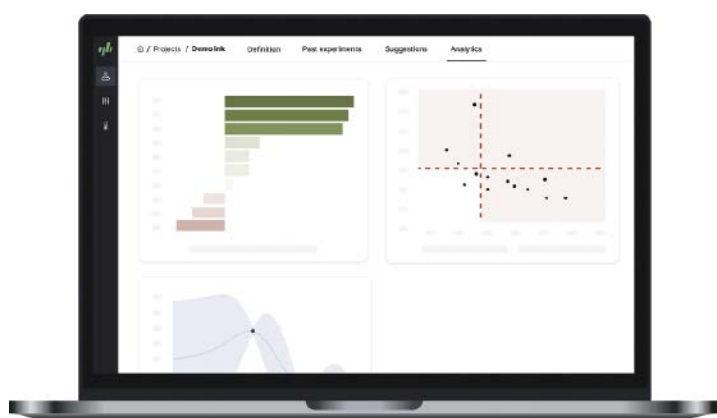
Quantum Boost enhances R&D accessibility through its cloud-based web platform. This platform facilitates the acceleration, management, and analysis of experimental processes in R&D. The platform's user experience is specifically tailored for formulators of any experience, ensuring that it is user-friendly and scalable. By simplifying advanced experimentation and analysis, the platform

aims to make the R&D process more inclusive and efficient, supporting a wide spectrum of formulation and material development projects.

We've established ourselves as a game-changer in the industry by working hand-in-hand with leading companies in the ink, paints & coatings, pharmaceuticals and specialty chemical sectors. Our approach has been directly compared with other design of experiment (DoE) software alternatives, and the results are undeniable. Clients using our solutions consistently achieve a two to five times acceleration in their outcomes, a clear testament to the effectiveness and efficiency of our approach.

Our consistent record of enhancing client performance has established us as a reliable and respected choice in the industry, and we have been growing rapidly ever since our inception. This growth reflects our commitment to excellence and our ability to adapt to the changing demands of the R&D sector.

■ Quantum Boost, London, UK  
www.quantumboost.com



The Quantum Boost platform is an AI formulation assistant that helps researchers develop breakthrough chemicals and materials faster than ever.

## ELEVATOR PITCH

### R&D Revolutionized

Quantum Boost is transforming the field of research and development with its cutting-edge cloud platform. By harnessing the power of Artificial Intelligence, we streamline the R&D process, enabling teams to achieve their objectives with unmatched speed and efficiency. Our platform offers an intuitive interface that simplifies complex data analysis and experimental design, allowing users to focus on innovation and discovery. Quantum Boost is the key to unlocking faster, more effective R&D outcomes for small-scale projects or large industrial operations.

#### Milestones

##### 2021

- Filip and Kacper founded Quantum Boost in Singapore under the wings of Entrepreneur First accelerator
- Quantum Boost secured initial venture capital funding.
- Launch of the QB platform and acquisition of the first paying customers

##### 2022

- Relocation of the Singapore headquarters to the UK
- Raising a pre-seed round with European investors, Inovo VC
- Growth of the team, product capabilities and customer base

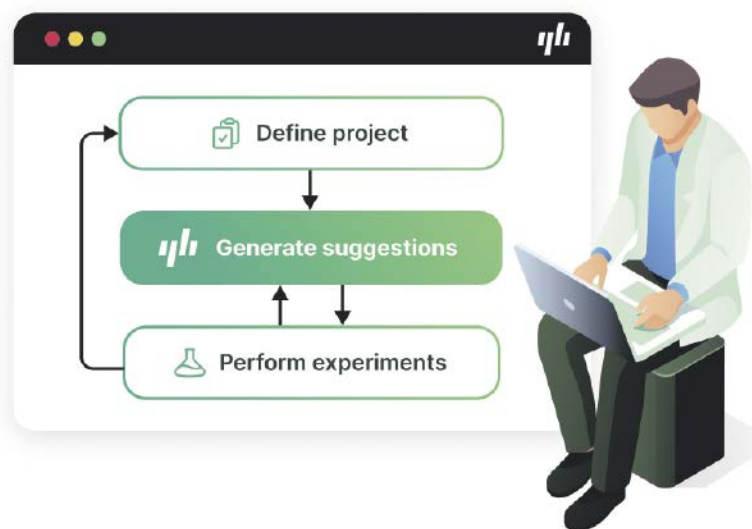
##### 2023

- The Quantum Boost platform was released publicly with a subscription model and a 14-day free trial.
- Collaboration with Quadra Chemicals for further development of the product in the chemical market and distribution in the USA & Canada

#### Roadmap

Quantum Boost is committed to relentlessly refining our platform. We're focused on rolling out new, impactful features and enhancing user experience, always in line with the latest in AI and machine learning. By integrating user feedback and technological advances, we aim to not only keep pace with but actively shape the evolving landscape of R&D.

As we recently unveiled Quantum Boost to the general public, our roadmap for the near future is focused on broadening its reach and influence within the R&D community. Our goal is not just to introduce a new tool, but to be a catalyst for the industry's transition towards integrating AI in R&D processes. We are committed to leading this paradigm shift and encouraging the industry to embrace this new era of technological advancement.



Quantum Boost's flexible workflow adapts to evolving project definitions, allowing modifications without sacrificing data or progress—unlike traditional DoE methods.

# Making Lab Automation Actually Work

## Augmenting Scientists with Transformative Technology

Manual experiment monitoring and data capture is still the status quo in most biotech and pharma labs, compromising efficiency and project timescales. But there is a better way. To accelerate scientific excellence, Reach Industries has created the visual lab intelligence platform Lumi, which leverages computer vision, voice, and machine learning to automatically capture operational data in labs. This system eliminates tedious data management and allows scientists to use transformative technology to manage laboratory operations and gain a deeper understanding of their reactions and processes. Silas Adekunle, co-founder and CEO of Bristol, UK-based Reach Industries, describes the company's vision, direction and next steps in its development to CHEManager.



Chris Beck, CTO, and Silas Adekunle, CEO, Reach Industries

### **CHEManager:** In a nutshell, what does Reach Industries do?

**Silas Adekunle:** Reach Industries is at the forefront of integrating digitalization and automation into the medicines development and manufacturing process. Our pioneering visual lab intelligence platform, Lumi, is a fusion of machine learning and computer vision technology. This platform is designed to optimize operational data capture, analysis, and process automation, thereby enhancing the repeatability and productivity of laboratory and manufacturing environments within the pharmaceutical sector, allowing medicines to get to market significantly faster and more efficiently.

### **What sectors and market segments does your company operate in?**

**S. Adekunle:** We operate primarily in the pharmaceutical sector, targeting all stages of medicines development, from discovery and process development to quality assurance and compliance in manufacturing. We are also exploring potential applications in biotech and biomanufacturing. This positions us across various segments of the global laboratory automation market and the pharmaceutical automation market.

### **What is/are Reach Industries' primary business model(s)?**

**S. Adekunle:** Our core business model revolves around providing both hardware and software as a service — or SaaS — platform access.

### **What does the competitive landscape look like for Reach Industries?**

**S. Adekunle:** We operate in a competitive market where various technologies target different aspects of the development and manufacturing value chain, ranging from audio data collection and electronic lab notebook providers to biolab robotics companies. However, we are highly distinguished due to Lumi's unique ability to offer comprehensive operational data monitoring, insights, and automation capabilities through advanced machine learning and computer vision technology.

### **What valuable experiences have you had in your entrepreneurial career so far?**

**S. Adekunle:** One of the most valuable experiences for us has been during the development of Lumi's core technology. It required significant research and development in active labs, sometimes in regulated environments. This could only be achieved via a collaborative approach with some of our earliest customers such as CatSci, a leading CRO. Engaging directly with end-users

early in the development process provided us with invaluable insights into the practical challenges and specific needs within the pharmaceutical industry. This collaboration not only influenced the technological development of Lumi but also helped us shape a customer-centric approach in our business model.

### **What are your next steps in technology and business development?**

**Chris Beck:** We are currently focused on further enhancing Lumi's functionality, particularly for operational data capture and intelligence specific to process development and manufacturing. We're strengthening the following capabilities of the platform:

- Complete plug'n'play remote monitoring and hands-free data capture of operational data.
- Easy and secure data warehousing for analysis, sharing and exporting with full auditing and traceability.
- Easy no-code process automation and pipelines.

We also have some exciting projects in the research phase that include novel data types, we are actively recruiting additional engineers to support this development which is inline with our business goals to expand our market presence and establish new partnerships.

## PERSONAL PROFILES

**Silas Adekunle**, CEO and co-founder of Reach Industries, is a Nigerian-British engineer, inventor and serial entrepreneur specializing in robotics & AI technology. Educated in the UK, he graduated with a First Class Honours Bachelor of Science in robotics technology from the UWE Bristol Robotics Laboratory. His achievements have been recognized with multiple honors, including Forbes 30 Under 30 in both Europe and Africa for Technology and Entrepreneurship. Adekunle's work at Reach Industries focuses on combining his technical expertise and entrepreneurial skills for business development.

**Chris Beck**, the CTO and co-founder of Reach Industries, is a seasoned technology leader with a strong background in AI, Robotics, and emerging technologies. He holds a Master of Science in Robotics from the University of Reading and dropped out of a Ph.D. in Computer Science, specializing in computer vision for robotics, from the University of Bristol due to the rapid growth of another start-up he co-founded.





**BUSINESS IDEA**

## Revolutionizing Pharma with Visual Intelligence

In the dynamic world of pharmaceutical research and development (R&D), Reach Industries emerges as a game-changer. Founded in 2019 and based in Bristol, UK, Reach Industries is redefining the medicines development landscape with its innovative visual lab intelligence platform, Lumi. This pioneering solution integrates machine learning and computer vision technology to automate operational data capture, insights and processes in labs, augmenting scientists so they can focus on the more creative aspects of their work.

Lumi, is a novel system comprising two core components: LabEye and the Lumi Cloud Platform. LabEye is an AI-empowered laboratory camera capable of capturing a comprehensive view of laboratory experiments and manufacturing processes. This device records crucial observations and sends the data securely to the Lumi cloud platform. The Lumi Cloud Platform is where the magic happens. It's where scientists can access and analyze the data captured by Lumi through an intuitive dashboard. The platform's machine learning algorithms offer insights by examining various user-defined parameters.

Additionally, it enhances environmental sustainability by reducing waste through improved quality control and supports social welfare by boosting worker health and safety. Its remote monitoring and automation capabilities significantly lessen workers' exposure to hazardous environments, promoting inclusivity.

The versatility of Lumi positions Reach Industries across multiple market segments in the pharmaceutical sector. From drug discovery and process development to quality assurance and compliance, Lumi is designed to cater to a broad spectrum of needs in the pharmaceutical value chain. The primary business model revolves around offering both hardware and software as a service, targeting pharmaceutical companies, research institutes, and innovative start-ups in the drug development domain.

Lumi has been deployed at various CROs and is currently undergoing trials at some of the most prestigious European and USA Pharma companies.



■ Reach Industries Limited, Bristol, UK  
www.reach.industries



**ELEVATOR PITCH**

## Visual Lab Intelligence Platform

Reach Industries is building a visual lab intelligence platform called Lumi. Lumi visually captures, understands, analyzes and contextualizes operational information that otherwise would require human intelligence in Lab environments, with applications across all stages of medicines development, from discovery and process development to quality assurance and compliance in manufacturing.

Lumi's proven impact is:

- It automates experiment monitoring and data capture with intelligent analysis and smart alerts.
- It enhances understanding of reactions and processes for scientists.
- It makes remote collaboration & knowledge sharing significantly easier with visual and contextual operational data.
- It provides an unparalleled layer of operational and business intelligence for Pharma and BioTech companies.

**2021**

- Collaboration begins with CatSci, a leading CRO
- Reach Industries completes its pre-seed VC round

**2022**

- Lumi expands across teams at CatSci and expands to universities in the UK

**2023**

- Lumi begin pilot at one of the world's largest biopharma companies
- Reach Industries completes its seed VC round

### Roadmap

Reach Industries is currently focused on further enhancing Lumi's functionality and is actively recruiting additional engineers to support this development. From a business perspective, it aims to expand the company's market presence and establish new partnerships, with an additional VC funding round to support its growth.

### Milestones

**2019**

- Reach Industries is founded

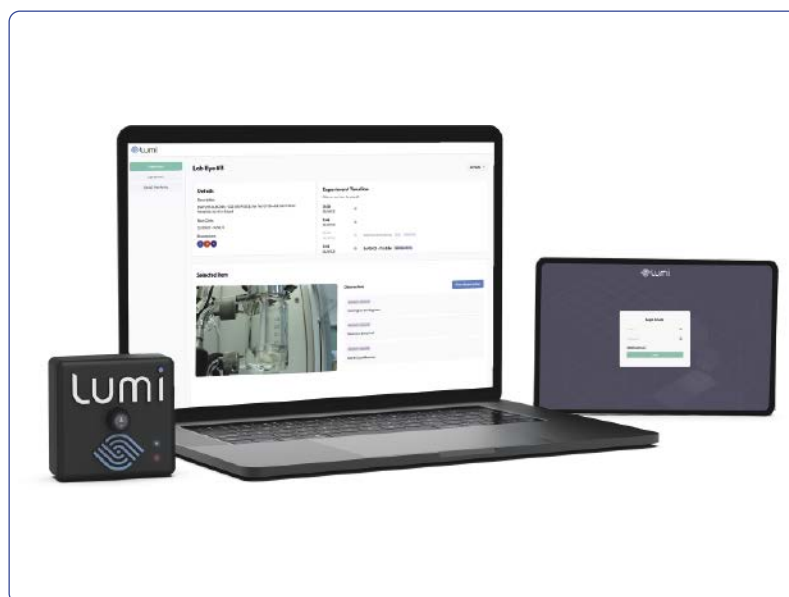
**2020**

- Reach Industries begins work on Lumi in response to various inefficiencies observed in pharma workflows and processes



Reach Industries is an early-stage start-up with a mission to augment scientists and make labs more efficient, so they can better and faster tackle world challenges.

© Reach Industries



Reach Industries has developed Lumi, a visual lab intelligence platform leveraging AI & computer vision to capture and analyse experiment data safely and efficiently.

© Reach Industries



## European Chemistry Partnering 2024

The 8<sup>th</sup> European Chemistry Partnering (ECP), a business speed dating event for the chemical and biotech industry, will be held on February 6, 2024 as a live conference in Frankfurt/Main, Germany, and on February 20–21 as an online event. Corporates can find new technologies to solve the problems of today and tomorrow. Start-ups and SMEs can engage in dialog with venture capitalists and industry representatives.

■ <https://ecp.european-chemistry-partnering.com/8th-ecp>

## Interphex 2024

The International Pharmaceutical Expo (Interphex), dedicated to pharma and biotech innovation from development to marketing, is scheduled to take place on April 16–18, 2024, in New York, NY, USA. The annual trade show and technical conference brings over 10,000 global industry professionals and 625+ leading suppliers together. The event provides a combination of no cost technical conference, exhibits, demonstrations, and networking events.

■ [www.interphex.com](http://www.interphex.com)

## Achema 2024

Achema, to take place on June 10–14, 2024, in Frankfurt, Germany, is the world forum for chemical engineering, process engineering and biotechnology. Manufacturers and service providers from over 50 countries present their products for chemical, pharmaceutical and biotech research and manufacturing as well as energy and environmental services. The accompanying congress features scientific lectures and numerous events.

■ [www.achema.de/en](http://www.achema.de/en)

## Chemspec Europe 2024

Chemspec Europe is to take place on June 19–20, 2024, in Düsseldorf, Germany. The event is the key platform for manufacturers, suppliers and distributors of fine and specialty chemicals to showcase their products and services to a dedicated audience of professionals in the industry sector. The product portfolio of this event covers fine and specialty chemicals for various industries. Conferences presenting the latest results of ongoing R&D projects round-off the show.

■ [www.chemspecurope.com](http://www.chemspecurope.com)

## Index

Accenture	4	LanzaTech	22
Alantum	22	McGraw-Hill	26
Azelis	16, back cover	Neil A. Burns	18
BASF	7, 19	Nextmol/Bytelab Solutions	28
CatSci	33	Nova Chemicals	20
Chemical Innovation Factory (CIF)	24	Porocel	22
CEPSA	19	Quantum Boost	30
Evonik	19, 22	Reach Industries	32
FECC	14	Röhm	22
Freie Universität Berlin	24	Ruhr-IP Patentanwälte	27
GreenChem	24	SAP	6
Häffner	17	Shell	19
Henkel	19	Simon Kucher & Partners	8
Holiferm	19	Technip	22
Hoyer	5	Technische Universität Berlin	24
Humboldt-University Berlin	24	The Boston Consulting Group	10
IMCD	14	Together for Sustainability (TfS)	7, 21
ISPE	inside front cover	Unilever	19
Jeneil Bioproducts	19	Wiley-VCH	26

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