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Supply Chain and Logistics Trends in the Chemical Industry, Pharmaceutical Logistics between Globalization and National Regulation

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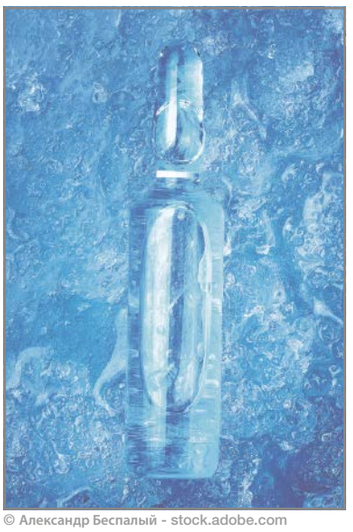

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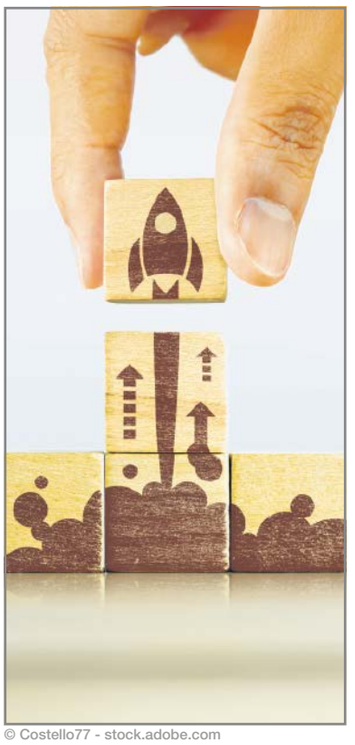

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Markets & Strategy

Fine & Specialty Chemicals

Logistics

Innovation

The Future of Demand for Chemicals

Capturing Growth and Securing Price Premiums

The chemical industry is seeing a major shift toward sustainability-related chemical products, with demand expected to grow 4.5 times faster than for conventional products. This change is driven by customer preferences and companies across industries aligning offerings, with both consumer and industry buyers willing to pay more for eco-friendly options. To capitalize on this opportunity, chemical companies must revise how they go to market, from business models to value propositions.

Demand for environmentally friendly products is on the rise, with more than half of consumers preferring these options, and a growing number of people willing to pay more for sustainable products.

Indeed, our global research shows 51% of consumers prefer to buy environmentally friendly products, and an analysis of company news releases and reports reveals that business-to-consumer companies (B2C) recognize this change (see Fig.1).

A US survey by PDI Technologies indicates that the share of consumers willing to pay more for sustainable products grew by 2 percentage points, from 66% in 2022 to 68% in 2023, and then by 12 percentage points to 80% in 2024.

Industry Commitments to Sustainability

This consumer shift propels manufacturing and consumer goods companies to develop and promote sustainable offerings and set and publicly share sustainability goals. For example, L'Oréal pledges to use 95% bio-based ingredients, derived from minerals or circular processes, by 2030; H&M Group aims to use recycled or sustainably sourced materials for 100% of its packaging by 2030.

Chemical companies can position themselves as strategic partners, helping customers meet their sustainability commitments. The demand for sustainability-related offerings involves two kinds of chemical products: sustainable chemicals to produce eco-friendly products and conventional chemicals used to manufacture products that reduce environmental impact, such as solar panels or electric vehicles.

As chemical customer industries strive to meet their decarbonization targets, the demand for sustainability-related chemical offerings will continue to grow. Demand for sustainability-related chemical products should increase from $340 billion in 2023 to $570 billion by 2028, according to a recent report published by Accenture. With an anticipated 11% compound annual growth rate (CAGR), this market offers a substantial opportunity for growth and innovation, expanding at a rate 4.5 times greater than the 2.4% CAGR projected for conventional products.

Growth in Sustainability-Related Segments

Delving deeper into the chemical sector's customer industries, end-consumer demand is driving higher growth in sustainability-related segments than conventional ones, and we expect this shift to continue shaping future chemical demand.

By analyzing global sales growth for 69 companies across multiple industries, we found that sustainability-related segments consistently outperformed overall growth, including conventional segments (see Fig. 2 & 3).

For example, from 2021 to 2023, the auto sector saw electric and hybrid vehicle sales grow by almost 40%, while overall growth was just under 10%, slowed by conventional products. In textiles, sustainability-related segments saw double-digit growth, contrasting with negative growth in conventional segments. Home and personal care products with sustainable ingredients drove growth rates more than double the overall average. These shifts highlight the influence of sustainability on industry growth and future chemical demand.

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Bernd Elser, Accenture

Strategies for Chemical Companies

While chemical companies can meet some future demand with existing offerings, capturing other aspects will require innovation, advanced technologies and new business models.

We've identified three key actions to help chemical companies capitalize on growing sustainability-related demand:

"As chemical customer industries strive to meet their decarbonization targets, the demand for sustainability-related chemical offerings will continue to grow."

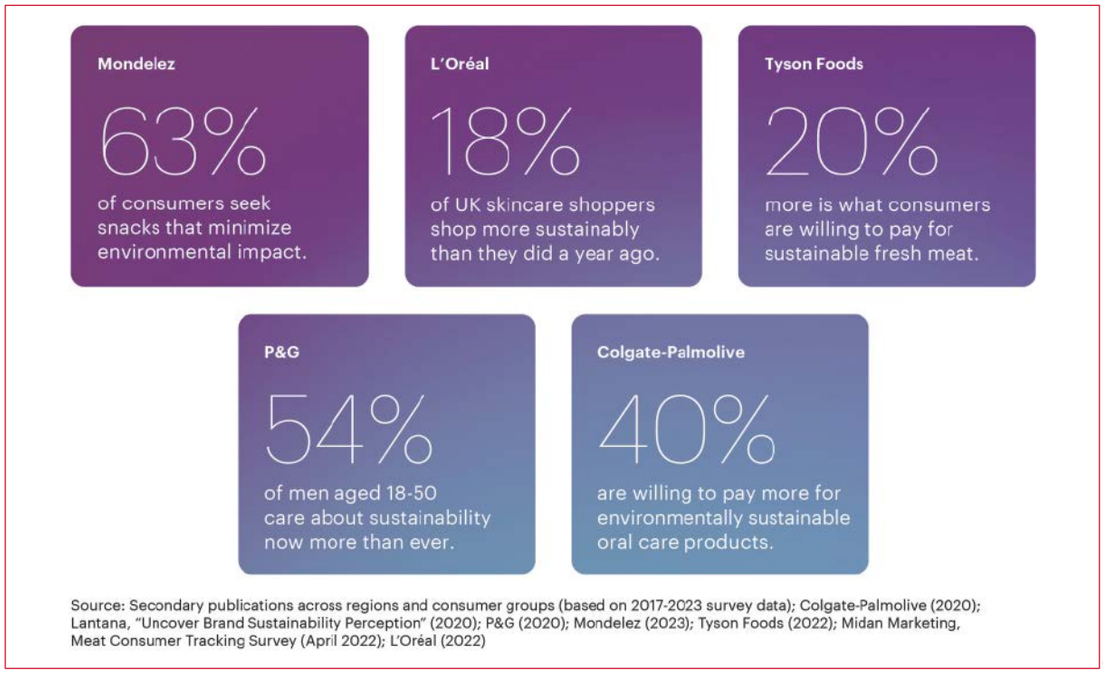

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Fig. 1: Top B2C companies believe sustainability influences consumer purchases.

■ 1. Accelerate innovation

R&D processes can be completely reinvented with digital, data and AI technologies. To meet future demand for

sustainable products with low greenhouse gas emissions, substantial innovation will be needed, including solutions with cost-effective, eco-friendly chemical processes and recycled or bio-based feedstocks.

Despite limited innovation budgets, advanced digital technologies such as generative AI can boost R&D success rates by up to 70%, our research shows. These tools can reduce time spent on manual tasks, allowing researchers to focus on value-creating activities such as collaboration and ideation.

For example, lab experiments can shift to quantum-powered virtual experiments, and in-house R&D units can transform into innovation ecosystems that foster collaboration with external partners.

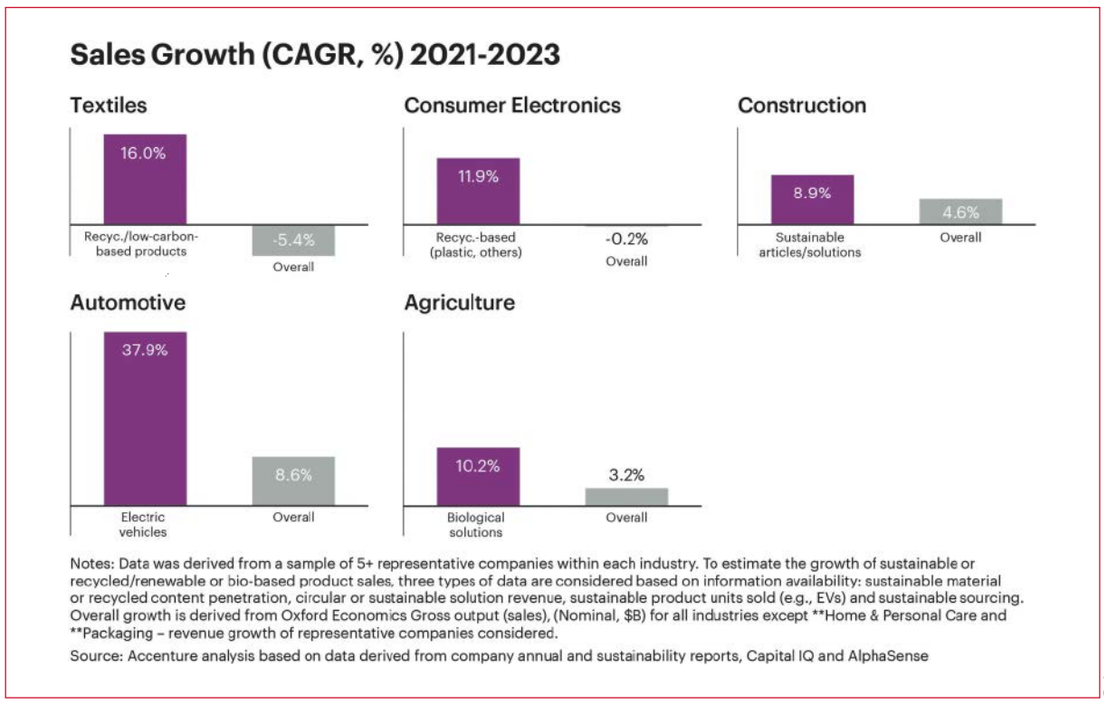

Fig. 2: Sustainability-related segments outpace conventional industry growth.

■ 2. Develop a transparent value proposition

Chemical companies can communicate a compelling value proposition that emphasizes the traceability and transparency of sustainability-related features. But sustainable chemical products face a challenge: Despite eco-friendly changes such as using sustainable feedstocks or reducing greenhouse gas emissions, the chemical molecule remains unchanged. Environmentally friendly modifications, which add value, may not be immediately obvious to buyers.

Technologies such as blockchain, digital product passports and business networks can improve traceability and transparency. Blockchain creates a transparent ledger of the chemical production process, while digital passports give detailed information about a product's value chain. Additionally, business networks connect companies within a supply chain through a digital platform, facilitating traceability.

By offering full transparency and traceability for the sustainability benefits of their products, companies can stand out in the market. This transparency also helps chemical companies justify their share of the premiums paid by consumers.

■ 3. Build value-chain partnerships

Forming strategic partnerships with a diverse set of stakeholders—including chemical customers, governments, technology companies and non-governmental organizations (NGOs)—is key. To drive collective success, these partnerships should focus on co-creation, shared innovation, investment commitments and risk- and profit-sharing.

Collaborating with technology companies can provide access to cutting-edge solutions, while partnerships with governments and NGOs can help navigate regulatory landscapes and address community concerns.

By fostering a collaborative ecosystem, chemical companies can improve their innovation capabilities and ensure their sustainability efforts are aligned with broader industry, consumer and societal preferences.

Capturing Growth from Future Demand

The shift toward sustainability-related offerings in the chemical industry is more than a trend; it's a fundamental change driven by consumer demand and innovation across a variety of sectors. By taking these three actions, chemical companies can meet the increasing demand for sustainability-related products, secure price premiums and position themselves for growth.

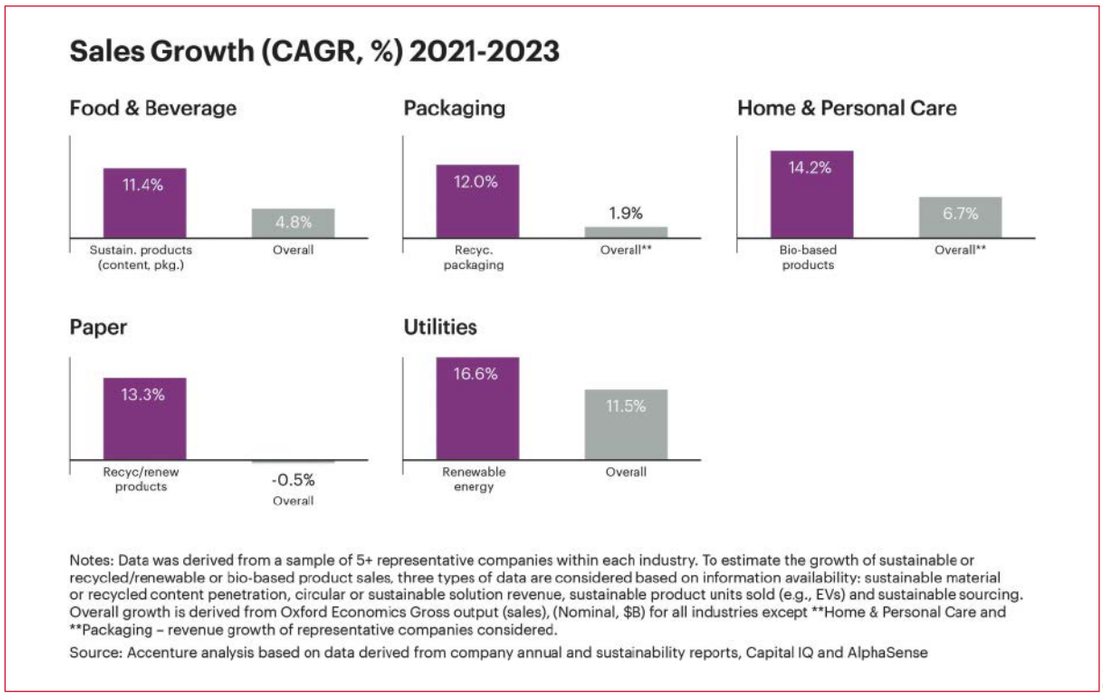

Fig. 3: Sustainability-related segments outpace conventional industry growth—cont.

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Substances of Concern

A New Cornerstone for Chemicals Management in the EU

The EU Chemicals Strategy for Sustainability (CSS) shed a new light on the concept of 'Substance of Concern'. So far, risk management measures for chemicals (in products) in the EU was risk-based, mostly preceded by an identification as 'Substance of Very High Concern' and/or by the demonstration of a risk to human health or the environment. By contrast, the concept of 'Substance of Concern', increasingly present in a variety of horizontal and sectoral EU legislations, is symbolic of a shift to a more hazard-centric approach to chemicals regulation in the EU, with important consequences in various regulatory contexts.

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Background of the Concept of Substances of Concern

Historically, in the EU's chemicals legislation (notably REACh), concerns posed by a substance only trigger the adoption of risk management measures to the extent that they reach a certain level of gravity, possibly initiated by their classification in a given hazard class under the CLP Regulation, thereby qualifying a substance as 'Substance of Very High Concern' (SVHC). This mechanism serves as a flagging mechanism for the most hazardous substances.

Such identification does not trigger any risk management measures (RMM) per se, but merely information requirements across the supply chain. Beyond that, it may attract authorities' attention towards the eventual adoption of further RMM, such as for example an inclusion in the REACh Authorization List or a restriction.

A broader understanding of the notion of Substance of Concern can be found in the "sectoral" biocides and plant protection products regulations. Under both regulations, however, qualifying as such merely excludes products containing the substance from fast-track authorization and approval procedures but does not bear regulatory consequences.

The Chemicals Strategy for Sustainability

The concept was revived with the launching of the EU's CSS in October 2020, which expanded it to include substances in the REACh Candidate List, as well as substances "which hamper recycling for safe and high quality secondary raw materials". With this evolution, the concept is no longer only safety-related, as consideration is now given to circularity objectives.

The strategy recommended the minimization of the presence of Substances of Concern, and, for the most harmful, a phasing out for non-essential uses. This rationale was subsequently incorporated into a range of legislations adopted in the context of the Green Deal.

A first example is the ecodesign for sustainable products regulation (ESPR), which establishes a general framework for the definition of ecodesign requirements for different types of products and materials. Some requirements are related to the presence of Substances of Concern, which receives in that context a definition which now constitutes a central reference point for other EU legislations.

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"With this evolution, the concept is no longer only safety-related, as consideration is now given to circularity objectives."

The definition of Substance of Concern, in line with the CSS, shows an extension beyond safety considerations. The notion is indeed substantially broadened to include substances with confirmed as well as suspected hazardous properties (e.g. CMRs and Endocrine Disruptors Category 1 and 2). Substances can also be deemed 'of

concern' if they negatively affect "the reuse and recycling of materials in the product in which it is present".

From that definition in the ESPR itself, the actual classification of substances as being 'of concern', will be defined at a later stage, within product and material-specific ecodesign requirements. Monitoring the adoption of the first set of requirements is key as they may set a precedent.

The consequences of the identification of a Substance of Concern will depend on each ecodesign requirement, but we already expect that it will trigger information and notification requirements of their presence throughout a products' value chain and lifecycle. This may expand to restrictions on the substances' use in a whole category of product or material.

"The consequences of the identification of a Substance of Concern will depend on each ecodesign requirement"

Divergence between ecodesign requirements may potentially lead to substances being banned for use in some products but not others—without a dedicated risk assessment. The same substance may in fact even not be considered as being of concern for other product categories. This may lead to important incoherencies and subsequent hurdles for companies.

In the meantime, the ESPR definition became a reference point in other legislations, such as the Packaging and Packaging Waste Regulation (PPWR). The PPWR however sets its own procedure to determine the conditions under which a substance is deemed to hinder reuse and recycling, which could lead to other inconsistencies. The use of such substances shall be minimized in packaging, with the possibility of setting restrictions.

Another interesting reference is found in the Corporate Sustainability Reporting Directive (CSRD), which introduces reporting requirements on Substances of Concern. It foresees that an undertaking shall disclose whether and how its policies aim at the substitution and minimization of the use of such substances, present reduction targets and report on their conditions of production, use, distribution and import/export. Such reporting requirements constitute an enormous challenge for companies as well as an important information gathering exercise for authorities.

A Shift Towards a Hazard and Sustainability-Based Management of Chemicals

The concept is increasingly present in EU legislations, beyond the remits of chemicals regulation. This comes with serious implications and somehow appears as an extension of the generic approach to risk management, whereby the mere classification of substance as Substance of Concern can automatically trigger a ban in certain types of products. This accompanies an increased reliance on hazard classification as a proxy for risk in recent EU chemicals regulatory activities, although restrictive measures should remain based on a risk assessment, as proportionality commands that they be used only as a last resort.

This approach was notably pushed forward in the revision of the CLP Regulation, which highly incentivizes new hazard classifications and straightforward processes. It first does so by incorporating new hazard classes, i.e., ED, PBT/vPvB, and PMT/vPvM. It then facilitates hazard classification by empowering the Commission to initiate harmonized classification while this competence was so far exclusive to the industry and the Member States. Alignment between self-classifications is also incentivized and grouped classification prioritized, whenever scientifically justifiable. Considering that the Substance of Concern concept heavily relies on hazard classification, these changes will render it even more impactful.

"Considering that the Substance of Concern concept heavily relies on hazard classification, these changes will render it even more impactful."

In parallel, the evolution of the EU chemicals legislation from a risk-based to a more hazard-centric approach is also visible in the context of REACh restrictions, with authorities considering some properties (e.g., persistence) as a sufficient trigger for RMMs. The example of the PFAS restriction proposal is in this sense striking.

The Path Forward

The concept of Substance of Concern is progressively taking root in the European Union's legislation. Still, many acts remain to be adopted before it becomes fully operative and the actual consequences of a substance's qualification upon its use in products be defined.

Uncertainties remain, even more so considering that the concerned policies constitute an inheritance from the previous Commission. More caution could be expected from the newly designated Commission, with the transition from the Green Deal to a Clean Industrial Deal, oriented towards reinforcing competitiveness. Nonetheless, one should not expect a full breakout from the previous approach considering the Commission's recent expressed intentions regarding the REACh revision and ongoing substances restrictions.

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DE&I Cuts: What's at Stake for the Chemical Industry?

Why Reduction of DE&I is a Risk and How 'Women in Chemicals' Fills the Gap

Diversity, equity, and inclusion (DE&I) initiatives have become increasingly important for attracting diverse perspectives, improving problem solving and advancing innovation in companies. Additionally, they enable employee retention through building company cultures that foster belonging and enhance employee satisfaction. As companies continue to do business globally, DE&I efforts ensure that their employees are equipped with the skills, support, and resources to engage effectively across cultures and geographies.

As recent economic pressures build, we are seeing companies scaling back their investments in DE&I. The chemical industry relies on innovation and collaboration to drive success. Pressure to reduce these investments presents a risk to employees and their sense of belonging to their organizations. Companies that de-prioritize DE&I risk significant reductions in their long-term profitability, talent pipeline, employee retention, and overall competitiveness. 'Women in Chemicals' (WiC) recognizes this challenge. While for-profit organizations pare back these initiatives, we are actively working to fill this void of resources through initiatives that empower women and other underrepresented groups, foster collaboration, and drive meaningful change to the chemical industry.

The Costs of Cutting DE&I Investments

Despite recent headlines, countless studies show that DE&I efforts have a positive correlation with profitability. Recent BCG studies show that "leadership that prioritizes inclusion in the workplace can slash attrition risk by 50%". The average cost of replacing a mid-level employee is estimated to be around 100% of their annual salary. For marginal investments in DE&I initiatives, organizations derive massive cost savings by minimizing their turnover. BCG also found that when employees believe that their company is prioritizing DE&I programming, their wellbeing increases significantly allowing for a more productive workforce. Data also shows that organizations with diverse leadership teams and inclusive cultures outperform their peers and competitors. A McKinsey study found that organizations in the top quartile for gender diversity on executive teams were 25% more likely to have above-average profitability. Homogeneous groups often fall privy to groupthink while diversity brings varied perspectives, ignites innovative thinking, improves problem-solving, and strengthens decision making across organizations.

"As companies continue to do business globally, DE&I efforts ensure that their employees are equipped with the skills, support, and resources to engage effectively across cultures and geographies."

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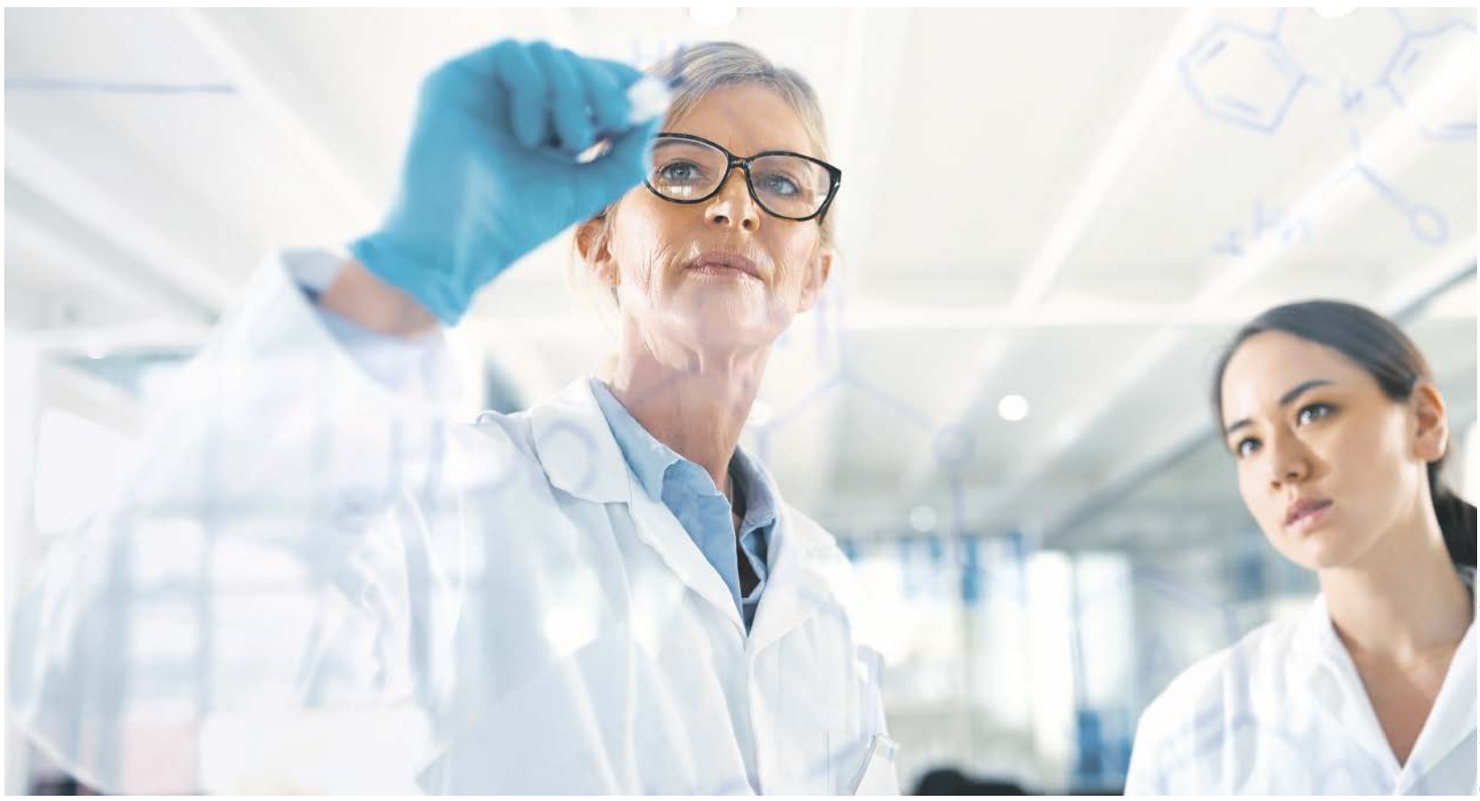
Kylie Wittl, Women in Chemicals

The stakes are particularly high for the chemical industry as we aim to provide innovative solutions to existential challenges. Leading cutting-edge technology in areas such as sustainability and energy transition requires the perspectives, thought leadership, and ingenuity that DE&I breeds. With-



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out intentional efforts to foster diverse teams, organizations and our industry as a whole risk falling behind in what continues to be an ever changing, competitive global market.

What is Women in Chemicals Doing

As multi-national companies with billion-dollar budgets begin to cut their DE&I initiatives, Women in Chemicals continues to double down on creating diverse, equitable and inclusive spaces for women in the chemical industry. Founded in 2021 on the heels of the "Me Too" Movement and the brazen murder of George Floyd when organizations' investments in DE&I were plentiful, Women in Chemicals identified and created opportunities to provide additional equitable outcomes in our industry. In this spirit of equity, we have always and will continue to ensure our membership is free. This allows anyone who wants to improve their personal or professional life to take advantage of our resources.

"While for-profit organizations pare back these initiatives, we are actively working to fill this void of resources through initiatives that empower women and other underrepresented groups, foster collaboration, and drive meaningful change to the chemical industry."

As recent trends indicate a significant decrease in the corporate investment of DE&I initiatives, Women in Chemicals continues to be dynamic and quick to respond to the industry's needs. Our members enjoy access to mentorship, networking, professional & personal development, and educational resources. A 501(c)(3) nonprofit, Women in Chemicals exists out of a passion to create a vibrant, support-centric community for women and allies to connect, collaborate, and thrive.

The Bigger Picture

Outside of my involvement with Women in Chemicals, I have had the fortune of working full time for organizations that prioritize robust investments into DE&I. With the creation of Women in Chemicals, there was a unique opportunity to foster the potential of others beyond the walls of my organization. Women in Chemicals was born out of a desire to expand our collective influence, in turn creating opportunities for our community to thrive in ways that elevate the industry as a whole.

"As companies face mounting challenges and competition, fostering diverse and inclusive teams will be essential to driving innovation, creating a sense of belonging for competitive talent and maintaining profitability."

Companies that enable their employees to leverage organizations like Women in Chemicals enhance their own employee value proposition, increase their employee engagement, and drive positive performance into their organizations. Reducing investments in DE&I is a decision that poses existential risks to singular organizations and the future of the chemical industry. As companies face mounting challenges and competition, fostering diverse and inclusive teams will be essential to driving innovation, creating a sense of belonging for competitive talent and maintaining profitability. Women in Chemicals offers a powerful platform to advance these goals, provide resources and connections, and support individuals and organizations alike.

By partnering with Women in Chemicals, companies can strengthen their DE&I value propositions, attract and retain top talent, and enhance their performance in a rapidly evolving market. Together, we can build a more inclusive, innovative, and successful chemical industry.

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Fostering Innovation and Collaboration

Sustainability and Digital Transformation Are Cornerstones of Specialty Chemicals Distributor IMCD's Strategy

Valerie Diele-Braun, CEO of IMCD, a leading global distributor and formulator of specialty chemicals and ingredients, sits down for an exclusive interview with CHEManager International's Christene Smith and Ralf Kempf. As she marks her first year in this pivotal role, Diele-Braun shares her vision for IMCD, the significant changes and achievements under her leadership, and the company's strong focus on sustainability. She also discusses IMCD's recent global expansions and how these efforts align with IMCD's overall strategic vision. She explores IMCD's strategic direction, accomplishments, and the challenges that lie ahead, offering a unique perspective on the dynamic trends currently shaping the market.

CHEManager International: Now that you are a year into your position as CEO, what have been the most significant changes and achievements under your leadership?

Valerie Diele-Braun: The company has excelled over the past 20 years, and I therefore see my mission as inducing more of an evolution than a revolution. Understanding the company correctly was crucial, and as a former board member, I had some insight already. Fine-tuning areas like sustainability and digital leadership are key to achieving even more excellence. We have established a sustainability program with a portfolio of products based on deep market understanding and innovation, and we are implementing ever more digital tools to enhance efficiency. Additionally, we have introduced a cultural value of continuous improvement to ensure we stay agile and ahead of the game. We continued our M&A track record, acquiring 12 companies last year, and developed numerous business opportunities with both new and existing principals, expanding geographically and adding new principals to our portfolio.

© IMCD

Valerie Diele-Braun, CEO, IMCD

Given your extensive international experience, how do you see the global market for specialty chemicals evolving, and what role do you envision IMCD playing in this landscape?

V. Diele-Braun: We need to be at our best in whatever field we operate because we are living in a VUCA (volatile, uncertain, complex, and ambiguous) world. In this chaotic environment, we must be the partner of choice for our principals and customers, which means being agile and responsive to ongoing changes. Consumers and governments are torn between the dual challenges of the economy and climate change, as seen with recent events like the LA fires and floods in Spain. The chemical industry needs to offer viable solutions, and distributors like IMCD must provide appropriate and cost-effective options to stay competitive. IMCD can play a leading role in digital transformation due to our speed, agility, and e-commerce tools. We are probably the only distribution company with a single CRM and ERP platform, and agility is crucial for success. This ability to adapt was one of the reasons I joined IMCD.

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At the past two FECC congresses, Boston Consulting Group experts were positive about the chemical distribution market, forecasting around 2-3% growth. Do you agree with this forecast, or are you more cautious about the sector's development?

V. Diele-Braun: I can't comment on specific numbers, but we are very positive about our industry and capabilities. The outsourcing trend continues, and our strong commercial relationships make us an effective and cost-efficient partner. Principals focus on innovation and efficiency, often investing in digital capabilities. Having IMCD handle commercial and supply chain aspects efficiently is a significant benefit. Our am-

bition is always to outperform the market.

IMCD has been actively expanding its presence in multiple regions, including its recent acquisition of Blumos in Latin America and Signet in India. Can you share more about these global expansion efforts and how they align with IMCD's overall strategic vision?

V. Diele-Braun: First, I'd like to comment on our acquisitions in 2023, such as Blumos in Chile, Daoquin in China, and Gova Ingredients in the Benelux. We have eight business lines, and our ambition is to be number one in each of them and in every country we operate. While we are one of the largest specialty chemicals distributors, we still have some way to go to achieve this. We strengthen markets through a combination of organic sales, cross-fertilization, new product lines, and M&A. Our acquisitions and investments allow us to quickly create critical mass in market segments, benefiting from economies of scale. This also helps our principals rationalize their structure and work with fewer distributors. For example, acquiring the last 30% of Signet Excipients made us a top company in India's pharma sector. With more than 80 Technical Centres worldwide, we have invested significantly over the year in lab work and product development, allowing us to roll out global trends quickly. We see ourselves as key partner for the digital infrastructure for our principals and customers.

> *"We strengthen markets through a combination of organic sales, cross-fertilization, new product lines, and M&A. Our acquisitions and investments allow us to quickly create critical mass in market segments, benefiting from economies of scale."*

IMCD has embedded sustainability into its business model, addressing global challenges for our planet and society. Could you elaborate on the specific initiatives IMCD is undertaking to promote sustainability and how these efforts are impacting your operations and partnerships?

V. Diele-Braun: We aim to be a force of influence by implementing sustainable solutions, developing a product portfolio with a better footprint. Examples include plant-based food and nutrition, dissolvable cosmetics, and lightweight materials for electric cars. We work with TfS (Together for Sustainability) and use EcoVadis methodology for our supplier screening. As a competitive employer, we offer good compensation and local ESG initiatives through our IMCD Cares Program. We focus on the total benefit of ownership and the overall benefit a product provides, rather than just comparing individual products. This approach helps us address potential customer reluctance to use sustainable materials by highlighting the broader benefits.

IMCD emphasizes the importance of collaboration, fostering connections and community.

© IMCD

IMCD is enhancing services through digitalization. Can you elaborate on these efforts and their impact on customer experiences? What future digital innovations can we expect from IMCD?

V. Diele-Braun: For many years, we have had one global IT platform, ERP, and CRM. Our MyIMCD customer platform, which is integrated with our website, provides a seamless commercial journey for customers. It provides a unified space for customers to access technical documentation, manage orders in real time, and explore IMCD's product and knowledge portfolio.

We are now launching the SalesAssistant, a guided product selection tool, allowing our sales experts to quickly find the best solutions, promoting our principals' products and suggesting additional beneficial products. Similarly, tools are being developed to enhance the company's ability to support customer needs with for instance AI-powered guided product search and product recommendation, in just a few clicks. We also use AI to support various tools and initiatives to stay efficient, and we provide seamless logistics solutions through our integrated supply chain platform.

Digitalization and digital transformation have been part of IMCD's journey since 2001. Despite challenges, we continued to invest in digital initiatives, showing our commitment. These tools enhance the expertise of our innovation labs and support our customers. With more than 80 labs worldwide, we invest in providing added value and we do that by sharing knowledge and best practices through unified digital tools and processes. IMCD focuses on growth, continuously seeking ways to support this growth and make our principals happy, and we believe that digital transformation is key.

IMCD operates in various, often fragmented market segments across multiple geographic regions. How does IMCD leverage synergies between its different business units to create value and enhance its overall performance?

V. Diele-Braun: One important aspect is our entrepreneurial spirit. We pride ourselves on our entrepreneurial people, who bring great ideas and new ways of working into the company. Successful ideas are shared as best practices, stimulating further innovation. Our matrix organization, which spans business groups and P&L in countries, fosters a can-do spirit and strong collaboration among employees. Each year, we welcome approximately 500 more employees, embracing newness and strengthening our DNA.

What do you perceive as the major hurdles and opportunities for the specialty chemicals and ingredients industry as a whole over the next five to ten years?

V. Diele-Braun: I don't see hurdles as obstacles but as opportunities to help our suppliers and principals. The ongoing consolidation of our principals means they need efficient and adaptable partners like us to remain commercially successful. Changing demographics, such as Generation Z's preference for digital interactions, present amazing opportunities for us. We have the tools to meet these new ways of working and demands. Competitiveness with suppliers from other regions also offers a chance to build additional services and solutions for our customers, maintaining close relationships and staying competitive.

You mentioned the importance of collaboration within the company, but what about with customers and competitors? Your sector is evolving from logistics to innovating and advising customers. In this VUCA world, collaboration is essential for survival. How do you see the role of collaboration in addressing industry challenges?

V. Diele-Braun: The development of collaboration is here to stay, especially in areas like sustainability where working together is crucial. While we must be careful about collaborating with competitors and will always ensure full legal compliance, we all operate in the same environment and should aim to improve it collectively. For our medium and small customers, we provide support and share our expertise, building strong relationships, especially in tough times. Internally, we encourage innovation through processes that allow employees to suggest and implement improvements rapidly. This is essential for development, agility, and attracting the right experts. We've launched "Element E," which stands for entrepreneurial and employees, symbolizing our commitment to our people's development, innovation and continuous improvement.

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Making Waves

How Industry Innovation is Supporting Sustainable Water Use

The issue of global water scarcity has shifted from a looming concern to an urgent, present-day crisis. Climate change, population growth and unsustainable practices have led to dwindling supplies that threaten food production, clean drinking water access and biodiversity. In fact, according to UNICEF, some 700 million people could be displaced by intense water scarcity by 2030. This evolving issue highlights the need for urgent action across all sectors, particularly those industries that rely heavily on water, such as personal care, textiles, food production and paint.

The Factors Driving Industry Change

Industrial facilities are major consumers of water, using it for cooling, washing, energy generation and sanitation. On top of ethical considerations, the pressure for companies to implement sustainable practices is compounded by a rapidly shifting regulatory landscape. Governments around the world are introducing stricter rules to address water use, such as the European Union's (EU) Water Reuse Regulation (WRR), enacted in July 2023. This regulation promotes circular water management by encouraging industries to recycle and reuse water more efficiently. Similarly, the UK's Water Framework Directive represents a strong push toward reducing industrial pollution and prioritizing environmental stewardship.

Consumer expectations are also changing in parallel with these regulatory developments. Today's shoppers increasingly demand transparency and accountability from brands. Eco-labels, certifications and sustainable production narratives are no longer optional; they influence purchasing decisions. Brands must therefore adopt innovative water-saving strategies to remain competitive and meet these evolving expectations.

Fortunately, technologies are advancing to optimize water reuse and recycling, including:

- Membrane filtration systems which effectively remove dissolved solids, contaminants and impurities.
- Biological treatment processes that use microorganisms to break down organic matter and remove contaminants.
- Advanced Oxidation Processes (AOPs) that employ powerful oxidizing agents to degrade organic compounds and eliminate persistent contaminants.
- Zero Liquid Discharge (ZLD) systems that combine various technologies, such as evaporation and crystallization, to produce high-quality water.

L'Oréal demonstrated innovative water recycling in its Warsaw facility, a region increasingly affected by drought. Recognized in 2021 with the Global Water Award, the company has worked to halve its water consumption while repurposing approximately 75,000 cubic meters of water. This success showcased the viability of water reuse in manufacturing operations and paves the way for more industrial water reuse projects.

Reducing industrial water is not just important for conserving resources, but also vital to mitigate the consequences of untreated wastewater. Untreated waste streams can carry contaminants that harm humans, wildlife and aquatic ecosystems; the World Health Organization has reported that nearly a third of the global population already consumes water in poor conditions.

As well as providing water security, supporting environmental compliance and aligning with corporate sustainability goals, improving efficiency of water use, by its very nature, can create more cost-effective processes. Therefore, riding this wave of change offers a path towards operational success while securing vital water resources for future generations.

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Tapping into Innovation for Greener Chemistry

Green chemistry refers to creative strategies that reduce waste, conserve energy and replace hazardous substances with safer alternatives. Innovation is therefore at the heart of sustainable water use.

The first green chemistry principle states that it is better to prevent waste than to treat or clean up waste after it has been created. Industries, governments and end users are demonstrating this principle through advances in formulations, processes and buyer trends that look to limit water use.

Personal Care: The Rise of Waterless Formulations

The personal care industry is already subject to various restrictions around cosmetic ingredients that limit environmental impact. These are constantly reviewed in the EU by the Scientific Committee on Consumer Safety (SCCS). For example, cyclic volatile methyl siloxanes (cVMS) have raised environmental concerns because of their persistence and bioaccumulative properties. In light of these concerns, the EU extended restrictions on substances like D4, D5 and D6 in rinse-off cosmetic products.

Despite efforts to improve the quality of wastewater, water is still often the first ingredient listed on personal care product labels, making its reduction an attractive and impactful solution. Waterless formulations, such as solid shampoos, are emerging as a game-changer in this sector, due to their many environmental benefits.

- Waterless and tableted formulations can often be packaged using recyclable materials, such as paper or cardboard.
- Solid formulations tend to be more concentrated, so require less packaging and support a reduced transport-related carbon footprint.
- Multi-functional solid formulations limit the need for multiple products.
- These formulations often have longer shelf lives and require fewer preservatives.

Upcycled materials are also emerging as a major trend within the industry, allowing brands to reduce resource dependency, manage waste and tell a compelling sustainability story. However, challenges remain, from ingredient variability to stringent regulatory requirements, that can complicate the path forward. For one, water is a critical consideration when processing recycled materials as many require washing and purification to ensure they meet cosmetic-grade standards. This can lead to high water use, contradicting sustainability goals.

To mitigate these issues, some brands are exploring green chemistry techniques that use less water, like supercritical CO_2 extraction, which uses pressurized carbon dioxide as a solvent. While these methods can reduce the environmental footprint of upcycled ingredients, they often require significant upfront investment which may limit accessibility for smaller brands.

Textiles: Leading the Way in Sustainable Dyeing

The textile industry is a major contributor to both water pollution and consumption. Producing a single cotton t-shirt requires an estimated 2,700 litres of water, sufficient to meet one person's drinking needs for 2.5 years. To tackle the impact on the environment, the EU wants to reduce textile waste and increase the life cycle and recycling of textiles. This is part of the plan to achieve a circular economy by 2050.

In 2020, textile production was responsible for 20% of global clean water pollution, with dyeing and finishing processes being key contributors. As a result, sustainable dyeing processes are being developed that can reduce water consumption up to 96%. These approaches are not only fast and easy to implement, but crucially require no water for soaping and rinsing, while also outperforming older methods.

End user habits have also changed significantly over decades, with the rise of fast fashion encouraging an increase in consumption. Of these items, less than half of used clothes are collected for reuse or recycling, and only 1% of used clothes are recycled into new clothes. New strategies to tackle this issue include steering consumer behavior towards more sustainable options, such as clothing rental, or encouraging the purchasing of better-quality clothing.

As part of the circular economy action plan, the European Commission proposed a strategy to tackle fast fashion and stimulate innovation within the sector. The strategy included new eco-design requirements for textiles, a Digital Product Passport, and calls companies to minimize their carbon and environmental footprints.

Food Production: Reducing Waste in Agriculture and Processing

Water is vital in the food and beverage industry, used both as an ingredient and for manufacturing and cleaning processes. Surprisingly, 69% of daily water consumption comes from the production of food, equating to 3.5 liters per person, per day.

As such, dietary choices can significantly impact water consumption. Organic farming, for example, uses less water through improved soil health, better water infiltration and reduced dependence on chemical fertilizers. Furthermore, shopping locally reduces transportation-related water use, and plant-based diets use up to 55% less water compared to omnivorous diets.

The popularity of plant-based diets is growing, but there are still barriers to its uptake, from nutrition to taste. Supplementation may therefore be required to enhance nutritional value, including vitamin B3 or creatine. When adding these ingredients, it may be necessary for developers to consider the use of a flavor-modifying ingredient to mask unwanted tastes. Trehalose, for example, is a versatile disaccharide used to preserve freshness, enhance flavor and improve texture in the food and beverage industry.

Other popular flavor modifiers include naturally derived vanilla, peppermint and lemon. When sourced sustainably and ethically, natural flavorings can help producers showcase their dedication to using naturally derived products.

By finding ways to create tasty, nutritional plant-based products, functional ingredients can provide solutions for foods that reduce environmental impact and save water.

Paint and Coatings: Innovations in Recycling

The paint industry is another high water consumer, with paint manufacturing processes generating large quantities of wastewater. Paint recycling is therefore emerging as a critical method to reduce waste and improve water use efficiency. In this context, recycling efforts are focused on reclaiming leftover paint or developing closed-loop systems that minimize wastewater generation during production.

Furthermore, some companies are adopting in-house mixing strategies, allowing them to reduce the number of products in storage. This not only minimizes waste but streamlines manufacturing processes, improving operational efficiency.

Turning the Tide on Wastewater

The water crisis is no longer a distant threat—it's a pressing reality that demands bold, collective action. From waterless formulations to advanced textile dyeing methods, industries are stepping up and proving that sustainability and profitability can go hand in hand.

By embracing green chemistry, adopting efficient water reuse technologies and aligning with evolving regulations and consumer expectations, industries are not only securing their own operations but also contributing to global water security. The shift toward sustainable water use is a shared responsibility and one that offers both environmental protection and long-term business resilience.

Through innovation, collaboration and commitment, industries are making waves towards a greener, water-secure future, demonstrating that sustainable practices are not just necessary but transformative.

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New Deal to Boost Competitiveness

Revamping Europe's Industrial Landscape

The EU Green Deal has severely hit the competitiveness and innovativeness of Europe's already struggling industry. Now, with the Clean Industrial Deal, things are set to improve — but this will require a change of mindset at the Commission.

The EU industry is on its way to a climate-neutral and more sustainable economy in Europe. The EU Commission intended to support and accelerate this transition with the "European Green Deal". This has not been successful; the Green Deal is not a growth program for Europe. Since its launch in 2019, the EU Green Deal has introduced a flood of regulations, some of which are poorly coordinated, forcing the European chemical industry to make significant investments in order to comply. Companies are also suffocating under the weight of reporting requirements.

The goal of climate neutrality is right and important, but the way to get there is not. The new regulations aim to promote more sustainable and climate-friendly production, but tend to increase the bureaucratic burden considerably, while the protection of health and the environment is often not significantly improved. Furthermore, they come at a time when the industry was already facing a multitude of crises. The financial crisis, the Covid-19 pandemic and geopolitical conflicts such as Russian aggression in Ukraine have further increased the burden on companies.

Green Deal Mainly Flourished in Bureaucracy

With regard to the EU chemical industry, more than 150 regulatory measures have been announced that will change the landscape for the industry. About 900 implementation measures already affected the chemical industry. Other significant measures like the revision of the REACh regulation have been announced but have not yet been implemented.

Centerpiece of the Green Deal activities is the Chemicals Strategy for Sustainability. Within this strategy, a multitude of parallel regulations has emerged, often incorporating extremely concerning approaches. For instance, the introduction of the essential use concept, a broader generic approach to risk management, and the introduction of the new hazard classes imply a shift away from well-established risk-based systems to blanket substance restrictions based on potential hazards. This is also to be found in the Circular Economy Action Plan, e.g. the Ecodesign for Sustainable Products Regulation, which includes a one-dimensional view of sustainability and limits the possibilities for further development.

In addition to the Chemicals Strategy for Sustainability and the Circular Economy Action Plan, there are many other EU regimes that directly determine and influence the burdens on our companies—such as the Emissions Trading System, the 2030 decarbonization targets, regulations on waste, packaging and labelling, water, soil and deforestation, CSRD reporting, compliance, due diligence, requirements under the Sustainable Finance Action Plan, energy regulations, the Industrial Emissions Directive … the list seems endless. Each of these norms brings with it new regulatory obligations. These might turn out very difficult or impossible to fulfil, as their total causes an immense strain in both administrative and technical terms.

Not only do these initiatives create uncertainty for the industry, they also cause high costs which can be detrimental, especially for SMEs. More studies than potentially necessary have to be funded. In addition, rising energy costs due to internal and external factors mean that production in Europe is no longer competitive, particularly in energy-intensive industries. The direct consequence of these increased costs for industry is the closure of sites in Europe and the shifts of future investments to countries outside the EU.

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Call for Policy Change

To counter these developments, more than 1,000 industrial organizations and companies from 25 sectors aligned their concerns in the Antwerp Declaration. They called the Commission for several actions to improve clarity, predictability, and confidence in Europe and its industrial policy.

What industry needs is the creation of a structural framework that allows it to develop, rather than strangling it with rigid restrictions. The Green Deal, with its numerous regulations and directives, should be inspired by the principle of technology neutrality according to which the transition can be achieved through a flexible approach to different technologies instead of being limited to a single solution. Objectives should be pursued leaving the industry with opportunities to invest and to do research in many technologies. Legislation should be limited to setting targets. The tools to achieve them should be developed by the industry itself in an independent context, using different approaches and pathways.

"Strengthening competitiveness and simplifying the wide range of regulations are key pillars of the work program and will remain so in the coming years."

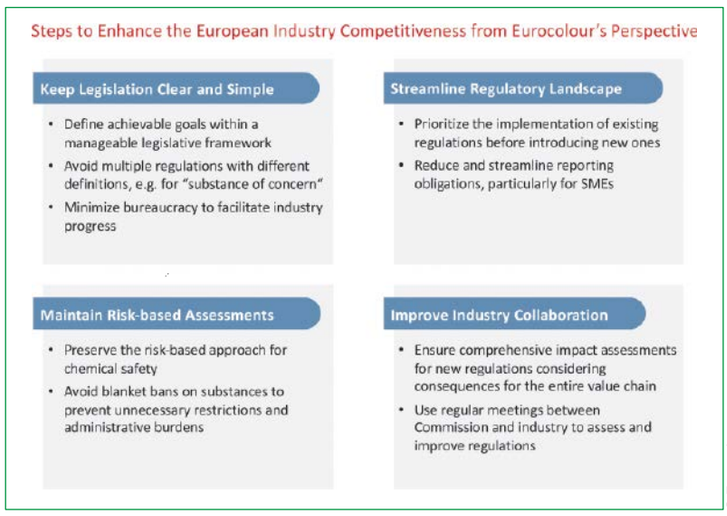
The establishment of a stable and sustainable regulatory framework for manufacturers is a fundamental and

perhaps underemphasized component of the Green Deal. Only if manufacturers are given clearly defined, achievable targets in a manageable regulatory framework will they be able to work towards them.

The Commission's New Approach

Following the recent European elections, the new EU Commission appears to have recognized these issues. In new policy documents, the Commission has announced its aim to make it easier to do business with the Clean Industrial Deal. It claims that the costs of all administrative burdens will be reduced by 25%, and by 35% for SMEs. A new category of companies called "small mid-caps" will allow companies somewhere between SMEs and large companies to benefit from regulatory simplification. The Clean Industrial Deal is intended as an overarching strategy and will therefore be the successor to the Green Deal.

For the chemical industry, a tailor-made action plan called the "Chemicals industry package" has been announced for the fourth quarter of 2025. This package is expected to include a targeted revision of the REACh regulation, which is said to help simplify the rules for the chemical industry. Whatever this means to the Commission. Blanket bans on groups of substances based on hazard could also be seen as a form of simplification, but it would have significant negative impacts on the whole industry.



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Steps to Achieve Real Change

If the guidelines are implemented correctly and the Mission Letters are not just for show, the first step is taken to give the European Industry a chance to be competitive. To achieve this goal, it is important to first sort out and prioritize the current, overloaded regulatory landscape, improve the communication between the Commission and industry, and avoid blanket bans on substances and technologies. The Commission needs to return competence to industry rather than continue to impose measures that looks good from a desk-top perspective but could have serious practical consequences.

The Commission's work program 2025, published last month, is a first indicator of the EU's political priorities, but does not yet show whether a real change in policy-making is taking place. A shift in its rhetoric and objectives ("a bolder, simpler and faster Union") gives hope, but it remains to be seen how substantive the implementation will be. For instance, it is claimed that there are 37 proposals for withdrawal. But these are non-starters, pending proposals that are already obsolete or have no chance of being agreed, with no real impact on business.

More effective relief may come in the form of a set of Omnibus proposals, in which several existing pieces of legislation are to be streamlined in a fast track procedure. The first omnibus package on sustainability aims to simplify the sustainability reporting obligations (CSRD), sustainability due diligence (CSDDD), and taxonomy requirements.

Alongside the Clean Industrial Deal, the "Action plan on affordable energy" is intended to help energy-intensive industries that are currently suffering from high energy prices. This is particularly important to our industry, which is dependent on competitive energy prices.

Strengthening competitiveness and simplifying the wide range of regulations are key pillars of the work program and will remain so in the coming years. The Commission's new initiatives have the potential to turn the tide together with the industry. It is to be hoped that the good intentions will be translated into action.

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From Data Silos to a Digital Future

How Kuraray in Europe Is Advancing the Digitalization of Operations, Maintenance, and Engineering

Chemical producers in Germany are grappling with rising costs, high energy prices, global competition, and an impending knowledge gap due to demographic shifts. Kuraray, a global leader in specialty chemicals, is addressing these challenges with a comprehensive digitalization strategy.

When it comes to high-performance materials, Kuraray is a key player in the automotive and construction industries, as well as in medical and packaging technology. With Japanese roots and its European headquarters in Hattersheim near Frankfurt am Main, Germany, the company markets these products under brands such as Kuraray POVAL, MOWITAL, SENTRYGLAS, and CLEARFIL. At its Frankfurt site, a key production center for polyvinyl alcohol (PVA), Kuraray is also driving a forward-thinking digitalization strategy. This project exemplifies the transformation of a traditional manufacturing operation into a data-driven, agile, and efficient company prepared to meet the demands of the future.

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Since the 1970s, the site in Frankfurt, Germany, has been home to production facilities for polyvinyl alcohol (PVA), which Kuraray acquired from Clariant in 2001. These plants are regularly modernized and adapted to new requirements by the engineering and maintenance teams. In the historically entrenched structures of the chemical industry, information and data are often scattered across different areas and tools, with some data not even being digitized. Finding this data requires a considerable amount of time for technicians and engineers, and in many cases, the same data must be entered into multiple systems.


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> *"Database-driven work requires a shift in mindset and standardization of processes."*
>
> Andre Ziese, Kuraray Europe

Inconsistent Data Frustrates Users

When different departments rely on different versions of the same data, delays and errors are inevitable. Engineers and operations staff spend an excessive amount of time gathering necessary information from various systems—an inefficient and frustrating task. "From the very beginning, it was clear to us that this was not just about technology but about the right workflow. Database-driven work requires a shift in mindset and standardization of processes," says Andre Ziese, Project Manager for CAD Digitalization at Kuraray Europe, Business Unit Poval.

Despite using modern IT systems such as the EMR (Electrical, Measurement, and Regulation) planning system Prodok, the asset management system Maximo, and SharePoint, digital tools alone are not enough to meet increasing demands.

"Engineering has always been structured like isolated islands in the Pacific, and the various tools were like coral reefs surrounding them," explains Ziese. "A central data pool as a 'Single Source of Truth' should connect all these islands."

To tackle these challenges, Kuraray engineers in Germany tested the integrated plant design solution CADISON by ITandFactory, which impressed them with its multidisciplinary approach and ability to integrate engineering data, graphics, and document management into a single solution. CADISON was also chosen because it allows seamless integration with existing systems like Prodok. A key factor in this decision was the bidirectional interface for exchanging EMR data.


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> *"If the performance is not right, the system won't be used."*
>
> Ayhan Sidal, Kuraray Europe

Data-Driven Workflows for Long-Term Efficiency Gains

By implementing Cadison, Kuraray aims to achieve clear objectives. Data-driven engineering is expected

to increase efficiency, automate data maintenance, and standardize workflows. As a byproduct, manually created "dumb" graphics are transformed into object-oriented, intelligent documents. Additionally, optimized processes will contribute to more sustainable operations and lay the groundwork for innovations such as AI-driven analysis and predictive maintenance. "For us in operations, digitalization is not just about technical changes but also about a new way of collaboration between engineering, maintenance, and production," explains Michael Giebisch, Production Manager at the Poval plant in Frankfurt.

The central database will enable faster and more efficient exchange of information, such as piping and instrumentation diagrams (P&IDs), piping documentation, and maintenance plans. "Keeping our flow diagrams up to date is essential. We can no longer work with multiple versions; we need a single, reliable data source," says Yannick Gahler, Operations Engineer at the Poval plant. "My daily goal is to spend less time searching for information and more time on productive work. Cadison is an important step in this direction."

This is achieved through intelligent cross-references in P&IDs. Notably, the flexibility of CADISON allows flow diagrams to be created with different tools based on specific needs. Process engineers in operations use the simpler CADISON PID Designer based on Microsoft Visio to update process changes or altered data in flow diagrams. This includes media, piping classes, title blocks, or equipment list data entered into forms.

For more extensive work on flow diagrams, maintenance and engineering teams can utilize the more powerful CADISON P&ID Designer (using the AutoCAD graphics engine). The key advantage is that P&IDs created based on Microsoft Visio can be converted into the DWG format without any data loss.


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"My daily goal is to spend less time searching for information and more time on productive work. CADISON is an important step in this direction."

Yannick Gahler, Kuraray Europe

It quickly became evident that integrating such a system requires not only technological resources but also patience and perseverance. The initial process of cleaning up and structuring databases and workflows turned out to be significantly more complex than anticipated. Additionally, employees need to be trained. Digitalization requires investments of time and money, which only pay off in the long run. "But the old workflows also cost money—without the added value of a consistent and centralized data source," emphasizes Ziese.

One often overlooked yet crucial aspect was the need to "clean out the basement:" outdated, redundant data structures and obsolete processes had to be purged and reorganized. However, this streamlining process was essential to unlocking the full potential of CADISON.

Creating User Acceptance

A key factor in the successful implementation was integrating the system into the existing IT landscape. The speed and stability of the technical environment play a vital role in user acceptance. To ensure this, the specialist departments, the internal IT team, and system provider ITandFactory worked closely together. "If the performance is not right, the system won't be used," states Ayhan Sidal, director DX-IT, Kuraray Europe.

Another crucial factor for project success is support from management. Users not only need training but also time and flexibility to familiarize themselves with the new system. "Resources must be made available. If employees feel that other priorities always take precedence, the project will fail," says Ziese.

Additionally, user-friendly input forms proved to be essential for adoption. CADISON offers extensive possibilities, but its complexity can be daunting unless it is tailored to the needs of different user groups. "The system needs a custom-fit suit that perfectly matches the various user groups," says Ziese. Developing user-friendly interfaces and specific workflows is therefore a critical step in fully leveraging the platform's potential.


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Andre Ziese, Kuraray Europe, in front of the Poval plant

Preparing for the Future

Despite the challenges, the integration of Cadison has yielded clear advantages. The centralized data foundation has reduced sources of errors, minimized search times, and accelerated processes. The ability to access up-to-date flow diagrams and maintenance plans has significantly improved collaboration between engineering, maintenance, and operations. In particular, the automatic updating of data across different modules has streamlined daily work and led to noticeable efficiency gains.


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"For us in operations, digitalization is not just about technical changes but also about a new way of collaboration between engineering, maintenance, and production."

Michael Giebisch, Kuraray Europe

However, the success of the project is not solely dependent on technology. Experience has shown that patience, a clean data foundation, robust IT structures, and clear change management are crucial factors. "We've learned a lot—mostly through trial and error. But that's exactly what is pushing us forward today," summarizes Andre Ziese.

Looking Ahead: The Path to the Summit

With the experience gained, Kuraray's teams look to the future with confidence. The next steps include optimizing the IT landscape, expanding the project into day-to-day operations and additional sites, and gradually working towards a long-term goal: developing a digital twin that maps the entire lifecycle of the plants. A digital twin is a virtual replica of physical systems that continuously updates with real-world data, allowing for simulations, predictive maintenance, and performance optimization.

"This engineering project is an important building block in our overarching digitalization strategy, which is globally driven by IT," says Sidal. Thus, Kuraray Europe is making steady progress from unstructured data and fragmented processes toward a connected, efficient, and data-driven work environment. "Digitalization is a change process," summarizes Andre Ziese. While the summit has not yet been fully reached, engineers, plant managers, and IT experts are now standing on a solid plateau—ready for the next stages of this digital expedition.

For more information visit:
www.Cadison.com

Time to Set the Course for the Future

Supply Chain and Logistics Trends in the Chemical Industry

The chemical industry is facing major challenges, with an urgent need for action. However, now is precisely the time to lay the groundwork for a successful recovery once the current downturn has been overcome. The study "Success Factor Supply Chain Management and Logistics in the Chemical Industry 2024", conducted by Solventure, Aimms, and Miebach, examines key trends and challenges, the role of digitalization and artificial intelligence (AI), and planning strategies in the European chemical sector. The study begins by asking: What are the current trends and challenges in the chemical industry? This broad question was broken down into specific trends and their perceived significance according to the study participants. Birgit Megges interviewed Klaus-Peter Jung, Partner at Miebach, about the key findings of the study.

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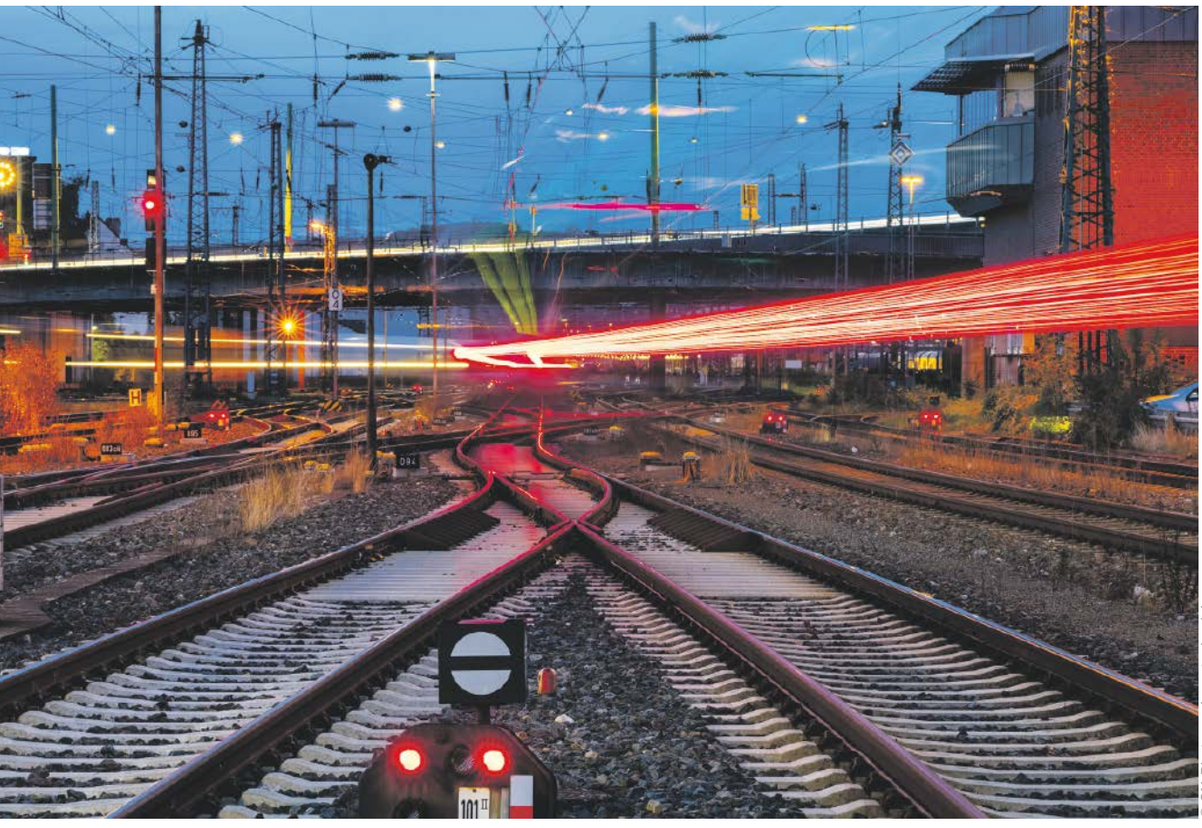
Klaus-Peter Jung, Miebach Consulting

CHEManager: Mr. Jung, the study reveals that the majority of participants consider rising cost pressures on warehousing and transportation to be the most critical issue, while CO_2 neutrality is currently a lower priority. Were you surprised by this result?

Klaus-Peter Jung: Not at all. This finding is reflected not only in the predominantly negative public reports about the state of the industry but also in our daily consulting work. In the short term, many companies are primarily focused on cost reduction and cost avoidance, leaving CO_2 neutrality as a secondary concern.

However, it's also important to acknowledge that logistics contributes only a small share of CO_2 emissions in the chemical industry—far less than in other manufacturing sectors or retail. Moreover, there is a "natural correlation" between reduced transport costs and lower CO_2 emissions: shipping is cheaper and more environmentally friendly than air freight, full trucks are more cost-efficient and eco-friendly than half-empty ones, and larger shipments are more economical and sustainable than multiple small ones.



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You explored how well the European chemical industry is prepared to tackle current challenges. What insights did you gain from the responses?

K.-P. Jung: Following the boom years of the early 2020s, the industry experienced an abrupt downturn for which, by its own assessment, it was not well prepared.

Looking at individual aspects, we found that only about half of the participants consider themselves 'very well' or 'well' prepared in terms of 'transparency through enhanced communication and close collaboration'. This figure drops to roughly one-third when it comes to handling 'rising cost pressures on warehousing and transport' or 'aligning logistics within the chemical supply chain with customer and product-specific requirements'.

Many companies are in 'work-in-progress' mode, addressing these challenges but without clear solutions yet.

> *"Many companies are actively exploring AI and its applications."*

Some even admit they are inadequately prepared—or not prepared at all—for certain issues.

Digitalization and AI are hot topics in supply chain management and logistics. How widespread are such solutions in the industry?

K.-P. Jung: Simply put: too limited. On the positive side, many companies are actively exploring AI and its applica-

tions. However, many still struggle to identify suitable use cases beyond inventory management, forecasting, and workforce management, as well as highly administrative, repetitive applications like customer service chatbots. Nevertheless, there is a sense of momentum in the search for AI applications—but with limited budgets.

I am far more critical when it comes to advanced digitalization tools beyond AI, such as digital twins and control towers. Given past Black Swan events like Covid-19 or the Suez Canal blockage, one would expect companies to have recognized the urgency of the situation and invested in digital twins to strengthen supply chain resilience. Unfortunately, we see that these proactive risk management measures have often been sacrificed in favor of short-term cost-cutting.

The study also examined how chemical companies approach planning at the strategic, tactical, and operational levels, who is involved, and what tools are used. What were the key takeaways?

K.-P. Jung: The chemical industry has a very different planning approach compared to other industries, such as consumer goods.

Strategic planning, such as decisions on production footprint or inbound and outbound networks, is typically conducted only every two to three years or on a need-to basis. Only a few companies follow a structured annual planning cycle.

In most cases, these strategic planning tasks fall under line management, though over 40% of respondents also rely on external consulting firms. External experts bring specialized methodologies, tools, and experience, while also freeing up internal resources and often delivering faster and higher-quality results—many companies still rely on Excel for these tasks.

> *"The industry is still far from achieving full digital transformation."*

Tactical planning follows various cycles: while inventory optimization tends to be weekly, S&OP planning rounds occur monthly in the vast majority of companies. Supply chain teams take the lead in tactical planning, whether for demand planning, inventory management, or supply & production planning. The logistics department is almost equally involved, particularly in demand and inventory planning, while production teams naturally take the lead in supply and production planning. Interestingly, very few companies assign these responsibilities to their sales teams, and if they do, it's only for demand planning or S&OP.

Across all three planning levels, one of our study's most critical findings is that Excel remains the dominant tool. While Excel is flexible and easy to use, it is also prone to errors and requires extensive manual effort. This highlights that the industry is still far from achieving full digital transformation.

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Between Globalization and National Regulation

Pharmaceutical Logistics Need to Integrate Global Expertise with National Networks

For those wishing to know what significant progress has been made in the field of pharmaceutical research in recent years and how the distribution of pharmaceutical products has evolved, a look at the development of pharmaceutical logistics can be very illuminating. Its changing portfolio and evolving structures provide clear indications of new focal points and industry developments, of the increased — and still rising — importance of outsourcing specific logistics services, as well as of growing complexity and heightened quality requirements.

These are the key trends in the field of pharmaceutical logistics through which one can discern some of the major shifts within the industry. Perhaps the most striking trend is the move towards active temperature control. These do not just constitute changes brought about by the amended control practices of the regulatory authorities.

Martin Reder, Trans-o-flex Express

Biopharmaceuticals are Driving the Trend Towards Active Temperature Control in Transport

The primary driver of the trend towards active temperature control is new products. This is because the proportion of temperature-sensitive products among newly launched pharmaceuticals is steadily increasing. In many cases, these are biopharmaceuticals that are not produced through chemical but biological processes. The stability of such biopharmaceuticals is generally lower than that of chemically manufactured products—something that is reflected in the demand for actively temperature-controlled logistics.

But why exactly actively temperature controlled? Could the necessary level of temperature control not be achieved using specialized packaging solutions (passive packaging)? What does the continuous decline in the use of passive temperature control—in the ranges of 15 to 25°C (ambient or room temperature) or 2 to 8°C (refrigerated temperature)—tell us about the development of the pharmaceutical industry?

The growing demand for active temperature control is linked to two overarching trends in our economy and society, from which the pharmaceutical industry is not exempt: rising cost pressures and the desire for greater sustainability. Studies conducted in-house, based on public and recognized sources, have revealed that the actively temperature-controlled transport of pharmaceuticals is not only more cost-effective than passive shipping but also more environmentally friendly.

Continued Page 20 ▶

Between Globalization and National Regulation

Continued Page 19

Passive Transportation is Too Expensive and Not Environmentally Friendly

The higher costs associated with passive transportation are due to the increased freight weight of the consignment—resulting from the additional packaging required, the inclusion of cooling packs and temperature trackers—but also the procurement and storage of the specialized packaging and, depending on the chosen option, the disposal or return transport. The study examined transport variants involving the use of both single-use cartons and reusable boxes. It was established that the climate impact of active temperature control is at most half that of passive temperature control. Specifically: The climate impact of active temperature control is 3.93 times lower than that of passive shipping in single-use cartons. Compared to passive temperature control using reusable boxes, the climate impact of active temperature control (also in a reusable box) is 2.63 times lower. This study did not factor in the risks associated with passive cooling. What happens if a consignment is not delivered within 24 or 48 hours, but remains in transit longer than planned—for instance, because lorries were caught in traffic? Often, products must then be destroyed, re-manufactured and re-shipped.

"Perhaps the most striking trend is the move towards active temperature control."

These days, pharmaceutical logistics companies require service providers who are proficient in all applicable temperature ranges and transport methods. The example of the various necessary temperature ranges—whether ambient, refrigerated, frozen or ultra-frozen—illustrates the advanced segmentation of the field of pharmaceutical logistics. Since the range of products is becoming increasingly specialized, logistics service providers are also increasingly confronted by the pharmaceutical industry's need to develop and implement special solutions for ever more specific requirements. This is driven by the increasingly customized and individualized health solutions that are enabling significant medical advances these days. Just consider the numerous immunotherapeutic approaches that are taking cancer treatments to a new level. And due to the fact these therapies are increasingly marketed on an international scale, they must be made available globally wherever possible. This trend is clearly reflected in pharmaceutical logistics.

Global Solutions and National Expertise

For instance, the takeover of the pharmaceutical logistics specialist Trans-o-flex by the globally active French group Geodis is no coincidence. While Trans-o-flex, as a mid-sized company with an industry focus, concentrated on its own networks in Germany and Austria and developed procurement and distribution logistics solutions through partners in other European countries, it can now establish and implement global supply chains with the support of its new parent company. As a result, customers can, for example, have pharmaceuticals produced in Asia or North America flown subject to temperature control to Germany, where Trans-o-flex takes care of their delivery.

"Despite all the globalization trends in the pharmaceutical industry, access to individual national markets remains heavily dependent on local expertise."

This not only requires the control of large volume flows in the procurement or distribution logistics. In the pharmaceutical industry, one particular logistical challenge involves the support of product launches. During the product launch phase, a company that has reached Phase III with a drug sends the new product to the regulatory authorities in various countries to obtain final approval and patenting for the respective market. Sometimes this involves only 50 consignments—each the size of an injection syringe—yet the optimal route involving the lowest risks must still be selected with great care. Safety measures and backup solutions must be developed and maintained as if handling a mass shipment, because regardless of the quantity, the product is subject to the same transport requirements. If a logistics provider transports a vaccine to Brazil, they must expend nearly the same amount of effort whether handling one syringe or 100,000.

In view of such diverse requirements, not only do Trans-o-flex customers benefit from the company's enhanced international reach and expertise in global logistics chains, but Geodis customers also profit from the national pharmaceutical logistics solutions offered by the German subsidiary. Despite all the globalization trends in the pharmaceutical industry, access to individual national markets remains heavily dependent on local expertise. Regardless of all attempts at harmonization at EU level, a sufficient amount of country-specific particularities persist in the implementation of national law. In today's pharmaceutical industry, the prospect of a one-size-fits-all solution possibly seems more remote than ever. And pharmaceutical logistics, seamlessly integrating global expertise with national networks, perfectly embodies this trend.

"In today's pharmaceutical industry, the prospect of a one-size-fits-all solution possibly seems more remote than ever."

Given the diversity of services required, the increasing complexity involved, and the globalization of both procurement and distribution logistics, in-sourcing the logistics chain—either in part or in its entirety — is simply out of the question. It is therefore crucial, when selecting outsourcing partners, to carefully consider their experience, industry expertise, levels of innovativeness, product portfolio, network quality, and the scalability of the services offered. Only with a strong and specialized logistics partner can managers in the pharmaceutical industry successfully focus on their core competencies and sleep soundly.

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Martin Reder, CEO, Trans-o-flex Express, Weinheim, Germany

■ www.trans-o-flex.com

CHEManager INTERNATIONAL

INNOVATION PITCH

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Industrial Biocatalysis
Development Platform for Data-Driven Enzyme Immobilization

Industrial Purification
Pollutant Removal with New High-Performance Adsorbents

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High-Performance Adsorbents: The Future of Clean Industry

Transforming Proven Science into Scalable Purification Solutions

Porelio is revolutionizing pollutant removal with advanced adsorbents, Functionalized Ordered Mesoporous Silicas (FOMS). Targeting PFAS, metals, and genotoxins in water and industrial products, FOMS outperform commercial solutions with unmatched selectivity and power. With its innovative, sustainable production process, Porelio is turning decades of proven scientific research into a scalable, high-impact solution for global pollution challenges. Two co-founders shared their vision to transform purification.

© Porelio

Rhea Machado, Porelio

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Javier Silva, Porelio

CHEManager International: What does the name Porelio mean?

Rhea Machado: Porelio combines "pore," representing the porous systems central to our technology, and "rheology," the science of flow. It reflects our focus on enhancing the selective capture of pollutants within nano-scale tunnels from flowing streams.

How would you describe FOMS in simple terms?

Javier Silva: Functionalized Ordered Mesoporous Silicas (FOMS) are like advanced sponges with uniformly aligned, open pores. Their surfaces feature molecular "arms" that selectively capture pollutants with high efficiency. Unlike traditional adsorbents, FOMS offer a tunable, ordered structure, enabling superior selectivity, faster adsorption, and higher capacity, making them ideal for purification challenges.

PFAS pollution is a pressing issue. How does Porelio tackle PFAS contamination?

R. Machado: PFAS, especially short-chain variants, are hard to remove due to their low concentrations and persistence. Porelio's FOMS adsorbents provide a scalable, highly selective solution for efficient PFAS removal, helping industries meet strict regulations cost-effectively without compromising performance.

What makes Porelio's technology unique?

J. Silva: While FOMS have been known for their adsorption properties for decades, their industrial use was limited by high costs and production challenges. Porelio's patented continuous synthesis process makes FOMS scalable and affordable, replacing outdated adsorbents with a solution that combines efficiency and cost-effectiveness.

Which industries benefit most from Porelio's technology?

R. Machado: Water treatment and fine chemical production face significant purification challenges due to tightening regulations and the limitations of conventional adsorbents. Porelio's FOMS offer a selective, durable alternative, ensuring compliance and reducing costs. In fine chemicals and pharmaceuticals, our technology enables precise separations with fewer steps, cutting energy use and waste while improving efficiency.

> *"Unlike traditional adsorbents, FOMS offer a tunable, ordered structure, enabling superior selectivity, faster adsorption, and higher capacity, making them ideal for purification challenges."*

Why was Porelio founded in Berlin?

J. Silva: Berlin is emerging as a green chemistry hub, and Porelio benefits from this ecosystem. GreenChem provides lab infrastructure and industry access, while UniSysCat, the Cluster of Excellence for catalysis and materials science, connects us to top researchers. This synergy helps us translate cutting-edge research into industrial purification solutions.

What's next for Porelio?

R. Machado: Porelio is scaling FOMS production from kilos to tons and optimizing material performance for industrial readiness. We're collaborating with partners for pilot validation and demonstrating feasibility in real-world applications. For wastewater treatment, we're addressing PFAS and emerging contaminants, while in fine chemicals and pharmaceuticals, our materials enhance separation efficiency and reduce costs. We're also engaging investors to support scaling deep-tech innovations, driving our transition from lab to industry. Beyond purification, we aim to transform the chemical industry and the world by tackling pollution removal at its source, enabling cleaner production processes and contributing to a sustainable future.

Personal Profiles

Rhea Machado is a process engineer and entrepreneur pioneering green chemistry solutions. She holds a Master's in Process Engineering from Hamburg University of Technology and a PhD from BasCat, a BASF-TU Berlin joint lab, specializing in heterogeneous catalysis. She played a key role in scaling Porelio's technology from lab to pilot scale and now leads the company as CEO. With a strong focus on innovation and sustainability, she oversees the company's growth and leads the business strategy to revolutionize industrial purification by ensuring sustainable scalability.

Javier Silva is a chemist specializing in materials science, catalyst synthesis, and molecular chemistry. During his research at BasCat, he developed model catalysts via surface modification, laying the foundation for the groundbreaking research to achieve the world's fastest, most energy-efficient, and cost-effective synthesis of FOMS, overcoming a major commercialization barrier. As CTO of Porelio, Javier leads the scientific strategy to develop cutting-edge green chemistry solutions to address global pollution challenges, driving innovation in sustainable materials.

Business Idea

Revolutionizing Industrial Purification: Porelio's Breakthrough Adsorption Technology

Industries like pharmaceuticals, fine chemicals, and water treatment face mounting challenges due to inefficient purification processes, rising costs, and stringent regulations. For instance, the global PFAS removal market, valued at $2.05 billion in 2023, is projected to grow at a CAGR of 7.15% as regulations tighten and contamination concerns escalate. Current solutions struggle with scalability, selectivity, and sustainability, creating an urgent need for innovation.

Porelio has a solution for pollutant removal that will be a game-changer, including for PFAS removal. Functional Ordered Mesoporous Silicas (FOMS) are advanced adsorbents offering unparalleled selectivity for hard-to-remove pollutants, cost-effectiveness, and sustainability, enabling industrial-scale purification for the first time. Porelio has cracked a 20-year scalability challenge in adsorption technology with its patented production process. FOMS outperform traditional materials like silica gels, activated carbon, polymeric resins and membranes, delivering superior performance at competitive prices, making them accessible for widespread adoption.

At the core of Porelio's innovation is a patented continuous synthesis process that ensures scalable, energy-efficient, and cost-effective FOMS production. This breakthrough reduces manufacturing time, energy consumption, and material costs compared to conventional methods, all of which has been validated at the kilo scale in a pilot plant.

Porelio's customizable FOMS address critical industry needs, from removing persistent PFAS contaminants to optimizing API purification and eliminating genotoxic impurities. By enhancing efficiency and compliance while reducing operational costs, FOMS empower industries to meet evolving regulations sustainably.

Currently, Porelio is validating FOMS in real-case scenarios, including PFAS removal and pharmaceutical manufacturing. With its transformative adsorption technology, Porelio is poised to redefine industrial purification, offering scalable, sustainable solutions for a cleaner, more efficient future.

- Porelio, Berlin
  www.porelio.com

Porelio The future of chemical purification

Elevator Pitch

Purification, Perfected — Scalable, Sustainable, and Game-Changing

Industries like water treatment face a $2.05 billion PFAS crisis, struggling with inefficient and costly purification. Porelio's breakthrough Functional Ordered Mesoporous Silicas (FOMS) solve a 20-year scalability challenge, delivering unmatched selectivity, cost-efficiency, and sustainability. Our patented synthesis enables industrial-scale production, validated in real-world PFAS and pharmaceutical applications. Porelio transforms purification, slashing costs, ensuring compliance, and driving a cleaner, greener future.

Milestones:

2020
- Securing €1.1 million in non-dilutive funding from the German Ministry of Education and Research for scale up validation

2022
- First patent granted

2023
- Successful validation of scaleup to the kilo scale of one prototype

2024
- Securing €1.2 million in non-dilutive funding from the German Ministry for Economic Affairs and Climate Action for FOMS pilot testing in real-case scenarios; Expansion of catalogue of FOMS for different impurity removal

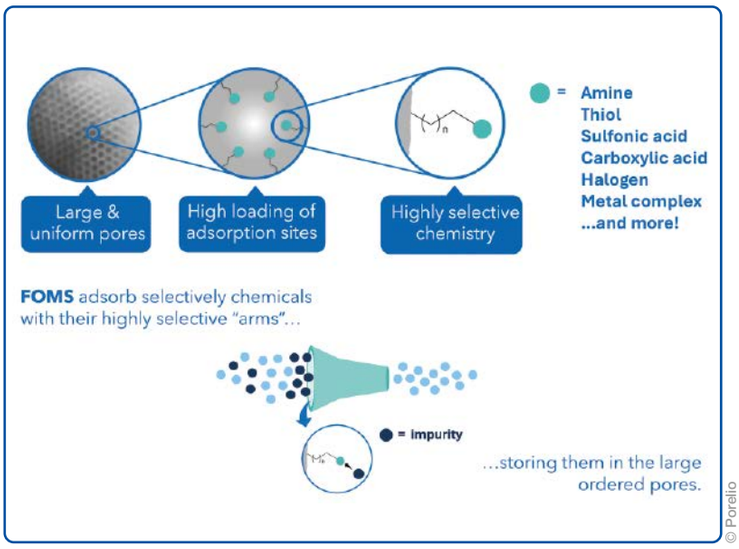
2025
- Foundation of Porelio; 7 employees

Roadmap

We are currently in the process of rigorously validating our FOMS technology for the removal of PFAS and genotoxic impurities under real-world conditions, with direct input and collaboration from industrial partners to ensure practical applicability and effectiveness. Following this validation phase, our roadmap includes scaling up through paid pilot projects to demonstrate the technology's viability at a larger scale, partnering with a contract manufacturing organization (CMO) to enable large-scale production and delivery, and securing strategic funding to establish our own state-of-the-art mass-production facility. By joining forces with us, you can play a pivotal role in revolutionizing contaminant removal, driving innovation, and creating a cleaner, safer, and more sustainable future for industries worldwide. Together, we can transform the way the world tackles pollution!

© Porelio

Porelio's pilot plant enables scalable, continuous synthesis of functionalized ordered mesoporous silica (FOMS), optimizing adsorption performance for industrial applications.



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FOMS: High-capacity adsorbents with large, uniform pores, high adsorption site loading, and selective chemistry—efficiently capturing impurities for advanced purification.

Data-Driven Enzyme Immobilization

Empowering Industrial Biocatalysis Through Data-Driven Development of Immobilized Enzymes

Inseit was founded in 2022 in Bern with the mission of developing biocatalysts that can be applied directly into industrial setups. Through enzyme immobilization and with its unique approach through biocomputation and advanced simulation technologies, the company is addressing key challenges in biotechnology and sustainability. Inseit was recently selected as part of the cohort of Venture Leaders Biotech 2024 by Venturelab, and was awarded in 2023 two prizes from the renown Nucleate accelerator.

CHEManager International: What inspired your innovative idea, and what problem does it aim to solve?

David Roura Padrosa: The idea for Inseit stemmed from recognizing the inefficiencies of the trial-and-error approaches in enzyme immobilization for biocatalyst development. Enzyme immobilization is a key technique, creating more stable and reusable biocatalysts, but it is still underused due to this. Other biotechnological fields also have the same combinatorial problem, for example enzyme engineering, and they have 'solved' it with data-driven approaches. So, we saw an opportunity to leverage computational tools and simulations to make enzyme immobilization faster and more predictable. Our innovation addresses critical bottlenecks in biocatalyst development, as development time and reliability are two of the main bottlenecks limiting the implementation of biocatalysis in industrial processes.

> *"We saw an opportunity to leverage computational tools and simulations to make enzyme immobilization faster and more predictable."*

Can you describe the key features and benefits of your innovation?

D. Roura Padrosa: Our core innovation lies in both *in silico* and in vitro innovations. First, before going to the lab we apply our *in silico* design workflows and simulations to understand what guides the immobilization of the protein and what are the best strategies to try. After this *in silico* screening, we go to the wet-lab screening. Here, we have been developing for the last two years a semi-high throughput screening platform that allows us to test multiple immobilizations at once. In combination, both aspects allow us to be rational, faster and more effective in our development.

On the other hand, we have also been working on expanding the off-the-shelve offer of immobilized enzymes. Currently, you can find almost exclusively only hydrolytic enzymes, but, biocatalysis goes way beyond this. We offer a wide range of optimized immobilized enzymes: transaminases, imine-reductases, alcohol dehydrogenases, ketoreductases and more. And we are constantly expanding this catalogue because we want to speed up the application of biocatalysis in R&D and production as much as possible.

> *"We are constantly expanding this catalogue because we want to speed up the application of biocatalysis in R&D and production as much as possible."*

What challenges did you face during the development of your innovation, and how did you overcome them?

D. Roura Padrosa: One challenge is from a technical aspect and the other is based on industry. From the technical perspective, one of our main challenges was creating accurate models to simulate immobilization, including protein-material interactions, as this is quite a new approach and very little has been done in this sense. We are getting better at this almost every week, with the new data created and refining our models and assumptions. On the other side, one thing that we had to consider since the beginning was scalability. We are, ourselves, an R&D company but we know our solutions have to be applied at scale to have the impact we want. This is why, since the beginning, we have been looking for partnerships to ensure that what we can produce at the gram scale ourselves, could also be produced, in a fast manner, at the kilogram or ton scale.

> *"Unlike traditional methods that rely on extensive lab experiments, our technology significantly reduces the trial-and-error process."*

How do you plan to bring your innovation to market, and what is your target audience?

D. Roura Padrosa: Our go-to-market strategy focuses on positioning Inseit as a trusted technology partner offering customized solutions for enzyme immobilization. Our initial target audience includes R&D teams in large biotech firms, pharma companies and even CDMOs who are looking to implement biocatalytic steps in their synthesis. We offer both CRO services, to develop customized solutions for our clients and direct sales of the products from our catalogue. Also, it's important to say that we don't stop there and part of our offering is also the application in continuous flow of the desired biocatalysts — a tailored solution or screening the ones we have in our catalogue.

© Inseit

David Roura Padrosa, Inseit

Personal Profile

David Roura Padrosa is the CEO and co-founder of Inseit, a spin-off from the University of Bern. David earned his PhD at the University of Nottingham (UK), focused on the discovery, characterization and application of novel enzymes for the synthesis of key intermediates in continuous flow. Since 2022, with Inseit, he combines his expertise in biocatalysis and bioinformatics for the development of novel tools that can advance the implementation of biomanufacturing strategies at scale.

What makes your innovation unique compared to existing solutions in the market?

D. Roura Padrosa: Inseit stands out because of its data-driven development. Time is crucial in development stages, and the fact that we can offer *in silico* planning of enzyme immobilization makes a difference for our clients. Unlike traditional methods that rely on extensive lab experiments, our technology significantly reduces the trial-and-error process. Our focus on tailored immobilizations and the wide offer in our catalogue is also unique, and it enables seamless integration of enzymes in multi-step synthesis.

Business Idea

Next-Gen Immobilized Enzymes

Enzymes are powerful catalysts for the synthesis of key chemical intermediates, drugs, food ingredients, and biofuels. But on an industrial scale, they often suffer from rapid inactivation due to harsh reaction conditions, requiring careful evaluation of their cost-efficiency. Moreover, while enzymes excel in certain reactions, they must normally be integrated with up or downstream chemical processes, and in their free form, they can be difficult to incorporate effectively. This limits their widespread adoption despite their demonstrated potential for greener manufacturing, but industries worldwide need stable, reusable enzyme systems to make their production processes both environmentally friendly and economically viable.

Inseit has developed developed a smart platform for enzyme immobilization to address these challenges. Its approach combines computer-based screening (*in silico*) with targeted lab testing (*in vitro*) to quickly identify optimal ways to immobilize enzymes in their most favorable conformation. This enhances enzyme performance, longevity, and reusability while making them more compatible with industrial processing requirements.

The company's tailored bioinformatic workflow sets it apart from conventional methods. It leverages data analytics, machine learning, and advanced simulations to predict optimal immobilization strategies before extensive laboratory testing, saving resources and accelerating time-to-market.

Inseit offers two commercial pathways: custom immobilization development services tailored to specific reaction requirements, and a growing catalog of ready-to-use immobilized enzymes designed for efficiency and versatility. Its products can be seamlessly integrated into existing production lines with minimal process adjustments.

Looking ahead, the company will expand its catalog and refine its technology to help industries adopt sustainable practices. Inseit's vision is to make enzymatic processes the preferred choice for green chemistry applications.

- Inseit, Bern, Switzerland
  www.inseit.ch

inseit
BIOCATALYST IMMOBILIZATION

Elevator Pitch

Towards the Integration of Industrial Biocatalysis

Recognizing the limitations of traditional approaches, the Inseit team developed a Data-driven method for enzyme immobilization. Since 2022, they have developed the *in silico* screening platform, secured key customers, and released the early catalogue of readily available immobilized enzymes. Looking ahead, Inseit is raising a second round of investment to scale its operations, expand the catalog and secure strategic partnerships with CDMOs for pilot projects

Milestones:

2021
- Inseit was selected to participate in the international accelerator organized by Johnson Matthey and The Bakery (UK) and build upon the first open-source tools made available in 2022.

2022
- Awarded a Bridge Proof of Concept grant from Innosuisse and Swiss National Science Foundation
- Incorporation of Inseit in Bern, Switzerland after being awarded a Bridge Proof of Concept grant from Inosuisse and Swiss National Science Foundation.

2023
- Inseit attracted the first round of angel investment after securing the first customer projects.
- Awarded two prizes—Scientific Excellence and Novel Idea Award from the Nucleate Activator

2024
- Inseit was selected as part of the Venture Leaders Biotech 2024, connecting with VCs, partners, and clients from the Boston ecosystem.
- Release of the first iteration of the catalogue of immobilized enzymes, focusing on cofactor recycling and auxiliary enzymes.

Roadmap

Inseit is seeking to establish new collaborations and proof of concept projects with leading CDMOs and fine chemical companies. Further to that, it is looking for strategic investment to ramp up its R&D capacity to both further develop the predictive capacity of our *in silico* screening tools and expand its catalogue of readily available immobilized enzymes.

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Overview of Inseit data-driven technologies, allowing for a fast and reliable development of immobilized enzymes.

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The Inseit team (from left to right, Gordon Honeyman, Cristina Lia Fernández Regueiro and David Roura Padrosa).

European Coatings Show 2025

The European Coatings Show (ECS) covers all aspects of the production of paints, coatings, sealants, construction chemicals and adhesives on March 25–27, 2025, in Nuremberg, Germany. The demands placed on paint and coatings are constantly growing. Therefore, the coatings industry faces great challenges. ECS gives attendees the opportunity to meet innovation leaders and discuss the latest developments in materials as well as technologies and equipment.

■ www.european-coatings-show.com

Interphex 2025

The International Pharmaceutical Expo (Interphex), dedicated to pharma and biotech innovation from development to marketing, is scheduled to take place on April 1–3, 2025, 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

ChemUK 2025

UK's largest annual chemical, laboratory & process industries supply chain expo & conference, ChemUK, will take place on May 21-22, 2025, in Birmingham, UK. The event will feature 550+ specialist exhibitors and 100+ expert speaker sessions and, as in every year, also presents features and projects that demonstrate real-world innovative products, solutions, and materials derived from ground-breaking chemistries while reflecting collaborative industry research and partnership.

■ www.chemicalukexpo.com

Chemspec Europe 2025

Chemspec Europe is to take place on June 4–5, 2025, in Cologne, 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.chemspeceurope.com

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