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## Markets & Economy

Resilience in Volatile Markets, The Materials Revolution: A Huge Opportunity for Chemical Companies, China's Chemical Industry Is Moving Inland

## Logistics

Cost Optimization of Chemical Supply Chains, Challenges for Chemical Logistics Procurement, Strategic Transport Planning, Supply Chain Due Diligence

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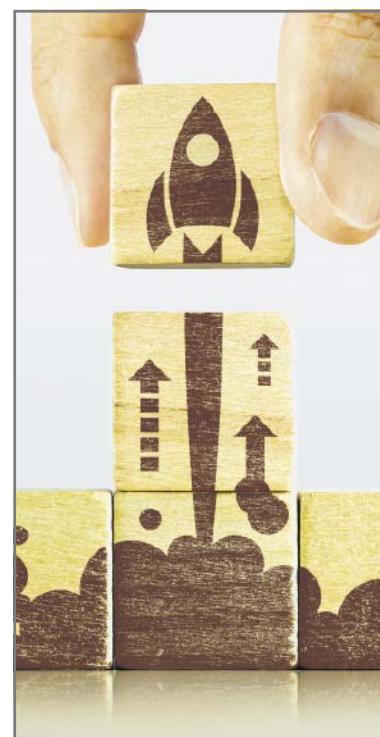
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# Chemicals M&A Review 2022 and Outlook 2023

## Out of a Storm, the Chemical Industry Could See Resurgence in 2023

2021 was historic for chemical M&As, it was a record-breaking year in terms of total value of deals. Therefore, it was expected that 2022 would only build upon this. However, the Russia-Ukraine war initiated on Feb. 24, 2022, plunged the world into financial chaos breeding uncertainty and unpredictability. Furthermore, chemical supply chains and feedstocks were majorly disrupted due to political unrest after just recovering from Covid lockdowns. This led to a global energy crisis and a steep rise in inflation which touched double digit figures in most countries. Interest rates were then subsequently raised to combat inflation. The combination of high interest rates, supply chain bottlenecks and geopolitical instability saw both the number and value of deals take a significant hit throughout 2022.

For the first time EU chemical imports exceeded exports in volume and value. This coupled with a trade deficit of €5.6 billion for Q1 2022 for Europe outlines the sheer gravity of crisis plaguing the EU. Therefore, the chemical industry has a myriad of long-term crises to solve, causing the ratings agency Moody's to downgrade its outlook for the global chemical industry from stable to negative.

### Declining Deals in 2022

Companies have faced a challenging macroeconomic environment worldwide since the 2008 Financial Crisis. Now, financial issues such as rising inflation, rising interest rates and a global economic recession looming on the horizon have significantly affected the deals which have taken place since the Covid-19 restrictions were lifted.

Overall, around 400 deals took place in 2022 with a total value of €100 billion. Europe led the maximum deal value, driven by the mega deals between Firmenich and DSM (€19 billion), DSM and Advent/Lanxess (€3.9 billion), Perstorp and Petronas (€2.3 billion), DSM and Avient (€1.4 billion) which were announced in 2022. DSM decided to focus on their core-competency of high-end nutrition so have undertaken a major divestment in other areas, a trend representative of the last years. The maximum deal value peaked in May (\$33.3 billion) which coincides with Q2 2022 when these mega deals took place. The majority of M&As were below \$1 billion as raising finance for deals was difficult in the tumultuous economic climate. Fig. 1 shows the steady decline in the number of deals made, along with the total value for each month throughout 2022. There was a clear peak in May which corresponds to the large divestiture of DSM.

Q1 2022 will be remembered for the initiation of the Russia-Ukraine war. This redefined the face of the global market and chemical supply chain especially in Europe, which ex-



Sébastien David, Advancy



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perienced soaring energy and feedstock prices, as key economies such as Germany were so dependent upon Russian gas.

The European chemical industry is extremely energy intensive, hence the significant increase and uncertainty in energy prices puts the European countries at a competitive disadvantage compared to non-European global players. Therefore, companies are rather focusing spending their capital on mitigating against the high energy prices than investing into M&A for growth.

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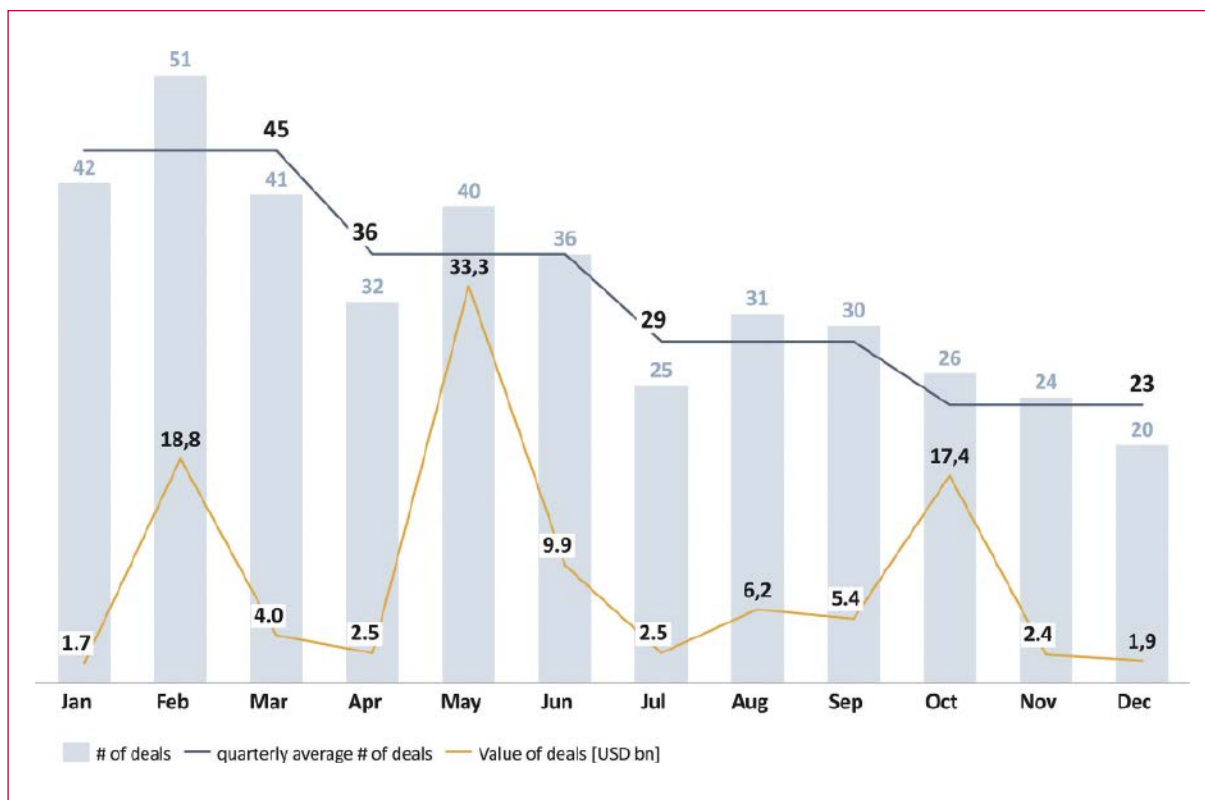


Fig. 1: Number and value of M&A deals undertaken for each month of 2022.

Russia was the leading supplier of gas into Europe, which has fostered a dependency due to the pipeline system. After the Russian economic sanctions, energy costs in Europe raised significantly, along with fuel prices. European gas and electricity prices have increased by 115% and 237%, respectively, since the start of

*“The chemical industry has a myriad of long-term crises to solve.”*

the war. As a wholesale gas benchmark, Dutch TTF averaged 7-8 times higher than the US Domestic natural gas prices, handing US companies a major competitive advantage over those in Europe. This created a huge uncertainty in the market which led to a subdued demand in M&A deals in Q1 2022.

Inflation reached an all-time high of 8.6% in the Eurozone by Q2 2022. As a result, the European growth forecast was reduced to 0.6%. Therefore, as a reactionary and cautious move to control inflation, the European Central Bank drastically increased interest rates. The deposit facility increased to 2%, the refinancing rate to 2.5% and the marginal lending to 2.75%; a 14 year

high. High interest rates mean raising finance or capital is much more difficult, therefore lowering the leverage of Private Equity (PE) companies for M&As. Furthermore, in the US, the Federal Reserve also increased the interest rate for the 7<sup>th</sup> time in a year, taking it to a level of 4.25% to 4.5%, its highest level in 15 years.

Another blow to the M&A market in 2022 was the weakening and volatility of global currencies. The euro suffered massive depreciation against the dollar. It saw a maximum of 1.1464 against the US dollar on Feb. 4, 2022, and a minimum of 0.9565 against the US dollar on Sep. 28, 2022, with an average of 1.0531 for the year. This volatility caused uncertainty and resistance to make cross financial zone transactions. In fact, the vast majority of deals were completed within the same currency zone, due to additional costs and unpredictability, as outlined in fig. 2.

Primarily deals happened in the same region. 75% of deals by buyers in North America (NAM) were from companies based in NAM and only 18% went to Europe for acquisitions. Similarly, European companies accounted for 55% of the deals that happened within Europe. Transcontinental deals between different continents saw a decline due to rising interest rates, slowing economic growth and currency fluctuations.

China, the world’s largest chemical economy, has been suffering from its strict implementation of Covid restrictions. China rolled out mass testing, quarantines and strict lockdowns which has severely reduced its overall economy growth rate figures compared to earlier years. The original target growth figure for 2022 set by the Chinese government was 5.5%. However, the actual growth was only 4.4%, a significant reduction driven by many closures and idle plants in the chemical industrial space.

### Impact of Environmental, Social and Governance Issues

The growing weight of environmental, social & governance (ESG) goals is a major factor for decision making in the chemical industry. New laws and legislations are being passed at an increasing rate, which only increases the importance of molding business strategy around compliance to these laws. For example, the European Climate Law outlines a legally binding target of net zero greenhouse emission by 2050. Similarly, the USA have announced an updated target to achieve a 50-52% reduction compared to 2005 levels in an economy wide net greenhouse gas emission by 2030.

The majority of manufactured goods have roots in or are somehow

linked to the chemical sector. Subsequently, chemical companies are under significant pressure to push the frontier of decarbonization strategy and technology development to reduce emissions. And of course, this applies to all players throughout the whole value chain. The increased importance of ESG issues spurs companies to explore M&As with the aim of acquiring businesses which can accelerate the achievement of sustainability goals, divest in their own business areas which are the least sustainable, or acquire emerging technologies to help meet the environmental goals.

### PE Firms and Corporate Investors

The types of companies engaged in M&As can be broadly categorized into two brackets: chemical companies and PE firms. Out of a total of ~400 deals in 2022, only 20% involved a PE firm buying a chemical company, however this accounted for almost 36% of the total value which took place in 2022. This shows the tendency for PE firms to leverage higher value deals compared to deals solely completed between chemical companies.

*“The weakening and volatility of global currencies was another blow to the M&A market in 2022.”*

PE firms help sculpt the M&A landscape. They often follow a buy and build strategy; buy a well-positioned platform company and then make multiple smaller acquisitions with key synergies in the weakest areas which helps to reduce the firm’s average acquisition cost and delivering enhanced asset value. PE firms look for the highest performance or growth potential in companies so they can build upon this with key acquisitions and then later sell the company for a much higher value and EV/EBITDA multiples. This occurs typically over a 5–8-year timeframe.

The main driver behind M&As performed by PE companies contrasts with the reasoning behind M&As for chemical companies.

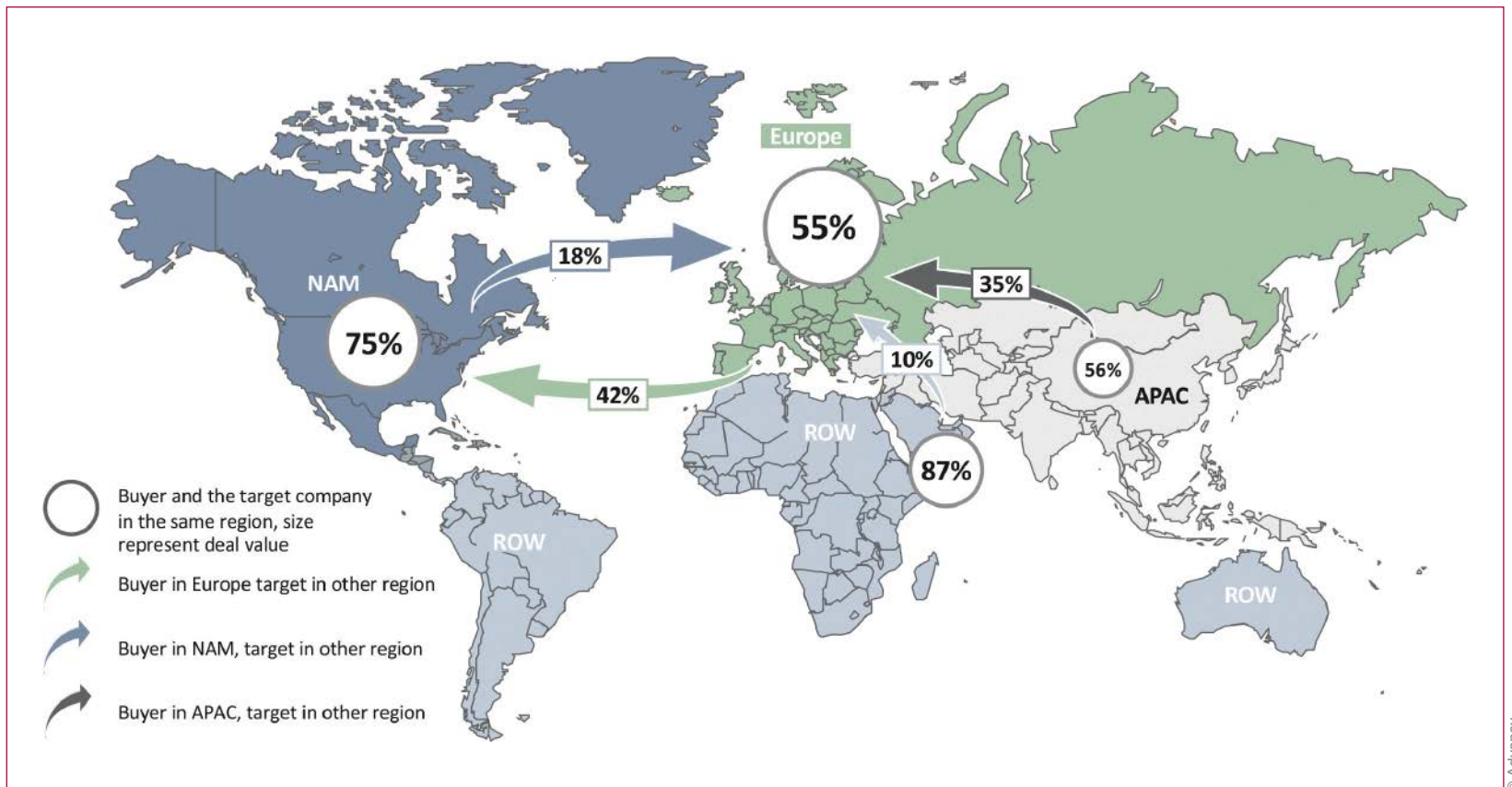


Fig. 2: The percentage of overall value of chemical M&A deals which were undertaken within and in between regions in 2022. Arrows represent deals by one region into another region and bubbles represent deals by a region within its own region. Size of the bubble represents the deal size of that region, with Europe being the region with max value of deals and APAC being the region with the least value of deals.

Chemical companies pursue M&As in order to: consolidate or strengthen their position in active segments; grow or refocus their portfolio; fix certain financial or cash flow issues; remove underperforming segments; or expand their portfolio into new and profitable areas. However, M&As performed by both PE and chemical companies attempt to create additional value by strengthening key business areas or eliminating weaknesses.

### Outlook for 2023

Higher energy prices are likely to continue, especially in Europe. To start getting cheaper gas, it would take at least 2-3 years as countries need to build permanent LNG terminals and strike deals. This, combined with the implementation of the European Climate Laws will require vast funds and investment to adjust, made more difficult without an immediate return on investment. Therefore, many smaller companies will find it hard to adapt and subsequently might see large scale and broad restructuring and consolidation across the chemical industry.

Chemical companies in Europe are facing material shortages along

with the energy crisis creating disruption across the supply chain which is expected to carry over to the first half of 2023. Therefore, companies will try to create resilience within their own supply chain and look for deals which can bolster their core competencies.

The carbon neutral targets set for 2050 make it essential for companies to reduce their Scope 1, 2 and 3 emissions. Therefore, many companies will consider M&As which would help reach these goals. The Inflation Reduction Act seeks to attract companies to work on addressing climate change by increasing investments in renewable energy, with a total fund of \$369 billion. Such schemes exert even more pressure on European companies and will accelerate M&As in this area.

The rising cost of production forces European companies to spend more money on innovation and continuous evolution to stay competitive and achieve higher growth in key areas. Therefore accelerating a detailed search to find such smaller companies with synergistic technologies to transform companies' processes to be more cost effective and sustainable.

Companies will also look to shift their production operations over-

seas to the US, due to abundant gas and energy reserves, attractive tax breaks and a predictable political and jurisdictional environment. With production in China currently slowing down and demand also suffering, many chemical companies in APAC might also consider moving towards

*“Private equity firms help sculpt the M&A landscape.”*

the US for setting up new bases in the future if falling exports to China continue.

The handful of deals still in the pipeline will likely be announced soon. We anticipate the planning of deals throughout Q2 which will come to fruition in the second half of 2023 after careful negotiations and due diligence. Furthermore, increased M&A activity is likely due to the lull in such activities towards the end of 2022 with many deals waiting for a more stable climate. Some release on energy prices could be seen with prices having fallen and new (temporary) LNG terminals are opening

in Europe. This, coupled with China easing its Zero Covid policy restrictions, will induce more certainty and predictability throughout the global market. Considering these factors, we predict a tentative first half of 2023 for M&A deals which is likely to see rise in the second half of 2023, as forecasts become more predictable and currency volatility steadies. This could happen especially in the divestiture area as large companies sell off non-core competency business sections to focus on their most profitable sections. PE companies or other chemical companies could then start to build new synergies in areas more aligned to their own expertise.

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# Resilience Is the Strategy for Success in Volatile Markets

The Chemical Industry Has Developed Extraordinarily Well over the Past Years — Despite Numerous Crises

*Stable through the Corona pandemic — the chemical industry has proven resilient even in this crisis. Between 2017 and 2021, the return for shareholders developed exceptionally well. By contrast, the first months of 2022 have been more difficult. The war in Ukraine, fluctuating prices for energy and raw materials, disrupted supply chains and inflation have taken their toll; demand in key customer groups such as the automotive industry has slumped. Nevertheless, even in these difficult times, the industry has outperformed others. For example, the total shareholder return (TSR) of the chemical industry has decreased half as much as the general stock market. This gives hope, as in the past the chemical sector has often been a trend barometer for general economic growth.*

For its annual report, „Value Creation in Chemicals 2022—Building Resilience as the Crisis Unfolds,“ strategy consultancy Boston Consulting Group examined the value performance of 351 of the world’s leading chemical companies between 2017 and 2021.

The 79 large-cap companies studied, i.e., companies with a market

capitalization of more than \$8.5 billion, are among the top ten of the 33 industries with the highest median TSR over the 5-year period. TSR takes into account the change in share price and other factors that affect shareholders’ net worth over a given period, for example dividends. Compared with the last ranking, the large-

est chemical companies have risen from 16<sup>th</sup> to 7<sup>th</sup> place. The median annual TSR has increased from 11% to 19%. The 272 mid-cap companies with a market capitalization of more than \$1 billion are also 3.5 percentage points above average, with a median TSR of 16%, putting them in 11<sup>th</sup> place. Among these companies are many comparatively young companies from India and China. They are growing rapidly, achieving a high TSR performance. They not only serve their home markets, they are also positioning themselves very quickly in regional markets.

All 351 companies surveyed achieved a median TSR of 12% – 4 percentage points higher than between 2015 and 2019. Even the downturn in the first half of 2022, which was mainly caused by war-related energy shortages, affected the chemical sector less than others. For example, the median (average) annual TSR did fall by 13% in the first half of 2022. However, public companies across all industries lost twice as much in the same period.



Andreas Gocke, Boston Consulting Group



Adam Rothman, Boston Consulting Group



Hubert Schönberger, Boston Consulting Group



## Focused Specialties on the Rise

In the latest ranking, companies from China and India dominate the top places. Of the ten large-cap companies, four are headquartered in China and mainly serve the domestic market—with the exception of Wanhua Chemical Group (rank 6). China’s largest MDI producer has gradually expanded its market share and now dominates the global MDI market. Zhejiang Huayou Cobalt (ranked 7<sup>th</sup>), also from China, and South Korea’s Posco Chemtech (ranked 1<sup>st</sup>) are benefiting from the electrification of the automotive industry as suppliers and producers of precursors for lithium batteries.

Demand for focused specialties rose sharply, particularly in markets affected by decarbonization and digitalization. Makers of semiconductors, electronic vehicles, and batteries have become increasingly important customers for Asian chemical players. The strategy of expanding the company’s own portfolio into adjacent business areas was also successful.





**Exhibit 2 - Top-Ranked Large-Cap Chemical Companies**

Rank in average five-year TSR, 2017 to 2021 Market value > \$8.5 billion

Rank	Company	Country	Subsector	Five-year TSR p.a. (%)
1	Posco Chemtech	South Korea	Multispecialty	67
2	Bachem	Switzerland	Focused specialties	54
3	SRF	India	Multispecialty	52
4	Entegris	US	Focused specialties	51
5	Guangzhou Tinci	China	Base	50
6	Wanhua	China	Base	46
7	Zhejiang Huayou Cobalt	China	Focused specialties	42
8	IMCD	Netherlands	Focused specialties	38
9	Lorza	Switzerland	Focused specialties	37
10	Zhejiang Satellite	China	Base	37

Sources: S&P Capital IQ; BCG analysis.  
Notes: "Large-cap" refers to companies that have a market value of greater than \$8.5 billion. "Base" = Base chemicals and basic plastics. Entries shown in green type ranked in the top 10 for TSR among all chemical companies analyzed.

Fig. 1: Top-ranked large-cap chemical companies.

**Exhibit 3 - Top-Ranked Mid-Cap Chemical Companies**

Rank in average five-year TSR, 2017 to 2021 Market value \$1 billion to \$8.5 billion

Rank	Company	Country	Subsector	Five-year TSR p.a. (%)
1	Alkyl Amines Chemicals	India	Focused specialties	98
2	Deepak Nitrite	India	Base	95
3	Toyo Gosei	Japan	Focused specialties	94
4	EcoPro	South Korea	Focused specialties	68
5	Balaji Amines	India	Focused specialties	62
6	Dongyue Group	China	Multispecialty	59
7	Navin Fluorine	India	Focused specialties	54
8	SKSHJ Paint	China	Focused specialties	48
9	Vinati Organics	India	Multispecialty	47
10	Chambal	India	Aerochemical and fertilizer	44

Sources: S&P Capital IQ; BCG analysis.  
Notes: "Mid-cap" refers to market values from \$1 billion to \$8.5 billion. Entries shown in green type ranked in the top 10 for TSR among all chemical companies analyzed.

Fig. 2: Top-ranked mid-cap chemical companies.

Zhejiang Satellite (ranked 10<sup>th</sup>), for example, expanded its petrochemical production capacities to offer a broader range of carbon-based products.

US specialty chemicals manufacturer Entegris (rank 4) has become a leading supplier to the semiconductor and high-tech industries through inorganic growth. The Dutch IMCD (rank 8) is one of the world's largest distribution companies for specialty chemicals.

One example of outstanding TSR performance is India's SRF (ranked 3<sup>rd</sup>), a multispecialty company that is successively expanding its portfolio in the specialty chemicals segment. With a five-year TSR of 52% annually, the company ranked third among the top ten large caps. SRF is one of the largest refrigerant manufacturers in India. The complete back-integration of production in this area has led to significant cost advantages. In addition, SRF has tapped into the large Indian domestic market in the agrochemicals and pharmaceuticals sectors.

### India Becomes the New China

Indian companies dominate the top ten mid-caps. Six out of ten companies come from there. The location benefits from supply bottlenecks in China which led to a market shift towards Indian companies. The domestic market for paints, refrigerants, pharmaceuticals, and industrial chemicals is also growing extremely rapidly. The prospects are good, especially since India itself has not had a significant chemical industry to date. Development is also being driven by the import of cheap Russian oil.

Dongyue Group ranks 6<sup>th</sup> among mid-caps and is also the highest ranked Chinese chemical company with an average TSR of 59%. Dongyue is among the major suppliers of polyvinylidene fluoride, which is used in lithium batteries. It also has businesses in fluoropolymers, organic silicones and refrigerants. In the first half of 2021 alone, sales growth was 178%.

*“Every crisis offers a great opportunity for companies to reposition themselves and create competitive advantages.”*

Looking at the TSR development of the chemical industry by subsector, a long-standing trend is confirmed: 11 of the top 20 large-cap and mid-cap companies come from the focused specialties subsector. This subsector achieves the best performance across all regions. The industrial gases subsector also continues the successful trend of recent years, with TSR rising from 13% to 17% compared with the last survey period. Multispecialties are also proving comparatively resistant to crises because they are mainly large companies. In volatile markets, they have advantages due to their diversification.

A key success factor for TSR performance is also the business model, as companies with a technology-based model have shown themselves to be particularly strong. They have proprietary intellectual capital, in-house research, and patents.

This group includes several suppliers of high-performance polymers, enzymes and catalysts for industrial processes, as well as companies specialized in the production of electronic chemicals used in the manufacture of semiconductors. In many cases, innovations like these are difficult to replicate or reproduce.

### Building Resilience

First and foremost, resilience means being able to adapt quickly to changing circumstances. Pandemic, Ukraine war and inflation—every crisis is over at some point, but the world is a different place afterwards. And every crisis offers a great opportunity for companies to reposition themselves and create competitive advantages. The successful compa-

quickly and expeditiously in order to increase the scope for action.

Besides changes in cost structures and assets, resilience requires new ways of working and faster decision-making processes. On this basis, chemical companies can develop a medium- and long-term plan to improve resilience. Existing weaknesses must be eliminated now to be prepared for the future—this includes the supply chain and production sites, human resources or the entire business model.

Although many companies in the industry are cautiously optimistic, the challenges are nevertheless great: they must maintain the ability to create value. In a much more volatile world, this is only possible if they are well prepared to adapt to changing conditions quickly and consistently.

*“11 of the top 20 large-cap and mid-cap companies come from the focused specialties subsector.”*

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# The Materials Revolution

## New, Innovative Materials Are Creating a \$150 Billion Growth Opportunity

*Companies in the materials industry — including chemical companies — are seeing a revolution that is likely to drive a new wave of growth. For European chemical companies in particular, it will bring opportunities to adopt new business models and compete more effectively in global markets. To succeed, however, they will need to rethink their value chains, expand manufacturing in the region, and take advantage of digitally powered approaches to innovation.*

There are certainly challenges ahead, but the opportunity is substantial. The materials revolution will be transformational, driving progress toward addressing some of the world's most fundamental issues—from helping to provide affordable green energy to building the circular economy—to better the planet for its citizens.

### New Materials, New Opportunities

The expanding variety of innovative products we're now seeing includes self-healing materials that can recover from scratches and cracks;

metal foams that are lighter than traditional metals while providing the same strength; and willow glass that is strong, lightweight and conformable, and can be used in ultra-thin displays and flexible solar cells. Smart materials, such as shape-memory polymers, can be deformed and then returned to their original shape in a controlled fashion using light, electricity or other stimuli—and one, vanadium oxide, “remembers” its exposure to such stimuli, allowing it to respond more quickly to later exposures.

New materials will enable new uses and create new markets, thus opening the door to new sources of

growth for chemical companies. Indeed, Accenture's research indicates that growth rates for new materials will be higher than those of traditional materials in the coming years (fig. 1)—creating an estimated \$150 billion growth opportunity by 2025.

This opportunity is linked to fundamental changes we're seeing in the materials markets across three key dimensions: the convergence of material classes; the convergence of material and digital properties; and a shift to smarter, more sustainable materials.

- **Convergence of material classes.** Our analysis of patent filings over the last four decades shows that innovation in materials has involved the increased convergence of material classes—that is, patents have tended to cite more than one material. In 1980, 70% of materials patents cited just one material, and 6% cited three or more; by 2020, just 46% cited one material, and 24% cited three or more.
- **Convergence of material and digital properties.** Traditionally, innovation in materials focused on op-



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Bernd Elser, Accenture

timizing properties such as heat resistance, tensile strength or resistance to corrosion. However, our patent analysis shows a new pattern—an increase in patents for materials that have digital and smart properties. In 2020, 24% of patents referred to smart and digital properties of the material versus 4% in 1980, indicating an increased convergence of material and digital properties.

- **Shift to sustainability.** There is a growing emphasis on materials that can help address environmental challenges and support the energy transition, according to our analysis. While patented solutions that combine material classes have typically been regarded as more difficult to recycle and less sustainable, the share of multi-material patents citing enhanced sustainability properties has actually risen from 2.4% to 8.7% during the 1980 to 2020 period—an indication of the growing connection between sustainability and innovative materials.

### How Change Will Happen

The effective creation, production and delivery of new materials will require the reshaping and reinvention of value chains (fig. 2). A significant amount of development and marketing will need to move closer to end customers to drive and accelerate innovation, disrupting existing value chains, such as the traditional structure of an original equipment manufacturer (OEM) and Tier 1, 2 and 3 suppliers. And the growing emphasis on circularity will create opportunities for companies to adopt new business models that use new materials to enable more reuse, mechanical and chemical recycling,



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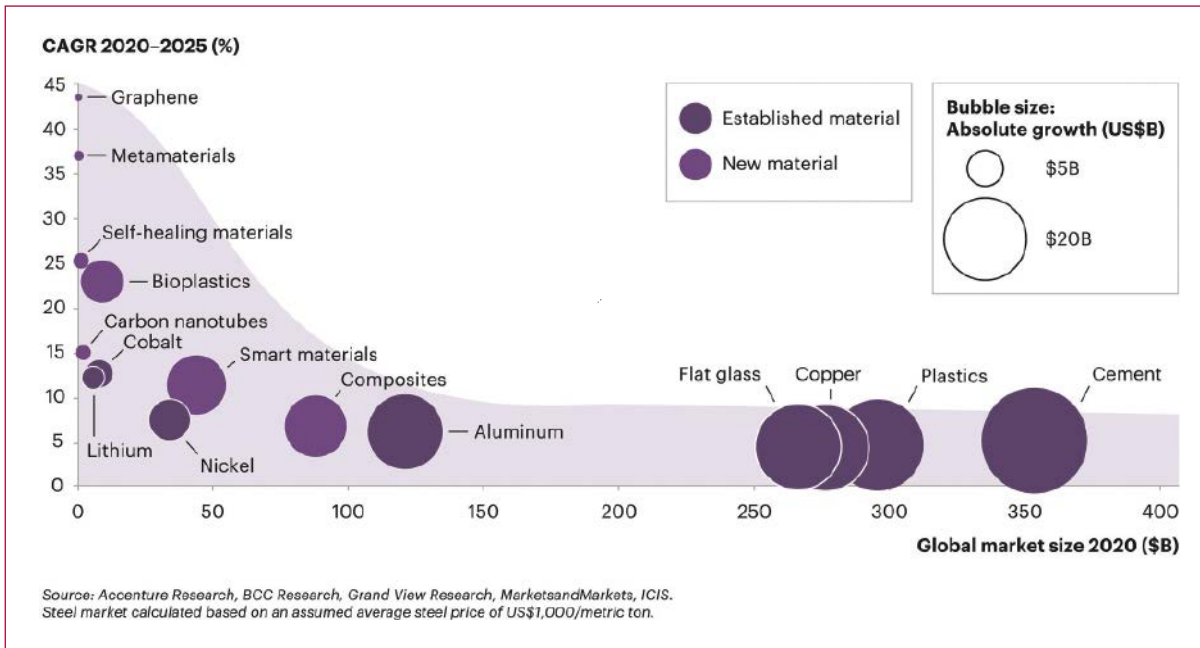


Fig. 1: Projected growth of established and new materials.

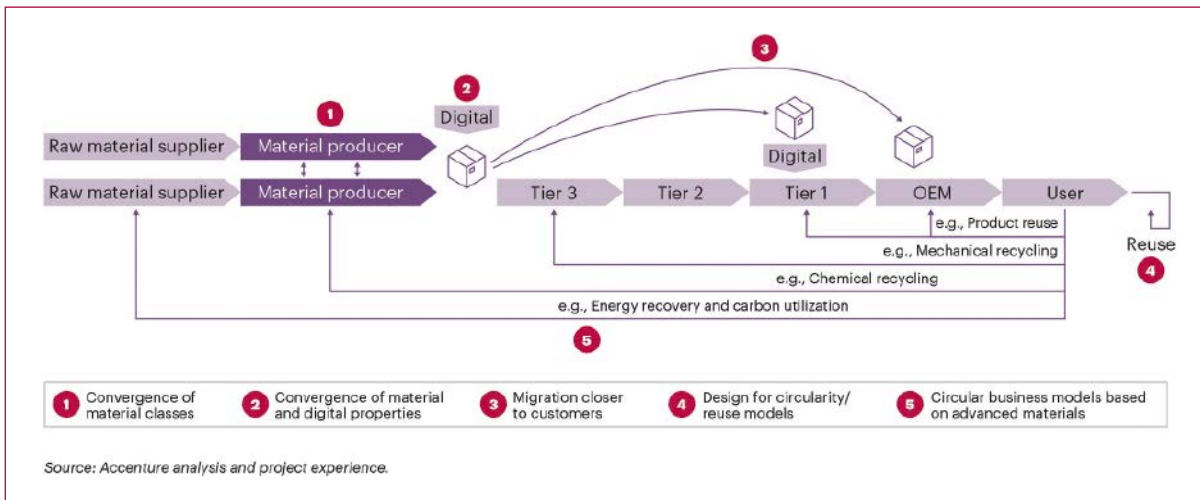


Fig. 2: Reshaping value chains for new materials.

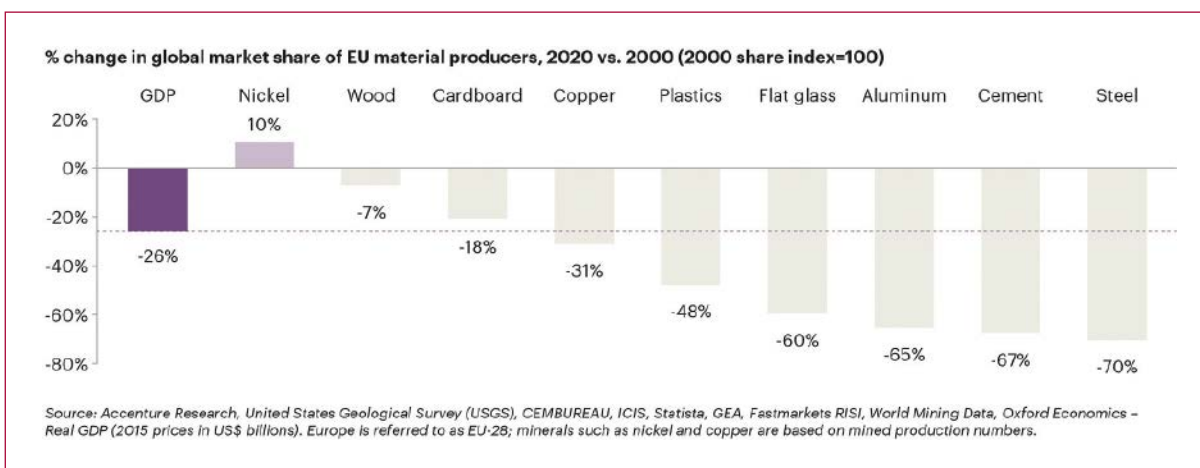


Fig. 3: European share of global materials markets.

energy recovery and carbon utilization.

Innovation is often based on further developments of existing materials, which means it relies largely on existing production capabilities—and for European chemical and other materials companies, that presents a

challenge. Over the last two decades, Europe’s share of global markets across almost all classes of materials has declined—much of this being lost to China (fig. 3). This is not just a result of having a reduced share of global GDP as in many materials categories, reductions in market share

have significantly outpaced the loss of GDP share. For example, the European share of steel and cement has declined 70% and 67%, respectively, compared to a 26% drop of GDP share. This indicates that Europe could find itself with relatively less manufacturing capacity to draw

on in the race for innovative materials.

On the other hand, the materials industry in Europe has other ways to benefit. It can consider working closely with startups, which play a significant role in the development of new materials. Europe has a sizable base of these startups, which represent a growing pool of talent, knowledge and capabilities—and the industry has an opportunity to collaborate with them to advance innovation. That means that companies and governments should work to generate environments that foster startups in order to strengthen the region’s ability to produce new materials.

At the same time, European companies can draw on today’s increasingly powerful “science technology” (science tech) to improve innovation efforts. Science tech builds on cloud, data, analytics, artificial intelligence and automation to allow virtual

*„New materials will enable new uses and create new markets.“*

rather than physical experimentation with new materials, bringing greater speed and better targeting to innovation. An Accenture analysis of priority patents shows that filings based on traditional development approaches in fields such as steel, cement, glass and so forth declined or grew only slightly in the past few years. At the same time, those involving disruptive innovations derived through computational chemistry—a type of science tech—increased more than 100%.

For chemical companies, the opportunity of the materials revolution is simply too big to ignore. It will not only provide new products to bring to market, it will also change the competitive landscape by allowing European chemical and other materials companies to compete on innovation, rather than simply costs. And it will enable the sector to play a vital role in driving the energy transition forward and building the circular economy.

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# Going Inland

## China's Chemical Industry Is Shifting from the Coastal East to the Central, Western and Northeastern Regions

*Historically, China's chemical industry has mainly been located in coastal provinces, with Shandong as the biggest and Jiangsu as the second biggest province by chemical sales, while the coastal regions of Hebei, Tianjin, Zhejiang, Liaoning and Guangdong are also among the top ten producers of chemicals. This concentration is partly a consequence of the high population density and subsequent central role in industrial production of these provinces. Coastal provinces are also obviously favored as locations targeting overseas exports of chemicals and more importantly the end products produced from these chemicals within China.*

In the past few years, however, the situation has changed to some extent. Comparatively rich areas such as Jiangsu or Shanghai have encountered

limits regarding available space. These provinces also face rising concerns both from an increasingly environmentally conscious middle class

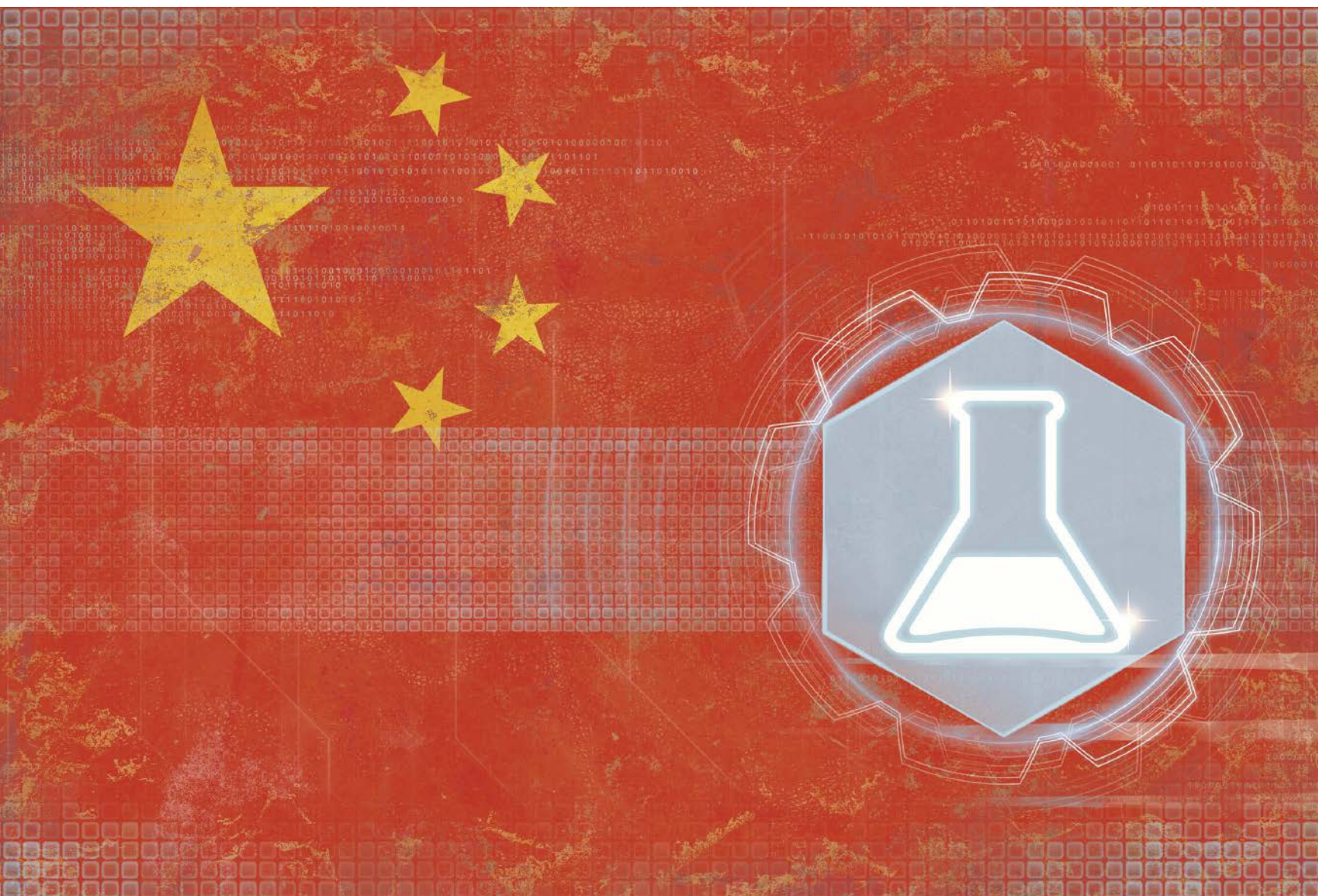
and from government officials worried about accidents, threatening their careers—such as the March 2019 explosion at a chemical plant in Jiangsu Province which killed 78 people. At the same time, these locations have various alternatives regarding interested industrial investors, many of which are regarded both as less risky and providing more jobs of a higher quality.

Environmental legislation has also had a strong impact on the chemical industry, particularly in the coastal provinces. The mandatory shift to chemical parks—along with often strict acceptance criteria these parks impose on new tenants—has forced many small companies to close down their production in these provinces.

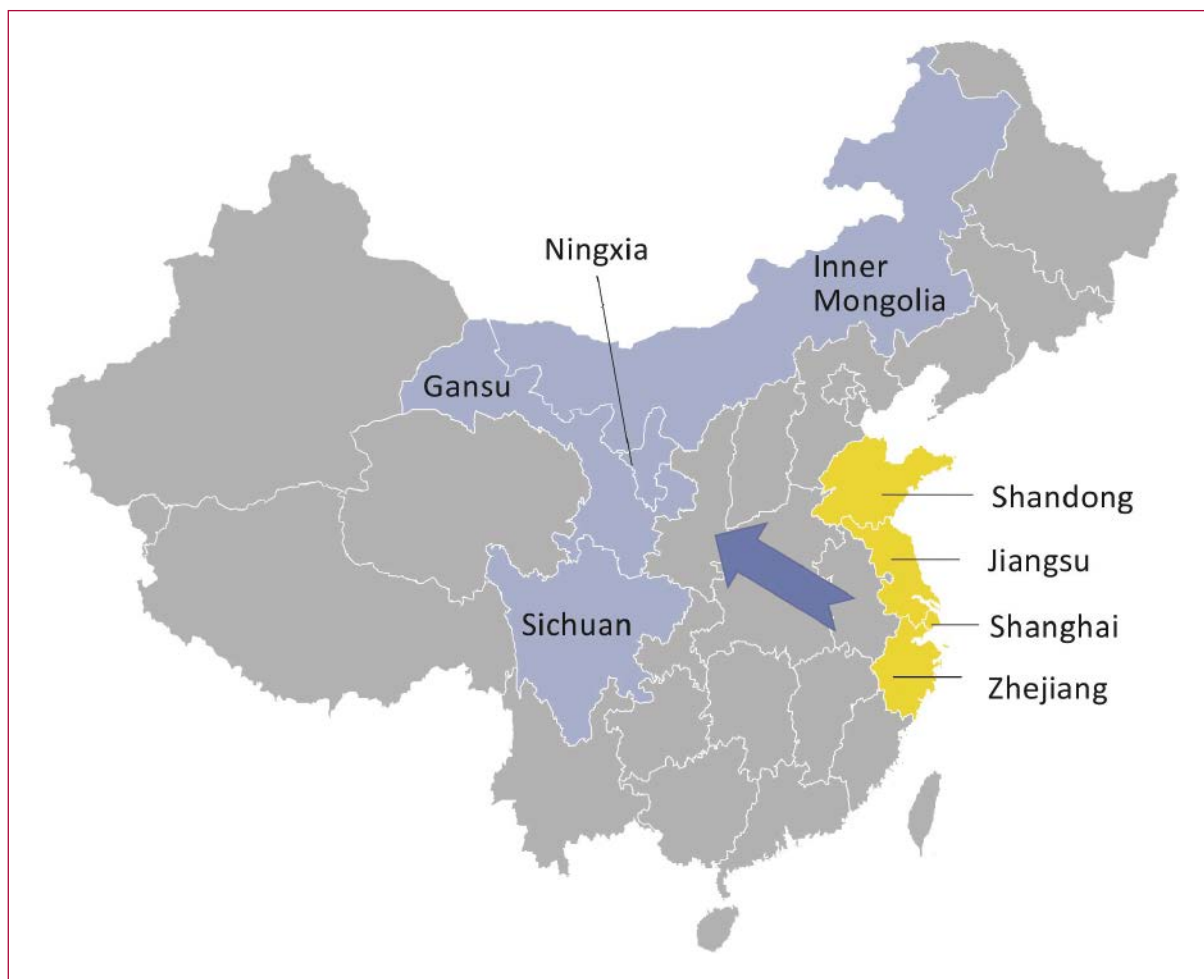


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The legislation enacted to protect the Yangtze river (the „Action Plan for In-depth Protection and Restoration of the Yangtze River,“ which prohibits chemical production within one kilometer of the river and its main tributaries) has led to further closures and also limited the area available for the settlement of chemical companies.







Direction of shift of chemical production in China with key provinces affected.

In Shandong, for example, the number of chemical parks was reduced from 199 to 84 within a period of five years, and more than 2,000 chemical companies were closed. In Jiangsu, after five years of intensified regulation of chemical companies, there are now only fewer than 1,000 chemical companies, down from more than 4,000 in 2015 and more than 3,000 in 2019. Several chemical parks in Jiangsu were closed as well. Other provinces including Hubei, Guangdong and Henan have also issued policies restricting chemical production.

Depending on their size, investment capital and profitability, affected chemical companies have reacted in different ways. Small, low-technology companies have mostly simply closed, a consequence that was probably quite intentional on the part of provincial governments, since these enterprises contribute relatively little to the economy while contributing disproportionately to the risks of chemical production.

However, several larger domestic companies have relocated production to provinces which are perceived to have less stringent criteria. For example, several pesticide pro-

ducers from Jiangsu province have moved parts of their production to inland provinces, such as Inner Mongolia, Gansu, Ningxia and Sichuan, where local governments have established chemical parks and provided incentives for companies from eastern China to locate there.

The scale of these relocations is quite large—one recent Chinese paper talks of 632 new transfer projects in the central, western and northeastern regions since 2019. It has even led to a partial backlash in the target provinces. For example, while about \$900 million was invested in chemical projects in Ningxia Province from 2016 to 2020, chemical production near the Yellow River basin has been restricted by the central government's environmental policy since 2021. Therefore, Ningxia has significantly tightened environmental regulations in 2022. From then on, many of the inspections and supervision that have mainly affected companies in the coastal provinces will also apply to chemical companies in Ningxia. Accidents like the 2022 one in Lanzhou, Gansu province, at the Shandong-based pesticide manufacturer Binnong Technology's production facility (Lanzhou production did not be-

gin until 2021) are likely to further speed up governmental supervision.

In any case, some of the relocations probably are not aligned with the objectives of the central government. For example, regulation specifically prohibits the transfer of outdated chemical production capacity across regions. However, the performance of provincial government officials is measured by a variety of parameters including both criteria related to environmental protection and to economic figures such as local employment and GDP growth—and there is a widely shared perception that in the less-developed, poorer provinces, the economic factors have a higher weight than in the richer coastal provinces.

One potential consequence of the production shift mentioned in this paper is an increasing separation of chemical production and chemical R&D. Highly qualified R&D chemists are unlikely to be willing to move to regions such as Ningxia or Inner Mongolia, preferring the lifestyle, educational infrastructure for their children and employment opportunities for their spouses only available in the highly developed coastal provinces. This potential split may be further

enhanced by the specific promotion of R&D in places such as Shanghai, a place that (with a few exceptions) is unlikely to provide encouragement for the expansion of traditional chemical production.

Interestingly, foreign chemical companies have so far shifted their production far less of away from the coast than domestic players, though many of them have been affected by the closure of chemical parks and the relocation of chemical production to chemical parks. This is due to a variety of reasons. Generally, Western foreign companies have higher environmental standards and thus have had fewer problems adapting to the local tightening of these standards. Their production plants tend to be fairly large compared to the average Chinese player, and they are the preferred tenants of coastal Chinese chemical parks due to their higher safety and environmental standards as well as their above-average tax payments. In addition, Western companies are potentially more likely to pay a higher premium on being close to international airports and residing in cities that are attractive and easy to reach for expats and customers. Also, they tend to be active in chemical segments that are somewhat less price sensitive, relying on superior technology rather than the lowest production costs, and thus can afford the higher costs of the coastal provinces. In fact, some Western companies such as BYK have even expanded production in coastal areas such as Shanghai despite already having an inland production site in Anhui province.

In conclusion, it remains to be seen whether the relocation of chemical production away from the coastal provinces is a longer-term trend or just a short-term phenomenon that will weaken once regulation and its implementation becomes more unified throughout the country. In the latter case, the disadvantages of producing chemicals in the more remote areas—such as increased logistics costs, potential separation of production from R&D and the greater difficulty to find qualified personnel—may well outweigh the benefits.

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# Resilience in Healthcare and Chemical Production in Europe

## Using Digital Twins for Sustainable Manufacturing Processes

*In the last few years, any circumstances taken for granted were wiggled or even turned upside down. We had to learn that in a globally connected world, the sun does not rise more beautifully every day. We learned that the supply chains were disrupted. Many comfortable conditions we could have enjoyed during the last decades, and we conceived as being on solid ground, have been turned upside down. Thus, Europe needs to become more resilient. On issues of healthcare and our core industries, on which Europe's prosperity rests. We need to be more adaptable to influences on the European economy, where we do not have a direct impact.*

### Resilience Through Innovative Sustainable Manufacturing Processes

For over 20 years, many pharmaceuticals have been produced outside of Europe due to cost and existing intellectual property rights. Furthermore, many pharmaceuticals are produced in a batch-wise manner. This led to a situation in Europe where some pharmaceuticals were not available for patients. During the Covid pandemic, we, the Europeans, became aware of breaking supply chains, but we also learned that we are great innovators and able to invent safe vac-

cines within a noticeably short time if the pressure is great enough. This learning curve shall be used as a springboard in the future to become better in healthcare industry, chemical industry and other industrial areas across Europe.

Sustainable manufacturing is one of the most common demands industries, such as the pharmaceutical, chemical, and biotechnological industries, are faced with today. It defines a chemical process avoiding unnecessary compounds, hazardous initial substances, hazardous products and solvents, saves energy, reduces the complexity of synthesis and

many more environmental principles for sustainable conduct. Extruder-assisted processes are well understood and can be optimized for specific educts and products with reduced by-products. Potentially, inflexible infrastructures and fixed distribution channels hinder the establishment of new sustainable processes and products.

So called "very old technologies" may be converted as more sustainable processes with new innovative insights, if the existing infrastruc-

*„Sustainable manufacturing is one of the most common demands industries are faced with today.“*

ture can be customized and new distribution models established. These innovations can be protected by intellectual property rights, such as patents, and be exploited by Europe's industry. For example, the first German patent (DE 1) discloses a solvent free process. One could look up similar "old solvent free processes" and use them as a basis or inspiration for



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new processes. These new processes may integrate current state of the art technologies and sustainable manufacturing processes in a mixed synergistic innovation process.

It is a fallacy to believe that to achieve these goals development of completely novel techniques is necessary. A holistic view is proposed, considering novel techniques, techniques used by nature, and sometimes old techniques in a new set-up with novel amendments and supplements that lead to sustainable manufacturing techniques.

A balanced and mixed IP strategy will also support the development, use and dissemination of greener chemistry with sustainable manufacturing, as patents protect the inventions of innovators.

In an objective way, factors that may hinder innovations should be







considered. Some non-exhausting examples are the own subjective imagination of involved people, missing decisions of management or limited imagination of other participants, general framework conditions such as laws, regulations, directives and other guidelines, established infrastructure, rules of the market, cost etc. Important impediments for innovations are product policy aimed at product differentiation rather than product variation, that may dominate a company's innovation strategy. A corporate policy based on persistence, the commonly used "me-too-strategy", waits until a third-party innovation has established itself on the market for example. This strategy relies on tradition out of conviction and hinders a switch to sustainable manufacturing and resilience. Therefore, approved development costs and available equipment are key factors that frame innovations and inventors' possibilities.

These non-exhaustive obstacles are only intended to indicate possible difficulties solved by inventors with much optimism, persuasion, perseverance and technical, legal and rhetorical knowledge.

Valid IP rights secure the innovator a monopoly position in the markets and thus enable them to recoup their investments and make profits. Likewise, IP rights give the innovator or pioneer protection against imitators, such as companies that are considered early followers and late followers, or against companies that want to market detailed improvements such as a modification. Valid IP rights are also marketing tools proving the innovative spirit of a company,

e.g., in social media, and are an enormously important part of the value of companies.

### Setting the Course for Sustainable Innovations Using Digital Twins

Digital Twins (DigiTwins) are a large research initiative in Europe and beyond, aimed at revolutionizing healthcare and biomedical research for the benefit of citizens and society. They are computer models enabling a prediction of optimized chemical processes, costs and by-products.

Testing modular standardized connectable, continuously operated, small sized extruders or mechanochemical reactors, may allow a reduction of the plant size and a switch from batchwise production in the pharmaceutical industry to a continuous production as is typical for the chemical industry. Using digital twins for the estimation of a new process set-up, e.g., switching from solvent assisted batchwise production to a continuous, extruder supported production, enables development of nearly fully automated production processes in small sized reaction plants in movable scalable infrastructures. Moreover, the calculations of the digital twin can lead to heavily reduced production costs.

### Setting the Course for Intellectual Property (IP) Strategy for Sustainable Innovations

Enabled through the intensified cooperation of EU member states, the

European legislator will establish a more uniform and cost-effective patent system. This new system can be used from 1st June 2023 in participating member states of the EU through the Unified Patent System covering a Unitary Patent (UP) and Unitary Patent Court (UPC). The „unitary effect“ of the new Unitary Patent avoids the previous fragmented protection in European Union countries, as all EU member states, except Spain and Croatia, want to implement the system in the future. The administrative and cost burden for all parties will be significantly reduced.

The European legislator has set a legal framework with the Supplementary Protection Certificate (SPC) Manufacturing Waiver (Reg. 2019/933 amending Reg. No 469/2009) that allows the production of specific generic pharmaceuticals during a certain time of the patent term, allowing stockpiling for the export of generic products outside the European Union, without patent protection. This is in addition to the former possible research privilege and Bolar-Roche Exemption.

These two legal frameworks will strengthen the resilience of availability of generics by reinstallation of the

production of generic pharmaceuticals in Europe. As a side effect these frameworks will strengthen the resilience of Europe's healthcare system and create safe jobs, especially when combined with sustainable manufacturing methods which are optionally designed by digital twins.

### Setting the Course for Europe's Future

European institutions should foster natural science on all levels from school to work during the working lives of European citizens. They should check critically marketing costs that avoid real innovations, due to the above-mentioned obstacles. And importantly they should boot-up the implementation of innovative sustainable manufacturing. Utilizing and promoting the above-mentioned tools by market players, public institutions, research institutions etc. within the new European legislative framework, an innovative transformation of Europe's pharmaceutical industry and parts of chemical industry to a sustainable and resilient manufacturing, is possible.

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On June 1, 2023, Routledge will publish the book "Mechanochemistry and Emerging Technologies for Sustainable Chemical Manufacturing." It contains, among other topics, a chapter on IP protection in the chemical sector, authored by Tanja Bendele. More info at: <https://bit.ly/IP-Mechanochemistry>

## FDA Issues Continuous Manufacturing Advice for the Pharma Industry

On Mar. 1, 2023, the FDA issued the International Council for Harmonization (ICH) final guidance on the use of continuous manufacturing in drug production. As reported by Pharmaceutical Technology, this marks the FDA's proactive steps to ease the pharmaceutical's industry transition to these advanced processes, states the announcement.

While not binding, the document covers the regulatory and scientific considerations needed for the development and implementation of continuous manufacturing in pharma, and the guidelines are meant for both new and pre-existing products.

This guidance was previously endorsed by the ICH Assembly in November 2022 and is regarded as an attempt to harmonize regulatory considerations surrounding continuous manufacturing. It adds to an overarching advisory framework established through other ICH guidelines.

For available products, the guidelines include considerations on the conversion of batch manufacturing practices to continuous manufacturing.

In the last few years, continuous manufacturing was cited as a solution to address the ongoing challenges facing pharmaceutical supply chains. The Covid-19 pandemic had highlighted the difficulties surrounding global supply chains and the reliance on manufacturers in other parts of the world.

In a June 2021 report following an executive order, the Biden administration called for more public investment into continuous manufacturing. Funding was also given to companies that would bolster US-based production of critical medicines. This method of manufacturing has been also highlighted as a way to mitigate the industry's environmental impact.

The document covers equipment design and process dynamics, among other topics, and features example of continuous manufacturing systems used to produce therapeutic proteins and tablet drugs in its annexes.

The guidelines also delve into quality control and process monitoring of continuous manufacturing.

In one of the final sections, the document showcases some of the approaches that can be taken when managing disturbances that could affect material quality. Disturbances can harm the flow of a normal continuous operation and may result in a diversion of material.

In addition to the guidelines, the FDA shared a discussion paper on the implementation of artificial intelligence in drug production. However, this paper is not meant to offer recommendations, but instead will be used to source feedback from the industry.

■ www.pharmaceutical-technology.com

# A New Take on Logistics Procurement

## Study Provides Recommendations for Action by the Chemical Industry

*In light of strained supply chains, logistics is increasingly becoming a competitive factor for the chemical industry. A recent study entitled “Procurement of logistics services in the chemical industry”, which was supported by Dachser Chem Logistics, offers concrete recommendations. The authors of the study are Christian Kille, Andreas Backhaus and Constantin Reuter.*

Times have changed. Supply chain disruptions, which result in delays and material bottlenecks, as well as reductions in the available capacity in logistics have demonstrated to companies in general, and particularly in the chemical industry, that they can only do so much. Until a few years ago, it was common practice when procuring logistics services to go with the cheapest provider and still expect excellent service. Such is the nature of a typical buyer’s market.

In the past three years, however, the market has morphed into one driven by supply. And despite a looming recession, this is unlikely to change. Reasons for this include a lack of qualified personnel, particularly drivers. In addition to soaring energy prices, this often presents a much greater challenge to chemical companies than to other industries. After all, chemical companies produce special goods—including dangerous goods. Handling these requires special equipment and know-how.

The recent study clearly shows that chemical logistics procurement needs to adapt to these challenges if it is to continue to contribute to corporate success in the future. This

means that those procuring chemical logistics services need to expand their knowledge so that they can select the right logistics solutions and partners. But they also need to tailor the procurement process to each situation—in short, a more customer-oriented approach is called for. In many sectors and corporate divisions, this is a well-established notion. In many areas of procurement, however, it is still quite new. After all, many procurement officers believe that customer orientation is the job of the sales department.

With a view to developing such a tailored procurement process and providing concrete recommendations, the study featured the customary market and process analyses, but also asked the chemical companies themselves what they think. The result is a procurement process that involves seven steps and poses 30 questions specifically about the procurement of transport services. It provides guidelines that help procurement officers choose the best solution in these challenging times and thus continue to enhance corporate competitiveness.

Overall, the study’s analyses call for a change in perspective in the procurement of chemical logistics:

**Customer orientation:** The user is the procurement officer’s customer for whom the logistics service is organized. Potential users are from production, sales, and purchasing. The user’s requirements need to be understood and woven into the tender to guarantee security of supply in a tailored manner.

**Overall-process orientation:** Not only are the user’s requirements diverse; unless they are understood and embedded in the overall process—in particular to avoid follow-up costs caused by, say, quality losses—supply efficiency can be compromised.

If procurement officers understand every aspect of how this works, the procurement of chemical logistics is prepared for the altered environment.

### “Bad” Procurement Costs Money

The study also shows that the quantifiable KPIs of the costs or prices of purchased logistics services do not reflect the total costs for the company. This is because errors in the logistics chain can disproportionately affect a chemical company’s total costs. The less attention paid to a logistics partner’s performance and quality, the more likely it is that errors will occur. Furthermore, an overall assessment of the logistics process that takes all parties into account enables cost savings that can be neither recognized nor increased if transport logistics is viewed in isolation. In fact, insufficient coordination or synchronization can even lead to additional costs elsewhere.



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These findings can be distilled into six recommendations for the procurement of chemical logistics:

- Building specific logistics expertise should play a fundamental part in the procurement of chemical logistics.
- All procurement activities ought to focus on the chemical logistics user.
- Sufficient time and effort should go into creating the tender, especially when it comes to identifying goals, requirements, and general conditions.
- Comprehensive knowledge of the market is crucial for implementing a competitive logistics solution.
- Narrow scopes of implementation and rigid contractual conditions are to be avoided.
- An exchange of information between the parties in the value chain should be an integral part throughout the term of contract.

### Keeping an Eye on the Entire Logistics Process

So what does bad procurement cost? The study does not quantify costs because they vary from case to case. However, it does offer tips for cutting existing costs down and avoiding additional ones. Ideally, procurement helps raise logistics performance while reducing overall process costs. If you’re interested in reading more of the study, please contact Dachser Chem Logistics: [chemlogistics@dachser.com](mailto:chemlogistics@dachser.com)

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# Strategic Planning in Transport Management

## From Production Planning to Strategic Transport Planning

*The uncertain environment of the past few years has turned the logistics market into a seller market. Shippers can stay ahead of the game through tactical and strategic planning in transport management enabled by accurate logistics forecasts.*

The recent global events have forced organizations to deal with never-before-seen unpredictability and complexity. At the same time, they have exposed the fragility of supply chains. A prime example is forwarding companies, which have been hit hard by the situation. The prevailing uncertainty resulted in empty containers and losses for carriers, which in turn led to supply chain bottlenecks and delivery problems around the world. Shippers have realized that they must adapt to the new global challenges and that a resilient supply chain is needed to satisfy increasing customer needs, meet strict lead times, and stay ahead of the competition.

### Logistics Challenges & Trends

Due to the considerable capacity constraints of the recent past, the logistics market experienced a change from a “buyer” to a “seller” market, which, in the logistics terminology, means a more dominant position of carriers over shippers. Capacity limitations associated with rising logistics costs pose an imminent risk to shippers’ delivery efficiency and are calling for new capabilities in transport logistics management.

Tactical and strategic planning in transport management is one of these new capabilities and a very promising one, in fact. It helps shippers overcome capacity limitations and

leverage extensive logistics optimization potential. Integrating logistics forecasting into operations is an essential enabler for this capability.

### Poor Logistics Forecasting

Shippers may experience a wide range of problems resulting from low-quality logistics predictions. These issues lead to higher costs and negatively impact operations and relationships with business partners. Inaccurate forecasting can make it difficult to properly manage assets and match transportation demand with the available capacity. Overbooking of transportation resources may lead to wasted capacity and additional costs, while underbooking may result in missed delivery dates and extra transportation costs. Aside from the financial consequences, poor forecasting may lead to unsatisfied customers and uneasy relationships with carriers. So how can you

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ensure that logistics forecasts will actually improve decision-making and competitiveness?

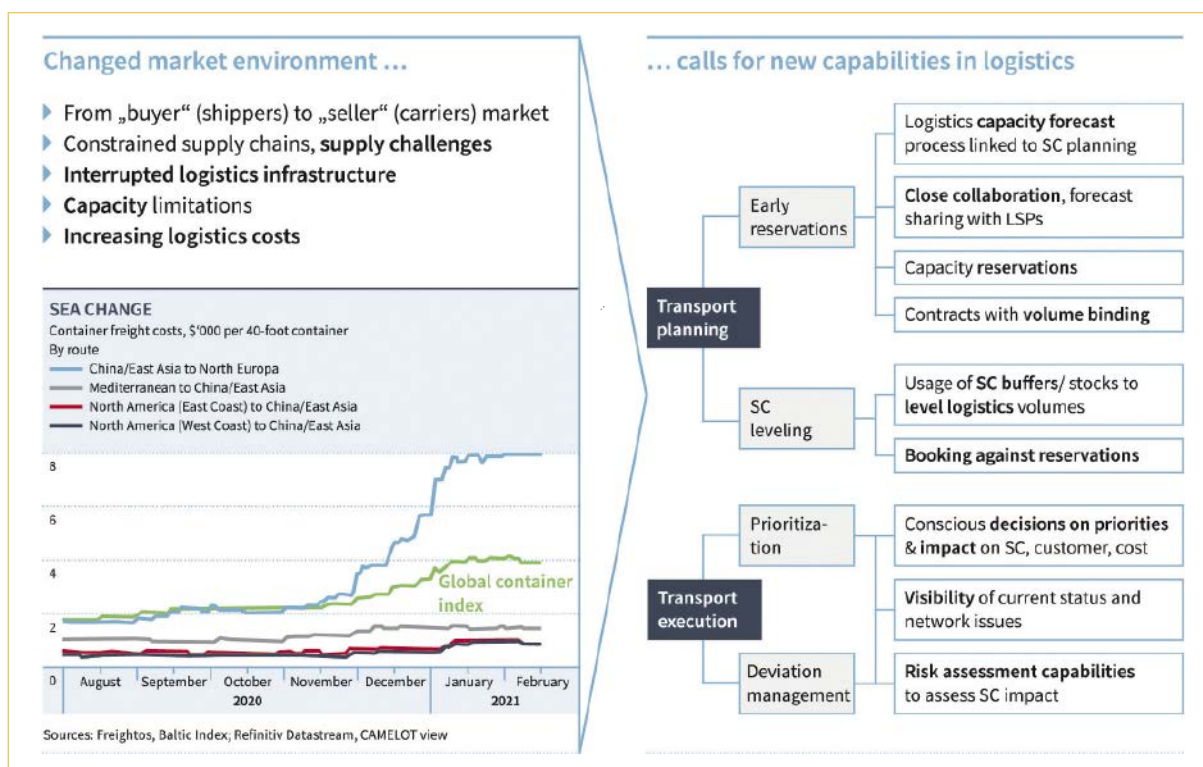
### Doing it Right

Incorporating logistics forecasting into operations is the answer to resolving the challenges described above. While production planning is a well-known concept for compa-



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New logistics capabilities

panies, few have realized the potential of translating production demand figures into an outlook on transport logistics demand. A more accurate logistics forecast helps companies to communicate and secure transportation capacity at the carriers more efficiently. In addition, the forecasts can be incorporated into strategic tenders and used to supplement historical data.

### The Benefits

Utilizing logistics forecasting in a company's operations and strategies can bring numerous benefits. Communicating capacity to the carriers regularly improves the logistics process of a company. This proactive approach allows carriers to plan and prepare for the company's future vol-

*„Due to the considerable capacity constraints of the recent past, the logistics market experienced a change from a 'buyer' to a 'seller' market.“*

ume, ensuring they have the required resources in place, resulting in lower risk, lower costs, and greater efficiency from the company's perspective. Also, a reliable logistics forecast

enables the reservation of the capacities at the forwarders, reducing the risk of booking too many or too few trucks or containers, which would result in high costs. This approach provides short-term savings for the

*„Utilizing logistics forecasting in a company's operations and strategies can bring numerous benefits.“*

company, by paying only for the capacity that will be needed. The benefits of working in closer collaboration with logistics partners go beyond the pure operational subcontracting and tendering relationship, it facilitates better plannability on the side of the logistics service provider and, ultimately, leads to a more secure capacity situation even in peaks. In addition to the benefits that come from regular proactive communication, a far-reaching planning horizon for logistics capacities as well as further advantages can be reached. The forward-looking approach, which results from integrating supply chain planning and logistics forecasting, breaks up silo thinking and helps logistics leave behind the firefighting mode and provide a strategic contribution to corporate success in the longer run. Reliable logistics forecast-

ing based on Sales and Operations Planning allows identifying pro-actively optimization areas in terms of tactical decision-making. It helps to optimize and expand the mode-of-transport selection by adding new transportation lanes. In addition, the potential of cross-site shipment consolidation and optimized shipment frequencies can be maximized and the most cost and time-efficient transports organized, leading to optimized lead times and full containers.

Integrating supply chain planning and logistics forecasts does not just enable organizations to secure transportation capacity at the carriers and allow for pro-active optimization. It also offers a major advantage in stra-

tegic tendering. By supplementing historical data with forecast values, a more accurate picture of future shipments and the company's business requirements emerges. From a long-term perspective, it leads to lower transportation costs, higher reliability and predictability, increased profitability, and optimal asset utilization.

### Supply Chain Efficiency

Implementing effective logistics forecasting enables effective tactical and strategic planning, thus contributing to overall supply chain performance. Integrating advanced IT solutions specifically designed for logistics forecasting helps to increase forecast accuracy, reduce manual effort, and decrease overall process costs. These solutions provide improved visibility and end-to-end transparency within the supply chain, allowing for more informed decision-making regarding business partnerships and market focus. Incorporating the solutions into the decision-making process helps optimize freight spend and make more effective strategic transportation management decisions. Implementing the capability for tactical and strategic planning enables companies to build a smoother and more resilient supply chain and gain a clear competitive advantage.

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# Well Prepared for the Future

## Supply Chain Assessment: Starting Points for Holistic Cost Optimization in the Chemical Industry

Due to the current very challenging economic and geopolitical situation, cost-cutting measures seem unavoidable for many companies. The German chemical industry is also feeling the massive headwind and is preparing for the onset of the downturn with cost-cutting programs, some of which are worth millions. But which measures make sense? Which will have a lasting effect and not just postpone necessary investments for the future? CHEManager asked Klaus-Peter Jung, Partner and Head of Industry for the Chemical Industry, Beverages and Logistics Service Providers at the Miebach Consulting Group, about a possible solution, the Supply Chain Assessment. The questions were asked by Birgit Megges.

**CHEManager:** Mr. Jung, where do most companies start their savings programs?

**Klaus-Peter Jung:** The desire for savings programs is great, and so is the need in some companies—but many companies quickly run out of ideas after the usual measures, such as restricting travel expense policies and the employment of consultants. The bigger question is how and where costs can be reduced, even in the short term, without laying off well-qualified personnel in exchange for high severance payments, which will be lacking again in six months or a year due to the shortage of skilled workers.

Many purchasers are currently finding out that pushing down purchase prices while facing persistent inflation and rising personnel and energy costs is quickly reaching its limits.

So where do we start? Many companies in the chemical industry are currently sitting on high inventories of raw materials, packaging and finished goods — still resulting from the pandemic. Due to the current reduced demand in some segments, „replenishment freeze“—where it can be implemented—is particularly effective in the short term. In addition, the impending crisis provides sufficient reason to rethink core issues such as the production footprint, the distribution network, and portfolio complexity.

**In your experience, why are the measures taken in many cases not effective in the long term?**

**K.-P. Jung:** Many measures are aimed at postponing necessary actions to avoid cash out today. While this is ef-



Klaus-Peter Jung, Partner and Head of Industry for the Chemical Industry, Beverages and Logistics Service Providers, Miebach Consulting Group

fective in the short term, it only postpones growth, optimization, or capacity problems to the near future where they will be magnified when the economy strengthens again. Not carrying out optimization projects now simply means postponing their positive effectiveness by months or even years. Investment projects in the chemical industry usually have a planning and implementation horizon of several years—to suspend them now means that the necessary capacities will not be available when demand picks up again.

The situation is even more serious when it comes to staff reductions

—these usually cost considerable amounts in the short term in order to free up employees who will then be desperately sought on the market again in 6 – 18 months and not found due to the shortage of skilled workers.

**What does your approach look like?**

**K.-P. Jung:** One starting point can be a supply chain assessment, the aim being to identify and implement starting points for holistic cost optimization in the supply chain. In this process, all the stones are turned over and examined to determine the extent to which savings potentials are slumbering there, and how these can be leveraged within a manageable period of time.

For example, the focus can be the procurement, production, or distribution network, but also all supply chain processes from planning to purchasing and inventory management to service provider control. This is agreed individually with the customer in order to develop and implement concrete measures quickly and efficiently.

**Can you explain in detail your approach to holistic cost optimization in the supply chain?**

**K.-P. Jung:** The background of the supply chain assessment is the analysis of the existing so-called target operating model, consequently of the entire set-up or the „production system supply chain management.“ As a rule, an analysis is carried out in the following dimensions: First, organization including interfaces and degree of centralization; second, employees, their qualifications and their skills; third, supply chain processes; fourth, technologies and tools such as planning tools, control towers or dashboards; fifth, KPIs and reporting; and sixth, the industrial footprint, by which network and partners are meant.

These dimensions describe the target operating models in supply chain management and exist—intentionally or unintentionally—in every company. The first three criteria describe so-called qualitative soft di-





mensions, while the last three are aimed at quantifiable hard dimensions. Short-term cost saving potentials are mostly oriented towards the latter hard dimensions, but optimization of these is usually not possible without taking the first three criteria into account. Therefore, the approach is set-up for a holistic cost optimization.

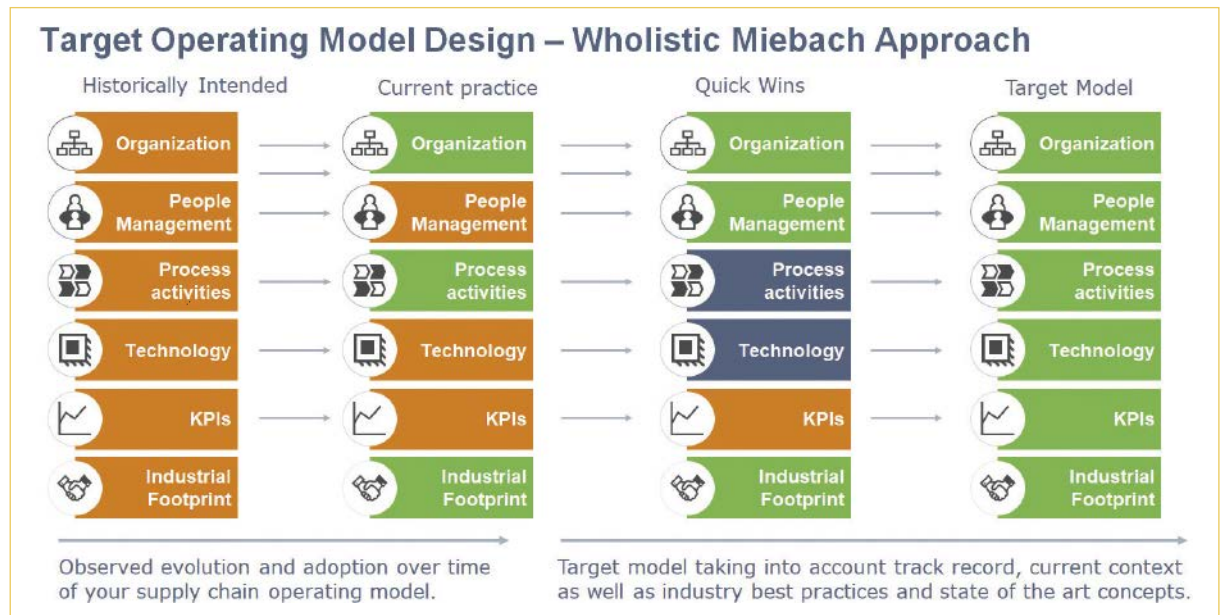
In most cases, these aspects were once defined in terms of how they should be lived, these are called Historically Intended. Deviating from this, an actual state has emerged over time, referred to as Current Practice, which partly still corresponds to the formerly defined state, and partly differs from it—whether positively or negatively.

The supply chain assessment analyzes both the defined and the actual state and, based on this, identifies both quick wins that can be realized in the short term and optimization potential that should be aimed for in the medium term, or target model. In addition to the current track record—what is working well and should be retained versus what is not working well—, current conditions, for example, planned conversion to S4 Hana prohibits measure XY in the short term, industry best practices and state of the art concepts are considered.

*These are a number of criteria that need to be analyzed. How do you ensure that the evaluations are not arbitrary?*

**K.-P. Jung:** This is not done arbitrarily, but by means of a standardized scale. Based on the research and consulting firm Gartner, so-called maturity levels have been defined for a wide variety of dimensions and processes, which enable an objective evaluation and classification of the company. Thus, in each project, there is usually an evaluation not only by the external party but also an internal assessment of the status quo by the customer.

The determination of which quick wins can be implemented in the short term and which level of maturity should be aimed for in the medium term is also worked out together with the customer. In most cases, a multi-stage approach is chosen, with short-term cost reductions as quick wins in the first step and medium-term development potentials being addressed in a second step. Together, we work out what effects will result from further development and how these



Approach to holistic cost optimization in the supply chain

should be structured in terms of both content and timing.

*In which areas of a company can this type of assessment be applied?*

**K.-P. Jung:** The implementation of this assessment can be extended to all supply chain processes, be it purchasing, production planning, inventory management, S&OP or customer

short-term effectiveness of a supply chain assessment. Short-term savings potentials that do not jeopardize medium-term success were identified, for example, in the tool-supported centralization of supply chain planning processes or the reduction of „Covid inventories“, and medium-term savings potentials were identified in the review of the production footprint with greater specialization of individual locations.

It is particularly important to emphasize that not only individual aspects are considered and may counteract other measures or framework conditions, but that short-term optimization is in line with a medium-term target operating model in order to master the feared crisis, but also to be well prepared for the subsequent upturn.

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*“In most cases, a multi-stage approach is chosen, with short-term cost reductions as quick wins in the first step and medium-term development potentials being addressed in a second step.”*

service. Cost reduction potentials usually arise both in the process itself, such as the reduction of resource requirements or the avoidance of interface losses, as well as in the result of the optimized processes, for example by increasing the quality of the planning results, the improvement of capacity utilization or the reduction of working capital.

*Have you already been able to gather experience that proves the success of the approach?*

**K.-P. Jung:** Concrete project examples have impressively demonstrated the

# Is the Swing also Coming to Germany?

## Centrally Controlled Logistics for Covid-19 Vaccines

*The elimination of the mask requirement is the most visible sign: The Corona pandemic has entered a new phase in Europe. And this should not least change the logistics of Corona vaccines. Countries like Germany, where vaccine logistics have so far been organized at the federal state level, should switch to a centralized solution. This is the only way to simultaneously solve two challenges. On the one hand, sufficient availability of the vaccines must be guaranteed. On the other hand, the overall logistics effort and the associated costs must decrease.*

Examples of national logistics solutions in the UK, the Netherlands and Belgium show how high availability and low costs can be brought down to a common denominator. Before that, however, the question must be answered as to why the decentralized solution of Corona vaccine logistics was and is less efficient and more expensive. There are three main reasons for this.

First, the previous concept in Germany, in which 16 federal states each sought and found their own solution for the storage and distribution of Corona vaccines, multiplied the administrative burden.

And not only at the logistical level, but also for the contracting authorities. Instead of a central contracting office, teams in 16 states dealt with the contracting of the regional solution. Sixteen times, an IT connection had to be developed and implemented so that the orders could be processed and controlled securely and transparently.

Secondly, compared to a central solution, no economies of scale or at least significantly lower economies of scale could be realized. The law of large numbers is clear here: the cost of storing a given quantity of vaccine doses at 16 different sites is higher



Dennis Spamer, Movianto

than storing the same quantity at a central site.

Third, the total stockpile quantity must be higher for 16 decentralized solutions than for centralized storage. This is because the centralized storage solution can compensate for fluctuations in demand from the individual states and the necessary safety

reserve is required only once rather than 16 times.

On the other hand, decentralized storage cannot achieve significant savings due to the advantages of the shorter distance between the warehouse and the recipient. This is because the largest cost block in transportation is always the one for the so-called last mile. And they are the same for a centralized as for a decentralized solution. Finally, the availability of vaccines the day after they are ordered is not an argument for a state-level solution. After all, from a central warehouse, a next-day rate of more than 99% can be achieved nationwide in Germany. The pharmaceutical logistics specialist Movianto, among others, proves this for its customers on a daily basis.

### Experience from Great Britain

And this is also shown by experience from other countries, such as Great Britain. The British were among the first to consider centralized control of logistics for Corona vaccines. As early as August 2020, Public Health England (PHE — now the “UK Health Security Agency”) and, in September, National Health Service Scotland (NHS) approached Movianto to support the distribution of Covid-19 vaccines and associated consumables in England, Wales, Scotland, Northern





Ireland, the Crown Dependencies and Overseas Territories. The subsidiary of Walden Group was selected because it had already been responsible for routine childhood vaccinations and large portions of the seasonal influenza vaccination program in the UK since 2005.

Due to the unique nature of the Covid-19 vaccines, logistics specialists developed a customized and highly secure vaccine warehouse. The individual vaccines are stored and distributed under different conditions. Pfizer-BioNTech, e.g., is stored at -75°C, while Moderna is stored at -20°C. More than a hundred ultra-low temperature freezers (ULT) had to be procured specifically for Pfizer-BioNTech vaccines. In addition, thousands of validated cold boxes, gel packs for a temperature of -21°C and tons of dry ice are needed. For dry ice, the total so far has been around 360 t. Normal Movianto operations run six days a week. In the meantime, at the request of the government, work was also carried out on Sundays.

For distribution, the company procured a new fleet of refrigerated vehicles to reach all sites in the NHS vaccine network. So far, that's 267 hospital centers, 204 pharmacy-run centers, 1,036 GP-run sites and 117 mass vaccination centers. Three phone calls took place daily between team leaders from Movianto, NHS Supply Chain and UK Health Security Agency. By November 2022, the logistics service provider had received, stored, and distributed more than 169 million doses of Covid-19 vaccine in the United Kingdom. The next-day delivery rate for Covid-19 vaccine is 99.84%.



In UK Movianto built a dedicated warehouse for the storage of Covid-19 vaccines. Ultra-low temperature freezers in which the material is stored at minus 75°C are building a central part of the logistics solution.

### Vaccine Handling in the Netherlands

The Netherlands received its first shipment of Corona vaccines on Dec. 26, 2020. Since then, they have been delivered and temporarily stored at a Movianto warehouse in Oss on behalf of the Dutch Ministry of Health before being distributed nationwide. On site 26 special ultra-low temperature freezers for the Pfizer-BioNTech vaccine are used, where the vaccine is stored at about -75°C. Moderna and Johnson & Johnson vaccines are stored at -20°C in a walk-in freezer that holds 700 pallets. AstraZeneca and Novavax vaccines are stored at +2 to +8°C in a cold storage facility that can hold up to 7,000 pallets.

Since the second quarter of 2022, another new site in Weert has served as a backup warehouse as part of a BCP (business continuity plan to compensate for downtime risks) strategy. This site was also equipped with 22 ultra-low freezers, among other things.

The ministry of health gives daily electronic notification of how many doses of which vaccine are to be delivered to which addresses the next day. The frozen vaccines are then taken out of the freezer the night before delivery and picked together with the other vaccines at +2 to +8°C. This ensures that all vaccines are thawed before they are loaded the next morning.

Distribution is handled by Movianto's sister company Eurotranspharma. It supplies all vaccination centers, hospitals and nursing homes nation-

wide. All vaccines are transported in refrigerated vehicles at 2 to 8°C. the UK and the Netherlands. The entire vaccine stock is stored in a warehouse in Aalst, which covers the same four different temperature ranges. Investment has been made in 40 ultra-low temperature (ULT) freezers. This is enough for more than eight million cans, which is more than the capacity tendered by the government. However, Movianto sees an increasing demand for ultra-low temperature refrigeration in the biotechnology sector and wants to be prepared for it. Around 40 employees work in the logistics center itself, which also stores goods from other customers. Another 30 work in the adjacent office wing in administration, sales and development.

### Conclusions for Germany

All three examples show how a centralized national logistics solution for storage and distribution of Covid-19 vaccines can succeed. In view of the plans for this in Germany, attention should still be drawn here to one bottleneck factor in this logistics strategy. If plans are indeed being made in Germany with a vaccine reserve between 100 and 200 million doses of the Pfizer-BioNTech vaccine alone, as appears to be the case, then more than 800 ULT units would be needed. In the current procurement situation, it could easily take one year before all these special refrigerators are delivered.

*Dennis Spamer, Managing Director, Movianto Deutschland, Ginsheim-Gustavsburg, Germany*

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

*“From a central warehouse, a next-day rate of more than 99% can be achieved nationwide in Germany.”*

### The Concept in Belgium

Since the end of October 2022, Movianto has also been responsible for storage and nationwide distribution of Covid-19 vaccines in Belgium. The concept is very much the same like in

## Addressing Existing Labeling and Supply Chain Challenges

Nearly three quarters (71%) of companies believe the cloud or a hybrid solution will be their preferred deployment method for labeling within the next three years, according to an annual report published recently by Logware, a global software company specializing in enterprise labeling and artwork management solutions.

The survey, which draws on insights from almost 500 professionals across industries in 55 countries, found a shift in attitudes toward cloud technology. Driven by the need to insulate operations from ongoing supply chain disruptions, product shortages, cost pressures, process inefficiencies, and manual errors, the report revealed that 50% of businesses al-

ready deploy important business applications in the cloud. This compares to just under 40% of companies embracing cloud-first strategies for enterprise applications a year ago.

Most participants (80%) reported that supply chain challenges had directly impacted their business. Furthermore, 93% said that it's important to have a business model that supports speed and agility in today's evolving business climate, while 62% of respondents believe that extending labeling to partners and suppliers enables them to avoid re-labeling, thereby saving time, money, and resources.

Facilitating transparency is a vital step in creating resilient supply chains, with 70% of respondents

flagging global traceability as a priority for their business in the coming 12 months. This is because companies need to ensure quality, safeguard products, protect patients, streamline the location of inventory, and guarantee on-time delivery to market.

As a result, businesses are using cloud technology to provide faster reaction times when managing potential recalls, avert risks presented by counterfeit goods, ensure customer safety, and protect brand reputation.

Digital traceability can also help companies to deliver on their corporate social responsibility goals. Of those surveyed, 76% reported already having a sustainability initiative within their company. Being able

to trace products both upstream and downstream will become important for managing the product lifecycle and sustainable sourcing. Intelligent supply chains can track, trace, and authenticate goods at every stage of the journey.

Industry 4.0 will also have a significant impact on companies and their manufacturing operations in 2023 and beyond, the report predicts. When it comes to printing on the production line, the survey illustrates that far too many businesses still rely on closed-loop systems that have disconnected, purpose-built software for different devices, resulting in manual and error-prone marking and coding operations. (rk)

# Supply Chain Due Diligence Act

## Requirements and Risks Especially in Relation to Logistics

On Jan. 1, 2023, the Supply Chain Due Diligence Act (“LkSG”) came into force in Germany. The objective of the LkSG is to improve the international human rights situation. For the first time, binding requirements are set for responsible supply chain management by companies.

The starting point for the national legal regulation was the UN Guiding Principles on Business and Human Rights from 2011, which included as basic principles the obligation of states to protect human rights, the corporate responsibility to respect human rights and corporate due diligence to prevent violations and the implementation of remedial measures have been established. In Germany, these Guiding Principles have been implemented through a National Action Plan 2016 – 2020 (NAP). However, this was merely a call for voluntary commitments, which did not include any sanctions for non-compliance. After it was determined in 2020 that only a fraction of German companies met the stan-

dards set out there, a mandatory legal regulation was established in the form of the LkSG.

### Protected Legal Positions

The aim of the LkSG is to prevent, minimize or end risks related to human rights and the environment. The affected legal positions are defined in the form of comprehensive prohibitions, which cover the core areas of human rights protection, employee protection and environmental protection. However, according to Sec. 2 (2) No. 12 LkSG, protection also extends to other legal positions that are not specifically defined and whose need for protec-

tion is “obvious when all relevant circumstances are reasonably considered”.

### Compliance with Duties of Care

According to the definitions in the LkSG, due diligence obligations consist, among other things, of the obligation to establish a risk management system, conduct regular risk analyses, anchor preventive measures (also for direct suppliers), documentation and also, which is very important, “the implementation of due diligence obligations with regard to risks at indirect suppliers.”

These are process-oriented obligations that require companies to develop effective and appropriate due diligence measures. The LkSG does not provide for an obligation to succeed or even a guarantee obligation. However, companies must take the objectively necessary measures within the scope of what is concretely feasible and appropriate.



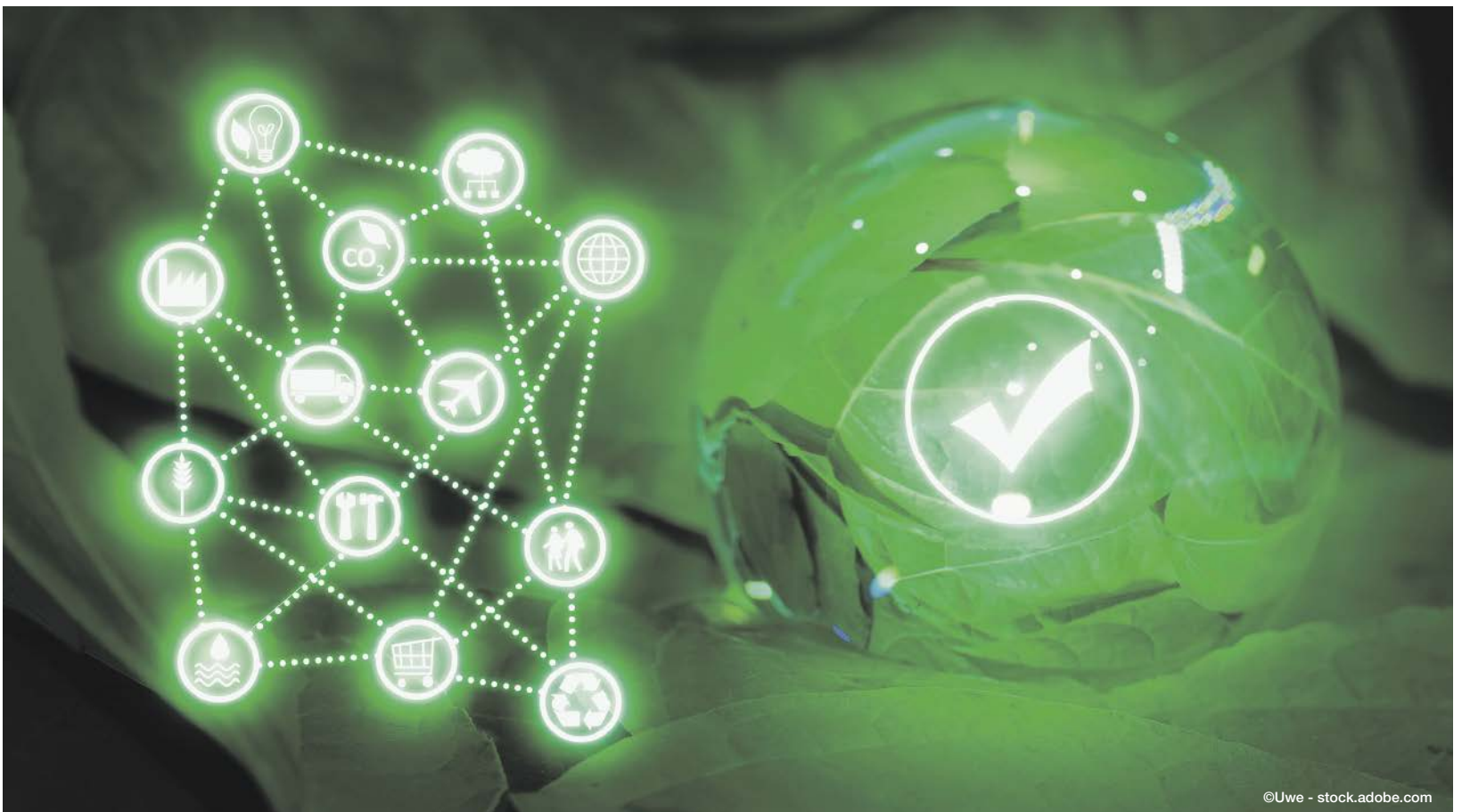
Andreas Fuchs,  
Arnecke Sibeth  
Dabelstein

### Official Monitoring

The authority responsible for monitoring is the Federal Office of Economics and Export Control (BAFA). Pursuant to Sec. 14 of the LkSG, BAFA carries out risk-based monitoring either upon application or ex officio.

The rights of the authorities under the LkSG are summarized as follows:

- Right to audit and order annual report
- Right of inspection with regard to compliance with the duty of care



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- General authority to issue appropriate orders and take appropriate measures
- Rights of access (properties, business premises)
- Right to inspect documents and records
- Search and seizure as investigative measure

**The controlled companies have the following obligations or rights:**

- Obligation to provide information
- Right to refuse to provide information in the event of imminent self-incrimination or incrimination of relatives within the meaning of Sec. 52 (1) of the Code of Criminal Procedure
- Obligation to surrender
- Obligation to tolerate and cooperate

**Sanctions for Violations**

Violations of the provisions of the LkSG are subject to various and quite substantial sanctions.

According to Sec. 23 LkSG, a penalty payment of up to EUR 50,000.00 can be imposed.

Sec. 24 (1) LkSG sets out a large number of different administrative offenses for different types of violations. Depending on the type and significance of the specific violation, fines of up to EUR 800,000.00 or up to 2% of the average annual profit are possible!

In addition, companies that are fined at least EUR 175,000.00 (with exceptions) shall be excluded from the award of public contracts. Furthermore, an entry in the competition register may be threatened.

**Who Is Affected by the LkSG?**

The LkSG applies to companies with their administrative headquarters, main office or branch office in Germany. As of Jan. 1, 2023, the LkSG will initially apply to companies with at least 3,000, and as of Jan. 1, 2024, also to companies with at least 1,000 employees in Germany.

Small and medium-sized enterprises below these thresholds are therefore not directly affected by the provisions of the LkSG. However, Sec. 2 (5) of the LkSG stipulates that the companies directly affected are also responsible for their "direct and indirect suppliers". This in fact leads to an indirect inclusion of all suppliers.

**Expanded Definition of "Supply Chain"**

For the purposes of the LkSG, a direct supplier is a "partner to a contract for the supply of goods or the provision of services whose supplies are necessary for the manufacture of the company's product or for the provision and use of the service in question." An indirect supplier is "any company that is not a direct supplier and whose supplies are necessary for the manufacture of the company's product or for the provision and use of the relevant service."

This broad interpretation means that transport service providers, forwarders and other logistics service providers, among others, are also affected at least indirectly by the requirements of the LkSG as an essential part of the supply chains.

**Contractual Inclusion of Suppliers/Logistics Service Providers**

For the aforementioned reasons, the respective clients directly affected are de facto forced to (also) oblige the logistics service providers they commission to comply with the requirements of the LkSG.

From the perspective of the directly obligated parties, it will not be sufficient to receive a simple declaration from their suppliers in which compliance with the requirements of the LkSG is promised more or less across the board, as can currently be observed in practice. The level of requirements here differs, for example, from the situation when implementing the requirements of the Minimum Wage Act. Compliance regulations customary in the industry (such as in the German ADSp 2017) can certainly be used as a starting point, but fundamentally fall short with regard to the specific requirements of the LkSG.

Rather, in order to provide suitable protection for the directly obligated parties, it will be necessary to specifically obligate suppliers to set up risk management systems, audit rights, employee training, etc., combined with suitable sanction mechanisms (special termination rights/compensation and indemnification provisions). It should be noted that implementation will be a considerable challenge for the logistics service providers concerned.

The form of contractual implementation depends on the specific situation in practice. As a rule, supplementary agreements will be suitable

for existing contracts, and supplementary clauses for new contracts.

**Outlook: "EU Supply Chain Directive"**

The EU published a draft EU Directive on corporate due diligence in the area of sustainability (EU 2019/1937) ("EU Supply Chain Directive") in February 2022. The planned EU Supply Chain Directive will go considerably beyond the requirements and consequences of the LkSG.

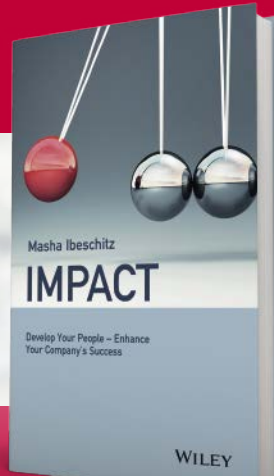
The EU Supply Chain Directive must first be adopted by the EU Commission and subsequently transposed into national German law. This will probably not be the case until 2024 at the earliest. Nevertheless, it is advisable to proactively keep in mind that it will be necessary to adapt the approach to these new requirements in the medium term.

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# Combining Production, Sales and R&D Capacities

## A Flexible Model that Delivers More Choice

Actylis made its debut in September 2022. A leading global manufacturer and sourcing expert of critical raw materials and performance ingredients for the life sciences and specialty chemicals markets, the new CDMO was created from US-based fine and specialty chemicals distributor Aceto, which — following its acquisition in 2019 by investment firm New Mountain Capital — has been executing a growth plan via significant organic and inorganic investments over three years before its foundation. The new enterprise comprises eight specialty manufacturing companies and three sourcing firms, integrated into a single organization of 800 staff, a presence in ten countries spanning three continents and a portfolio of more than 4,000 products. Gilles Cottier, CEO of Actylis, has played a tremendous role in Aceto's transformation into the new Actylis brand. He became CEO of then Aceto in July 2019 following leadership roles with Lonza and Sigma-Aldrich. Ralf Kempf and Michael Reubold asked Cottier about the reasons for creating the new brand identity, the challenges of combining so many companies, and Actylis' strategy going forward.

**CHEManager:** Mr. Cottier, what is behind the name Actylis? Is it merely a well-sounding made-up word or does it have a meaning and a message?

**Gilles Cottier:** Actylis was created to unite a wide range of capabilities of several manufacturing and sourcing specialists for the life science industry into a new, global enterprise with a unique hybrid approach that is greater than the sum of its parts. Derived from the Latin terms for 'act' and 'life', Actylis combines the experience and expertise of eleven industry specialists into an integrated global ingredient powerhouse. The synergies that existed between the individual companies (A&C, A&C Bio Buffer, Aceto, Biotron Laboratories, Cascade Chemistry, Finar, Inter-Actifs, IsleChem, Pharma Waldhof, Syntor Fine Chemicals and Talus) has created a company that provides key benefits to our customers in high-growth end markets. This consolida-



Gilles Cottier, CEO, Actylis

tion enables us to offer customers highly flexible, customized solutions addressing their specific needs, while assuring reliable on-time delivery of the high-quality ingredients essential to their success.

**After Aceto's transformation, and given the level of familiarity of the old name, what was the reason for introducing the new brand identity?**

**G. Cottier:** While each of the companies that together formed Actylis was well known and trusted in their individual fields, each has transformed into something different and im-

*"Actylis combines the experience and expertise of 11 industry specialists into an integrated global ingredient powerhouse."*

proved over what they've been in the past. This meant that their legacy brands—especially the Aceto brand—represented something significantly different than what it had only a few years ago. Our capabilities now include global R&D centers of excellence, GMP and Non-GMP manufacturing plants in various locations in







North America, Europe and Asia, sourcing hubs at strategic locations as well as global supply chain, technical sales and quality teams. We focus on sales synergies between the integrated companies and under one new brand this process is made much easier and more cost-effective.

*What are the end markets Actylis serves today, and what are your plans for expanding your scope?*

*G. Cottier:* We service finished drug manufacturers in biopharma and pharma, as well as manufacturers in the cosmetics, nutrition, specialty chemicals and agriculture markets.

*What is Actylis' strategy to support customers in these markets innovate and grow?*

*G. Cottier:* The industry we serve is a global leader of innovative technology adoption such as targeted therapies, and gene and cell therapies. As a raw material supplier, we also need to be flexible and agile to create customized critical raw materials to serve this innovative market—this is the difference we offer our customers. Our R&D Centers of Excellence work closely with our customers to develop novel and niche ingredients. This consultative approach to our customer relationships enables them to commercialize their finished drug products more rapidly.

*The company's hybrid business model is based on manufacturing and sourcing. Where do you see the main benefits resulting from this set-up for your customers?*

*G. Cottier:* Actylis' business strategy was born out of the current market trend in the Life Science sector—the need for more flexibility and agility in raw material manufacturing and supply. Our intimate knowledge of customers' needs, consultative perspective, and focus on innovation and quality to provide unparalleled choice and flexibility to our customers. By embracing choice, we can offer a standard product sourced from anywhere in the world, one we manufacture at one of our facilities or we can create a product specifically created to suit the needs of our customer—this gives them truly flexible options surrounding supply chain, geography, innovation, timeline, and cost.



*What do you perceive as the most pressing needs and requirements of your customers?*

*G. Cottier:* Companies like us must be able to move quickly to adjust to challenges of the life science industry. We have built our strategy around agility and flexibility to manage the developing areas that our industry face:

- A move towards more local supply to mitigate risk.
- A reversal of raw material supplier consolidation to friend-shoring and supply diversity.
- An even greater focus on sustainability.
- A reduction of focus on lean models, replaced by smarter inventory planning approaches, and supplier diversity.

*With its global presence, Actylis can offer its customers great geographic flexibility. Do you sense a growing demand for on-, re- or nearshoring in the markets you serve?*

*G. Cottier:* Supply chain risk assessment is likely to be a priority for manufacturers over the next 2 – 3 years. Once this assessment has been completed, supplier diversification will be at/near the top of most risk mitigation strategies. Geographical diversification is the likely second stage. We suspect this will take the form of near and “ally” shoring. Onshoring will be the slowest to implement as costs, regulations, available resources etc. will take time to work through. Re-

sourcing away from cost-centric suppliers will add to product costs, but will be offset with improved lead times, less in-transit inventory and reduced obsolescence. Our global network and local regulatory expertise give us the flexibility to deliver the best supply solution for our customers' needs.

*Do you have investment plans you can share with us, either in existing facilities and capabilities or in new ones?*

*G. Cottier:* As our industry evolves and manufacturing processes develop, we constantly review global and local technological advances and legislative & regulatory changes to ensure we are at the cutting edge. We regularly benchmark ourselves against the best companies in our

*“As a raw material supplier, we also need to be flexible and agile to create customized critical raw materials to serve this innovative market.”*

and other markets to ensure we are aware of, and strive for, the most up-to-date systems and practices to use across our network of facilities. As an example, we have rolled out a global

MasterControl eQMS (Quality Management System) to ensure we are all operating on unified system to give our customers assurance of our global quality management regardless of location.

In addition, we have an ongoing commitment to investing in our facilities. Most recently, we opened a new 30,000 ft<sup>2</sup> state-of-the-art clinical cGMP API manufacturing facility in Eugene (OR) and we have also just upgraded our two GMP facilities in Montreal to Class 7 & 8.

*What is your plan for Actylis to continue growth and success in the markets it serves?*

*G. Cottier:* Actylis is the culmination of an ambitious initiative launched several years ago to address the major unmet need for better and more dependable access to critical raw materials and performance ingredients essential for the manufacture of highly regulated products in key industries. The supply chain challenges of the past few years have made our vision for Actylis especially relevant, and we are proud to help our customers dependably manufacture the life-giving products we all rely on.

Our strategy is simple—provide our customers with choice. We will continue to mature this strategy via organic growth and more acquisitions in the life science sector over the coming years.

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

# Delivering Quality with Speed for European Market

## WuXi STA Pushes ahead with the Expansion of its Global R&D and Manufacturing Network

WuXi STA, a division of WuXi AppTec, a Global R&D and manufacturing services provider (CRDMO) for the pharmaceutical and healthcare industry, is increasing its regional footprint in Europe. Currently, the division operates facilities in the UK, Switzerland and Germany. CHEManager spoke with Jinling Chen, Head of WuXi STA's drug product business and Jamie Andrews, Site Head of the Couvet manufacturing site – a facility that the company purchased from Bristol-Myers Squibb in 2021 – about the strategy and goals of the European expansion.

**CHEManager: WuXi STA's footprint in Europe starts from the facility in Switzerland. When and how was the facility added to the WuXi STA map?**

**Jinling Chen:** The site was acquired from Bristol-Myers Squibb in August 2021 as a drug product manufacturing site and was already fully operational when purchased. It was quite a modern facility—the site was constructed between 2016 – 2018 and is installed with top-class equipment. Despite its 'young age', the Couvet facility had already passed multiple inspections from the FDA, EMA, SwissMedic, and Japanese

PMDA. It was also designed with industry-leading energy efficiency and environmental standards with a few industry awards received for this. Looking forward, we foresee its potential as an increasingly important node in our global CRDMO network of 14 sites across Asia, the US and EU.

**What are the core capabilities of this site?**

**Jamie Andrews:** The Couvet site is a manufacturing facility for oral solid drug product at both clinical and commercial scales, with best-in-class



Jinling Chen, Head of Drug Product business, WuXi STA



Jamie Andrews, Site Head of Couvet facility, WuXi STA

equipment including automated visual inspection and fully integrated IT systems. In addition, the site has deeply customizable packaging and labeling lines for both primary and secondary packaging. The Couvet site has the annual capacity of one billion units of oral dosage forms, supplying eight key markets globally, including the US, EU, UK, Switzerland, Aus-

tralia, New Zealand, Canada, and Japan.

**What are the company's growth prospects in Europe?**

**J. Andrews:** WuXi STA expects the Couvet site to become a key drug product supply hub in Europe. In order to achieve this goal, we will continue to enhance Couvet capabilities. New manufacturing, packaging and labeling capabilities are under construction, which will double the capacity once fully operational. Additionally, a larger warehouse implemented

*“WuXi STA expects the Couvet site to become a key drug product supply hub in Europe.”*

with an automated environment control system is also part of the near-future expansion plan to handle increasing logistics and supply demands.

**J. Chen:** We have also connected other nodes of our facilities for our European clients. Our drug product manu-







facturing site in Wuxi city, China, passed the EMA inspection last year and is currently supporting our European clients. We keep the same standards across all the sites within WuXi STA, so our clients can receive the same high-quality product from any site with a robust supply chain. This is also a demonstration of our dual-sourcing strategy.

*For several years, WuXi has been pursuing a dual sourcing strategy. How has this worked for WuXi STA?*

*J. Chen:* With a dual sourcing strategy, one manufacturing task can be assigned to multiple manufacturing sites. For European clients, their drug products can be manufactured at both the Couvet site in Switzerland and the Wuxi city site in China. We offer this dual-sourcing strategy to ensure robustness of supply. In case of any disruption at one site, the other can immediately step in to maintain productivity. We can guarantee the continuation of supply through our global network, providing an added layer of reassurance with increased efficiency.

*WuXi STA has invested heavily in building and expanding its high potent (HP) manufacturing capabilities.*



© WUXI STA

*ities. What are the reasons for engaging and investing in this field?*

*J. Chen:* The need for HP drug development continues to increase driven

*“With a dual sourcing strategy, one manufacturing task can be assigned to multiple manufacturing sites.”*

by a growing demand for oncology drugs. To better serve our global customers, we opened our first HP

(<1 µg/m<sup>3</sup>) oral dosage drug product manufacturing facility in the Wuxi city site last year. And this year, we will open our first HP injectable drug product manufacturing line. Together, with the well-established HPAPI development and manufacturing facilities in the Changzhou and Jinshan sites, we now offer a one-stop solution for both early and late stages to clients with HP drug outsourcing needs.

*What other capabilities can European clients expect from other WuXi drug product facilities?*

*J. Chen:* WuXi STA has recently invested in the injectable drug product

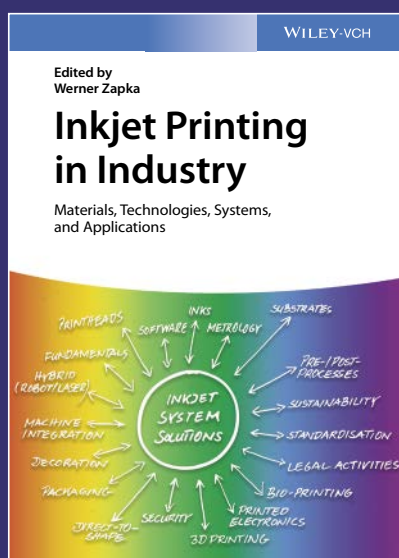
platform including the opening of two wholly automated manufacturing lines in fully enclosed isolators. Our facility supports multiple parenteral dosage forms and in different filling formats. From a new technology perspective, we opened a new lipid nanoparticle (LNP) manufacturing facility that provides new solutions to deliver more complex molecular modalities such as oligonucleotides.

*How much increase in demand and subsequently in supply are you expecting to see in the near future and how do you plan to meet it?*

*J. Andrews:* We are well set for growth, and the Couvet site is well prepared with its existing available capacity, significant expansion plans, as well as having the leverage of the global CRDMO network it connects to.

*J. Chen:* Speed and quality are customers’ top priorities. Leveraging WuXi STA’s strong capability in both API and drug product, our integrated CRDMO platform can provide fast, flexible, and high-quality solutions—particularly when we support customers with both API and drug product.

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



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# Containment Technology for HPAPI Manufacturing

## How Flexible Containment is Driving Growth in the HPAPI Market

*The incentive for drug manufacturers to equip their production facilities with the capacity to process highly potent active pharmaceutical ingredients (HPAPIs) is clear. This fast-growing segment of the market now accounts for 25% of all drugs produced globally. It is a sector that is set to continue expanding, with some analysts projecting that it will reach a value of \$40 billion by 2027.*

This projected expansion shows the potential of the market. However, safety and regulations must be followed for successful growth, as HPAPIs are notoriously difficult to handle.

With several major oncological drugs also due to go off patent over the next few years — including Nilotinib in 2024, Pomalidomide in 2025 and Enzalutamide in 2026—“HPAPI ready” businesses will be free to make bids for their manufacture.

These oncological drugs are used by healthcare providers to target specific types of cancer. Nilotinib, for example, combats chronic myeloid leukemia, a cancer of the blood cells, while Enzalutamide is a treatment for advanced prostate cancer.

While safe to administer to patients in a targeted way, the high potent na-

ture of the ingredients can prove extremely harmful for the workers involved in their manufacture if they are not handled appropriately. Any mistakes made during the production process could result in life-changing aftereffects for the operators.

For this reason, it is critical that manufacturers can demonstrate to authorities, such as the European Medicines Agency (EMA)—which is responsible for the scientific evaluation, supervision and safety monitoring of medicines across the EU—that they can work with highly potent ingredients safely. They will need to show that their employees will be protected at all times and, equally important, that they can also prevent any product cross contamination when handling them.

### Growth In Demand Across Europe

As the demand to meet HPAPI requirements increases, more drug manufacturers are focusing on how they can achieve appropriate safety standards with the equipment they are using—especially in emerging economies, such as in Turkey and Poland.

The deployment of containment solutions has become critical for these businesses as they look to satisfy regulators by demonstrating the quality, safety and repeatability of their production processes.

So, what is the best way for those businesses looking to become ‘HPAPI ready’ to install containment capabilities? Should manufacturers build entirely new facilities, or does it make more sense to convert their existing production lines?

### Converting Existing Facilities

For sure, the fastest, and most cost-effective, approach would be to retrofit existing facilities. This can be achieved by installing flexible



Mark Arnold, Onfab

containment technology that can be made bespoke to the needs of each manufacturer. Flexible solutions are designed for single use and can be easily deployed to protect both the user and the product in a contained environment.

This technology allows companies to take on contracts for smaller batches of precision medicines at short notice whilst avoiding large upfront capital expenditure and ongoing equipment depreciation.

This would also enable manufacturers to easily move from open handling manufacturing processes to contained environments that can manage the increased toxicity involved in HPAPIs. Companies can simply contain key parts of their existing manufacturing process—such as the weighing, mixing and milling elements. In fact, 98% of all existing process equipment can now be retrofitted with flexible containment technology.

As these solutions are bespoke to the manufacturer, each one can be designed to have minimal impact on existing standard operating procedures (SOPs). This work can be completed within the space of a few days, at a low cost, to prevent disruption.

### Building New Facilities

When it comes to the design and build of new facilities, businesses have traditionally opted to deploy rigid isolators. This remains a popular choice—particularly when they are producing larger batches of the same drugs on an ongoing basis.

However, as manufacturers look to scale up HPAPI production, we are increasingly seeing businesses choosing to incorporate flexible containment solutions at their new build sites too.



© Kevin Timmons Photography





There are five key reasons why they are looking to include these flexible alternatives:

■ **Cleaning and cleaning validation:**

With a flexible containment approach, manufacturers can remove and incinerate disposable elements, such as single use glove bags—and this greatly reduces the cleaning and cleaning validation process.

This validation is especially important when working with HPAPI drugs, where cleaning can mean going down to the submicron level to reduce traces of a compound. The other key advantage to using disposable elements is that the risk of cross-contamination is removed.

■ **Proven safety:** Companies that have previously used flexible containment to retrofit sites are more likely to deploy flexible containment on new sites (compared to companies new to this technology) as their own tests have confirmed the equipment meets safety standards.

Flexible solutions have been independently tested and proven to achieve less than 1 µg/m<sup>3</sup> (OEB 5),

supporting the manufacturing of products with OELs in the nanogram range.

■ **Compliant and adaptable:** Flexible containment technology is capable of controlling humidity, temperature, oxygen degradation and UV light management, by integrating automated and non-automated control systems.

This is opening up the possibility of working with a wider range of drugs, including those that are sensitive to light, such as dacarbazine. The adaptability of the technology also means that products can be consistently produced and controlled in line with the quality standards laid out by good manufacturing practice (GMP) regulation.

■ **Change of use:** Flexible containment ensures minimal downtime with simple engineering change out between non-potent and highly potent compounds.

When not required, framework and control systems can be easily stored away until they are needed

again—while the protective film can be disposed of and replaced after each use.

■ **The financial case:** Flexible containment helps businesses to avoid the large capital expenditure that comes with installing rigid isolator systems. The cost difference between a contained rigid system and flexible system is tenfold. If you were to build a rigid process isolator costing around £100,000, an equivalent retrofitted in-process flexible isolator would typically cost £10,000—and achieve the same containment levels.

However, perhaps the biggest cost benefits are the savings made through the cleaning validation process. This is not so much due to the cost of the cleaning itself, but through the reduced downtime at the production facilities. Manufacturers are no longer losing days while rigid isolators are cleaned and tested between batch runs.

As businesses equip themselves to meet growing demand for HPAPI

drugs, the decisions they take around containment will have implications from a safety, regulatory and financial perspective.

While rigid isolators still have a role to play for manufacturers that are consistently producing the same drugs, others require greater agility.

Flexible containment solutions are providing these businesses with the ability to cut down lead times for customers, without compromising safety standards.

This capacity to produce smaller batches of drugs much faster, and keep costs low, is providing a crucial differentiator in what is a competitive, fast-growing market.

*Mark Arnold,  
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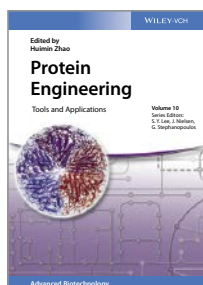
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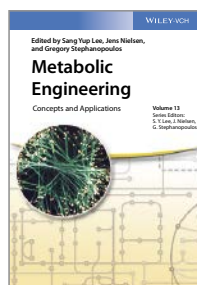
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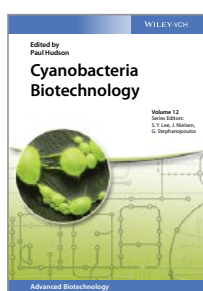
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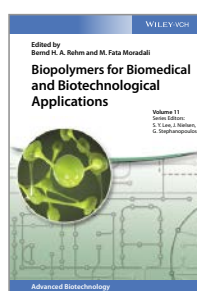
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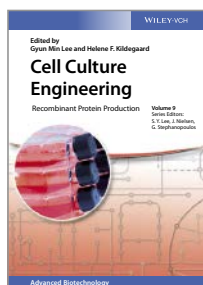
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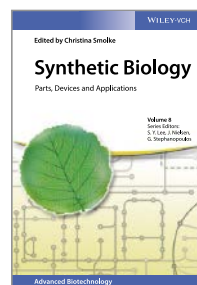
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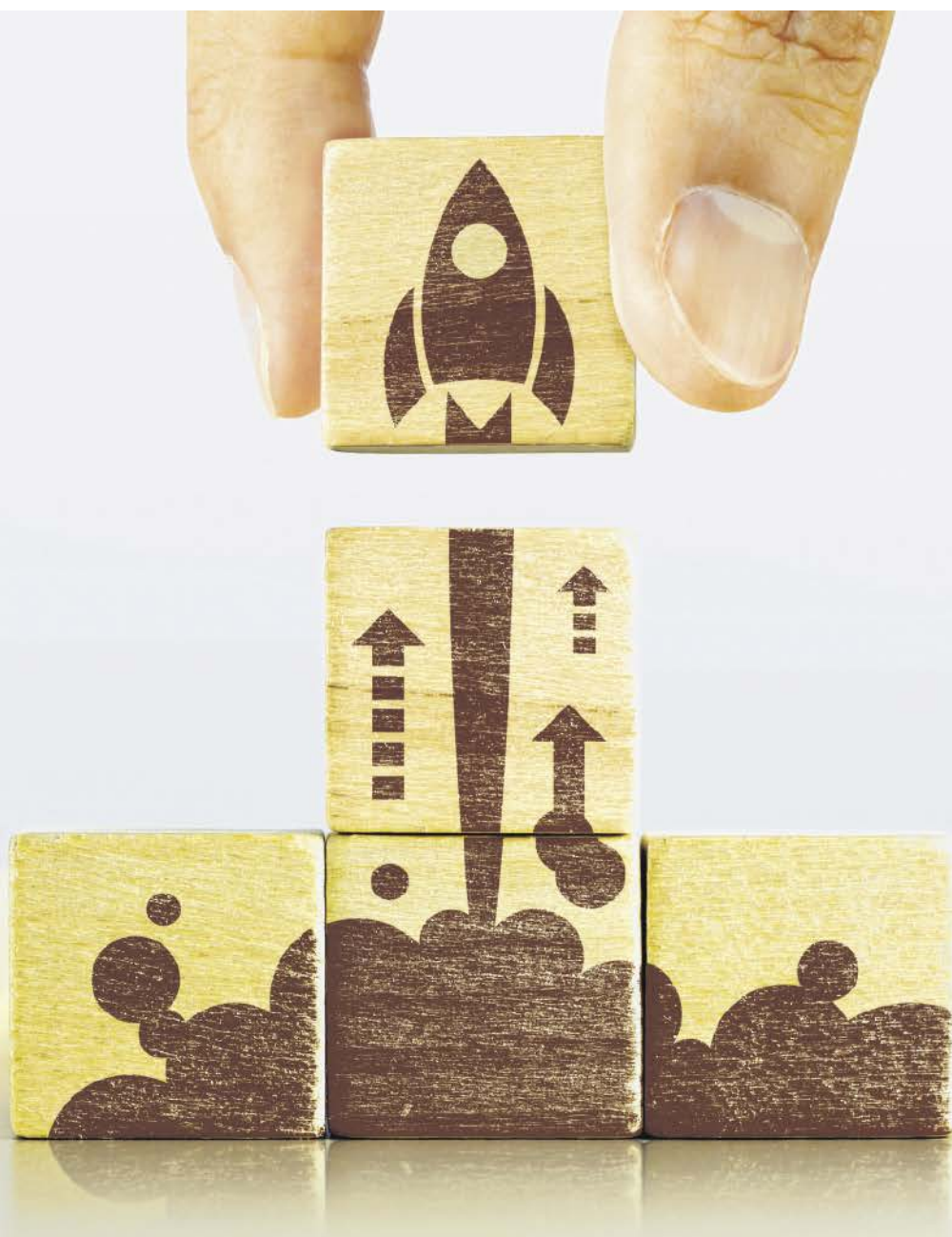
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# Advanced Oxidation Treatment for Wastewater

## Oxidative Destruction of Organic Micropollutants with Nanoporous Catalysts and Scalable Energy Sources

Wastewater generated from industrial production streams and contaminated groundwater contains a massive range of micropollutants, like pharmaceuticals, pesticides, and industrial chemicals such as PFAS. These persistent compounds are non-biodegradable, bio-active, carcinogenic, and toxic to the lives of humans and our ecosystems. The Schlieren, Switzerland-based start-up Oxyle has developed a unique technology that offers complete removal and real-time monitoring of a wide range of micropollutants in a cost-effective and sustainable manner. Oxyle's co-founders, CEO Fajer Mushtaq and CTO Silvan Staufert, explained to CHEManager their unique overall approach to solve the global water contamination crisis and the company's next steps.



Fajer Mushtaq, Oxyle



Silvan Staufert, Oxyle

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

**Silvan Staufert:** Coming from a highly competitive and innovative University, ETH Zurich, we've realized the lack of innovation or sense of urgency by the water sector to address the emerging threat of organic pollutants in our water resources. By focusing our research into this area, we were able to achieve a technological breakthrough that can address the varied customer needs in this growing and profitable market. We were motivated to find Oxyle to be global leaders in protecting our precious water resources against micropollutants.

**What is unique about your approach to solving the global water contamination crisis?**

**Fajer Mushtaq:** We have developed a market-disruptive technology platform comprised of our modular plug-and-play reactors, our unique nanoporous catalysts, and our real-time water quality monitoring services. Our catalyst is activated by scalable energy sources such as bubbling, mechanical vibrations, stress, or even the flow of the water itself. Once activated by these clean and sustainable energy sources, our catalyst starts generating highly reactive radicals

that destroy a wide range of micropollutants and degrade them into mineralised by-products such as water, sulphates, chloride, etc. Our solution is applicable to treat a wide array of micropollutants from industrial chemicals like PFAS to pesticides or pharmaceuticals, in a wide concentration range—from low ng/L to 100's of mg/L.

**What are the value propositions Oxyle offers its customers?**

**S. Staufert:** We offer our customers an efficient water treatment and monitoring platform that can treat all micropollutants of concern, non-selectively. Our treatment technology is driven by clean energy sources, does not use any toxic chemicals, and does not produce any secondary waste. We allow our customers to reuse treated water and reduce their blue water consumption and improve their sustainability goals. Our real-time micropollutant monitoring technology ensures that only the highest quality effluents are discharged. By working with our environmentally friendly solution, our customers enjoy a sustainable image. Our solutions are 2 – 10x cheaper than the existing solutions on the market. Moreover, our fully automated, easy-to-use modular technology ensures that our customers meet even the most stringent regulations.

**What have been the most exciting projects so far?**

**F. Mushtaq:** With our technology, we eliminate even the most mobile and persistent micropollutants such as Forever Chemicals, commonly referred to as PFAS chemicals (over 8,000 chemicals). Due to their highly persistent and stable form, if these toxic and carcinogenic chemicals are not effectively treated, they contaminate our precious ecosystems. One of the most exciting and impactful projects that we recently completed was focused on the removal of a range of these PFAS chemicals from contaminated groundwater. With our treatment, we demonstrated the removal of all measured PFAS compounds to below detection limits, in a sustainable, scalable, and cost-effective manner for our customers. Highly rewarding outcome considering there are thousands of such sites all over Europe. With our effective treatments, Oxyle will not only improve the health of our contaminated ecosystems but also protect humans from their negative impact.

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

**F. Mushtaq:** At present, we are piloting our technology at various customer sites across Europe to gain

### PERSONAL PROFILES

**Fajer Mushtaq**, CEO and co-founder, has a master's in mechanical engineering and a PhD from ETH Zurich in developing novel nanomaterials for water remediation. Having grown up in India with limited access to water resources, Fajer is determined to introduce effective and affordable water solutions on the market.

**Silvan Staufert**, CTO, and co-founder has a master's in mechanical engineering and a PhD from ETH Zurich on developing new sensors for micro and nano applications. Coming from a family of engineers, Silvan has always been passionate about using his engineering skills for bringing a long-lasting impact on the health of our ecosystems.

valuable customer testimonials and grow our outreach into new segments. We are also increasing our production capability to scale our operations and developing our remote monitoring service packages. We will bring our full-scale reactors to market towards the end of this year to serve our industrial customers and water remediation companies.





**BUSINESS IDEA**

## Nanotechnology-Driven Wastewater Treatment

At present, 80% of the world's wastewater is discharged into rivers, lakes, and groundwater bodies without receiving any treatment. Rapid industrialization and growing demand for better consumer goods mean ever-increasing discharge of toxic pollutants into effluents and a strain on our freshwater resources. Just this year, EPA's health advisory level for PFOA (a chemical used in the production of waterproof clothes, Teflon, cosmetics, etc.) was drastically lowered from 400 ppt (ng/L) in 2009 to 0.004 ppq (pg/L), due to the danger these chemicals pose to humans when consumed.

### Removal of Micropollutants

Oxyle has developed a sustainable and scalable technology that destroys a wide range of micropollutants including the forever chemicals such as PFAS, pharmaceuticals, hormones, pesticides etc. from contaminated wastewater. Oxyle's novel treatment process is driven by their nanoporous catalysts that oxidize and eliminate micropollutants, down to detection limits of 1 ng/L, even for the highly persistent compounds

that are resistant to existing treatments—a value that is 10–100x lower than our competitors.

### Real-Time Monitoring

This process is coupled with Oxyle's proprietary analytics technology that allows for real-time monitoring of micropollutants, a truly unique and much-needed offering that helps customers comply with their strict discharge regulations. The aim is to install remotely operated modular, decentralized reactors of varying sizes to meet customer needs from chemical and pharma companies, hospitals, and environmental remediation projects.

### Scalable Business Model

Oxyle will earn revenue from licensing our technology to manufacturing partners. Our dominant source of revenue is recurring sales of our catalyst and water quality monitoring service packages. This revenue model ensures a low CAPEX for our customers while guaranteeing sustainable revenue growth for Oxyle.

■ Oxyle AG, Schlieren, Switzerland  
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**ELEVATOR PITCH**

## Protecting Precious Water Resources

We are living in an era where we face several existential crises on a daily basis and the lack of clean, pollutant-free water is one of them. At Oxyle, we are providing market-disruptive solutions that remove and detect micropollutants in an efficient, cost-effective, and sustainable manner for our industrial and municipal customers. Flexibility is at the heart of our technology since its conceptualization. Key performance metrics such as ease of use, energy efficiency, and treatment decentralization are always in the focus. With our scalable technology platform, we provide both efficient treatment and monitoring solutions and are ideally positioned to tackle this problem wherever it comes up. Our ongoing customer pilots have shown removal of PFAS to below detection limit. We are building on this momentum to provide products that protect our health and the environment from these toxic forever chemicals. We are exploiting new market drivers such as stricter regulations and growing public pressure to expand our operations in attractive market segments and help a diverse portfolio of global customers. Oxyle has successfully completed several paid pilots with industrial and municipal customers, advanced its technology to TRL8 through on-site demonstrations, and grown to a team of 17 people. Oxyle's team of water experts possesses

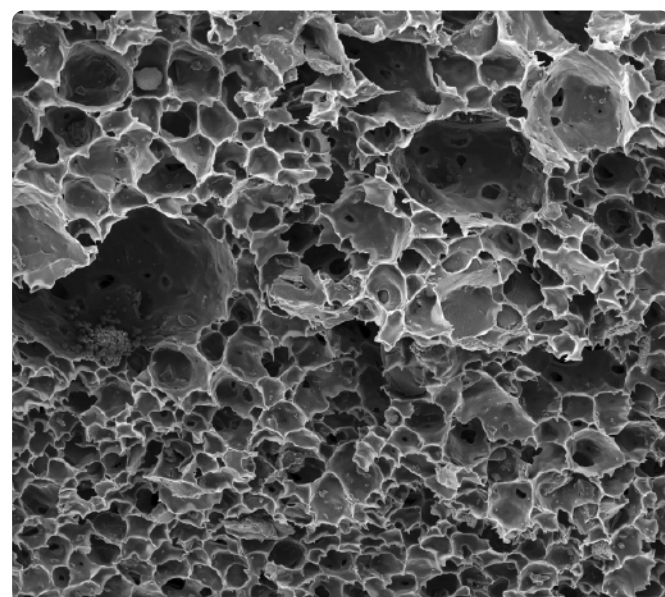
strong expertise in developing and implementing advanced water treatment and monitoring solutions for our customers.

### Milestones

- 2020**
  - Founding of Oxyle
  - Commission our first small-scale reactor for on-site customer pilot
  - Grand Prize winner of 2020 Venture Competition
- 2021**
  - Raised 4.1 million CHF in non-dilutive funding
  - Won SEIF Social Innovation award
  - Won Hello Tomorrow Energy & Environment Vertical and 2<sup>nd</sup> place overall
- 2022**
  - Grown to a team of 15 people
  - Completed ten customer proof-of-concepts and pilots
  - Set up our catalyst production space and analytics laboratories
  - Raised 2.8 million CHF pre-seed round with European and American VCs
- 2023**
  - Commissioned our medium-scale pilot units on customers sites
  - Market entry of our batch reactors in EU



Oxyle's wastewater treatment platform (shown is one of the pilot units) includes modular reactors, nanoporous catalysts, and real-time monitoring services powered by clean energy sources.



Oxyle's novel treatment process is driven by their nanoporous catalysts that oxidize and eliminate micropollutants.

# Silicone Recycling without Loss of Quality

Sustainable Chemistry and Circular Economy: Innovative Technology Saves Energy and CO<sub>2</sub>

Berlin, Germany-based start-up company New Dawn Silicones — formerly known under the name We Are Galaktika — has developed a resource-efficient chemical recycling technology that allows silicones to be reused without loss of quality. With this idea in the field of sustainable chemistry, the start-up addresses one of the most pressing environmental problems. The use of innovative technology makes it possible to use end-of-life silicones as the starting material for new, high-quality silicones, thus contributing to a circular economy that saves energy and resources while also having a more positive climate footprint compared to the use of new raw material. The founders are supported by the International Sustainable Chemistry Collaborative Centre (ISC3).

**CHEManager: Originally, you wanted to produce a more sustainable menstrual cup, in the meantime this has evolved to become an innovative recycling technology for used silicones. What prompted you to change course?**

**Tina Rose:** My passion is the circular economy and our drive from the beginning was to reduce the carbon footprint of silicone and contributing to ensuring that the conditions of a circular economy are also applied in the silicone industry. Everything else follows these overarching goals. The extension of our basic idea from a single product to silicone recycling for many applications, came about through our participation in the Circular Economy Incubator of Impact Hub Berlin. Among other things, we carried out impact calculations and very quickly realized that we could not limit it to menstrual cups if we want to make a difference in our carbon footprint. In the end, with Stephan Enthaler we met exactly the person who was still missing from our puzzle.

**Klara Yoon:** Stephan shares our values and, with his research in the field of sustainable chemistry, brought us the right building block: the technology with which we can recycle silicones. That's why we always talk about a 'magic fit' when we look back on that first meeting.

**What is special about recycling silicones and what makes the process so particularly sustainable?**

**Stephan Enthaler:** Unlike the classic mechanical recycling route, in which new products are physically formed from plastic waste, which can result in quality losses and make it difficult to separate additives, we have opted for a chemical recycling method for silicone waste. In this process, silicones are broken down into smaller units at the molecular level, purified and later reassembled into new silicone. As a result, the recycled silicone obtained has a consistent or higher quality, or the properties can be customized for the customer, id est, it is theoretically possible to obtain high-quality medical technology products from silicone waste using chemical recycling (upcycling), for example. In addition, there are also advantages in terms of resource efficiency, energy efficiency, CO<sub>2</sub> footprint, etc. compared to the new production of the silicone, for example, from silicon dioxide and fossil resources, so that chemical recycling methods can contribute to a resource-conserving circular economy.

**T. Rose:** In addition to the obvious savings in resources and CO<sub>2</sub>, our product will also contribute to the ESG goals of companies and industries that use silicones in their products and production.

**How does your passion, the circular economy, come into play here?**

**K. Yoon:** The circular economy is the key point of our idea, but not possible without a take-back scheme. It's always a combination of technology and access to end-of-life material.



Klara Yoon, New Dawn



Tina Rose, New Dawn



Stephan Enthaler, New Dawn

**T. Rose:** Exactly, and that's why we're also working on proofs of concept in three areas: Firstly, in the manufacturing industry, for example with the recycling of cable sheathing as well as silicone applications in machines. Secondly, in medical technology and the care sector—here we are working on a take-back scheme. And thirdly, household waste, which still presents us with the greatest challenge due to the organization of the take-back scheme. We're still in the early stages here, but we're already in dialogue with the waste management industry in many areas.

**What is the next step on your way?**

**S. Enthaler:** There are initial concrete inquiries from medical technology, the automotive industry, etc. We are in the process of recycling industrial silicone waste and collecting more data. Our medium-term goal is to demonstrate a circular economy approach for a selection of silicone products based on chemical recycling.

**K. Yoon:** Another milestone after winning the ISC3 Innovation Challenge is the development of mentioned proofs of concept with global companies from the pharmaceutical industry and automotive sectors. The contact has been established through coaches and mentors and increased visibility—not least through the support of the ISC3, which has enabled us to present our idea to a broader professional audience worldwide and to investors with know-how and experience beyond the chemical industry.

**T. Rose:** We are currently looking for funding to take the next step: a test facility to transfer our laboratory process to mini plant level in 2023 to further improve the process and collect even more data.

## PERSONAL PROFILES

**Klara Yoon**, co-founder, studied media studies in Trier, Germany, and Utrecht, The Netherlands. Her current role with the company lies in strategy, fundraising and creating the drumbeat and guiding their implementation. Before founding New Dawn she worked in film production and photography.

**Tina Rose**, co-founder, studied economics in Bremen, Germany, and Melbourne, Australia. She brings strategic and analytical thinking as well as years of experience in business development into the start-up. As a former manager of international cooperation projects at Airbus she knows how to facilitate complex projects with a diverse set of stakeholders. As a co-founder, she follows her passion for a circular economy.

**Stephan Enthaler**, co-founder, studied chemistry at the University of Rostock, Germany, and continued with a PhD study at the Leibniz-Institut für Katalyse (LiKat). Afterwards, he worked at the Technical University Berlin and the University of Hamburg on sustainable chemistry, especially on catalytic chemical recycling of plastics and its transfer to circular economy. He has a research background in chemical recycling and created the recycling technology for silicones.





## BUSINESS IDEA

### Silicone Recycling Technology

The female-led start-up New Dawn Silicones (aka We Are Galaktika) from Germany has developed a resource-efficient chemical recycling technology for end-of-life silicones and is thereby tackling one of the most pressing environmental problems of our society.

The innovative technology is a beneficial building block for a circular silicone economy. In more detail, end-of-life silicones collected from customers were successfully converted in the initial depolymerization step to low-molecular weight compounds/monomers solvent-free, at low temperature and within short reaction times.

Different types of monomers can be obtained depending on the molecular structure of the parent silicones, e.g., linear, linked or cross-linked silicones. The monomers were collected by reactive distillation; therefore, all types of internal and external contaminations (e.g., additives, plastics) present in the silicone waste are separated by the distillation process and the monomers are obtained in excellent purities. During the distillation process the monomers can be already converted by polymerization

to new (recycled) high quality, e.g., cyclic silicones, which are applicable as a platform for all types of silicone products (e.g., medicinal or food grade). Importantly, the technology is easily scalable and is designed following the requirements of sustainable and resource-efficient chemistry.

Lately, the company finalized the lab process which will be submitted for patent application in Q1/2023. They are currently raising money for building a mini plant to collect data, optimize processes at plant level and then run, operate, and test it with the waste from partners. The long-term goal is to license the technology which is planned for 2026, after the scale up with the pilot plant.

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**NEW  
DAWN**



© New Dawn Silicones

New Dawn Silicones has developed a resource-efficient chemical recycling technology for end-of-life silicones.

## ELEVATOR PITCH

### Milestones and Roadmap

The waste caused by end-of-life silicones is an underestimated environmental problem of our society. New Dawn Silicones' vision is to transform the linear silicone industry into a circular one by using existing resources more effectively. They not only reduce the carbon footprint by 60% compared to the production of virgin silicone but contribute to the conservation of biomass and diversity.

The mission is to completely close the material cycle for silicone products and to be able to also recycle multi-component materials.

Thus, compared to other silicone recycling processes, for instance mechanical recycling, New Dawn's silicone comes out with the same quality as the virgin silicone.

#### Milestones

2021

- Project kick-off under the name We Are Galaktika

2022

- Joining the incubator program „Circular Together“ of Impact Hub Berlin
- Winner of the ISC3 Innovation Challenge

2023

- Name Change to New Dawn Silicones
- Seven Proof of concepts with partners from various industries (automotive, medical, silicone molding etc)

#### Roadmap

- Q1: Patent application and founding of New Dawn Silicones GmbH
- Q2: Pre-Seed funding
- Q3: Building mini plant

2023

- 2t/y Eternal Silicone
- Seed funding

2025

- Pilot plant, 1,000 t/y Eternal Silicone

2026

- Licensing of the technology

2028

- 64.000 t/y Eternal Silicone with licensees/10% of EU Market



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End-of-life silicones are first converted in a depolymerization step to low-molecular weight compounds/monomers. These monomers are then collected by reactive distillation.

## Interphex 2023

The International Pharmaceutical Expo (Interphex), dedicated to pharma and biotech innovation from development to marketing, is scheduled to take place on April 25 – 27, 2023, in New York, NY, USA. The annual trade show and technical conference brings over 10,000 global industry professionals and 625+ leading suppliers together. The event provides a combination of no cost technical conference, exhibits, demonstrations, and networking events.

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

## Chemspec Europe 2023

Chemspec Europe is to take place on May 24 – 25, 2023, in Basel, Switzerland. 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](http://www.chemspeceurope.com)

## CESIO World Surfactant Congress 2023

The 12<sup>th</sup> CESIO World Surfactant Congress, to be held in Rome, Italy, on June 5 – 7, 2023, provides an opportunity for experts across the surfactants value chain to meet. The theme for this edition will be: “Surfactants—High Performance Solutions for a Better World”. This event represents the perfect opportunity to learn about the latest developments in key areas such as business & market trends, safety & regulatory affairs and technical & applications.

■ <https://cesio-congress.eu>

## Specialty & Agro Chemicals America 2023

The Specialty & Agro Chemicals America show—scheduled to take place on June 20 – 22, 2023, in Savannah, GA/USA—is a forum that promotes chemical manufacturing, chemical technologies, and related chemical industry services that have specific applications for the agrochemical and specialty chemical markets. The event will focus on the chemical products and technologies that have specific applications for the agrochemical and specialty chemical manufacturing markets.

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

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Printed by: DSW GmbH & Co. KG,  
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