



European Chemicals Outlook – Second half of 2023

A time for critical decisions

As we move into the second half of 2023, the European chemicals industry faces an uncertain future. Inflation has hurt consumer spending, a changing geopolitical landscape makes long-term investment and

footprint decisions riskier, industry commitment to sustainability will require large-scale transformation, and new regulations loom, not only in Europe. ➔

Economic background: Modest economic rebound expected

Despite severe headwinds, the EMEA chemical sector remained resilient...

With Covid supply chain issues still ongoing, the outbreak of the war in Ukraine hit the European economy hard. Energy prices surged and global growth slowed to 3.2%, more than 1 percentage point less than expected at the end of 2021. As of April 2023, there appears to be a modest uptick in the global economy, and inflation has reached its peak. Core inflation, however, is still increasing, and there are voices predicting a more severe recession. European industry, and especially the chemical industry, has significantly shut energy-intensive production lines. Together with the mild winter, this helped avoid rationing of natural gas and a severe European recession.

...but the chemical industry has been hit hard

In 2022, with the start of the war in Ukraine and the foreseeable end of Russian gas and oil deliveries, European chemicals companies quickly came under pressure, and stock prices plummeted. The chemical industry's place at the head of the value chain impacts it early in a down-cycle, but for the first time in history the EU has imported more chemicals than it exported.

This mirrored the decrease in competitiveness of European assets due to a sharp spike in energy prices. A significant number of industry players have reacted to this new situation by announcing cost-saving programs and personnel-reduction schemes for their European sites. The capacity for energy-intensive production has been reduced, and sometimes even shut down permanently. Some industry associations for the chemical sector in Europe have asked to pause work on the Chemicals Strategy for Sustainability (CSS), claiming that the industry now faces a "fundamentally different" geopolitical and economic situation.

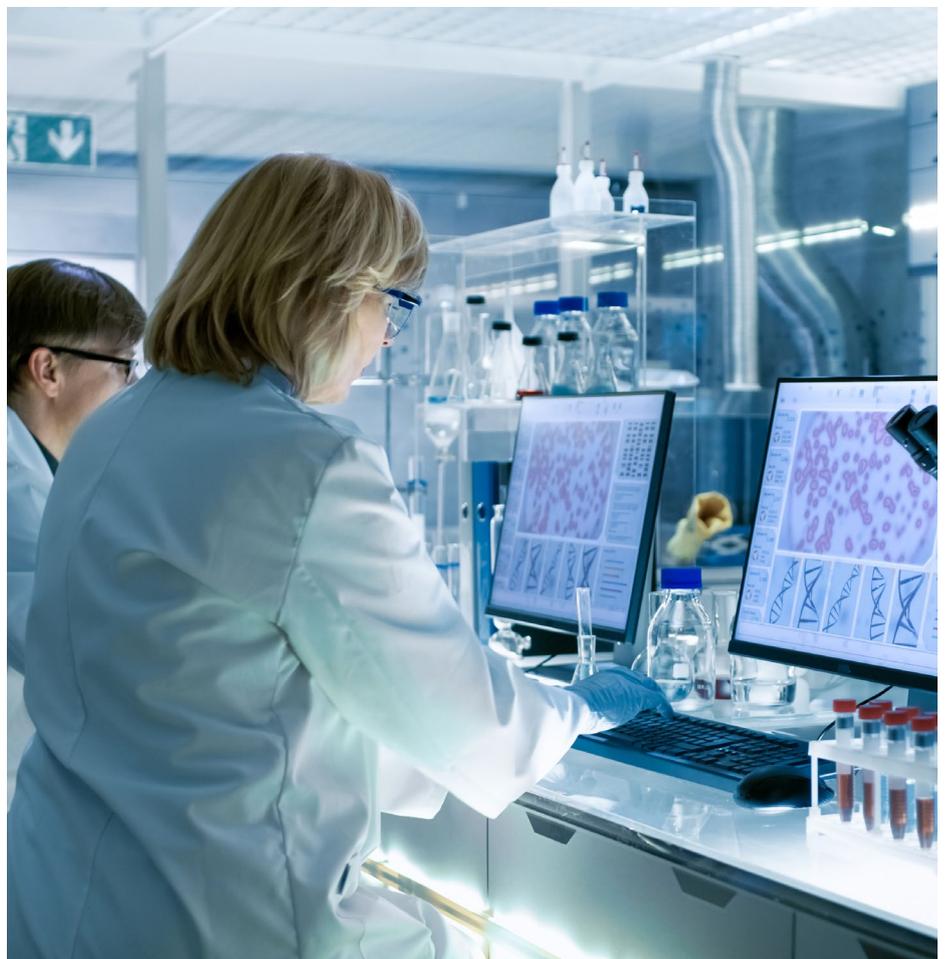
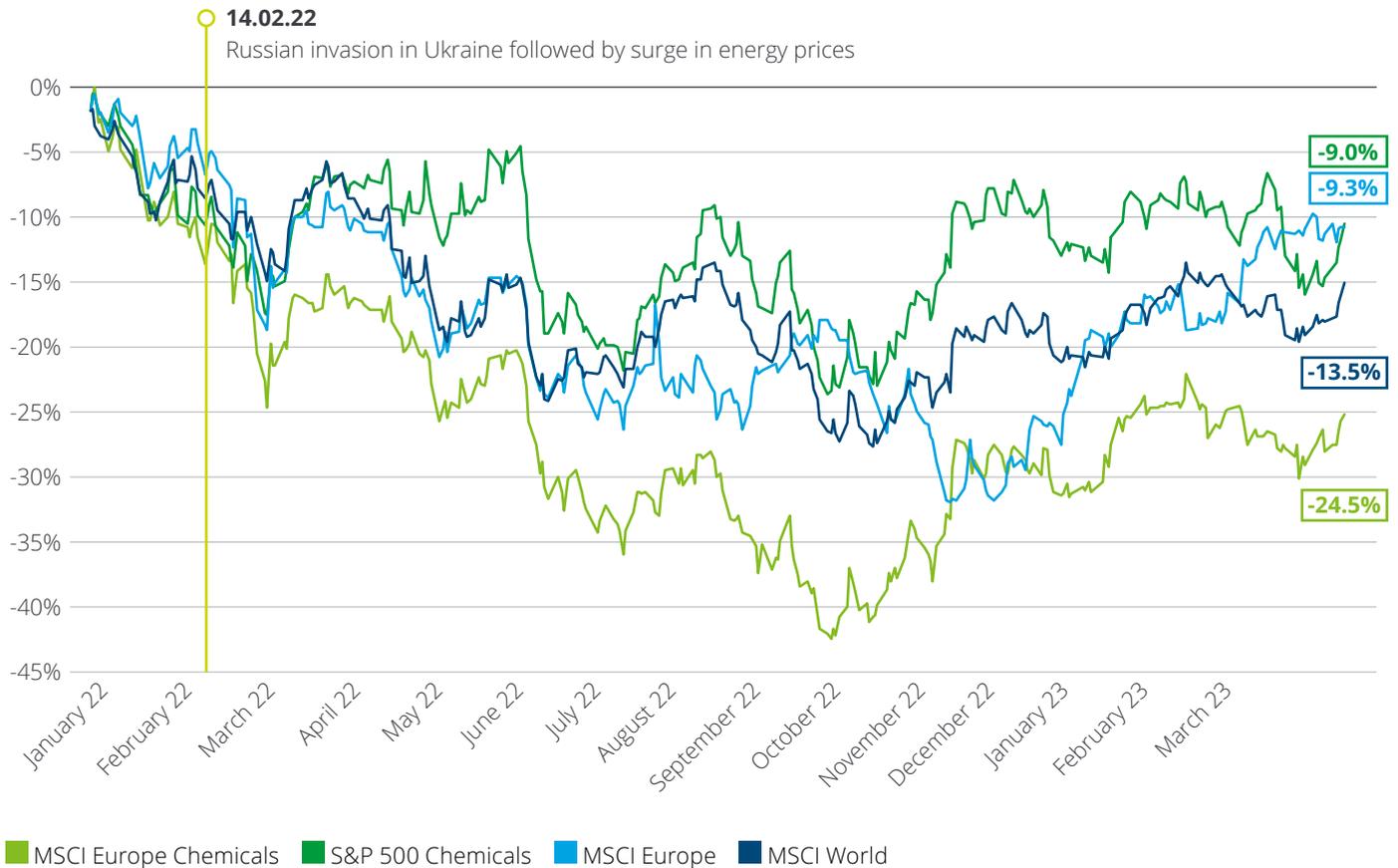


Fig. 1 – Cumulative Chemical Index performances January 2022 – March 2023



Significant uncertainty remains

Despite these negative developments, the general macroeconomic view is that inflation will be contained and growth will be sluggish in 2023, or a mild recession at worst. For Germany, as an example, this would mean stagnant growth between -0.3% and +0.3% in our current forecast. The US and Europe are expected to avoid the kind of hard landings seen in previous inflationary outbreaks. But Europe will continue to feel the effects of 2022 energy prices and slow growth, especially as natural gas supply remains unsteady for winter 2023/2024.

In China, the most important end market for the chemicals industry, current expectations are for growth of +5.0%. In other markets like India and Indonesia, we foresee higher growth.

EMEA chemical industry hit by severe headwinds and uncertainty remains

Geopolitics: New risks for investment and operations

Companies want to go where the markets are. But that comes at a price. Geopolitical risks are on the rise

The importance of geopolitics has greatly increased in recent years. The chemical industry primarily holds long-term assets on the ground, and broken supply chains due to Covid, rising antagonism between China and the USA, and the start of the war in Ukraine have shown that there is a real risk of geopolitics quickly and radically impacting the value of these assets. This effect is not limited to countries within active war zones, and extends to countries under sanctions, and perhaps one day even to countries that belong to opposite global political camps.

It's not just about fixed assets

Not only physical assets like production plants need better protection against geopolitical risks, but soft assets like digital tools, data, and intellectual property as well. A related issue is ensuring control and entrepreneurial decision-making. All of this requires in-depth assessment of the legal and regulatory environment and the overall geopolitical situation, including protection of property, protection against political interference, effects of possible sanctions, data security, free choice of software tools, and so on. Geopolitics also have a significant impact on value chains and value creation in the chemicals industry. Examples are the resilience of the supplier landscape, sourcing restrictions via local content rules, and the ability to build and maintain a world-class supplier ecosystem.

Critical decisions needed now despite uncertainty

The chemicals industry is generally characterized by multi-year investment cycles. That requires a long-term view of end-markets, cost competitiveness of assets, secure and competitive access to feedstock and so on. Players in the chemicals industry must make decisions now, despite any geopolitical effects:

1) Investing in time-critical transformations amidst geopolitical uncertainties.

The time to set the course for a sustainable and digital future is now. This will require major investment in new assets and technologies. As to sustainability, without the chemical industry there will be no broad decarbonization and no circular economy. Without digital technologies, implementation will not be efficient. So the industry is experiencing a very special investment cycle: Many chemical firms are increasing their investments, and need to make crucial footprint and technology decisions now, including for the Chinese market (see deep dive on China). But geopolitical uncertainty has risen to levels not seen in decades, and different chemical companies have taken different paths. Some, for example, have postponed building new production plants in mainland China. Others have confirmed their overall commitment to China and started with investment waves for the next decade, although most plan to do this stepwise, with constant case-by-case review processes for each project.

2) Rebuilding the supply chain.

Like many others, the chemical industry has refocused its supply chains from centralized just-in-time concepts mostly focused on cost optimization, to a more balanced approach factoring in resilience, decarbonization, and alternative feedstock to meet sustainability requirements (like bio-based or recycled materials). The aim is to reduce risk and dependency in the supplier base, in feedstock sources, and in the production footprint. This means that additional suppliers must be approved, most likely with regional distribution among them, and supplier service levels must be adapted to increase resilience (for example by adjusting safety stocks or maintaining slack capacity). These supply chain changes will likely lead to an increased overall cost-base.

3) Improve market transparency.

Many fields of the chemicals business face the challenge that their end-user markets are several steps away. This makes it difficult to correctly assess market trends, customer needs, and future demand. To reduce investment risk, these markets need to be better understood and tracked by anticipating market demand and geopolitical risks, like embargoes and supply chain bottlenecks, that might affect their downstream value chains. In times of increased geopolitical risk, chemical players must be more aware than ever of the value chains in which their products are processed, by analyzing their customer base for an outlook on future demand, locations, supply chain reengineering, and respective risks.

Deep Dive Geopolitics: China

Investing in China

China is already the largest chemicals market on the globe at 45% of overall market volume. And in absolute terms it also offers the largest growth opportunities, with estimates of two-thirds of the growth in chemicals occurring in China in the coming years. A presence in this market is imperative for those who aspire to remain global players and to profit from its market growth. But Covid lockdowns in China (in parallel to the start of the war in Ukraine) have shown that non-market factors such as geopolitical risk are also important decision-making factors. This is especially true for chemical players in globalized value chains where access to, and growth of, global markets are essential.

Regarding China risks, Taiwan immediately comes to mind. While this will continue to cause geopolitical uncertainty, there are many other disruptors to be navigated, like cyber-security laws, data regulation, self-sufficient demand, and patent protection. And considering its strong government-driven economy, knowing about relevant Chinese development plans and economic policies is important.

Many Chinese chemical companies are moreover rising more rapidly than expected under the support of local government and capital markets. Their competitiveness is strengthened by aggressive capacity expansion, ever-increasing investment in R&D, and better adaptability to local market.

(Chemical) companies must thus make fundamental strategic decisions on their investment focus in China. It is crucial to know how to integrate into the Chinese market, how to grow business when

confronted with intensive local competition and with what localization landscape, including the future digital ecosystem required. The latter will also strongly depend on the coming Chinese regulation landscape and business culture.

Several chemical companies are now considering corporate strategy and architecture that allow for decoupling from mainland China (separating both the physical and the digital asset base from the worldwide business). The aim is to continue their presence in China with more independent and locally adjusted subsidiaries. Whereas in most cases there is no need for an immediate hard decoupling, company strategy and contingency planning should become highly flexible. The geopolitical situation might, just to give one example, at some point lead to trade barriers or bans on certain Western technologies and applications. It is also possible that the Chinese government will demand the use of Chinese software or other domestic applications for its national markets – and that Western economies reciprocate in kind. In both cases it would be very difficult to find one-to-one replacements, and continuation of global initiatives and collaborations would be severely hampered. Complexity levels would also rise, and in all likelihood the replacement solution would not perform at the previous level.

The impact of data regulations is currently limited to HR and customer data (so it concerns mainly peripheral systems). If regulations start focusing on more data categories, the impact on core systems architecture, including ERP, R&D, workspace and production systems, may be much higher.

Yet global chemicals companies in China will need to focus on being successful in China itself – the largest and fastest growing market in the world. There is a clear need to adapt global business models to fit in with Chinese ways of working and with the Chinese digital applications ecosystem. What is needed are the right skills and partners to drive both expansion into the Chinese market and digitalization using global solutions, while also building a new set of local Chinese solutions and applications.

Sustainability: Where, when and how?

Industry still stuck with short-term measures

There is no doubt that the European chemicals industry is fully committed to a sustainable future, and in particular to reducing CO₂ emissions significantly by 2030 and becoming net-zero by 2050 at the latest. But different aspects of sustainability, like collaborative innovation, green energy supply, and feedstock substitution, have not yet translated into corporate action plans everywhere. Our recent discussions with chemical industry representatives manifest the following trends:

There is no alternative to sustainability, yet corporate action plans remain short term.



Action plans do not reach far.

Company net-zero commitments are fixed and in place for 2030 and 2050, and most companies also have a concrete sustainability action plan for the next 12 to 18 months that is already being implemented. So short-term measures are on the way, as is focusing on renewable energy supply and on ESG monitoring and reporting issues.



Deep uncertainties remain.

Some of the reasons for this lack of planning lie with uncertainties in regulation and market preparedness. The chemical industry is structurally very capable and willing to plan ahead for the long term. However, most industry representatives think the regulatory framework does not yet provide enough clarity (see following chapter). There is also great uncertainty around the availability of sustainable feedstock and energy (see below). Last but not least, the sudden challenges resulting from the war in Ukraine and the European energy crunch have led to a shift in short-term priorities through 2022, and have locked up scarce management and planning resources.



Long-term planning lags.

Beyond this 12-18 month time frame, many companies still lack an implementation plan. No concrete measures have been defined for achieving 2030 nor the 2050 targets.



Foundations need to be laid now.

Nevertheless, 2023 and 2024 are still widely regarded as the years that will 'set the scene' in the industry. During these years the pathway to net-zero must develop from mere commitment to concrete action plan, despite all the uncertainties and challenges ahead.

Deep Dive Sustainability: Hydrogen

Low-carbon hydrogen: Huge availability gap

The chemical industry presently produces close to 69 megatons of 'gray' hydrogen from natural gas, and an additional 48 megatons as a byproduct of other reactions. This hydrogen is mostly used for ammonia and methanol syntheses, as well as in oil refinery processes. Future low-carbon hydrogen will come in the colors green, blue, turquoise and yellow, depending on how it is produced (for example 'green' from renewables, and 'pink' from nuclear).

But the need for low-carbon hydrogen far exceeds current gray and chemical by-production. As an energy carrier of the future, low-carbon hydrogen is to be used in most applications where electricity is impracticable, for example in high-temperature processes. The World Energy Council estimates an annual demand of a further 270 megatons to be produced by 2050 to cover some 10% of the total world energy demand with net-zero carbon emissions.

That is the official long-term plan. But what does a realistic near-term perspective for the European chemicals industry look like until 2030? As shown, the chemical industry already uses large amounts of hydrogen that need to become low-carbon as soon as 'green customers' are willing and able

to pay the price. As we approach 2030, the chemical industry will not remain the sole user of hydrogen. In parallel to the chemical industry's rising needs, there will be considerable additional demand for heavy-duty road transport and maritime shipping (direct hydrogen use and as ammonia or e-fuels) as well as for commercial aviation (sustainable aviation fuels, SAF). Hydrogen demand for steel production is not expected to kick in before 2040.

Will there be enough low-carbon hydrogen for everybody? Certainly not. It is important to realize that low-carbon hydrogen basically does not exist yet. Of today's roughly 117 megatons of (mostly gray) hydrogen, over 94% ends up in chemicals and refining. Several players have now announced they will produce a total of 53 million tons of both green and blue hydrogen by about 2030. While that sounds good, we must be aware that:

- Roughly half of the projected 53 million tons of green and blue hydrogen are mere announcements
- Overall low-carbon hydrogen demand is estimated at 150 million tons by 2030

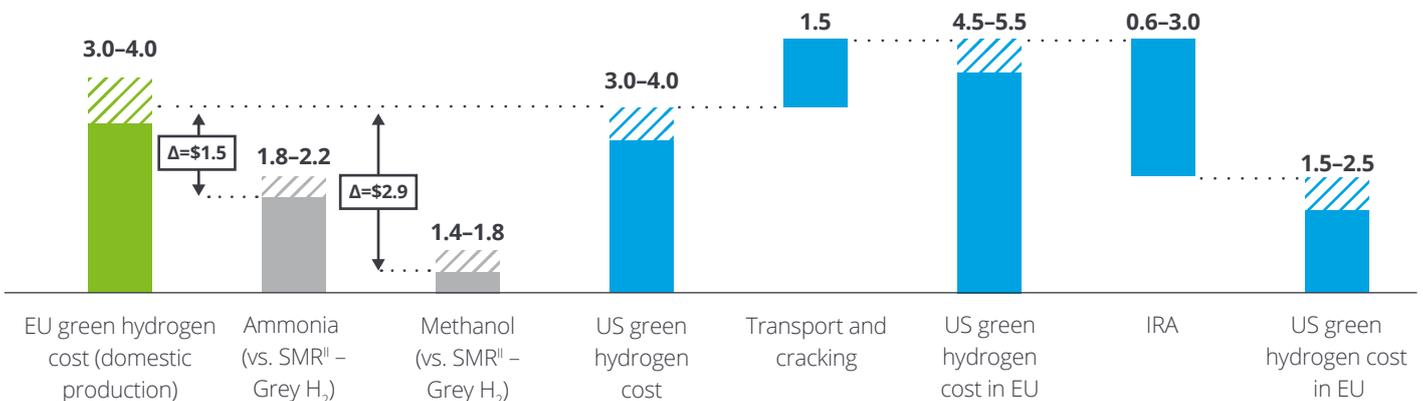
This means that by 2030 there will be an annual capacity gap of at least 100 million

tons of green, blue, turquoise and yellow hydrogen if no new projects start soon. In terms of expense, today's European production costs of green hydrogen are not competitive with gray hydrogen, but several proposed EU policies could bridge the gap, something that the US Inflation Reduction Act (IRA) is already doing, as shown in figure 1.

It is interesting that in such an environment of foreseeable imbalances in supply and demand the involvement of the chemical industry is comparably low. Around 80% of low-carbon hydrogen projects are run by today's energy incumbents and, again of interest -they prefer consortia to do it.

Only 10% of hydrogen projects, representing 6% of capacity, are in cooperation with actual hydrogen customers, and only some of them are chemical companies.

Fig. 2 - Green hydrogen production costs in the EU and impact of IRA



Regulation: A steady source of new uncertainties

EU Green Deal regulations threaten to hurt exports. But they might also spur innovation.

EU Green Deal needs a fence

Regulation has been a key area of industry uncertainty for several decades now, and we foresee that this situation will continue in the years ahead. But we are also seeing very relevant regulation to be enacted in 2023, with wide-ranging impact on chemicals players for years to come. The EU Emissions Trading System (EU ETS) and the EU Carbon Border Adjustment Mechanism (CBAM) are regarded as both threat and opportunity to European chemicals players. They might put the export competitiveness of the European chemicals industry at a serious risk if other regions are less strict, while on the other hand, a position at the forefront of the sustainability transformation strengthens the position of European chemicals players in leading the material transformation and innovation.

Emissions trading might be next

Most of the chemicals are currently not affected by the EU Emissions Trading System (EU ETS), but they could be included in future revisions. Already included in the regulation are emissions from production of acids and bulk organic chemicals. A separate new ETS II for road transport fuel and buildings will be established by 2027, potentially influencing transport costs for chemical companies. Similarly, CBAM includes hydrogen and fertilizers, triggering importers' duty to report and make subsequent financial adjustment for both direct and indirect emissions. Currently CBAM does not include the categories petrochemicals and polymers (polymers were excluded in the last review), but they could be relisted in the next review of categories. The draft CBAM regulation contains an explicit mandate of the Commission to assess, by the end of 2026, the possibility of extending CBAM to organic chemicals and polymers.

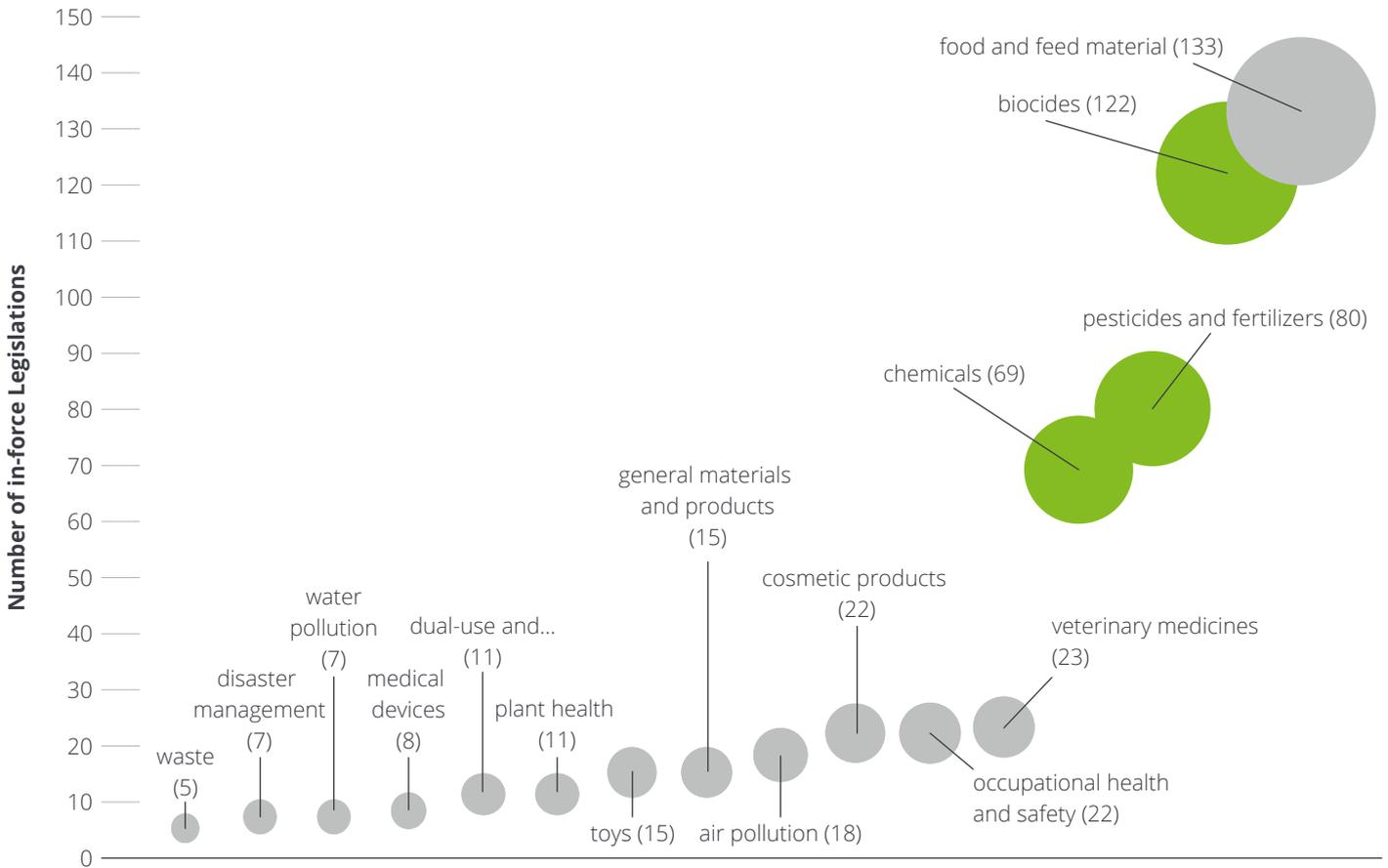
"Zero-Tox" still undefined

Chemicals players must consider many additional European regulatory elements. One example is 'zero-tox' regulation. Zero-tox is considered a significant challenge for the industry, with major potential impact on product portfolio. But there is still no clarity on that regulation, and consultation processes are ongoing. Overall, there are more than 80 regulatory measures currently proposed, including controversial revisions of EU industry standards like REACH.

Europe is not alone

There are also competing green investment programs in different regions. For example, the US Inflation Reduction Act (IRA) directly competes with the EU Net-Zero Industry Act / Green Deal Industry Act. While these are a mix of regulation and investment programs, they are also geopolitical instruments, and when we mention that geopolitics is on the rise, regulation is one of its instruments. Over the coming months we will have a clearer view whether these programs have a significant impact on attracting or securing investments or whether they are (mis)used to build up highly competitive positions within the chemicals value chain.

Fig. 3 – EU exposure regulation over 16 legislative domains. The ball sizes represent the number of in-force legal instruments comprising Commission Regulations, Commission Directives, Commission Implementing Regulations, Council Regulations, Council Directives, Directives of the European Parliament and of the Council and Regulations of the European Parliament and of the Council.



Source: Bruinen de Bruin, Y., Franco, A., Ahrens, A. et al. Enhancing the use of exposure science across EU chemical policies as part of the European Exposure Science Strategy 2020–2030. *J Expo Sci Environ Epidemiol* 32, 513–525 (2022). <https://doi.org/10.1038/s41370-021-00388-4> Nature / Journal of Exposure Science & Environmental Epidemiology, 2022

Action plan: Four non-regret actions for 2023

The time to act is now

Many long-term investment decisions must be made, and implementation started, this year, even if it is next to impossible to predict future geopolitical developments or correctly appraise the EU's regulatory moves. One thing does seem certain: The European business environment will be fueled by a growing demand for low-carbon chemicals, new recyclable and compostable materials, and any new services that facilitate a circular economy. Serious questions remain as to what effect the Green Deal and its associated regulation will have on industry exports.

Our recommendations on what to do (or continue doing) in the second half of 2023:

- 1) Design resilience plans for different 'world states' based on geopolitical risks and vulnerabilities as part of strengthened strategic flexibility and contingency planning
- 2) Define company impact for all planned regulation initiatives, focusing on portfolio and assets.
- 3) Implement your net-zero now; do not risk delays and secure access to net-zero/green energy.
- 4) Increase the number and intensity of partnerships and cross-company collaboration initiatives along the value chain to de-risk and accelerate value capture from transformations (energy transition, net zero, circularity, zero-tox).



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