INDUSTRY OUTLOOK 2030+ | GERMAN CHEMICAL INDUSTRY

Executive Summary | October 2021

Oxford Economics is delighted to present our English-speaking audience a summary of the most important results of our latest study in Germany. On behalf of the Stiftung Arbeit und Umwelt der IG BCE -the foundation for labour and environment of the trade union IG BCE – we conducted an industry outlook 2030+ for the German Chemical Industry. The full report in German can be found here.

Chemical products form the basis of many different items that we use every day. Packaging materials, detergents and body care products, or preservatives for food—all consumer goods are ultimately based on the outputs of the chemical industry. Even so-called transformation products for the hydrogen and energy industries such as carbon fibre and glass fibre products which are used in wind turbines are based on the processing of chemical inputs.

The German chemical industry is facing extensive challenges that will fundamentally alter many businesses over the coming years. Due to its high energy intensity, achieving carbon emission reduction targets poses a major challenge. Moreover, increasing competition from abroad—especially from China and the US—as well as the transition to a so-called Chemistry 4.0 will require profound adjustments of the chemical industry.

The Sector Outlook 2030+ "Chemical Industry" is based on an analysis of the latest industry research and data. The following **research questions** are at its core:

> (1) What is the current status of the German chemical industry with regards to company structure, employment, and investment and innovation activity, and what is the economic and trade policy setting under which it operates?
>
> (2) To what extent is the German chemical industry affected by transformation trends such as digitalisation, globalisation, and demographic change?

(3) Which technologies and processes—but also regulations and political settings—can contribute to a successful sustainability transformation and decarbonisation of the industry?

(4) What are the strengths and weaknesses, opportunities, and threats for the German chemical industry with regards to production, innovation and transformation in the near- to medium-term?

Germany is one of the most **important chemical players worldwide** and leads the global value-added ranking within Europe. The German chemical industry generated around 143 billion euros in turnover in 2020, which corresponds to 1.7 per cent of total German value-added output. Its contribution to employment is also high. Approximately one per cent of all employees subject to social security contributions were employed in the chemical industry in 2020. The most important sub-sector is the basic chemicals segment, generating around half of the total turnover. However, the importance of speciality chemicals is increasing.

The German chemical industry is considered an **innovation** driver. Total innovation expenditure amounted to around 6.7 billion euros—approximately five per cent of innovation expenditure by the total manufacturing sector. However, the relative expenditures for innovations and research & development are showing a declining trend. Furthermore, the level of **digitalisation** in the German chemical industry is currently just around the average of the wider manufacturing sector. Digitalisation efforts thereby mainly focus on process optimisation rather than the exploration of new business models, which still seems to be fraught with too much uncertainty (ifw Kiel 2020). These developments are a cause for concern in light of the international competitive situation.

As a **highly export-oriented industry**, the German chemical sector is closely integrated into complex international value chains on both the sales and the procurement sides. On the sales side, the export of intermediate products has continuously grown over time (ifw Kiel 2020). On the procurement side, offshoring strategies have resulted in increased sourcing of intermediate inputs from international markets. With around 40 per cent of the finished product value, the German chemical industry is even more strongly integrated into international value chains than the automotive industry or the mechanical engineering sector (MERICS 2020). However, there are increasing calls to improve local vertical integration to not only reduce the industry's dependence on long and opaque supply chains but also to respond to China's increasing market dominance (ifw Kiel 2020).

The **dramatic growth of the Chinese chemical industry** is posing increasing challenges for the German chemical industry. While earlier on in China's growth path it was only the basic chemicals segment that faced an exodus of investment away from Germany, China is now also becoming competitive in the production of higher value-added speciality chemicals. This is supported by the Chinese government's huge investments in the chemical industry. In fact, 40 per cent of all chemical innovations now come from China (Commerzbank 2021). The threat from non-Asian competitors including the US and Middle Eastern countries are also rising due to their strategy of forward integration of value chains in regions with low raw material and energy costs (Kiyar, Adisorn, Leipprand & Lechtenböhmer 2020).

The chemical industry plays a key role in Germany's **green transformation** for three main reasons. First, it is one of the most energy-intensive industries—the basic chemicals segment has the second-highest share of energy costs in gross value added across the entire manufacturing sector. Second, fossils fuels are not only

used as a source of energy but also serve as input materials in production. Around one-third of emissions are process emissions that are inevitable in conventional production. Third, as an intermediate input producer, the chemical industry can provide considerable leverage for downstream industries. As a result, the transformation of the chemical industry is not only much more broad-based than that of other industrial sectors but also has a greater potential for reducing emissions.

The industry is aware of its responsibility and is committed to achieving climate neutrality by 2050. However, this entails **enormous challenges**. Although there already exist promising technologies for reducing greenhouse gas emissions, many low-carbon breakthrough technologies (LCBT) are still far from market maturity and are also considerably more expensive than conventional processes (DECHEMA & FutureCamp Climate 2019). In addition, production plants in the chemical industry are generally very capital-intensive and have a lifespan of up to 70 years. Therefore, it is estimated that the green transformation will require investments of around 68 billion euros between 2020 and 2050 (VCI & IG BCE 2020). Meanwhile, investment conditions are highly uncertain— the future CO2 price in particular is a key factor that will determine the profitability of green investments.

Achieving carbon neutrality will require a reliable supply of green electricity and biomass at affordable prices. Implementing the **key technologies**—namely green hydrogen, the circular economy, and the bioeconomy—will significantly raise Germany's electricity demand, but current electricity prices are above average in European and international comparisons and therefore too high for the industry to remain competitive. Access to renewable raw materials must also be ensured to support the bioeconomy.

The green transformation presents a **challenge for the German chemical industry's international competitiveness**. The European Green Deal, the planned carbon border adjustment mechanism (CBAM), comparatively high raw material and energy costs, and the European chemicals policy framework may have a negative impact on the sector's competitive position and cause carbon leakage. In addition, some firms are already considering migrating to locations closer to renewable energy sources if the political focus continues to lie exclusively on green hydrogen. These migration considerations can be counteracted by implementing a supportive policy framework. Policy instruments such as Carbon Contracts for Difference (CCfD) and the Research Allowances Act introduced in late 2019 are promising first steps.

However, the green transformation also holds considerable opportunities. The German chemical industry can evolve to become a **leader in the field of sustainable and environmentally friendly technologies** such as green hydrogen, the circular economy, and the bioeconomy. This would significantly strengthen its competitiveness, which, due to its cost structure, currently tends to score more on quality than on low prices. Reshoring (parts of) the supply chain will thereby be vital to create a circular economy. Digital applications can be a key to achieving this goal.

SWOT-Analysis of the German Chemical Industry

Strength	Weaknesses
• High employee qualification levels	• Dependence on expensive raw material imports (especially naphtha)
• Good innovation climate with good networking and political support	• High energy costs in international and European comparison
• Excellent application-oriented research institutes (e.g., Max Planck Societies)	• Limited competitiveness of the basic chemicals segment due to high energy costs
• Leading position in submarkets of many German chemical producers	• Average degree of digitalisation of companies and digital skills of employees
• Broad local customer base	• High capital intensity of production facilities, energy-intensive production processes, long investment cycles
• Well-developed, efficient infrastructure (especially chemical parks, pipelines, waterways, and ports as well as train routes and loading stations)	• Financial strength of SMEs in the chemical industry and lack of venture capital
Opportunities	**Threads**
• Stronger linking of process steps and production sites through digital technologies	• Fast-growing Asian emerging markets such as China becoming net exporters of high value-added speciality chemicals
• Further development of product-based business models through digital services (e.g., in agrochemicals)	• High regulatory density
• Greater local production depth through digitalisation	• High planning uncertainty with regards to the future regulatory framework
• Policy-driven demand boom in the construction and automotive sectors	• Migration of production closer to renewable energy sources (green leakage)
• Technological leadership in green hydrogen, resource-efficient and sustainable production processes, the bioeconomy, and the circular economy	• Forward integration of value chains in regions with cheaper raw materials (USA, China, Middle East)
• Increasing world market demand	• Increasing innovation by international competitors
• Expansion of local value chains through protectionism and decoupling	• Increasing shortage of skilled workers

Source: Commerzbank (2021), ifw Kiel (2020), Oxford Economics

REFERENCES

Commerzbank. (2021): *Branchenbericht Chemische Industrie in Deutschland.* Commerzbank AG: Frankfurt am Main.

DECHEMA & FutureCamp Climate. (2019): *Roadmap Chemie 2050. Auf dem Weg zu einer treibhausgasneutralen chemischen Industrie in Deutschland.* FutureCamp Climate GmbH & DECHEMA Gesellschaft für Chemische Technik und Biotechnologie e.V.: München/ Frankfurt am Main.

ifw Kiel. (2020): *Analyse der industrierelevanten wirtschaftlichen Rahmenbedingungen in Deutschland im internationalen Vergleich.* Bundesministerium für Wirtschaft und Energie: Berlin.

Kiyar, D., Adisorn, T., Leipprand, A., & Lechtenböhmer, S. (2020): *Scoping Paper: Politische Instrumente für die Transformation der Industrie.* Wuppertal Institut für Klima, Umwelt, Energie gGmbH: Wuppertal.

MERICS. (2020): *Chinas Streben nach Dominanz in globalen Zuliefer- und Wertschöpfungsketten: Auswirkungen auf Europa.* Stiftung Arbeit und Umwelt der IG BCE: Berlin.

VCI & IG BCE. (2020): *Gemeinsame Strategie von IG BCE und VCI zu einer Wasserstoffwirtschaft.* Verband der Chemischen Industrie e.V. (VCI) & Industriegewerkschaft Bergbau, Chemie, Energie (IG BCE): Frankfurt am Main/ Hannover.