

Advanced technologies can transform the chemical industry and its value chain

Sectoral Watch: Technological trends in the chemical industry

The role of the chemical industry

The chemical industry is a cyclical, trade intensive industry with highly globalised supply chains. The chemical industry plays a particularly important strategical role for the economy, as it provides products and materials or solutions to virtually all its segments. At the same time, its global market share has shrunk significantly since 1998.

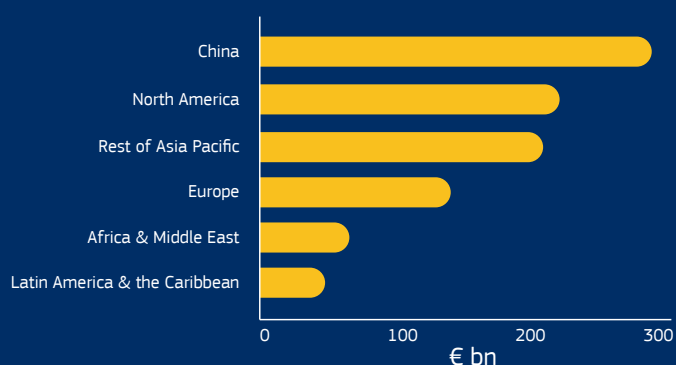


Figure 1: Size of chemical industry (Gross Value Add) by region in 2017

Traditionally, the chemical industry is characterised by a reliance on fossil resources and energy- and waste-intensive production.



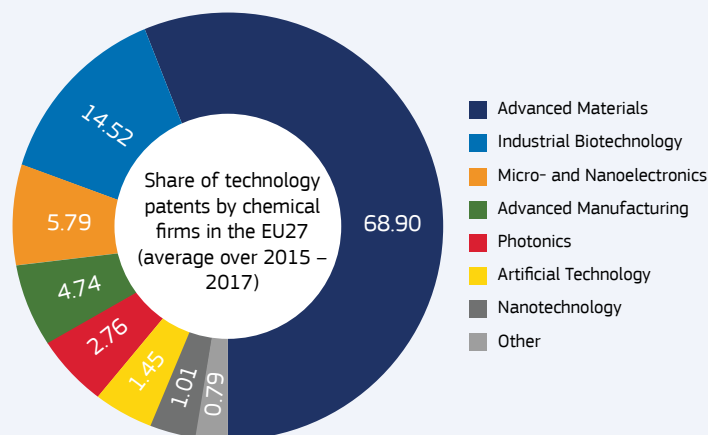
However, the modern chemical industry has been increasingly seen as part of the solution to many environmental challenges. Its contribution to sustainability is particularly evident through:

- The development and use of renewable bio-based materials and
- Provision of technologies that help reduce waste, raise energy efficiency and improve production processes.

The chemical industry is undergoing a technological transformation in its value chain because of new trends and the adoption of disruptive technologies

Chemical companies are under growing pressure to adopt new technologies that can generate greater value and fuel new growth. This ranges from raw materials supply, R&D via production to customers and end users presenting new challenges. It is increasingly exposed to disrupting trends such as sustainability and the circular economy, digitalisation and additive manufacturing.

Trends	Technologies
Sustainability and Circular Economy	<ul style="list-style-type: none"> • Industrial biotechnology • Circulating molecules • Waste-to-Chemicals • Carbon Capture Utilisation • Bio-refineries
Digitalisation	<ul style="list-style-type: none"> • AI/Data Analytics • Internet of Things • Robotics • Blockchain
Additive/Adaptive manufacturing	<ul style="list-style-type: none"> • 3D printing • Advanced Materials

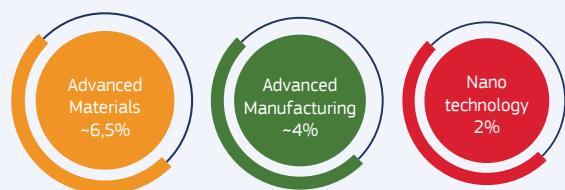


The chemical industry can contribute to the circular economy in manifold ways:

- Creating materials that are more durable, sustainable and energy efficient
- Cascade use of renewable feedstock criteria for the production of bio-based chemicals
- Increasing the recyclability of end products

The amount of start-ups is largest in the field of Life sciences and Industrial Biotechnology, followed up by environment and sustainability-oriented start-ups

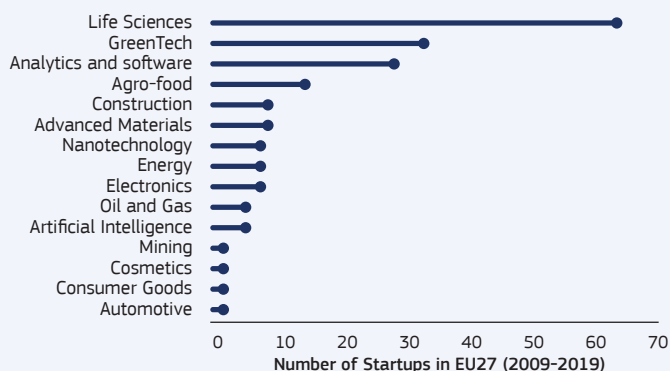
Most common skills are:



Fastest growing skills are:



The amount of start-ups represents trends of technology development in industries.



Innovation and digitalisation are essential for the European chemical industry to secure its business success and to retain its competitive edge, while at the same time posing challenges for chemical companies



There are **significant opportunities in research and development** to create higher value-added, higher margin products at a faster pace that would help European chemical businesses to enhance their strong position in the global value chain. These include:

- Alternative feedstock and energy sources
- Improved energy storage
- Environmentally friendly technologies
- Intelligent materials and nutrition



Digitalisation presents opportunities for the European chemical industry and is predicted to become an integral part of the business and success model of the chemical industry.

- Adoption of digital business models and platforms
- Optimisation of production processes
- Opportunities for chemical research and innovation



Trade issue tensions resulting in higher costs, delivery problems and uncertain demand environments



Highly competitive environment with acceleration of innovation cycles and the emergence of new competitors



Impact on existing technologies, product portfolios and business models in the chemical industry and its customers and suppliers



The **COVID-19 crisis** along with the overall continuing **growth reduction** in the last years

Opportunities

Challenges

About the Advanced Technologies for Industry (ATI) project

The ATI project – funded by the European Commission – supports the **implementation** of Europe's new growth strategy with a systematic monitoring of **technological trends** and reliable, **up-to-date data** on advanced technologies.



The **Sectoral Watch** analyses trends in the generation and uptake of advanced technologies, related entrepreneurial activities and skills needs in a number of selected sectors. It interprets data from a list of data sources compiled to monitor advanced technologies and their applications in industry across Europe and key competitor economies. It allows policy makers, industries and intermediaries to contextualise the collected data on advanced technologies specific for the industries in focus.