

# LANDSCAPE OF THE EUROPEAN CHEMICAL INDUSTRY 2018





## Austria

### Fachverband der Chemischen Industrie Österreichs (FCIO)

Number of companies

**245**

Turnover

**€14.77 billion**

Direct employees

**44,760**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### Third largest industrial sector in Austria

Chemicals are the third largest industrial sector in Austria, generating about 10.2% of industrial added value. The industry provides about 11.7% of total Austrian industrial employment, 11% of R&D expenditure and 17% of industrial spending on environmental protection.

### Significant output growth in the last decade

In 2016 the value of chemicals production was €14.77 billion, broadly unchanged for the past three years – though over the past decade chemical sales grew by 26.9%.

### The bulk of our chemicals are exported

About 70% of the chemicals produced in Austria are exported, and the value of chemical exports has grown over the past seven years. In 2016, 82% of imports originated in European countries, and almost 80% of exports were sold to countries in the same region.

Many Austrian chemical companies have foreign subsidiaries or are the Central and Eastern European headquarters for multinational chemical companies. Growth of operations in the newer EU countries has helped drive the recent growth of the Austrian chemical industry.

## A sector dominated by mid-sized companies

The chemical sector comprised 245 companies in 2016 (down from 291 in 2006), employing nearly 44,800 people – an increase of about 3,200 over the previous decade. It is made up of primarily of mid-sized companies which employ an average of 145 people. Only 64 companies have more than 250 employees. Chemical companies are distributed across Austria, with key clusters in Upper Austria near Linz and in the Vienna region.

## Investment has fluctuated but the trend is up

Plastics (raw materials and products) were more than 49.8% of production by value in 2016, followed by pharmaceuticals (14.5%). Agrochemicals were 3.1%. Over the last ten years, investment in the chemical industry has fluctuated widely. It peaked in 2007, before the global economic crisis, and is still under this level today.

## Chemical industry - key data 2016

Companies	251
Staff	44,760
Revenues	€ 14,768 billion
Imports	€ 19,757 billion
Exports	€ 19,097 billion

Source: Annual Report 2016. Association of the Austrian Chemical Industry

## Overview of the chemical industry production – Breakdown by sectors 2016

Plastic products	36.6%
Other chemicals	10.2%
Plastics for manufacture	13.2%
Pharmaceuticals	14.5%
Man-made fibres	6.1%
Rubber products	2.0%
Detergents, cosmetics	3.0%
Coating materials, printing ink and putty	3.6%
Agricultural chemicals	3.1%
Industrial gases	1.1%

Source: Annual Report 2016. Association of the Austrian Chemical Industry

## Foreign trade figures for 2016 of the Austrian chemical industry (€ million)

	Imports	Change from previous year	Exports	Change from previous year
EU	13,071	0.8%	11,459	-7.0%
EFTA	2,925	7.2%	2,331	27.9%
Remaining European countries	229	-2.0%	1,382	4.6%
Americas	2,451	-2.8%	1,669	5.2%
Asia	1,061	-1.0%	1,956	2.6%
Africa	12	-26.9%	216	-2.2%
Australia-Oceania	7	79.6%	84	-5.5%
<b>Total</b>	<b>19,757</b>	<b>1.1%</b>	<b>19,097</b>	<b>-0.9%</b>

Source: Annual Report 2016. Association of the Austrian Chemical Industry

### HOW ARE WE DOING?

#### Strengths

- High level of innovation
- High level of specialisation
- Social stability
- Well-educated and trained labour force
- Strategic location at the centre of Europe

#### Weaknesses

- Increases in labour costs in recent years
- Demographic trends
- High energy costs
- High administrative and regulatory burden

### OUR CONTRIBUTION TO A COMPETITIVE EUROPE

A Life Science Strategy (Ministry of Science, Research and Economy with broad participation of numerous stakeholders) is currently being prepared. This will complement existing horizontal strategies in the fields of research, innovation, energy, and resources. However, centralised strategies sometimes tend to be of more political than practical relevance.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/austria/>



## Belgium

essenscia

Number of companies

**> 720**

Capital spending

**€2.1 billion**

R&D investment

**€4 billion**

Turnover

**€65 billion**

Direct employees

**90,000**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### At the heart of the Belgian industry

The chemical, plastics and life sciences industry is the industrial pillar of the Belgian economy accounting for nearly one third of total manufacturing value added. In 2016, the industry achieved sales of over €65 billion, and employed 90,000 workers, while supporting 150,000 related jobs.

Though Belgium, with 11 million inhabitants, has only 2% of Europe's people, its chemical, plastics and life sciences industry generates 5% of value added by the sector across the continent. On a per capita basis Belgium is the world's number one in the sales of chemicals and plastics.

### Forming a global hub

Enabling all other industrial sectors, chemicals and life sciences in Belgium are a central chemical hub in a globalised world. More than 75% of employment in the Belgian industry is by foreign-based parent companies.

### Export champion

Chemicals and life sciences are Belgium's top exports. 80% of the production is exported, creating a positive trade

balance. Neighbouring countries, and particularly Germany, are the main trading partners, accounting for 40% of exports. But exports to emerging countries have significantly risen.

### Clustering for efficiency

Belgium hosts a world-class petrochemical cluster at the port of Antwerp, where three-quarters of the world's top chemical companies are present. Lying at the centre of the Western European pipeline network, Antwerp is directly connected with all the major sub-clusters in Belgium – the Feluy-Seneffe-Manage triangle, Jemeppe-sur-Sambre, companies along the Albert Canal, Tessenderlo, Ghent and into the Ruhr district of Germany and Delta region in the Netherlands.

### Combining expertise

Life sciences are mainly clustered in Walloon-Brabant province east of Brussels near to universities, and around Antwerp. Ghent is home to a biotech valley which brings together world-class expertise in the field of medical, industrial and agricultural biotechnology. Plastic and rubber processing companies are spread across the country.

### Investing in research

The sector spent €4 billion on R&D in 2016. About 60% of R&D expenditure is in-house. The balance, in the form of outsourced research, reflects close collaboration between companies and technology centres for boosting innovation. Chemicals and life sciences are the largest private investor in R&D, accounting for more than 60% of R&D spending by all manufacturing companies. During the past decade, R&D spent by the chemical and life sciences industry increased by 75% and life sciences account for more than 80% of the sector's total. However, industry spending on sustainable bio-based and green chemistry is increasing.

## HOW ARE WE DOING?

### Strengths

- Attractive location at the heart of industrial Europe and the Western European pipeline network
- Easy access to raw materials and export markets via three seaports: Antwerp, Ghent and Zeebrugge
- A unique integrated cluster of chemical companies covering the whole value chain
- Competitive logistical platform with tailor-made storage terminals and distribution platforms
- Highly-skilled workforce ensures world-class technical expertise for some key products
- Operational excellence and high safety standards
- World-class energy efficiency
- Strong collaboration with universities
- Unique network between companies, authorities, and customers to implement REACH and CLP
- Excellence in industrial and academic research and a unique academic and industrial collaborative network
- A wide choice of science parks with incubation and innovation centres

### Weaknesses

- High energy costs due to cost pass through of public green energy strategies
- Relatively high labour costs
- Ageing workforce and quest for new talent

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## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Seeking a sustainable future

The government of Flanders, the Northern part of Belgium, has prioritised cluster policy and commercialisation of research, defining innovation hubs in a bid to become a leading EU region by 2020.

Catalisti, the Spearhead Cluster Chemicals & Plastics has been launched by essenscia, more than 100 companies, all Flemish universities and the Flemish government. Its mission is to accelerate the transition towards sustainability by promoting open innovation, identifying, stimulating and catalysing innovations. It focuses on renewable chemicals, putting waste and sidestream to use, intensifying processes and advancing sustainable products. To that end, the Spearhead Cluster supports small, medium and large enterprises and knowledge institutions in defining, setting up and implementing innovation projects.

In Wallonia, the southern part of Belgium, socio-economic priorities were set out in the 2005 Marshall Plan, updated as Marshall.4.0. The Walloon government's Horizon 2022 focuses on industrial policy, including sustainable chemistry. GreenWin, its sustainable chemistry cluster brings together small and large enterprises, universities, research centres, training organizations and communities. GreenWin is organised around the life cycle of materials: development of sustainable products and materials; sustainable integration and implementation of materials and treatment and making best use of waste and waste-water. Wallonia was designated the EU executive among six "model demonstrator regions" to reinforce its strategy to lead in sustainable chemical production.

A second cluster, BioWin, brings together more than 100 health biotechnology and medical technology companies.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/belgium/>



## Bulgaria

### Bulgarian Chamber of Chemical Industry (BCCI)

Number of companies

**643**

Capital spending

**€214 million**

R&D investment

**€3.1 million**

Turnover

**€1.403 billion**

Direct employees

**13,500**

National contact



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### DESCRIPTION OF THE PRIORITY STATUS OF THE CHEMICAL SECTOR IN RELATION TO THE OVERALL INDUSTRY SECTOR RANKING OF THE REGIONS

The priority areas of the chemical sector in Bulgaria for the period 2020 are related to the development and implementation of new environmentally friendly technologies, producing chemical products needed on the market. Priority is given to the utilization of released now days wastes converting them to the secondary raw materials, minimizing emissions and saving energy resource.

### SITUATIONAL ANALYSIS OF THE CHEMICAL INDUSTRY

- The chemical industry in Bulgaria is important for the country, contributing to better productivity, gross domestic product (GDP) and a better external trade For selected products like soda ash, mineral fertilizers, petrochemicals, cellulose and some others, the location is important for our country and for the chemical industry in the region. During year 2015 the export of chemical products increased with 22.5 % and is the highest rate in Bulgaria for all sectors. Soda ash, mineral fertilizers, fuels and cellulose have the main contribution about; Leading companies are Solvay Sodi, Lukoil-Neftochim, Agropolichim, Neochim, Svilosa and Orgachim.
- Production of chemical products contribute with 4.5% to the industrial output and 4.7% to the value add it; Production of rubber and plastics also have a positive trend and contribute to the add it value with 4.5% from the industry in the country.
- The sector in Bulgaria faces particular breakdowns related to employment and The average age of workers is



- climbing, requiring better education of students to compete better with previous generations of workers.
- Long-term co-operation between the Bulgarian Chamber of Chemical Industry (BCCI) and leading companies and Universities is a good precondition for better and more effective joint research pilot studies and development and implementation of new technologies in the practice.
- Grey economy, low administrative capacity and long term procedures of permits remain to be a problem for more effective way and progress in the sector.

## STRENGTHS AND WEAKNESSES OF THE EXISTING CHEMICAL INDUSTRY BASE

### Strengths

- The areas where the Bulgarian chemical industry is in an advantageous competitive position vis-à-vis the rest of Europe are soda products, fertilizers, fuels and motor oils, cellulose among others

### Weaknesses

- Shortage of domestically-produced oil and natural gas resources
- Specific energy consumption
- Low acceptance of chemical industry and products by the Bulgarian public and green NGO's
- Increasing legal pressure – taxes and fees; burdensome and too long procedures in Bulgaria
- Low level of recycling and utilization of plastics, paper and biodegradable wastes

## TOP NATIONAL STRATEGIES (PUBLIC OR PRIVATE) THAT ARE PUTTING THE MEMBER STATE IN A EUROPEAN/GLOBALLY ADVANTAGED POSITION

The top objective of the National Public Strategies is utilization of biomass from different sources – with the emphasis on wastes of different origin.

Expected and needed new products as a result of co-operation at national and EU-level are:

- New chlorine production using membrane technology – two sites were proposed, but not approved from state Authorities
- New Sulfur – containing complex fertilizers – still in development stage
- New Nano-products on organic and inorganic base – research studies
- New soil conditioners from industrial and agriculture wastes – already one example in the practice

## VALUES OF INDICATORS FOR 2015 IN BULGARIA – PRODUCTION OF CHEMICAL PRODUCTS (C-20)

- Number of companies – 643
- Added value (% of manufacturing) – 8.5%
- Turnover (euros bn) : 1.403
- Direct employment : 13 500 (2.6% from the number of workers in the manufacturing industry)
- Capital spending (euros bn) : 0.214
- R&D expenditure (euros billion) : 0.0031

**Source:** *National Statistical Institute for the period January-December 2015 - 2016*

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/bulgaria/>



## Croatia

### Croatian Chemical Industry Association / Udruženje kemijske industrije (UKI)

Number of companies

**333**

Turnover

**€779 million**

Direct employees

**5,717**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A tradition of chemistry

Croatia was the birthplace of two Nobel laureates in chemistry, Lavoslav Ružička and Vladimir Prelog. The industry has a long tradition here and an experienced and well-educated work force.

### Wide ranging expertise

Chemicals and pharmaceuticals, together with plastics and rubber processing are integral to the Croatian economy. Production spans pharmaceuticals, cosmetics, soaps, detergents, polymers, plastics and rubber products, fertilizers, agrochemicals, paints, varnishes and similar coatings, printing ink and fillers, industrial gases, glues and explosives.

Though the industry depends upon imported raw materials, it is well accepted by citizens, and there is good collaboration around investment new technologies and production to strengthen competitiveness.

### An important industrial sector

The chemical industry is concentrated around larger towns, especially Zagreb, and generated revenues of €779 million in Croatia in 2016, 3.9% of the manufacturing industry total. Its 333 companies employed 5,717 people. Pharmaceuticals employs another 4,602 across 51 companies that generated revenues of €907 million, 4.5% of the manufacturing industry total. Plastics and rubber had €707 million of revenues, in 2016, spread across 698 registered companies employing 7,762 workers.

## **Modernising fast**

Most companies, especially SMEs, serve the domestic market. They are busy restructuring and modernising production processes to meet European standards, reduce operating costs and achieve international quality certification.

## **A leading exporter**

Many companies, especially larger ones, are export-oriented. In 2016 chemicals were 5.2% (€643 million) of total Croatian exports, pharmaceuticals 7.3% (€898 million) and plastics and rubber 3% (€364 million).

## **HOW ARE WE DOING?**

### **Strengths**

- Long history and tradition
- Highly skilled work-force
- Advanced technology
- High-quality and price-competitive products
- Excellent geostrategic location within Europe with access to Central Europe, the Mediterranean and three Pan-European corridors.
- Seaports and most modern transport infrastructure in the region,
- Rising domestic demand

### **Weaknesses**

- Dependence on imported raw materials
- Uncertainty over fuel supplies
- High energy and logistic costs
- Lack of investment in new and innovative products
- Insufficient investment in marketing
- Inadequate links between companies and research institutions to develop new products and improve technology
- High cost of taxes, levies and utility charges
- Pressure to increase tax take from heavy public sector deficit
- Heavy administrative and regulatory burden

## **OUR CONTRIBUTION TO A COMPETITIVE EUROPE**

### **Using national initiative**

Two national initiatives, the Croatian Industrial Strategy 2014 - 2020 and the Croatian Smart Specialisation Strategy, should help our industry increase competitiveness and innovation, thereby retaining or creating jobs.

### **Collaborating to innovate**

Universities and research institutes are working with industry organisations, under the umbrella of the Croatian Chamber of Economy, to strengthen co-operation between science and our industry sectors to increase competitiveness.

### **Opportunities for Growth**

There are many opportunities for growth of the chemical industry in Croatia. Consumption of most chemical products per capita in Croatia has not yet reached EU levels. The production structure of the chemical industry should be changed to boost the competitiveness of the Croatian chemical industry, and to move toward the production of high value added products. Our assets are a highly skilled labour force supported by good scientists and an excellent geostrategic location.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/croatia/>



## Czech Republic

Association of Chemical Association of the Czech Republic (SCHP CR)

Number of companies

**854**

Turnover

**€21.4 billion**

Direct employees

**124,142**

National contact



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### CHEMICAL INDUSTRY SNAPSHOT

#### The Republic's second-largest manufacturing industry

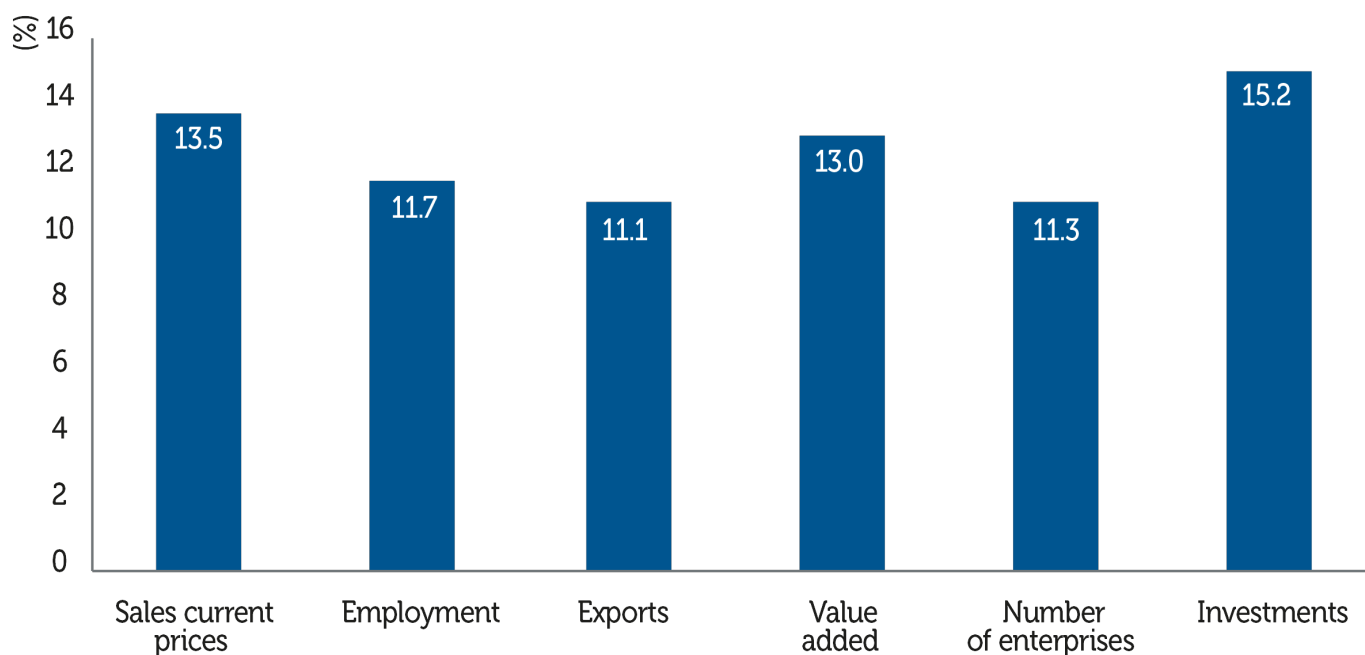
Chemicals are the second-largest manufacturing industry in the Czech Republic by sales, after automotive. The main chemical clusters are in North-West Bohemia, North Moravia and Central Bohemia, but plants can be found throughout the Republic.

The Czech chemical industry spans petroleum refining, chemicals, pharmaceuticals and rubber and plastics processing (NACE 192, 20, 21, 22).

#### From motor fuels to tyres

Products include motor fuels, heating oils, lubricants, paraffin and asphalt, inorganic and organic bulk chemicals, fertilizers, basic petrochemicals, plastics, synthetic resins and rubbers, as well as paints, dyestuffs and pigments, agrochemicals, pharmaceuticals, tyres and other rubber products.

## Shares of the chemical industry in key indicators of the Czech manufacturing industry in 2016



### A leading employer

In 2016 Czech chemical industry sales at current prices were €21.4 billion and the industry employed 124,142 people. But nevertheless chemical imports exceeded exports by €6.9 billion – a deficit that had increased by €1 billion year-on-year. In 2016, 854 chemical companies had more than 20 workers.

Annual investment were €1.1 billion, and Czech companies financed 50-70 % of R&D themselves, with the balance from EU and state funding. Collaboration between industry and academia is working well.

### HOW ARE WE DOING?

#### Strengths

- Well-educated workforce
- Strategic central European location
- Unique national pipeline network crude oil, motor fuels, ethylene, ethylbenzene
- Longstanding history of chemical production
- Ongoing investment
- A significant manufacturer of industrial and agricultural tires and plastic automotive parts

- Excellent cooperation between companies and unions

## Weaknesses

- Relatively high energy and input costs natural gas, electricity and water
- Dependence on imported raw materials, especially crude oil
- Burdensome Czech and EU legislation
- Insufficient waste recycling
- Poor scale economies

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The Czech Republic favours a market-led economy, enabled by framework conditions in energy, research, education, infrastructure and other areas. These are backed by a national Smart Specialisation strategy and 14 regional Smart Specialisation strategies.

## Industry leads

The Association of Chemical Industry of the Czech Republic promotes links with research and other industries via the Czech Technology Platform for Sustainable Chemistry; the Czech Technology Platform PLASTICS; and the Czech Bio Technology Platform. These Focus on new (nano) materials, effective and flexible processes, biotechnologies, renewable resources, bioplastics and recycling of plastics and other materials.

## Chasing added value

Opportunities for growth lie in the production of high value added products, notably nanomaterials, bioplastics, polymers, epoxy resins. There is scope for more polyethylene, polybutadiene and ethylbenzene capacity.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/czech-republic/>





## Denmark

### Procesindustrien (PI)

Number of companies    Turnover

**245**

**€5.5 billion**

Capital spending

Direct employees

**€3.2 billion**    **11,394**

R&D investment

**€415 million**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A growing and efficient leading industry

Denmark's chemical industry recorded sales of approximately €5.5 billion in 2016, up approximately 27% since 2000 and 0.5% compared to 2015, providing 5.74% of national industrial output and 6.1% of value added (€2.07 billion). Thanks to its high productivity and efficiency, its workforce is 4% of the manufacturing total.

### Led by exports

Since 2010, exports have grown 34% at current prices to reach 7% of export of Danish goods in 2016, and on average it has grown 5% in the same period. Approximately 65% of the Danish production is being exported.

### Driven by investment in intellectual property

In 2015, the total employment in the Danish chemical industry was 11,394 people and 245 companies, a reduction of 2,030 since 2000. The investment of €670 million in 2016 was approximately 8.2% of the industrial total. Nearly two-thirds (62%) was devoted to intellectual property (R&D).

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## HOW ARE WE DOING?

### Strengths

- High level of innovation
- Excellence on safety
- Strong environmental protection
- Well-educated workforce
- Outstanding quality

### Weaknesses

- Negative perceptions of the chemical industry and a tendency to supplement EU laws with national legislation
- High energy taxes
- State bureaucracy: obtaining consent to develop new or existing chemical production sites is difficult
- High labour costs
- Lack of competitiveness compared with Asia and other countries

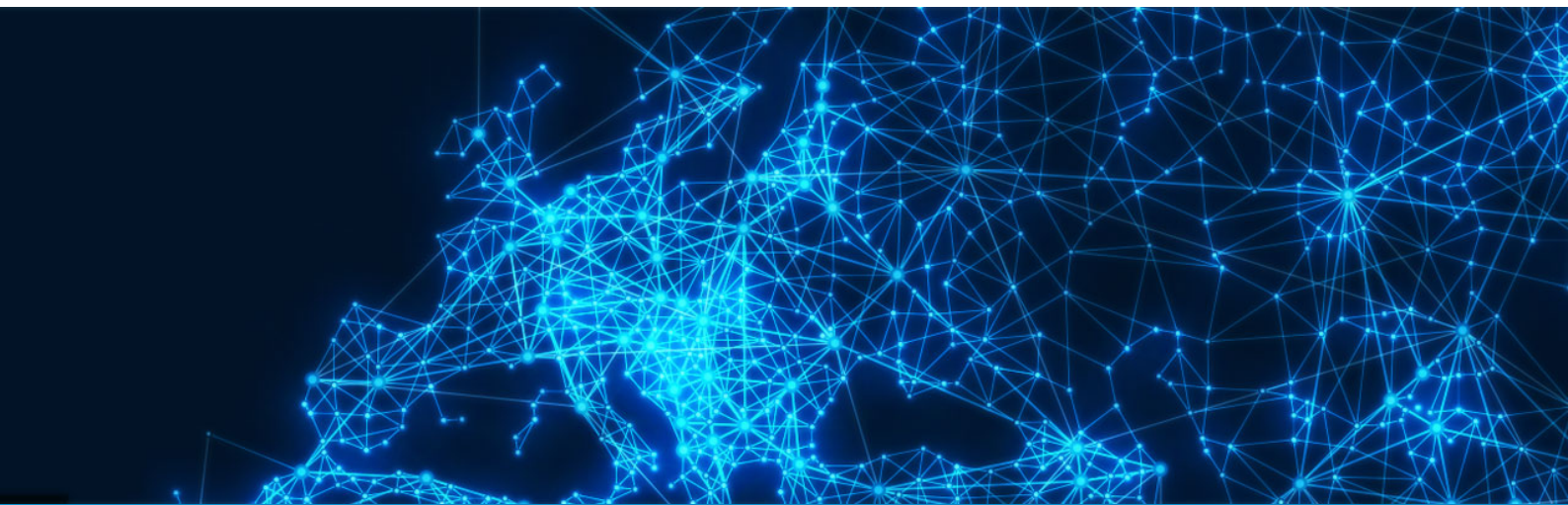
## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The Danish economy strengthened throughout 2015, reflected in rising GDP and an additional 66,000 private sector hirings since the 2012 turnaround.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/denmark/>



## EU28

### Cefic

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Number of companies    Turnover

**28,329**

**€507 billion**

Capital spending

Direct employees

**€21.7 billion**    **1,140,000**

R&D investment

**€9.1 billion**

National contact



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## A CORNERSTONE OF THE EUROPEAN ECONOMY

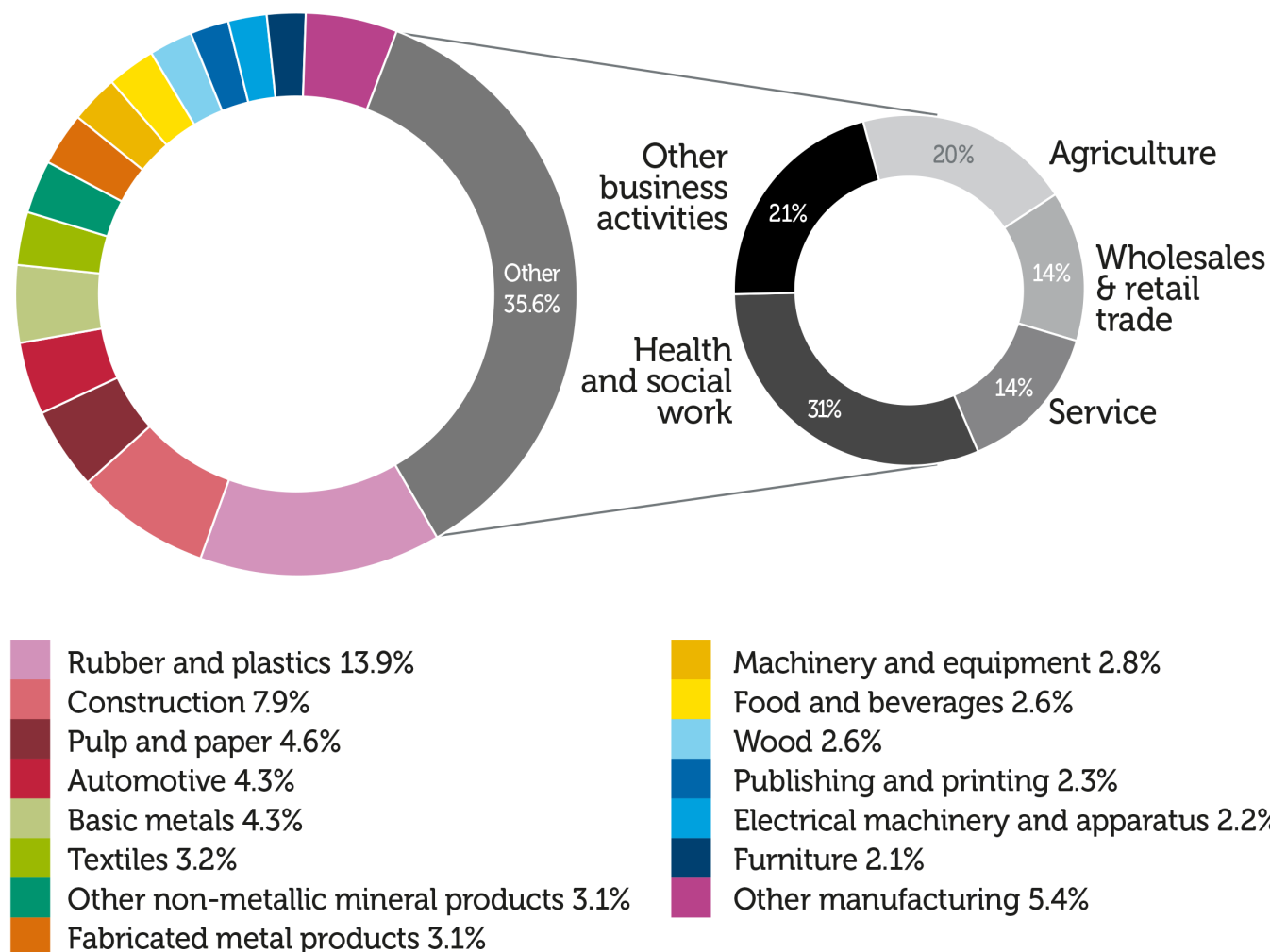
The European chemical industry is of major importance for economic development and wealth, providing modern products and materials and enabling solutions in virtually all sectors. It is a wealth generating sector of the economy, and a valuable part of Europe's economic infrastructure. It aims to provide solutions for the achievement of a competitive, low carbon and circular economy in Europe and beyond.

### Industry is the biggest customer for EU chemicals

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## Contribution of the chemical industry to the EU economy

### Customer sectors of the EU chemicals industry



Sources: Eurostat data (Input-Output 2000) and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU 28

## EU CHEMICAL INDUSTRY SNAPSHOT

The chemical industry generates 1.1 per cent of EU gross domestic product (GDP).

The European chemical industry is highly successful. Traditionally, it has been a world leader in chemicals production.

With 1.14 million workers and sales of €507 billion (2016), it is one of the largest industrial sectors and a leading source of direct and indirect employment in many regions.

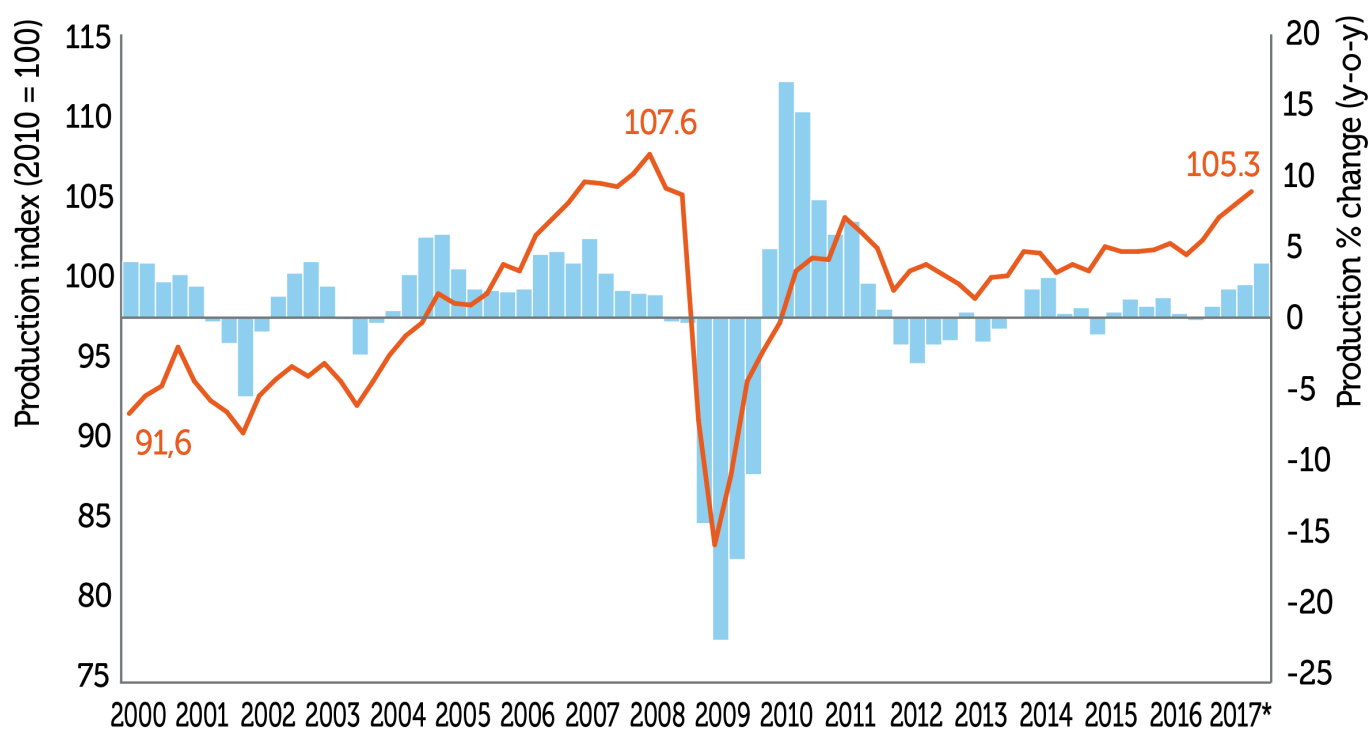
Cefic supports the Commission's goal for industry to contribute 20% of GDP by 2020. That's a bold ambition, not an absolute target. Today, industry contributes about 15% of GDP, and industrial investment is declining. As investment share in primary production falls, Europe is losing ground in technological capability, and European value chains are at risk.

## On a promising trend

According to EU Commission Business Survey data, chemicals confidence is far above the long-term average. Production in the EU chemicals sector grew 3.8% from January to November 2017 compared to the same period of 2016, with output rising in most chemicals sub-sectors. Chemicals output is still 1.5% below the first quarter of 2008 but close to that level.

## Closer to its pre-crisis level

### EU chemicals production growth



- EU chemicals production index (2010 = 100)
- EU chemicals production % change (y-o-y)

Source: Cefic Chemdata International 2016

\* Jan-June-2017, % change (y-o-y): 3.1

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Unless specified, EU refers to EU 28

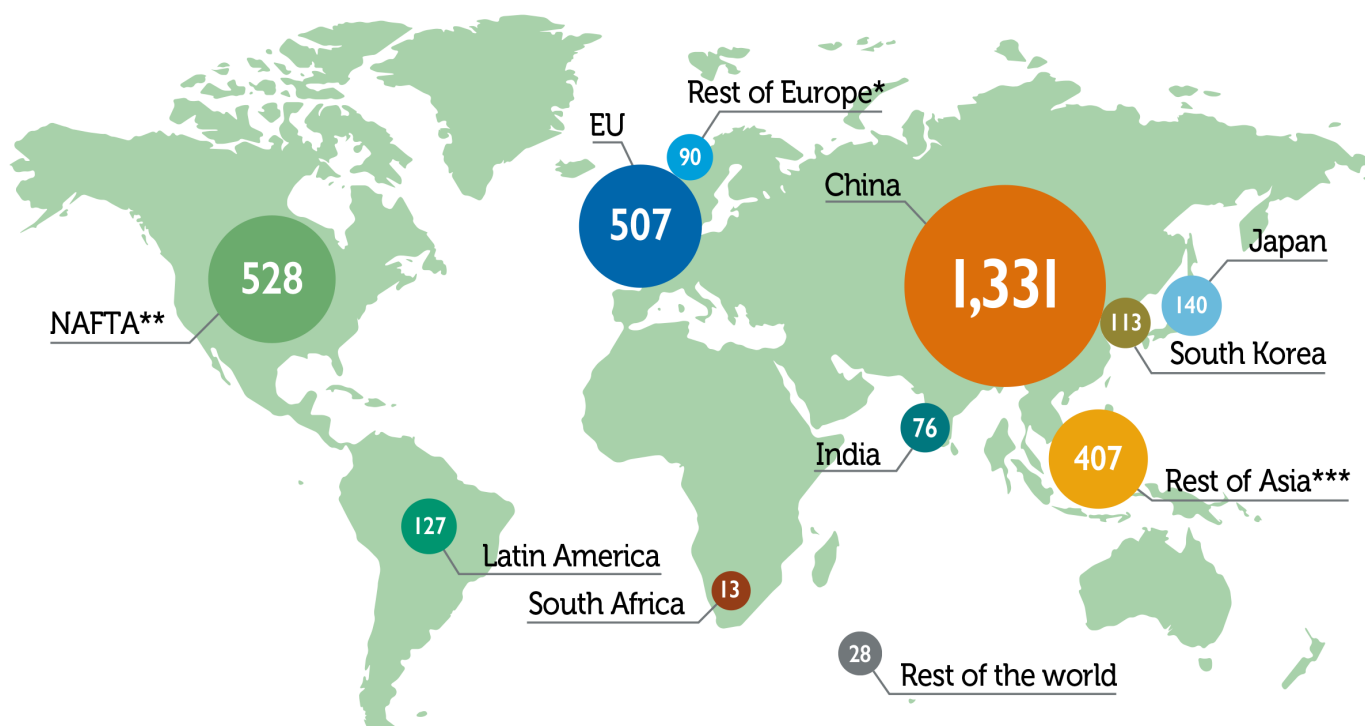
## ASIA RISING

World chemicals sales were €3,360 billion in 2016, up 0.4% from €3,347 billion in 2015. This is not spectacular growth. The modest recovery was largely driven by China, where chemicals surged by €50.8 billion to reach €1,331 billion.

### Asia forges ahead

## World chemical sales: geographic breakdown

World chemicals sales (€3,360 billion in 2016)



Source: Cefic Chemdata International 2016

\* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine

\*\* North American Free Trade Agreement

\*\*\* Asia excluding China, India, Japan and South Korea

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

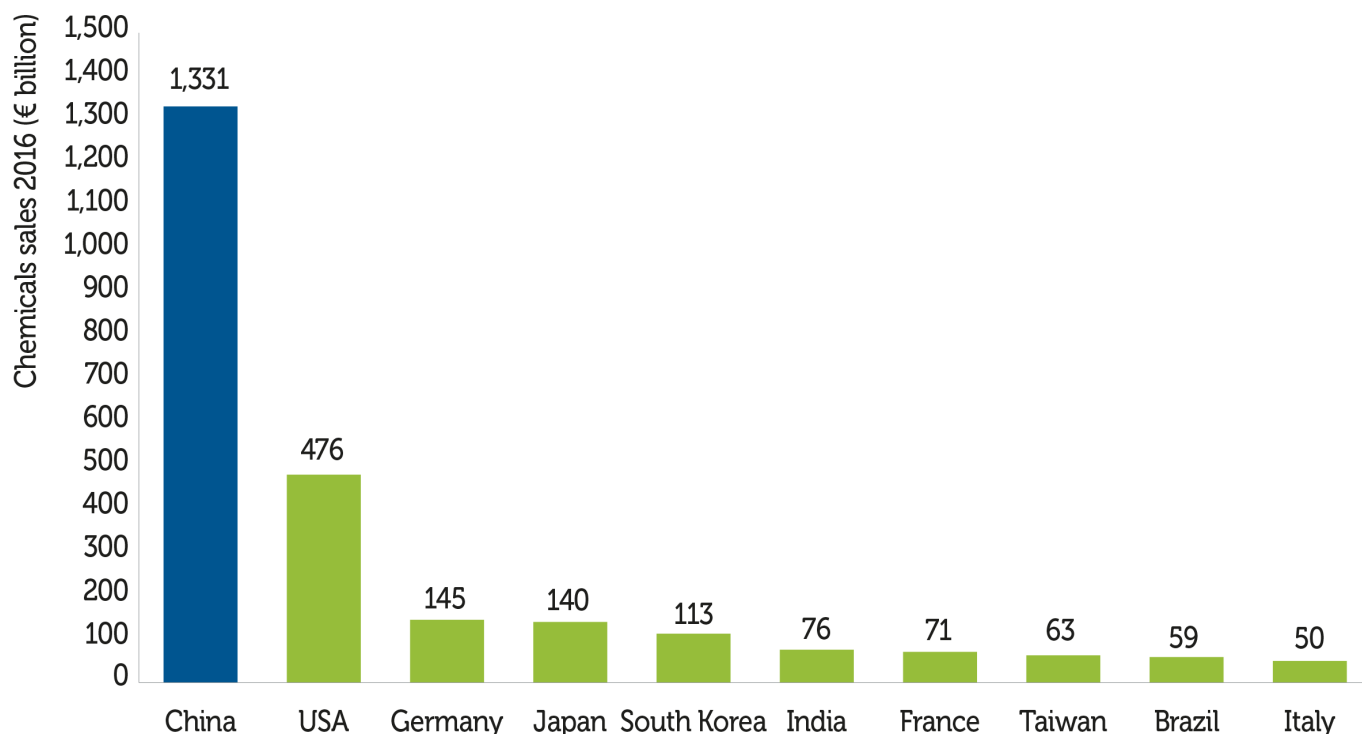
### Europe still strong on sales

The EU chemical industry ranks second by sales, a whisker ahead of the United States. Including non-EU countries, total European chemicals sales reached €597 billion in 2016, or 17.8 per cent of world output. But China has leapfrogged Europe to top global sales ranking.

In 2016, sales from the 30 largest chemical-producing countries totalled €3,066 billion. Twelve of the top 30 were in Asia. Their €1,916 billion of sales contributed to top 30 chemicals sales and captured 57.0 per cent of world chemicals sales.

## China dominates chemicals world rankings

### Chemicals sales by country: top 10



Source: Cefic Chemdata International

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

## China plans ahead

The world landscape of the chemical industry is changing rapidly. China is planning an ambitious industrial policy strategy to take its chemical industry to the next stage of development – a strategy outlined in the “13th Five-Year Plan” on the Chinese petroleum and chemical industry. China is looking to move from “following the lead” to “taking the lead” and from a “big country” to a “great power” of the petroleum and chemical industry, leading on technology innovation and trade and prevailing in international markets.

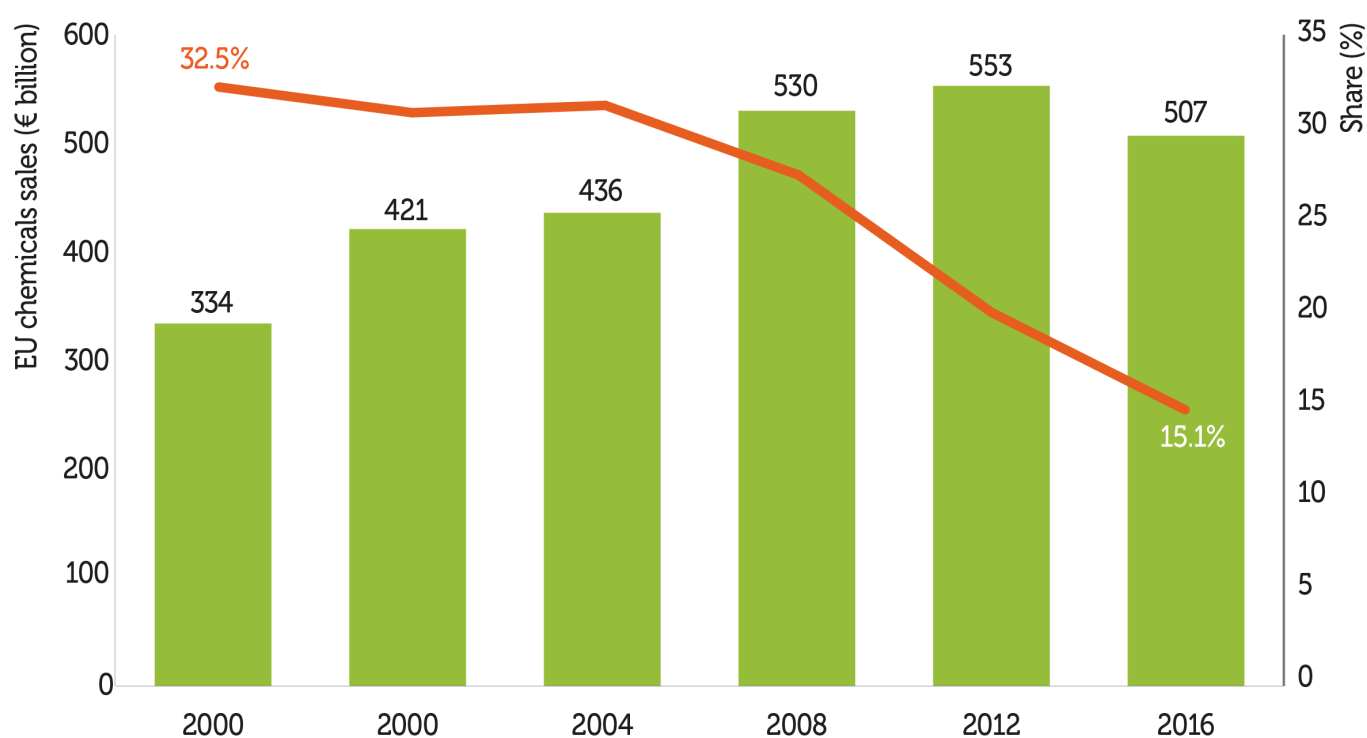
## THOUGH SALES ARE UP, EU MARKET SHARE HAS HALVED

The EU chemical industry’s share of world markets has declined in the past two decades. In 1996 EU industry sales were €334 billion – 32.5 per cent of world chemicals sales. EU chemicals sales have since grown by 52 per cent.

But worldwide, chemical sales have soared from €1,029 billion in 1996 to €3,360 billion in 2016. So the EU's market share has fallen to 15.1 per cent in 2016. This "dilution effect" looks set to continue. Demand for chemicals is growing strongly in China, India and other emerging countries but slowly in Europe and North America, where Europe sells most of its chemicals.

## A smaller share of a bigger cake

### EU share of global chemicals market



■ EU chemicals sales (€ billion)

— World share (%)

Source: Cefic Chemdata International

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## Losing competitiveness

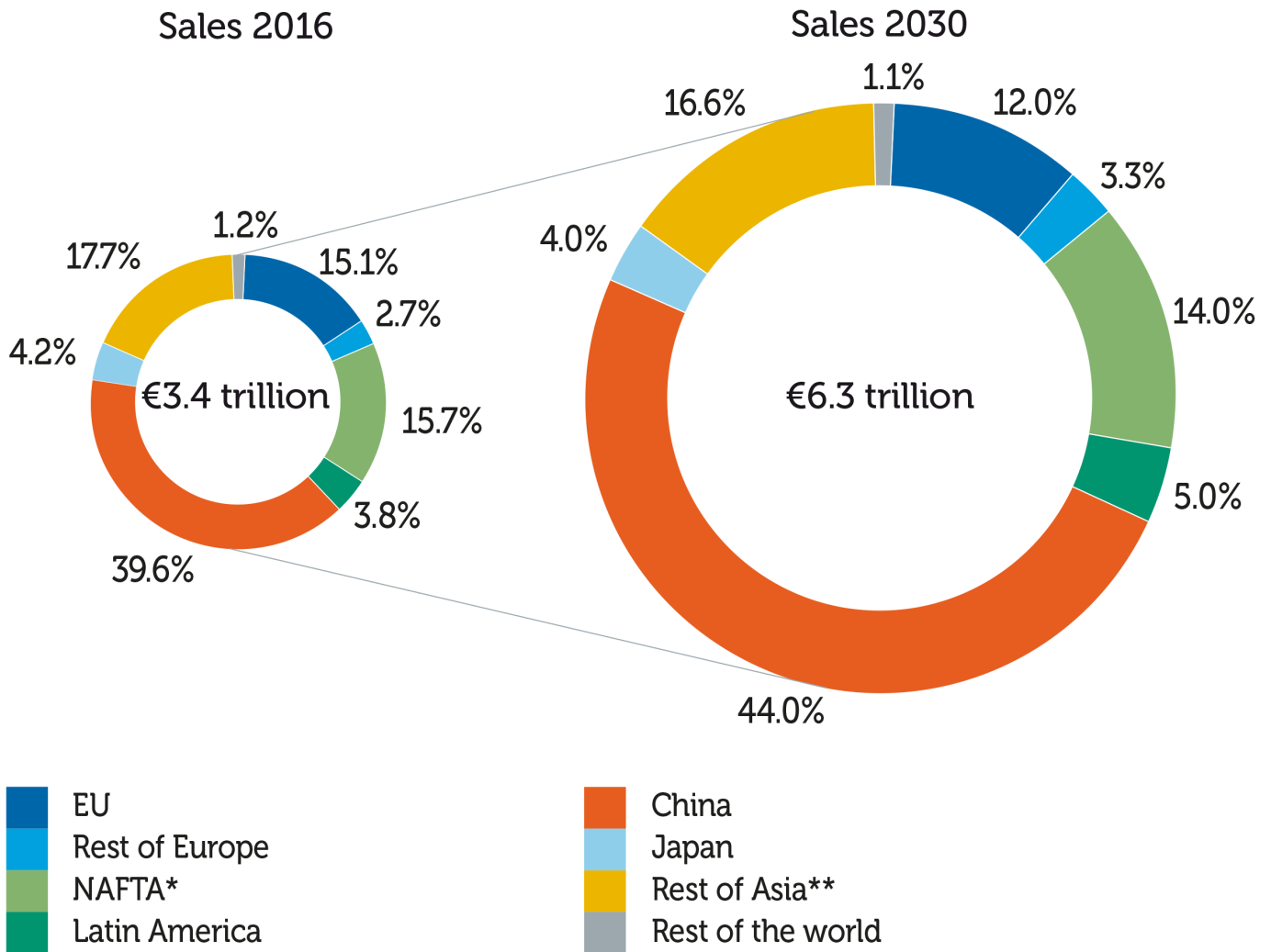
A study of EU chemical industry competitiveness commissioned by Cefic from Oxford Economics (2014) blamed high energy prices, currency appreciation, high labour costs, and regulatory and tax burdens, among other factors of the loss in competitiveness. Oxford Economics found that R&D intensity, energy prices and exchange rates strongly shaped competitiveness.



By 2030, world chemicals sales are expected to reach €6.3 trillion in 2030. But the EU chemical industry is expected to fall into third place, behind China, with 44% of the world market, and the US.

## A shrinking slice

### Projected growth in world chemicals sales 2016-2030



Source: Cefic Chemdata International 2016

\* North American Free Trade Agreement

\*\* Asia excluding China and Japan

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

## An export opportunity

Although competition in China's chemical market is intensifying and demand growing more weakly, China still offers a huge and attractive market both for chemical suppliers and their customer industries. In the medium-term, European

chemical producers are expected to benefit through increased exports or via local investments, thanks to their technological capabilities and innovative products, notably in consumer chemicals, automotive, electronics, food and nutrition.

### **THE EU REMAINS A NET EXPORTER OF CHEMICALS**

Trading chemicals around the world stimulates competition, provides an incentive to develop new markets through innovation, stimulates production efficiency and helps improve the quality of human life. Historically a big exporter, EU chemical industry achieved a significant extra-EU net trade surplus of €47.3 billion in 2016.

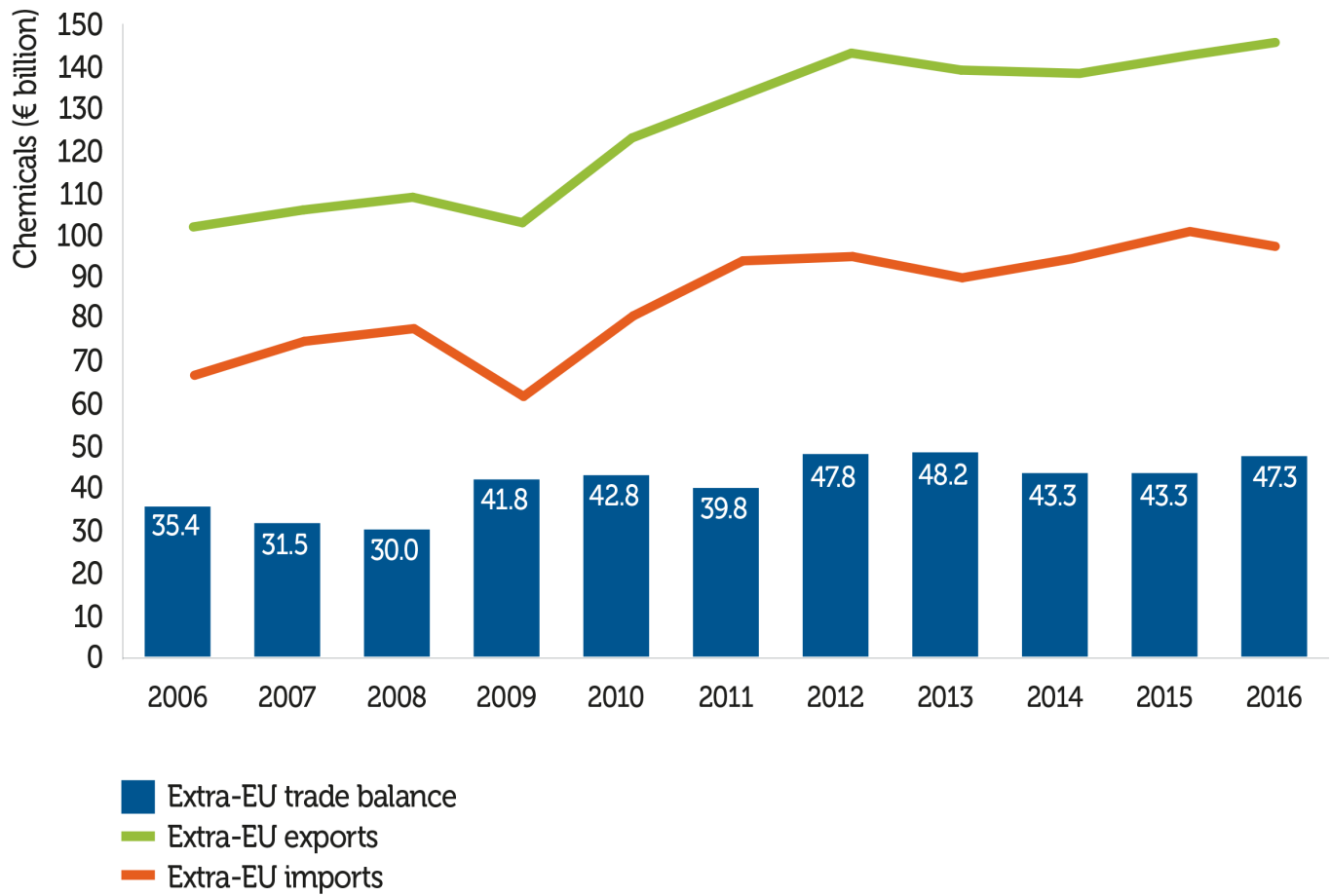
### **Trade agreements could open markets further**

Trade agreements with key partners such as the US, Mercosur and Japan would enable our industry to enhance efficiency and better exploit our technical strengths.

### **Trading benefits**

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## Extra-EU chemicals trade balance



Source: Cefic Chemdata International

Unless specified, chemical industry excludes pharmaceuticals

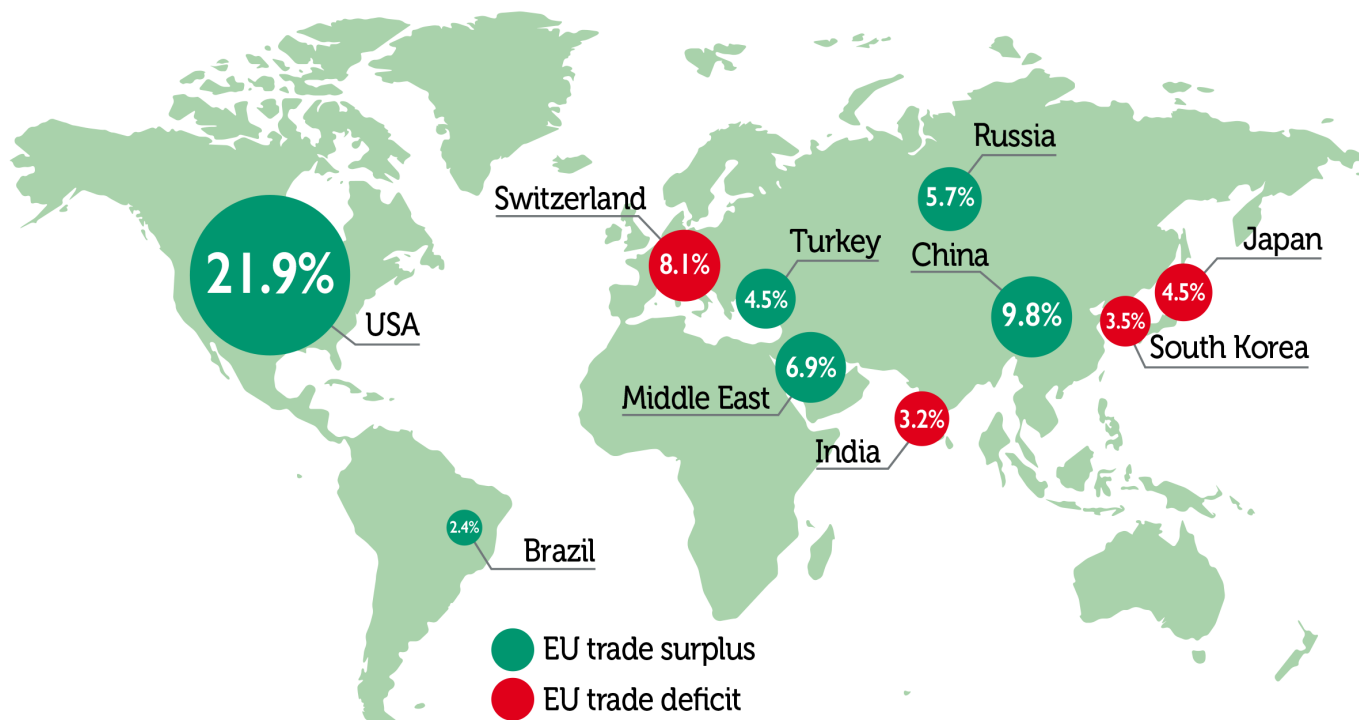
Unless specified, EU refers to EU 28

The flow of chemicals between the EU and its trading partners, calculated as total exports plus imports, was valued at nearly €245.2 billion in 2016. The US was by far the EU's biggest trading partner in chemicals in 2016, buying €30.6 billion of EU exports, and providing €23.0 billion of EU imports – nearly 22 per cent of total EU chemicals trade in 2016.

### Who buys what

## EU chemicals trade flows with top partners

Extra-EU chemicals trade 2016 (€245.2 billion)



Source: Cefic Chemdata International

\* Trade = exports + imports

Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU 28

### An emerging US energy advantage

Transatlantic trade flows are expected to change considerably in the next five years, because the US shale gas boom has triggered a massive build-up of new chemicals production capacity there. Any EU-US deal would therefore need to contain strong provisions regarding access for EU companies to US energy and feedstock.

Narrowing the gas price gap with the US is especially important for petrochemicals and polymers, which have lost global export competitiveness in the past decade because gas, used both as a feedstock and to provide energy for crackers, can account for as much as 60% of operating costs.

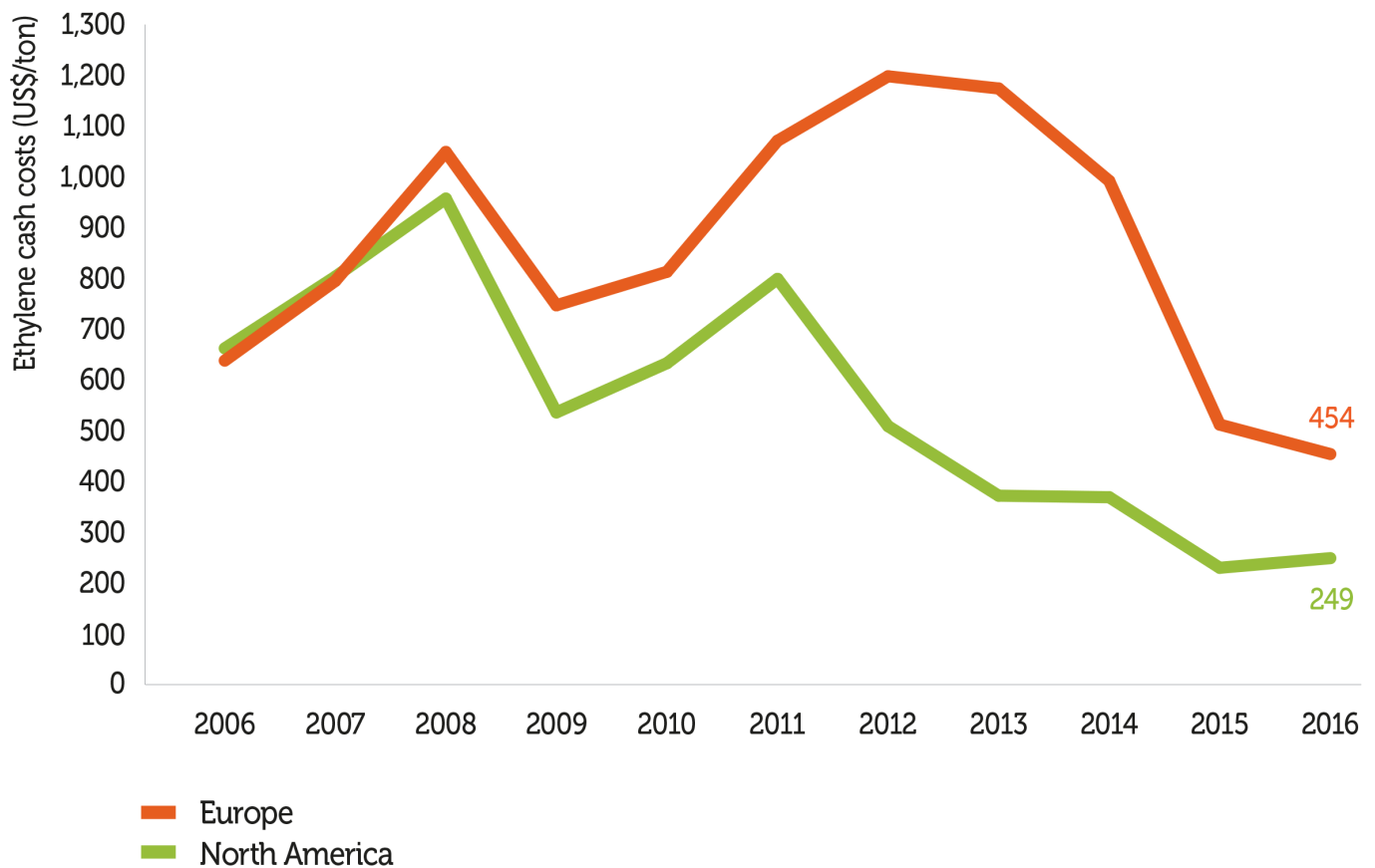
### Grasping Chinese opportunities

China is the EU's second-biggest chemicals trading partner, accounting for nearly 9 per cent of EU exports. China has become the most important growth market for global chemical companies and a major investment location. Though Chinese chemical companies are increasing their focus on specialty chemicals, the country will remain a major importer of commodity chemicals for some time to come.

## HIGH ENERGY COSTS IMPACT EUROPEAN COMPETITIVENESS

The chemical industry is energy-intensive and competes globally. Anything that increases energy costs in Europe relative to our competitors has a major impact on competitiveness. Rivals in the oil and gas-rich Middle East, and more recently the United States benefit from advantageous energy and feedstock prices. The shale gas boom in the United States has greatly reduced the cost of producing ethylene, a vital chemical industry building-block.

### Average ethylene cash costs in the EU versus North America (US\$/ton)



Sources: ICIS and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU 28

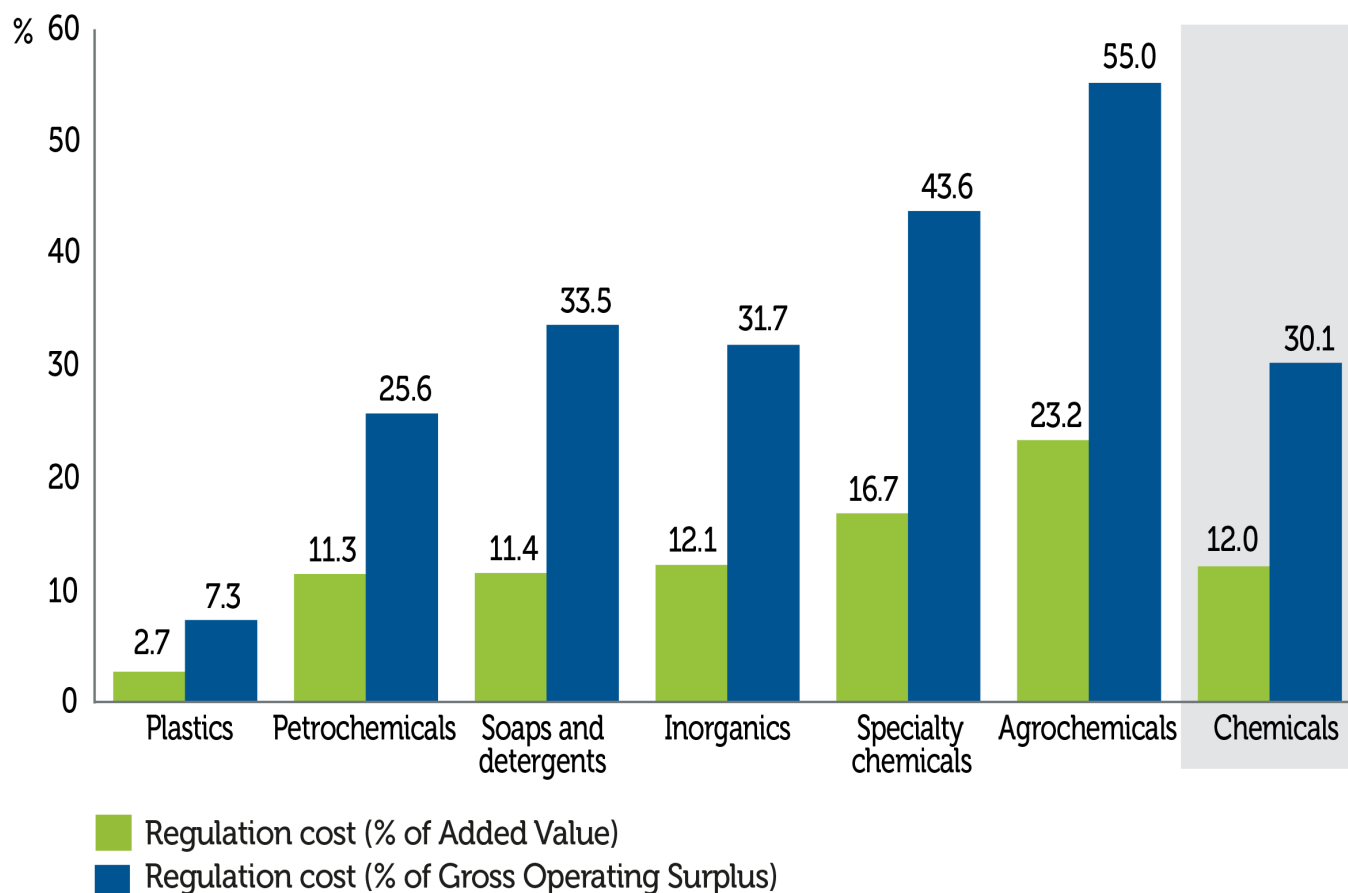
Ethylene is the foundation for production of plastics, detergents and coatings. In 2013, making ethylene in Europe was three times more expensive than in the US or the Middle East. This is boosting profits abroad and attracting billions of dollars in investment, including from European chemical companies. Falling oil prices have reduced EU costs, but EU producers remain at a cost disadvantage for producing base chemicals.

## REGULATORY COSTS HAMPER EU CHEMICALS

EU legislation adds many costs for the European chemical industry, hampering its international competitiveness.

Under the REFIT Programme, the European Commission has evaluated cumulative costs arising from existing EU legislation, to better understand how legislation affects the sector's international competitiveness, and help shape policy-making.

## Impact of regulatory cost\* on the chemicals sector



Source: EU Commission Report, "Cumulative Cost Assessment, (CCA) for the EU Chemical Industry" (11 July 2016)

\* Average cost per year (2004-2014)

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

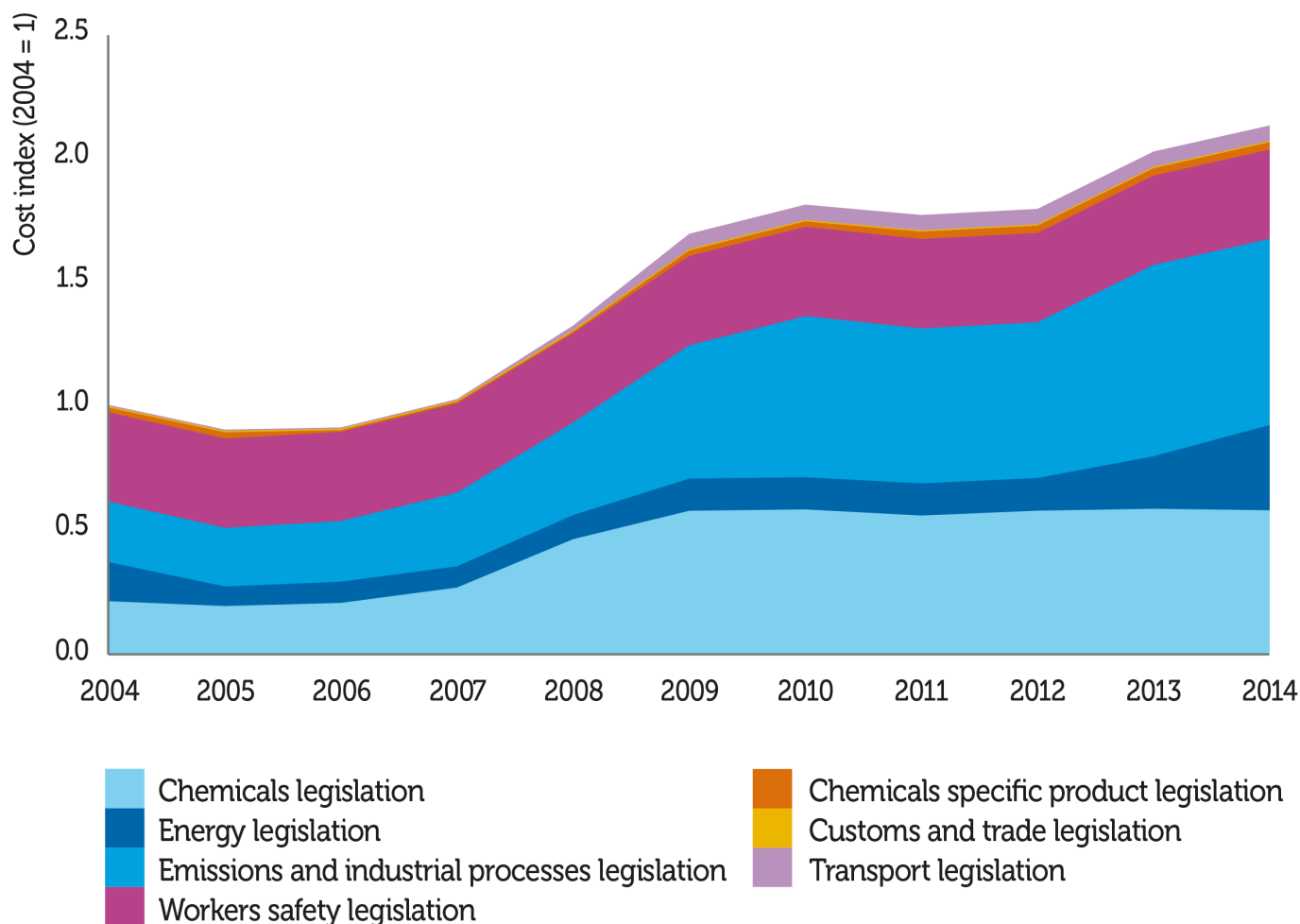
The Cumulative Cost Assessment (CCA) (July 2016) found that legislation cost companies in six subsectors €10 billion a year on average during 2004-2014. Regulatory costs were 12% of value added, and 30%, of Gross Operating Surplus (GOS), a proxy for profit.

The main drivers of regulatory cost are industrial emissions (33%), chemicals (30%) and worker safety (24%), together 87% of total regulatory costs. Costs ranged from 23.2% of value added in agrochemicals to 2.7% in plastics. In specialty chemicals regulatory costs were 16.7% of value added, for inorganic basic chemicals 12.1%, for organic basic chemicals 11.3% and for soaps and detergents 11.4%.

## EU REGULATORY COSTS DOUBLED IN A DECADE

During 2004-2014 compliance costs were driven up by the introduction of REACH regulations in 2007, CLP in 2008, investment ahead of Seveso III in 2012 and ETS Phase 3 in 2013. Energy legislation also contributes to the rising costs, especially after 2012.

### Legislation cost during the period 2004-2014



Source: EU Commission Report, "Cumulative Cost Assessment, (CCA) for the EU Chemical Industry" (11 July 2016)

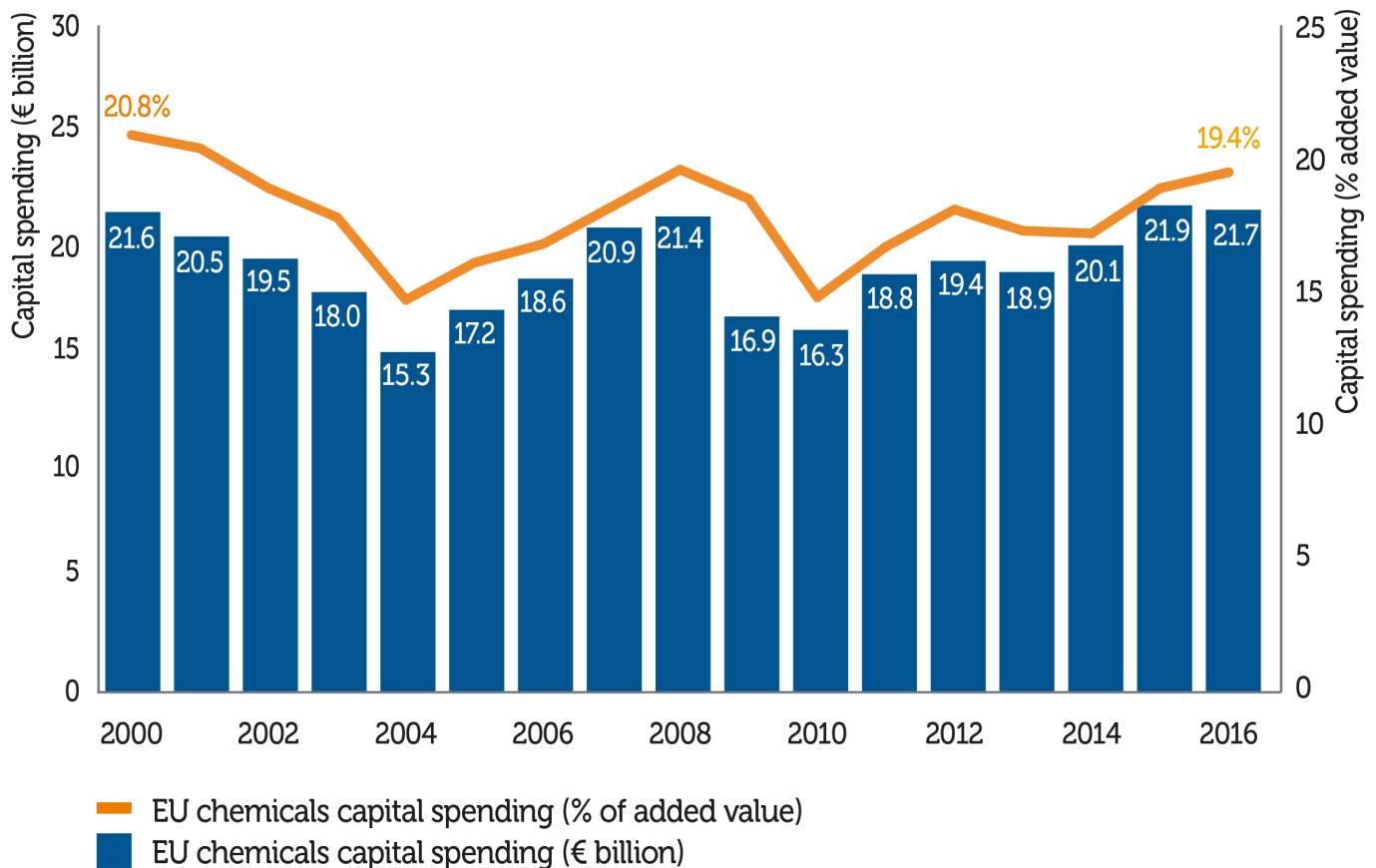
*Unless specified, chemical industry excludes pharmaceuticals  
Unless specified, EU refers to EU 28*

The Cumulative Cost Assessment (CCA) is a tool to show policy-makers the impact of regulation on the competitiveness of the European chemical industry. Simultaneously, the European Commission is conducting a Fitness Check on Chemical Legislation and has reviewed REACH. The aim is to ensure legislation is achieving its objectives in the most efficient way, and rectify any shortcomings without compromising health, safety and environmental protection.

Europe's chemical industry needs a regulatory framework that is fit for purpose, consistent, cost-effective and which does not negatively impact its competitiveness vs other regions.

## CAPITAL SPENDING INTENSITY REACHED THE HIGHEST LEVEL IN EIGHT YEARS

### Capital spending in the EU chemical industry



Source: Cefic Chemdata International

Unless specified, chemical industry excludes pharmaceuticals  
 Unless specified, EU refers to EU 28

Investment (in absolute figures) has been increasing from 2004 to 2008, registering a positive trend at a consistent pace. The year 2010, however, experienced a steep decline compared to 2008, down by nearly 24.0%. A gradual increase occurred from 2010 to 2015. The year 2016 posted a similar range of value on chemicals investment (€21.7 billion).

In relative terms, the ratio of capital spending to added value, or capital intensity, has been increasing gradually since 2010, reaching the value of 19.4% in 2016. This is the highest value on capital intensity observed since 2009. It is however below its record level of 20.8% registered in 2000.

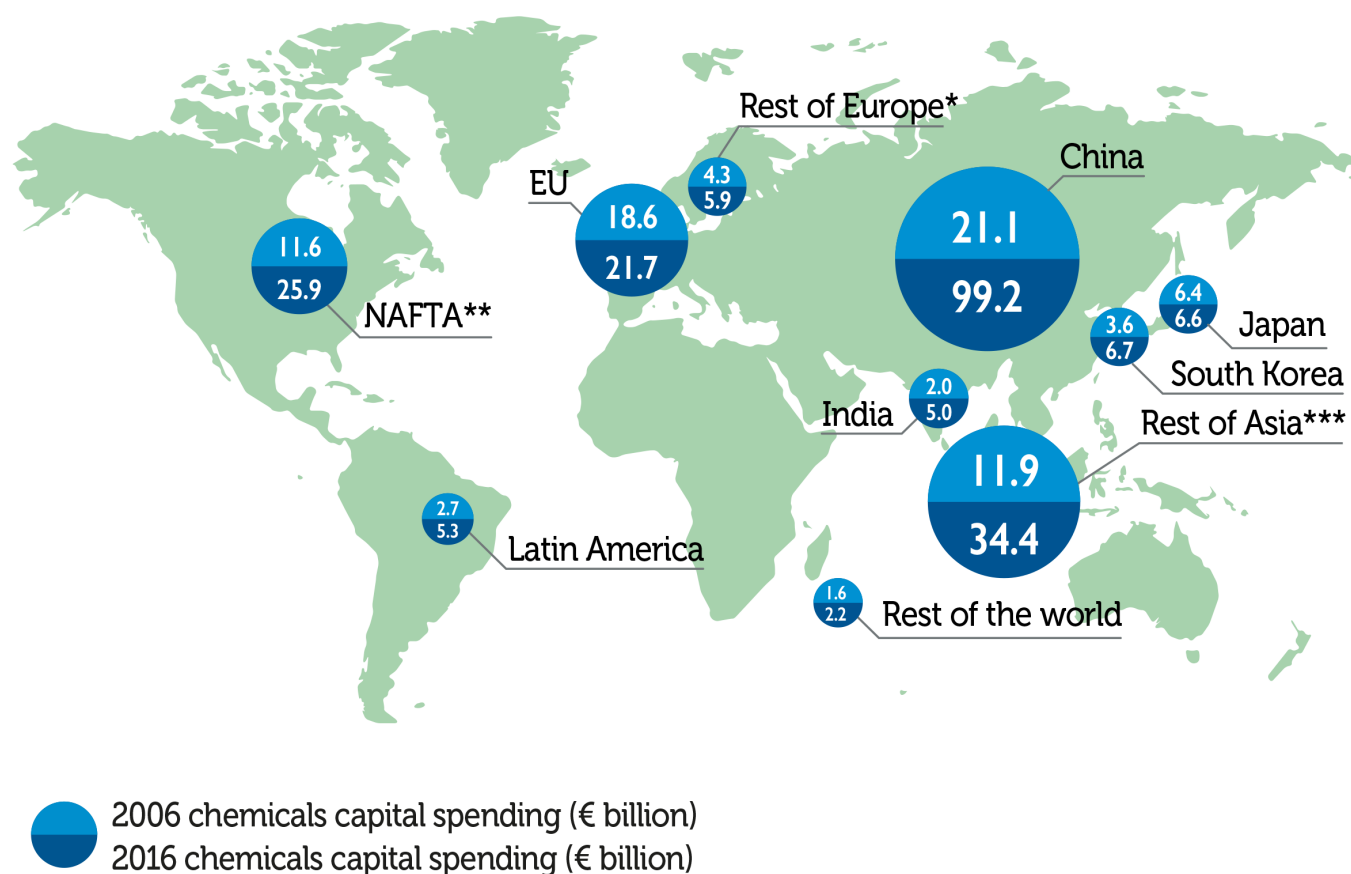
### Shifting investment abroad



Chemical companies in the world invested in 2016 a total value of €212.8 billion, up from €83.8 billion in 2006. On a global basis, the level of investment in the chemicals sector was 2.5 times higher in 2016 compared to ten years ago.

China is by far and away outpacing the other economies in the world. China contributed nearly 47% of global investment, up from 25% in 2006.

## Capital spending by region



Source: Cefic Chemdata International 2016

\* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine

\*\* North American Free Trade Agreement

\*\*\* Asia excluding China, India, Japan and South Korea

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

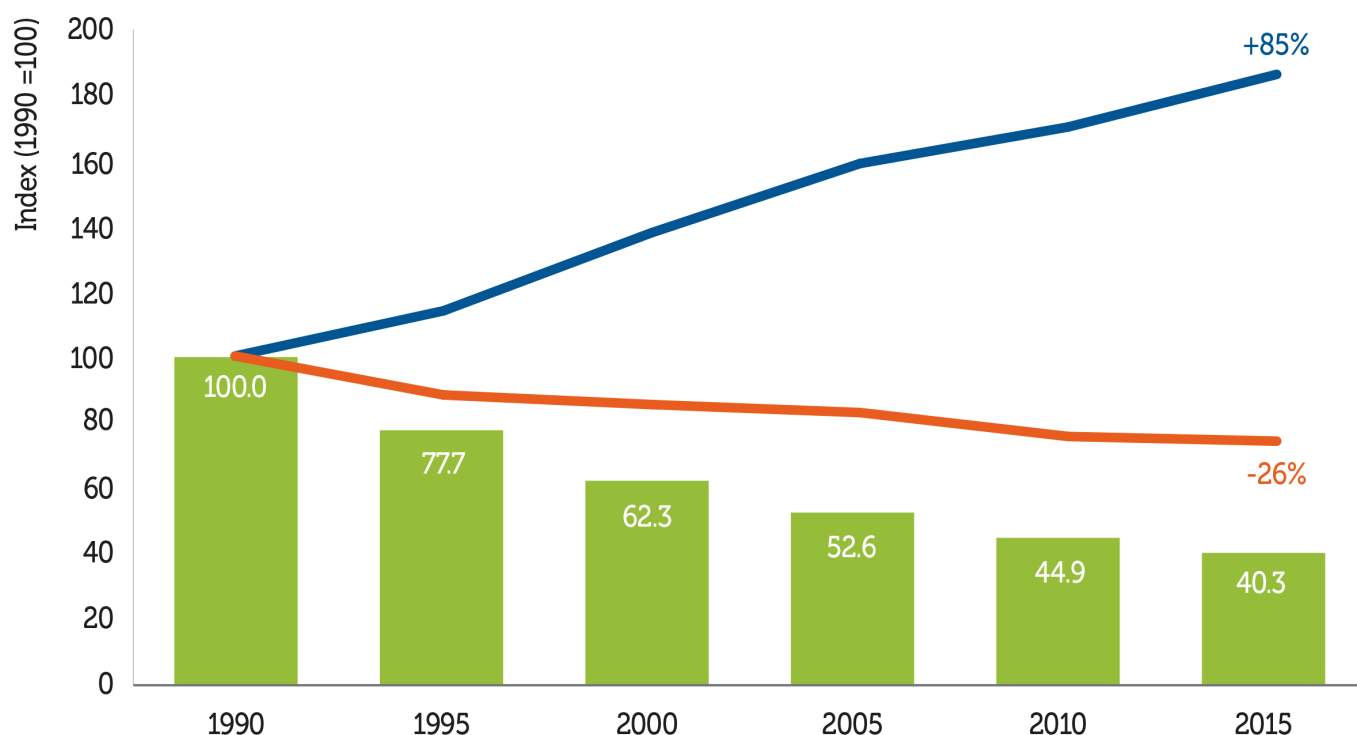
## EU CHEMICALS ENERGY EFFICIENCY DOUBLES

EU chemical producers, including pharmaceuticals have sharply reduced fuel and power energy consumption per unit of production. By 2015, energy intensity – energy consumption per unit of production – in the chemical industry, including pharmaceuticals, was 57.9 per cent lower than in 1990.

Further energy efficiency gains are subject to decreasing returns. Yet during the 25 years from 1990 to 2015 the industry increased output without raising energy inputs, lowering its energy intensity by an average of 3.6 per cent per year.

Improvements on energy efficiency have been spectacular during the first 15 years from 1990 to 2005. The past 10 years from 2005 to 2015 show moderate improvements.

## Energy intensity\* in the EU chemical industry



Average growth rate p.a. 1990 - 2015

- EU chemicals production index (2.5%)
- EU energy consumption index (-1.2%)
- EU energy intensity (-3.6%)

Source: Eurostat and Cefic Chemdata International 2016

\* Energy intensity is measured by energy input per unit of chemicals production (including pharmaceuticals)

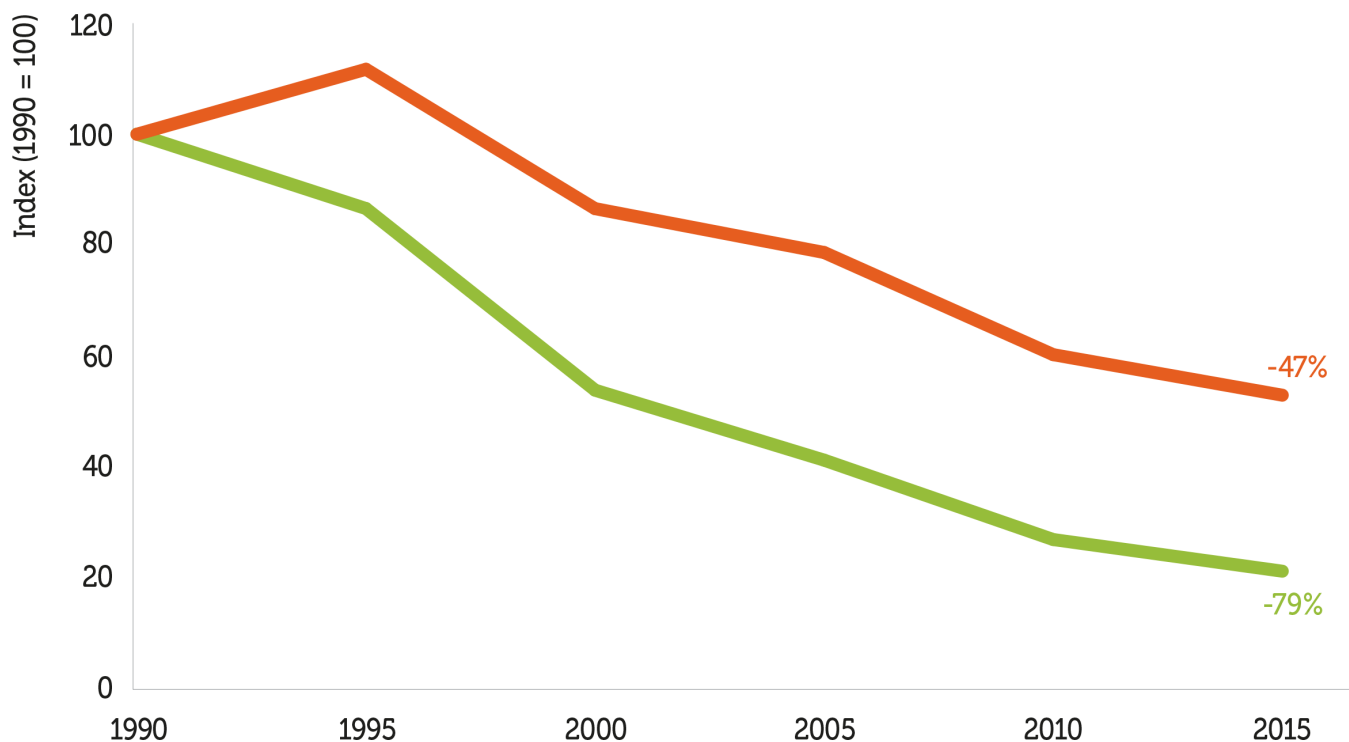
Unless specified, chemical industry excludes pharmaceuticals

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## ENHANCING ENVIRONMENTAL PERFORMANCE

Over the last two decades, the chemical industry, including pharmaceuticals, has made an enormous effort to minimise the environmental impact of its production. Greenhouse gas (GHG) emissions per unit of energy used fell 48 per cent between 1990 and 2015. GHG intensity - the GHG emissions per unit of production - was cut 79 per cent from 1990 to 2015.

## Greenhouse gas emissions per unit of energy consumption and per unit of production\*



- EU chemicals GHG\*\* emissions (per unit of energy consumption)
- EU chemicals GHG\*\* intensity (per unit of production)

Sources: European Environment Agency (EEA) and Cefic analysis

\* Including pharmaceuticals

\*\* GHG = Greenhouse gas

*Unless specified, chemical industry excludes pharmaceuticals*

*Unless specified, EU refers to EU 28*

**Please note that no figures are available for Cyprus, Luxembourg and Malta.**

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/eu/>



## Estonia

Federation of Estonian Chemical Industries / Eesti Keemiatööstuse Liit

Number of companies

**97**

Turnover

**€600 million**

Direct employees

**2,536**

National contact

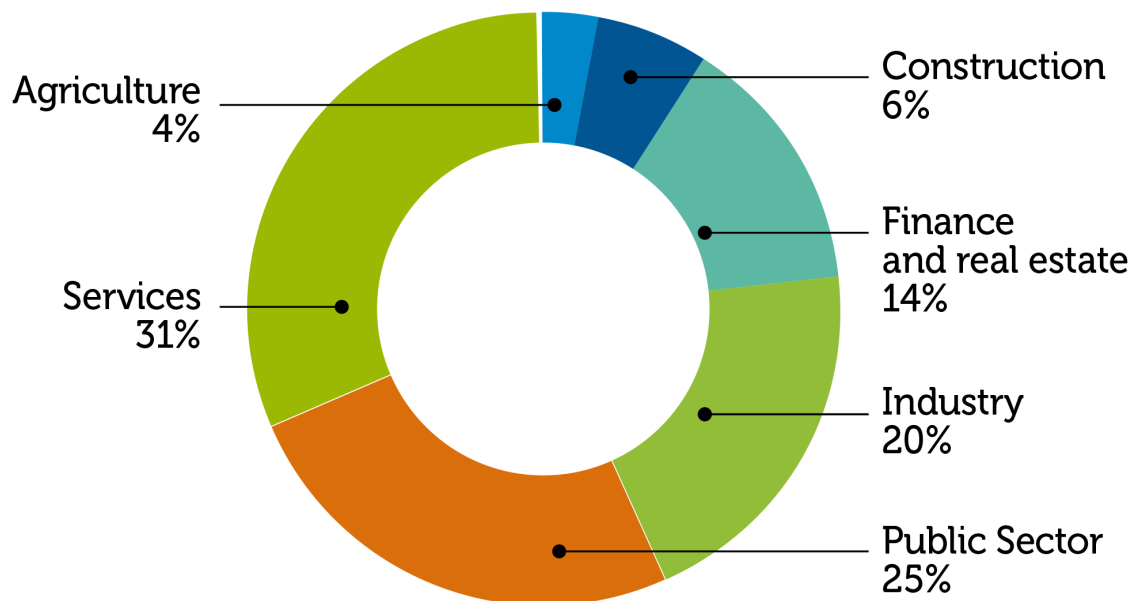


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### CHEMICAL INDUSTRY SNAPSHOT

The Estonian chemical industry is a small but export-oriented, well established and specialised sub-sector of Estonian industry. Overall industrial activities account for 20% of Estonian GDP. That share is higher than the European average, but at the same time well in line with the EU's 20/20/20 strategy, which in addition to well-known energy, resource and climate goals, sets a target for raising industry's contribution to EU GDP from 15.2% to 20% by 2020. In 2015, Estonian gross domestic product (GDP) was €20.48 billion in current prices.

### Estonian GDP Structure (2015)



The processing industry accounts for 74% of the whole industry sector. Chemicals and chemistry products account for 5.7% of the processing industry, contributing about 0.9% to GDP.

It must be noted that the Estonian Statistics Office considers the production of shale oil under the “fuel oils production” sector, so the shale oil contribution to GDP is viewed separately from chemicals. However, all shale oil producing companies in Estonia need to comply with the EU chemicals regulatory framework and are, therefore, members of the Federation of Estonian Chemical Industries (FECI).

The chemical industry has a high growth potential and is one of the most competitive industry sectors in Estonia. Traditionally, the export share of Estonian chemical companies’ sales has been high, accounting for 66.9% in 2016. Based on turnover, the productivity and output rate per worker are among the highest compared to other industry sectors.

### SITUATIONAL ANALYSIS OF THE CHEMICAL INDUSTRY

The Estonian chemical industry is characterised by strong territorial concentration, as more than half of the chemical industry is located in one county: East-Viru. This results from tradition and development possibilities of that region.

Two important chemical sub-sectors are characteristically specific to the Estonian chemical industry: oil shale chemistry and the producing of rare earth metals and their oxides. Industrial production of Estonian shale oil was started in 1924. Producing oil from oil shale is a long-term tradition in Estonia, but a unique process in Europe. It

makes a remarkable contribution to the economy of the country.

The Estonian economy is characterised by a large share of small businesses, but the vast majority of sales are generated by the minority of big companies. This pattern is reflected by the chemical industry as well.

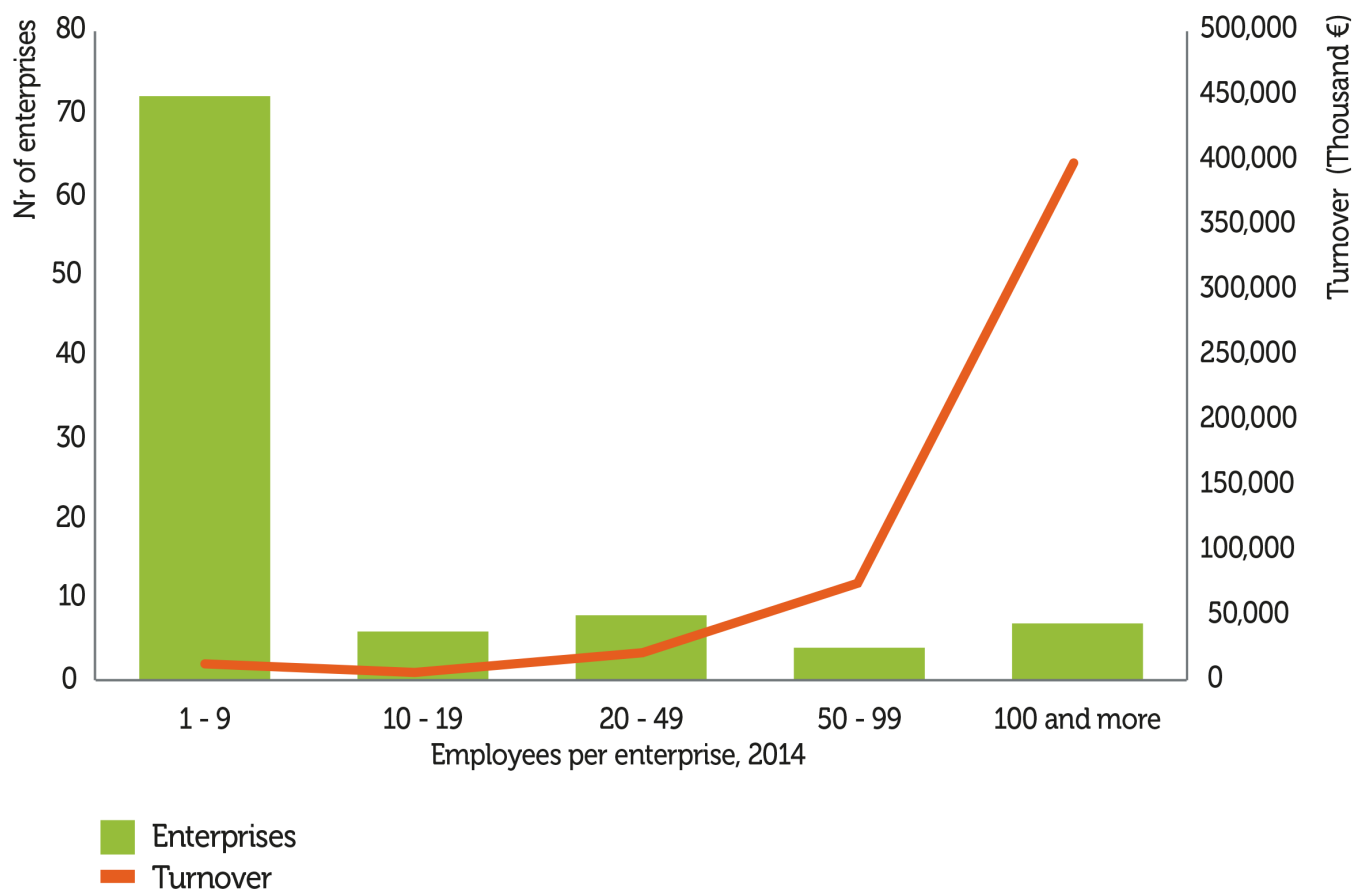
According to the Estonian Statistics Office, the total number of businesses in 2016 in Estonia was approximately 73,000. Among those, there were 97 companies in the chemical industry, only two of which had more than 250 employees. The number of employees in chemical industries was 2,536, accounting for 3.4% of the number of people employed in the processing industry. At the same time, sales account for 5.0%. The overall turnover of the chemical industry in 2016 was €600 million.

Again, it must be mentioned that the profile of FECl members is somewhat different than the national chemical industry defined by the statistics office. To that end, FECl has 55 member companies that employ approximately twice as many workers as the national chemical industry.

Export success comes mostly from East-Viru county, where the main export articles are shale oil and - phenols, benzoic acid, sodium benzoate, and plasticizers, rare earth metals and their oxides; production of urea fertilizers has ceased.

Producers of construction chemicals, namely sealants and construction adhesives, play a big role in chemical product exports. Export volumes of applied chemistry are more modest, but Estonia has a long experience in producing cosmetics and applied chemistry such as home care products.

## Production of chemicals: structure of enterprises and their turnover



	Export, € million				Import, € million			
	2010	2013	2014	2015	2010	2013	2014	2015
Goods in total	8,743	12,288	12,083	11,627	9,268	13,903	13,776	13,084
Goods of chemical industry and related sectors (includes pharmaceuticals and explosives)	395	703	601	548	735	1,084	1,111	1,082
Share of chemicals exports/imports in total exports/imports	4.5%	5.7%	5.0%	4.7%	7.9%	7.8%	8.1%	8.3%

Source: Estonian Statistics Office, [www.stat.ee](http://www.stat.ee)

The Estonian chemical industry co-operates closely with research institutions, as the main universities in Estonia engaged in offering chemical and engineering education have appointed representative facilities that are direct members of the association (FECI).

## HOW ARE WE DOING?

### Strengths

- Success in niche markets
- Unique experience and knowledge as the only European manufacturer of rare earth metals and their oxides
- Leading producer of polyurethane foams globally

- Unique natural resource in the form of oil shale and concentrated, unmatched know-how in shale oil production – in addition to serving as an excellent export article, this industry branch significantly contributes to keeping Estonia's place as one of the few energy independent countries in the EU and to enhancing R&D by creating needs and appliances
- Opportunity-offering location: port connections to Europe; borderline of Europe and wide Russian market
- Good quality-cost relationship of the workforce

## Weaknesses

- High average age of chemical industry workforce and chemistry researchers in Estonian universities, making it necessary to find younger employees and scientists to allow for sustainability
- High and increasing energy prices; no incentives for energy-intensive industries
- Complex and burdensome EU legislation and a tendency to supplement EU legislation with national fees in the environmental taxation sector are placing additional financial burdens on the Estonian chemical industry
- High portion of indirect taxes and tendency to make unexpected changes in the tax system creates uncertainties and discourages long-term investments
- Lack and/or fragmented structure of support to SMEs to ensure that the growing regulatory burden does not hurt their competitiveness and that access to competence in R&D – intensive industry branches is available for SMEs
- Estonian model of creating added value places a relatively large burden on the environment in terms of CO<sub>2</sub> efficiency and material productivity

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

For the first time, Estonia is developing a specific industrial policy. The government has recognized the importance and potential of the industry sector and as the first action point developing industry's Green Paper in cooperation with all relevant stakeholders including FECI.

## Present and Future Prospects

Due to the depth of scientific research on oil shale and resources of good quality oil shale, this branch of industry should be the key sector for the development of the Estonian economy. In order to cope with increasingly stringent local and European Union environmental regulations and to ensure a competitive chemical industry for Estonia, a supportive economic environment is needed. This is especially important in the situation of unpredictable factitious oil market resulting in unnaturally low oil prices.

Additionally, there is a need for the preservation and development of the scientific potential of chemistry; preparing and educating needed chemists and specialists on chemical safety; and development activities of the chemical industry through new technologies and processes. These measures would ensure the preservation of production and export capability of chemicals and chemical products, and would improve the employment situation. It is necessary to acknowledge the key role of the chemical industry as a developer and enabler of "traditional" and "new, potentially bio-based, economy" in Estonian society. It is impossible to develop the economy and a whole society without knowledge of chemistry and the chemical industry.

In Estonia the smart specialisation strategy is compiled by the Ministry of Education and Research as well as the



Ministry of Economic Affairs and Communications. The aim of the strategy is to support contributions to growth in the research-intensity of the Estonian economy, enhancing collaboration between R&D institutions and companies. Furthermore, the support will help to raise the capabilities of R&D institutions to carry out applied research needed for business in smart specialisation growth areas.

The funding supports companies in commissioning necessary applied research or product development projects from universities or research institutions. FECl played an important role in getting the chemical industry recognised as an area with high growth potential. Three areas of growth were selected as a result of the Development Fund's analysis:

- Information and communications technology (ICT) horizontally via other sectors
- Health technologies and services
- Enhancement of resources

The sub-sectors under the last growth area include: entrepreneurs active in the areas of materials science or industry, endeavor to identify innovative construction options or seek opportunities for the more effective utilisation of oil shale in the chemical industry.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/estonia/>



## Finland

### Chemical Industry Federation of Finland

Number of companies

**400**

Capital spending

**€851 million**

R&D investment

**€429 million**

Turnover

**€19.7 billion**

Direct employees

**33,400**

National contact



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Director General  
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## CHEMICAL INDUSTRY SNAPSHOT

### A growing industry

With revenues of €19.7 billion in 2016 and €11.4 billion of exports in 2017, the chemical industry is Finland's second largest. It provides 20% of Finnish industrial output and exports.

### Driven by innovation

Finnish chemical companies drive and create growth through the introduction of new, innovative products and services. And the sector has become relatively more important as other industries, such as electronics and forest products, have declined.

### Ranging from oil refining to cosmetics

Output of the Finnish chemical industry ranges from chemicals and chemicals products, oil refining, pharmaceuticals, plastics and rubber products, paints and coatings, to detergents and cosmetics. Basic chemicals include water treatment chemicals, fertilizers, titanium dioxide and polyolefins.

### **Underpinning other sectors**

Chemicals are a vital enabler of other Finnish industrial sectors, notably machinery and metal products, electronics, and pulp and paper.

### **Clustering in the south and west**

The Finnish chemical industry directly employs approximately 33,400 people. There are major chemical clusters in Southern and Western Finland, in Porvoo (oil refining and petrochemicals), and the Turku area (pharmaceuticals, oil refining), while a high-tech chemical cluster is found further north at Kokkola.

### **Investing in renewal**

R&D spending hovers around €400 million and averages 2.0% of revenues.

Investment in the chemical industry, largely replacement investment, totalled approximately €851 million in 2017, making up 17% of Finnish manufacturing investment.

## **HOW ARE WE DOING?**

### **Strengths**

- Well-educated and highly skilled labour force
- Good collaboration with universities
- Very good research and university structure
- Good physical and social infrastructure
- Operational efficiency and safety
- Ability to satisfy sophisticated consumer demands
- Specialisation
- Strong mining industry potential
- Location next to Russian markets, knowledge of Russia
- Location next to Arctic sea routes, knowledge of the Arctic
- Small and compact market for testing
- Positive public attitude towards the industry

### **Weaknesses**

- High energy and logistics prices
- Location on the Northern edge of Europe
- Lack of road connection to Central Europe/reliance on sea transport
- Strong reliance on imported raw materials
- Pressure to increase taxes and fees due to public sector financial deficit

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## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Developing sustainability

Finland does not follow sectoral industrial policies. However, the chemical industry benefits from a national bio-economy strategy and growth strategies for health sector research, development and innovation activities (RDI), published in 2013. A roadmap for circular economy development is being prepared.

As an enabler of all other industrial sectors, the chemical industry is highly integrated into other sectors, and smart specialisation is a natural way for a small country such as Finland to compete and succeed amid global competition.

### Going green

Low-emission and renewable fuels, water treatment, closed industrial processes and use of waste-based raw materials all offer growth opportunities.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/finland/>



## France

### Union des Industries Chimiques (UIC)

Number of companies

**3,335**

Turnover

**€70 billion**

Direct employees

**165,000**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A key contributor to the French economy

The chemical industry is a key component of the French economy. Industry added value was estimated at €18.5 billion in 2017, more than 8% of the country's manufacturing added value, ranking chemicals third behind the food and beverages and metallurgy.

The chemical industry is a leading industrial exporter, first in front of aerospace. It accounts for more than 13% of total manufacturing exports and with a €8.6 billion trade surplus, chemicals ranks second only behind aerospace in its positive contribution to the national balance of trade.

### A leading employer

The chemical industry in France has 3,335 companies, of which 94% are SMEs and nearly 6,000 production sites. Its companies employ 165,000 people, 6% of French manufacturing workers, and generate 660,000 indirect jobs.

### Serving consumers too

French output ranges from basic chemicals to specialty and fine chemicals. The industry is strong in consumer chemicals, including soaps, detergents, cosmetics and perfumes.

The strategic role of the chemical industry in the development of a sustainable economy is clearly recognised by the French government and the Ministry of Industry.

## Chemical industry - key figures

Number of companies (2016)	Sales (2017)	Manufacturing industry contribution (2016)	Exports (2017)	International sales (2017)
3,335	€70 billion	8% of added value	€58.7 billion	> 80% of total
Direct employment (2017)	Indirect employment (2017)	R&D expenses (2015)	R&D personnel (2015)	Environment investments (2017)
165,000	660,000	€1.8 billion	12,870	7% of total chemical investments

## A major exporter

When fine chemicals for pharmaceuticals are included, the chemical industry generated turnover of €70 billion in 2017, more than 80% was exported. Around 62% of exports go elsewhere within the European Union.

## Investing in the future

Capital investment was €3.1 billion in 2017, equal to 17% of added value. Modernization, safety and environmental improvements accounted for 78% of the total.

Another €1.8 billion, around 10% of added value, was invested in research and development, nearly 8% of all French industrial research spending.

## Organised into competitive clusters

In France, 31 competitiveness clusters have links to chemicals and materials. Seven are totally or partially dedicated to chemicals:

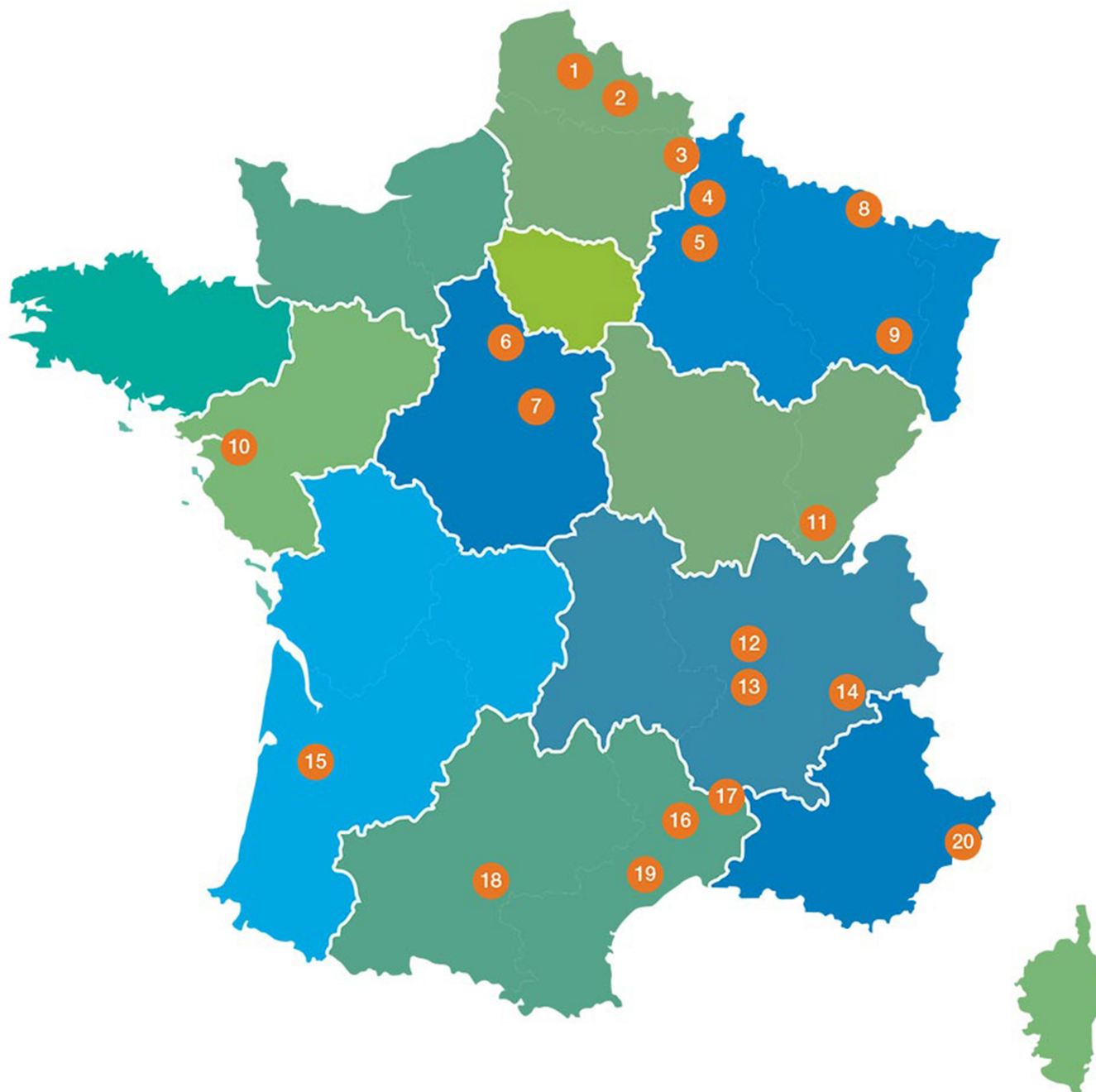
- AXELERA in Auvergne-Rhône-Alpes (Lyon)
- TRIMATEC in three regions: Languedoc-Roussillon, PACA and Auvergne-Rhône-Alpes
- IAR in Hauts de France
- XYLOFUTUR in Nouvelle Aquitaine (Bordeaux)
- ELASTOPOLE in Centre-Val de Loire

- MATIKEM in Hauts de France
- PLASTIPOLIS in Auvergne-Rhône-Alpes

UIC has signed a partnership with Axelera, Trimatec and IAR to speed up innovation sharing with companies, especially SMEs.

## Key chemical innovation clusters

Key innovation clusters specializing in the chemical industry by chemical regional associations



- |  |   |
|--|---|
| 1 MATIKEM<br>Cluster of competitiveness<br>Materials biobased              | 11 PLASTIPOLIS<br>Cluster of competitiveness<br>Chemistry/eco technologies                                |
| 2 IFMAS<br>ITE<br>Biobased materials/starch & derivatives                  | 12 AXELERA<br>Cluster of competitiveness<br>Chemistry/eco technologies                                    |
| 3 Pivert<br>ITE<br>Biorefineries/oil & forest biomass/biofuel              | 13 TECHTERA<br>Cluster of competitiveness<br>Materials/composites/textile                                 |
| 4 IAR<br>Cluster of competitiveness<br>Biorefinery/bioenergy/agromaterials | 14 TENERRDIS<br>Cluster of competitiveness<br>Biomass/hydrogen/fuel cells                                 |
| 5 ARD<br>Biodemonstration platform<br>Sugar                                | 15 XYLOFUTUR<br>Cluster of competitiveness<br>Wood for materials  |
| 6 COSMETIC VALLEY<br>Cluster of competitiveness<br>Cosmetics & Perfumery   | 16 EAU<br>Cluster of competitiveness<br>Used water recycling/eco technologies                             |
| 7 ELASTOPOLE<br>Cluster of competitiveness<br>Rubbers & polymers           | 17 TRIMATEC<br>Cluster of competitiveness<br>Clean and non-detrimental processes<br>for industrial sector |
| 8 MATERIALIA<br>Cluster of competitiveness<br>Nanomaterials/composites     | 18 AGRIMIP INNOVATION<br>Cluster of competitiveness<br>Agromaterials                                      |
| 9 FIBRES<br>Cluster of competitiveness<br>Agromaterials/wood               | 19 GREENSTARS<br>ITE<br>Biorefinery/algae   |
| 10 IRT JULES VERNE<br>IRT<br>Composite                                     | 20 PASS<br>Cluster of competitiveness<br>Plants extraction/flavors  |

## AUVERGNE-RHONE-ALPES

- 1<sup>st</sup> for the production of chemicals in France
- 2<sup>nd</sup> in terms of employment
- More than 700 private companies
- 32,000 people directly employed and more than 100,000 associated
- Leading sector for exports
- 25% of French chemical research

## Strengths

- Strategic location between Northern and Southern Europe and good local transport links and connections to the Swiss, Italian and German markets
- Main olefin provider with refinery and steam-cracker plants
- Concentration of major and international groups (Arkema, BASF, Bayer, Solvay,... ) with their production sites



- and research centers and many mid-cap, small and start-up companies
- Major chemical platforms as Les Roches-Roussillon, French leader in mineral and organic products and Grenoble expertise in Chlorine, phosgene and hydrogen, ...
- Top competitiveness boosters and world-class clusters for chemistry and incidental activities as Axelera, Lyonbiopôle, Plastipolis, Tenerrdis, Trimatec, Techtera...: Science & Engineering, public/private research organization studying. Collaborative platforms for innovative R&D projects as Axel'one
- Universities and engineering schools in Lyon, Grenoble, St-Etienne and Clermont-Ferrand

### NORMANDY

- 13,000 direct jobs in the chemical industry
- 80% of national oil and additives production (40% of European production), 25% of olefins and 50% of plastics and elastomers
- Europe's leading fertilizer producer
- 2nd largest producing region of medicinal chemistry products in France
- €2.5 billion invested over the last eight years to improve production and meet new environmental standards
- 1st industry exporter in the region: chemicals represent more than 20% of regional exports

The chemical industry is a key sector of the regional economy.

### Strengths

- Involved in every sector of the value chain
- Highly specialised companies in petrochemicals, additives & lubricants and crop-protection
- Highly efficient port at Le Havre – Europe's fifth-largest
- Global companies including Total, Exxon Mobil, Arkema and BASF, backed by SMEs
- Development of two industrial and chemical platforms
- Sustained innovation via Nov&atech (plant chemistry) and Nov@log (logistics competitive cluster)
- Public and private stakeholders support further industrialization

### PROVENCE-ALPES-COTE D'AZUR

- 3.3% of regional GDP and 30% of regional exports
- 3rd largest region for jobs with 16,500 workers
- About 410 private companies, of which 80% are SMEs
- Port of Marseille, a gateway to Mediterranean markets

Marseille/Etang de Berre is a major cluster for liquid bulk hydrocarbons and chemicals. Demand benefits from the growth of aerospace, energy and micro-electronics.

Further east Grasse is a long-standing centre for fragrances, whose rapid growth is driven by luxury sector and demand for bio-sourced raw materials.

### Strengths

- 3 chemicals parks with international scale chemical plants (PIICTO, Berre, Lavera)

- 5% of European olefins production
- Major chemical companies: Ineos, LyondellBasell, Kem'one, Total Petrochemicals and Arkema
- 40% of French capacity for chlorine and its derivatives
- Strong universities and research centre support focused green chemistry under a collaborative policy

Strengthening support among regional public authorities for chemicals to play a significant role in the regional post-carbon economy. Regional policy encourages the development of SMEs and supports clusters like NOVACHIM to develop the chemical industry and foster innovation.

A number of projects are being developed involving industrial symbiosis (e.g. Power to gas).

### **HAUTS DE FRANCE (formerly Nord-Pas-de-Calais and Picardie regions)**

- The leading industrial employer
- 492 enterprises – 13.7% of French employees
- 30,000 workers
- Global producers including Arkema, Dow Chemical Company, Procter & Gamble, BASF, L'Oréal, Roquette and SMEs
- Development of two industrial and chemical platforms (one operated by Weylchem Lamotte, another one operated by Arkema)

The chemical industry in Hauts de France is a key sector of the regional economy. Competitive and innovative, focused on high added value products, it contributes to the economic and industrial development and sustainable growth.

### **Strengths**

A strategic geographical situation. Sustained innovation with research centers (green chemistry) and world-class competitiveness clusters focused on chemicals and materials:

- Industries & Agro-Resources (IAR), the French bioeconomy cluster
- Bio refining Cluster I-Trans (Transports)
- UP'EX (textiles)
- Materialia (materials)
- MATIKEM (materials)
- A young population and universities, engineering schools, technical centres that partner with the chemical industry
- Sound infrastructure, logistics and multi-modal transport
- A large bio-mass potential of plant materials
- Innovation fostered by the development of a green chemical industry aided by sustainable chemicals with notably bio-chemistry institute PIVERT, the Oilseed Bio-refinery of the Future, and the BRI and IMPROVE platforms.

### **ILE DE FRANCE**

- 4,000 establishments of which 2/3 are small, medium and very small companies (SME/VSE)
- An increase of 15% of establishments between 2010 and 2016
- 54,000 employees of which 1/4 are from specialty chemistry
- More than 50% of women in managerial skills
- Dominant activities: cosmetics, chemical trade, treatment of special wastes

With Paris as its centre Ile-de-France benefits from the presence corporate offices, production sites and research centres. Arkema, Air Liquide, Solvay, PCAS, L'Oréal, BASF, Dow Chemical, Henkel, Bayer, and Total Petrochemicals are active in the region.

### Strengths

- High commitment to innovation
- Particularly active in Sustainable Development and Circular Economy
- Mainly focused on International
- Strong synergy between world-class universities and other laboratories fosters innovation, speeding development of green and environmental chemistry, notably CEA, CNRS and the Institut Pierre et Marie Curie
- World-class top education institutions, including Ecole Polytechnique, Chimie Paris Tech and Centrale

### HOW ARE WE DOING?

#### Strengths

- Large industrial market with global leaders in energy, transport, aerospace, perfumes and cosmetics and, water treatment
- Renowned environmental and process expertise
- High-capacity for innovation (R&D, financing system for innovation)
- A leader in bio-based chemistry
- Fiscal incentives, notably the research tax credit
- Highly educated young people and an effective training system
- A great location and transport infrastructure
- Nuclear energy and low GHG emissions
- Many SMEs, an innovative ecosystem and strong marketing and production

#### Weaknesses

- Dependence on imported raw materials
- Low acceptance of chemical industry and products by the French public
- Too many national regulatory initiatives regarding chemicals

### OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The French chemical industry's Strategy Committee for Chemicals and Materials, has drawn up a plan for:

- **Competitiveness** based on:
  - More innovation
  - Favourable economic, fiscal and regulatory conditions

- Long-term access to energy and raw materials at competitive prices
  - A supportive business environment for chemical, industry investment
  - Strong regional clusters
  - Integration of chemicals and materials into promising downstream industries, such as materials, composites and healthcare
- **Sustainability:** developing a sustainable economy focusing on renewable energy, resources and recycling
  - **Attractiveness:** offering more innovative products and technologies to customers, and aligning jobs and skills with industry prospects

### Smartening up

UIC leads the SusChem National Platform and helps SMEs participate in European projects, while helping them promote their products and know-how to big chemical companies, to aid innovation partnering. UIC promotes regional smart specialisation and international collaboration, and is closely involved on dedicated topics between different countries (example of Bioeconomy in Hauts de France).

So it can be underlined that representation of French chemical industries is very high in the EU's Horizon 2020 programme.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/france/>



## Germany

### Verband der Chemischen Industrie e.V. (VCI)

Number of companies

**2,000**

Capital spending

**€7.4 billion**

R&D investment

**€10.5 billion**

Turnover

**€184.7 billion**

Direct employees

**447,064**

National contact



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Director General  
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## CHEMICAL AND PHARMACEUTICAL INDUSTRY SNAPSHOT

### Third-largest industry in Germany

With a 2016 turnover of €184.7 billion, chemicals and pharmaceuticals are the third-largest industry in Germany, behind only automotive and machinery and equipment.

### Broad and strong

The German chemical industry is strong across all segments: basic inorganics, petrochemicals, polymers, agrochemicals, specialties, cosmetics and pharmaceuticals. It is also well spread across the country, although some regions are more specialised in basic chemicals, while others focus more on specialties or pharmaceuticals.

As an enabler of all other industrial sectors, the chemical industry has its role in all economic regions or clusters. To highlight just a few specific segments, technologies or regions would not be a suitable way to describe the strength of the German chemical industry.

The German chemical industry recovered quickly from the setbacks of the world economic crisis of 2008-2009,

surpassing its pre-crisis production peak in 2011. In 2016 nearly 2,000 companies partly organized in 40 Chemical Parks employed 447,064 people. With weak growth in Europe and emerging countries, output growth was low from 2012 to 2016. However, recovery started in 2017.

Development until 2030: A VCI Prognos study update *The German Chemical Industry in 2030*, predicts growth of 1.5% a year until 2030 for the German chemical industry. The most important trends affecting chemical and pharmaceutical industry are sustainability, digitalisation and circular economy as identified in the study *Chemistry 4.0* by VCI and Deloitte.

Areas of growth for the chemical industry lie in the topics addressed in the “High Tech-Strategy” of the Federal government. Due to digitalisation, process and organizational innovations are gaining in relative importance.

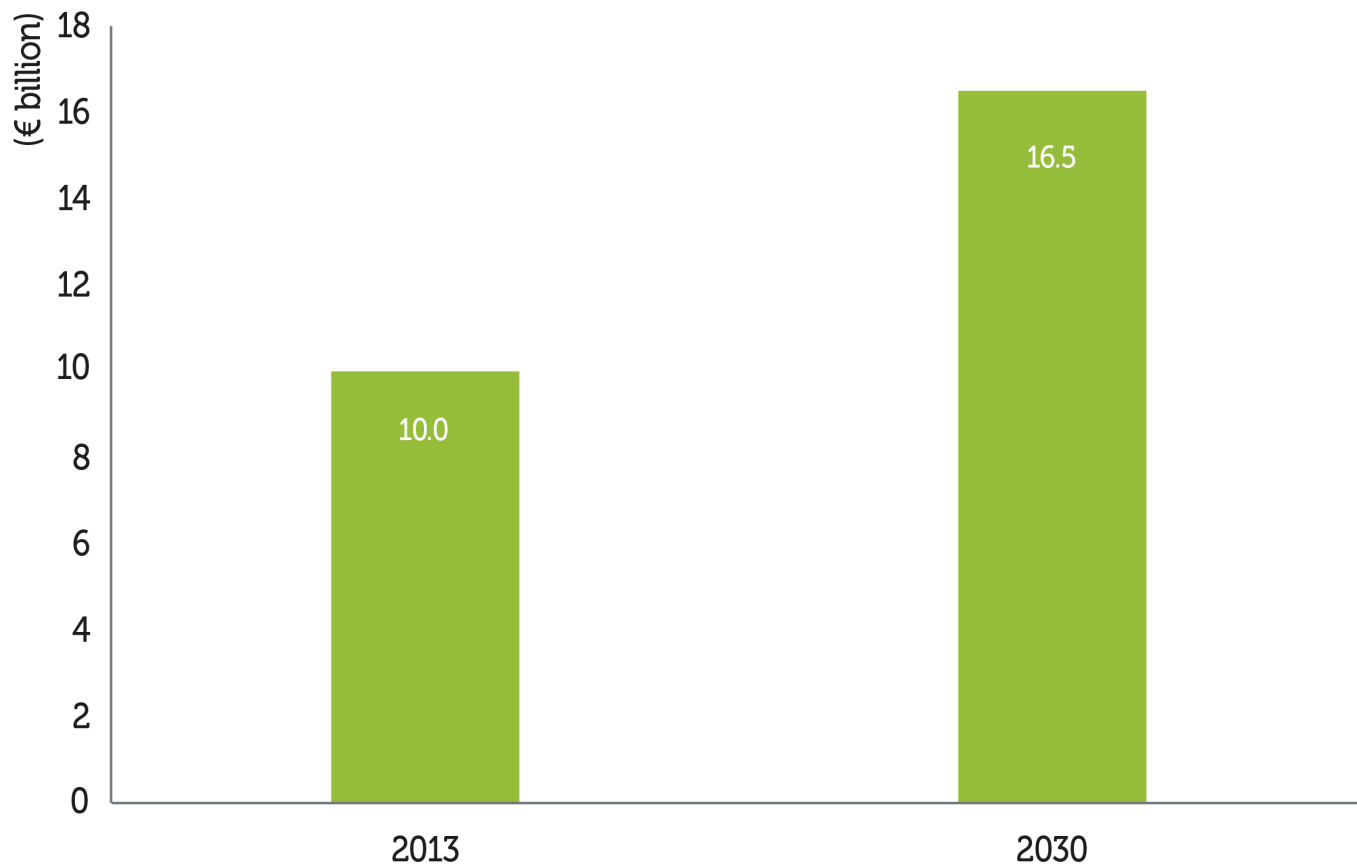
### **Progressing through research**

More than 70% of German chemical companies have research activities, and R&D spending exceeds €10 billion each year. While German chemical companies get less than 1% of their R&D expenditures through government funding, collaboration between industry and academia is well established: one third of chemical companies collaborate with academia in research projects.

To maintain its competitive edge, the German chemical industry will enhance its research effort by 2030.

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R&D budget of the German chemical industry

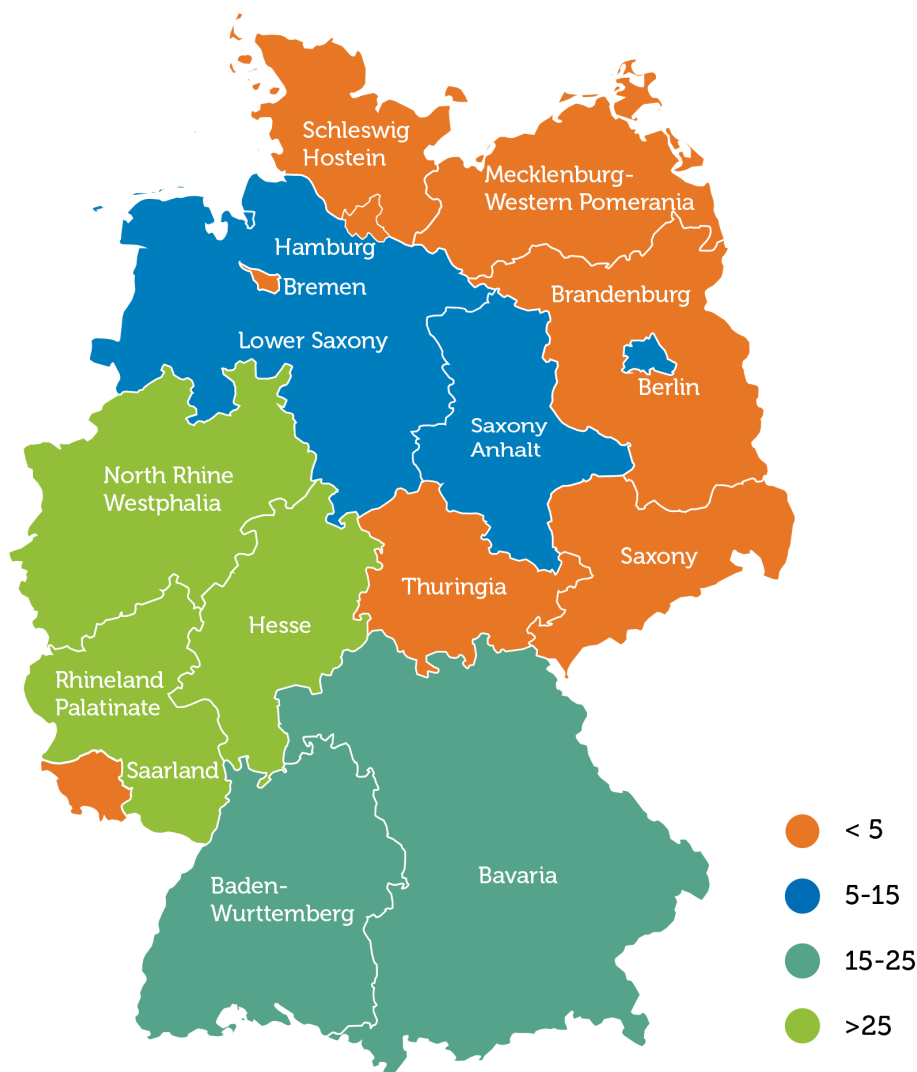


Source: VCI Prognos 2030 study

**Transport matters**

Three states on the Rhine have the largest chemical industries: North Rhine Westphalia, followed by Rhineland-Palatinate and Hesse, with its strong pharmaceutical industry. Good access to transport infrastructure is one important locational factor for a successful chemical industry. In Eastern Germany, Saxony-Anhalt is the top chemical producer.

## Chemical sales according to German Länder (in € billion)



## HOW ARE WE DOING?

### Strengths

- Highly- integrated, globally competitive clusters and chemical parks
- Highly-innovative chemical sector
- Highly-specialised small and medium-sized enterprises
- Strongly globalised industry with activities in all centres of growth
- High resource efficiency
- Well-educated labour force (academic, non-academic, e.g. via dual education)
- Close supplier-customer relations
- Strong research and university infrastructure
- Capable physical infrastructure, positioned at the centre of Europe
- Good cooperation between companies and unions (Social partnership)
- Long experience and focus on safety
- Able to meet sophisticated consumer demands
- A leader in establishing processes of digitalisation of the chemical industry



- Positive public image

## Weaknesses

- Energy prices are high and rising
- Strong reliance on imported raw materials
- Rather vulnerable to external shocks (scarcity in many raw materials)
- Demographic change will pose an increasing threat in the future, especially in rural areas
- Slow upgrade of IT infrastructure including high-speed internet
- Lack of skills for digitalisation
- A sceptical view of change and new technologies in some parts of society

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Creating a framework for success

Germany does not have an explicit sectoral industrial policy. Government sets overall horizontal framework conditions (research, energy, education, and infrastructure) and companies and other players adapt to customer needs.

### Encouraging research through public policy

In 2015, government R&D spending, including funding of industrial R&D, was 0.92% of GDP while corporate R&D was 2.01% of GDP, making 2.93% of GNP in total.

The Federal government's *High Tech Strategy* focuses on innovation in climate and energy, health and nutrition, mobility, security, communication, digitalisation and labour, and on key enabling technologies, such as bio, nano, materials and production. Complementary regional programmes of the states focus on the academic and industrial strengths of their regions.

There are some sectoral initiatives on technology development in Germany, which encompass value chains and go beyond the chemical industry. To name three:

- The National Platform on Electric Mobility
- The Platform "Industrie 4.0" to support dissemination of digital technology throughout the economy, especially the manufacturing sector
- The support for renewable energies by the EEG (Renewable Energy Law)

Whether these initiatives will prove to be ultimately successful remains to be seen. For example, costs for renewable energy production threaten to curb production of energy-intensive products, while new jobs in renewable energy technologies have been lost in recent years.

Closely related to the field of chemicals is the national "BioEconomy 2030" strategy, which has been jointly developed by government and industry. There are several regional initiatives, such as a Hesse health industry project involving the pharmaceutical industry.

### **Teaching the right skills**

Both at the Federal and the Länder level, Germany strives to strengthen the role of Science, Technology, Engineering and Maths (STEM) teaching in schools, vocational training institutions and universities and keep teaching up to date.

### **Profiting from research connections**

Strong and effective links with industry and services as well as research institutions are a strategic advantage for the German chemical industry. Collaboration between industry and academia is well established: one third of chemical companies collaborate with academia in research projects.

### **Working together**

Germany's world-leading industrial sectors, such as automotive, chemistry, electrical/electronic equipment, and machinery collaborate in R&D. Its chemical parks are efficient local platforms for collaboration between chemical producers and suppliers of infrastructure, services and other inputs.

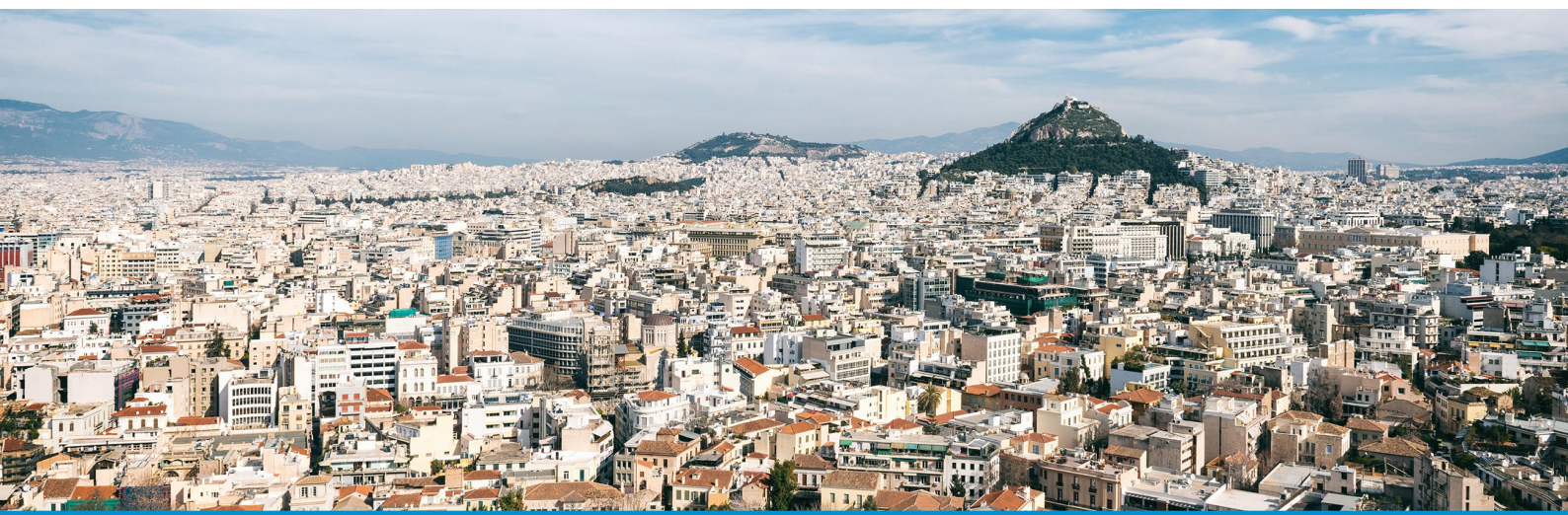
In 2015, the German Ministry of Economics, together with industrial sectors (including the chemical industry) and trade unions, started the "Bündnis Zukunft der Industrie" – a joint effort to identify measures to secure or enhance the competitive position of German industry.

### **Smartening up**

Funding in the context of "smart specialisation" via the EU structural funds is of lower importance as Germany is doing very well economically, and state R&D funding of German industry is mostly from national, not EU sources.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/germany/>



## Greece

### Hellenic Association of Chemical Industry (HACI)

Number of companies

**1,000**

Turnover

**€2.2 billion**

Direct employees

**13,000**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

The chemical industry is 5.5% of Greek industry but provides 13% of the country's exports, 44% of the chemicals produced are exported.

Its plants are largely divided between the North Greece region around Thessalonica, responsible for 20% of output and the Central and South Greece region, where the prefectures of Viotia and Attica account for almost 45% of total output.

Nationwide, the chemical industry employs almost 12,900 people. The industry comprises almost 1,000 companies, 99% of them SMEs. A few of big companies produce basic chemicals, fertilizers, petrochemicals and polymers. Many SMEs focus upon construction and isolation materials and , consumer products and agrochemicals, while a handful of micro-enterprises are active in nanomaterials.

Greek universities train significant number of chemists and chemical engineers. Some emigrate, but the presence of well-educated scientists should enable development of further collaboration between universities and industry.

Government R&D spending and EU funds together account for 0.7 % of GDP, well below the EU average. It is widely recognised that there is plenty room for improvement.

## HOW ARE WE DOING?

### Strengths

- Located in southern Europe close to the Middle East and Balkans
- The fast-growing port of Piraeus and its rail connections provide good market access. Many multinationals use Piraeus as a logistics hub
- Well educated chemists, engineers etc
- Economic reforms are improving the business environment
- Hydrocarbon exploration ongoing in the Ionian sea
- Mineral resources
- Collaboration between companies, authorities, and users to implement REACH & CLP and other piece of legislation

### Weaknesses

- High energy costs for both electricity and natural gas
- Heavy reliance on imported raw material
- Comparatively high taxes
- Difficulties in accessing capital because of bank capital controls
- Public sector bureaucracy

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

Restructuring the Greek economy will enhance competitiveness of the Greek chemical industry.

The priority for the coming decade is production of pharmaceuticals, advanced materials, insulation materials and agrochemicals, which are needed for domestic consumption.

Greece has important oil refining capacity, a strategic geopolitical location and an outstanding shipping industry that can provide access to natural gas.

Untapped oil reserves are estimated to include 22 billion barrels in the Ionian Sea off the coast of western Greece and more than 4 billion barrels in the Northern Aegean.

Greece has a growing role in the supply of natural gas to Europe. Work has begun on the Trans Adriatic Pipeline (TAP) from Greece, via Albania and the Adriatic Sea to southern Italy, which will allow gas to flow from the Caspian region to European markets.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/greece/>



## Hungary

### Hungarian Chemical Industry Association (Mavesz)

Turnover

**€15.2 billion**

Direct employees

**83,193**

National contact



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Director  
budai@mavesz.hu

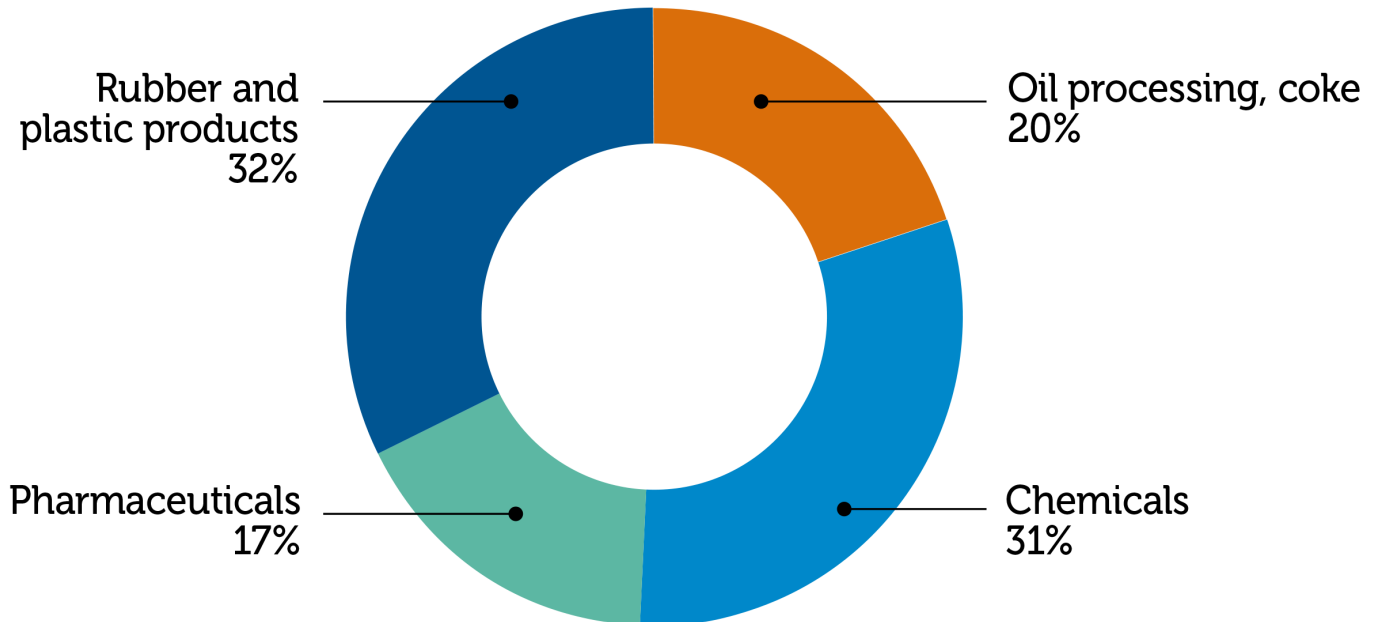
## CHEMICAL INDUSTRY SNAPSHOT

### A big industry growing well

The chemical industry plays a large role in Hungary's economy. Sales of Hungarian chemicals and chemical products nearly doubled from €2.8 billion to €5.0 billion during 2009-2016, registering a growth rate above the EU chemical industry average.

Industry output, including oil refining, chemicals and pharmaceuticals production as well as rubber and plastic products, reached €15.2 billion in 2016 - 22.6% of total manufacturing production.

Chemical industry structure in Hungary (€15.2 billion, 2016),  
22.6% of manufacturing industry

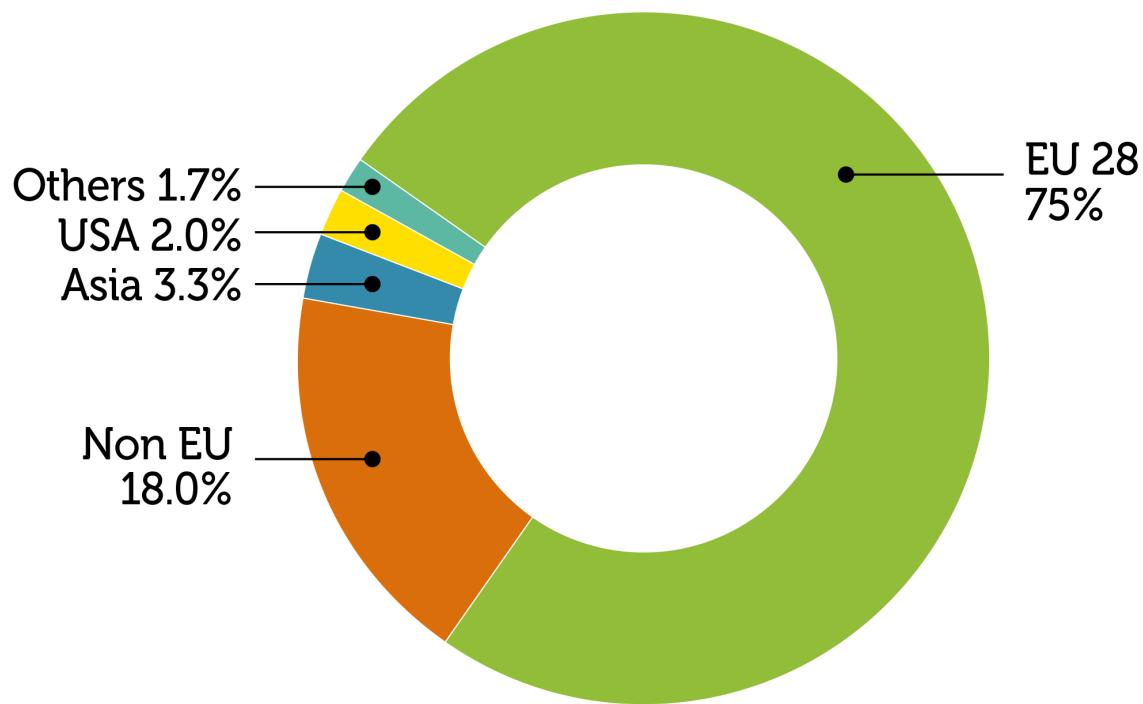


### HOW ARE WE DOING?

The industry has been on a continuous growth track since 2012 due to expanding export markets and the high level of investments into production capacities and the further expansion of the chemical value chain, particularly in petrochemistry. The leading Hungarian chemical companies are important regional players in the Central European chemicals market of petrochemicals, polymers, carbon fibers, fertilizers and others.

The growth is export driven, above 60% of chemical products manufactured in Hungary are exported and sold predominantly in the EU Single Market.

## Hungary chemicals & chemical products export markets (2015)



### Backed by a strong research base

The chemical and pharmaceutical industries have a long history in Hungary, as do research, development and innovation that are particularly essential now to the competitiveness and sustainable development of the country's chemical companies. Producers operate laboratories and research centres. The Research Centre of Natural Sciences of the Hungarian National Academy and the technical universities of Budapest, Veszprém, Debrecen and Miskolc engage in both basic and applied research projects in cooperation with companies and/or under EU programmes and projects.

### A leading employer

The industry is a big employer, with more than 80,000 workers, including 14,000 in chemicals and 17,000 pharmaceuticals. By 2016 the number of employed exceeded has in fact exceeded the pre-crisis levels.

With gross wages above the national average, the chemical sector is a valued employer.

## 2016 full time employment in NACE 19-22 (Number of persons)

White collar workers	28,963
Blue collar workers	54,231
<b>Total</b>	<b>83,193</b>

Source: KSH

## REGIONAL CLUSTERS

### Built upon infrastructure

Hungary has a developed infrastructure of motorways, roads and railways as well as advanced communications network and energy supply systems provide the necessary background for chemical industry development. For the chemical industry the recent development of intermodal logistic capabilities for the transportation of goods is of particular importance.

In addition, the geographical location of the country makes it a natural choice for investments and operations in Central and South Eastern Europe.

Important chemical clusters are located in three regions:

#### Northern Hungary

- 20% of sales
- focus on petrochemical and polymer production
- two large companies with <€1 billion turnover, backed by SMEs
- Close collaboration with universities in Miskolc and Debrecen

#### Central Hungary (Budapest and environs)

- 45% of sales
- focus on oil refining, petrochemicals and polymers; specialty and fine chemicals; and pharmaceuticals
- Large presence of SMEs
- Close collaboration with Budapest Technical University and Veszprém Pannon University.

#### Central Transdanubia

- 8% of sales
- focus on fertilizers, carbon fibres and agrochemicals
- Many SMEs
- Close collaboration with Veszprém Pannon University



## PREPARING THE FUTURE

### Strengths

- A strong petrochemical base
- Scale economies of scale, up-to-date technologies and sound environment practices
- Capacity enhanced by investment to meet demand from automotive, electronics and agriculture
- A location of choice for serving Hungary and South-Eastern Europe

### Weaknesses

- Highly dependent on imported feedstock and energy sources
- High energy prices are weakening competitiveness

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Focussing on talent

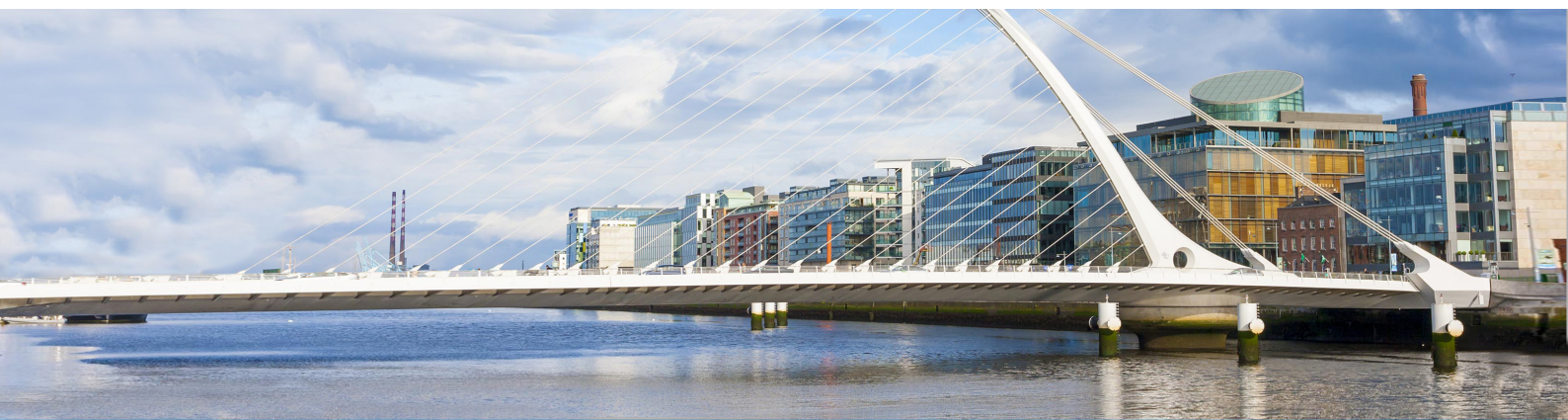
A supportive industrial policy and a less bureaucratic and financially much less burdensome regulatory framework at both the European and national level are prerequisites for the sustainability of the chemical industry. Education and training are vital. Hungary has a solid educational system, from elementary school to universities, and the teaching of science subjects at all levels of education and the importance of the technical professions are increasingly emphasized. At the same time special efforts and programs should be undertaken by both business and government to make natural sciences, and in particular, chemistry more attractive to the younger generations.

### Working together to retain skills

Chemical companies are making considerable efforts to attract young people to the industry. They maintain close relations with vocational training schools, specialized high schools and technical universities to provide the succession to an ageing workforce and not less importantly, to have an influx of young, well-trained and highly educated people to operate new production facilities that emerge as a result of investments in the sector.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/hungary/>



## Ireland

### BioPharmaChem Ireland

Capital spending

**€10 billion**

R&D investment

**€600 million**

Direct employees

**> 30,000**

National contact



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 Director General  
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## CHEMICAL INDUSTRY SNAPSHOT

### Ireland's leading exporter

Chemicals, referred to here as the pharmaceutical sector, plays a pivotal role in the Irish economy. It accounts for over 60% of goods exported from the country. It employs more than 30,000 people, and supports a further 26,000 indirect jobs. More than half our workforce are university graduates.

### Dominated by pharmaceuticals

In Ireland the industry is dominated by pharmaceutical companies engaged in either Active Pharmaceutical Ingredient (API) manufacture or and also dosage form manufacture (hence the term pharmaceutical). As a centre for manufacturing biopharmaceuticals Ireland is second only to the United States. Recent investments amount to just under €4 billion - the majority from US-based companies including Bristol Myers Squibb, Alexion, Regeneron and Eli Lilly.

### A platform for global companies

Nine of the top 10 global pharmaceutical companies, many US-based, are located in Ireland. It is the largest net

exporter of pharmaceuticals in the world.

## Clustered around Cork and Dublin

Ireland is small and can be viewed as a single industrial policy region. There is a cluster of API plants around Cork – mostly engaged in high- end chemical synthesis. Dublin has a more diverse industry base including chemical synthesis, drug product formulation and biotechnology based manufacture – including fermentation, purification and formulation. Recent investments will make Dublin a leading global cluster for biologics (biopharmaceutical) manufacture.

## An international export platform

Ireland's chemical and pharmaceutical industry exported €64 billion of products in 2016, 60% of the country's exports.

The sector pays more than €2 billion of corporation tax each year.

## A four-fold rise in jobs, with more to come

Employment in the sector grew from 5,200 in 1988 to 30,000 in 2016, supporting as many again providing services to the sector. Companies plan about €4 billion of capital projects during 2012-2020, creating more than 3,000 new jobs. Replacement value of the sector is estimated at €45 billion.

## HOW ARE WE DOING?

### Strengths

- Excellent levels of regulatory compliance (EHS/Quality), reducing manufacturing risk or risk of supply interruptions
- Depth of compliance experience
- Record of continual improvement helps companies bring product to market on time
- Very positive national perceptions of the industry
- Ranked seventh worldwide for competitiveness
- Ranked the fastest-growing EU economy in 2016 (International Monetary Fund)
- A well-qualified workforce that has achieved critical mass
- A large and growing research skill base which will significantly assist the attraction and retention of high tech FDI now significantly increasing indigenous innovation
- 440 world class principal investor (PI)-led research teams
- 2 000 PhD graduates in total at an ongoing average rate of approximately 400
- 1 000 post-doctoral research training places

### Weaknesses

- Cost base high – including labour and energy costs
- Dependent on inwards investment
- Responding to patent cliff issues

- Pressure on cost of healthcare

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The key policy driver nationally is the development of the national research base in order to harness and anchor innovation in the country. This led to the establishment of Science Foundation Ireland (SFI), which funds basic and applied research. The Programme for Research in Third Level Research Institutes (PRTLII) has invested in state-of-the-art research infrastructure.

### Specific industry initiatives

**SSPC-2** – a centre specializing in reach into solid state chemistry and wet synthesis has been established. This €35 million research centre is part funded by Government (SFI), the industry and the university sector. It is an excellent example of industry-academic-Government collaboration. It will concentrate on near- to- industry research and innovation.

**PMTC** – The Pharmaceutical Manufacturing Technology Centre – funded by government through Enterprise Ireland will fund applied research conducted by the research community for industry.

**NIBRT** – The National Institute for Bioprocessing Research and Training – will support innovation in the biotech sector – part funded by industry and Government. A state-of-the-art facility.

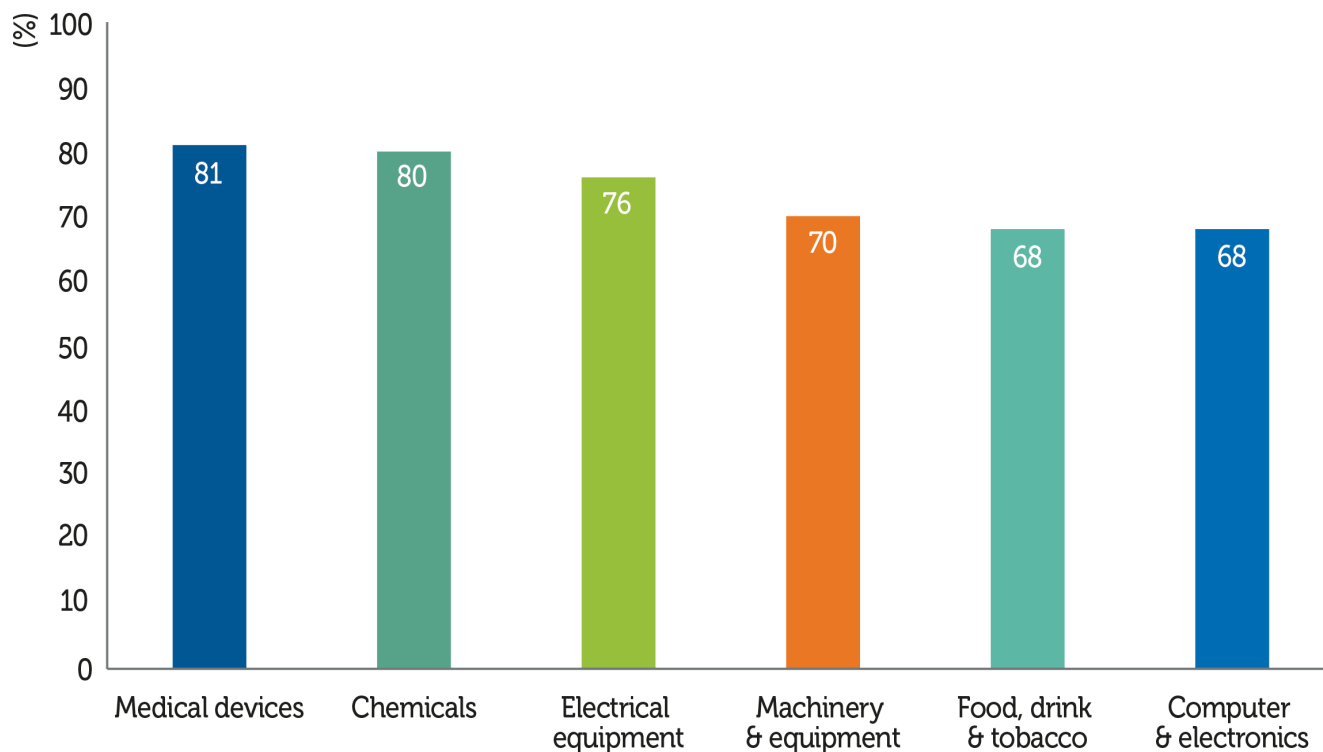
**CRANN** – Research institute established by government specialising in nanotechnology.

### Research Policy

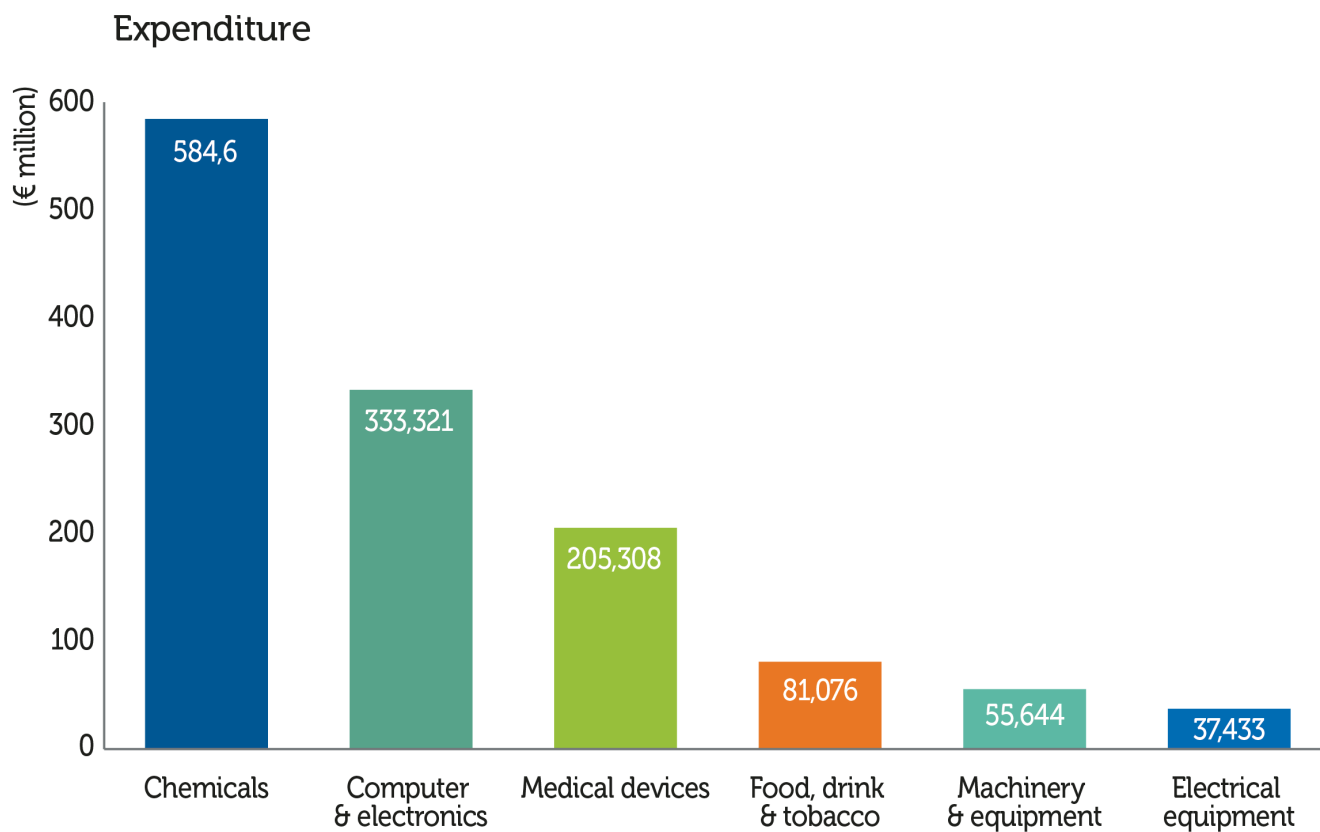
The pharmachem sector as demonstrated above is not only “high value” in terms of its expenditure on the Irish economy in terms of salaries but is also a major participant in private sector research and development. Just over 80% of pharma and chemical firms engaged in R&D in 2011, behind only medical device firms. This is well ahead of other manufacturing sectors including electrical equipment and computers. In this sense the pharma sector is not only a major manufacturing industry but also a very high value manufacturing industry, as R&D jobs tend to be of a better quality than more basic manufacturing.

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Firms engaged in R&D



To see the benefits of this for the economy one need only look at expenditure on R&D by the sector. In 2011 the sector spent almost €600 million on R&D – nearly twice that of other high tech sectors such as IT and three times as much as medical devices. Given the importance of R&D in economic growth and the high level of value attached to R&D positions, this is a major contribution to the Irish economy.



Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/ireland/>



## Italy

### Federazione Nazionale dell' Industria Chimica (Federchimica)

Number of companies

**2,800**

Capital spending

**€1.6 billion**

R&D investment

**€520 million**

Turnover

**€52 billion**

Direct employees

**108,100**

National contact



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Director General  
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## CHEMICAL INDUSTRY SNAPSHOT

### An important industry providing high qualified jobs

The chemical industry in Italy had 2016 sales of €52 billion, generated by 2,800 companies. Together they achieve 6% of Italy's manufacturing sales, making chemicals the country's sixth-largest manufacturing sector in terms of production value and the third in terms of exports. It employs about 108,100 high qualified workers but the sector generates an even greater number of indirect jobs, about twice than through direct employment.

### Strong and growing specialization in downstream chemicals

Italy maintains a significant and strategic presence in basic chemicals but is relatively more specialized in specialties and consumer chemicals, accounting for 57% of total production value, compared to 45% of European average and realising an export surplus of more than €3 billion in 2016. Chemical firms in Italy focus on chemical sub-sectors where the average size is lower because scale economies are not so relevant and the key of success often consists in offering to customers tailor made products: detergents and cosmetics, speciality chemicals and active pharmaceutical ingredients.

## **A science-based industry operating in partnership with Italian Districts**

Italian chemical industry is a science-based industry that supports the sustainability and competitiveness of virtually all other industrial sectors through its innovative products and solutions, created with significant strong efforts in R&D activity and about 6,000 employees dedicated to it.

Being a country with a strong and diversified industrial basis, Italy represents a large market for chemicals accounting for about €60 billion. In particular, there are about 150 Industrial Districts - including so-called traditional sectors but also medium-high technology ones - which are known around the world for their high quality and innovative products: their success very often relies on sophisticated chemical intermediates made in Italy and responding to specific requirements.

## **A balanced industry structure**

Chemical industry in Italy is characterized by the well balanced presence of three different actors, all of them playing a very important role: Italian SMEs (38% of total chemical production value), medium-large Italian groups (24%) and foreign capital companies (38%).

Chemical SMEs represent a significant reality in Italy and suffer particularly from regulatory burden. Main Italian chemical groups include some big players of basic chemicals but also several dynamic specialized players leading in their specific niche at European or world level. Most of them are active in foreign markets also with production units. Foreign capital companies have chosen Italian location not only to produce for domestic market, but also to export and for R&D.

## **HOW ARE WE DOING?**

### **An increasing international attitude**

Italian chemical companies are taking advantage of globalization by providing their international customers the same solutions developed for the domestic market: high innovation, customization, flexibility, just-in-time and fulfilment to very specific and tailor-made requirements, even in small quantities of products.

Exports to turnover ratio has reached 53% and has been increasing by 14 percentage points in the last 10 years. Moreover, in recent years, export performance has proved to be one of the most successful among European producers (+22% in 2010-2016).

Not only large firms, but also SMEs are strongly oriented to international markets.

### **Lombardy: a real vocation for chemicals**

Italian chemical industry is concentrated in Northern Italy (78% of chemicals employment) , close to downstream European markets and local customer companies.



In particular, Lombardy has a real vocation for chemicals: not only is it home to 31% of Italy's chemical firms, 41% of jobs and 45% of chemicals turnover, but it is among the top five chemical regions in Europe (in terms of employees and number of companies) and the first non-German.

Chemical industry in Lombardy has different features from other European regions with strong chemicals presence: production is not concentrated in a handful of highly integrated sites, but across a network of foreign multinationals, Italian medium and large groups and local SMEs.

These companies can benefit from the presence of major universities and research centres, able to develop research and put scientists at work on industry-oriented projects.

Elsewhere:

- Emilia-Romagna accounts for 13% of chemical jobs employment and 12% of turnover;
- Veneto for 10% of jobs and 8% of turnover;
- Piedmont for 10% of jobs and 10% of turnover, with a significant specialisation in bio-based chemicals.

## PREPARING THE FUTURE

### Strengths

- **Strong interaction with Industrial Districts**, i.e. SMEs belonging to the traditional and medium-high tech sectors of Made in Italy which are world trend setters, wide open to innovation and always ready to test and develop new products.
- **Talent**: large pool of able and motivated Italian chemists with particular skills in areas including fluorine chemicals, woven and non-woven polyester, polyurethanes, special polymers, leather chemicals, adhesives, pharmaceuticals active ingredients and cleaning additives.
- **Widespread research-based innovation**: with about 700 chemical companies active in R&D, both national and foreign-owned, Italy is second only to Germany for number of companies engaged in R&D in Europe. 42% of chemical companies in Italy have in-house R&D, more than twice the manufacturing average.
- **Remarkably constructive industrial relations**: Italy's chemical sector has a participatory and pragmatic industrial relations culture that supports renovation and often anticipates changes in regulation. The national collective labour contract aims to improve productivity also through organisational and working hours flexibility. It favours company-level bargaining and enables temporary agreements amending national rules. It also favours employability, training and youth employment. Chemical and pharmaceutical industry has been the first sector in Italy to adopt a supplementary pension and healthcare funds. According to a recent survey involving foreign capital companies' top management, in a rapid moving environment flexibility of the organization is the most important Italian strength.

### Weaknesses

- **Electricity costs** 30% above the European average, largely because of taxes and incentives for renewables.
- **Logistics costs** in Italy higher than in some other European countries.
- **Lack of industrial culture and lack of confidence in new technologies** in some parts of Society and Institutions.

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## OUR CONTRIBUTION TO EUROPEAN COMPETITIVENESS

Italy does not follow an explicit sectoral industrial policy, but some horizontal measures are particularly relevant for the chemical industry.

### **Backing sustainability and market-led innovation**

The Ministry of Economic Development's *Fund for Sustainable Growth* is available to support projects enhancing sustainable growth, including Green Chemistry.

The Ministry of Research supports clusters, including two dedicated to bio-based chemicals for biotechnologies.

### **Strengthening partnership with Education and Public Research system**

Universities offer a large pool of excellent chemists in specific areas and actions are on track to build strong and scientific skills on formulation chemistry. Dual education has been reinforced in upper secondary schools, especially in technical institutes.

### **Encouraging R&D and the new technical wave**

Fiscal incentives apply to intellectual property assets. Significant incentives for implementation of Industry 4.0 involve also chemical processes.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/italy/>



## Latvia

### Association of Latvian Chemical and Pharmaceutical Industry (Lakifa)

Number of companies

**500**

Turnover

**€699 million**

Direct employees

**8,901**

National contact



Raina Dureja-Dombrovskā  
Executive Director  
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## CHEMICAL INDUSTRY SNAPSHOT

### Building on historic strengths

With sales of €699 million in 2017, the chemical and pharmaceutical industry is a longstanding cornerstone of the Latvian economy. The historic commitment to a strong research, development, and manufacturing base in sophisticated chemical and pharmaceutical products was reaffirmed in 2009 when government made it a priority sector. Chemical and pharmaceutical companies have always been the high added value of Latvian products, consisting of both our scientific achievements and the ability of entrepreneurs to turn ideas into competitive products.

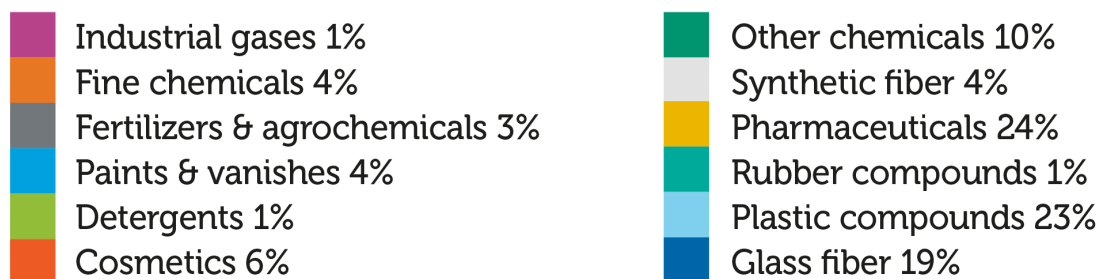
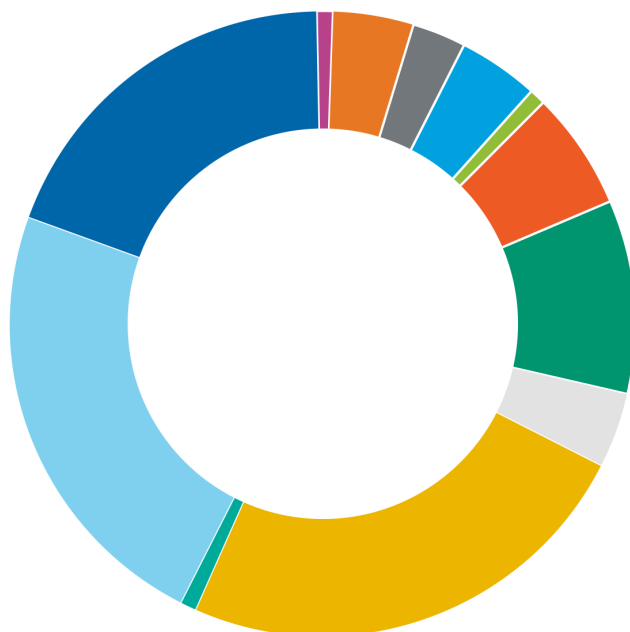
### Rooted in research

Chemicals and pharmaceuticals account for 10% of manufacturing industry by turnover, and the last year we

strengthened ourselves as the fourth largest industry in Latvia, exporting 72% of its' output. Experience and traditions, skills, efficiency and R&D capacity underpin an ongoing development of the chemical, pharmaceutical and biotechnological sector.

## HOW ARE WE DOING?

### Distribution of production by subsectors in 2017



### An important employer

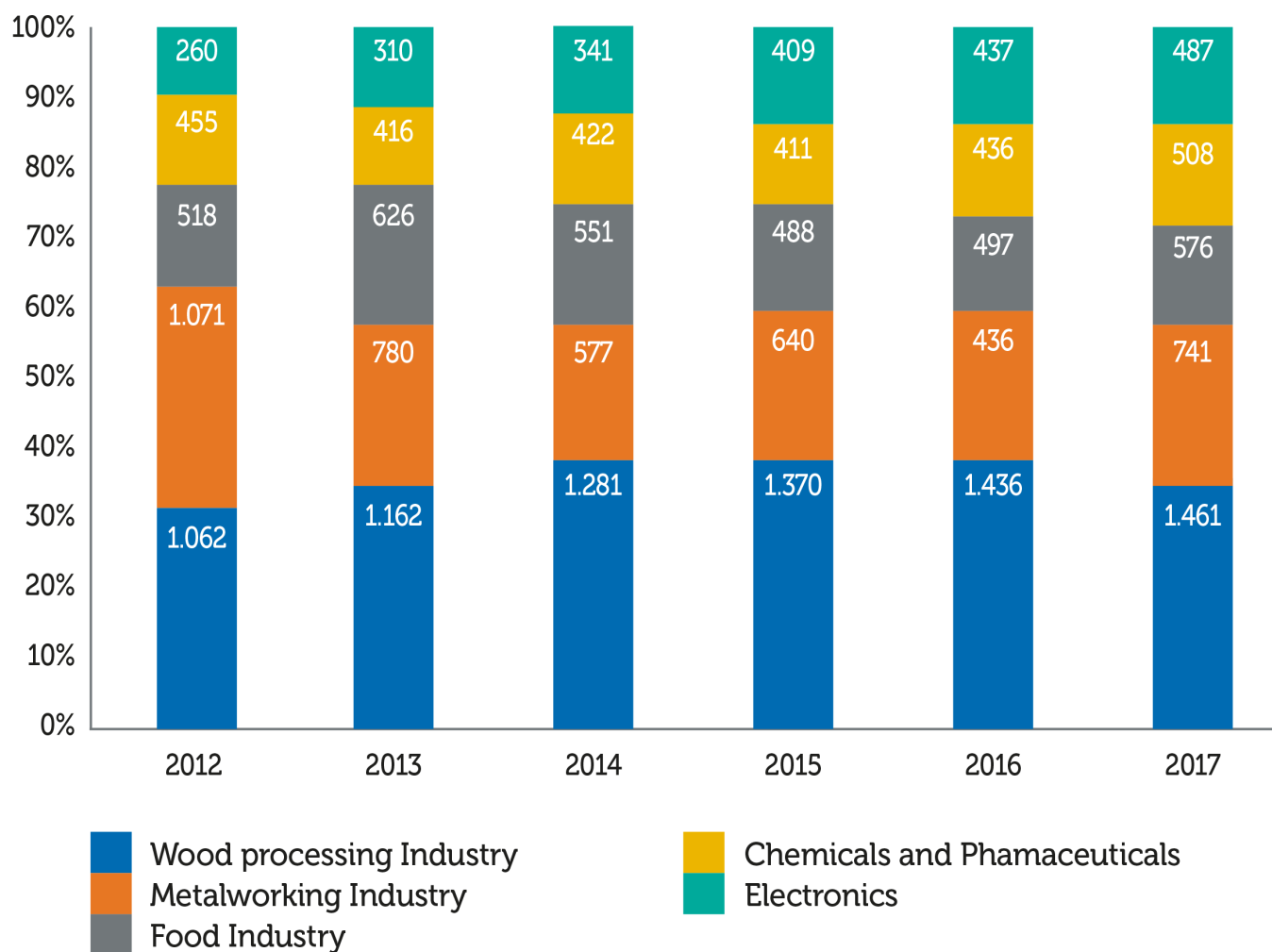
Latvia's chemical industry had around 500 companies in 2017; all but a handful were SMEs. Employment in chemicals and pharmaceuticals is stable at 4,000 people, and another 5,000 work in plastics and rubber compounds subsector and glass fiber industry. Our industry is in second place compared to the average salary level among all sectors of Latvian economy. This implies both high tax payments to the state budget and a higher rate for the Latvian economy as a whole.

### Leading with exports

Latvia produces and exports a diverse range of pharmaceuticals and chemical goods, from unique anti-cancer medicine to fine chemicals, paints, household chemicals and cosmetics.

We are exporting worldwide, but the core export markets are Baltic neighbours Lithuania, Estonia and the Confederation of Independent States (CIS) followed by Denmark, Germany, Sweden, and the Netherlands.

## Customer sectors of Latvian chemical exports



## Backed by education and skills

Seven higher education institutions and professional schools collaborate closely with industry to educate and train young people in the skills needed in our industry.

## PREPARING THE FUTURE

### Strengths

- Skilled, flexible and relatively cheap workforce
- Modern, flexible plants producing to EU standards
- Strong research capacity
- High added value products
- Proximity and expertise in Russian markets
- Broad international cooperation between exporting enterprises
- Positive attitude: the industry is a priority sector for economic development

### **Weaknesses**

- Reliance on imported raw material
- Government creates pressure to increase taxes and fees
- Limited industry resources to invest in business development
- Lack of new production technologies (except pharmaceuticals)
- Brain drain: able scientists often move abroad
- Reluctance of research institutions to undertake relevant research
- Ageing workforce
- Skills gaps

### **OUR CONTRIBUTION TO A COMPETITIVE EUROPE**

To reinforce R&D investment, the Latvian government and Education and Science Ministry will support nine National Level Research Centres (NLRC) including centres dedicated to pharmacy and bio-medicine, food processing technologies, nano-structured and multifunctional materials, structural and construction technologies and public health and clinical medicine. Latvian CRO (Contract Research Organization) activities are also gaining recognition.

Clustering to compete globally, The Life Sciences Cluster of Latvia comprises about more than 30 pharmaceutical, chemical, and biotechnology companies, as well as educational and research institutions, skilled in organic chemistry and biopolymer research, microbiology and virology, genomics, immunology, biotechnology, and wood chemistry.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/latvia/>



## Lithuania

### The Association of Lithuanian Chemical Industry Enterprise

Number of companies

**104**

Turnover

**€1.63 billion**

Direct employees

**5,000**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A leading industry

Chemicals is the third-biggest industry in Lithuania after oil refining and food production. Total sales in 2016 were €1.63 billion, down from €1.89 billion in 2015.

### HOW ARE WE DOING?

#### A strong exporter

Chemicals were 12.4% in 2016 compared to 10.9% of Lithuania's industry exports in 2016 and have been growing in recent years. The main products are phosphoric and nitrogen fertilizers and plastics, notably PET.

A nascent life sciences, pharma and biotech sector is growing fast, and exceeded €300 million of annual sales. The chemical industry is dispersed around the country, including coastal areas. It employed 5,000 people in 2016.

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## PREPARING THE FUTURE

### Strengths

- Well-educated labour force
- A university and research and university base with newly-created R & D centres
- Easy access to and expertise in the Russian markets
- Convenient logistics for road and sea transport
- Implementation of quality standards (mainly ISO) is widespread
- Constructive dialogue with the authorities

### Weaknesses

- High prices for energy including natural gas
- Heavily reliant upon imported raw materials
- Government deficit creates pressure to increase taxes and fees

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

Lithuania has set up three integrated Science, Studies and Business Centres (“Valleys”) designed to aid the development of its chemical industry. They are Sunrise Valley at Vilnius; the Centre for Physical Sciences and Technology at, Vilnius; and SANTAKA , (pharmaceuticals and, life sciences) at Kaunas.

Two of Lithuanian six proposed Smart Specialisation priorities are related to chemistry: medical and pharmaceutical engineering and new functional materials.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/lithuania/>





## Netherlands

### Vereniging van de Nederlandse Chemische Industrie (VNCI)

Number of companies

**470**

Turnover

**€55 billion**

Direct employees

**57,000**

R&D investment

**€750 million**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A strong industry at a gateway to Europe

The Netherlands has Europe's fourth-largest chemicals industry. The combination of Rotterdam harbour, good infrastructure, top universities and qualified personnel has attracted many of the world's largest chemical companies.

### A leading employer

Chemicals turnover in 2017 was €55 billion, including €5 billion from pharmaceuticals. Our industry employs 57,000 people, including 13,000 in the pharmaceutical industry, in more than 470 companies. It's the second-largest industry in the Netherlands.

### In the global vanguard

In basic chemistry, biotechnology, food ingredients, coatings and high performance materials, the Netherlands is

among the world's top players. The chemical industry provides more than 15% of the Netherlands exports, outpacing export volumes from Japan.

### **Driven by innovation**

Our chemical industry is a leading innovator, investing €750 million a year in research and development, a fifth of national industrial R&D.

### **Networked with neighbours**

The combination of Rotterdam harbour and pipelines to nearby chemical production centres in Belgium, Germany and northern France ensures the Netherlands industry forms part of a strong cluster in Northwest Europe.

### **Clustering in the regions**

The Netherlands is relatively small and manageable country with outstanding roads, rail links, waterways, telecommunications, and energy supply pipeline networks linking production regions.

The main clusters are:

#### **Rotterdam/Botlek/Pernis/Moerdijk**

Rotterdam focuses on basic chemicals and petrochemicals. Looking ahead, the port of Rotterdam aims to integrate its petrochemical complex with those of Antwerp, Moerdijk, Terneuzen and Vlissingen to create a single large global leader connected closely with those in Germany.

#### **South Limburg/Chemelot**

South Limburg is a centre for life sciences and materials, supported by the University of Maastricht.

#### **Delfzijl/Eemshaven and the eastern Netherlands/Twente**

There are 160 companies here spanning energy, recycling, chemicals, metals and logistics.

## **HOW ARE WE DOING**

### **Strengths**

- A key part of Europe's biggest cross-border chemical cluster
- Well-educated labour force
- Stable political and social climate
- Served by the port of Rotterdam
- Rising productivity has reduced unit labour costs

### **Weaknesses**

- Relatively high energy costs - being tackled by a collaboration between all involved to achieve an affordable and clean energy supply
- An ageing workforce- tackled by public-private skills planning

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Building research capacity

Education, science, knowledge institutes and industry are collaborating on research to accelerate innovation.

### Opportunities for growth

A 2012 study sponsored by VNCI predicted substantial sector growth.

The chemical industry is expected to transform through more efficient use of raw materials, a shift from fossil inputs biomass, bio waste and other resources. Free trade, improved energy efficiency, raw material diversification, focused R&D, sustainable innovation and facilitating legislation are needed to help achieve this goal.

### Supported by government policies

The chemical industry is among those in which the Netherlands achieves world class excellence, and benefits from supportive government policies.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/netherlands/>



## Norway

### Norsk Industri

Turnover

**€16.1 billion**

Direct employees

**13,000**

National contact



Ole Børge Yttredal

Director General

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## CHEMICAL INDUSTRY SNAPSHOT

### An integrated industry

In 2017 Norway's chemical, oil refining and pharmaceutical industry had sales of NOK 157.3 billion (€16.1 billion), of which NOK 94 billion were exports (59.8%). The sector employed 13,000 full-time equivalents, and generated NOK 37.4 billion (€3.8 billion) of added value. Official statistics treat chemicals, oil refining and pharma as a single industry.

### Powered by oil and electricity

In an industrial economy dominated by petroleum and mechanical engineering, chemicals forms part of the nation's process industries.

### Targeting exports

The chemical industry is export-oriented, and highly exposed to global competition. Though the industry benefits from access to hydro power and is environmentally-friendly, competitiveness is curbed by high wage costs and a strong currency – though falling oil prices have recently eased the pressure.

## Between river and sea

Chemical plants are chiefly located along the coastline, close to hydroelectric power plants and deep, ice-free harbours. There are some local concentrations of chemical and other process industries – sometimes in industrial parks or in clusters operating across regional borders. International companies dominate the chemical and other process industry in Norway.

## From basic to biotech

Norwegian chemical production centres upon basic inorganics, fertilizers, petrochemicals, polymers, and some specialties and bio-refineries. The pharmaceutical industry is relatively small.

Biotech start-ups are located around the universities in Oslo and Tromsø.

Universities are located in four of the 10 counties with numerous process industry companies. The University of Technology and Science in Mid-Norway has the closest links with the chemical sector.

## HOW ARE WE DOING?

### Strengths

- Unique combination of indigenous energy resources: hydropower, petroleum and renewables (wind power and biomass)
- 97% renewable electricity
- An electricity surplus yielding competitive power prices vis-à-vis continental Europe
- High energy and resource efficiency – expertise in reducing GHG-emissions
- Low environmental footprint
- Well-educated labour force with appropriate industrial skills
- Cooperation between companies and unions, and lean organisation
- Political stability
- NGOs and politicians back hydro-powered process industries
- Socially sustainable production with strong focus on health and safety
- Globally integrated and export intensive

### Weaknesses

- High labour and living costs
- Energy prices are high compared to non-European rivals (notably China)
- Expensive feedstock
- Ageing population
- Location on the fringe of Europe
- Brightest people often drawn to petroleum sector (falling oil prices may alter the trend)

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

## Neutral enabling policies

Norway does not have an explicit sectoral industrial policy strategy: Government sets horizontal framework conditions (research, energy, education, infrastructure, environment).

## A climate change advantage

The government-appointed expert panel on green competition published, in 2016, a broad set of policy recommendations including support to the development of process industries in Norway using renewable electricity. Government climate ambitions are aligned to those of the EU: the EU ETS price is the main climate-related tax on industrial activities. Norwegian process industries receive free emission and carbon compensations.

## Funding for pioneering technologies

Enova, an enterprise managed by the Norwegian State, supports pilot and demonstration installations, and deployment of new technology. Environmental technology development and deployment are also supported, along with SME projects.

## Supporting knowledge and innovation

Research policy is not highly industry-oriented, but does embrace biotechnology, climate and energy, nano and materials technology. Two of twelve National Centres of Excellence financed by Innovation Norway promote industrial innovation: Micro and Nanotech and Energy and Climate Change, and Innovation Norway backs one process industry business cluster. Universities are located in four of the 10 counties with numerous process industry companies. The University of Technology and Science in Mid-Norway has the closest links with the chemical sector.

## Power for sale

A surge in development of renewable generation, coupled with efficiency improvements in Swedish nuclear plants, has raised the Nordic generation capacity surplus to 25 TWh. Electricity prices are expected to remain compared to Continental Europe.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/norway/>



## Poland

### Polish Chamber of Chemical Industry

Number of companies

**> 11,000**

Turnover

**€ > 35 billion**

Direct employees

**279,000**

R&D investment

**€0.7 billion**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### A heavyweight industry

With 2016 sales of €35.7 billion, the chemical industry, including pharmaceuticals and rubber and plastics, is the second largest industry in Poland after food processing. It accounts for almost 12% of turnover of industrial output, ahead of motor vehicles.

### A massive employer

The sector employs 279,000 people: 74,000 in chemicals, 23,000 in pharmaceuticals and 182,000 in production of rubber products and plastics goods.

Polish chemical production covers all segments of the industry: basic organics and inorganics, petrochemicals, polymers, agrochemicals, specialties, cosmetics and pharmaceuticals. Basic chemicals account for over 65% of chemical production. Yet that strength also reflects a weakness.

## A trade deficit

Poland has a longstanding trade deficit in chemicals: in 2016 it was €7.5 billion. The biggest deficit occurs in pharmaceuticals, primary-form plastics chemical products and organic chemicals. The chemical industry location is concentrated in southern Poland.

There are also large chemical sites in north-west Poland near the border with Germany, and in central and eastern Poland. Manufacturers include some leading international chemical companies.

## HOW ARE WE DOING?

### Strengths

- High resource and energy efficiency, especially in manufacturing fertilizers and petrochemicals
- Well-educated and efficient labour force
- Good supplier and customer relations
- Good industrial R&D centres, university and technical university infrastructure
- Safety expertise

### Weaknesses

- High energy prices compared to nearby countries
- Heat and power sourced from hard coal and lignite, with a big environmental impact
- Heavy reliance upon imported raw materials
- Heavy reliance upon gas imported from Russia: gas pipelines are still being modernised and connected to LNG import facilities. However, the level of diversification of gas supplies increases year to year
- Poor rail infrastructure and high rail transport costs

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Strategy for sustainable development

On 16 February 2016 the government adopted a national strategy for sustainable development. It aims to develop the Polish economy, and companies, including their productivity and foreign expansion, promoting investment and innovation, including better cooperation between science and business. Chemicals are a key sector.

The government's 2020 goals include:

- Increasing investment to over 25% of GDP
- Raising R&D spending to 2% of GDP from 0.8% today
- Raising the number of medium-sized and large enterprises to over 22,000
- 70% increase in Foreign Direct Investment by Polish companies
- Industrial production growth to outpace GDP growth
- Polish GDP per capita to reach 79% of the EU average



## Supporting adoption of new technologies

Sectoral programmes will support the adoption of new technologies and products, including the INNOCHEM programme dedicated for chemicals.

This is underpinned by range of activities and initiatives:

- StartInPoland programme - commercialisation of innovative solutions created by start-ups
- Rapid decisions on support for initiatives with the biggest innovation impact (so-called “first speed” programmes)
- Reform of scientific and research institutes to make them work better for the economy
- New acts supporting and improving legal aspects of innovation activity

## Building links between industry and academia

Despite past successes, links between industry and research/universities are weak: they are to be rebuilt.

Chemical consumption per head remains below the EU average. The chemical industry should develop production of more high value added products.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/poland/>



## Portugal

### Associação Portuguesa das Empresas Químicas (APEQ)

Number of companies

**790**

Turnover

**€4.341 billion**

Direct employees

**12,472**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

The Chemical Industry, including the activities classified as NACE 20, represents about 5% of the GDP of the total Portuguese industry.

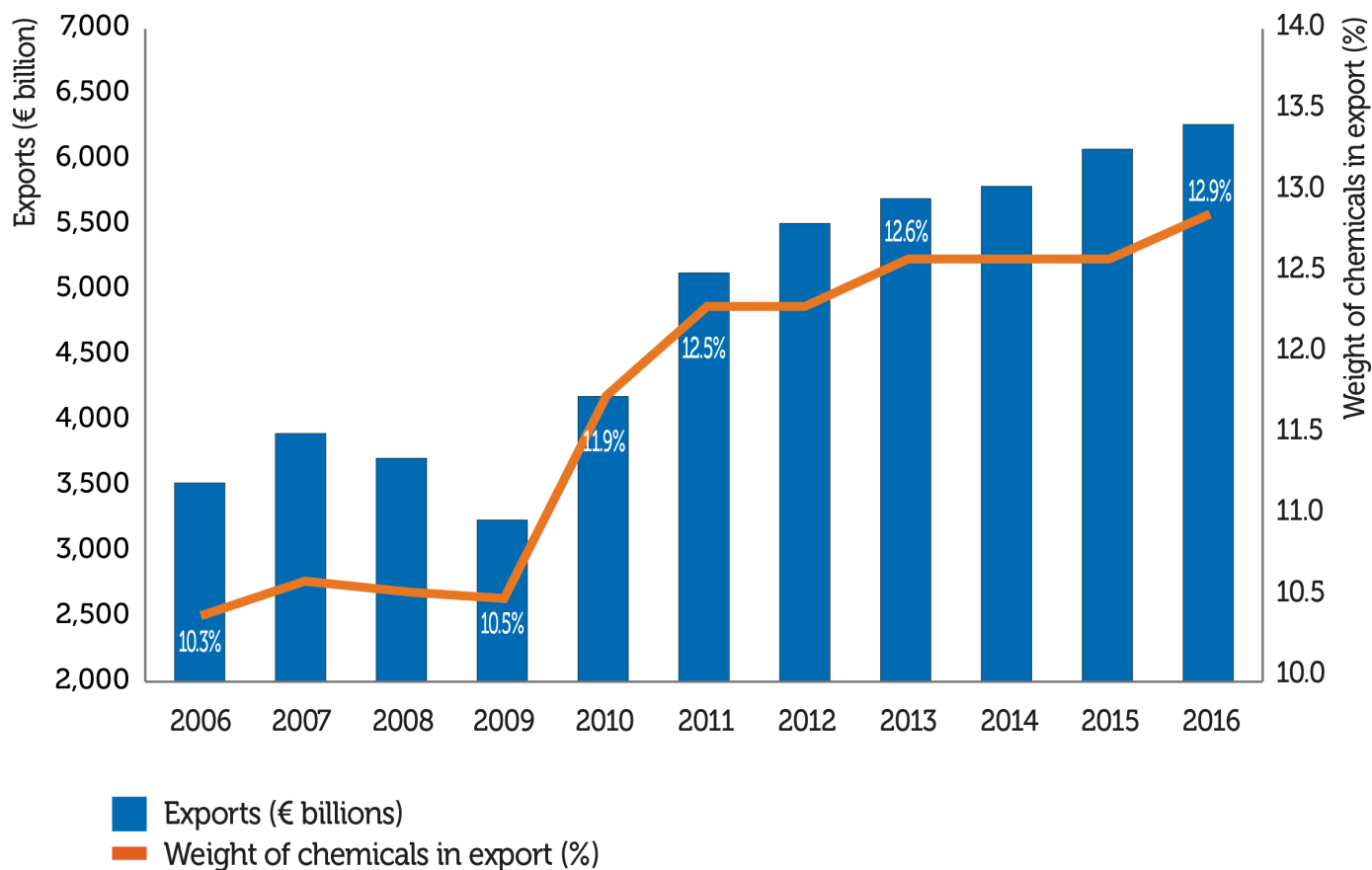
Compared with the others sectors, the Chemical Industry has an important role as exporter.

During the last years this sector has kept a good position in the ranking of the exporters, with a stable value of about 12% of the Portuguese export sales.

In 2016 exports of chemical, plastics and rubber products reached the value of €6.5 billion.

Against 2015, this value increased 3.3%.

## Chemical Exports

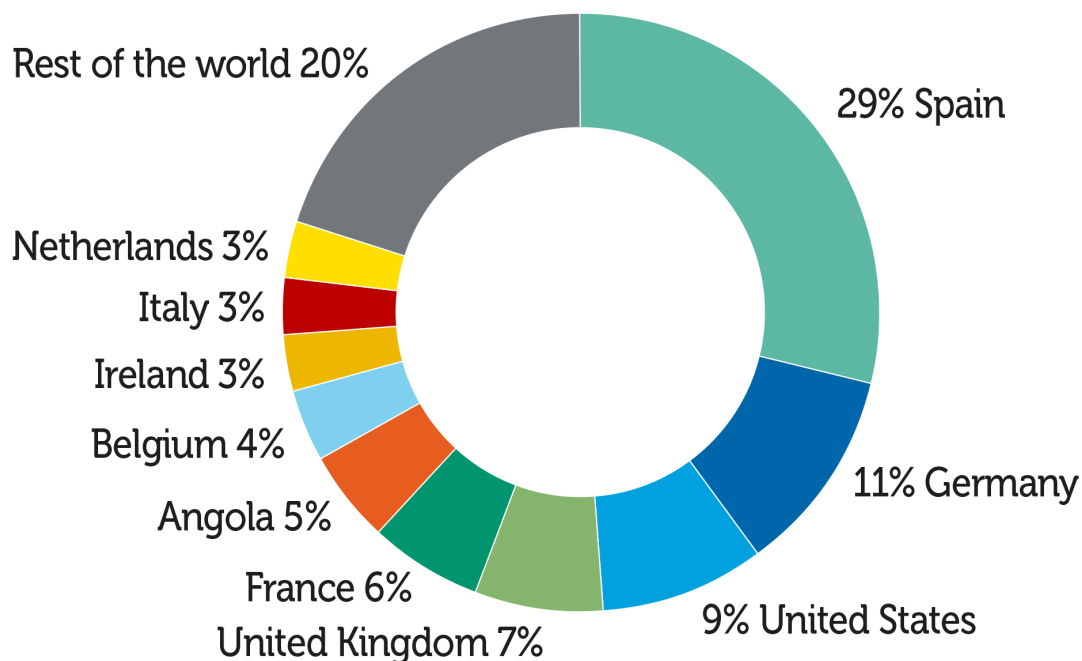


## Chemical industry\* in 2016 (€ million)

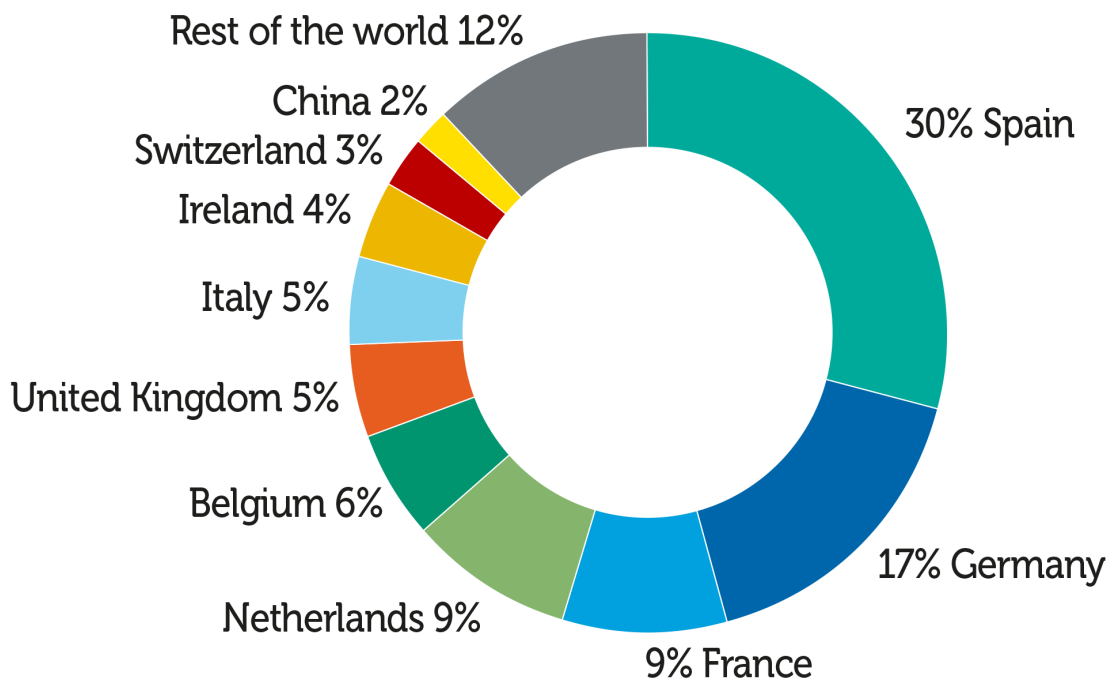
	Export	Change compared to 2015	Import	Change compared to 2015
Intra - EU	2,253	+5.6%	6,359	+1.9%
Extra - EU	953	-1.5%	946	-8.6%
<b>Total</b>	<b>3,205</b>	<b>+3.4%</b>	<b>7,305</b>	<b>+0.4%</b>

\* Chemicals + Primary forms of plastics (ethylene, propylene and PVC)

Chemical exports - main destinations (2016)



Chemical imports - main origins (2016)



Structure of the chemical industry in Portugal

In 2016 there were about 790 companies included in CAE 20. Most of companies classified as chemical industries were small and micro companies, mostly operating in the area of the consumption products.

Larger operators are involved in activities such as basic chemicals, fertilizers, petrochemicals, polymers and, with less importance, fibers and specialties. There is also a small but dynamic group of companies in the fine chemicals area with its own know-how and a significant contribution to exports.

## Number and size of chemical companies

NACE 20 - Manufacture of chemicals, chemical products and man-made fibres, except pharmaceutical products.

### Key facts 2016

	NACE 20	% in Section C*
Number of companies	790	1.2%
Personnel employed	12,472	1.8%
Turnover (€ million)	4,341	5.3%
Gross fixed capital formation (€ million)	143	3.9%
Gross added value (€ million)	859	4.3%

\* Manufacturing industry

## Location of the main chemical industry hubs

Geographically, the chemical industry in Portugal is mostly located in two defined chemical industry hubs in Estarreja and Sines, and in the industrialized areas of Lisbon and Oporto.



- 1 Porto Area**

  - Aromatic production in Matosinhos Refinery (Benzene)
  - Chemicals Specialities
  - Industrial Gases
- 2 Hub of Estarreja /Aveiro**

  - Nitric Acid, nitrobenzene, aniline, hydrogen, carbon monoxide, chlor/alkalis and methylene disocyanate (MDI)
  - Urea-formaldehyde resins
  - PVC
- 3 Lisbon Area**

  - Fertilizers
  - Fibers and Reinforcement technical fibers
  - Chemical Specialities and Pharmaceuticals
  - Industrial Gases
- 4 Pole of Sines**

  - Refinery and petrochemical complex - Ethylene
  - Polyethylene, Butadiene and ETBE plants
  - Terephthalic acid plant (PTA)
  - Urea-formaldehyde resins
  - Industrial Gases

## Oporto Area

In Oporto Area and close to a large harbor, a refinery is located. This refinery includes an aromatics plant with a capacity of 400 kt /y, where raw materials for the chemical industry, such as benzene, toluene and ortho xylene, are produced. Benzene is used as a raw material at Estarreja, the other products being exported. Several small industries, supplying chemicals for other industries, can be found in the Oporto Area.

## Hub of Estarreja/Aveiro

This hub has a significant supply chain integration, accounting for 10% of the total Portuguese chemical industry. Methylene Diphenyl Diisocyanate, or MDI, is the most important output and is produced mainly for export.

Nitric Acid, nitrobenzene, aniline, hydrogen, carbon monoxide and chlor / alkalis, are also produced in this hub by different companies. Large quantities of these products are used in the production chain of the MDI, but external sales are also significant. The output of this hub includes other less important products associated with the above main products.

Also located in the same area are other chemicals plants such as PVC and urea-formaldehyde resins.

One of the main raw materials, benzene, comes from a refinery located in Matosinhos (Oporto), about 45 kilometers (km) away. Other raw material, ammonia, is brought by rail from the Lisbon area (300 km), while VMC (vinyl chloride monomer) comes by pipeline (25 km) from the port of Aveiro.

This hub is considered an efficient site, mainly export-oriented, with good links with universities mainly Aveiro (about 20 km away), Porto (40 km) and Coimbra (80km).

Concerning logistics, the hub uses the port of Aveiro (25 km), railways and a motorway junction (enabling connections with the whole of Portugal, Spain and Europe). There are some points which can be improved, such as the transport of benzene and the railway connection with the harbor of Aveiro.

The strong dependency on one output (MDI) is the weak point of this hub, limiting the development strategy.

## Lisbon Area

In the past there were two important hubs for chemicals in the Lisbon area. Since 1985, for competitiveness and environmental reasons, plants producing basic chemicals, which were the basis of these hubs, have been disabled.

The Lisbon area has still sizable chemical units in the field of middle-sized plants such as fertilizers, fibers + reinforcement technical fibers, specialties and pharmaceuticals. These industries are not interconnected, and the plants are in different locations, so they do not constitute a chemical complex. Their competitive edge comes from the importance of Lisbon as a consumption center, not only for the final consumers but also for downstream users, together with the good logistic conditions, such as the port of Lisbon, railways, motorways and from the central location in terms of the country.

Lisbon has two universities featuring high quality schools of technology.

The sales of the chemical industry in the Lisbon area are roughly estimated to represent about 35% of the national total.

### **Pole of Sines**

Sines is a petrochemical complex, planned in the early 70s, at the coast and 150 km south of Lisbon. The construction started in the middle of that decade, with a 10 million tonnes refinery and an ethylene plant. The ambitious initial plan was affected by the two oil crisis, and the growth of the complex was slower than planned. At present, in the addition to the refinery and to the Ethylene plant, there are plants for the production of polyethylene, butadiene, and ETBE (ethyl tert-butyl ether). In the same complex there are also plants for the production of PTA (terephthalic acid) and urea formaldehyde resins. Local utilities include a large coal power plant.

The sales from Sines represent about 20% of the Portuguese Chemical Industry. This figure can be some points higher, with the stabilization of the 600 Kilotonnes /year PTA plant.

The main logistic strength of the complex is a deep water harbor (28 meter) capable of receiving ships up to 350 Kilotonnes (kt). This harbor, planned together with the refinery, now receives different kinds of bulk cargoes, including liquefied gases, liquids and solids. A container terminal was added some years ago. Near the harbor there is a large LNG storage facility, linked with a LNG maritime terminal connected with natural gas transport network. The complex also has a railway connection.

The refinery recently underwent a deep revamping and its competitiveness has been improved.

The future development of the petrochemical complex is strongly dependent on the competitiveness of the Ethylene plant.

## **HOW ARE WE DOING**

### **Strengths**

- Logistics



Portugal, being a peripheral country in Europe, is well placed in relation with other continents – North America, South America and Western and Northern coast of Africa.

The expansion of the Panama Channel will allow much larger ships to pass through it, and most of the traffic between Asia and Europe is expected to use it. Then Sines will be the closest European harbor. The railway connections between Sines and Europe are already being improved and the general logistic conditions of this hub will improve considerably.

Sines has good conditions for receiving liquefied natural gas (LNG) from the US and will be an appropriate entry to Europe, as soon as the capacity of the pipelines between Spain and France is increased

- Know-How

The chemical industry in Portugal is supported by the availability of competences at the different levels, at reasonable costs. There are good chemical engineering schools and the research in the universities has been improving considerably during the last 15 years.

## Weaknesses

- The value chain in the Portuguese Chemical Industry has significant gaps, mainly in the field of intermediate products, making the production processes often not completely integrated.
- Electricity costs are higher compared with the average in Europe, especially as regards big consumers. The electric power connections between Iberia and the rest of Europe are poor, making it difficult to develop of a real competitive market in Portugal and Spain.
- Portugal does not have natural gas reserves. There are good facilities to import LNG, but pipeline connections are limited to just one supplier (Algeria). This means that price of natural gas cannot be better than in other European countries, which means high figures compared with other world regions.

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The segment of chemical specialties for the manufacturing of pharmaceuticals has been quite dynamic in Portugal during the last years. The number of companies in this segment is limited, but their growth, both in terms of number of patents, production and employment, has been quite substantial. The cost of energy and the difficulties of financing are not relevant for this segment, which supports its ability to grow in the development of know-how and in the availability of qualified human resources at reasonable costs.

Production of Nano-materials is being developed in Portugal, with one company already able to offer products based on its own proprietary and unique technology. Additionally, the Iberian Nanotechnology Lab, located in the north of Portugal, with its state of the art facilities and top researchers from all over the world is expected to drive the widespread of nanotechnology throughout the industrial landscape.

The segments related with forest products should also be watched. Portugal has an extensive area covered by pine

and eucalyptus woods which support developed industries of cellulose, paper and wood based panel production. These industries induce the development of several segments of chemicals. For instance, they justify the existence of plants of Urea formaldehyde resins and they are important consumers of the chlor-alkali products. Related with the pine woods, there are some chemical companies producing derivatives of the resins, which are quite competitive in the external market.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/portugal/>



## Romania

### Romanian Chemicals Producers and Distributors Association (APDCR)

Number of companies

**979**

Turnover

**€2.3 billion**

Direct employees

**22,500**

National contact



Alexandru Badea  
President

[alexandru.badea@brenntag.ro](mailto:alexandru.badea@brenntag.ro)

## GENERALITIES

Country's economy grew by 4.8% in 2016, the highest since 2008 and the third fastest in the EU.

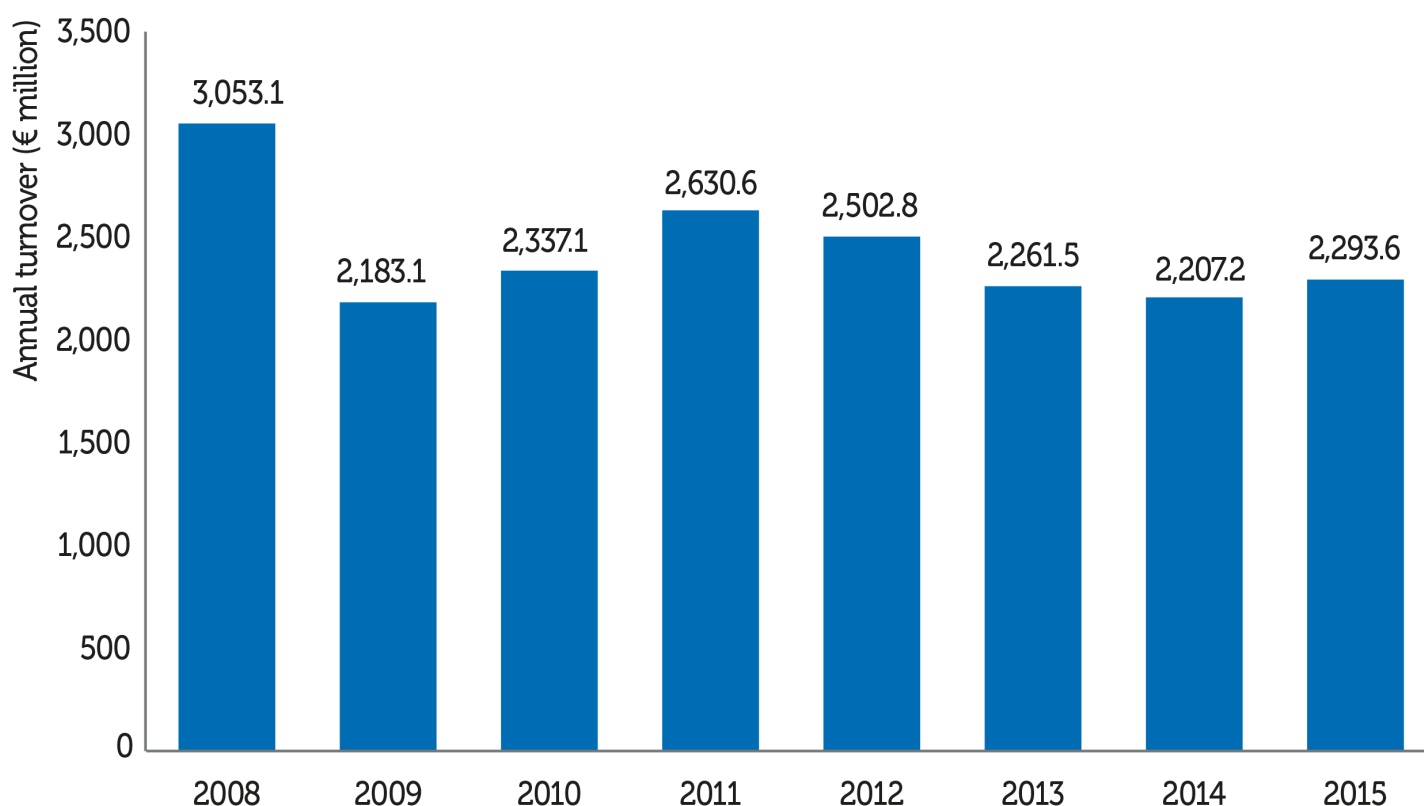
Romania's priorities for the period 2017-20 include investments in infrastructure, job creation, SME's development and focus on health care and education.

## CHEMICAL INDUSTRY SNAPSHOT

### Smaller, but still sizeable

In 1990 the Romanian chemical industry achieved a record value of turnover, but since then over 85 large enterprises have disappeared. In 2016 the structure of chemical industry indicates a total number of 2,052 companies with a significant value of turnover (in the table provided we included wholesalers (1,158 companies, with approx. €2.43 billion turnover) and agents involved in the sales of fuels, ores, metal, chemicals (577 companies, with approx. €1.1 billion turnover).

## Turnover of chemicals and chemical products manufacturing in Romania from 2008 to 2015



Source: Eurostat © Statista 2017

## Structure of chemical companies in 2016

Structure based on NACE codes	Turnover (EUR)	Nr of companies
Extraction of minerals for the chemical and natural fertilizers industry	618,751	7
Manufacture of other basic inorganic chemicals	148,297,558	45
Manufacture of other basic organic chemicals	292,758,049	82
Manufacture of pesticides and other agrochemicals	97,444,012	23
Manufacture of other chemical products n.c.a.	170,816,782	160
Agents involved in the sale of fuels, ores, metals and chemical products for industry	1,094,240,143	577
Wholesale of chemical products	2,429,956,672	1,158
<b>Grand total</b>	<b>4,234,161,973</b>	<b>2,052</b>

According to Eurostat SBS Database, the number of companies operating in the Romanian chemicals industry amounted to 979 in 2016. The number of people directly employed by the Romanian chemicals business was about 22.5 thousand in 2016. Capital spending invested in the chemicals business in Romania was about €271 million in the

same year and according to the same EU source.

Source: National Institute of Statistics

## Overcoming complex problems

Following the shift to free market economic policies that began in 1990, large state-owned production facilities, hampered by obsolete technology, high production costs and low productivity had to be restructured and privatized.

Economic contraction reduced demand for chemical products and key external markets were lost, while the remaining industry fragmented from 97 companies in 1990 to 3,500 by end-2006.

## Signs of recovery

The number of chemical manufacturers in Romania dipped to 824 in 2012 but since then began to recover.

Important players in the chemical industry foresee joining synergies and increasing efforts for competitive presence on the market.

## Romania's chemical industry in 2016

<b>Basic chemicals</b>	12 companies
No. of employees	4,379
Annual turnover	€ 441 million
<b>Paints, varnishes and inks</b>	12 companies
No. of employees	3,026
Annual turnover	€ 310 million
<b>Lubricants</b>	7 companies
No. of employees	374
Annual turnover	€ 178.8 million
<b>Adhesives</b>	3 companies
Nr. of employees	264
Annual turnover	€ 128.4 million
<b>Rubber products</b>	5 companies
Nr. of employees	751
Annual turnover	€ 39.9 million
<b>Chemicals trade</b>	10
Nr. of employees	599
Annual turnover	€ 488.5 million
<b>Plastic products</b>	25 companies
Nr. of employees	6,712
Annual turnover	€ 604.8 million

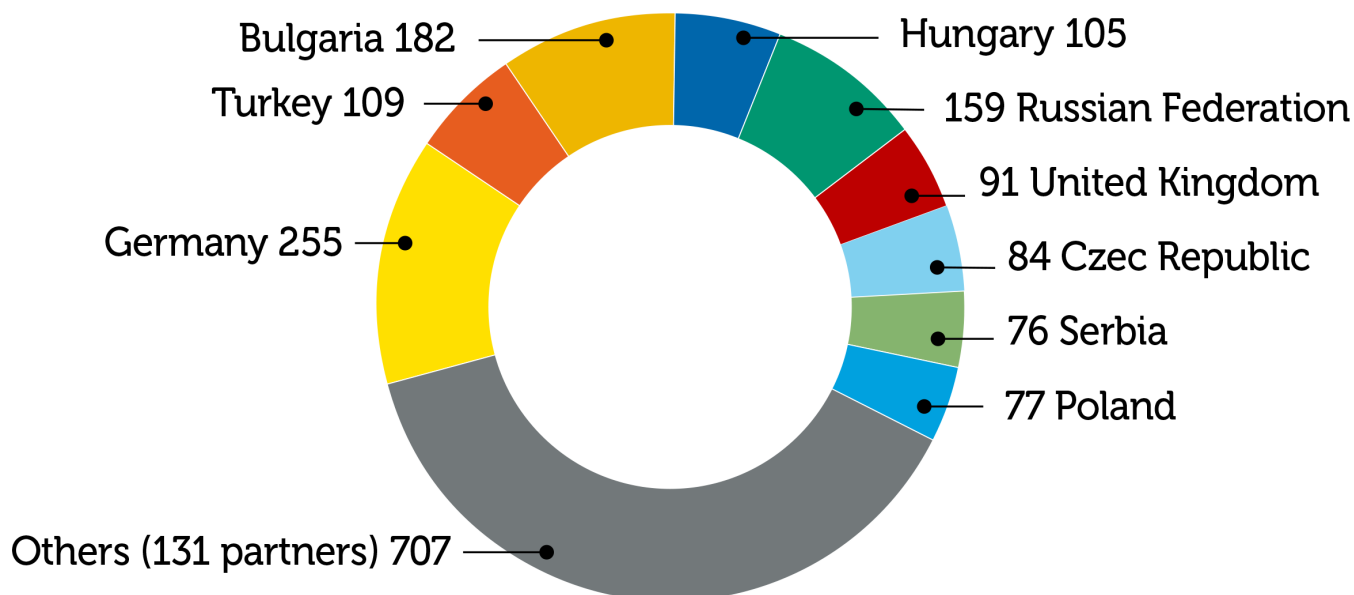
Source: Major Companies Romania 2017

## Chemical exports in 2016

The total value of chemicals exported in the world is US\$ 1,924,1 million.

In 2016, the top partner countries to which **Romania Exports** Chemicals include **Germany, Bulgaria, Russian Federation, Turkey** and **Hungary**.

### Chemical exports in 2016 (in US\$ billion)



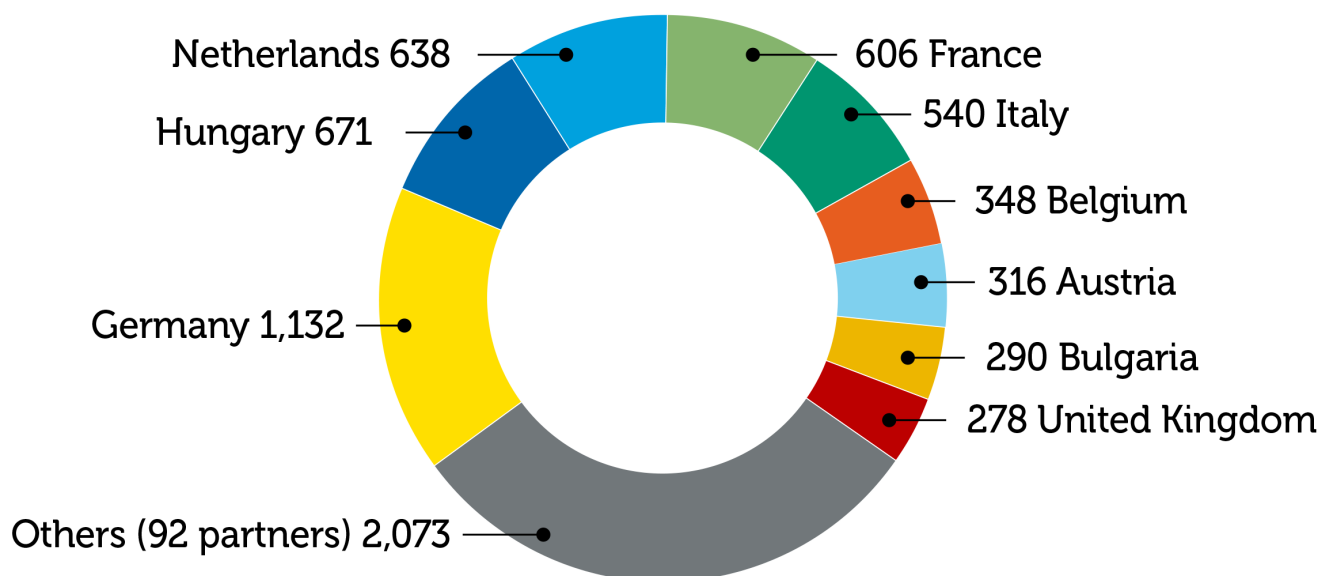
Source: <https://wits.worldbank.org/CountryProfile/en/Country/ROM/Year/2016/TradeFlow/export>

## Chemical imports in 2016

The total value of chemicals imported is US\$ 7,155 million.

In 2016, the top partner countries from which **Romania Imports** Chemicals include **Italy, Hungary, France** and **Poland**

### Chemical imports in 2016 (in US\$ billion)



Source: <https://wits.worldbank.org/CountryProfile/en/Country/ROM/Year/2016/TradeFlow/Import>

### Continuing progress

Three factors are expected to aid further improvements in chemical industry competitiveness:

- Development of industrial clusters as part of regional development
- Enhanced spending on Research & Development and Innovation, to meet a target 2% of GDP (public and private funding)
- Cohesion policy contributes to reach competitiveness goals

### HOW ARE WE DOING?

#### Strengths

- A strong petrochemical base
- Important natural resources and energy self-reliance
- Good level of regulatory compliance (EHS/Quality)
- Strategic location in the centre of Europe
- FDI potential
- A mature market - growth is export
- EU membership
- Hub for Central and Eastern Europe
- Long tradition chemical production

#### Weaknesses

- Lack of innovation and specialization
- Aging population, and falling numbers Poorly- educated and trained labor force
- Rising labor and energy costs
- Heavy administrative and regulatory burden; over regulation in some cases
- Limited access to leading technologies
- Vulnerability to imports and external shocks
- Poor infrastructure ( transport mainly)
- Lack of know-how
- Inadequate links between companies and research institutions for developing new products and improving technology
- Pressure to increase taxes and fees arising from public sector deficit

### **OUR CONTRIBUTION TO A COMPETITIVE EUROPE**

Economic enabling strategies have been developed, aligned to the EU's 2020 strategy. These include national industrial policy (SRR), export strategy, (SNE), Mining Strategy 2017-2035, Romania's Energy Strategy 2016-2030, with perspectives for 2050 and the competitiveness and Innovation strategy (SNCI).

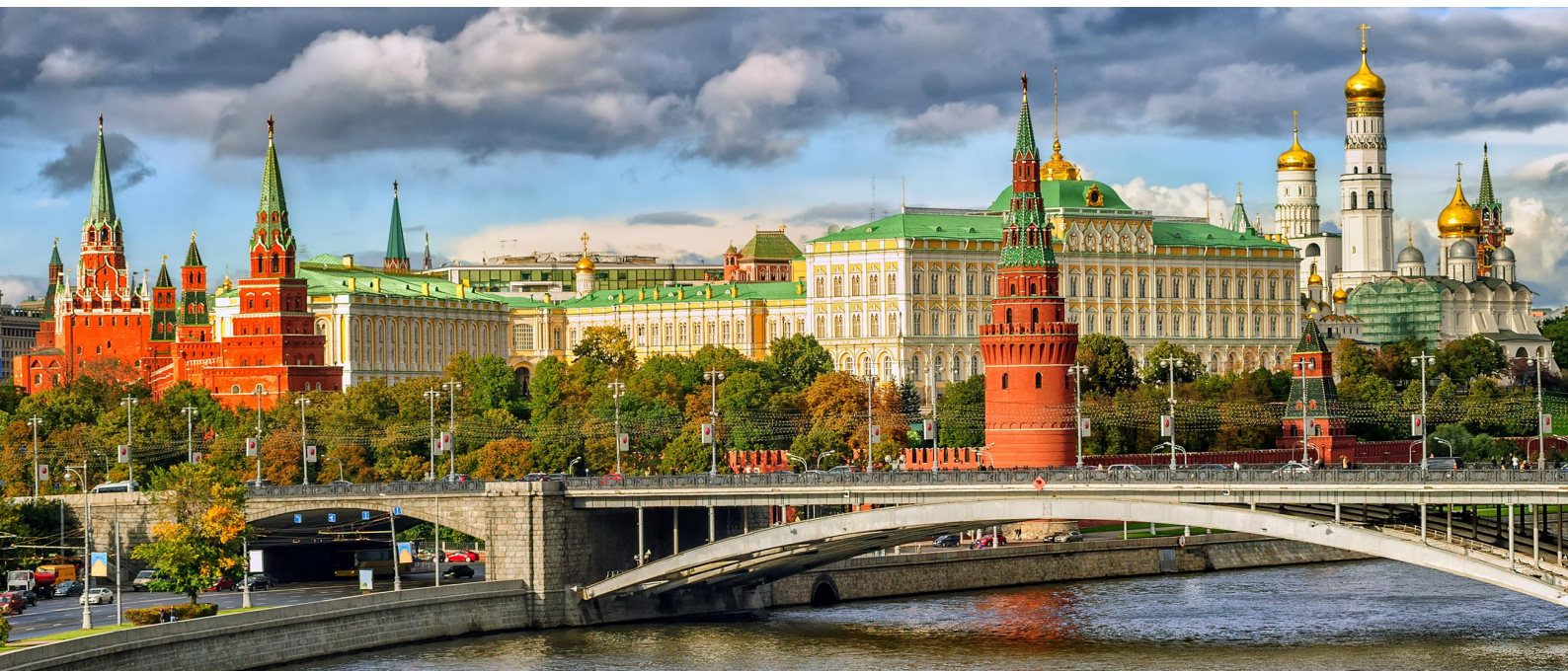
Government sets overall horizontal framework conditions across energy, research, education, and infrastructure, but these strategies are sometimes of more political than practical relevance.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/romania/>





## Russian Federation

### Russian Chemists Union (RCU)

Number of companies

**3,500**

Direct employees

**> 650,000**

National contact



Victor Ivanov  
President  
[press@ruschemunion.ru](mailto:press@ruschemunion.ru)

## CHEMICAL INDUSTRY SNAPSHOT

### Central to the economy

The chemical industry is a key part of the national economy and industry in Russia. In 2017, the value of chemical and petrochemical output was approximately Roubles 3,600 billion, up 5.6% year-on-year and equal to 3.7% of gross domestic product (GDP).

### Deep and broad

Russia's chemical industry has some 3,500 large enterprises and SMEs, and 100 scientific and design organisations and experimental plants. Together they employ approximately 650,000 production workers.

## Fuelled by oil and gas

Drawing on massive oil and gas reserves, the industry has developed ethylene complexes and ammonia plants, and expanded production of finished products.

## Getting greener

The Russian Government, the Ministry of Industry and Trade and the Ministry of Energy have recently focused their attention on the strategic role of the chemical industry for a sustainable economy. In 2017, the government approved a new legislation on waste management.

## Spread across the country

Geographically, the chemical industry is significantly represented in 44 of Russia's 83 regions. Chemical and petrochemical production clusters are led by five main big companies:

- **Sibur holding company:** – SIBUR Tobolsk, in conjunction with the Zapsibneftekhim project is an anchor enterprise of the Tobolsk cluster, which includes an R & D centre and a local university.
- **Nizhnekamskneftekhim:** an anchor enterprise whose business activities embrace supporting R&D centres and cooperation with universities involved in the processing of petrochemical products in Nizhnekamsk, Krasniye Polyany, Kazan and other clusters.
- **PhosAgro:** leads at Cherepovets city and Apatity
- **EuroChem:** is the champion of Belorechensk city, Novomoskovsk city and elsewhere
- **Gazprom Neftekhim Salavat:** leads at the Salavat city cluster in the Republic of Bashkortostan

## HOW ARE WE DOING?

### Strengths

- Huge raw material resources
- Investment in processing and infrastructure
- Active development of chemical clusters

### Weaknesses

- Need to meet multiple standards (The Eurasian Economic Union, the Customs Union, OECD)
- Low labour productivity
- Modernisation is still ongoing

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### A threefold development strategy

Three major initiatives will contribute to further development of chemical production in Russia:

- Increased public focus upon the industry's development via the government's Development Strategy of Chemical and Petrochemical Industries until 2030 Implementation of projects such as the RUSNANO research

- programme, and substantial efforts at large Russian companies and research universities
- Construction of the Amur Gas Processing Plant, a joint project involving the SIBUR holding company and Gazprom, and of the Amur Gaschemical Complex in the Far Eastern Federal district. These will form the world's largest project for the production of specialty chemicals, ethylene, and polymer products

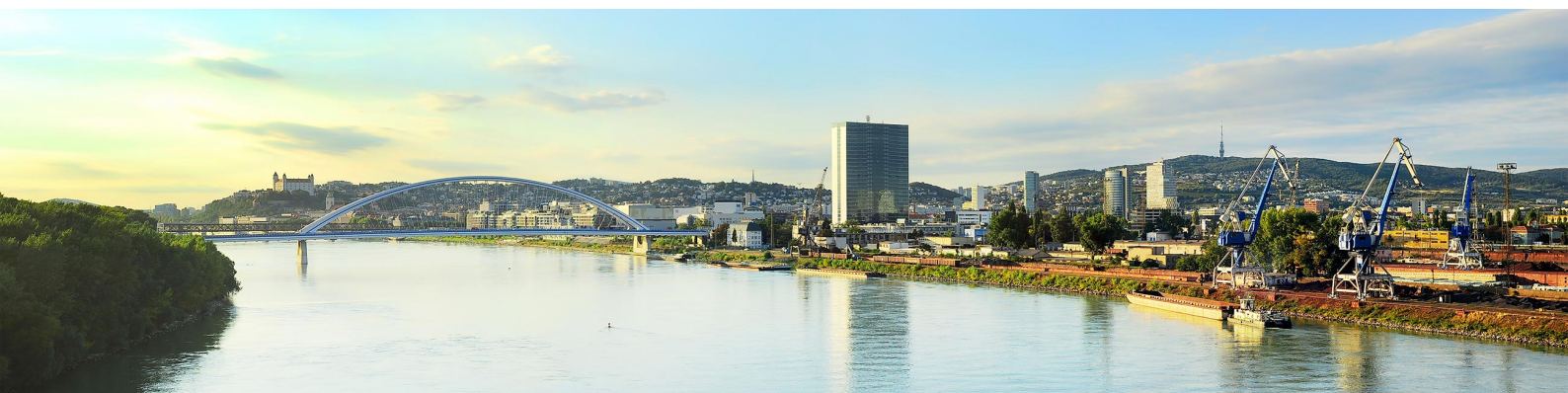
### **Opportunities for Growth**

- Labour productivity
- Demand growth in Russia's domestic market (including car assembly by leading automakers, a construction boom and agriculture development)
- Regional development (the Eurasian Economic Union, China, European Union, etc)

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/russian-federation/>



## Slovakia

### ZCHFP - Association of Chemical and Pharmaceutical Industry of the Slovak Republic

Number of companies

**1,776**

Turnover

**€9,809 million**

Direct employees

**9,300**

R&D investment

**€641 million**

National contact



General Secretary  
Silvia Surova  
surova@zchfp.sk

## CHEMICAL INDUSTRY SNAPSHOT

### Basic macro-data on Slovakia

- Population: 5.4 million
- Area: 49 thousand km<sup>2</sup>
- GDP: €14,910 per capita in 2016
- Currency: euro (€) as of January 1, 2009

In the 1990s the Slovak chemical industry was influenced by three significant factors: partition of Czechoslovakia, orientation from eastern markets to western ones and privatisation. Some chemical companies successfully transformed and survived this period, some were bought by foreign investors, and others did not take roots in the new market environment and exited the market. The first decade of new millennium represented stabilization, integration to EU market and new investments.

Data for 2016 show the chemical sector with the sales of €9,809 million, translating to an 11.87% share of total Slovak industry sales. The Slovak chemical sector has 11.1% and 13.5% shares of total exports and added value respectively. The chemical sector is ranked third in terms of Slovak industrial production, followed by the automotive and electro-technical sector.

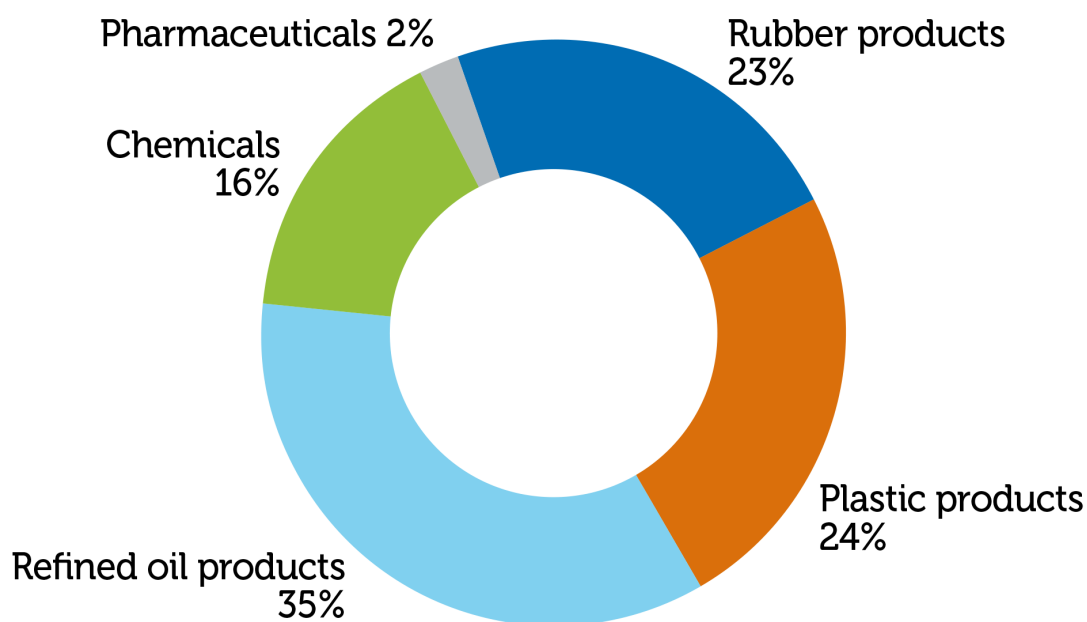
**Chemical sector and its share of total industrial manufacture of Slovakia in 2017**

Indicator sector	Unit	Chemical	Industrial manufacturing in total	Share of chemical sector
Sales	€ million	9,809	82,647	11.9%
Employees	Persons	45,116	418,297	10.8%
Exports*	€ million	7,802	70,074	11.1%
Imports*	€ million	42,680	404,116	10.6%
Added value	€ million	2,148	15,683	13.7%

\* data 2016

Shares of particular sectors on the total sales of chemical products in the Slovak Republic (%).

Total sales in 2017: € 9,809 million


**Foreign Trade**

## Commodity structure of Slovak exports and imports of chemical products by sub-sectors in 2016

Sub-sector	Unit	Exports	Imports	Balance
Refined petroleum products	€ million	1,449	810	639
Chemicals products	€ million	2,284	3,832	-1,548
Pharmaceutical products	€ million	523	1,769	-1,246
Rubber and plastic products	€ million	3,545	2,858	687
Chemical industry in total	€ million	7,802	9,267	-1,465

There were in 2016 (31 Dec 2016) 285 manufacturing companies in Slovakia's chemical and pharmaceutical sector with the number of employees over 20, 44% small companies, 42% of medium size and 14% of them were large with 250 or more staff.

As to the international comparison, total sales of the Slovak chemical industry represent up to 1.8% of the EU's sales and some 0.3% of total world sales (2016).

### SITUATIONAL ANALYSIS OF THE CHEMICAL INDUSTRY

Industrial production is located mainly in the west part of Slovakia which is formed by Bratislava, Trnava, Trenčín and Nitra Self-governing Regions. These western regions have a 60% share of Slovakia's total GDP (2016). Central Slovakia is formed by Žilina and Banská Bystrica Self-governing Regions, with a share of 20%, and the Eastern part, formed by Prešov and Košice Self-governing Regions, with a 20% share of total GDP. The highway connection between the west and the east of Slovakia is still not finished, which is a big handicap – mainly for Prešov and Košice regions. It is to be finished by about 2020.

The chemical industry is also concentrated mainly in the western part of Slovakia where oil refinery, production of primary plastics, rubber products (tyres), fertilizers, coatings, pharmaceuticals, plastic products are located. Production mainly focuses on of man-made fibres, plastic foils and other chemical products in central and eastern Slovakia. Many small- and medium-sized companies are geared to the production of rubber, plastic and other products for the automotive industry. There are three big car factories: Volkswagen, Peugeot-Citroen and KIA, located in the western part of Slovakia. A total number of over 1,3 million cars manufactured in 2016, the equivalent of 191 units per 1 000 inhabitants, the most of any country in the world. A new plant of Jaguar Land Rover Company is under construction near the town of Nitra.

As far as the accessibility of universities and research technology organisations is concerned, there are three universities important for the industry: Comenius University and Slovak University of Technology both located in Bratislava, and the University of Technology in Košice in eastern Slovakia. There are four private R&D Institutes geared mainly to the chemical sector: R&D of chemical technology, petrochemicals, plastics, and man-made fibres. There is good co-operation between specialised faculties of the universities, R&D institutes and the Slovak Academy of Science, a state institution. Lack of state support for applied R&D is a significant issue for the Slovak chemical industry. In 2016 there were €641 million of financial means for the whole R&D in Slovakia, of which €263 million from state and public funds, €296 million from the private sector, which in total represented 0.79% of the Slovak

GDP. At the beginning of 2013 the government prepared the material Strategy of Research, Development and Innovations in the Slovak Republic till the Year 2020. ZCHFP SR and its members very actively participated in the preparation of the material.

## HOW ARE WE DOING

### Strengths

- Central location, possibility to act as a connecting territory between the north and the south, the west and the east of Europe (Ukraine, Russia)
- Availability of oil (Družba pipeline) and gas (Bratstvo pipeline) from Russia
- Relatively low labour costs
- Euro-zone membership
- Sound and stabilised banking sector
- Well-educated and skilled people
- Tradition of chemical production in all regions
- Research and development capacities ready to join new projects

### Weaknesses

- Slovakia is short of most raw materials that are important for chemical production
- Uncompleted highway infrastructure
- Relatively high prices of electricity
- High dependence on Russia (and Ukraine) for gas deliveries

The combination of the above-mentioned strengths gives Slovakia a good advantaged position in general.

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

In particular, the Slovak chemical sector can build its future progress on good cooperation between universities, the Slovak Academy of Science, the private R&D institutes and R&D departments of advanced manufacturing companies. Their cooperation within the Projects Nanoforce, FreeFOAM and INNOCHEM is one of the best examples.

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/slovakia/>



## Slovenia

### Chamber of Commerce and Industry of Slovenia (CZS)

Number of companies

**781**

Turnover

**€5.4 billion**

Direct employees

**28,000**

National contact



Darja Bostjancic  
Director  
Darja.bostjancic@gzs.si

## CHEMICAL INDUSTRY SNAPSHOT

### One of the main pillars of the economy

The chemical industry is one of the main pillars of the Slovenian economy, generating €5.4 billion of sales in 2016, some 21% of the country's industrial output. Chemical manufacturing has a long tradition here<sup>[1]</sup>.

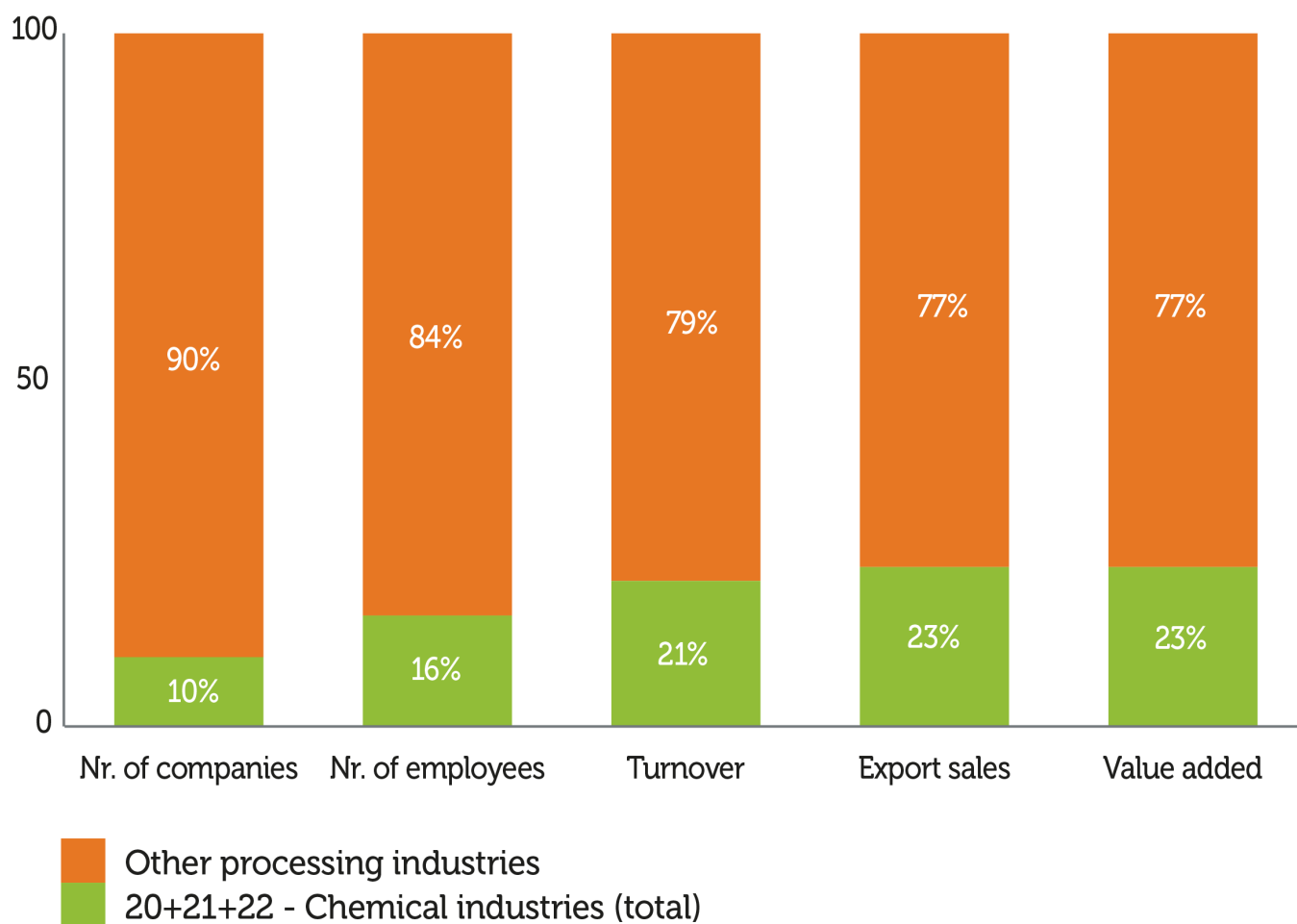
[1] data for year 2016

### And a leading employer

Production of chemicals and chemical products, manufacture of pharmaceutical raw materials and preparations and of rubber plastic products together employed almost 28,000 people.



### Slovenia - Chemical industries' position within the processing/manufacturing industries, 2016



Source: KAPOS GZS 2016

#### Pharmaceuticals dominate

There are 781 chemical industry companies (95% of them SMEs<sup>[2]</sup>). Many of the largest, though few in number, are in pharmaceuticals, which account for 39% of chemical industry output by sales value.

[2] size defined according to the Slovenian Companies Act

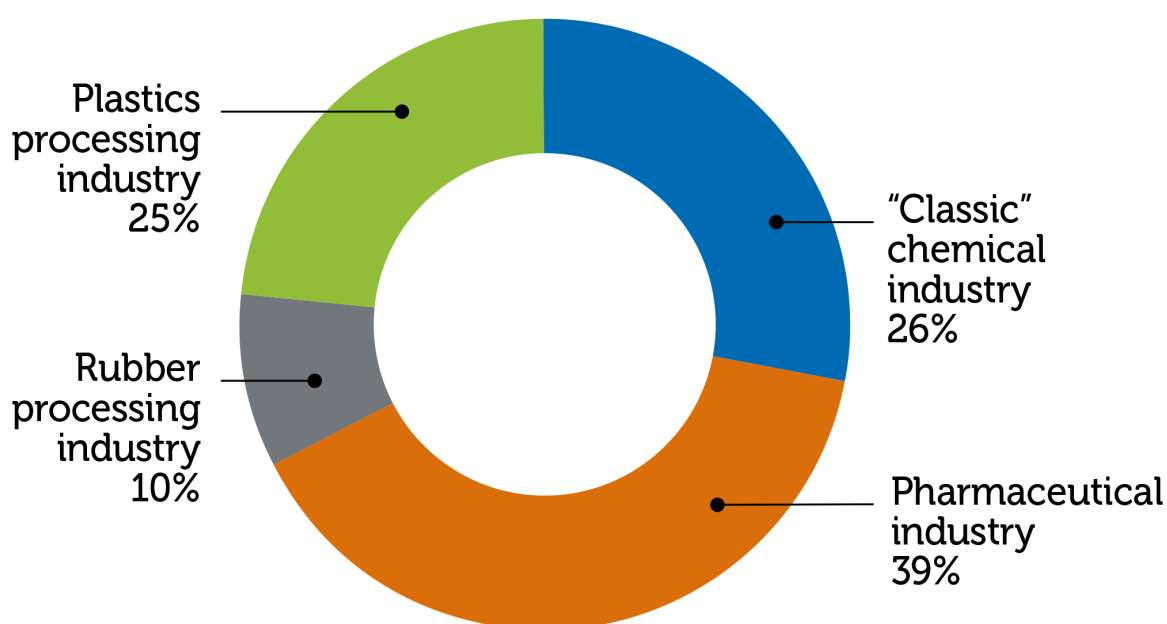
#### Automotive is a major customer

Overall, two-thirds of companies are involved in plastic processing. Many of these supply the automotive industry, or advanced packaging products for industrial and consumer use.

Main products of the traditional chemical industry include pigments, coatings and paints, adhesives, artificial fibres, some inorganic basic chemicals and some types of consumer chemicals (e.g. cosmetic products).

The rubber processing industry produces tyres, rubber belts, environmental protection equipment and rescue products.

## Turnover structure per segments of chemical industry in Slovenia, 2016 (total = €5,4 billion)



Source: KAPOS GZS 2016

### Geared up to export

The chemical industry is largely export-oriented: exports are 80% of sales by value, reaching 95% in pharmaceuticals. In rubber products 80% of output is exported, and for classic chemical products the share is 75%, falling to a slimmer 62% of plastics.

### HOW ARE WE DOING?

#### Strengths

- Well-educated, qualified, skilled and internationally-savvy workforce
- An extensive transport network and a convenient deep-sea port
- A geostrategic position in *Central Europe* between the Alps and the Mediterranean

- A gateway between Western and South Eastern Europe, with good knowledge of Balkan countries' culture and markets

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Encouraging applied R&D

The *Research and Innovation Strategy of Slovenia 2011-2020* explicitly calls for more efforts to promote and facilitate more applied R&D (responding to industry requests) to bring more innovative products to the market.

Slovenian universities and R&D institutions are sound, and some institutions are recognised internationally, offering significant support to the chemical industry.

### Tackling society's challenges

Though some chemical companies have long worked closely and productively with R&D institutions, others need to make up lost ground, while R&D institutions need better funding.

The *Slovenian Industrial Policy 2014-2020* identifies chemical sectors whose technologies address key societal challenges, such as the environment, energy, sustainable production and consumption, food, human health and ageing.

### Smart Specialisation Strategy

*Slovenia's Smart Specialisation Strategy (S4)* priorities include Development of Materials (with smart multi-component materials and coatings) and Health (with biopharmaceuticals, diagnostics and therapeutics in translational medicine, cancer treatment, resilient bacteria and natural medicines and cosmetics).

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/slovenia/>



## Spain

### Federación Empresarial de la Industria Química Española (FEIQUE)

Number of companies

**3,000**

Turnover

**€63.1 billion**

National contact

Capital spending

**€2.1 billion**

Direct employees

**193,500**



Juan Antonio Labat  
Director General  
[jal@feique.org](mailto:jal@feique.org)

## CHEMICAL INDUSTRY SNAPSHOT

### Now Spain's second-biggest industry

In 2017 chemicals, including pharmaceuticals but *not* plastics and rubber products, became the second largest industry in Spain, accounting for 12.8% of manufacturing gross product. It generated value of about €19 billion on sales of €63 billion – outpaced only by the massive food, beverages & tobacco industry.

### Bucking the trend

Since the beginning of the economic crisis in 2007, the chemical industry has increased sales by 27%, even as Spanish industrial production overall slumped 20%. Spain now ranks among the seven biggest chemical countries in Europe.

### Becoming a strategic sector

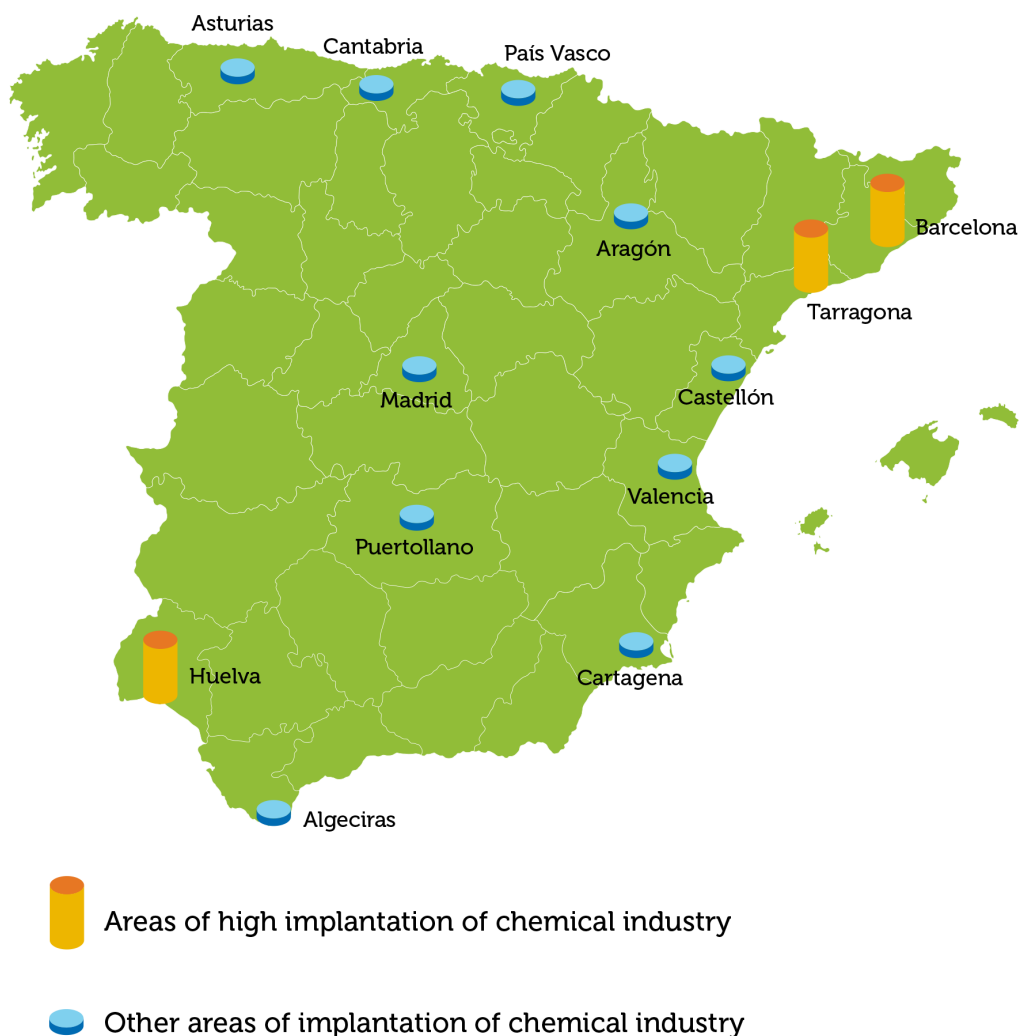
The chemical industry is the second-largest exporter of the Spanish economy, and the leading investor in R&D (25% over the total industry) and environmental protection. In 2009 government declared it a strategic sector.

## Main figures of the Spanish chemical industry

Number of companies	(2017)	3,118
Sales	(2017)	€63.1 billion
Manufacturing Gross Product Contribution	(2016)	12.8%
Exports	(2017)	€35.3 billion
International Sales	(2017)	56% of total
Direct Employees	(2017)	193,500
Indirect Employment (2015)	(2017)	464,420
Sales by Employee	(2017)	€326,000

**Catalonia** region produces 43% of Spain's chemicals.

**Tarragona**, a region located in the south of Catalonia, has one of the largest petrochemical clusters in southern Europe, producing 23% of Spain's chemicals. The site produces about 21 million metric tonnes (MMT) per year and employs 10,000 people, generating more than 30,000 jobs in related activities. It is closely linked to local universities and research bodies.



**Madrid** region provides 13.5%, mainly pharmaceuticals and detergents.

**Andalusia** in the south produces 12.7% of output and includes Spain's second largest chemical site at Huelva, where main outputs are organic and inorganic chemicals. The site employs 7,869 people directly and indirectly and generates a production value of about €8.2 billion.

**Valencia** region accounts for 8.4% of Spanish production. Together these four regions produce 78% of Spain's chemicals.

## HOW ARE WE DOING?

### Strengths

- Easy market access to high growth regions in Northern and Western Africa, Mediterranean Countries and Latin America. A gateway to EU chemicals market
- High national chemical consumption

- Largest chemical cluster in the Mediterranean
- 46 seaports with international shipping facilities
- Europe's biggest (15,600 km) motorways network, making for great logistics
- 60 tonne trucks authorised
- 3 Trans-European rail networks
- Flexible labour market and competitive labour costs
- Strong collaboration with authorities in the development of national R&D&I strategies and programmes
- Strong collaboration with universities and business schools, research centres, chemical engineers and professional associations
- Largest gas infrastructure in Europe, including seven regasification plants enabling diversity of supply
- National Competitiveness Plan for the Chemical Industry
- Strong public support for the chemical industry, backed by a social responsibility certification programme
- Strong alliance with other industries: Alliance for the Competitiveness of Industry (chemical, automotive, steel, refinery, paper, food & beverages, and concrete industries); Energy Industrial Platform (15 sectors)
- Biggest growth of the economy and consumption in the Eurozone countries

## Weaknesses

- Lack of domestic raw materials production
- Weak access to European Energy Market

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Driving down power and transport costs

Electricity and gas reforms were completed in 2015 to reduce energy costs.

The national logistics strategy for the chemical industry (2015-2020) aims to develop infrastructure and services for main chemical plants and clusters.

### National Competitiveness Plan for the Chemical Industry (€200 Million yearly from 2010)

- Started in 2013 and no end foreseen
- Objective: finance new investments and competitiveness improvements

### New Industrial Policy

- Starting 2018. Encompass 13 sectorial policies for strategic industries (including chemical industry)
- Objective: increase industry contribution to GDP (20%)

### Others

- National strategy R&D+I plan
- Supporting programme for innovative clusters
- Innovation support programme for SMEs

## Links to Research Infrastructure

- Strong links created with university research infrastructures via partnership between Feique and the Association of Chemical Engineering and Chemistry Faculties, to public research infrastructures, namely through partnership between Feique and the National Council of Scientific Research
- Strong cooperation with public and private research infrastructures through SusChem España

## Links to other industries

- Alliance for the Competitiveness of Industry, formed by chemical, automotive, steel, refine, paper, food & beverages, and concrete industries representing a 50% of manufacturing gross product
- Energy Industrial Platform, formed by 15 electricity consumer sectors

## Smart Specialisation

The chemical industry is considered a strategic sector for Spanish national research and innovation programmes. Regarding the RIS3 Programme for Smart Specialisation, Feique has entered into contact with the 17 Spanish Regions for RIS3 and has developed through SusChem Spain a roadmap with proposals for specialisation areas in advanced materials, industrial biotechnology, advanced manufacturing and nanotechnology.

Region	Regional agency in the smart specialization platform
Andalucía	Agencia IDEA
Aragón	Instituto Tecnológico de Aragón
Canarias	Gobierno de Canarias
Cantabria	iCan
Castilla y León	Junta Castilla y Leon
Castilla-La Mancha	Junta Castilla - La Mancha
Cataluña	Acció
Comunidad de Madrid	MadridNetwork
Comunidad Foral de Navarra	Fundación Moderna
Comunidad Valenciana	IMPIVA
Extremadura	ONE- Organizando una Nueva Extramadura
Galicia	Axencia Galega de Innovación GAIN
Illes Balears	Fundación BIT
La Rioja	Sistema riojano de innovación
País Vasco	Euskadi+innova
Principado de Asturias	IDEPA
Región de Murcia	Instituto de Fomento de Innovación

## More Information

[chemspain.org](http://chemspain.org)

[radiografia.feique.org](http://radiografia.feique.org)



[cefic.org](http://cefic.org)

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/spain/>



## Sweden

### IKEM - Innovation and Chemical Industries in Sweden

Number of companies

**1,800**

Turnover

**€35 billion**

Direct employees

**47,700**

National contact



Magnus Huss  
Director General  
magnus.huss@ikem.se

## CHEMICAL INDUSTRY SNAPSHOT

### A massive exporter

The chemical industry (including oil & refinery, NACE 19, chemicals, NACE 20, pharmaceuticals, NACE 21 and the rubber & plastics sectors, NACE 22) produced 20% of total Swedish exports in 2016, worth approximately €24.4 billion.

### Underpinning many other industries

Acting as a foundation for economic development, our industry includes chemicals and chemical products, oil refining, pharmaceuticals, plastics and rubber products, paints and coatings, hygiene products, detergents, agrochemical and other chemical products. Basic chemicals include plastics in primary forms and organic and

inorganic basic chemicals.

## Providing many jobs

The industry provides about 47,700 full-time jobs in 1,800 companies.

## HOW ARE WE DOING?

### Strengths

- Well-educated and highly skilled workforce
- Good physical and social infrastructure
- Renowned environmental expertise
- Strong safety and responsibility culture (Responsible Care) in production and distribution
- Very good R&D centres, university and technical university infrastructure
- Highly integrated globally-competitive clusters and chemical parks
- High resource efficiency
- Strong collaboration with trade unions

### Weaknesses

- High energy and logistics prices
- Reliance on raw material imports
- High labour costs
- Low acceptance of chemical industry and products by the Swedish public

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Building a bio-based economy

Sweden does not follow a sectoral industrial policy. However, the government has a national strategy for developing a bio-based economy, which includes research, development and innovation and coordinating the work of research funders, researchers business and potential customers.

### Investing in research

Sweden is big in R&D for being such a small country. Even though Sweden cannot measure up to the bigger countries in terms of money spent in total or the number of full-time equivalents, a different story is told when one accounts for the size of the economy and population.

Expenditures on R&D amounted to €13.7 billion in Sweden in 2015. R&D expenditures have been increasing steadily for a long time, but has been stable at 3.3% of the GDP in recent years. About 70 percent of research are funded by industry and commerce.

### Links with other industries and research/universities

The chemical industry and the forest industry in Sweden are collaborating and in 2014 the strategic innovation program BioInnovation was established. This will hopefully lead to a closer collaboration in the future when cars, wind generators, medical supplies, cables, colours and materials could be made with Swedish timber as a raw material.

Both the chemical and the forest industries are needed for that to happen. It is also important that the research is relevant to the business community and the surrounding community in order to be useful.

### **Opportunities for Growth**

Growth in the Swedish chemical sector is low, despite high R&D activity. A better capacity to create innovation and collaboration between industry and R&D organizations are important to find and seize growth opportunities. The industry has identified innovation as the top common agenda for joint efforts. Policymakers and government are being addressed to find new growth opportunities and secure a good collaboration between government and industry.

An opportunity for Sweden is to build a bio-based economy. Sweden has a unique position to attract investment for this transition, since Swedish timber can be used as raw material.

### **Smart specialisation**

As an enabler of all other industrial sectors, the chemical industry is highly integrated to other sectors, and smart specialization is a natural way for a small country like Sweden to compete and succeed amid global competition.

Reference: Based on official statistics from Statistics of Sweden.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/sweden/>



## Switzerland

scienceindustries

Number of companies

**250**

Direct employees

**70,000**

R&D investment

**CHF 7 billion**

National contact



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Director general

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## CHEMICAL INDUSTRY SNAPSHOT

### Switzerland's leading exporter

The 250 chemical, pharmaceutical and biotech company members of scienceindustries contributes 45% of Swiss exports and constitute the country's top export industry.

With exports of CHF 98 billion and imports of CHF 47 billion in 2017, members of our business association earned a trade surplus of CHF 52 billion.

### Growing fast

scienceindustries' companies form Switzerland's biggest industrial sector, ahead of machinery. Between 1995 and 2011 their output at an average annual rate of 12.4%, far ahead of the 2.8% average achieved by Swiss industry overall.

### Powered by people

scienceindustries members are massive employers, with 70,000 employees in Switzerland in 2017, and about 321,000 more abroad. They are also well qualified: 62% of employees in scienceindustries companies have a higher qualification, against 42% for Swiss industry as a whole.

The industry is characterised by specialised regional clusters industries:

**Pharmaceuticals:** Located in North-western (Basel) and Central Switzerland (Zug and Lucerne). Produces prescription and over-the-counter drugs (patented or generic) and ingredients.

**Diagnostics:** Central Switzerland (Zug and Lucerne). Healthcare products which aid physicians to diagnose diseases.

**Vitamins:** North-western Switzerland (Basel). Bulk product used in manufacturing or pharmaceuticals, foodstuffs and animal feed.

**Flavours and fragrances:** Western Switzerland (Lake Geneva). Ingredients for manufacturing food, cosmetics and perfumes.

**Crop protection agents:** North-western Switzerland (Basel) and Wallis. Herbicides, fungicides and insecticides including their active ingredients, primarily used in agriculture.

**Specialty and fine chemicals:** Often providing tailored solutions involving intensive research and development, production of specialty chemicals is spread throughout Switzerland. The global annual demand for some of these specialties is often below a few metric tons, and all member companies are strongly export-oriented.

## HOW ARE WE DOING?

### Strengths

- Focus on research-intensive high-end specialties
- Market leadership in many fields
- Outstanding scientific and technological know-how and workforce skills
- Development of innovation clusters aids large, medium and small firms
- Supportive regulatory environment – including for patent and price issues

### Weaknesses

- Skill shortages and a quota system for non-EU workers
- Need for supportive regime for repatriation of profits to sustain Switzerland's viability as a research location

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## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### A global research hub

Science and innovation are the basis for the economic success of our science industries. In 2016 science industries members invested around CHF 7 billion in research and development in Switzerland, a third of their worldwide research investments.

Member companies focus on specialties, mainly pharmaceuticals and diagnostics, vitamins, crop protection agents, flavours and fragrances and fine chemicals. Specialty chemicals for industry purposes, pigments and dyestuffs constitute the rest.

Our success is based upon well-equipped regional centres, comprising universities, private research institutes and companies.

Swiss companies help drive research around the world, and leaders have research activities in the US, Singapore, Japan, as well as EU facilities in the United Kingdom and Germany. Collaboration with and investments in other companies are growing. Biotech companies are particularly important in identifying and developing new ideas, new technologies and innovative products. Companies in north-western Switzerland allocate around 20% of their R&D budgets to co-operative projects with external research groups.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/switzerland/>



## Turkey

### Turkish Chemical Manufacturers Association (TKSD)

Number of companies

**21,000**

Turnover

**€43 billion**

Direct employees

**317,000**

National contact



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President

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## CHEMICAL INDUSTRY SNAPSHOT

### Contributing to economic growth

The chemical industry in Turkey greatly benefitted from the export-oriented economic policy changes in 1980, and has shown an impressive increase both in production and exports during the last five years, contributing significantly to the growth of the national economy. Currently, the Turkish chemical sector – with its modern technology and diversified products – is the key component of the manufacturing industry and integrated into the supply chain of national industries, especially the textiles and automotive sectors.

The Turkish chemical sector covers a wide range of products in 14 distinct product chapters in foreign trade statistics. The production of the sector is generally aimed at the products required by the manufacturing industry and the directly consumable products; namely, petrochemicals, thermoplastics, fertilizers, organic and inorganic chemicals, pharmaceuticals, synthetic fibres and yarns, soap and detergents, paints, etc

Gross production value in the chemical sector has reached \$33 billion level in 2015 which is made up of chemicals/products (41%), pharmaceuticals (10%) and plastic/rubber products (49%). Employment showed a 13.3% increase from 280 to 317 thousand during the 2011-2015 period.



Most of the companies in the chemical industry, especially private sector companies, are located in Istanbul, Izmir, Kocaeli, Sakarya, Adana, Gaziantep and Ankara. The Turkish chemical industry has developed significantly in terms of quality, productivity and protection of the environment, and has been successful in adopting the EU's technical standards. In addition, Responsible Care, the chemical industry's trademarked voluntary initiative on environmental, health and safety issues, has been successfully implemented since 1992.

The Turkish CLP (Classification, Labelling and Packaging) by-Law was issued in December 2013 and is being implemented since 2015.

The Turkish REACH by-Law was issued in June 2017 and entered in force in December 2017. Pre-notification will be made (like SIEF) till December 2020 and registration will be made between December 2020 and 2023.

The Turkish petrochemicals industry has shown considerable growth since 1970. The dominant organisation in the Turkish petrochemical sector is Petkim PetroKimya Holding A.Ş., which was privatised recently. There are two petrochemical complexes - one being the Petkim Aliaga complex in Izmir and the other Tupras (Turkish Petroleum Refineries Corporation) Korfez Petrochemical and Refinery in Kocaeli. In these two complexes, a wide range of petrochemicals, all common plastics (HDPE, LDPE, PS, PVC, and PP), aromatics, ethylene glycol, phthalic anhydride, terephthalic acid, carbon black, synthetic rubber, acrylonitrile and caustic soda are produced. The total production of these petrochemicals reaches about 2.9 million tonnes/year, and meets about 25% of domestic demand.

Since the textile sector is well-developed in Turkey, polymer production related to textiles and the production of textile chemicals have also developed simultaneously. Large plants for the production of polyamide, polyester and acrylic fibres have been built, and production has been directed to both foreign markets as well as the domestic. Almost all synthetic fibres are produced by the private sector, and synthetic fibre production is around 850,000 tonnes/year.

The fertilizer industry is also one of the key industries for Turkey, which has been supporting vast agricultural potential of the country. Currently, there are seven private sector companies producing fertilizers with total production capacity of 5.8 million tonnes/year. Turkey's fertilizer production meets domestic demand and the surplus is exported.

Pharmaceuticals, soap and detergents, soda, chromium chemicals, boron chemicals, paints, sodium sulphate, fatty acids and rose oil are the other main areas of production of the chemical industry. The pharmaceuticals industry has become one of the leading sectors of the chemical industry, accounting for approximately 10% of the chemical industry's production. Production trends of pharmaceuticals are closely related to domestic demand. Turkish pharmaceutical companies manufacture a wide range of pharmaceutical products, mostly generic formulas. The number of pharmaceuticals on the market is 3,100 and this number reaches 7,200 when alternative posologies are included. It is worth mentioning that the Afyon Alkaloids Factory produces 20% of the morphine consumed by pharmaceuticals industries all over the world.

The Turkish soap and detergent industry has shown very good performance in terms of quality, capacity and exports. There are many companies in the soap and detergent industry, about 15 of them being the major ones; among these there are multinational groups which have worldwide reputations. Since 1990 domestic and foreign investments in the Turkish cleaning products industry have increased considerably. As a consequence, detergent production capacity has reached 1.3 billion tonnes and soap production capacity has reached 550,000 tonnes; both have great export potential. The consumption and production of cosmetics and personal care products are growing rapidly. The number of cosmetics and personal care products is increasing every year. Hair care has the largest share of the cosmetics and personal care products market in Turkey. Natural cosmetic production is on the rise, due to growing demand for these products.

Parallel to the developments in Turkey's construction, automotive and marine industries, the paints and coatings industry has also developed to become one of the most dynamic sectors of the Turkish chemical industry. Today the industry produces about 800,000 tons/year of paints and coatings and is comprised of about 600 manufacturers, 20 of them being large-scale companies. In addition to meeting domestic demand, the Turkish paint sector has recently tended to export more.

Turkey has the largest soda factory in the Middle East, with a total capacity of 750,000 tonnes per year. In addition to light and dense soda ash, refined sodium bicarbonate and sodium silicate are produced at the Mersin plant. An extremely rich trona (natural soda ash) deposit was found near Ankara, at Beypazari and at present Turkey has substantial export potential for soda ash. Eti Soda A.Ş. started operation in 2009, with 1 million tonnes/year soda ash planned to be produced.

Being among the top five countries supplying chrome ore to world markets, Turkey produces and exports some of the most important chrome chemicals and derivatives such as sodium bichromate, basic chrome sulphate, chromic acid and chrome oxide.

Turkey also enjoys a comparative advantage in boron chemicals - borax decahydrate, borax pentahydrate, boric acid and sodium perborate - due to the size of its reserves, the quality of minerals and proximity to consumer markets. Eti Maden İşletmeleri Genel Müdürlüğü is the dominant producer of boron minerals and boron chemicals and the sole exclusive exporter of boron chemicals.

Turkey has developed a substantial capacity and production of sodium sulphate. In sodium sulphate production, Turkey is second largest in Europe and sixth in the world.

Owing to Turkey's climatic and ecological conditions, many medicinal and aromatic plants are cultivated or gathered from nature. Turkey is one of the most important rose oil exporters in the world market. The majority of these exports originate from the Isparta region. Laurel oil, thymus oil, lavender oil and origanium oil are also produced in Turkey.

In conjunction with recent industrial growth in Turkey, the consumption and production of many other chemicals are growing rapidly, and the number of chemicals produced is increasing every year. The recent developments in textile and leather chemicals are also worth mentioning, and many small- and medium- size companies have recently started to operate in these two sectors. In the Turkish chemical industry, there are about 314 companies with foreign investment. The Turkish chemical industry has a 13% share of total foreign capital in Turkey.

## HOW ARE WE DOING?

### Strengths

- Unique geographical location for the world markets and oil & gas pipeline routes
- Presence of high younger population ratio as near-future employment potential
- Good adoption of international industry standards and EU harmonisations with EU market rules
- Presence of entrepreneurial capacity/potential of SMEs and Organized Industry Zones
- Presence of well-developed industry sectoral diversity and infrastructure

### Weaknesses

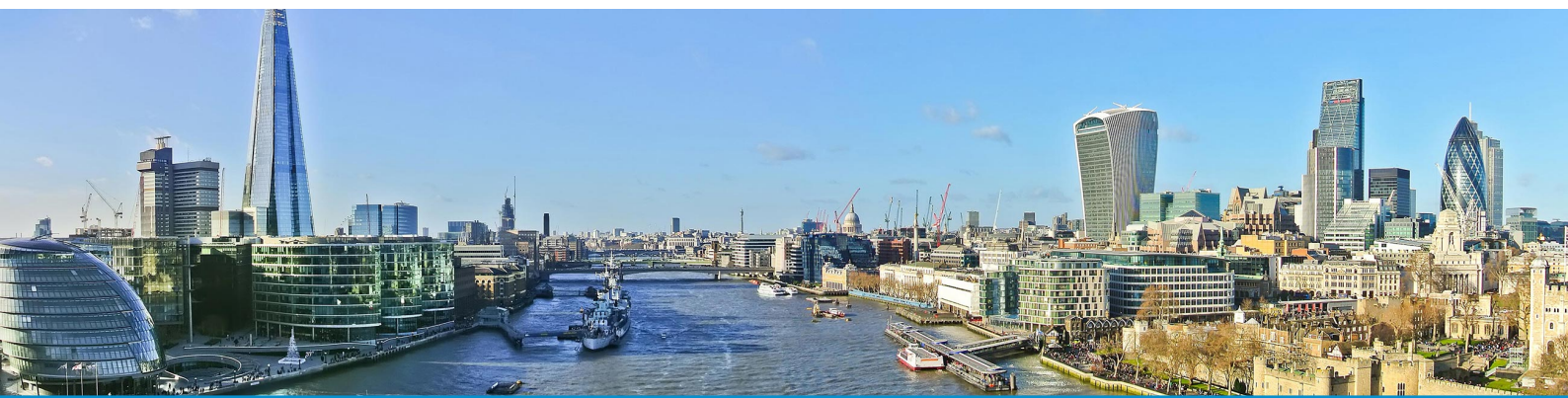
- Relatively low allocations for R&D spending in chemical industry sectors
- Dependency on high-cost imported energy and raw materials supplies
- Limited production capabilities in high-added-value chemical products
- Inefficiencies in clustering between chemical sectors

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

- Incentives by the state government were recently declared for new chemical industry investments, with the goal of reaching a US\$50billion in chemicals exports by 2023.
- Incentives in the form of land allocation and investment credit support for establishment of clusters of integrated chemical industry zones were also developed, both at national and at regional level, to encourage and sustain innovation and new domestic and international production facility investments

Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/turkey/>



## United Kingdom

### Chemical Industries Association (CIA)

Number of companies

**3,460**

Capital spending

**€4.7 billion**

R&D investment

**€6.3 billion**

Turnover

**€59.5 billion**

Direct employees

**140,000**

National contact



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## CHEMICAL INDUSTRY SNAPSHOT

### The third-biggest industry

With £48.7 billion of revenues and £17.8 billion value added in 2016, chemicals & pharmaceuticals is the UK's second largest industry. Only the food, beverages and tobacco processing sector is bigger.

### Offering a full product range

The UK industry is active in all key areas: basic inorganics, petrochemicals, polymers, agrochemicals, paints, detergents and personal care products, in specialties such as adhesives, flavours and fragrances, and in a host of industrial specialties including lubricants, fuel additives, construction chemicals and catalysts. It is also a global leader in pharmaceuticals.

### Employing and investing

Together these businesses employed 140,000 in 2016, and around half a million if you include all whose jobs depend on the industry. Public and private R&D spending in chemical and pharmaceutical manufacturing businesses was £5.1 billion (€6.3 billion) in 2016, of which £4.1 billion in pharmaceuticals.

## Recovering growth

Chemical production grew by 3.5% in 2017 but pharmaceutical production contracted by 4.4%. Both sectors have struggled in the face of uncompetitive energy costs due to ambitious climate policies in the UK.

## Revitalising pharmaceuticals

Output of pharmaceuticals, for decades the fastest-growing sector, fell as companies sought to counter increased R&D and regulatory costs and fewer blockbuster drugs by moving production elsewhere. This led to outsourcing of active ingredient production both elsewhere in Europe, including Ireland, but also to industrializing nations with or near large consumer populations, including India, China and Singapore.

But the outsourcing trend has been called into question, because of higher-than-expected costs, extended supply chains and poor quality control in some new production locations.

The UK's strong science base has helped UK R&D spending stay high but the UK has struggled to attract significant manufacturing investment.

## Strong in the north

There are chemical manufacturing sites in all UK regions. Primary commodity chemicals are produced mainly in Scotland and Northern England. Feedstocks include hydrocarbons (mainly gas and refined petroleum fractions), minerals and vegetable or animal-derived oils and fats.

## Clustered with customers

Sequential processing is the norm, with co-located processing clusters adjacent to industrial customers in other industries.

## Close to feedstocks

North West England is the leading chemical producer, followed by Scotland, North East England and the Yorkshire/Humber areas, while the South East and East of England regions also rank highly. Locations often depend upon availability of feedstocks such as North Sea hydrocarbons, salt and limestone, and energy (originally coal).

## Handy for ports

Though peripheral to the centre of the European market, all chemical-producing regions have access to good ports and many benefit from an ethylene pipeline network, while Liquefied Natural Gas (LNG) re-gasification terminals complement natural gas supplies from the North Sea and Europe.

## Investing to cut costs

Recent investments underpin long-term viability by enabling several petrochemical crackers to use cheap ethane from the US or UK shale gas, if available.

## Main UK chemical sites and the ethylene pipeline



### Building on knowledge

Speciality chemicals and pharmaceuticals are more widely distributed. In recent years pharmaceutical R&D has increased in South-East and Eastern England, close to the renowned universities of Oxford and Cambridge.

### HOW ARE WE DOING?

#### Strengths

- Ethane import infrastructure and three crackers able to use ethane as a feedstock
- LNG import and re-export facilities
- Several closely integrated clusters

- An extensive ethylene pipeline network
- Modern chlor-alkali and derivatives production based on membrane technology
- Strong exports to geographically diverse markets
- High resource efficiency
- Strong pool of highly-skilled researchers and staff
- Highly innovative, backed by exceptional research and university infrastructure
- Excellent labour relations
- Strong safety and responsibility culture and performance in production and distribution
- Able to satisfy sophisticated consumer demands
- Government becoming more supportive of new technologies and domestic shale gas exploration
- Improving public perception
- Heightened political recognition due to Brexit and new Industrial Strategy

## Weaknesses

- The uncertainty of Brexit
- Fragmented ownership of plants within clusters can lead to non-optimal long-term strategies
- Energy prices are globally uncompetitive, driven up by EU and UK climate policies while US Middle East and Russian rivals access cheap hydrocarbons
- Mature European market: growth is faster in Asia and the US
- Scarcity of skilled craft workers because of ageing and competition from other sectors
- Relatively weak domestic manufacturing base despite strengths in automotive, aerospace and pharmaceuticals

## OUR CONTRIBUTION TO A COMPETITIVE EUROPE

### Strengthening strategic planning

In 2014 the UK chemical industry established a sector partnership with Government to address long term growth based on competitive energy; reinforced and new supply chains; and collaborative innovation. Against the backdrop of a new industrial strategy from the British government, this Chemistry Growth Partnership is now being revised with a new strategy to be published in April 2018. This, in turn, will be followed by a proposed “sector deal” between the industry and government – a limited number of collaborative strategic actions/projects to deliver growth out to 2030. The country’s industrial strategy is very much focused on manufacturing and regional economic development and job creation. This represents a good opportunity for the UK chemical industry given it is located in a number of northern clusters – especially Humberside, Teesside, the north west, Yorkshire and Scotland (Grangemouth).

### Putting science to work

The current UK government has committed around £4.7bn to support R&D and innovation. This commitment should be seen against the broader ambition to boost R&D spending to 2.4% of GDP by 2027. The majority of this money is being directed to the country’s Research Councils and around £725m is being earmarked to support the sector deal initiative through the Industrial Strategy Challenge Fund (ISCF). The Chemistry Growth Partnership will be aiming to access ISCF funding for its proposed sector deal by the end of June 2018. In the meantime, March 2018 will see the opening of the country’s new National Formulation Centre in the north east of England – an earlier deliverable from the CGP’s collaborative work with government.

### Working together

Through cross industry collaboration, chemistry aims to facilitate solutions the growth of automotive, aerospace, construction, life sciences and personal care through development of better products. Chemical industry links with UK academic centres are strong and R&D spending intentions rising, despite concerns triggered by the Brexit referendum over future access to talent and the EU's Horizon funding programme.

### **Removing barriers**

A ban on shale gas exploration was ended in 2016, with planning permission granted in the north of the country. These actions, allied to the more immediate benefit of imported ethane feedstock from the US into Grangemouth and Teesside should enable growth in primary petrochemicals, fertilisers and related sectors. Further progress is expected in 2018 with Cuadrilla's horizontal drilling and fracking anticipated to begin in Q2 of this year.

### **Navigating Brexit**

Modified Patent Box incentives and the new National Formulation Centre, combined with pharmaceutical re-shoring, should aid investment. The UK chemical industry will be working hard with Cefic and its European national counterparts to minimise any adverse impact from the Brexit referendum and its aftermath. More specifically, CIA and Cefic have signed a joint statement calling for minimal disruption as the desired outcome from the Brexit negotiations.

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Landscape of the European Chemical Industry Website:

<http://www.chemlandscape.cefic.org/country/united-kingdom/>





**Chemistry making a world of difference**

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