LANDSCAPE OF THE EUROPEAN CHEMICAL INDUSTRY 2020
Austria
Fachverband der Chemischen Industrie Österreichs (FCIO)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
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<tbody>
<tr>
<td>240</td>
<td>€16.18 billion</td>
<td>Sylvia Hofinger</td>
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<td></td>
<td></td>
<td>Director General</td>
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<tr>
<td></td>
<td></td>
<td><a href="mailto:hofinger@fcio.at">hofinger@fcio.at</a></td>
</tr>
<tr>
<td>Direct employees</td>
<td>45,600</td>
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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 2018 the value of chemicals production was €18.18 billion, a moderate increase for the past three years - though over the past decade chemical sales grew by 20.3%.

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 240 companies in 2018 (down from 294 in 2008), employing nearly 45,600 people – an increase of about 2,100 over the previous decade. It is primarily made up 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 49.3% of production by value in 2018, followed by pharmaceuticals (14.4%). Agrochemicals were 2.5%. 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 2018

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<tbody>
<tr>
<td>Companies</td>
<td>240</td>
</tr>
<tr>
<td>Staff</td>
<td>45,6</td>
</tr>
<tr>
<td>Revenues</td>
<td>€16.18 billion</td>
</tr>
<tr>
<td>Imports</td>
<td>€25.086 billion</td>
</tr>
<tr>
<td>Exports</td>
<td>€23.826 billion</td>
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Source: Annual Report 2018, Association of the Austrian Chemical Industry

Overview of the chemical industry production – Breakdown by sectors 2018

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<tbody>
<tr>
<td>Plastic products</td>
<td>36.3%</td>
</tr>
<tr>
<td>Other chemicals</td>
<td>13.1%</td>
</tr>
<tr>
<td>Plastics for manufacture</td>
<td>13.0%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>14.4%</td>
</tr>
<tr>
<td>Man-made fibres</td>
<td>6.1%</td>
</tr>
<tr>
<td>Rubber products</td>
<td>2.0%</td>
</tr>
<tr>
<td>Detergents, cosmetics</td>
<td>2.6%</td>
</tr>
<tr>
<td>Coating materials, printing ink and putty</td>
<td>3.6%</td>
</tr>
<tr>
<td>Agricultural chemicals</td>
<td>2.5%</td>
</tr>
<tr>
<td>Industrial gases</td>
<td>1.0%</td>
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Source: Annual Report 2018, Association of the Austrian Chemical Industry
Foreign trade figures for 2018 of the Austrian chemical industry (€ million)

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<thead>
<tr>
<th></th>
<th>Imports</th>
<th>Change from previous year</th>
<th>Exports</th>
<th>Change from previous year</th>
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<tbody>
<tr>
<td>EU</td>
<td>17,258</td>
<td>7.3%</td>
<td>15,749</td>
<td>0.8%</td>
</tr>
<tr>
<td>EFTA</td>
<td>2,767</td>
<td>-16.7%</td>
<td>2,016</td>
<td>-6.5%</td>
</tr>
<tr>
<td>Remaining European countries</td>
<td>2,999</td>
<td>7.5%</td>
<td>2,036</td>
<td>13.6%</td>
</tr>
<tr>
<td>Americas</td>
<td>52</td>
<td>205.1%</td>
<td>266</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Asia</td>
<td>288</td>
<td>5.2%</td>
<td>1,471</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Africa</td>
<td>1,714</td>
<td>16.3%</td>
<td>2,194</td>
<td>1.7%</td>
</tr>
<tr>
<td>Australia-Oceania</td>
<td>9</td>
<td>-1.7%</td>
<td>95</td>
<td>0.5%</td>
</tr>
<tr>
<td>Total</td>
<td>25,087</td>
<td>4.7%</td>
<td>23,827</td>
<td>1.0%</td>
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</tbody>
</table>

Source: Annual Report 2018, 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

Numerous Strategies (Life Science, Energy and Climate, Hydrogen, Bioeconomy, Research) have been prepared by the Government for the past months. The Chemical Industry – among other stakeholders – was involved in the preparation and provided input to all of them, however centralised strategies sometimes tend to be of more political than practical relevance and the next Government might restart some of these processes.

Landscape of the European Chemical Industry Website:

http://www.chemlandscape.cefic.org/country/austria/
Belgium
essenscia

<table>
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<tr>
<th>Number of companies</th>
<th>Turnover</th>
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<tr>
<td>&gt; 720</td>
<td>€65 billion</td>
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</table>

Capital spending
Direct employees

€2.1 billion         92,500

R&D investment

€4.5 billion

National contact
Yves Verschueren
Managing Director
yverschueren@essenscia.be

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 one third of total manufacturing value added. In 2018, the industry achieved sales of over €65 billion, and employed 92,500 workers, while supporting 210,000 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. 75% 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 chemical cluster at the port of Antwerp, where several of the world’s top chemical companies have major production sites. Lying in 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 the 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 €4.5 billion on R&D in 2018. 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 65% of R&D spending by all manufacturing companies. During the past decade, R&D spent by the chemical and life sciences industry increased by 90%, mainly driven by life sciences companies. 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 – and high quality air cargo for pharmaceuticals from Brussels and Liège airport
- A unique integrated cluster of chemical companies covering the whole value chain
- Competitive logistical platform with tailor-made tank 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
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.

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.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/belgium/
**Bulgaria**

Bulgarian Chamber of Chemical Industry (BCCI)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
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| 642                 | €1.578 billion | Yoncho Pelovski
|                     |              | Vice President
|                     |              | yonchop@gmail.com |

<table>
<thead>
<tr>
<th>Capital spending</th>
<th>Direct employees</th>
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<tbody>
<tr>
<td>€678 million</td>
<td>13,350</td>
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<tr>
<th>R&amp;D investment</th>
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<td>€127 million</td>
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**CHEMICAL INDUSTRY SNAPSHOT**

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 use of generated wastes converting them to the secondary raw materials, minimizing emissions and saving energy resource, contributing for circular economy.

- The chemical industry in Bulgaria is important for the country, contributing to better productivity, gross domestic product (GDP) and a better external trade or 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. From 2015 up to the end of May 2019 the export of chemical products, mainly soda ash, mineral fertilizers, fuels and cellulose increased by 22.5 % - the highest rate in Bulgaria for all sectors. Leading companies are Solvay Sodi, Lukoil-Neftochim, Agropolichim, Neochim, Svilosa and Orgachim for chemical products and AGRIA for pesticides; ZEBRA for rubber and PLASTIMO for plastics.
- In 2018 chemical products had positive export/import balance.
- Production of chemical products contribute 4.7% of the industrial output and 4.9% of added value; Production of rubber and plastics also have a positive trend and contribute 4.5% of added value from the industry in the country. During last decade the productivity multiplied by 2.67 but the number of workers decreased.
- The sector in Bulgaria faces particular breakdowns related to employment, with an ageing workforce and the need for a better education of students.
Long-term co-operation between the Bulgarian Chamber of Chemical Industry (BCCI) and leading companies and Universities is a precondition for better and more effective joint research pilot studies and the development and implementation of new technologies in the practice.

Low administrative capacity and long term procedures of permits remain an obstacle to efficiency and progress.

**HOW ARE WE DOING**

**Strengths**

- The Bulgarian chemical industry is in an advantageous competitive position for 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 use of plastics, paper and biodegradable wastes

**OUR CONTRIBUTION TO A COMPETITIVE EUROPE**

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

As a result of co-operation at national and EU-level, new products are expected and needed:

- New chlorine production using membrane technology. Two sites were proposed, but not approved from State Authorities
- New sulfur – containing complex fertilisers. Some new productions have already been introduced
- New nano-products on organic and inorganic base. Research has started
- New soil conditioners from industrial and agriculture wastes. Already one example in the practice
- Better use of industrial wastes

**Source:** National Statistical Institute for the period January-December 2015 – 2019

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/bulgaria/
**Croatia**

Croatian Chemical Industry Association in Croatian Chamber of Economy/ Udruženje kemijske industrije Hrvatske gospodarske komore (UKI)

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<th>Number of companies</th>
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<tr>
<td>353</td>
<td>€809 million</td>
<td>Renata Florjanić Executive Secretary <a href="mailto:rflorjanic@hgk.hr">rflorjanic@hgk.hr</a></td>
</tr>
</tbody>
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**CHEMICAL INDUSTRY SNAPSHOT**

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.

Chemicals and pharmaceuticals, together with plastics and rubber processing are an integral part of 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.

The chemical industry is concentrated around larger towns, especially Zagreb, and generated revenues of €809 million in 2018, 3.6% of the manufacturing industry total. Its 353 companies employed 5,987 people.

Pharmaceuticals employ another 5,039 people across 54 companies that generated revenues of €842 million, 3.8% of the manufacturing industry total. Plastics and rubber had €801 million of revenues in 2018, spread across 742 registered companies employing 8,241 workers.

Most companies are SMEs (351) and they mostly serve the domestic market. They are busy restructuring and
modernising production processes to meet European standards, reduce operating costs and achieve international quality certification.

Many companies, especially larger ones, are also export-oriented mostly to countries in the same region. In 2018 chemicals export was €796 million, pharmaceuticals export was €932 million and plastics and rubber export was €444 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
- High 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.

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)

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<tr>
<td>1851</td>
<td>€19.77 billion</td>
<td>Ivan Soucek</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:ivan.soucek@schp.cz">ivan.soucek@schp.cz</a></td>
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</tbody>
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Direct employees

129,500

CHEMICAL INDUSTRY SNAPSHOT

The Republic’s second-largest manufacturing industry

Chemicals (NACE 20) play a key role in the Czech economy. Integrated sector (Nace 19.2, 20, 21, 22) is 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 19.2, 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.

A leading employer

In 2018 Czech chemical industry (Nace 20, 21, 22) sales at current prices were €19.67 billion and the industry employed 129,500 people. But nevertheless chemical imports exceeded exports by €13.3 billion – a deficit that had increased by €6 billion year-on-year. In 2018, 1851 chemical companies were registered.

Annual investment reached €1.98 billion (for only Nace 20: €0.49 billion), and Czech companies financed 50-70 % of R&D themselves, with the balance from EU and state funding in total €43.2 million. 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 and natural gas
- Burdensome Czech and EU legislation
- Limited availability of experienced workforce
- Insufficient 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. Chemical recycling is becoming one of the key focus for development and implementation.

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.

Source: Panorama zpracovatelského průmyslu ČR, 2018; Ročenka 2018 o vývoji chemického průmyslu v ČR

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/czech-republic/
Denmark
Confederation of the Danish Industry (Confederation of Danish Industry is an employers’ organisation)

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<th>Number of companies</th>
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<tr>
<td>277</td>
<td>€6.4 billion</td>
<td>Karin Klitgaard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director of Environmental Policy</td>
</tr>
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Capital spending
Direct employees

€3.7 billion
10,657

R&D investment

€1.7 billion

CHEMICAL INDUSTRY SNAPSHOT

A growing and efficient leading industry

Denmark’s chemical industry recorded sales of approximately €6.4 billion in 2018, an increase of approximately 49% since 2000 and 3.7% compared to 2017, forming 6.24% of the national industrial output. Thanks to its high productivity and efficiency, its workforce accounts for 3.6% of the manufacturing total.

Driven by investment in intellectual property

In 2018, the total employment in the Danish chemical industry was 10,657 people and 277 companies, a reduction of 2,767 since 2000. The investment of €1.7 billion in 2017 has increased by 45% since 2009.

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 to Asia and other countries

OUR CONTRIBUTION TO A COMPETITIVE EUROPE

The Danish economy strengthened throughout 2018, reflected by the rising GDP (1.5%) and an additional 41,300 private sector hirings in 2018.
EU28
Cefic

- Number of companies: 30,000
- Turnover: €565 billion
- Capital spending: €22.8 billion
- Direct employees: 1,171,000
- R&D investment: €10.0 billion

National contact
René van Sloten
Executive Director
Industrial Policy
rvs@cefic.be

A CORNERSTONE OF THE EUROPEAN ECONOMY

The European chemical industry is a solution provider for a competitive, low carbon and circular economy in Europe and beyond. It is a wealth generating sector of the economy, and a vital part of Europe’s economic infrastructure.

Industry is the biggest customer for EU chemicals
EU CHEMICAL INDUSTRY SNAPSHOT

The chemical industry generates 1.1% per cent of EU gross domestic product (GDP). With 1.71 million workers and sales of €565 billion (2018), it is one of the largest industrial sectors and a leading source of direct and indirect employment in many regions.

Today, industry contributes approximately 15% of GDP, but 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.

Facing uncertainty

The European chemical industry is facing uncertainty, and leading indicators do not point to a recovery in the coming months.
Rising protectionism all over the world is negatively impacting industrial and economic activity. The regulatory uncertainty over Brexit and escalating trade wars between the US and its key partners are weakening investor confidence. Lack of growth in other manufacturing industries also contributes to weaker demand in chemicals. As a result, the EU chemical production slightly declined in the first half of 2019. Total sales (domestic sales and exports) also remained at the previous years’ level.

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**ASIA RISING**

World chemicals sales were €3,347 billion in 2018, up 2.5% from €3,266 billion in 2017. This is not spectacular growth. With €1,198 billion in 2018, China is still the largest chemicals producer in the world, contributing 35.8% of global chemicals sales in 2018.

**Asia forges ahead**
Europe still strong on sales

The EU chemical industry ranks second by sales, slightly ahead of the United States. Including non-EU countries, total European chemicals sales reached €694 billion in 2018, or 20.7% of world output. But China has passed Europe to top the global sales ranking.

In 2018, sales from the 30 largest chemical-producing countries totalled €3,131 billion. Twelve of the top 30 were in Asia. Their €1,886 billion of sales contributed to top 30 chemicals sales and captured 56.4 % of world chemicals sales.

China dominates chemicals world rankings
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 into the next stage of development – a strategy outlined in the “13th Five-Year Plan” of the Chinese petroleum and chemical industry.

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 1998 EU industry sales were €361 billion – 32.9% of world chemicals sales. EU chemicals sales have since grown by 51%.

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
EUROPE LEADS IN SPECIALTY CHEMICALS

By 2030, world chemicals sales are expected to reach €6.6 trillion. The EU chemical industry is expected to fall into third place behind China, (with nearly 50% of the world market), and the US.

By contrast, and on a segment level, the chemical industry in Europe is still characterised by high market share in specialty chemicals and pharmaceutical ingredients, which is expected to continue to grow in the future.
Future growth will be driven by innovation and diversification in materials and components across the manufacturing and construction sectors, as well as consumer goods.

**An export opportunity**

Although competition in China’s chemical market is intensifying and demand is becoming weaker, China still offers a huge and attractive market for both chemical suppliers and their customer industries. In the medium-term, European chemical producers are expected to benefit through increased exports or via local investments. This is 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 large exporter, EU chemical industry achieved a significant extra-EU net trade surplus of €48.1 billion in 2018.
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

Extra-EU chemicals trade balance

The flow of chemicals between the EU and its trading partners, calculated as total exports plus imports, was valued at nearly €278.3 billion in 2018. The US was by far the EU’s biggest trading partner in chemicals in 2018, buying €31.8 billion of EU exports, and providing €24.4 billion of EU imports - 20 % of total EU chemicals trade in 2018.

Who buys what
An emerging US energy advantage

Transatlantic trade flows are expected to change considerably in the next five years as 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 11.0% 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 CHEMICAL INDUSTRY

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 US has greatly reduced the cost of producing ethylene, a vital chemical industry building-block.

Average ethylene cash costs in Europe versus North America (US$/ton)

Ethylene is the foundation for the 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. Recent analysis from 2018 showed that Europe generated the highest ethylene cash cost in the world.

REGULATORY COSTS REMAIN HIGH

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.

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%.

**CAPITAL SPENDING INTENSITY REACHED THE HIGHEST LEVEL SINCE 2000**
Investment (in absolute figures) in the EU has been increasing. EU chemicals investment reached a value of €22.8 billion in 2018 – the highest level of capital spending since 2000.

In relative terms, the ratio of capital spending to added value, or capital intensity, of the chemical industry in the EU has been increasing gradually since 2010, reaching a value of 16.2% in 2018. This is slightly below the long-term average intensity over the years 2000-2017 (17.7%).

**Shifting investment abroad**

In 2018 chemical companies invested €193.1 billion worldwide, up from €108.6 billion in 2008. On a global basis, the level of investment in the chemicals sector was nearly 1.8 times higher in 2018 compared to ten years ago.

China is significantly outpacing the other economies in the world. China contributed 45% of global investment, up
EU CHEMICALS ENERGY EFFICIENCY DOUBLES

EU chemical producers, including pharmaceuticals, have sharply reduced fuel and power energy consumption per unit of production. By 2017, energy intensity – energy consumption per unit of production – in the chemical industry, including pharmaceuticals, was nearly 55 per cent lower than in 1991.

During the 27 years from 1991 to 2017 the industry increased output without raising energy inputs, lowering its energy intensity by an average of 3% per year.

Energy efficient has also improved significantly since 1991.
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% between 1991 and 2017. GHG intensity – the GHG emissions per unit of production – was cut 76% from 1991 to 2017.
Please note that no figures are available for Cyprus, Luxembourg and Malta.
**Estonia**
Estonian Chemical Industry Association (ECIA) / Eesti Keemiatoostuse Liit

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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 Gross Domestic Product (GDP). That share is higher than the European average, but at the same time well in line with the EU 2020 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 GDP was €20.48 billion in current prices.
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 production of rare earth metals and their oxides. Industrial production of Estonian shale oil 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 FECI members is somewhat different to the national chemical industry as defined by the statistics office. To that end, FECI has 55 member companies that employ approximately twice as many workers as the national chemical industry.

Export success comes mostly from the 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.
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 FECI members.

**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 CO2 efficiency and material productivity

OUR CONTRIBUTION TO A COMPETITIVE EUROPE

For the first time, Estonia is developing a specific industrial policy. The government has recognised the importance and potential of the industry sector and as the first action point developing industry 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. FECI 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.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/estonia/
Finland
Chemical Industry Federation of Finland

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| 400                 | €24.1 (2018) billion | Mika Aalto  
                     Director General  
                     mika.aalto@kemianteollisuus.fi |

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<th>Capital spending</th>
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<td>€1,190 (2017) million</td>
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CHEMICAL INDUSTRY SNAPSHOT

A growing industry

With revenues of €24.1 billion in 2018 and €12.3 billion of exports in 2018, the chemical industry is Finland’s second largest. It provides 19% 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 33,700 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 €480 million and averages 2.0% of revenues.

Investment in the chemical industry, largely replacement investment, totalled approximately €1,190 million in 2017.

**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, especially in the battery value chain
- Large resources of forest
- 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
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 national roadmap for circular economy development was published in 2016 and updated in 2018. Industrial sectors including the chemical industry are preparing sector-based carbon neutrality roadmaps.

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, circular economy solutions including closed-loop industrial processes and use of waste-based raw materials all offer growth opportunities.
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 €18.75 billion in 2018, 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 aeronautics. It accounts for more than 13% of total manufacturing exports and it stands in its second position as a contributor to the industry’s trade balance after aeronautics with a €10.2 billion trade surplus.

A leading employer

The chemical industry in France has 3,300 companies, 94% are SMEs and nearly 6,000 production sites. Its companies employ 166,650 people, 6.7% of French manufacturing workers, and generate 830,000 indirect and induced 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 recognized by the French government and the Ministry of Industry.

### Chemical industry - key figures

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<td>3,300</td>
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<td>166,650</td>
<td>830,000</td>
<td>€1.9 billion</td>
<td>13,351</td>
<td>6% of total chemical investments</td>
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### A major exporter

When fine chemicals for pharmaceuticals are included, the chemical industry generated turnover of €75 billion in 2018, nearly 75% were exported (including the exports of the chemical distribution). Around 61% of exports go elsewhere within the European Union.

### Investing in the future

Capital investment was €3.1 billion in 2018, equal to 16.3% of added value. Modernization, safety and environmental improvements accounted for 72% of the total.

Another €1.9 billion, more than 10% of added value, was invested in research and development, which represents more than 8% of all French industrial research spending.

### Organised into competitive clusters

In France, about thirty competitiveness clusters have links with chemicals and materials. Six are totally or partially dedicated to chemicals:

- AXELERA in Auvergne-Rhône-Alpes (Lyon)
- ELASTOPOLE in Centre-Val de Loire (Orléans)
- EURAMATERIALS in Hauts de France (Villeneuve d’Ascq)
- IAR in Hauts de France (Laon)
- PLASTIPOLIS in Auvergne-Rhône-Alpes (Oyonnax)
France Chimie has signed a partnership with Axelera 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
ILE DE FRANCE

- 4,200 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 center, Ile-de-France benefits from the holding of the headquarters, production sites and research centers. Arkema, Air Liquide, Solvay, SEQENS, L’Oréal, BASF, DowDuPont, 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

AUVERGNE-RHONE-ALPES

- The 1st region for the production of chemicals in France
- 2nd in terms of employment
- Nearly 700 establishments with more than 32,000 direct employees and more than 100,000 associated employees
- More than 90% of companies are SMEs
- Total turnover valued at more than €12 billion
- More than €500 million of investments, about 20% of which for the Health-Security-Environment
- Leading sector for exports with more than 80% of turnover abroad, including around 66% to Europe. Auvergne-Rhône-Alpes chemical industry accounts for 17.5% of the French chemical exports.
- 25% of the 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, phosphene and hydrogen, ...
- Top competitiveness boosters and world-class clusters for chemistry and incidental activities as Axelera, Lyonbiopôle, Plastipolis, Tenerridis, 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

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

- The leading industrial employer and the 3rd chemical region in France
- 29,640 workers in 470 enterprises
- International producers including Arkema, DowDuPont, 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)
- A strong development around the bio-based chemical and the bioeconomy
66% of the companies are involved in R&D programs

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**

- Thanks to the strategic position of the region at the crossroads of Northern Europe, also to the presence of major ports and logistics platforms combining rail, road and fluvial, regional chemistry has retained a wide variety of activities and exports 60% of its production.
- Sound infrastructure, logistics and multi-modal transport
- All chemical sectors are represented in the region from the formulation of molecules for pharmaceuticals and solvent regeneration to biotechnology or bio-based chemistry
- Sustained innovation with research centers (green chemistry) and four world-class competitiveness clusters focused on chemicals and materials: the European bioeconomy cluster Industries & Agro-Resources (IAR), Bio refining Cluster I-Trans (Transports), EurAMaterials (merger of UP-TEX and MATIKEM), Materalia
- A large bio-mass potential of plant materials
- Innovation fostered by the development of a green chemical industry with notably bio-chemistry institute PIVERT, the Oilseed Bio-refinery of the Future, and the BRI and IMPROVE platforms
- A French institute for the storage of energy, RS2E (French research network on electrochemical energy storage)
- A young population and universities, engineering schools, technical centers that partner with the chemical industry encouraging prospects for development, in terms of jobs (new jobs emerging), foreign trade and therefore strengthening the competitiveness of the region’s chemical activities

**MEDITERRANEE**

- 3.3% of regional GDP and 30% of regional exports
- 19,000 workers
- About 550 private companies, 94% 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 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 the French capacity for chlorine and its derivatives
• Strong universities and research center support focused on 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. A number of projects are being developed involving industrial symbiosis (e.g. Power to gas, VASCO 2: CO2 to oil by microalgae)
• Regional policy encourages the development of SMEs and supports clusters like NOVACHIM to develop the chemical industry and foster innovation

NORMANDY

• The Normandy region concentrates 4% of the companies and 3.8% of the establishments of the branch (8th place)
• 13,000 direct and 40,000 indirect jobs in the chemical industry, 5.7% of the employees of the branch
• more than 220 chemical sites, 65% of which are SMEs
• Main activities of chemicals in the Normandy region: basic chemicals, specialty chemicals and soaps, perfumes and detergents
• 25% of olefins and 50% of the polymers and elastomers productions in France
• 80% of oils and additives production in France (40% of European production)
• Europe’s leading fertilizer producer
• 2nd largest region of medicinal chemistry products in France
• €2 billion invested over the last nine years to improve production and meet new environmental standards
• 1st industry exporter in the region: chemicals represent more than 20% of regional exports

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)
• The Cosmetic Valley extends also in the Normandy region gathering numerous chemical companies in the region
• Public and private stakeholders support further industrialization

HOW ARE WE DOING?

Strengths

• Large industrial market with global leaders in energy, transport, aeronautics, perfumes, cosmetics and water treatment
• Renowned environmental and process expertise
• High-capacity for innovation (R&D, financing system for innovation) and worldwide oriented exports
• 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 and production sites

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, recycling and circular economy

• Attractiveness: offering more innovative products, digitalization and new production process (bioeconomy) and technologies to customers and aligning jobs and skills with industry prospects

Smartening up

France Chimie promotes regional smart specialization and international collaboration, and is closely involved on dedicated topics between different countries (example of Bioeconomy in Hauts de France).

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/france/
Germany
Verband der Chemischen Industrie e.V. (VCI)

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**CHEMICAL AND PHARMACEUTICAL INDUSTRY SNAPSHOT**

**Third-largest industry in Germany**

With a 2018 turnover of €203.0 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.

In 2018 nearly 2,050 companies partly organized in 40 Chemical Parks employed 462,553 people. Sales in the industry rose by almost 4 percent to 203 billion Euro in 2018. 60 percent of total sales were generated with
customers abroad.

Development until 2050: A VCI Prognos study Wege in die Zukunft, predicts growth of 1.6% a year until 2050 for the German chemical industry.

Among the most important trends affecting chemical and pharmaceutical industry are sustainability, climate change, protection of natural resources, and circular economy. The German chemical industry, together with its customers, is developing and implementing new processes and products e.g. with the aim to reach greenhouse gas neutrality by 2050, to use CO\textsubscript{2} as an input or to use plastic materials via recycling as feedstock for the next generation of products.

New technologies such as nano- und biotechnology and digitalisation are explored to find efficient ways to achieve these goals.

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 60% of German chemical companies have research activities, and R&D spending exceeds €11 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 2050.
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.
HOW ARE WE DOING?

Strengths

- Highly-integrated, globally competitive clusters and chemical parks
- Highly-innovative chemical sector
- Highly-specialised small and medium-sized enterprises
- Powerful protagonist in international value chains 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
- Network of 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 and protection of the environment
- 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
- Dependence on the automotive industry as important customer
- Links to international suppliers and markets become vulnerable due to rising protectionism and global tensions
- Rather vulnerable to external shocks (scarcity in many raw materials)
- Demographic change will pose an increasing threat in the future, especially in rural areas
- Lack of skills for digitalisation
- Slow upgrade of IT infrastructure including high-speed internet
- Slow progress on new electricity grids to enable the “Energiewende” towards renewable energy
- Lengthy approval procedures with legal uncertainties
- A sceptical view on change and new technologies in some parts of society

OUR CONTRIBUTION TO A COMPETITIVE EUROPE

Creating a framework for success

Germany started developing an industrial strategy in 2019. Until now the strategy’s scope remains open. Traditionally, in Germany, government sets overall horizontal framework conditions (research, energy, education, and infrastructure) and companies and other players adapt to customer needs. But ambitions in climate policy, increased international competition and emerging new technologies have raised new needs for an industrial policy.

Encouraging research through public policy

In 2017, government R&D spending, including funding of industrial R&D, was 0.94% of GDP while corporate R&D was 2.0% of GDP, making 3.04% 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 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.

**Smartenning 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.
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 Voiotia and Attica account for almost 45% of total output.

Nationwide, the chemical industry employs almost 13,500 people. 1 job in chemical industry is linked to 5.7 jobs of the whole economy. The industry comprises almost 1,000 companies, 99% of them SMEs. A few big companies produce basic chemicals, fertilizers, petrochemicals and polymers. Many SMEs focus upon construction and isolation materials, consumer products and agrochemicals, while a handful of micro-enterprises are active in nanomaterials.

Greek universities train a significant number of chemists and chemical engineers. Some emigrate, but the presence of well-educated scientists should enable the development of further collaboration between universities and industry. Government R&D spending and EU funds together account for 0.8 % of GDP, well below the EU average. It is widely
recognized 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. Experienced personnel from abroad is ready to return
- Economic reforms are improving the business environment like digitalization etc.
- Hydrocarbon exploration ongoing in the Ionian Sea and Crete area, 30 areas have been identified for exploration
- Mineral resources available
- Very good compliance to the demanding EU chemical legislation
- Interesting place to receive investment of R&D Centers, Business Centers etc.
- Excellent potential for sustainable agriculture and tourism
- On going reform of the taxation system for business

Weaknesses

- High energy costs for both electricity and natural gas
- Heavy reliance on imported raw material
- Still no attractive salaries
- Still difficult to access capital
- Vocational training does not fulfill the business demands
- Public sector bureaucracy

OUR CONTRIBUTION TO A COMPETITIVE EUROPE

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

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

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.
http://www.chemlandscape.cefic.org/country/greece/
Hungary
Hungarian Chemical Industry Association (Mavesz)

<table>
<thead>
<tr>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
</table>
| €5.4 billion | Ivan Budai  
Director  
budai@mavesz.hu |

Direct employees

15,039

CHEMICAL INDUSTRY SNAPSHOT

An important industry growing well

The chemical industry plays an important role in Hungary’s economy. Sales of Hungarian chemicals and chemical products nearly doubled from €2.8 billion to €5.4 billion during 2009-2019, registering a growth rate above the EU chemical industry average.

Chemical industry output, including the manufacturing of plastics in their primary forms (organic and inorganic chemicals, fertilizers and other agrochemical products, carnon paints, cosmetics and other consumer chemicals) amount to 6 % of the total manufacturing industry of the country. Hungary is also a leading producer of acryl based carbon fibers.
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 energy efficiency, 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 agrochemical active ingredients.

The growth is export driven, about 70% (in 2018: 67.8%) of chemical products manufactured in Hungary are exported and sold predominantly in the EU Single Market.
Hungary chemical industry export markets (NACE 20, 2017)

- **EU 15**
  - 40.4%
- **EU 13 “New members”**
  - 34.0%
- **Non EU**
  - 18.6%
- **Asia**
  - 3.3%
- **USA**
  - 2.0%
- **Others**
  - 1.7%

Largest export markets
- Germany
- Central European countries

**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. The market leader companies operate laboratories and research centers. The Research Centre of Natural Sciences of the Hungarian National Academy, and also 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 programs and projects.

**An employer of highly trained workforce**

The chemical industry is not a labor intensive branch of the economy, with only 15 thousand highly trained employees – 6,300 white collar and 8,700 black collar workers. It is an important contributor to the GDP of the country, distinguishing itself as one of the knowledge industries of Hungary.
The number of employed increased by 2.1 % in 2018 in comparison with the previous year due to new production facilities with the completion of investment projects in the sector.

### 2017/2018 full time employment (previous year = 100,0)

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<td>Total</td>
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### 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 that provide the necessary background for the operation and development of the chemical industry. For the sector the recent development of intermodal logistic capabilities for the transportation of goods and the ongoing improvement of railways are 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, with significant capacities for agrochemical active ingredients and phosgene production
- Two large companies, each with <€1,5 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
- 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, sound environment for new investments
- Economies of scale, up-to-date technologies and sound environment practices
- Capacity enhanced by investment to meet demand from automotive, electronics, construction industries and agriculture
- A location of choice for serving Hungary, and Central and South-Eastern Europe

Weaknesses

- Highly dependent on imported feedstock and energy sources

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. The teaching of science subjects at all levels of education and the importance of the technical professions are increasingly recognized and emphasized by government policies. At the same time special efforts and programs should be undertaken by both business and government to make natural sciences, and in particular, chemistry and chemical professions more attractive to the younger generations.

Working together to retain skills

Chemical companies are making considerable efforts to attract young people to the industry. The Hungarian Chemical Industry Association plays an increasingly active, supportive role in this effort. 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 ongoing and further investments in the sector.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/hungary/
Ireland
BioPharmaChem Ireland

Capital spending  Direct employees
€10 billion  > 30,000
R&D investment
€1.8 billion

National contact
Matt Moran
Director General
matt.moran@ibec.ie

CHEMICAL INDUSTRY SNAPSHOT

Ireland’s leading exporter

Chemicals, referred to here as the biopharmachem 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 30,000 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 pharmachemical). As a centre for manufacturing biopharmaceuticals Ireland is second only to the United States. Recent investments amount to just under €10 billion – the majority from US-based companies including Bristol Myers Squibb, Alexion, Regeneron and Eli Lilly.

A platform for global companies

Ten 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. There are emerging clusters in the midlands and also in the South East of the country.

An international export platform

Ireland’s chemical and pharmaceutical industry exported €73 billion of products in 2018, 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 2018, supporting as many again providing services to the sector. Companies invested about €10 billion in 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 (PRTLI) 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.
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. By 2018 this figure rose to €1.8 billion.
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
Turnover: €56 billion
National contact: Claudio Benedetti, Director General, c.benedetti@federchimica.it

Capital spending: €1.7 billion
Direct employees: 109,600
R&D investment: €559 million

CHEMICAL INDUSTRY SNAPSHOT
An important industry providing high qualified jobs

In 2018, the chemical industry’s sales (excluding pharmaceuticals) amounted to €56 billion, generated by 2,800 companies. Together chemical companies achieve 6% of Italy’s manufacturing sales, making chemicals the country’s fourth largest manufacturing sector in terms of production value and the third in terms of exports. The chemical sector employs about 109,600 high qualified workers but generates an even greater number of indirect jobs, about twice as much as 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 58% of total production value, compared to 47% of European average and realizing an export surplus of more than €3.7 billion in 2018. 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 to success often consists in offering to customers tailor made products: specialty chemicals, detergents and cosmetics and active pharmaceutical ingredients.
A science-based industry operating in partnership with Italian Districts

The 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. Chemical companies have been strengthening their commitment to research in Italy: R&D personnel has increased by 86% over the last decade and exceeds 8,000 employees. 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

The 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 55% 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 (+39% in 2010-2018).

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 it is home to 31% of Italy’s chemical firms and 41% of jobs, 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 centers, able to develop research and put scientists at work on industry-oriented projects.

Elsewhere: Emilia-Romagna accounts for 13% of chemical jobs employment, Veneto for 10% of jobs, Piedmont for 10% of jobs.

**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 800 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. 50% 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. The 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** 20% above the European average, largely because of taxes and incentives for renewables.
- **Logistics costs** 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.

**OUR CONTRIBUTION TO EUROPEAN COMPETITIVENESS**

Even if Italy did not formulate an explicit sectoral industrial policy, a set of novel incentive schemes and mechanism has been recently defined and launched in order to support innovative investments by the manufacturing sector, and which positively affects the chemical sector, a science-based Industry.

**Backing sustainability and market-led innovation**

The Ministry of Economic Development’s *Fund for Sustainable Growth* is still available and ongoing with regard to the support of projects promoting green chemistry which includes and encompasses sustainable growth, circular economy and bioeconomy.

The horizontal measure promoting energy efficiency within the Industry has been renewed, addressing the energy performance of the manufacturing sector through the direct involvement of electricity distributors which, being the obliged subjects within the so-called scheme “White Certificate”, must partner with companies to define, present and implement investments aiming to obtain significant targets of energy savings with respect to the previously monitored baseline.

**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 resources have been channelled to support the
digital transformation and implementation of Industry 4.0, which strongly impacts also process industries and not
only discrete manufacturing.

Chemical companies in Italy nowadays are able to exploit fiscal tax-breaks both for R&D investments and activities,
and for training their employees, aiming to at a multidisciplinary workforce.

During 2019 a new instrument was launched: the Voucher for Innovation Manager. The Voucher aims to create an
easy access and entry points for professionals (whose cost will be partly funded by MiSE), allowing the manufacturing
industries to implement innovative investments.

Italy is recognized as one of the most interesting country in EU as it offers fiscal incentives to companies investing in
innovation.

Finally, tax-breaks have been launched during 2019 aiming to increase risk capital and investments in innovative
start-ups by private investors and Companies too.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/italy/
CHEMICAL INDUSTRY SNAPSHOT

Building on historic strengths

With sales of €699 million in 2017, the chemical and pharmaceutical industries are 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 the government made it a priority sector. Chemical and pharmaceutical companies have always been the added value of Latvian products, due to their scientific achievements and the ability of entrepreneurs to turn ideas into competitive products.

Rooted in research

Chemicals and pharmaceuticals account for 10% of the manufacturing industry by turnover. These industries ranked fourth largest industry in Latvia, exporting 72% of their 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 the plastics and rubber compounds subsector and the glass fiber industry. The industry comes in second place when comparing the average salary level with all sectors of the 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
Latvia exports worldwide, but the core export markets are the 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](chart)

**Backed by education and skills**

Seven higher education institutions and professional schools collaborate closely with the industry to educate and provide young people with the skills needed for industry.

**PREPARING THE FUTURE**

**Strengths**

- Skilled, flexible and relatively cheap workforce
• Modern, flexible plants meeting 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 Contract Research Organization (CRO) activities are also gaining recognition.

Clustering to compete globally, The Life Sciences Cluster of Latvia comprises 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

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Direct employees
6,300

CHEMICAL INDUSTRY SNAPSHOT
A leading industry

The chemical industry ranks third in Lithuania, after oil refining and food production. Total sales in 2018 were €2.2 billion, up from €1.9 billion in 2017.

HOW ARE WE DOING?
A strong exporter

Chemicals accounted for 7.96% in 2018 compared to 7.09% of Lithuania’s industry exports in 2017 and have been growing in recent years. The main products are phosphoric and nitrogen fertilisers and plastics, notably PET.

The nascent life sciences, pharma and biotech sector is growing fast, and now exceeds €500 million of annual sales. The chemical industry is dispersed around the country, including coastal areas. It employed 6,300 people in 2018.

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 the six Lithuanian smart specialisation priorities proposed are related to chemistry: medical and pharmaceutical engineering and new functional materials.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/lithuania/
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...
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/Bolek/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/Chamelot

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/
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  €62,15 billion

Direct employees  315,000

R&D investment  €0.7 billion

National contact

Tomasz Zielinski, Ph.D., Eng.
President of The Board
tomasz.zielinski@pipc.org.pl

CHEMICAL INDUSTRY SNAPSHOT

A heavyweight industry

The chemical industry has a very high position among industrial sectors of the Polish economy. The share of chemical industry in the total industry is 17%. The Polish chemical industry is developing dynamically, with a growth rate which is second among the world’s largest economies.

The last decade shows that the chemical sector is one of the fastest growing areas in the Polish economy. The average annual growth rate of sales of the chemical sector in 2009-2018 amounted to 7,3% compared to 6,4% increase in sales of industrial processing in the corresponding period.

In 2018, the sales of the chemical industry, including manufacture of coke and refined petroleum products, pharmaceuticals, rubber and plastics, amounted 62,15 billion EUR. Compared to value in 2017, it has increased by about 15%.
Production of the chemical industry in Poland is dispersed. Manufacturing plants of the largest domestic producers are located throughout the country. To reduce transport costs and increase competitiveness, processing plants are often located close to the companies manufacturing chemicals in primary forms.

**A massive employer**

In 2018, the chemical industry was the third largest employer in Poland, employing 315,000 people. It represents 12% of total employment in the entire Polish industry, which is more than in other industry sectors such as automotive, furniture or mining.

**A trade deficit**

Foreign trade plays a very important role in the chemical industry in Poland. A large part of raw materials and semi-finished products is imported for processing and consumption or for export abroad. 2017 saw a significant increase in the favorable trade balance of chemical processing, at 42% compared to the previous year.

At the same time, the unfavorable trade balance of chemistry decreased in volume terms, which shows that the use of semi-finished products manufactured in the country increased significantly.

Still Poland has a longstanding trade deficit in chemicals: in 2018 it was 7.7 billion EUR. The biggest deficit occurs in volume terms.

**HOW ARE WE DOING?**

The chemical industry, like other sectors of the economy, is shaped by global trends. The most important factors determining these changes are directions of new regulatory solutions and changes in consumer behavior. The most important trends shaping the chemical industry include regulations, ecology, customisation, geopolitics, new business models, industry 4.0 and innovation.

**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 on imported raw materials
• Heavy reliance on 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

INVESTMENTS

In the coming years, enterprises plan to allocate the largest investment outlays for adaptation to environmental regulations as well as modernisation and replacement investments. Polish chemistry needs greater transparency and predictability of regulatory solutions as well as increased availability of financial support instruments for dynamic growth of innovations.

From 2012 to 2017, investment outlays in the Polish chemical industry recorded a steady increase until they reached 3,08 billion EUR. In turn, in 2018, according to estimates from the previous year, investment expenditure decreased by as much as 18,8%. However, it should be taken into account that these are estimates and may change.

The chemical industry is constantly taking measures to reduce its impact on the environment. It is an integral part of the process of change and development of the sector. For plants, it is not only the modernisation of installations, recognition and monitoring of threats or increasing efficiency, but also the improvement of safety in the production and distribution of chemical substances, as well as the implementation of modern, innovative, pro-environmental technologies.

One of the most important directions of pro-environmental investment are activities related to the protection of air and climate, which is directed at 85% of all ecological investments.

SUSTAINABLE DEVELOPMENT AND CSR

Polish chemical companies undertake number of activities aimed at implementing the main pillars of the sustainable development policy.

It is a series of initiatives aims to environmental protection, job development, employee safety and support for local communities. Activities which are taken by representatives of Polish chemistry enable the achievement of 17 Sustainable Development Goals and 169 tasks, which were included in the UN Resolution “2030 Agenda for Sustainable Development” signed in September 2015 by 193 countries. Poland was one of them. The goals were officially introduced in 2016 and replaced the Millennium Development Goals, which were to be achieved by 2015.

The implementation of activities of the 2030 Agenda is one of the elements of the stable development and growth of Polish chemistry.
Portugal
APQuimica – Associação Portuguesa da Química, Petroquímica e Refinação

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>867</td>
<td>€4.879 billion</td>
<td>Luis Araujo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director General</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:luis.araujo@apquimica.pt">luis.araujo@apquimica.pt</a></td>
</tr>
<tr>
<td>Direct employees</td>
<td>14,604</td>
<td></td>
</tr>
</tbody>
</table>

CHEMICAL INDUSTRY SNAPSHOTS

The activities classified as NACE 20 + NACE 211, represent about 5.4% of the total GDP of the Portuguese industry.

In comparison to 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 2018 exports of chemical, plastics and rubber products reached the value of €7.1 billions.

This is an increase of 2.6% since 2017.
Chemical Imports

Imports by Product Group
Annual rates of change in value, volume and price
(January to December 2018/2017)
Chemical Exports

Exports by Product Groups and Subgroups
Year-on-year growth rates in value, volume and price
(January to December 2018/2017)
Chemical Exports

- Exports (€ billions)
- Weight of chemicals in export (%)
Chemical imports - main origins (2018)

- Rest of the world: 20%
- Spain: 30%
- Ireland: 2%
- China: 2%
- United Kingdom: 4%
- Belgium: 5%
- Italy: 6%
- France: 6%
- The Netherlands: 8%

Chemical exports - main destinations (2018)

- Rest of the world: 29%
- Spain: 27%
- Italy: 3%
- Belgium: 4%
- Angola: 4%
- The Netherlands: 5%
- United Kingdom: 6%
- France: 10%
- Germany: 12%
Structure of the chemical industry in Portugal

In 2018 there were about 847 companies included in NACE (20+211). Most of the companies classified as chemical industries were small and micro companies, mostly operating in the area of consumer products.

Larger operators are involved in activities such as basic chemicals, fertilisers, 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 and NACE 211 – Manufacture of basic pharmaceutical products.

### Key facts 2018

<table>
<thead>
<tr>
<th></th>
<th>NACE 20 + Nace 211</th>
<th>% in Section C&lt;sup&gt;*&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of companies</td>
<td>867</td>
<td>1.2%</td>
</tr>
<tr>
<td>Personnel employed</td>
<td>14,604</td>
<td>2.0%</td>
</tr>
<tr>
<td>Turnover (€ million)</td>
<td>4,879</td>
<td>5.4%</td>
</tr>
<tr>
<td>Gross fixed capital formation (€ million)</td>
<td>333</td>
<td>7.1%</td>
</tr>
<tr>
<td>Gross added value (€ million)</td>
<td>989</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

<sup>*</sup> 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 industrialised 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 ans petrochemical complex - Ethylene
   - Polyethylene, Butadiene and ETBE plants
   - Terephthalic acid plant (PTA)
   - Urea-formaldehyde resins
   - Industrial Gases
Porto Area

A refinery is located close to the harbour in Porto. 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 are 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 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 vinyl chloride monomer (VMC) comes by pipeline (25 km) from the port of Aveiro.

This hub is considered an efficient site, mainly export-oriented, with good links to 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 harbour 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 still has sizable chemical units in the field of middle-sized plants such as fertilisers, fibers and 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 central location of Lisbon, the good logistics conditions - such as the port of Lisbon, railways, motorways - and the importance of Lisbon as a consumption centre for final consumers and downstream users.

Lisbon has two highly esteemed universities with a technology curriculum.

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

**Pole of Sines**

Developed in the early 70s, Sines is a petrochemical complex 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 addition to the refinery and the ethylene plant, there are plants for the production of polyethylene, butadiene, and ethyl tert-butyl ether (ETBE). In the same complex there are also plants for the production of terephthalic acid (PTA) 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 stabilisation of the 600 Kilotonnes/year PTA plant.

The main logistic strength of the complex is a deep water harbour (28 meter) capable of receiving ships up to 350 kt. This harbour, 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 harbour there is a large LNG storage facility, linked to a LNG maritime terminal connected with the natural gas transport network. The complex also has a railway connection.

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

In the near future, it will be possible to evaluate the production capacity of the ethylene plant.

**HOW ARE WE DOING**

**Strengths**

- Logistics

Portugal, being a peripheral country in Europe, is well placed in relation to other continents - North America, South America, Africa, and the northern part of the Middle East.
The expansion of the Panama canal will allow much larger ships to pass through, and most of the traffic between Asia and Europe is expected to use it. Then Sines will be the closest European harbour. 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 LNG from the US and will be an appropriate entry to Europe, as soon as the capacity of the pipelines between Spain and France has improved.

- 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 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. Therefore production processes are not fully integrated.
- Electricity costs are higher in comparison to the average in Europe, especially since Portugal is a big consumer. The electric power connections between Iberia and the rest of Europe are poor, making it difficult to develop 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 the price of natural gas cannot be better than in other European countries, which means high figures compared to 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. 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 to forest products should also be watched. Portugal has an extensive area covered by pine and eucalyptus woods which support 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.
Romania
Romanian Chemicals Producers and Distributors Association (APDCR)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
</table>
| 979                 | €2.3 billion | Alexandru Badea
                      |                                          | President
                      |                                          | alexandru.badea@brenntag.ro

Direct employees
22,500

GENERALITIES

The 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 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 (table includes 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).
According to Eurostat Structural Business Statistics (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 22,500 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 of 2006.

### Signs of recovery

The number of chemical manufacturers in Romania dipped to 824 in 2012 but have since begun 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

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

- Netherlands 638
- France 606
- Italy 540
- Belgium 348
- Austria 316
- Bulgaria 290
- United Kingdom 278
- Germany 1,132
- Hungary 671
- Others (92 partners) 2,073


**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
- Foreign Direct Investment (FDI) potential
- A mature market - growth is export
- EU membership
- Hub for Central and Eastern Europe
- Long tradition of chemical production
Weaknesses

- Lack of innovation and specialization
- Ageing population
- Poorly educated and trained labour force
- Rising labour 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 knowledge
- 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, export strategy, Mining Strategy 2017-2035, Romania’s Energy Strategy 2016-2030, with perspectives for 2050 and the competitiveness and Innovation strategy.

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

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/romania/
Russian Federation
Russian Chemists Union (RCU)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,500</td>
<td>Victor Ivanov</td>
</tr>
<tr>
<td></td>
<td>President</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:press@ruschemunion.ru">press@ruschemunion.ru</a></td>
</tr>
</tbody>
</table>

Direct employees
> 630,000

CHEMICAL INDUSTRY SNAPSHOT

Central to the economy

The chemical industry is a key part of the national economy and industry in Russia. In 2018, the value of chemical and petrochemical output was approximately 3,800 billion Roubles, up 2.7% year-on-year and equal to 3.8% 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 2018, 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, etc.)
- Low labour productivity
- Modernisation is still ongoing

OUR CONTRIBUTION TO A COMPETITIVE EUROPE

**A threefold development strategy**

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

- Increased public focus on 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)
- Development of special chemistry
- Regional development (the Eurasian Economic Union, China, European Union, etc.)

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

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>307 (with the number of employees over 20)</td>
<td>€10,347 million</td>
<td>General Secretary Silvia Surova <a href="mailto:silvia.surova@zchfp.sk">silvia.surova@zchfp.sk</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R&amp;D investment</th>
<th>Direct employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>€641 million</td>
<td>46,143</td>
</tr>
</tbody>
</table>

CHEMICAL INDUSTRY SNAPSHOT

Basic macro-data on Slovakia

- Population: 5.45 million
- Area: 49 thousand km2
- GDP: USD 20,670 per capita in 2018
- 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. New millennium represented stabilisation, integration to EU market and new investments.

Data for 2018 show the chemical sector with the sales of € 10,347 million, translating to an 11.75% share of total Slovak industry sales. The Slovak chemical sector has 10.78% and 12.39% shares of total exports and added value respectively. The chemical sector is ranked third in terms of Slovak industrial production, followed be the engineering
industry (including automotive) and electro-technical sector.

**Chemical sector and its share of total industrial manufacture of Slovakia in 2018**

<table>
<thead>
<tr>
<th>Indicator sector</th>
<th>Unit</th>
<th>Chemical</th>
<th>Industrial manufacturing in total</th>
<th>Share of chemical sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>€ million</td>
<td>10,347</td>
<td>88,064</td>
<td>11.75%</td>
</tr>
<tr>
<td>Imports - dovoz</td>
<td>€ million</td>
<td>10,411</td>
<td>77,030</td>
<td>13.52%</td>
</tr>
<tr>
<td>Exports - vývoz</td>
<td>€ million</td>
<td>8,569</td>
<td>79,490</td>
<td>10.78%</td>
</tr>
<tr>
<td>Employees</td>
<td>Persons</td>
<td>46,143</td>
<td>429,541</td>
<td>10.74%</td>
</tr>
<tr>
<td>Added value (mil. €)</td>
<td>€ million</td>
<td>2,013</td>
<td>16,245</td>
<td>12.39%</td>
</tr>
</tbody>
</table>

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

Total sales in 2018: € 10,347 million

- **Refined oil products** 37%
- **Chemicals** 16%
- **Rubber products** 22%
- **Plastic products** 23%
- **Pharmaceuticals** 2%

**Foreign Trade**
Commodity structure of Slovak exports and imports of chemical products by sub-sectors in 2018

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>Unit</th>
<th>Exports</th>
<th>Imports</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refined petroleum products</td>
<td>€ million</td>
<td>1,758</td>
<td>1,278</td>
<td>480</td>
</tr>
<tr>
<td>Chemicals products</td>
<td>€ million</td>
<td>2,592</td>
<td>4,272</td>
<td>-1,680</td>
</tr>
<tr>
<td>Pharmaceutical products</td>
<td>€ million</td>
<td>385</td>
<td>1,707</td>
<td>-1,322</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>€ million</td>
<td>3,835</td>
<td>3,155</td>
<td>680</td>
</tr>
<tr>
<td>Chemical and pharmaceutical in total</td>
<td>€ million</td>
<td>8,570</td>
<td>10,411</td>
<td>-1,841</td>
</tr>
</tbody>
</table>

In 2018 (31 Dec 2018), there were 307 companies in Slovakia’s chemical and pharmaceutical sector with more than 20 employees, 42.0% small companies, 44.6% of medium size and 13.4% of them were larger with 250 or more staff.

Regarding international comparison, total sales of the Slovak chemical industry represent up to 1.5% of the EU’s sales and some 0.28% of total world sales (2017).

**SITUATIONAL ANALYSIS OF THE CHEMICAL INDUSTRY**

Industrial production is located mainly in the western part of Slovakia which is formed by Bratislava, Trnava, Trenčín and Nitra self-governing regions. These western regions have a 59% share of Slovakia’s total GDP (2018). Central Slovakia is formed by self-governing regions Žilina and Banská Bystrica, with a share of 20%, and the Eastern part, formed by self-governing regions Prešov and Košice, with a 21% share of total GDP. The highway connection between the west and the east of Slovakia is still not finished, which is a big drawback mainly for Prešov and Košice regions.

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 four big car factories: Volkswagen, Peugeot-Citroen, Jaguar Land Rover and KIA, located in the western part of Slovakia. A total number of over 1,08 million cars manufactured in 2018, the equivalent of 198 units per 1,000 inhabitants, the most compared to any country in the world. A new Porsche plant is under construction near the town of Piešťany.

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.

Slovakia spends only about 0.7 – 0.8 % of its GDP on R&D per year. Slovakia relies on EU funding for research and
development, as private sector investment is insufficient. 39% of national R&D investment is based on foreign sources of funding, in particular EU funds, which account for 89% of all funding in this area.

New Investment in chemical industries

Duslo, a.s.
- *Investment:* €310 million
- New Ammonia operation

Fortischem, a.s.
- *Investment:* €50 million
- New salt electrolyzes and modernization of manufacture

Continental Matador Rubber, s.r.o.
- *Investment:* €9.5 million
- Original equipment and new laboratory for final products

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 advantage.

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.
The Slovak association of chemical & pharmaceutical industry (ZCHFP SR) has cooperated within the Projects Nanoforce, FreeFOAM, INNOCHEM, ChemPharmVET, ChemMultimodal and ChemTube with partners from all of the Europe.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/slovakia/
Slovenia
Association of Chemical Industries of Slovenia (at Chamber of Commerce and Industry of Slovenia - GZS)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>€6.1 billion</td>
<td>Darja Bostjančič Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:zki@gzs.si">zki@gzs.si</a></td>
</tr>
</tbody>
</table>

Direct employees

31,000

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 €6,1 billion of turnover in 2018, some 20% of the country’s industrial output. It is an industry with long tradition, well educated, qualified, skilled and internationally savvy labour force and high export orientation.

And among the leading employers

Production of chemicals and chemical products, of pharmaceutical raw materials and preparations and of rubber and plastic products together employed 31,000 people. Labour force is well educated, skilled, qualified and internationally savvy.
Pharmaceuticals dominate in turnover

There are 800 chemical industry companies (97% of them SMEs[1]). The largest, though very few in number, are in pharmaceuticals, which account for 39% of chemical industry turnover.

[1] size defined according to the Slovenian Companies Act

Automotive is also an important customer

Overall, two-thirds of companies are involved in plastic processing. Many of these supply the automotive industry, provide plastic products for construction purposes or advanced plastic packaging products for industrial and consumer use.
The traditional chemical industry main products 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, 2018 (total = €6.1 billion)**

- **Plastics processing industry** 26%
- **Rubber processing industry** 9%
- **“Classic” chemical industry** 26%
- **Pharmaceutical industry** 39%

*Source: KAPOS GZS 2018*

**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 60% for 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
OUR CONTRIBUTION TO A COMPETITIVE EUROPE

Encouraging applied R&D

The Research and Innovation Strategy of Slovenia 2011-2020 explicitly calls for 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 for 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)

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,300</td>
<td>€65.7 billion</td>
<td>Juan Antonio Labat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director General</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:jal@feique.org">jal@feique.org</a></td>
</tr>
</tbody>
</table>

**CHEMICAL INDUSTRY SNAPSHOT**

**Now Spain’s second-biggest industry**

In 2018 chemicals, including pharmaceuticals (but excluding plastics and rubber products), became the second largest industry in Spain, accounting for 13.4% of manufacturing gross product. It generated value of about €20 billion on sales of €65 billion – outpaced only by the massive food, beverages & tobacco industry.

The chemical industry continues its consolidation as one of the key sectors in the Spanish economy. This sector comprises over 3,300 companies with a turnover of over 65.7 billion euros and generates 670,000 direct, indirect and induced jobs. The Spanish chemical sector is a key sector in advanced economies, hence in the Spanish economy. Its activity directly and indirectly generates 5.8% of the national GDP, and it employs 3.5% of the active occupied population.

Furthermore, the quality of the employment results in high tax contributions by the companies and workers in the sector, as their income tax and social security payments account for over 20,000 euros per employee per year. Two factors continue to be crucial for the future of the chemical industry: its export capacity and its innovative leadership. In the first case, the sector is now the economy’s second-largest exporter, and 57.5% of its production goes to
foreign markets.

In the area of innovation, the chemical sector is the leader in investment and expenditure in R&D&I and also in research staff employment.

**Bucking the trend**

Since the beginning of the global economic crisis in 2007, the chemical industry has increased sales by 32%, even though Spanish industrial production overall slumped by 15%.

**Becoming a strategic sector**

The chemical industry is the second-largest exporter of the Spanish economy, and the leading investor in R&D (22% over the total industry) and environmental protection. In 2009, the government declared it a strategic sector for the Spanish economy.

**Main figures of the Spanish chemical industry (2018)**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover</td>
<td>€65.7 billion</td>
</tr>
<tr>
<td>Value added</td>
<td>€20.0 billion</td>
</tr>
<tr>
<td>Contribution to the industrial GDP</td>
<td>13.4%</td>
</tr>
<tr>
<td>Number of companies</td>
<td>3,300</td>
</tr>
<tr>
<td>Capital spending</td>
<td>€2.1 billion</td>
</tr>
<tr>
<td>Exports</td>
<td>€37.7 billion</td>
</tr>
<tr>
<td>Sales in foreign markets</td>
<td>57.5% of total</td>
</tr>
<tr>
<td>Contribution to Spanish exports</td>
<td>15% of total</td>
</tr>
<tr>
<td>Direct employment</td>
<td>196,800 employees on the payroll</td>
</tr>
<tr>
<td>Expenditure on training</td>
<td>€229 per employee and year</td>
</tr>
<tr>
<td>Permanent contracts</td>
<td>93% of the total contracts</td>
</tr>
<tr>
<td>R+D+i</td>
<td>2.5 billion euros (26% of total R+D+i)</td>
</tr>
<tr>
<td>Innovative companies</td>
<td>59% of the total of the sector</td>
</tr>
<tr>
<td>Turnover generated from innovative or new Products</td>
<td>25% of the total sector</td>
</tr>
<tr>
<td>Research staff recruited</td>
<td>22.5% of the total industry</td>
</tr>
</tbody>
</table>

**Main Production Areas**

*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 five 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 chemicals consumption (over €72 billion)
- Largest chemical cluster in the Mediterranean
- 46 seaports with international shipping facilities
- Europe’s biggest (15,600 km) motorways network, making for great logistics
- 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

First electricity and gas reforms were completed in 2015 to reduce energy costs. The new renewable energies strategy (2019), the drastic reduction of the regulated costs on electricity and gas energies (2019), and the announced statute for electricity-intensive industries (2019), will provide a more competitive energy cost.

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

National Agenda for the Competitiveness of the Chemical Industry

- Published in 2019 and signed by Feique and the Government of Spain
- Objective: Develop the competitiveness of the chemical industry adopting 40 actions

New Industrial Policy

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

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

Snapshot of the Chemical Industry:
https://www.feique.org/pdfs/radiografiasectorial.pdf

CSR and Sustainable Development Report:
https://www.feique.org/pdfs/informeRSE.pdf

« Smart Chemistry. Smart Future » Report:
https://www.feique.org/pdfs/informeRSE.pdf

Invest in Chemicals. Invest in Spain:
https://www.feique.org/Inversores.pdf

National Agenda for the Chemical Industry:

Chemical industry International trade issues:
chemspain.org

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/spain/
Sweden
IKEM - Innovation and Chemical Industries in Sweden

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Turnover</th>
<th>National contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,521 (in 2017)</td>
<td>€32 (in 2017) billion</td>
<td>Magnus Huss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director General</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:magnus.huss@ikem.se">magnus.huss@ikem.se</a></td>
</tr>
<tr>
<td>Direct employees</td>
<td>51,300 (in 2017)</td>
<td></td>
</tr>
</tbody>
</table>

**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 21% of total Swedish exports in 2018, worth approximately €31.9 billion (2018).

**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 51,300 full-time jobs in 2,521 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, although 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 €16.2 million in Sweden in 2017. R&D expenditures have been increasing somewhat over the last couple of years, and represented 3.4% of the GDP in 2017. 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.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/sweden/
Switzerland

**scienceindustries**

<table>
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<th>National contact</th>
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</table>
| 250                 | Stephan Mumenthaler  
stephan.mumenthaler@scienceindustries.ch |

**Direct employees**

70,000

**R&D investment**

CHF 7.2 billion

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**CHEMICAL INDUSTRY SNAPSHOT**

**Switzerland’s leading exporter**

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

With exports of CHF 104 billion and imports of CHF 20 billion in 2018, members of our business association earned a trade surplus of CHF 54 billion.

**Growing fast**

Scienceindustries' companies form Switzerland's biggest industrial sector, ahead of machinery.

**Powered by people**

Scienceindustries members are massive employers, with 70,000 employees in Switzerland in 2018, 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

### 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 2018 science industries members invested around CHF 7.2 billion in research and development in Switzerland, a third of their worldwide
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.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/switzerland/
**Turkey**

Turkish Chemical Manufacturers Association (TKSD)

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**Direct employees**

120,776

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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 over 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 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 reached €24 billion level in 2018 which comprised of chemicals/products (84%) and pharmaceutics (16%). Employment showed a 14.2% increase from 105,000 to 120,000 between 2012-2017.
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 has been 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 İzmir and the other Tupras (Turkish Petroleum Refineries Corporation) Korfez Petrochemical and Refinery in Kocaeli. These two complexes produce a wide range of petrochemicals including all common plastics (HDPE, LDPE, PS, PVC, and PP), aromatics, ethylene glycol, phthalic anhydride, terephthalic acid, carbon black, synthetic rubber, acrylonitrile and caustic soda. 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 comprises 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.

As one of 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 Isletmeleri Genel Müdurluğu 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.

Given 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-sized 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$50 billion in chemicals exports by 2023.
- Incentives in the form of land allocation and investment credit support for one establishment of integrated chemical industry clusters were also developed, both at national and at regional level, to encourage and sustain innovation, along with 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)

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CHEMICAL INDUSTRY SNAPSHOT

The second-biggest industry

With £55.5 billion of revenues and £19.2 billion value added in 2018, chemicals & pharmaceuticals is the UK’s second largest manufacturing 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 specialities such as adhesives, flavours and fragrances, and in a host of industrial specialities including lubricants, fuel additives, construction chemicals and catalysts. It is also a global leader in pharmaceuticals.

The UK chemical industry is also closely linked to the industry for the manufacturing of rubber and plastic goods which in 2018 had a turnover of £24.5 billion, a GVA of £8.6 billion and employed 185,000 people.
Employing and investing

Businesses in the chemical industry employed 153,000 in 2018, 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 £5.4 billion in 2018, of which £4.5 billion came from pharmaceuticals.

Recovering growth

Chemical production grew by 1% in 2018 while pharmaceutical production grew by 2.9%. Both sectors have struggled in the face of uncompetitive energy costs due to ambitious climate policies in the UK paired with further reluctance for investors to commit to the UK in the face of protracted Brexit uncertainty.

Revitalising pharmaceuticals

Production of pharmaceuticals, for decades one of the fastest-growing sectors, fell sharply between 2009 and 2014 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. These factors have led to the UK’s production of pharmaceuticals slowly trend up since 2014.

The UK’s strong science base has helped R&D spending stay high but the UK has struggled to attract significant manufacturing investment, a situation we hope is alleviated with clarity over Brexit and the Government’s supportive approach with regard to Industrial Strategy.

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, landed in Grangemouth and Teesside.

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
- Improving public perception
- Heightened political recognition due to Brexit and new Industrial Strategy

**Weaknesses**

- The uncertainty of Brexit and the medium to long-term impact on investment
- 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
- English and Scottish moratorium on shale gas exploration
- 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 Theresa May’s Government in 2017, this Chemistry Growth Partnership was revised with a new strategy published in November 2018. This has been followed by the November 2019 submission of a “Sector Deal” – a collective industry proposal to Government aimed at public/private investment in transformational projects tackling waste, decarbonization and broader sustainability challenges with the aim of strengthening chemistry-related supply chains and regional clusters. 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 UK government wants the UK to be the world’s most innovative economy and through the Industrial Strategy, has committed to reaching the target of 2.4% of GDP investment in Research and Development (R&D) by 2027. As a first step to reaching the target, the Government announced an additional investment of £7bn for R&D over 5 years (from 2017-18 to 2021-22) as part of the National Productivity Investment Fund. This raises public investment in R&D from around £9.5bn per annum in 2016-17 to around £12.5bn per annum in 2021-22 – the biggest ever increase in public funding of R&D.

Working together

The long term growth ambitions of the Chemistry Council and its proposed Sector Deal has seen strong supplier/customer collaboration. For example, projects aimed at delivering more sustainable materials for consumer products; waste to feedstock opportunities and advanced materials for batteries are helping build strong links between chemical businesses, academe, waste companies and the consumer product and automotive industries. Chemical industry links with UK academic centres remain strong, although R&D spending intentions are inevitably being influenced by Brexit uncertainty and related future access to talent and the EU’s Horizon funding programmes.

Navigating Brexit

Minimal disruption to existing trade and investment flows remains the overall objective under Brexit. The industry - both in the UK and across the EU27 - is well positioned in terms of preparation, profile and influence to ensure that its interests are best represented in any new trade relationship that emerges. More immediately, the UK industry will be looking for a positive response from the British Government to its Sector Deal project proposals – especially as many of these are designed to address the growing societal concerns over climate change, plastics and waste and chemicals in the environment.

Landscape of the European Chemical Industry Website:
http://www.chemlandscape.cefic.org/country/united-kingdom/