

2020 FACTS & FIGURES

of the European
chemical industry



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Foreword

The chemical industry is a valuable part of Europe's economy. We provide innovative solutions to delivering a low carbon and circular economy, both within Europe and beyond its borders.

A favourable European industrial policy is needed to stimulate innovation and investment and deliver these objectives. One that safeguards European industrial competitiveness globally.

Ambitious trade policies are vital in this regard. In an increasingly uncertain trade environment, free trade agreements, such as CETA and the EU-Japan Economic Partnership Agreement, contribute to increased trade activity and foster economic growth.

Horizon Europe has the potential to revolutionise Europe into a global innovation hub. The European chemical industry continues to innovate, with an annual investment of €10 billion on R&I in 2018 – the highest value since 2000.

Safety remains our top priority when doing business and operating our facilities. The European chemical industry is committed to ensuring compliance with REACH – the most protective chemical legislation in the world. We must continue to strengthen and better enforce REACH and, together with the Institutions and the Member States, ensure this legislation is properly implemented.

With the right framework conditions in the EU, our industry can play a large role in building a better sustainable future for Europe and its people. We stand ready to cooperate closely with the Institutions to ensure this vision is brought to reality.

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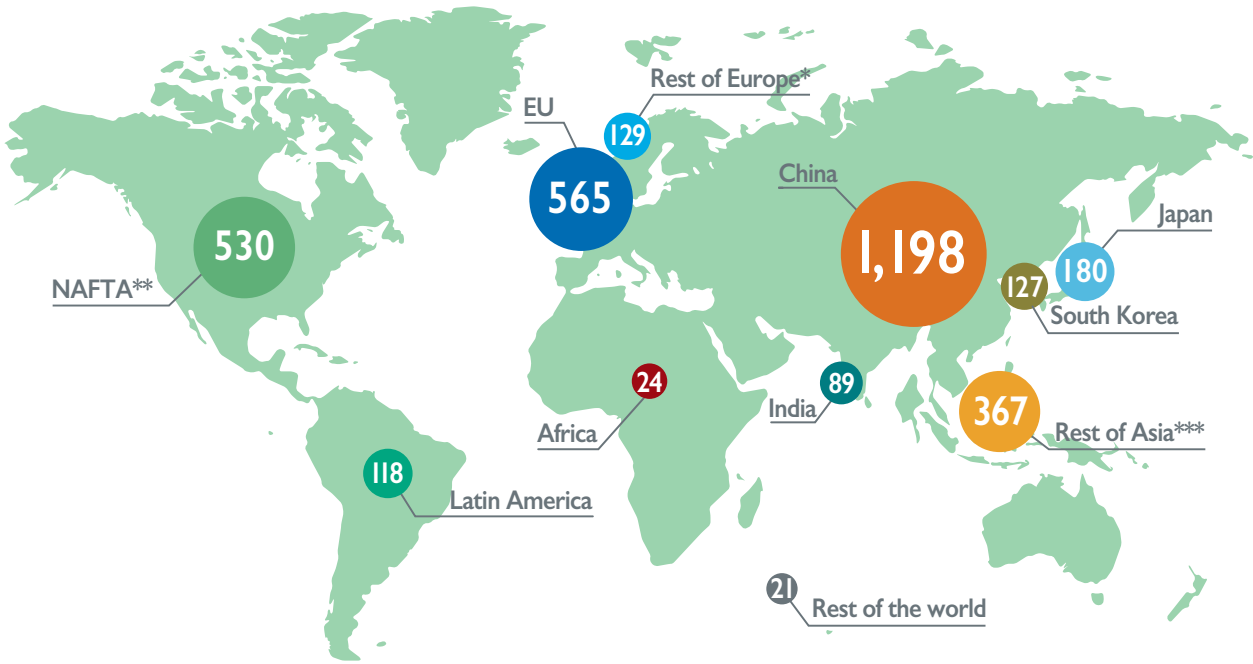
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Europe is the second largest chemicals producer in the world

World chemical sales (2018, €3,347 billion)



Source: Cefic Chemdata International 2019
* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine
** North American Free Trade Agreement
*** Asia excluding China, India, Japan and South Korea

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

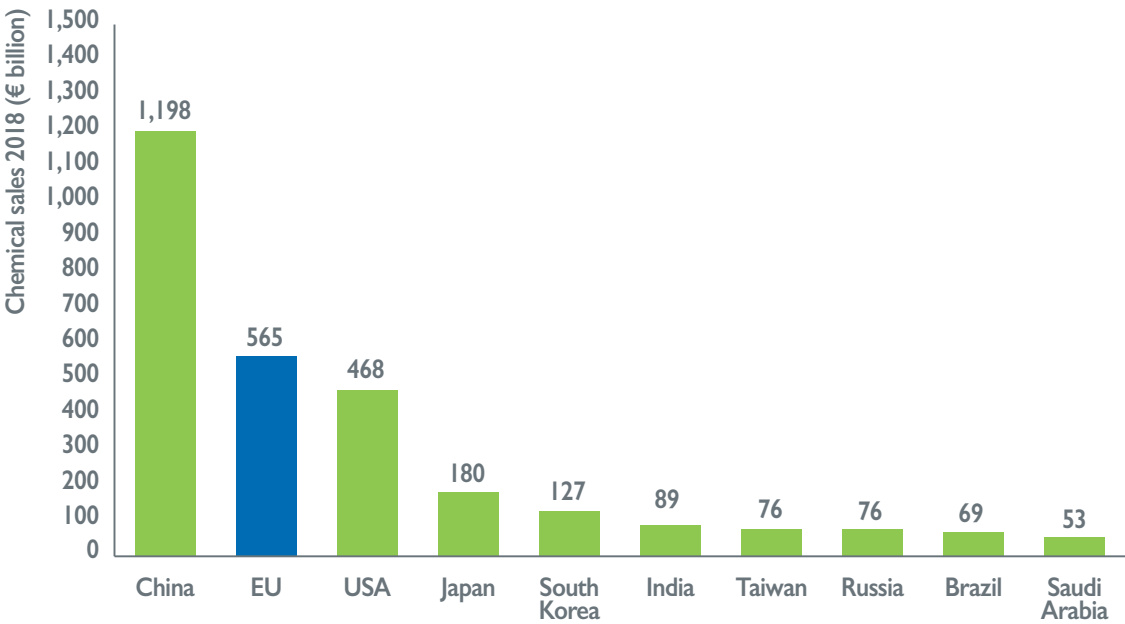
A look at global chemical sales over the past ten years (2008-2018) shows:

- In 2009, China became the world's largest chemicals producer for the first time, representing 23.6% of global chemical sales, followed by the EU, accounting for 23.4% of global sales. China has continued to gain market share since 2009 to the detriment of Europe.
- World chemicals turnover was valued at €3,347 billion in 2018. Global sales grew by 2.5% from €3,266 billion in 2017 to €3,347 billion in 2018. With €1,198 billion in 2018, China is still the largest chemicals producer in the world, contributing 35.8% of global chemical sales in 2018.
- With 16.9%, the EU chemical industry ranks second in total sales, with the United States contributing 14%. Worldwide competition has changed significantly over the last ten years, as emerging countries in Asia now hold the top ranking in sales.

- The BRIC countries (Brazil, Russia, India, and China) accounted for 42.8% of global chemical sales in 2018. Nearly three quarters of global chemical sales were attributable to BRIC, the EU and the USA in 2018. The remaining quarter of global chemical sales were generated mainly by emerging countries in Asia, including the Middle East.

China dominates chemical sales world ranking

Chemical sales by country: top 10



Source: Cefic Chemdata International 2019

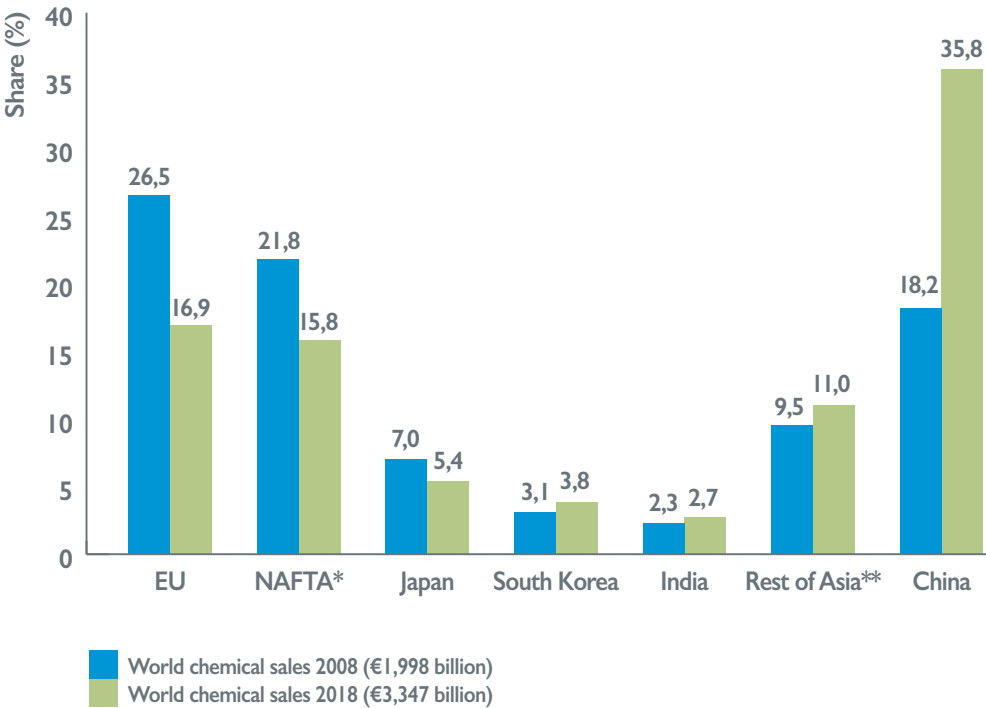
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- In 2018, the top 10 chemical-producing countries had a combined turnover of €2,901 billion, accounting for 86.7% of global chemical sales.
- Six countries out of the top 10 biggest producers are Asian (China, Japan, South Korea, India, Taiwan, and Saudi Arabia), generating chemical sales of €1,886 billion – 51.5% of the world market. China’s sales levels are higher than the EU and US markets combined (€1,198 billion compared to €565 bn + €468 bn).
- Two of the top 10 are European producers (EU28 + Russia), generating sales revenue of €640.5 billion (19.1%). European chemical sales grew by 2.8% from 2017 to 2018. Sales revenues increased in most countries in Europe in 2018.
- Two of the top 10 country sales are American producers (the USA and Brazil), generating chemical sales of €537.6 billion (16.1%). Sales revenues in the US chemical industry grew modestly by less than 1% in 2018 compared to 2017. Business development in Brazil did not improve in 2018, with about a 2% decline in sales revenue.
- The world landscape of the chemical industry is changing rapidly. China is taking its chemical industry to the next stage of development and is looking to move from “following the lead” to “taking the lead” and from a “big country” to a “great power” of the petroleum and chemical industry, leading in technology innovation and trade, and prevailing in international markets.

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EU market share drops significantly as emerging markets surge

World chemical sales by region



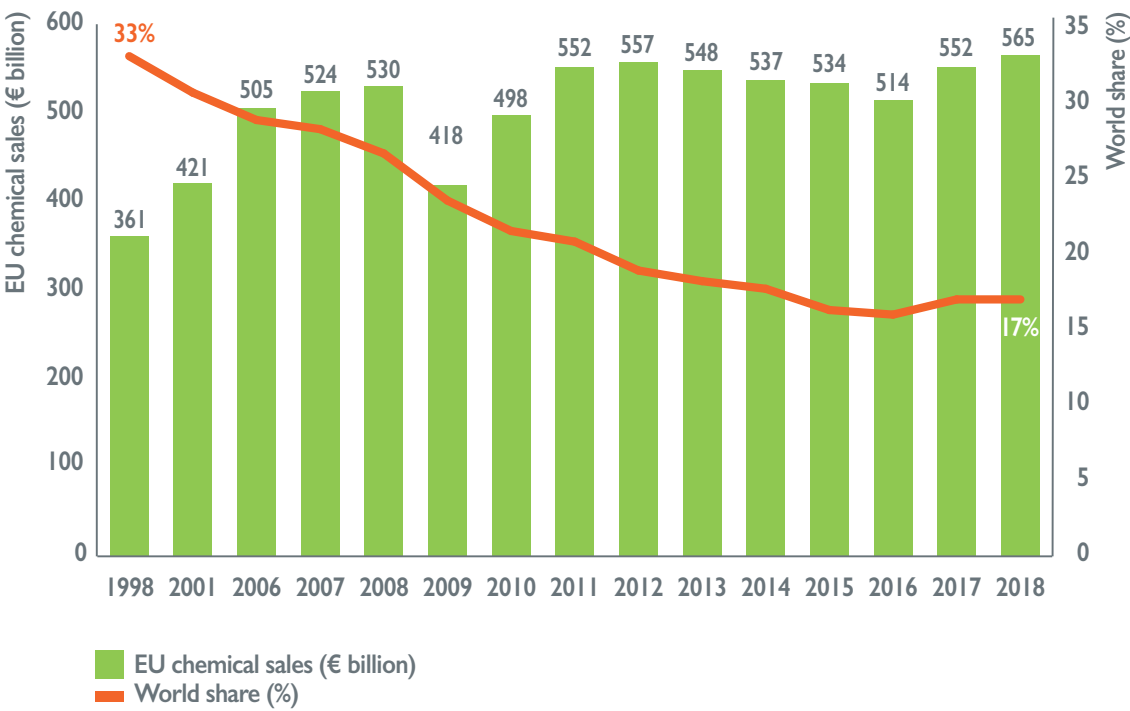
Source: Cefic Chemdata International 2019
* North American Free Trade Agreement
** Asia excluding China, India, Japan and South Korea

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- China's share of world chemicals market sales in 2018 swelled to 35.8%, up from 18.2% reported in 2008. The EU contribution to world chemical sales dropped from 26.5% in 2008 to 16.9% in 2018. The EU gradually lost its top spot in world chemical sales to China and the rest of Asia (excluding Japan).
- The results also show a decreasing share of chemical sales for industrial regions (NAFTA and Japan) over the past ten years. NAFTA's share of global sales went down from 21.8% in 2008 to 15.8% in 2018. There is a less spectacular result for Japan, where market share decreased from 7 % to 5.4% in the same period.
- The European chemical industry is still a world leader and a highly innovative sector. With 90% of GDP growth taking place outside Europe in the coming decades, the challenge is to stay competitive. Taking advantage of emerging market opportunities will require EU leadership in creating attractive framework conditions that enhance the global position of European chemicals.

World market share of EU chemical sales drops by half

EU share of global chemicals market



Source: Cefic Chemdata International 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Global chemical sales are three times bigger in 2018 than twenty years ago. Global chemical sales have been growing consistently since 1998, expanding three times in value in 2018 (€1,097 billion vs €3,347 billion)
- In 1998, the EU reported sales of €361 billion, making up 32.9% of world chemical sales in value terms. In 2018, sales values in the EU area regained 56% of their original value in 1998. As a consequence of steep global chemicals market growth, the relative share of the EU chemicals market nearly halved in 20 years, dropping from 32.9% to 16.9%.
- This trend is expected to continue in the future. Data analysis shows strong chemicals demand growth in China, and other emerging countries and low growth in Europe and North America, where Europe sells most of its chemicals.
- Overall growth of chemicals demand and production, as well as faster growth in emerging regions, is a continuing future trend. Growth in Europe remains low, mainly due to mature markets and an ageing population, while the EU's trade surplus remains high. Other structural factors will deeply affect the development of the chemicals business in the coming years such as immigration, digitalisation, populism, among others.
- Besides increased competition from other regions, there are other potential reasons for this relative decline, including comparably high energy prices, lagging innovation, currency appreciation, high labour costs, and regulatory and tax burdens. Sector research and development (R&D) intensity, energy prices and the exchange rate have strong quantitative links to competitiveness.

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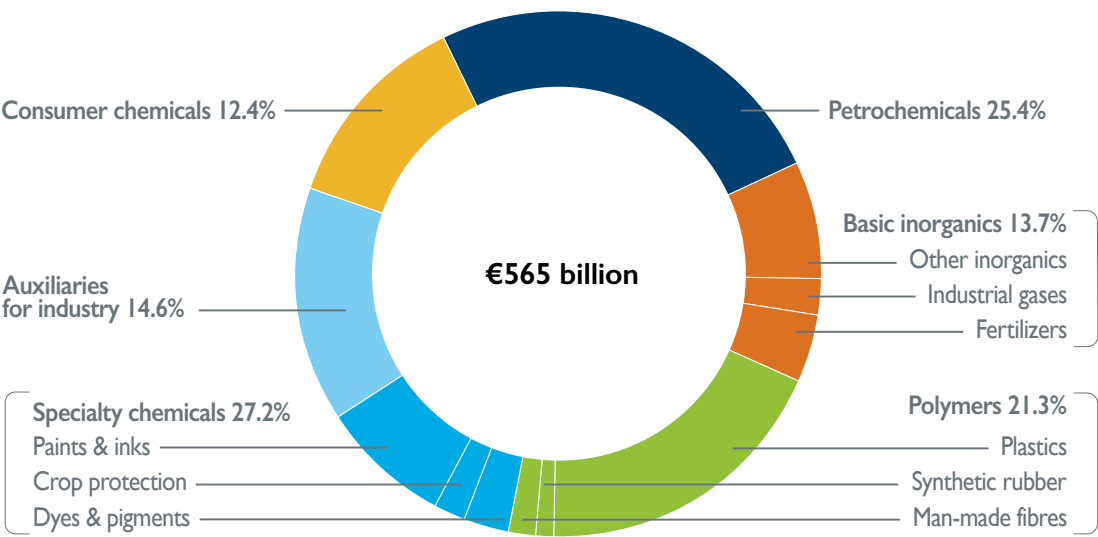
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Base chemicals account for 60% of EU chemical sales

EU chemical sales 2018 (€565 billion)



Source: Cefic Chemdata International 2019

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- Output from the EU chemical industry covers three broad product areas: base chemicals, specialty chemicals and consumer chemicals. Base chemicals, also known as commodity chemicals, cover petrochemicals and their derivatives (polymers) along with basic inorganics. They are produced in large volumes and sold in the chemical industry itself or to other industries.
- Base chemicals represented 60.4% of total EU chemical sales in 2018. The inorganic basic chemicals sub-sector includes production of chemical elements, inorganic acids such as sulphuric acid, bases such as caustic soda, alkalis and other inorganic compounds such as chlorine. The petrochemicals sub-sector covers manufacturing of chemicals using basic processes, such as thermal cracking and distillation. Polymers in primary forms is, in most cases, integrated into petrochemicals sites. Plastics in primary forms embrace the manufacture of resins, plastic materials and elastomers.
- Specialty chemicals cover areas such as paints and inks, crop protection, dyes and pigments, and auxiliaries for industry (other chemicals such as glues, essential oils and gelatine). Specialty chemicals are produced in small volumes, but they nevertheless represented 27.2% of total EU chemical sales in 2018.
- Consumer chemicals are sold to final consumers, such as soaps and detergents as well as perfumes and cosmetics. They represented 12.4% of total EU chemical sales in 2018. Petrochemicals and specialty chemicals accounted for the majority – 52.6% – of EU chemical sales that year.

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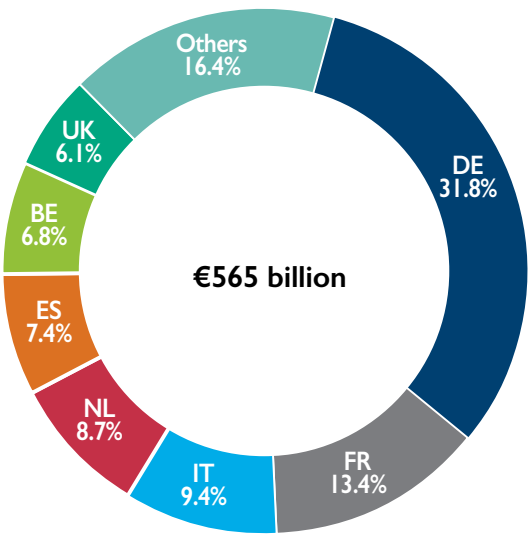
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More than 60% of EU chemical sales generated in four EU Member States

EU chemical sales broken down by country (2018)



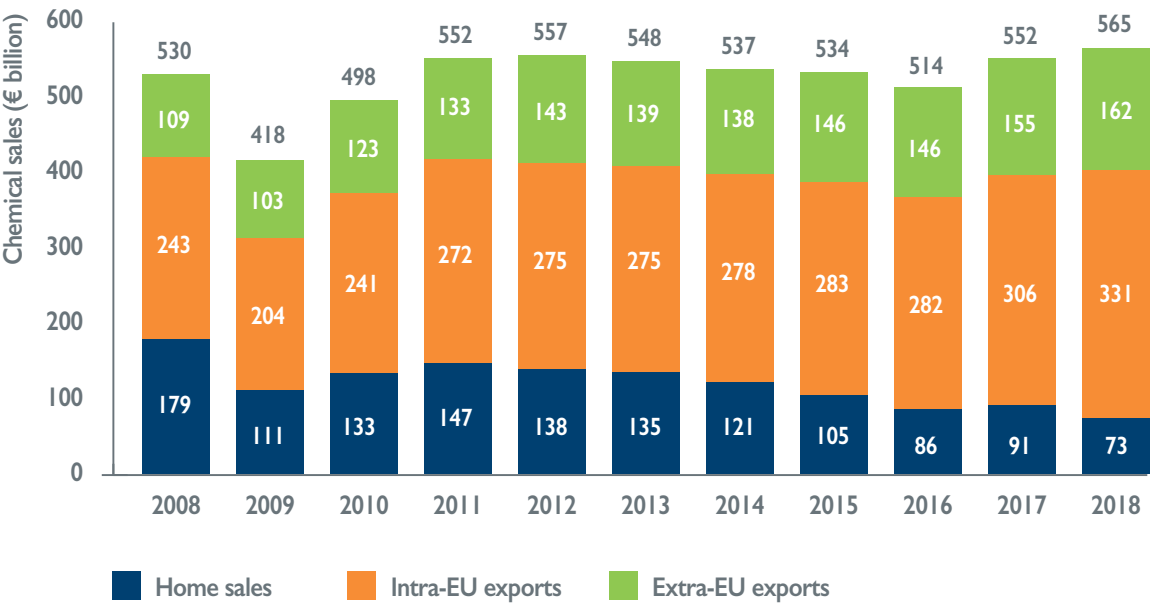
Source: Cefic Chemdata International 2019

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- Germany and France are the two largest chemicals producers in Europe, followed by Italy and the Netherlands. These four countries accounted for 63.3% of EU chemical sales in 2018, valued at €357.7 billion. The share rises to 83.6%, or €472.1 billion, when including Spain, Belgium, and the United Kingdom. The remaining EU Member States accounted for 16.4% of EU chemical sales in 2018, to which Poland and Austria are the two largest contributors.
- UK chemical sales reached, on average, €38.6 billion (2010-2018); EU27 chemicals exports to the UK reached €23.4 billion, while imports from the UK totalled €20.3 billion. The UK accounts for 7.2% of EU28 chemical sales, and more than half of UK chemicals production is exported to the EU27 area (52.5%). The UK's decision to exit the EU presents a political and economic challenge that creates significant uncertainty for companies and their employees.

EU chemical sales reach highest level since 2008

EU chemical sales structure (€ billion)



Source: Cefic Chemdata International 2019

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- Total sales in 2018 were the highest since 2008. Total sales of the EU chemical sector cover three categories: home sales, intra-EU sales and extra-EU sales (or exports). The chart illustrates the dramatic decline in EU chemical total sales levels during the 2009 economic downturn. The chemical sector has been on a gradual upturn since 2010.
- Home sales lost about 60% of their original value in ten years. Home sales represent chemicals revenue generated by EU chemicals companies from selling into their home country market (e.g. French companies selling their chemical products in France). From 2008 to 2018, EU home sales decreased on average by 8.6% per annum; home sales went down from €178 billion in 2008 to €73 billion in 2018.
- Intra-EU sales extended 36% of their value in ten years. Intra-EU sales cover revenue generated by EU chemicals companies from selling in the EU single market but not into their home country market, (e.g. French companies selling their chemicals products in Belgium or Germany).

Removing both trade and non-trade barriers inside the European Union with the single market helped boost growth and competitiveness in the EU chemical industry, increasing the number of chemical transport operations across EU borders.

Intra-EU sales (marked as “intra-EU exports” on the graph) climbed from €243 in 2008 to €331 in 2018.

- Extra-EU sales increased by nearly half of their value in ten years. The European chemical industry is an exporting industry, with 29% of its production outside the EU. During the period 2008 to 2018, EU chemical exports outside the EU single market increased on average by 4.1% per annum. Extra-EU sales (exports) in 2018 regained about half of their original value registered in 2008. The chemical industry must continue to be globally competitive to sustain its existing capacity and grow in line with global demand.

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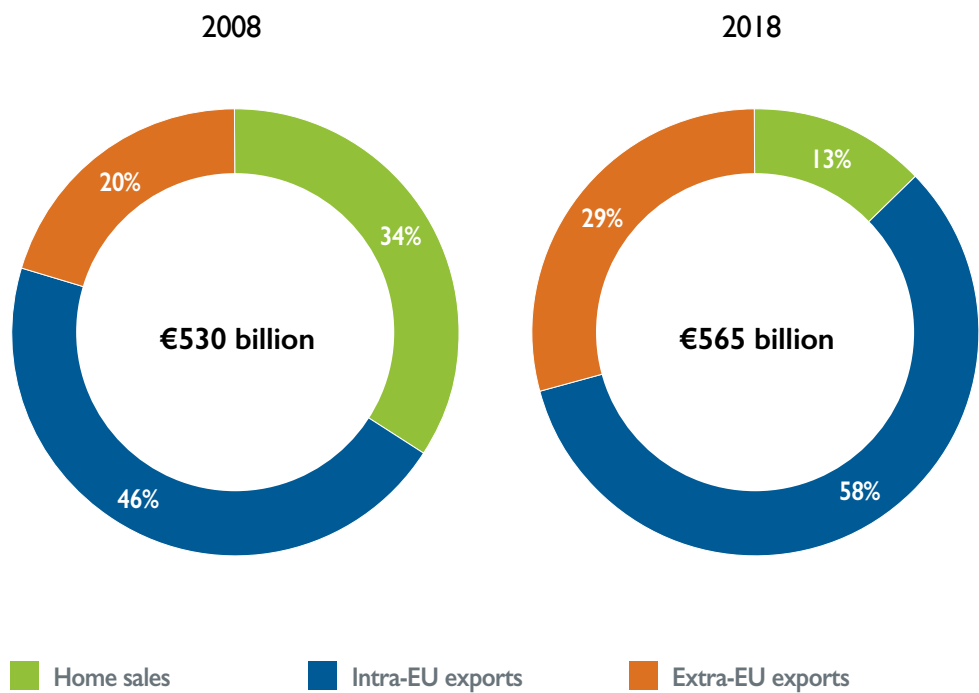
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More than €160 billion is generated from selling chemicals outside the EU area

EU chemical sales structure (%)



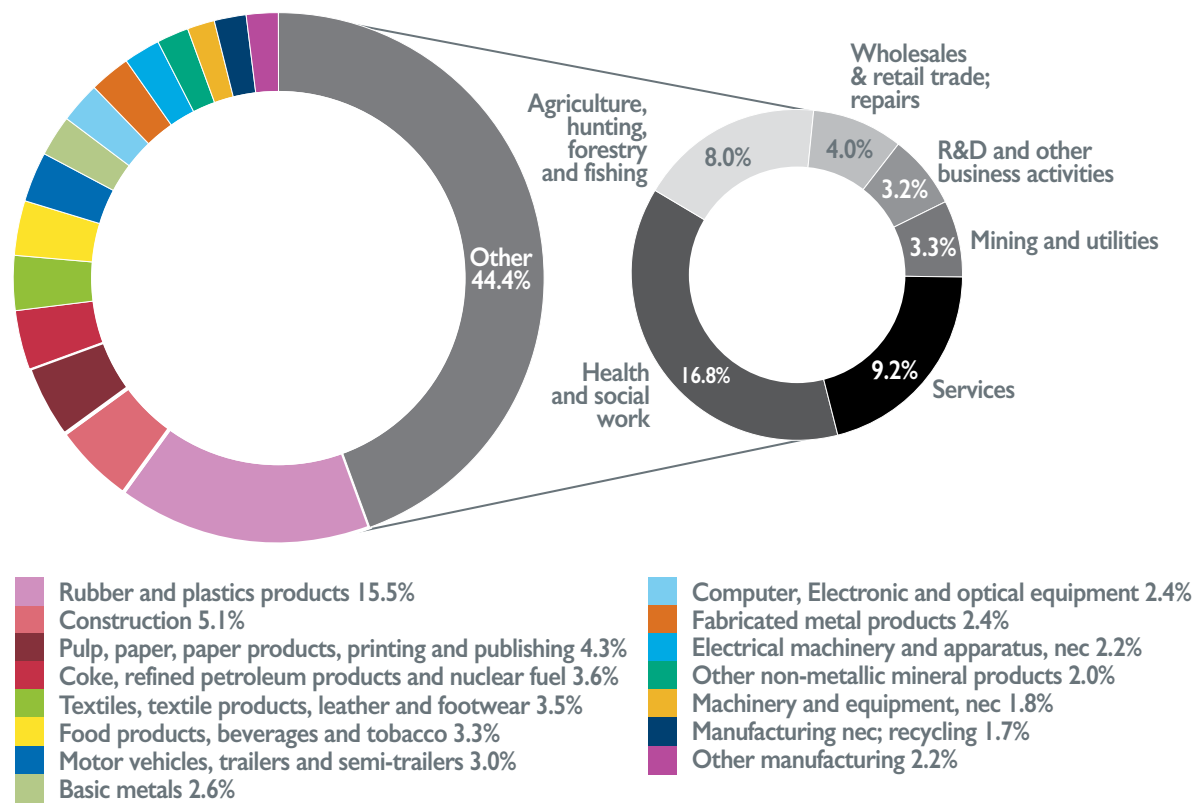
Source: Cefic Chemdata International 2019

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- **Home Sales:** In 2018, 13% of chemical sales revenue was generated from selling in the EU country home market.
- **Intra-EU Sales:** While “home sales” are declining, the importance of intra-EU sales is increasing. By 2018, intra-EU sales – excluding domestic receipts – accounted for 58% of total EU chemical sales, up from 46% in 2008. From 2008 to 2018, EU intra-EU sales increased on average by 3.1% per annum.
- **Extra-EU Exports:** In 2018, 29% of chemical sales revenue was generated from selling in the non-EU chemical market (exports), up from 20% in 2008. The three primary markets for EU chemical exports are Asia, the neighbouring EU countries, and the NAFTA trade bloc.

More than half of EU chemicals are supplied to the industrial sector

Customer sectors of the EU chemical industry (2017)



Sources: ICCA report 2019, Catalyzing Growth and Addressing Our World's Sustainability Challenges (Oxford Economics)

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- The European chemical industry is a key pillar for a sustainable society, providing employment to 1.2 million people in Europe and acting as a solution provider to other sectors of the economy, for all of the sustainable development challenges such as energy and climate, transport, health, food, hygiene, housing, among others.
- The chemical industry supplies almost all sectors of the economy, and its strategies directly impact downstream chemicals users. Chemical manufacturers not only transform raw materials into final products for every day consumption but also provide inputs to a broad range of sectors, from agriculture to transportation.
- More than half of the EU chemicals sold to downstream users go to other industrial sectors, according to a recent Oxford Economics study (March 2019)¹. Beyond chemical manufacturers, the biggest industrial users of chemicals are the rubber & plastics, textiles, construction, computer production, and pulp & paper sectors. Overall, 56% of EU chemicals sold to downstream users go to other industrial sectors. The remainder goes to other branches of the global economy such as health and social work, agriculture, and services.

¹ "Catalyzing Growth and Addressing Our World's Sustainability Challenges, ICCA report, March 2019"

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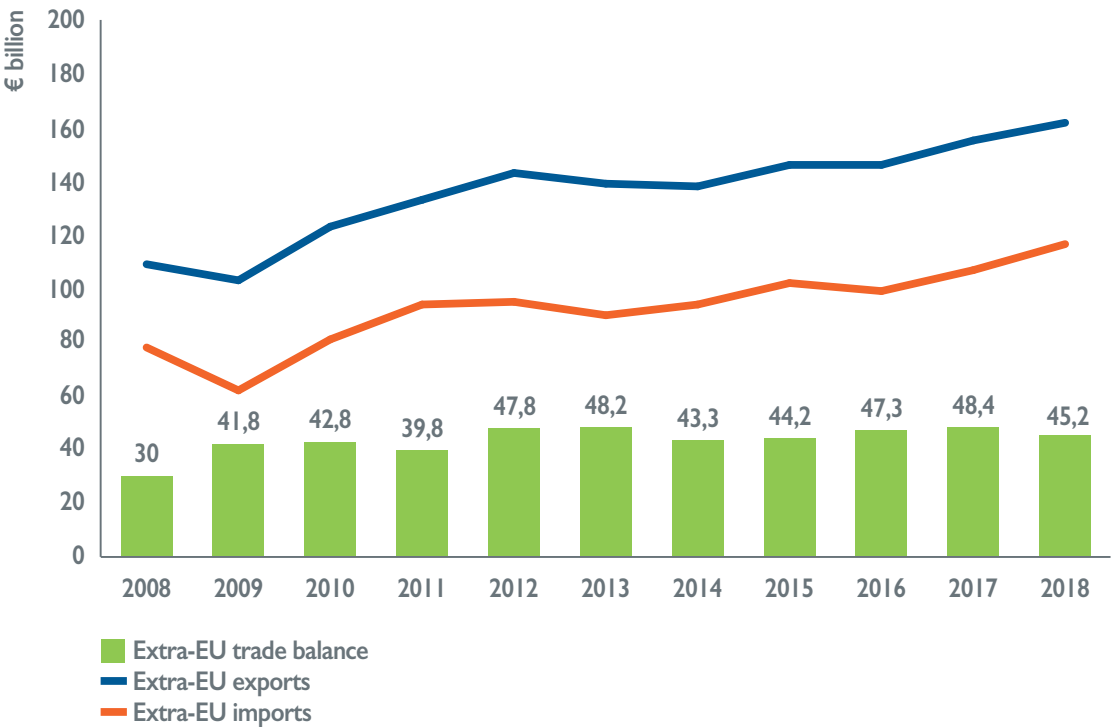
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EU chemicals trade surplus reaches significant level

Extra-EU chemicals trade balance



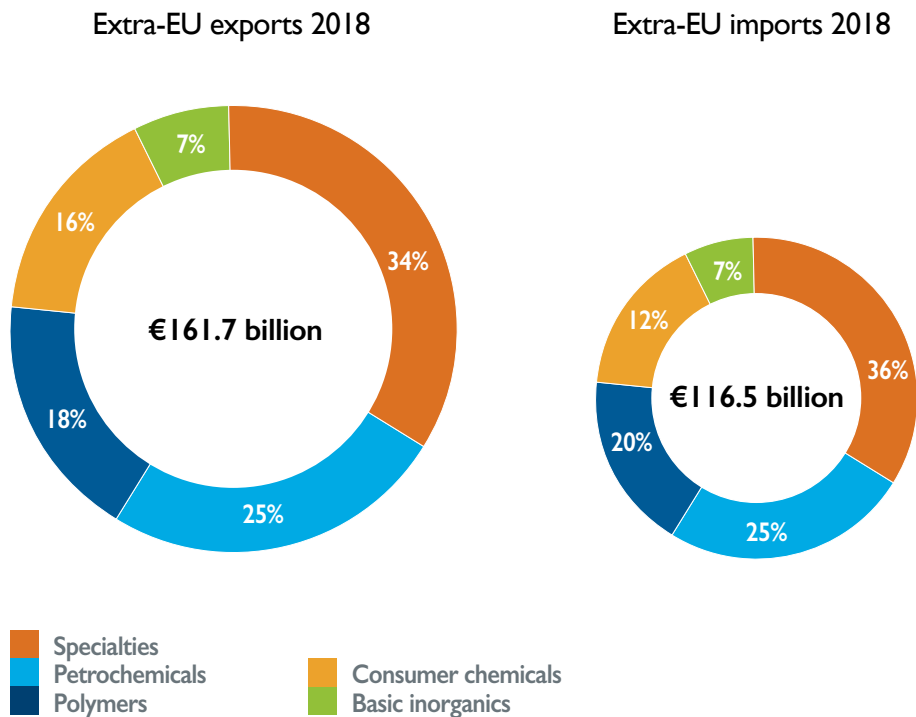
Source: Cefic Chemdata International 2019

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- Trading chemicals around the world stimulates competition, provides incentive to develop new markets through innovation and stimulates production efficiency. Above all, it helps to improve the quality of human life.
- A historically important player in the global chemical market, the EU chemical industry continues to benefit from trade opportunities. Both chemical exports and imports recorded an increase in 2018 compared to 2017.
- This analysis shows that in 2018, imports grew faster than exports. With 9.1%, import growth was far above the long-term average growth (4%). By contrast, export growth was close to the long-term average (4.1%). The EU chemicals trade surplus outside the European Union reached €45.2 billion in 2018, down by €3.2 billion compared to 2017.
- Open competition and open markets would help generate more trade and benefits for all partners and citizens. Trade agreements with key partners will enable our industry to enhance efficiency and better use our technical strengths.

EU records trade surplus for most chemical sectors

Extra-EU chemicals trade flows by sector (€ billion)



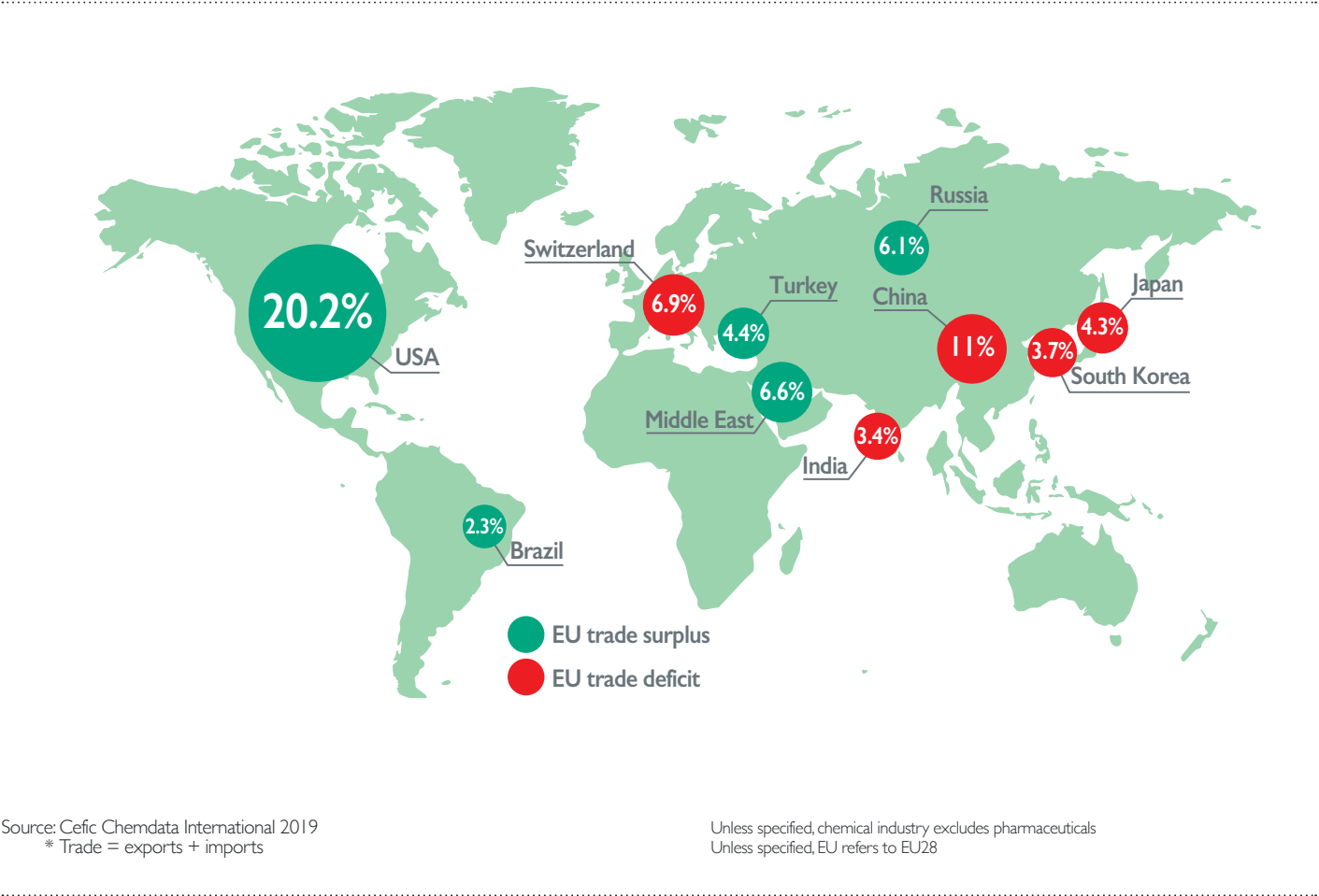
Source: Cefic Chemdata International 2019

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- EU chemical industry exports reached €161.7 billion in 2018. Specialty chemicals is the largest exporting sector, accounting for one third of total EU chemical exports in 2018. Petrochemicals was the second largest exporting sector, contributing 25% of total EU chemical exports, followed by the polymer sector, contributing 18% of total chemical exports. Consumer chemicals contributed 16% of total exports, and with 7%, basic inorganics was the smallest exporting sector.
 - EU chemical imports from the non-EU area reached €116.5 billion in 2018. Petrochemicals was the largest chemicals importer in 2018 (36%), followed by specialty chemicals and polymers, contributing 25% and 20% respectively. Basic inorganics accounted for 12% of total imports and, with 7%, consumer chemicals was the smallest importing sector.
- The EU chemical sector generated a trade surplus of €45.2 billion in 2018. Trade analysis indicates that the EU chemical sector recorded a trade surplus in 2018 for specialty chemicals, consumer chemicals, polymers and petrochemicals; however, basic inorganics experienced a trade deficit in the same year.
 - The chemical industry depends on free trade and open markets, both for its raw materials and as outlets for its products. The industry relies increasingly on tightly interconnected clusters that participate in global value chains.

Top 10 EU partners account for 70% of EU chemicals trade*

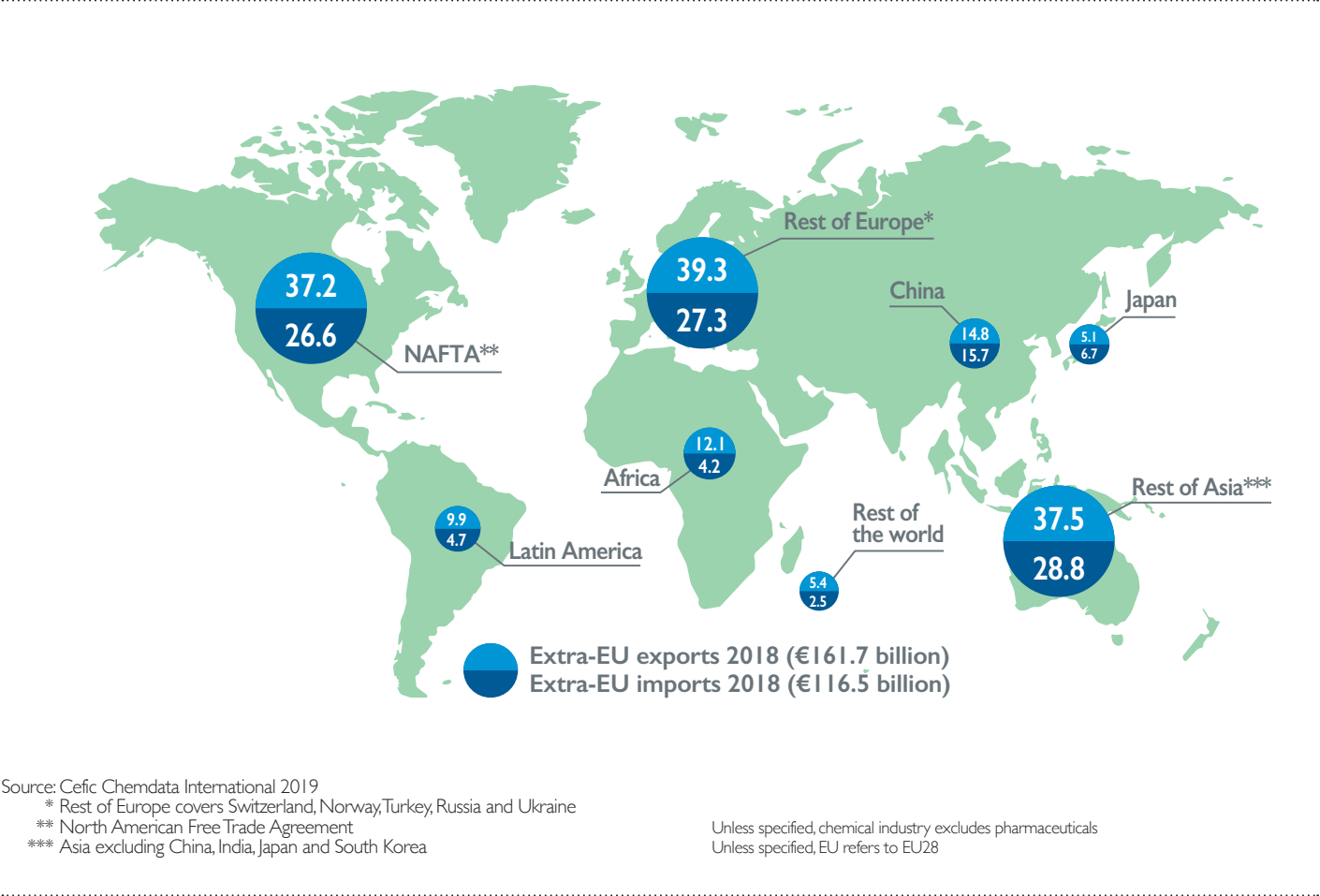
EU chemicals trade* flows with top partners (2018)



- Extra-EU chemicals trade flow, calculated as total exports plus imports, was valued at nearly €278.3 billion in 2018. The top 10 EU partners accounted for nearly 70% of extra-EU chemicals trade in the same year.
- The US was the EU's biggest trading partner in chemicals in 2018. It bought €31.8 billion of EU exports, whilst providing €24.4 billion of EU imports, and contributed 20.2% of total EU chemicals trade in 2018. Transatlantic trade flows are expected to change considerably in the next five years because the US shale gas boom has triggered a massive build-up of new chemicals production capacity.
- Today, China is the EU's second largest chemicals trading partner, accounting for 11% of EU chemicals trade. China has become the most important growth market for global chemical companies and a major investment location. While Chinese chemical companies are gradually increasing their focus on specialty chemicals, the country will remain a major importer of commodity chemicals for some time to come. Chinese expansion does not necessarily imply Europe loses out; rather, there are wins for both, and China offers many opportunities.

EU trade surplus with top competing markets

EU chemicals trade flows with major geographic blocs



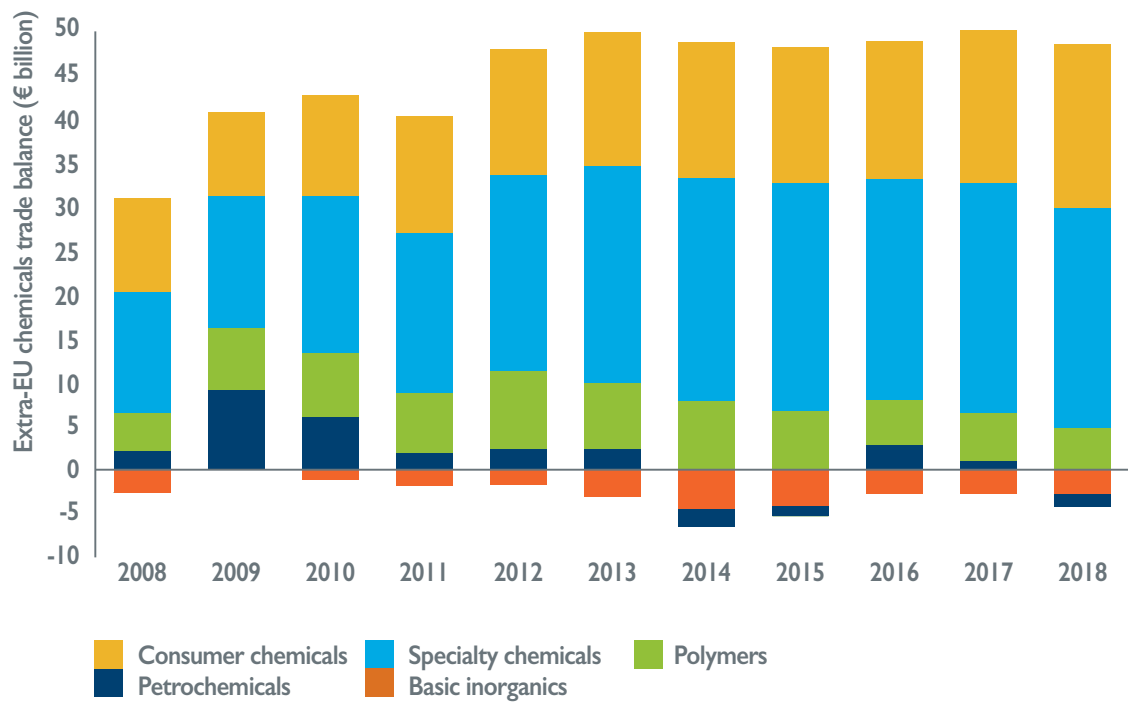
A look at the 2018 EU chemicals trade balance with key countries and regions shows:

- Apart from China and Japan, the European Union has a trade surplus with all main trading regions – NAFTA, Asia, Latin America, Africa, and non-EU Europe. The two major geographic blocs trading with the European Union in 2018 have remained North America and the rest of Europe.
- The European Union generated its largest chemicals trade surplus with the rest of Europe, which covers Turkey, Switzerland, Russia, Norway and Ukraine. The EU surplus with the rest of Europe amounted to €12 billion in 2018, to which specialty chemicals and consumer chemicals contributed significantly.

- The EU generated a chemicals trade surplus of €7.5 billion with the United States. Petrochemicals contributed to three quarters of the total EU chemicals surplus with the USA. This sector is sensitive to US shale gas development. The USA is the world's biggest producer of bioethanol, making around 54% of world production in 2013.
- The EU had a chemicals trade deficit with India, mainly reflecting the deficit that occurred in petrochemicals (€1.7 billion). India is the world's second largest emerging market, and the EU is playing a key role in this transformation as India's greatest source of foreign direct investment.
- The EU had a chemicals trade deficit with Japan, mainly due to the deficit occurring in polymers (€1.1 billion) and specialty chemicals (€0.9 billion). The EU also had a chemicals trade deficit with South Korea, due to the deficit that appeared in polymers (€2.5 billion).

Specialty and consumer chemicals contribute the most to EU chemicals trade surplus

Extra-EU chemicals trade balance (€ billion)



Source: Cefic Chemdata International 2019

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- The EU chemicals trade surplus in 2018 reached €45.2 billion, 55.8% of which came from specialty chemicals. Specialty chemicals generated the largest EU trade surplus compared to the other chemical sectors. Consumer chemicals has the second strongest external trade performance, followed by polymers.
- Petrochemicals registered in 2018 a trade deficit of €1.5 billion after two consecutive years of trade surplus in 2016 and 2017. Basic inorganics experienced a trade deficit of €2.7 billion in 2018.

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The EU is the largest chemicals exporting region in the world

World network of major chemicals exports flows (2017, € billion)

	EU	Rest of Asia*	United States	China	Japan	Rest of Europe**	Middle East	Latin America	Africa	Oceania	World
EU		37,9	30,0	15,2	5,2	29,0	11,2	9,5	12,1	2,3	158,3
Rest of Asia*	18,2		9,3	60,4	8,8	2,1	7,2	4,2	4,9	3,0	122,3
United States	21,3	17,1		12,0	7,0	1,3	2,7	13,8	1,8	2,0	120,2
China	13,6	47,9	10,9		6,9	2,8	3,9	7,5	5,0	2,6	103,3
Japan	5,8	28,4	6,1	16,3		0,3	0,5	0,6	0,3	0,4	59,3
Rest of Europe**	19,1	7,0	2,4	2,4	0,5		0,7	2,5	0,6	0,1	35,8
Middle East	5,3	12,3	1,4	12,4	0,3	0,5		1,4	1,5	0,4	35,6
Latin America	3,3	1,4	3,9	1,0	0,5	0,1	0,1		0,2	0,0	11,7
Africa	4,8	2,8	0,7	0,6	0,1	0,2	0,7	1,0		0,1	10,9
Oceania	0,3	1,3	0,4	0,4	0,3	0,0	0,1	1,0	0,0		3,1
World	93,7	157,9	86,8	122,3	29,8	36,4	27,3	41,3	26,7	11,0	689,1

Source: Cefic Chemdata International 2019

* Asia excluding China, Japan and Middle East

** Europe excluding EU; it covers Russia, Norway, Turkey, Switzerland and Ukraine

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- This brief overview of world chemicals trade flows uses a trade matrix, where the world is divided into 10 geographical regions: the EU, the USA, China, Middle East, Japan, rest of Europe, rest of Asia, Latin America, Africa and Oceania. Countries of "rest of Europe" are mainly Switzerland, Russia, Norway, Turkey and Ukraine. The main countries in "rest of Asia" are South Korea, India and other emerging countries in Asia (China, Japan and Middle East are excluded).

- Trade Matrix:** The matrix has been put together from export data in the chemical sector (Nace 20). Exporting regions are presented in rows and importing regions are presented in columns. The intercept of row "i" and column "j" means exports from region "i" to region "j". The main diagonal of the matrix (shaded cells) represents intra-region trade (e.g. exports from EU countries to EU countries). For the purpose of trade performance analysis, intra-trade flows are excluded from the present section.

- Intra-Trade:** It is commonly known that trade between contiguous regions is significant (e.g. intra-EU trade); it reflects factors such as distance between trading partners, transport costs, and the existence of common borders. Proximity of the markets is a key factor stimulating intra-trade. Our trade analysis (including intra-trade) shows that chemicals trade within the EU internal market is significant, since 28% of total world chemicals trade takes place between EU countries.

Compared to the other trading regions, the EU is also the largest chemicals exporting region in the world, accounting for 43% of world chemicals exports. EU intra-trade is by far the largest intra-regional trade in the world.

The analysis of the major chemicals exports flows between the main regions shows the following results:

- The EU is the largest chemicals exporting region in the world:** EU chemicals exports to the rest of the world (intra-EU trade excluded) amounted to €158.3 billion in 2017. The EU area accounts for 23% of world chemicals exports. China is the fourth largest destination for EU chemicals exports, followed by Japan, rest of Europe, Middle East and Latin America. The top four largest chemicals exporting regions in the world are the EU, Rest of Asia*, the USA and China.
- The EU is the third largest chemicals importing region in the world:** EU chemicals imports from the rest of the world excluding intra-EU imports were valued at €93.7 billion in 2017. The EU area contributed 13.6% of world chemicals imports. The four main import origin markets of the EU area are the USA, rest of Europe, rest of Asia* and China.

The EU area is the largest destination market for US chemicals exports

World network of major chemicals exports flows (2017, top 5, %)

	Largest exporting market	Second largest exporting market	Third largest exporting market	Fourth largest exporting market	Fifth largest exporting market	Top 5
EU	Rest of Asia*	United States	Rest of Europe**	China	Africa	78.5%
Rest of Asia*	China	EU	United States	Japan	Middle East	85.0%
United States	EU	Rest of Asia*	Latin America	China	Japan	59.1%
China	Rest of Asia*	EU	United States	Latin America	Japan	83.9%
Japan	Rest of Asia*	China	United States	EU	Latin America	96.7%
Rest of Europe**	EU	Rest of Asia*	Latin America	United States	China	93.3%
Middle East	China	Rest of Asia*	EU	Africa	United States	88.3%
Latin America	United States	EU	Rest of Asia*	China	Japan	86.7%
Africa	EU	Rest of Asia*	United States	Middle East	China	87.6%
Oceania	Rest of Asia*	United States	China	EU	Japan	90.8%
World	Rest of Asia*	China	EU	United States	Latin America	72.9%

Source: Cefic Chemdata International 2019

* Asia excluding China, Japan and Middle East

** Europe excluding EU; it covers Russia, Norway, Turkey, Switzerland and Ukraine

Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU28

The summary results of the top five chemicals export markets for the 10 geographical regions selected in the previous table are (data 2017):

- The EU area is the largest destination market for US exports:** Nearly 18% of US chemicals exports are sold in the EU chemicals market. Rest of Asia (Japan, China and Middle East excluded) and Latin America are respectively the second and third largest exporting markets for the US chemical sector. China is the fourth largest destination for US chemicals exports, accounting for nearly 10% of total. The USA contributes nearly 18% of world chemicals exports.
- The EU area is the second largest destination for Chinese exports:** Trade between China and its neighbours is very significant. As might be expected, the rest of Asia* market is by far the largest destination for Chinese chemical exports (46%). The EU market area is the second largest destination for Chinese chemicals exports. 13% of Chinese chemicals exports are sold in the EU area, meaning the EU chemical market is the most important market for China after the Asian market. The USA is the third main destination for Chinese chemicals exports, accounting for about 11% of total exports of China. China accounts for 15% of world chemicals exports.

The EU has the largest chemicals surplus in the world

World matrix: chemicals trade balance (2017)



Source: Cefic Chemdata International 2019
* Asia excluding China, Japan and Middle East
** Europe excluding EU; it covers Russia, Norway, Turkey, Switzerland and Ukraine

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

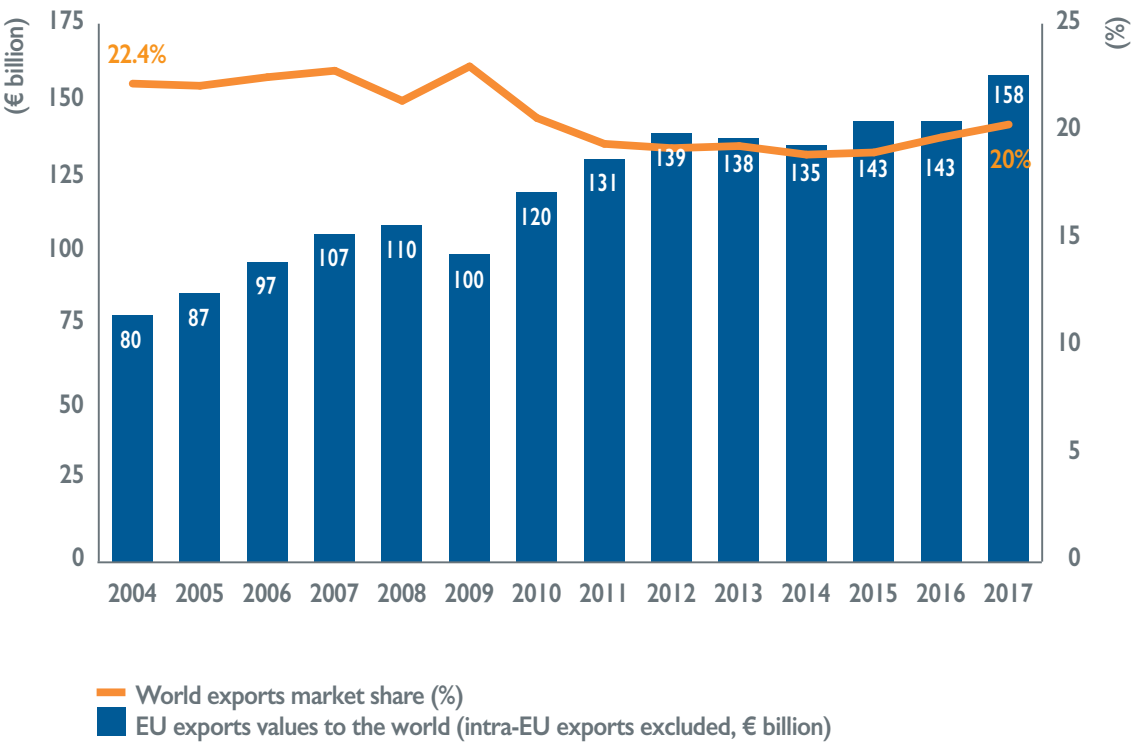
- Following is a brief analysis of the chemicals trade balance using the trade matrix (data 2017). The chemicals trade balance is calculated for each region as total exports minus imports. Intra-trade is of course excluded.

A look at the chemicals trade performance of each region shows the following:

 - The EU area has by far the largest chemicals surplus in the world:** The European Union is the only region to have a trade surplus with all trading regions. The top five largest chemicals surpluses are generated for the EU by trading with rest of Asia, rest of Europe, the USA, Africa, and Latin America. 12.1% was generated by trading with Middle East and Oceania. Trading with China is generating a small surplus for the EU area. The EU area has by far the largest chemicals surplus in the world, followed by the USA.
- The US chemical sector generates the second largest trade surplus in the world:** Four regions have performed well (export value higher than import value). Comparing the total chemicals trade balance for all regions, the analysis shows that only four regions generated a chemicals surplus with the world in 2017: the EU, the USA, Japan and Middle East. These regions performed well, since they have generated a net exports value.
 - The “rest of Asia” has by far the largest chemicals deficit in the world:** The analysis reveals that six regions have a trade deficit (export value lower than import value): rest of Asia, China, Latin America, Africa, Oceania and rest of Europe. The largest trade deficits are generated by rest of Asia. China and Oceania generated respectively a trade deficit of €19 billion and €7.9 billion.

Growing EU chemicals exports

EU chemicals exports to world (€ billion, intra-EU trade excluded)



Source: Cefic Chemdata International 2019

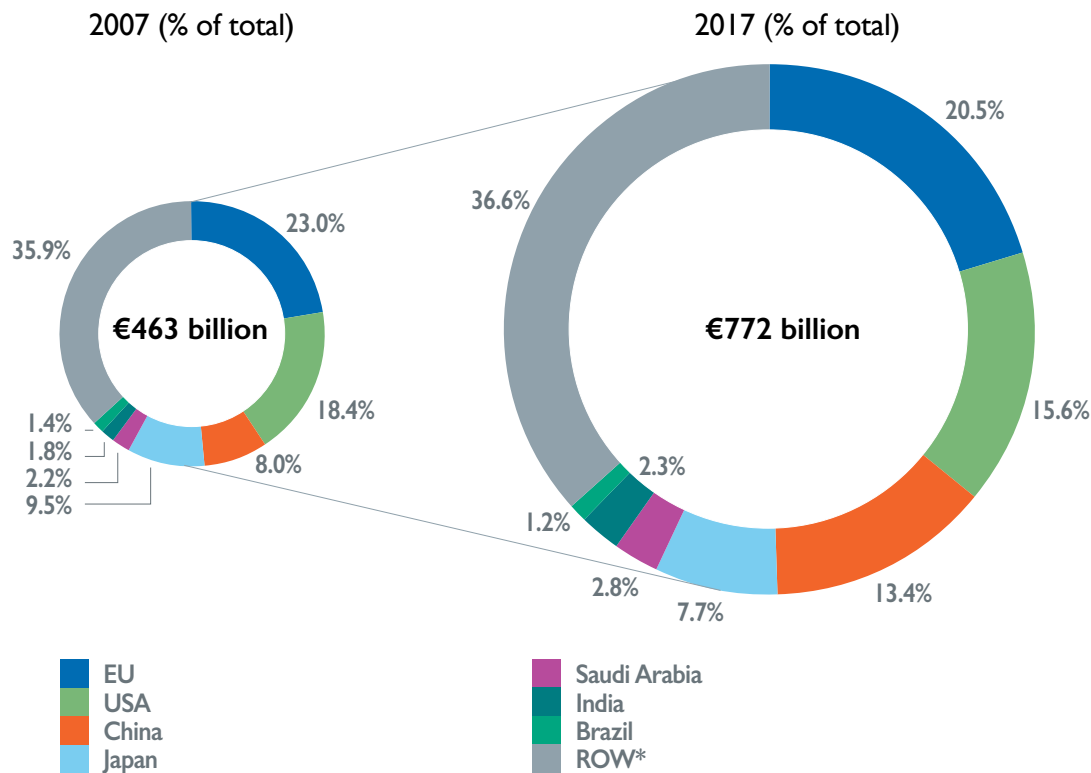
Unless specified, chemical industry excludes pharmaceuticals
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A look at EU chemicals exports during the years 2004-2017 shows the following results:

- World exports grew 6.1% per annum from 2004 to 2017. World exports amounted to €772.5 billion in 2017, up from €357.2 billion in 2004 (more than doubling in thirteen years).
- EU chemicals exports grew 5.4% per annum on average. Exports reported a substantial increase from €80.1 billion in 2004 to €158.3 billion in 2017. Exports in value terms rose significantly; at 98% higher in 2017 compared to 2004.
- EU export values show a positive and encouraging trend; however, the EU's world exports market share decreased from 22.4% in 2004 to about 20.5% in 2017. The decline in EU exports competitiveness is in line with the falling EU sales market share.

Decreasing share of chemicals exports for the EU, USA and Japan

Chemicals exports by country of origin



Source: Cefic Chemdata International 2019
* Rest of the World, intra-EU trade excluded

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- World exports reached the value of €772.5 billion in 2017, up by 67% from €463.5 billion ten years ago.
- Europe is not the only region losing its export share; other industrial regions are experiencing similar effects. The US export market share went down from 18.4% in 2007 to 15.6% in 2017, while Japan's export market share declined from 9.5% to 7.7% during the same period of comparison.
- Emerging countries such as China and India have benefited more than industrial countries. Export values have increased substantially in China (2.8 times bigger in value in 2017 compared to 10 years ago), and India (2.2 times higher during the same period). The export market share of China nearly tripled in 10 years – from 8% in 2007 to 13.4% in 2017.



GROWTH AND COMPETITIVENESS

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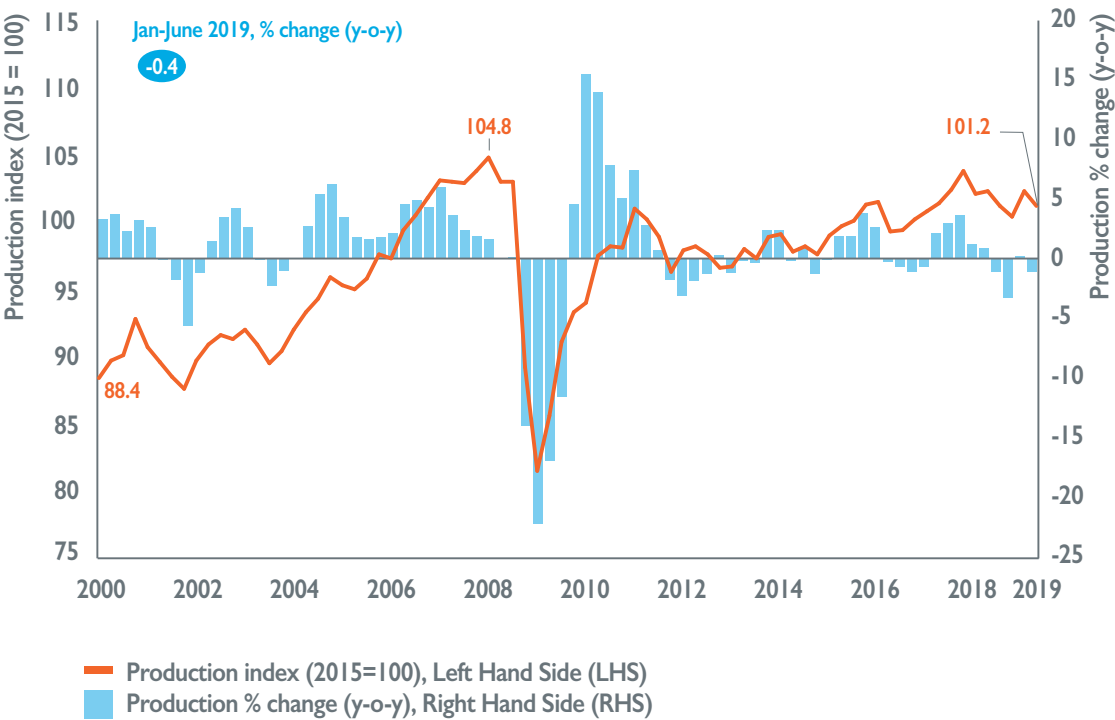
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EU chemicals maintains steadily growth

EU chemical industry production



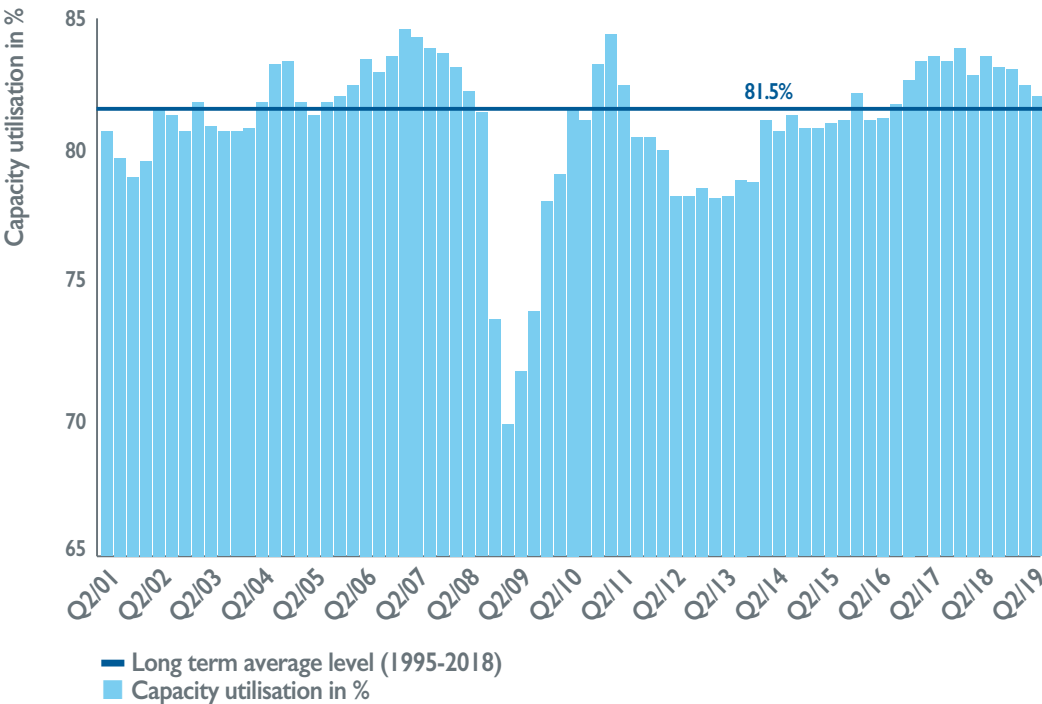
Source: Cefic Chemdata International 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- The European chemical industry is facing much uncertainty, which continues to dominate the economic and business environment. The short-term outlook is unfavourable, and leading indicators do not point to a recovery in the coming months.
- Overall, EU chemical production was slightly negative in the first half of 2019. Total sales (domestic sales and exports) were at the previous year's level. Exports outside the EU area were slightly above the same period of last year. Export demand from non-European countries in the chemical industry is weaker than in the preceding year, and does not compensate for lower internal demand. Imports were far above the first half of 2018.
- Total manufacturing output in Europe is slowing down, especially in the automotive industry and in durable consumer goods like electrical appliances. Domestic demand for non-durable consumer goods, such as food and beverages, is growing overall, reflecting rising private incomes in the European economy. The construction industry, benefitting from low interest rates, high demand for additional housing and the need to refurbish the existing building stock, is also expanding; however, dynamics seem to be losing some steam here as well.

EU capacity utilisation is slightly above its long-term average

EU chemical capacity utilisation rate (%)



Source: European Commission and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Capacity utilisation was down 0.5% (Q2-2019). According to EU Commission Business Survey data, capacity utilisation in the EU chemical sector reached the value of 82.1% in the second quarter of 2019, down from 82.5% reached in the first quarter of the same year.
- Capacity utilisation was 1.8% below the previous year's level (Q2-2019 vs Q2-2018), but is still slightly above the long-term average (2005-2018).

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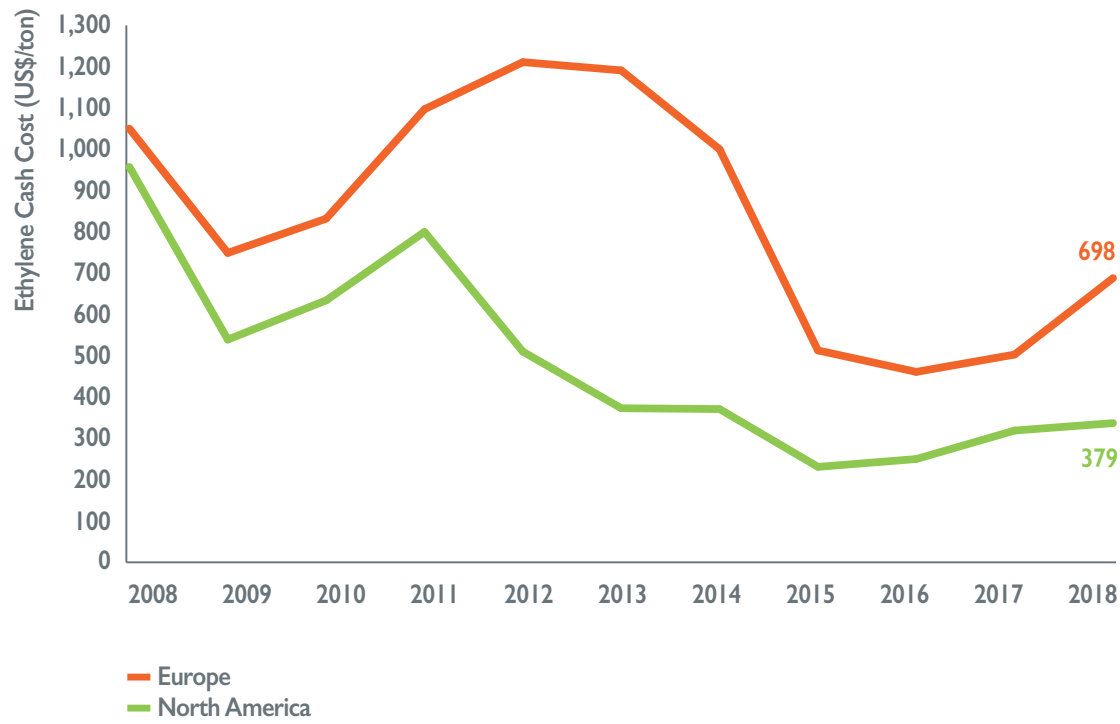
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Energy costs are the Achilles' heel of European industry

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



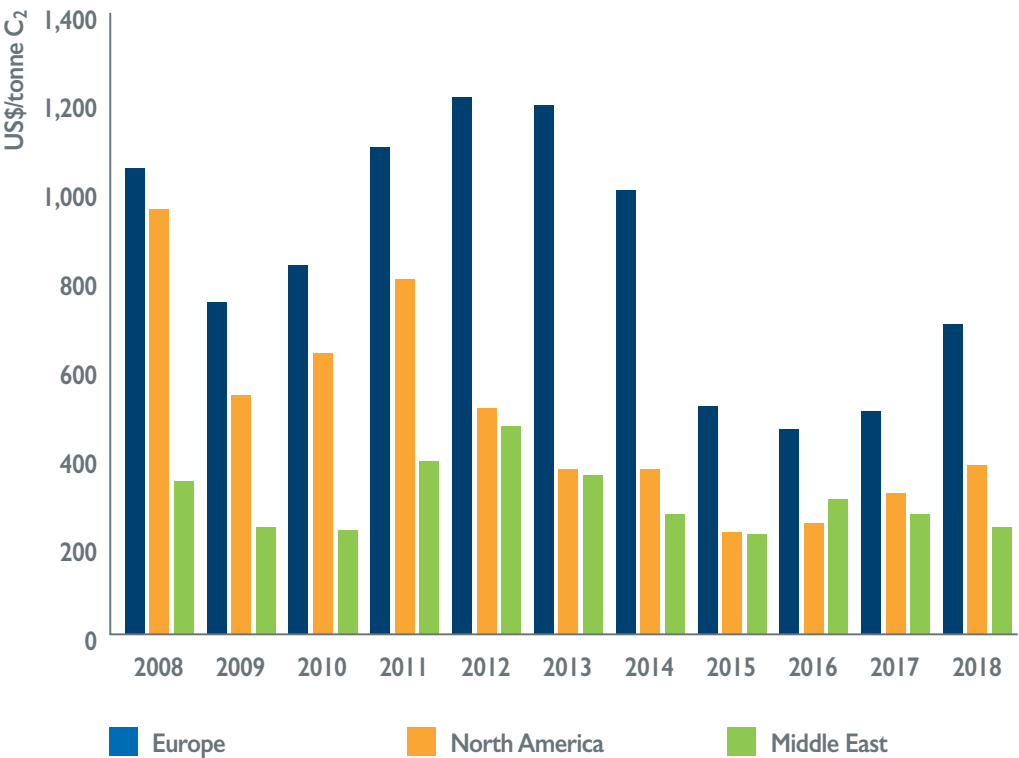
Source: ICIS and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Competing globally, the chemical industry is energy intensive. Increases in energy costs in Europe relative to our competitors might impact competitiveness.
- Globally, ethylene is the highest volume building block in the chemical industry. It is the basic feedstock for the production of plastics, detergents and coatings, amongst many other materials.
- Energy costs are the Achilles' heel of European industry, especially compared to the United States which is riding on a shale gas boom. Advantageous energy and feedstock prices are a clear enabler of competitiveness. The shale gas boom in the United States has greatly reduced energy and feedstock costs, and a clear indicator of this situation is the cost of producing ethylene.

Europe at a competitive disadvantage compared to the USA and the Middle East

Ethylene cash cost of regional steam crackers



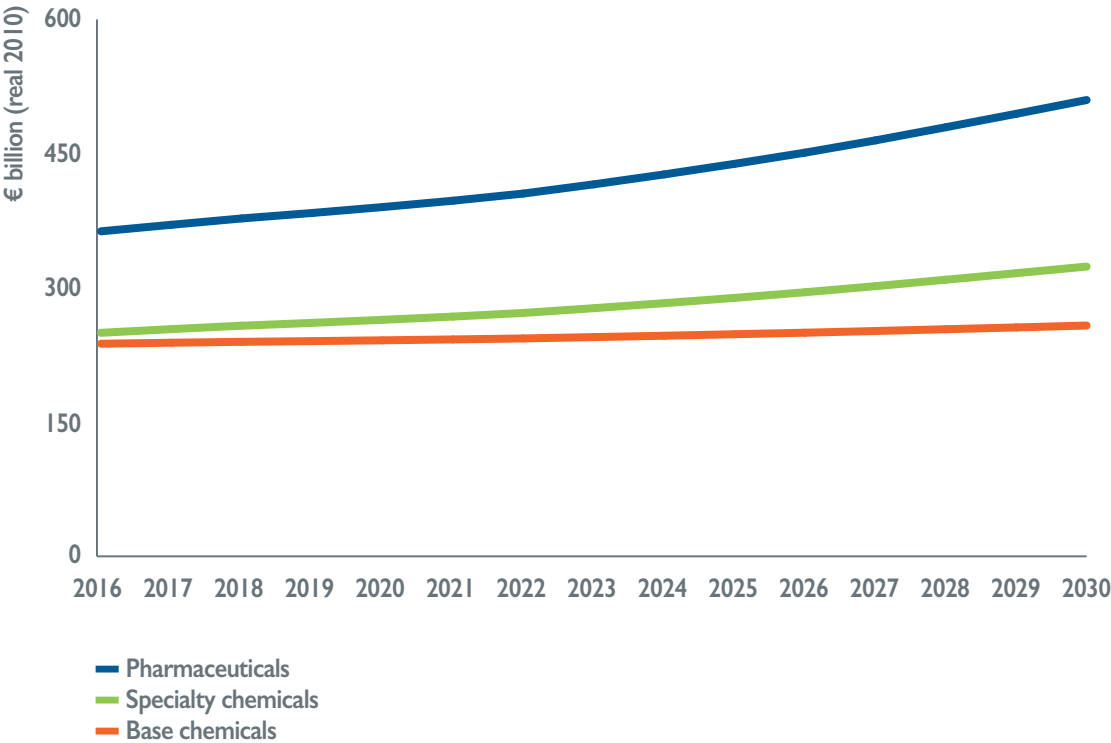
Source: ICIS

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- In 2018, ethylene cash cost in Europe was about 40% above the previous years' level. 2018 shows a significant increase of the ethylene cash cost in Europe compared to 2017. A less substantial increase of 20% was observed in the USA during the same period.
- Making ethylene in Europe was three times more expensive than in the US in 2013 (due to the shale gas boom). Europe's competitive disadvantage vis-à-vis its rivals was reduced from 2013 to 2017.
- The cost difference between the USA and Europe diminished significantly from 2014 to 2017. Making ethylene in Europe was 2.7 times more expensive in 2014. Since then, the situation gradually improved until 2017 (2.2 times in 2015, 1.8 times in 2016, and 1.6 times in 2017).
- The cost difference between Middle East and Europe diminished considerably from 2014 to 2017. Producing ethylene in Europe was 3.7 times more expensive in 2014 compared to Middle East. 2017 showed better results for Europe, falling to 1.9 times more expensive.
- However, 2018 showed less competitive results compared to 2017, but still close to the long-term average. The global picture for 2018 carried a clear message: Europe still has a competitive disadvantage compared to the USA and the Middle East. Europe generated the highest ethylene cash cost in 2018.

Europe leads in specialty chemicals

EU production value (real 2010, € billion)



Source: Prognos model results and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- On a segment level, the chemical industry in Europe is characterised by high market share in specialty chemicals and pharma 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.
- The speed of innovation and transformation is expected to pick up due to the introduction of Industry 4.0 technologies.



OUR CONTRIBUTION TO EU INDUSTRY

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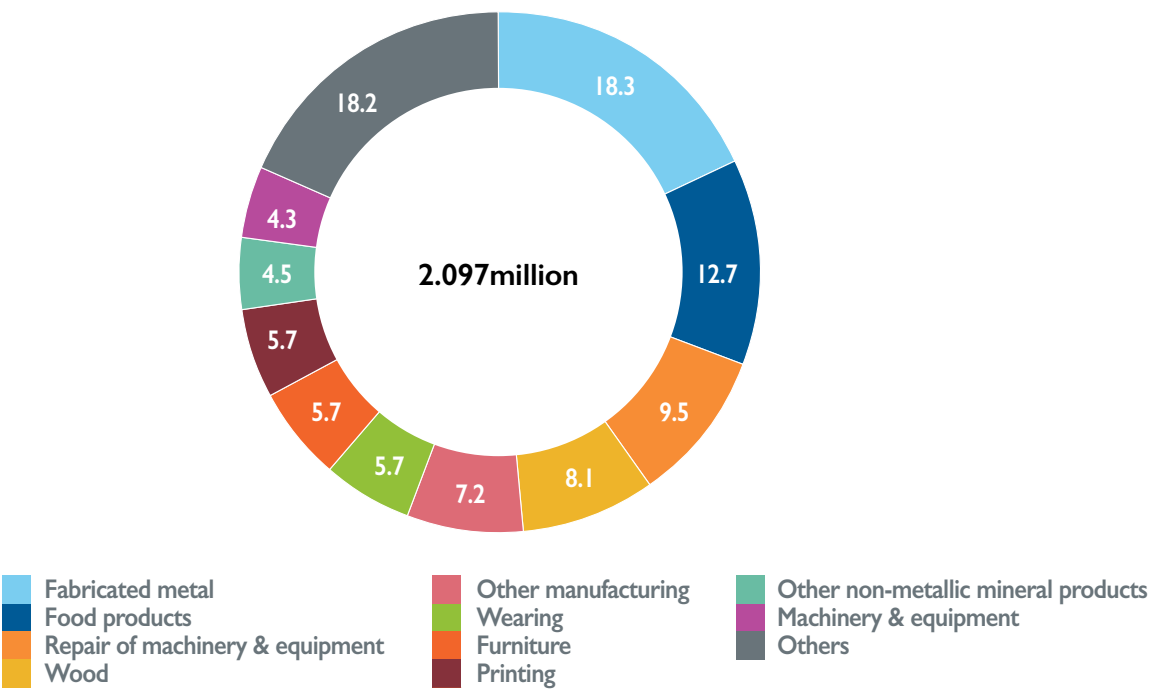
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Top 10 sectors account for 82% of total EU manufacturing enterprises*

Top 10 sectors: number of enterprises (%)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Eurostat code, V111110

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- There are 2.1 million enterprises in the EU manufacturing sector. Fabricated metal products is the largest sector, accounting for 18.3% of all enterprises operating in the EU manufacturing industry, followed by the food industry (12.7%).
- 10 sectors account for 82% of total EU manufacturing enterprises. There are 28,000 companies operating in the EU chemical sector, accounting for 1.4% of the total number of enterprises in the EU manufacturing sector (see Eurostat code, V11110).

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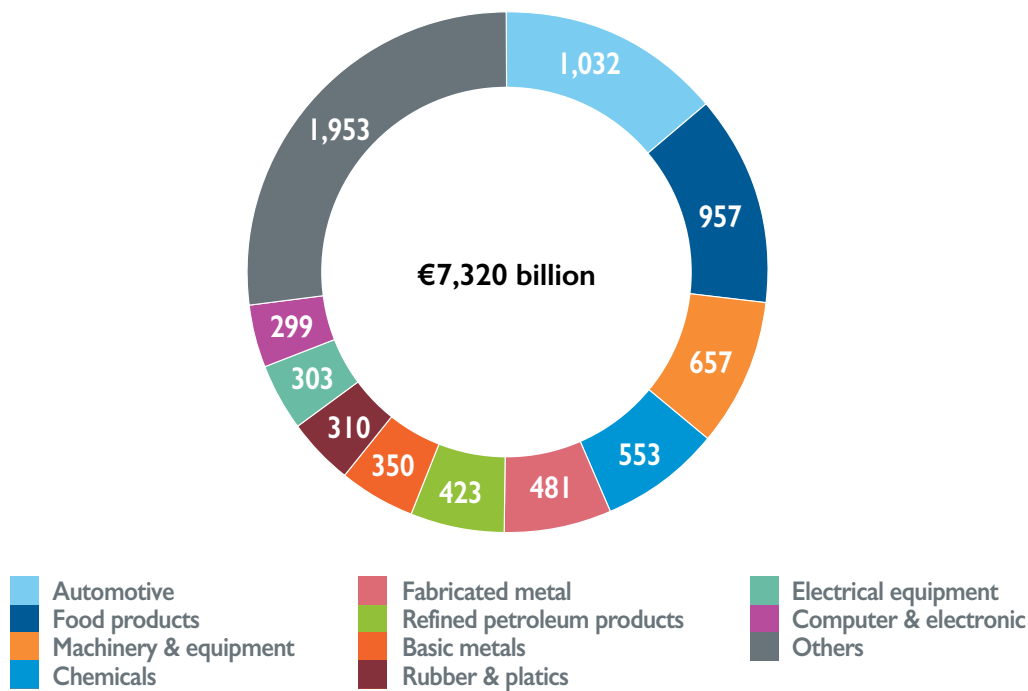
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Chemicals is the fourth largest producer* in EU manufacturing

Top 10 sectors: turnover (€ billion)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Eurostat code, V12110

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Turnover comprises the totals invoiced by the unit during the reference period. It includes all duties and taxes on the goods or services invoiced by the unit with the exception of VAT invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on to the customer. Price reductions, rebates and discounts as well as the value of returned packing must be deducted (see Eurostat code, V12110).
- 10 sectors account for 73% of EU manufacturing turnover. Automotive and food products are the two largest sectors in the EU manufacturing industry, accounting for more than one quarter of all turnover (27.2%).
- With €533 billion, chemicals represent the fourth leading sector, accounting for 7.6% of EU manufacturing turnover.

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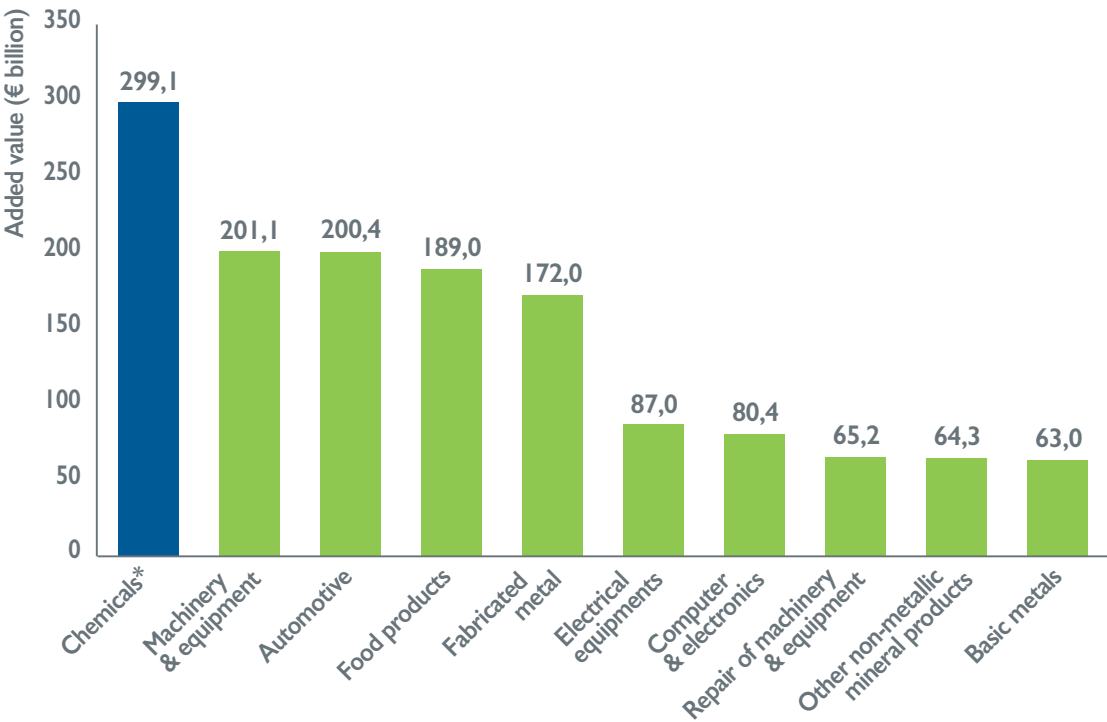
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Accounting for 16% of added value, chemicals* is the leading sector

Top 10 sectors: added value (€ billion)



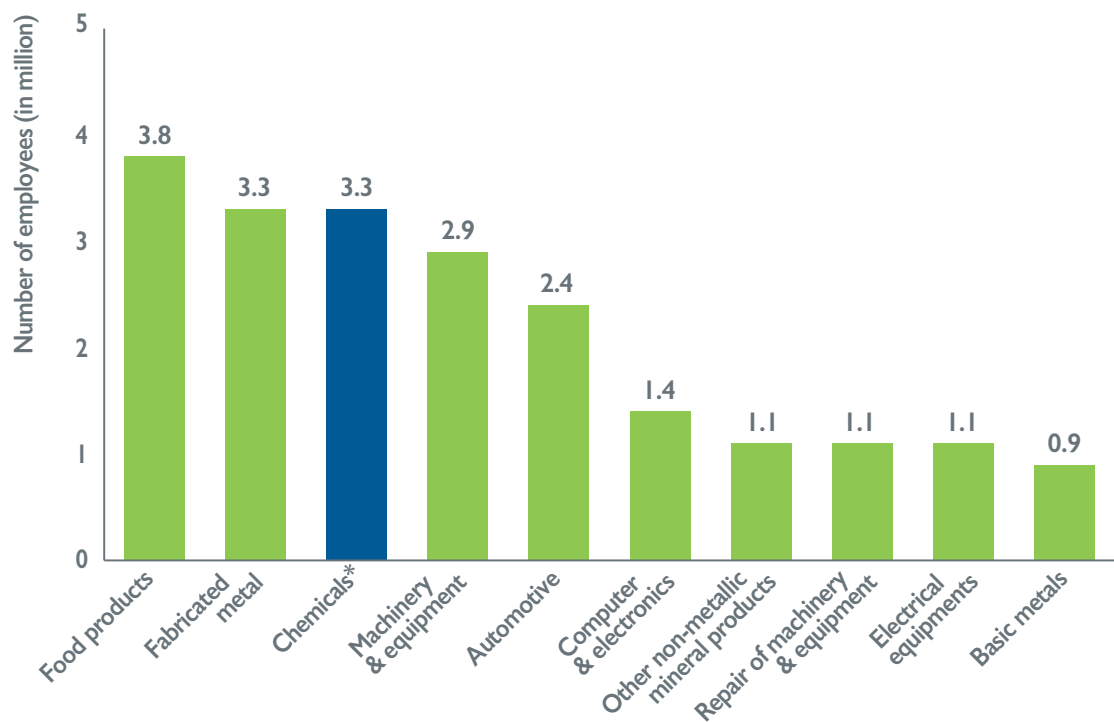
Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Pharmaceuticals and rubber & plastics included, Eurostat code, V12150

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- Value added at factor costs is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. Value adjustments (such as depreciation) are not subtracted (see Eurostat code, (V12150).
- 10 sectors account for 75% of EU manufacturing added value. The chemical sector (including pharmaceuticals and rubber and plastics) is the largest sector in the EU manufacturing industry, accounting for about 16% of added value.

The chemicals* sector contributes 12% of EU manufacturing employment

Top 10 sectors: number of employees (in million)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Pharmaceuticals and rubber & plastics included, Eurostat code, VI6130

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Unless specified, EU refers to EU28

- Number of employees is defined as those persons who work for an employer and who have a contract of employment and receive compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in kind. A worker from an employment agency is considered to be an employee of that temporary employment agency and not of the unit (customer) in which they work (see Eurostat code, VI6130).
- There are 28.3 million people directly employed in the EU manufacturing sector (data 2015). 10 sectors account for 75% of EU manufacturing employment. Food products and fabricated metals are the two largest sectors in the EU manufacturing industry, accounting for a quarter of all employment (25.2%).
- Chemicals (including pharmaceuticals and rubber and plastics) is the third largest sector (3.3 million people). It contributes 11.6% of EU manufacturing employment. The sector generated an even greater number of indirect jobs – up to three times higher than through direct employment.
- According to Eurostat data, employment in the EU chemical industry (without pharmaceuticals and rubber and plastics) is particularly high in five sub-sectors – petrochemicals; paints, varnishes and similar coatings; printing ink and mastics; plastics in primary forms; perfumes and toilet preparations; soap and detergents, cleaning and polishing preparations – all sectors with a significant presence in the EU.

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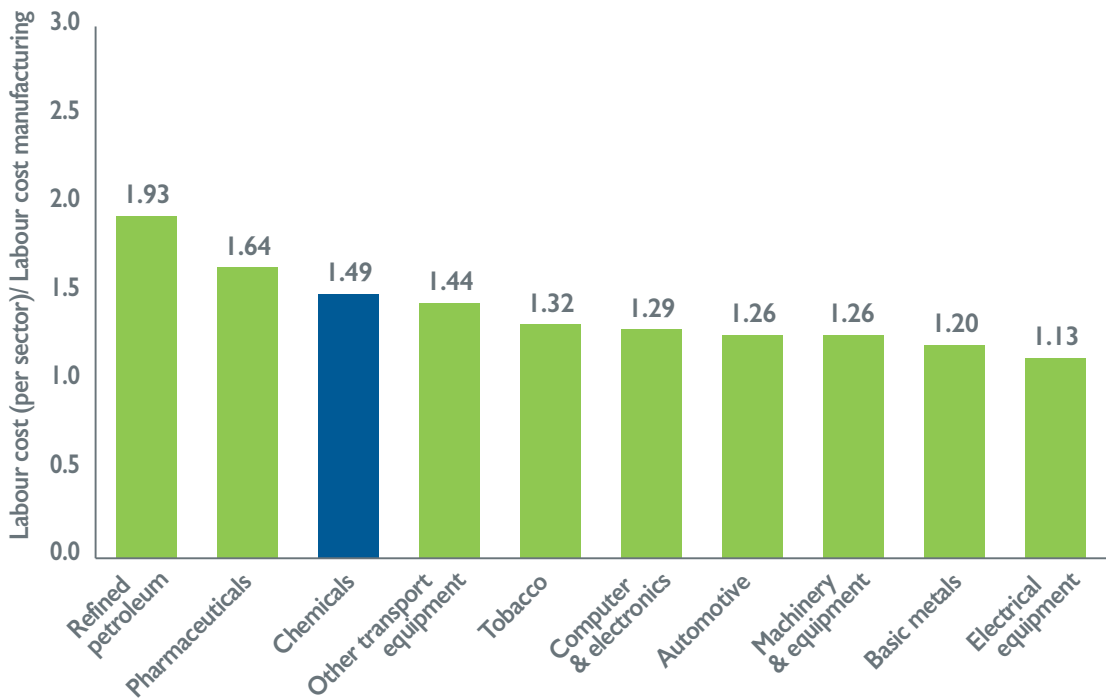
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50% higher salaries in chemicals than manufacturing average*

Top 10 sectors: labour costs per employee (LCE in manufacturing = 1)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Eurostat code, V91210-Average personnel costs

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Personnel costs are defined as the total remuneration, in cash or in kind, payable by an employer to an employee (regular and temporary employees as well as home workers) in return for work done by the latter during the reference period. Personnel costs also include taxes and employee social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions. Personnel costs are made up of wages and salaries and the employer's social security costs (see Eurostat code, V91210).
- Personnel costs amounted to €1,140 billion in the EU manufacturing sector. 10 sectors account for 73.1% of EU manufacturing personnel cost. Machinery equipment and automotive are the two largest sectors in the EU manufacturing industry, accounting for nearly a quarter of all personnel costs (23.6%). Chemicals represent the fifth largest sector (€66 billion), accounting for 6% of EU manufacturing personnel costs.
- According to Eurostat data, the chemical sub-sectors with the highest personnel costs at the EU-aggregate level are organic basic chemicals, plastics and paints. However, the analysis indicates that some sub-sectors with very low absolute value at EU-aggregate level appear to have the highest costs per employee, such as synthetic rubber or pesticides/nitrogen.
- Concerning the personnel costs per employee, chemicals represent the third leading sector. Refined petroleum, pharmaceuticals and chemicals generated the three highest costs per employee. Labour cost per employee is nearly 50% higher than the manufacturing average.

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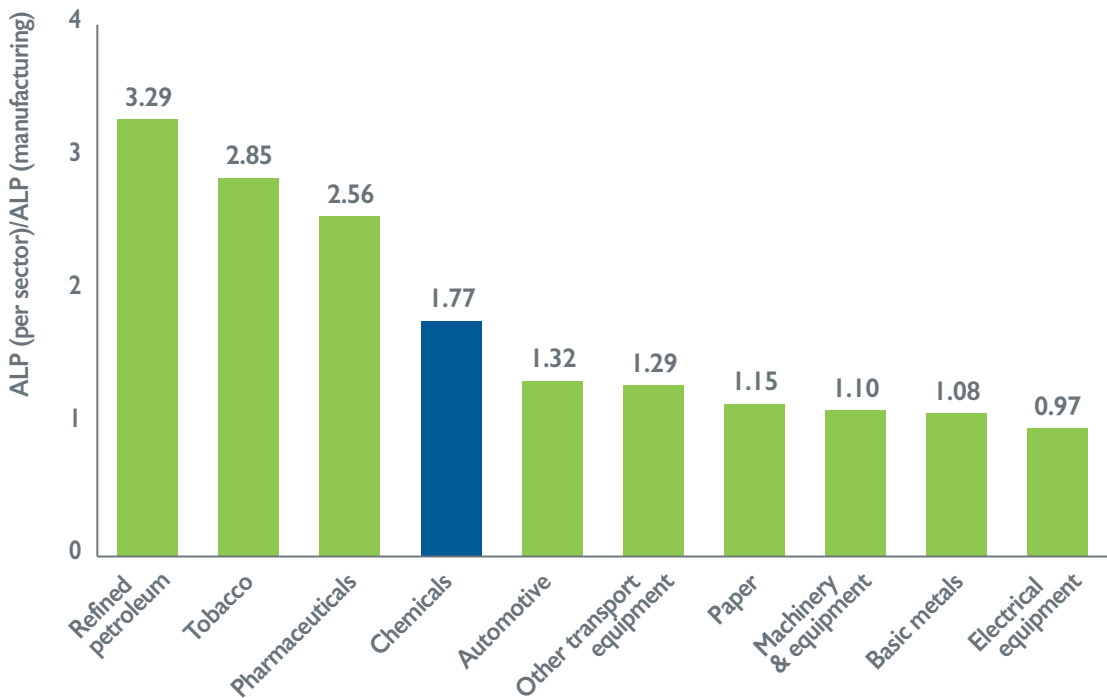
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Labour productivity* 77% higher in chemicals than manufacturing average

Top 10 sectors: Apparent labour productivity (ALP in manufacturing = 1)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019

* Eurostat code, V91110

Apparent labour productivity (Gross value added per person employed) - thousand euro

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Apparent labour productivity (gross value added per person employed) expressed in thousand of euros. The number of persons employed is defined as the total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams). It excludes manpower supplied to the unit by other enterprises, persons carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises, as well as those on compulsory military service (see Eurostat code, V91110).

- Chemicals represent the fourth leading sector. Apparent Labour productivity is 77% higher in chemicals than the manufacturing average.

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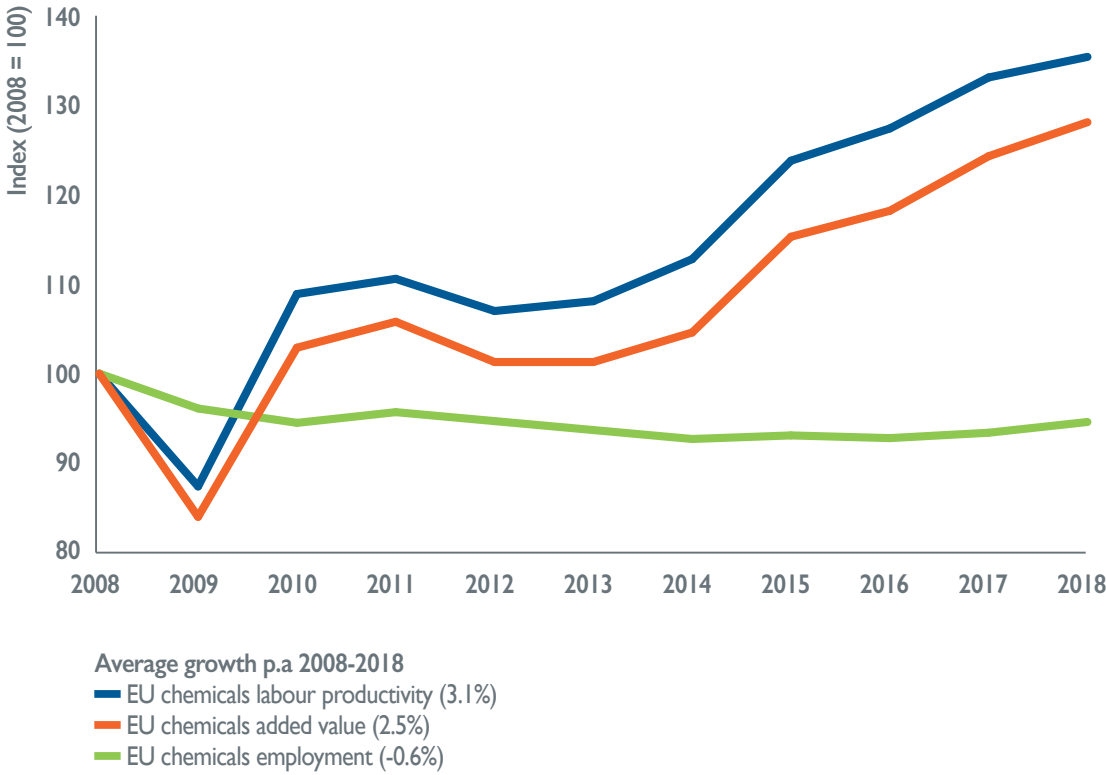
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Labour productivity rate grows at 3.1%

Labour productivity in the EU chemical industry



Source: Eurostat and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Highly-educated and trained employees, coupled with continuously high investments in the workforce, have turned the EU chemical sector into a leading industry in terms of high labour productivity.
- Between 2008 and 2018, labour productivity in the EU chemical industry rose at an average annual rate of 3.1%.

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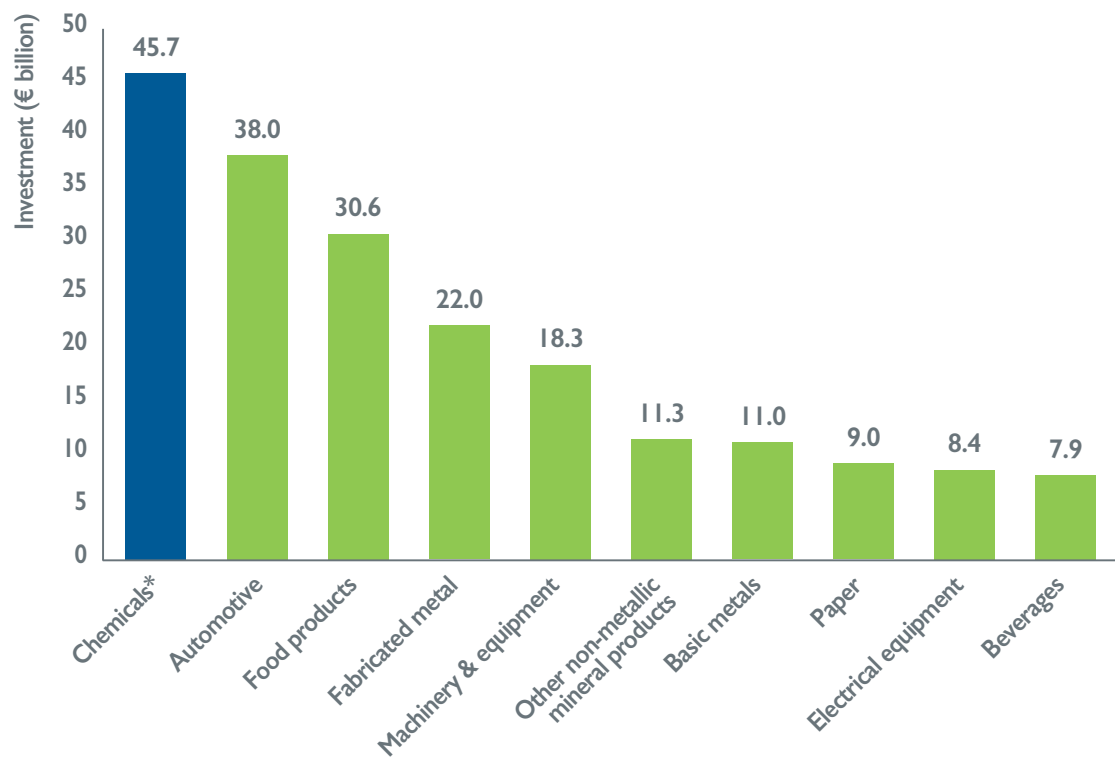
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Chemicals* is the largest investor in EU manufacturing

Top 10 sectors: investment (€ billion)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Pharmaceuticals and rubber & plastics included, Eurostat code, V15110

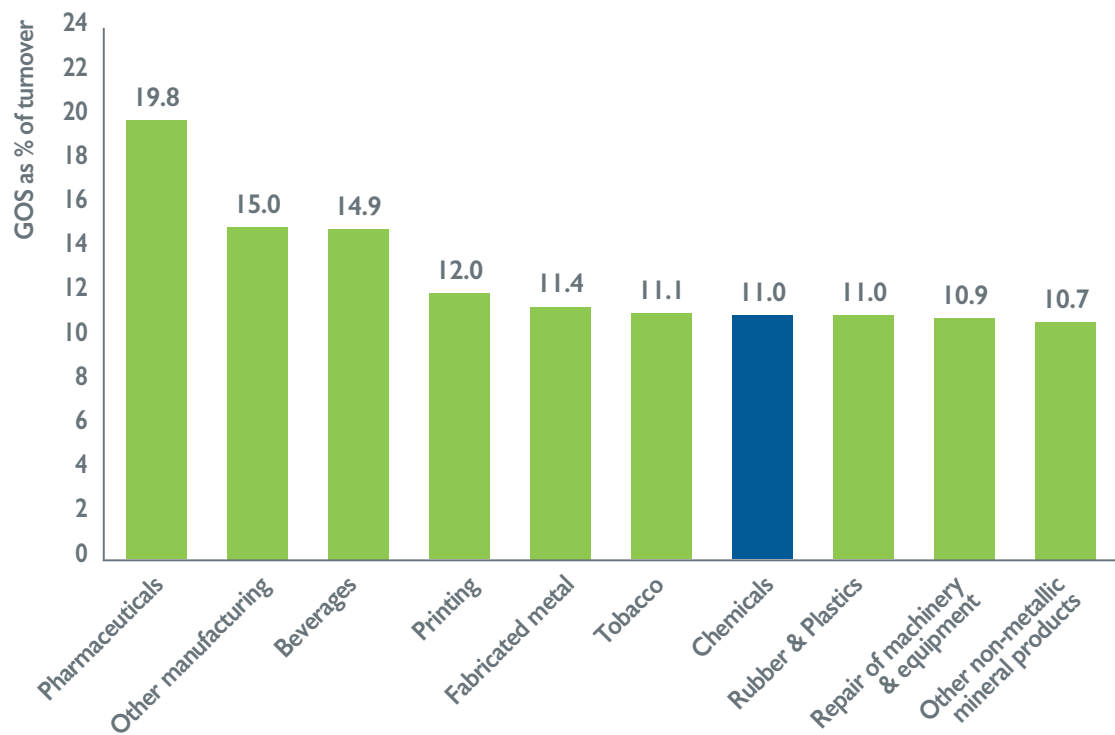
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- Gross investment in tangible goods is defined as investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. capitalised production of tangible capital goods), having a useful life of more than one year including non-produced tangible goods such as land. Investments in intangible and financial assets excluded (see Eurostat code, V15110).
- Investment rate (intensity)¹ in chemicals is far above the manufacturing average, amounting to 14% in the EU manufacturing sector.
- There are 2.1 million enterprises operating in the EU manufacturing sector. They invested about €253 billion in 2015. Chemicals (including pharmaceuticals and rubber and plastics) represent the largest investor in EU manufacturing, accounting for 18.1% of total investment, followed by Automotive and Food.

¹ Investment intensity = Investment (as % of sales)

Gross operating surplus (GOS)* in chemicals accounts for 11% of turnover

Top 10 sectors: gross operating surplus (% of turnover)



Source: Eurostat SBS Data 2015 and Cefic analysis 2019
* Eurostat code, V92113

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Gross operating surplus (GOS), or profits, is defined as value added minus personnel costs. It is the surplus generated by operating activities after the labour factor input has been compensated for. GOS in chemicals accounts for 11% of turnover (see Eurostat code V92113).
- With regard to its gross operating profit, chemicals compares favourably to other manufacturing sectors as well. The ratio of gross operating profits to turnover is the seventh highest in industry and is well above the manufacturing average.

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ENERGY CONSUMPTION

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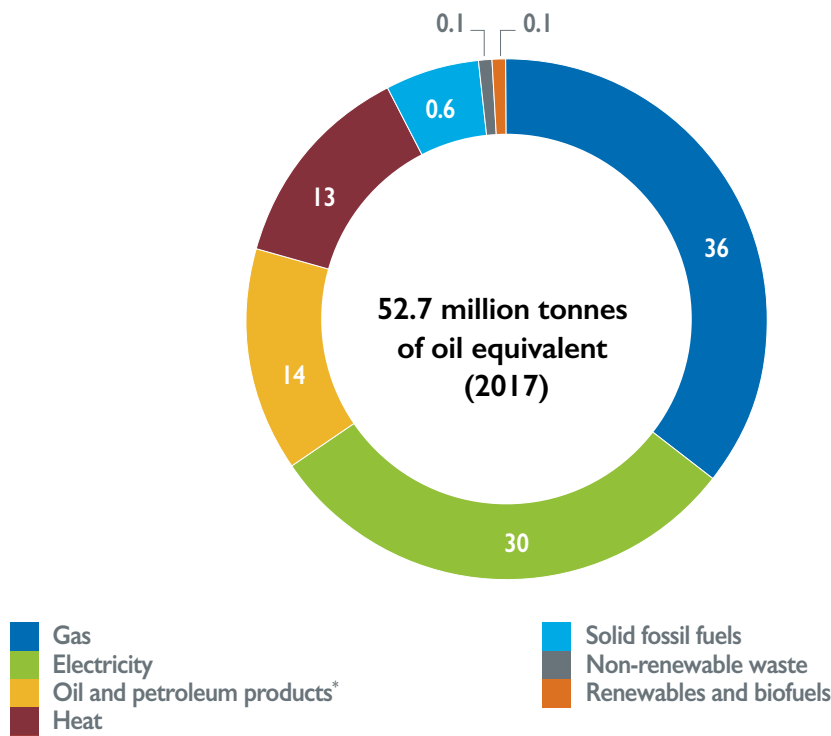
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Gas and electricity account for nearly 2/3 of total energy* consumption

Total energy consumption* in the EU chemical industry by source



Source: Eurostat energy database
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
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- Energy in all products: consists mainly of gas (natural gas, G3000, and manufactured gases C0350-0370), electricity (E7000), oil and petroleum products (excluding biofuel portion) (O4000XBIO), heat (H8000), solid fossil fuels (C0000X0350-0370), non-renewable waste (W6100_6220), renewables and biofuels (RA000), and others such as peat and peat products (P1000), oil shale and oil sands (S2000) and nuclear heat (N900H).
- The EU chemical industry, including pharmaceuticals, significantly reduced its fuel and power consumption from 1990 to 2017. Most of the energy used by the chemical industry as feedstock is stored in products and can still be recycled. Regarding other raw materials, the chemical industry uses a wide variety of natural and processed feedstocks, including metals, minerals and agricultural raw materials such as sugar, starch and fats.
- The chemical industry transforms energy and raw materials into products required by other industrial sectors as well as by final consumers. The cost of energy and raw materials is a major factor in determining the competitiveness of the EU chemical industry on the global market.
- In 2017, the fuel and power consumption of the EU chemical industry, including pharmaceuticals, amounted to 52.7 million tonnes of oil equivalent. Gas and electricity account for nearly two thirds of total energy* consumption

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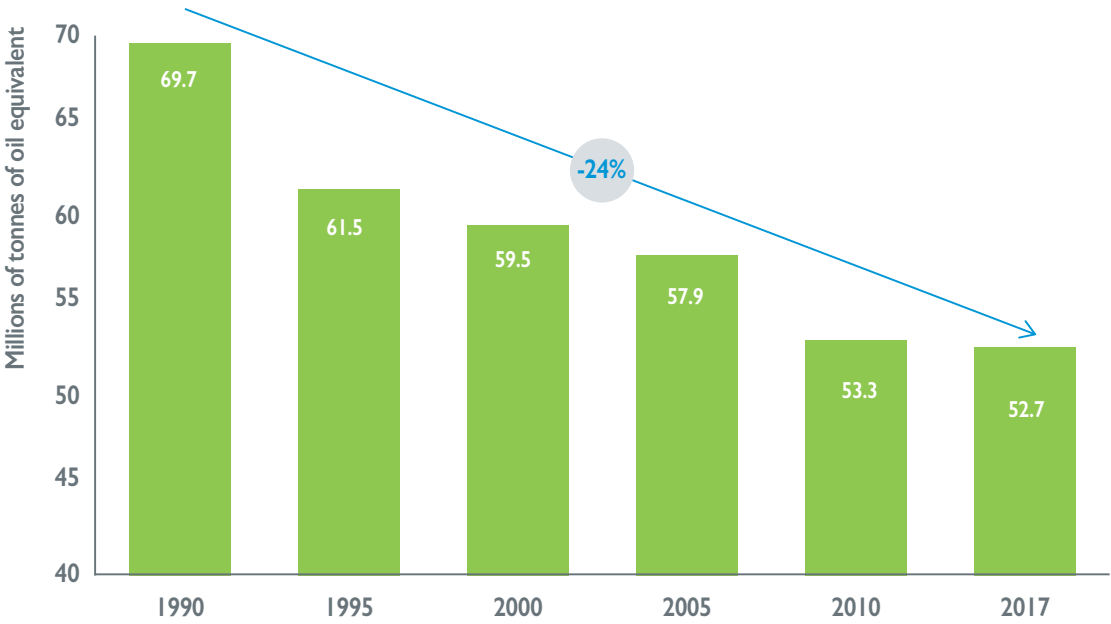
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Fuel and power consumption* falls 24% since 1990

Fuel and power consumption in the EU chemical* industry



Source: Eurostat and Cefic analysis 2019
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
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- Total energy consumption in the EU chemical sector was valued at 52.7 million tonnes of oil equivalent in 2017, down from 69.7 million tonnes in 1990 (24% less). Energy consumption in the EU chemical sector went down by an average of 1.03% per annum between 1990 and 2017. Energy consumption in chemicals accounted for 20.2% of total industry energy consumption in 2017.
- In 1990, the fuel and power consumption of the EU manufacturing industry amounted to 341.7 million tonnes of oil equivalent. Between 1990 and 2017, the sector considerably decreased its fuel and power consumption by 80.6 million tonnes of oil equivalent. The amount of energy consumed in 2017 was 23% less than in 1990.

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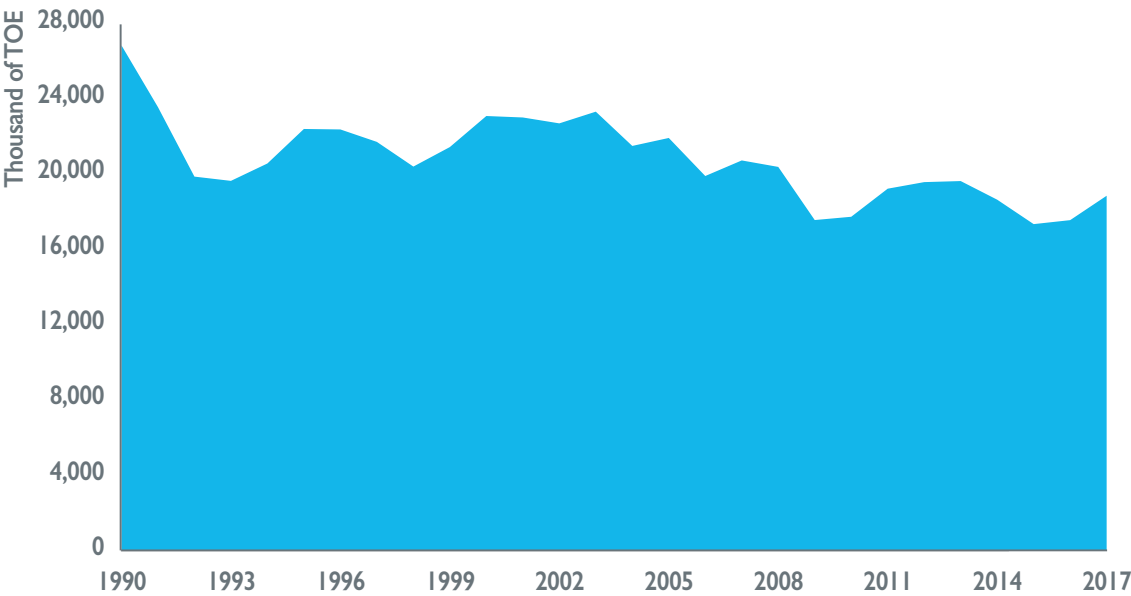
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Gas consumption* falls 30% since 1990

Gas consumption* in the EU chemical industry:
Thousand tonnes of oil equivalent



Source: Eurostat energy database (G3000)
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Gas energy consumption is the sum of natural gas (G3000), and manufactured gases (C0350-0370). "Gas" consumption in the EU area was valued at 18.8 million tonnes of oil equivalent in 2017 (far below the 26.6 million reported in 1990). "Gas" consumption went down by an average of 1.3% per annum between 1990 and 2017, and by 30% in 2017 compared to 1990.
- More than one third of total energy consumption in the EU chemical sector is attributable to "gas" (35.8% in 2017, down from 38.5% in 1990). Gas consumption in the EU chemical sector accounts for more than 21% of total industry consumption (2017). The share of gas consumption in total industry consumption went down from 24% in 1990 to 21.5% in 2017.

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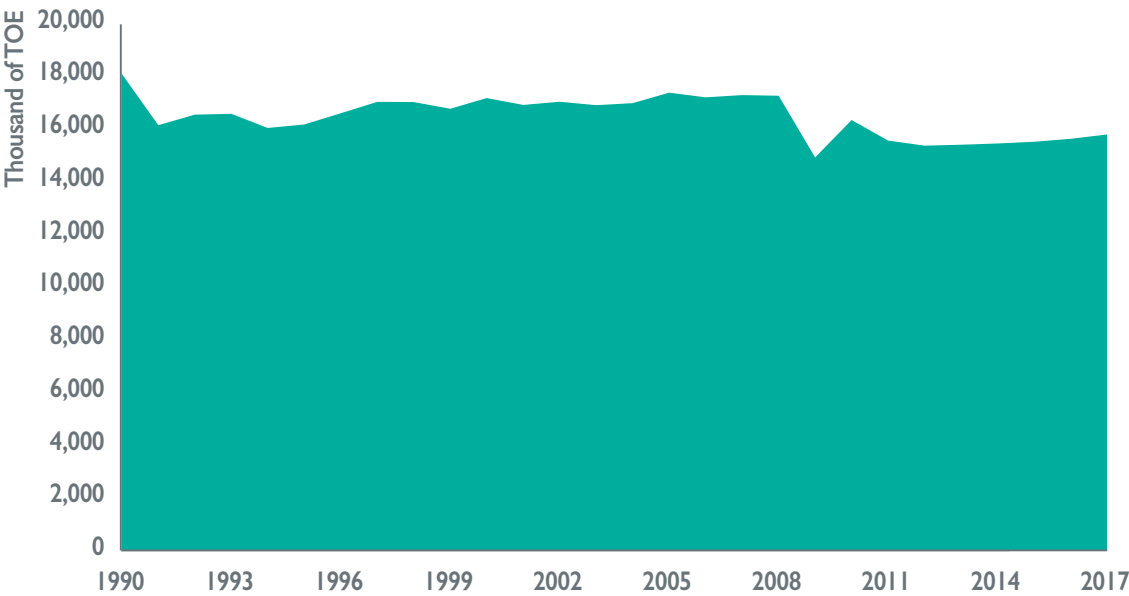
Energy

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Electrical energy consumption* falls nearly 13% since 1990

Electrical energy consumption* in the EU chemical industry:
Thousand tonnes of oil equivalent



Source: Eurostat energy database (E7000)
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- “Electrical energy” consumption (E7000) in the EU chemical business area was valued at 15.8 million tonnes of oil equivalent in 2017 (below the 18.1 million reported in 1990). “Electrical energy” consumption went down by an average of 0.5% per annum between 1990 and 2017. “Electrical energy” consumption went down by nearly 13% in 2017 compared to 1990.
- “Electrical energy” consumption accounts for 30% of total energy consumption of the EU chemical sector in 2017 (up from 26% in 1990). “Electrical energy” consumption in chemicals accounted in 2017 for 17.7% of total industry (down from 21.2% in 1990).

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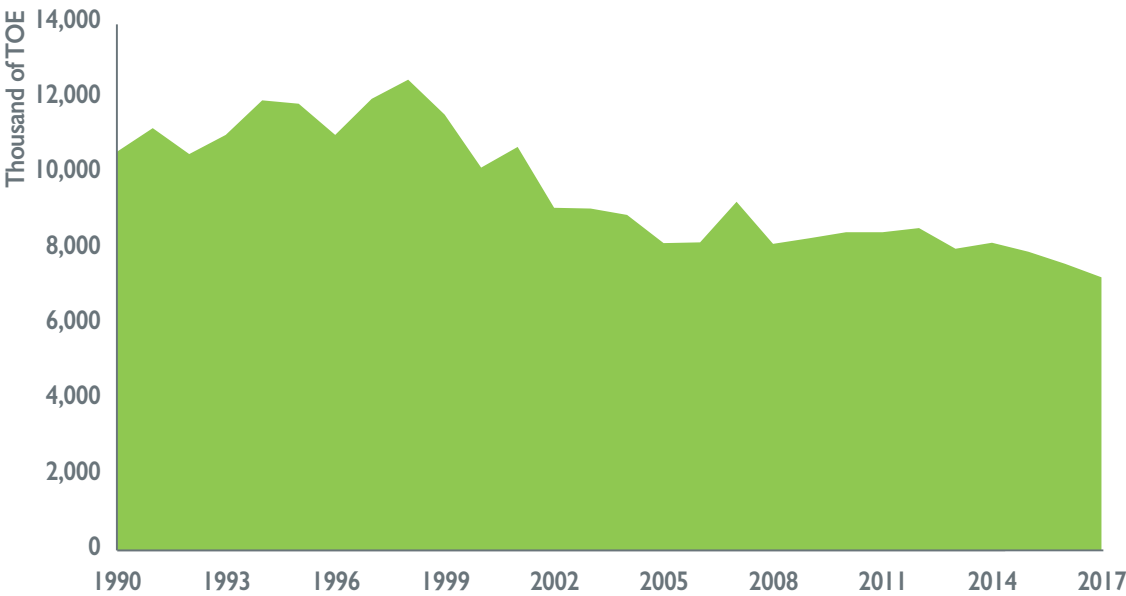
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Total petroleum consumption* falls 31% since 1990

Total petroleum products consumption* in the EU chemical industry:
Thousand tonnes of oil equivalent



Source: Eurostat energy database (O4000XBIO)

* Chemicals including pharmaceuticals, oil and petroleum products (excluding biofuel portion)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- “Oil and petroleum products” consumption (excluding biofuel portion) (O4000XBIO) in the EU chemical sector was valued at 7.3 million tonnes of oil equivalent in 2017, compared to the 10.6 million registered in 1990. “Petroleum” consumption went down at an average of 1.4% per annum between 1990 and 2017. “Petroleum” consumption fell by 31% in 2017 compared to 1990.
- “Petroleum” consumption accounted for 13.8% of total energy consumption of the EU in 2017 (slightly down from 15.2% in 1990). “Petroleum” consumption in the EU chemical sector accounted for 27.1% of total industry petroleum consumption in 2017.

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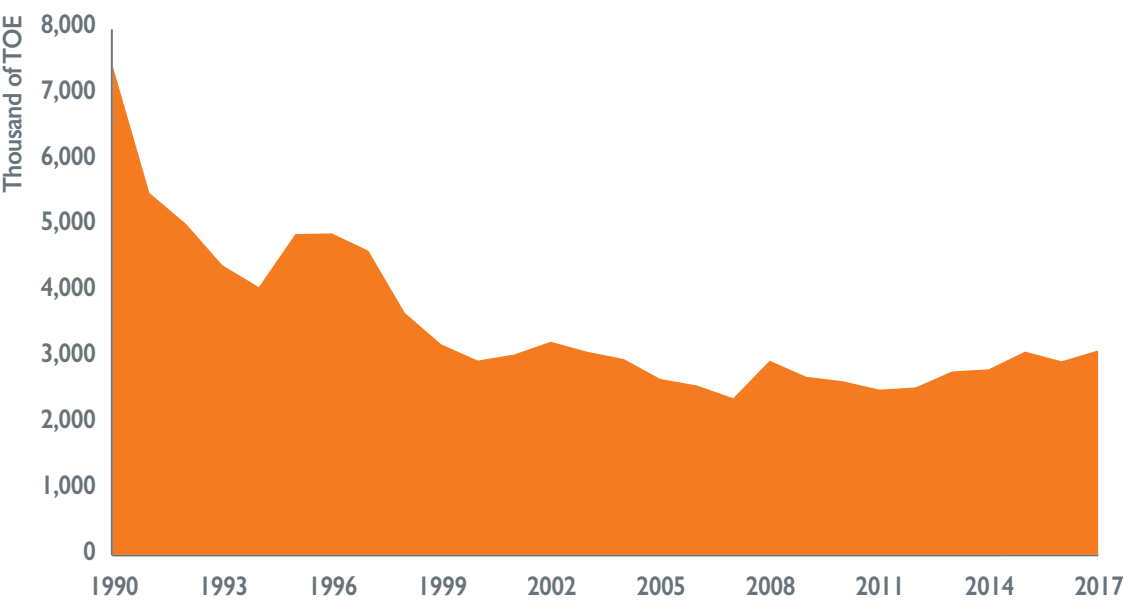
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Solid fossil fuels consumption* falls 58% since 1990

Solid fuels consumption* in the EU chemical industry:
Thousand tonnes of oil equivalent



Source: Eurostat energy database (C0000X0350-0370)
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
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- “Solid fossil fuels” consumption (C0000X0350-0370) in the EU chemical sector was valued at 3.1 million tonnes of oil equivalent in 2017, far below the 7.4 million registered in 1990. “Solid fossil fuels” consumption went down by an average of 3.2% per annum between 1990 and 2017. “Solid fossil fuels” consumption fell by 58% in 2017 compared to 1990.
- “Solid fossil fuels” consumption accounted for 5.9% of energy consumption of the EU chemical sector in 2017, far below the 10.6% registered in 1990. The share of “Solid Fuels” consumption in chemicals to total industry was valued at 21.5% in 2017.

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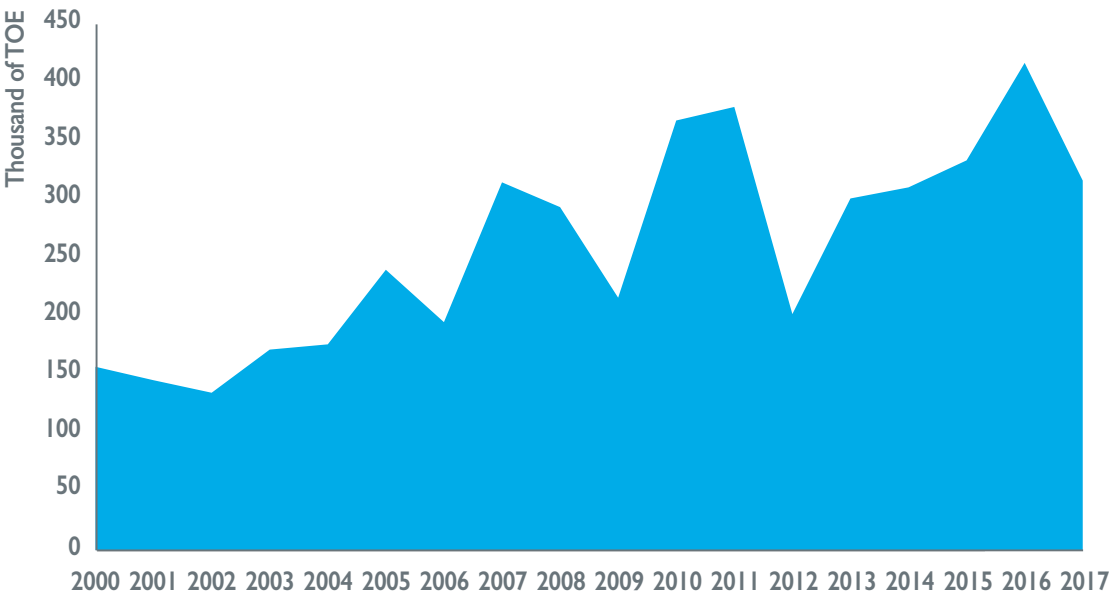
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Renewable and biofuels energies consumption* more than doubled since 2000

Renewable energies consumption* in the EU chemical industry:
Thousand tonnes of oil equivalent



Source: Eurostat energy database (RA000)
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Renewable and biofuels energy consumption (RA000) in the EU area was valued at 316 thousands of tonnes of oil equivalent in 2017, significantly up from 156.8 in 2000. Renewable and biofuels energy consumption grew at an average of 4.2% per annum between 2000 and 2016. Renewable and biofuels energy consumption was 1.2 times higher in 2016 compared to 2000.
- The share of renewable and biofuels energy consumption in chemicals increased from 0.3% in 2000 to 0.6% in 2017.

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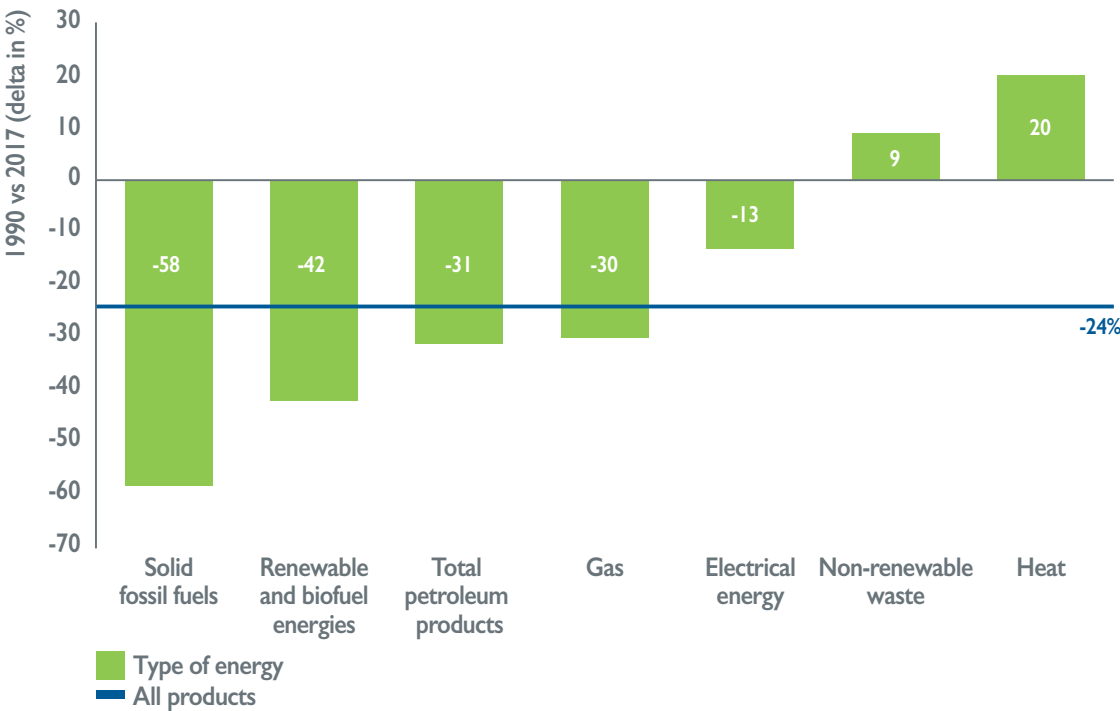
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A significant reduction in energy consumption* since 1990

EU chemicals energy consumption*: 2017 compared to 1990 (delta in %)



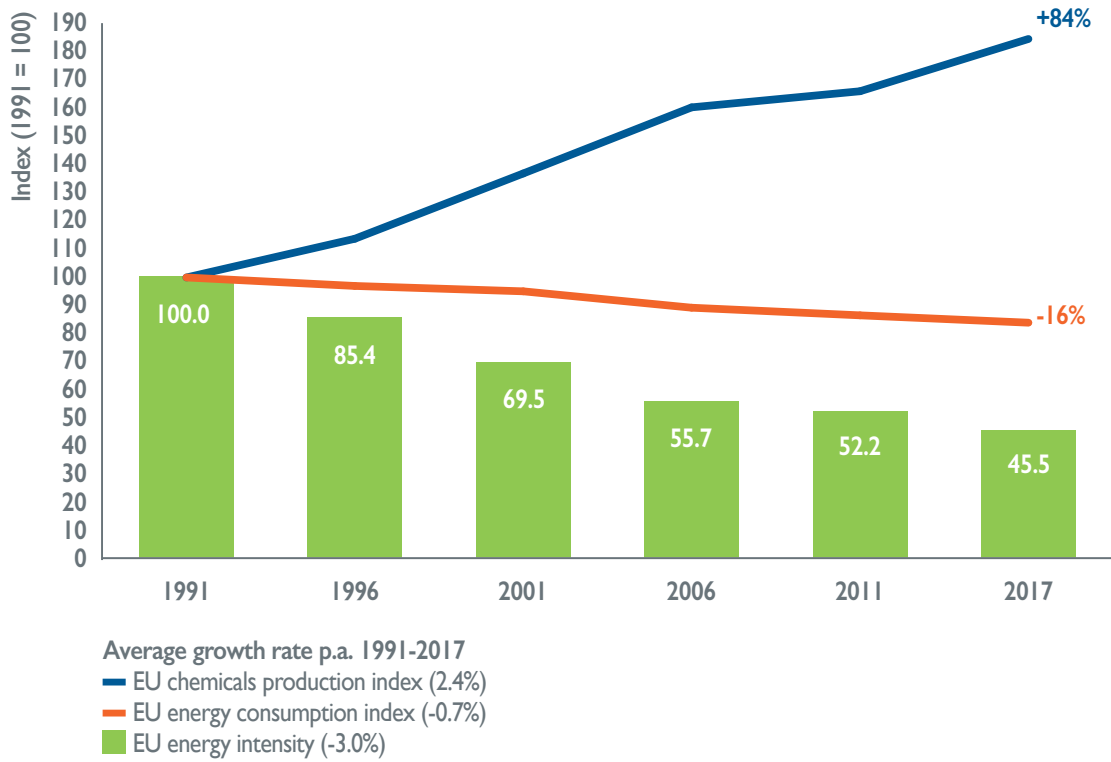
Source: Eurostat energy database
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
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- In absolute terms, the EU chemical industry significantly reduced its fuel and power consumption by 17 million tonnes of oil equivalent from 1990 to 2017. Nearly half of this decline was driven by the reduction in gas consumption as a source of energy used by the EU chemical industry.
- Gas consumption amounted to 18.9 million tonnes of oil equivalent in 2017, down from 26.9 million tonnes of oil equivalent in 1990 (30%).
- The EU chemical industry dropped its consumption of solid fossil fuels from 7.4 to 3.1 million tonnes of oil equivalent between 1990 and 2017. The reduction of solid fossil fuels looks impressive, with a nearly 60% decrease in 2017 compared to 1990. Finally, consumption of total petroleum products and electrical energy dropped respectively by 3.3 million and 2.3 million tonnes of oil equivalent in the same period.

Energy intensity* halved over a 26-year period

Energy intensity* in the EU chemical industry



Source: Eurostat energy database and Cefic Chemdata International 2019

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

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- The EU chemical sector has been a pioneer in energy efficiency. It recognised early that in order to be competitive in a global market, competitive advantages must be sought at every opportunity.
- As one of the most energy-intensive sectors, chemical companies have also had more scope for reduction than others. By making processes more efficient, including the construction of new facilities, the energy efficiency drive has been sustained for many years. Making further significant improvements requires technological breakthroughs.
- For many years, the EU chemical industry, including pharmaceuticals, has made strenuous efforts to improve energy efficiency by reducing its fuel and power energy consumption per unit of production.
- By 2017, energy intensity, being the energy consumption per unit of production, in the chemical industry, including pharmaceuticals, was 55% lower than in 1991. Further improvements to energy efficiency are subject to decreasing returns. The chemical industry succeeded in continuously increasing its input from 1991 to 2017, while at the same time keeping its energy input relatively constant.
- As a result, the EU chemical industry has excelled in significantly lowering its energy intensity by an average of 3% per year. This analysis shows that improvements in energy efficiency were spectacular from 1991 to 2005. The period from 2005 to 2017 shows less significant performance.

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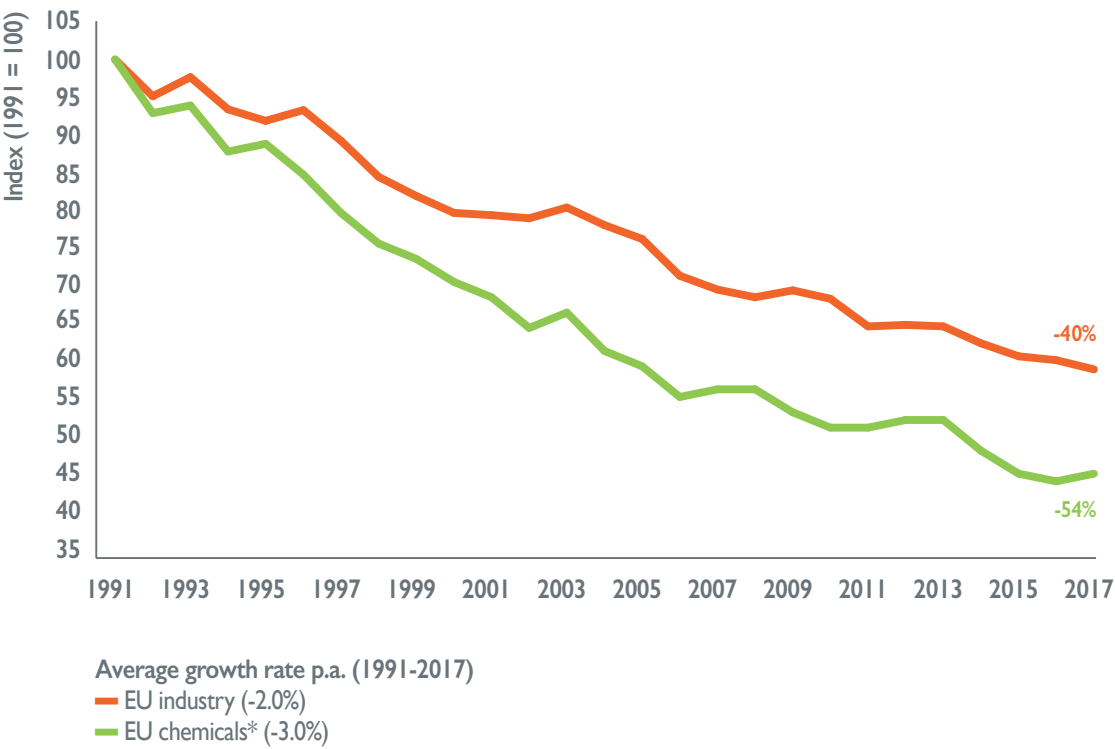
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Chemical sector* consistently performs better than overall industry

Energy intensity: Chemicals* vs total industry



Source: Eurostat energy database and Cefic Chemdata International 2019
* Chemicals including pharmaceuticals

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Energy intensity in the EU chemical industry decreased by an average of 3% per annum from 1991 to 2017. As for the whole of the EU manufacturing sector, the energy intensity went down by 2% per year during the same period. Energy intensity in the EU chemical industry was 55% lower in 2017 compared to 26 years ago.

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CAPITAL & R&I SPENDING

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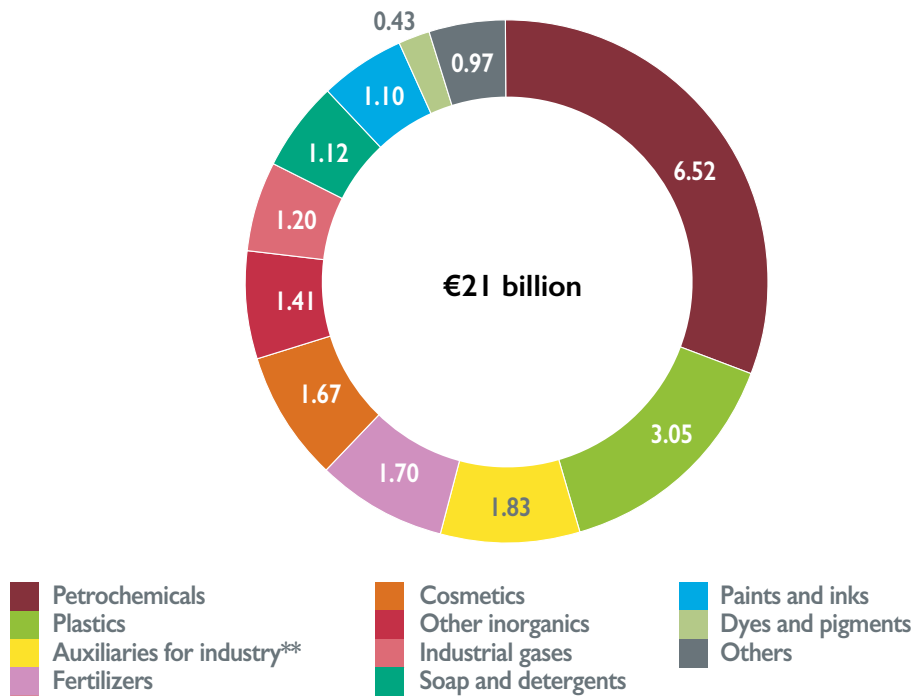
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Petrochemicals is the largest investor in the EU chemical sector

Capital spending in the EU chemical industry broken down by sub-sectors (€ billion)



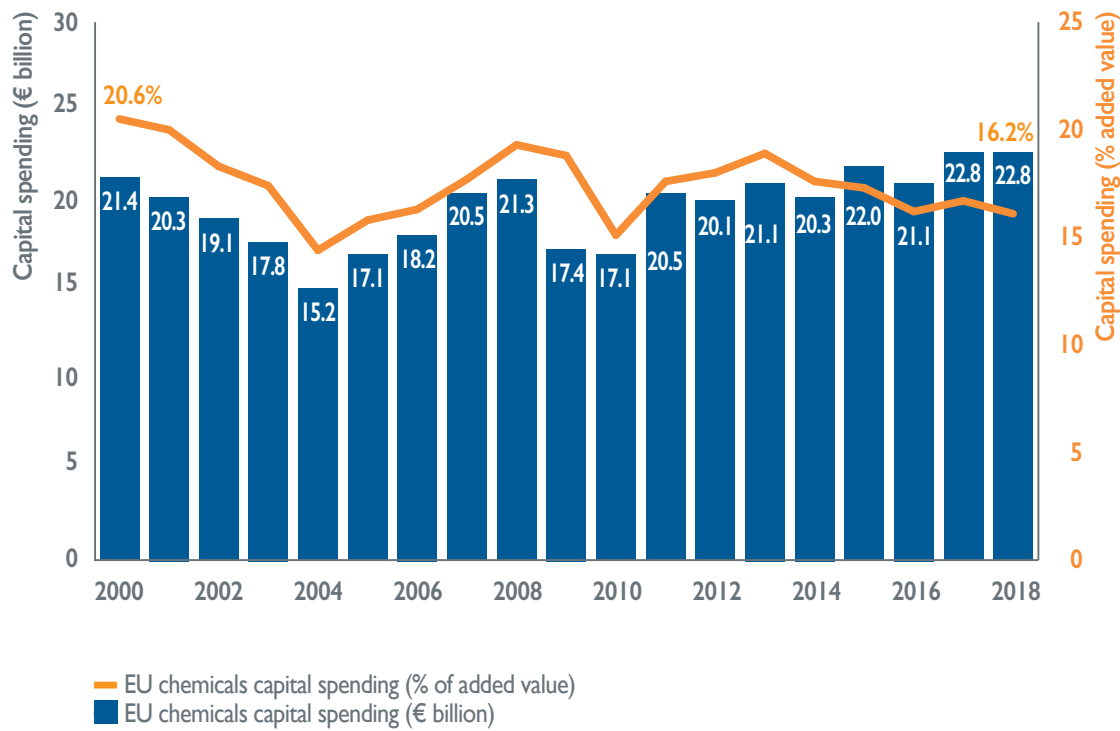
Source: Eurostat SBS Data (2015)

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Unless specified, EU refers to EU28

- Gross investment in tangible goods is defined as investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. capitalised production of tangible capital goods), and having a useful life of more than one year, including non-produced tangible goods such as land. Investments in intangible and financial assets are excluded (see Eurostat code, V15110).
- Nearly one third of EU chemicals investment is attributable to the petrochemicals business. With €6.5 billion, petrochemicals is the largest investor in the EU chemical sector; followed by plastics and “auxiliary for industry”.
- On the global scene, the European petrochemicals industry is in challenging times. All regions are expanding their petrochemical production bases. These investments are usually not intended as stand-alone plants, but as an initial step to generate huge chemical and, subsequently, manufacturing hubs.
- Several major petrochemical projects, including the first steam cracker to be built in Europe in 20 years (ethane/ Ineos) and propane dehydrogenation plants, were announced in 2017–18 for Europe.
- It was the first time in many years that Europe has seen capital-investment announcements in petrochemicals of this size. In general terms, the strength of the EU petrochemical industry is the high integration of crackers in the chemical value chain in Europe. One of the key challenges facing the petrochemicals business is the EU Commission-led Green New Deal for Europe and the discussion to fully decarbonise the EU economy by 2050.

EU capital spending reaches second highest level since 2000

Capital spending in the EU chemical industry



Source: Cefic Chemdata International 2019 and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Capital investment is a key factor in securing the future development of the chemical industry. In many cases, major equipment or plant renewals require long-term planning. Such investments are not only related to the improvement of productivity or introduction of new products but are also due to the need to comply with regulations or reduce operating costs.
- The chart illustrates that investment (in absolute figures) in the European Union has been increasing. EU chemicals investment reached the 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 European Union has been increasing gradually since 2010, reaching the value of 16.2% in 2018. This is slightly below the long-term average intensity over the years between 2000 and 2017 at 17.7%.
- The European chemical industry continues to believe in the future. It needs to maintain investment in its existing infrastructure and in new production facilities to ensure the chemical sector has a viable and vibrant future.

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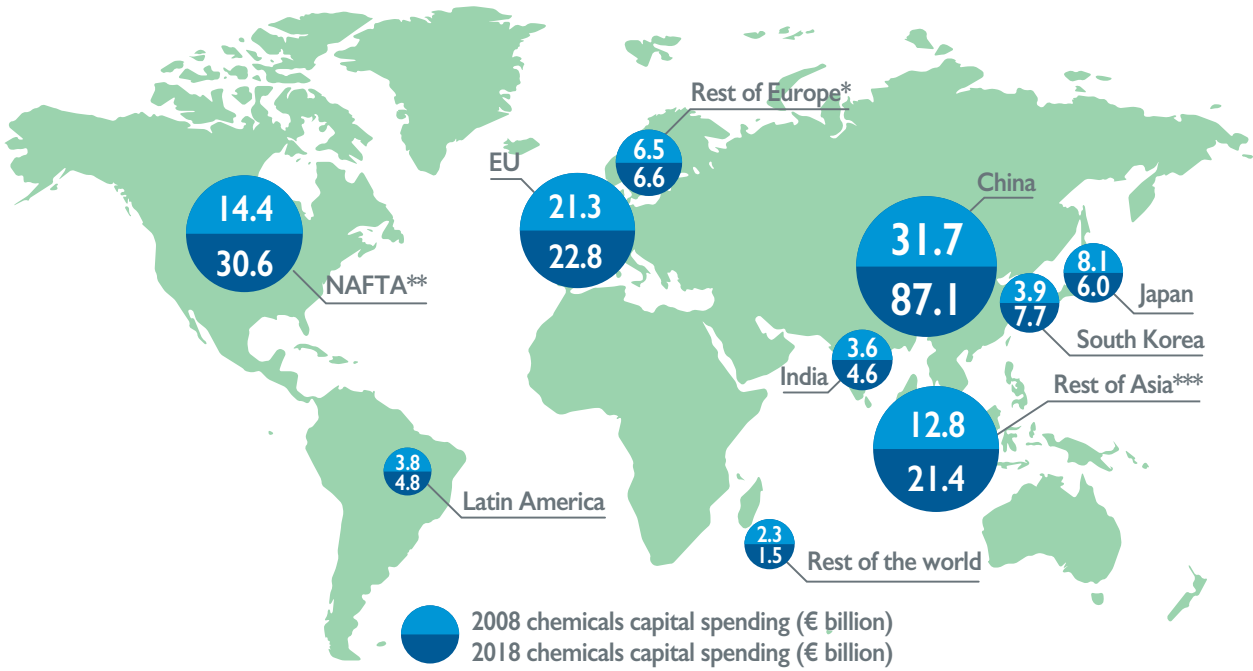
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China dominates world chemicals investment

Capital spending by region



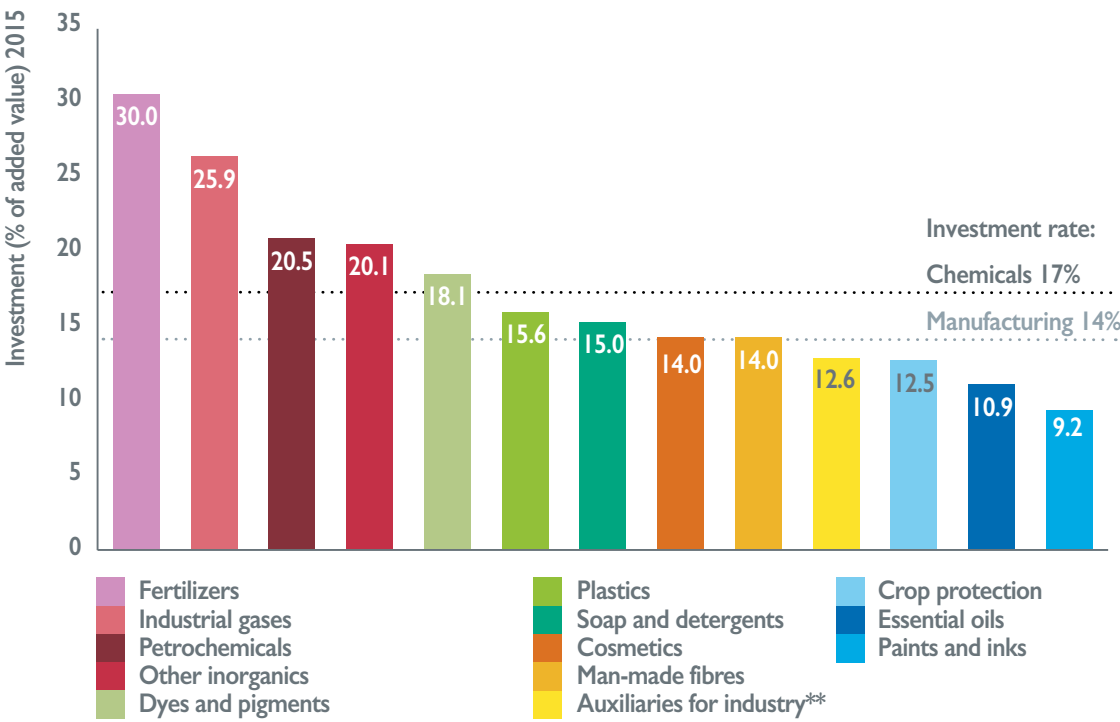
Source: Cefic Chemdata International 2019
* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine
** North American Free Trade Agreement
*** Asia excluding China, India, Japan and South Korea

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- In absolute values, the level of world investment in the chemical sector was 1.8 times higher in 2018 compared to 10 years ago (€193.1 billion vs €108.4 billion).
- Between 2008 and 2018, global investment grew 6% per annum on average. This is far below Chinese investment growth of 10.6% during the same period.
- China is outpacing other economies in the world such as North America (7.8%), South Korea (7%), rest of Asia (5.2%), India (2.5%) and Latin America (2.4%). With less than 1% growth, Europe (EU28 + rest of Europe) is still lagging behind the main regions in the world.
- In 2018, China contributed 45% of global investment, up from 29% in 2008. NAFTA still ranks second, contributing 15.9% of global investment in 2018. Europe came third, accounting for 15.2% of global investment the same year.

Capital spending (% of added value) 21% higher in chemicals than manufacturing average

Capital intensity* in the EU chemical industry broken down by sub-sectors



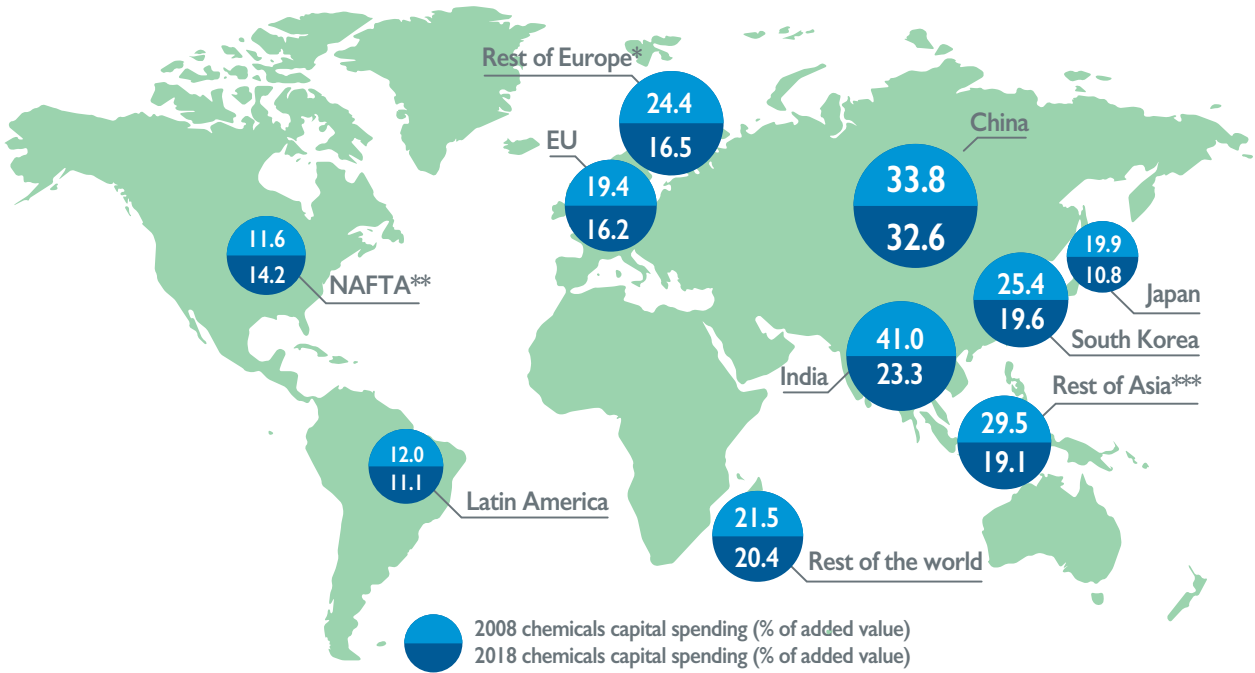
Source: Eurostat SBS Data (215)
* Eurostat V15110 - Gross investment in tangible goods; intensity is defined as V94415 (investment/value added at factors cost)
** Nace code, 2059 other chemical products n.e.c.

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Data analysis compares capital spending in the EU chemicals business broken down by sub-sector. The metric used in the analysis is capital intensity, meaning capital spending expressed as percentage of added value.
- The analysis shows capital intensity is equal to 17% in the EU chemicals business, above the 14% registered in the EU manufacturing sector as a whole. Capital intensity is 21% higher in chemicals than the manufacturing average.
- The highest capital intensity is attributable to fertilizers and industrial gases, followed by petrochemicals, which is the largest investor in the EU chemicals business. The lowest intensity values are attributable to “crop protection”, followed by “essential oils”, and “paints and inks”.

EU capital intensity below key emerging economies

Capital spending (% added value), 2008 vs 2018



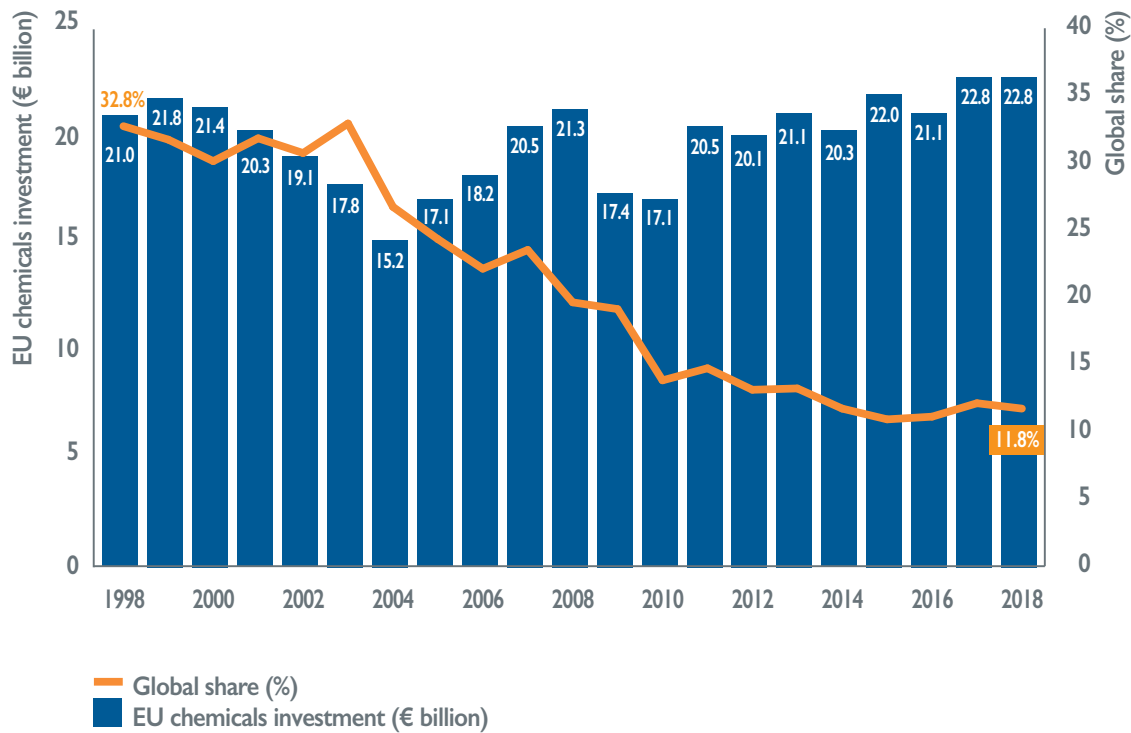
Source: Cefic Chemdata International 2019 and Cefic analysis 2019
* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine
** North American Free Trade Agreement
*** Asia excluding China, India, Japan and South Korea

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- Capital spending intensity (spending as a percentage of added value) in China and India is far higher than in the rest of the world. In 2018, capital spending accounted for nearly one third of added value in China (32.6%). In India, more than a fifth of added value is attributable to capital spending (23.3%). South Korea and the rest of Asian countries showed an intensity value which is close to 20%. With 16.2%, the EU area is still behind the emerging-producing regions in Asia, but significantly ahead of NAFTA and Latin America.
- Capital spending in the EU chemical industry grew by less than 1% per annum on average in ten years (2008-2018). By contrast, added value grew quicker at 2.5% during the same period.
- Capital spending intensity is a key factor affecting competitiveness. It is an indicator of loss of attractiveness as well a driver of future competitiveness: the more investment the more competitive the region becomes and vice versa. For example, since 2010, there have been 339 new chemical industry projects announced in the USA. Together, these projects represent \$201 billion in new capital investment in the USA. More than half (56%) of the investment has already been completed or is currently under construction. (Source, ACC-Sep-2019).

EU loses two thirds of its original market share over a 20-year period

EU share of global chemicals investment



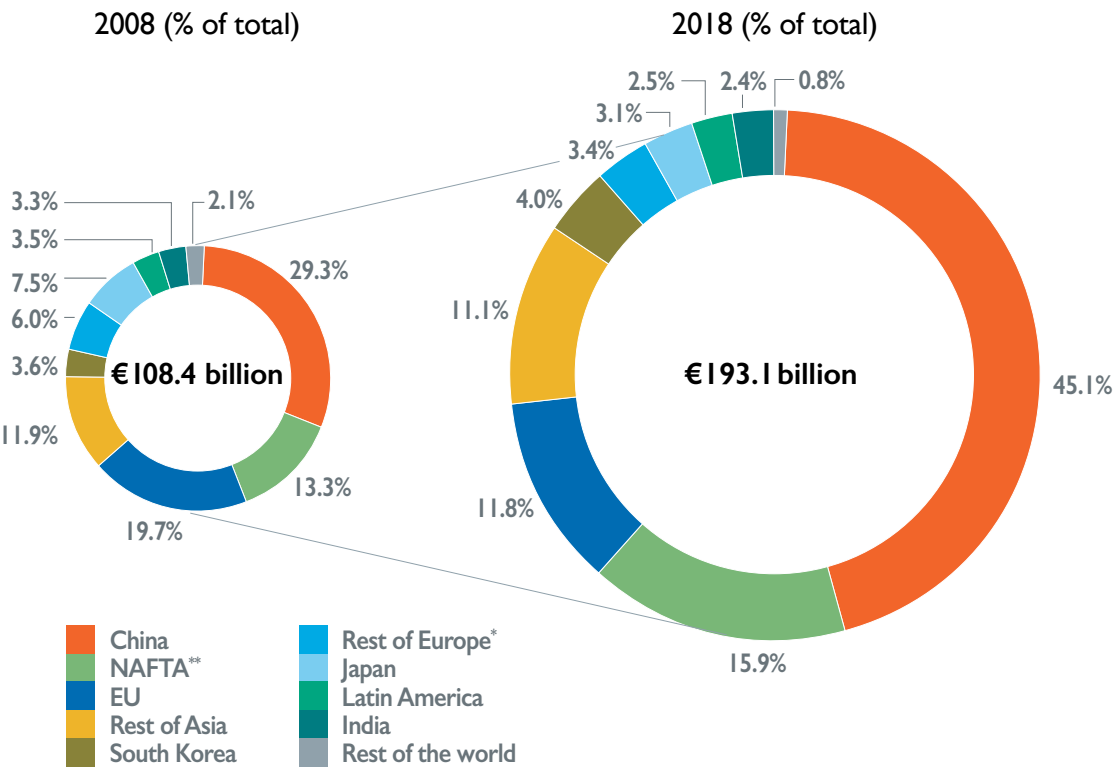
Source: Cefic Chemdata International 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Developments over the last 20 years indicate that the European Union position has weakened. In 1998, the EU reported capital spending of €21 billion, making up a third of global chemicals investment. In 1998, the EU was the largest chemicals investor, dominating the chemicals world ranking at that time. China accounted for less than 5% of global investment.
- EU chemical spending has been growing modestly since 1998. By contrast, global investment reported an impressive increase from €64.1 billion in 1998 to €193.1 billion in 2018. Therefore, the EU investment market share lost about two thirds of its original value in 20 years, down from 32.8% in 1998 to 11.8% in 2018.

Significant decline in share of chemicals capital spending for the EU and Japan

Chemicals capital spending by country, 2008 vs 2018 (% of total)



Source: Cefic Chemdata International 2019

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

** North American Free Trade Agreement

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Unless specified, EU refers to EU28

A look at global capital spending in the chemicals business shows the following:

- World capital spending reported the value of €193.1 billion in 2018, up from €108.4 billion in 2008. Investment around the world grew at 6% per annum on average over the past 10 years. It showed a very encouraging trend: chemicals companies around the world have nearly doubled their investment in ten years.
- Strong development in China drove the significant increase in global investment in the chemicals business. China accounted in 2018 for 45.1% of global investment, far above the 29.3% reported in 2008. NAFTA and South Korea reported positive results, but less spectacular compared to China.

- Apart from China, NAFTA and South Korea, all main countries reported a decline in global market share in 10 years. The EU area and Japan experienced the most significant decline in their world share during the same period.
- The EU investment market share went down from 19.7% in 2008 to 11.8% in 2018. Japan reported a less dramatic decline, from 7.5% to 3.1% during the same period. The rest of Europe accounted for 3.4% in 2018, far below the 6% reported in 2008.

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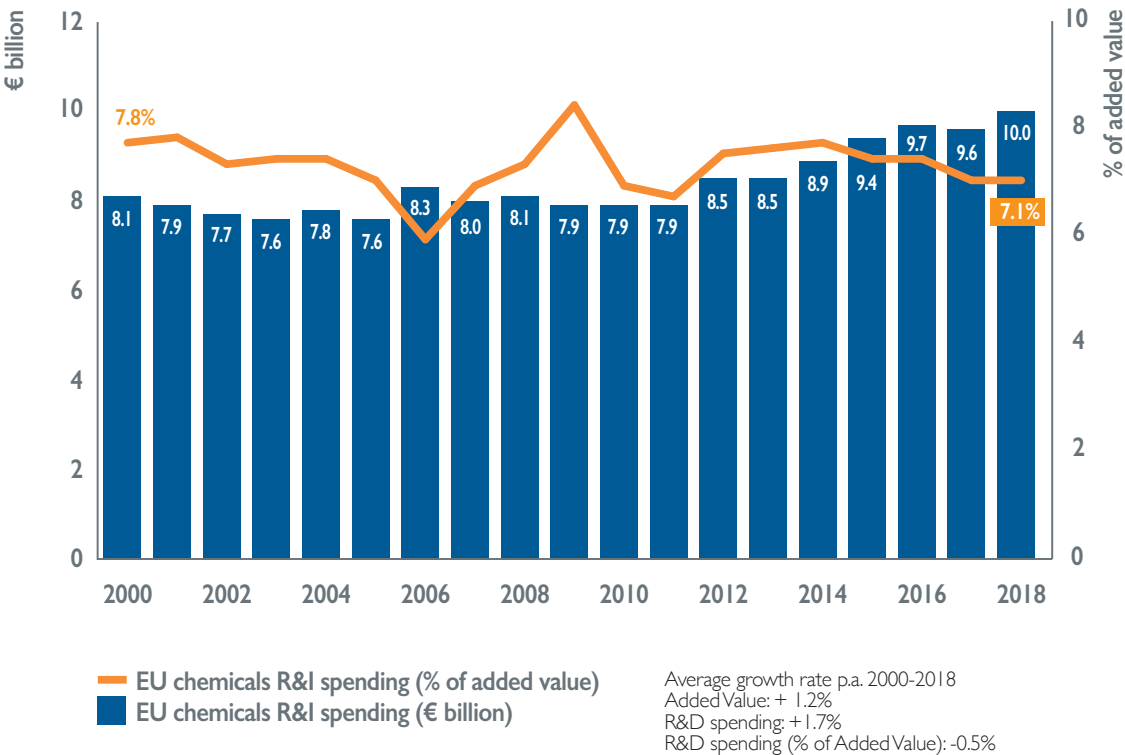
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EU Research and Innovation (R&I) spending reaches highest level since 2000

R&I spending in the EU chemical industry



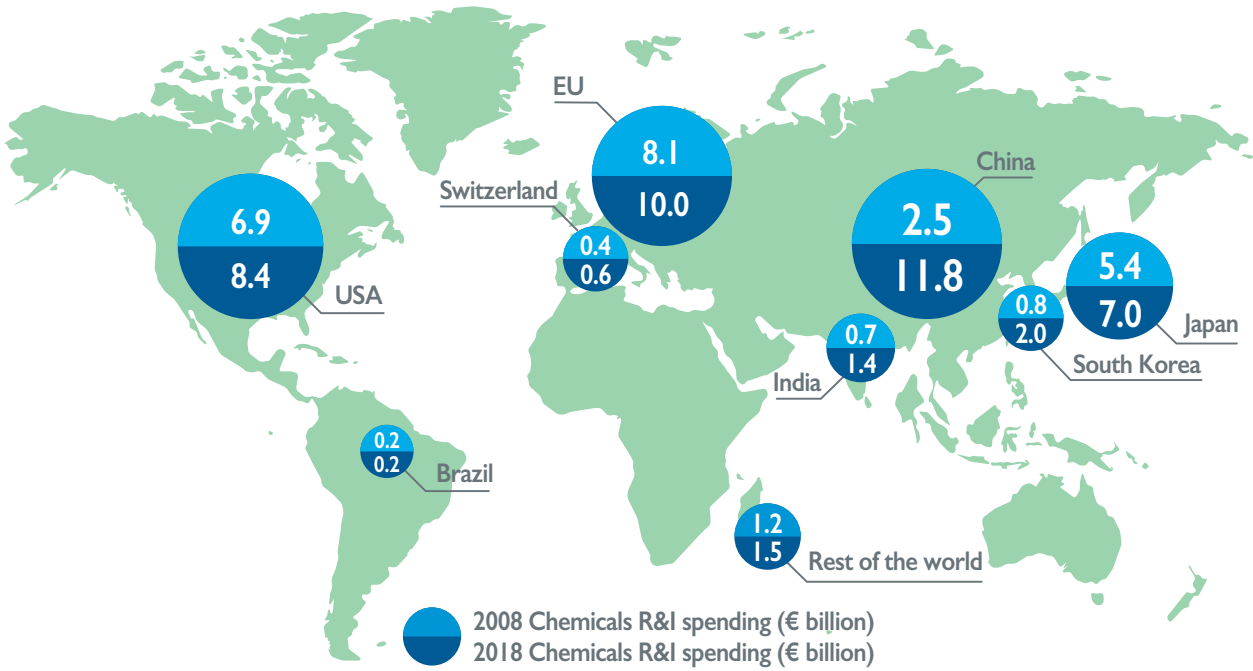
Source: Cefic Chemdata International 2019 and Cefic analysis 2019

Unless specified, chemical industry excludes pharmaceuticals
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- Investments in R&I are key elements in securing the future of the chemical industry and needed to maintain or increase its strong contribution to solving societal challenges. Indeed, the chemical industry is an enabler of innovation in numerous downstream value chains through its products and technologies.
- Spending on R&I in the EU chemical industry was valued at an average annual level of €8.4 billion between 2000 to 2018. In 2018, R&I spending reached €10 billion, the highest since 2000.
- Concerning chemical intensity, the analysis shows that R&I spending in the EU chemical business grew at an average of 1.2% per annum between 2000 and 2018. Added value reported similar growth during the same period at 1.7%. As a result, R&I intensity (spending as a percentage of added value) registered a similar value at 7.1% in 2018 compared to 7.8% in 2000.

Europe is the second largest R&I investor in the world

R&I spending by region



Source: Cefic Chemdata International 2019

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Global R&I spending in the chemical sector reached €42.9 billion in 2018, from €26.2 billion in 2008. On a global basis, R&I spending was 64% higher in 2018 compared to ten years ago.
- Between 2008 and 2018, global R&I grew about 5.1%. This is far below Chinese R&I growth of 16.6% during the same period. China is by far outpacing the other economies in the world. R&I spending in China was 4.6 times higher in 2018 compared to 2008.
- The EU area is still the second largest investor in the world. It accounted in 2018 for 23.3% of global chemicals R&I spending.

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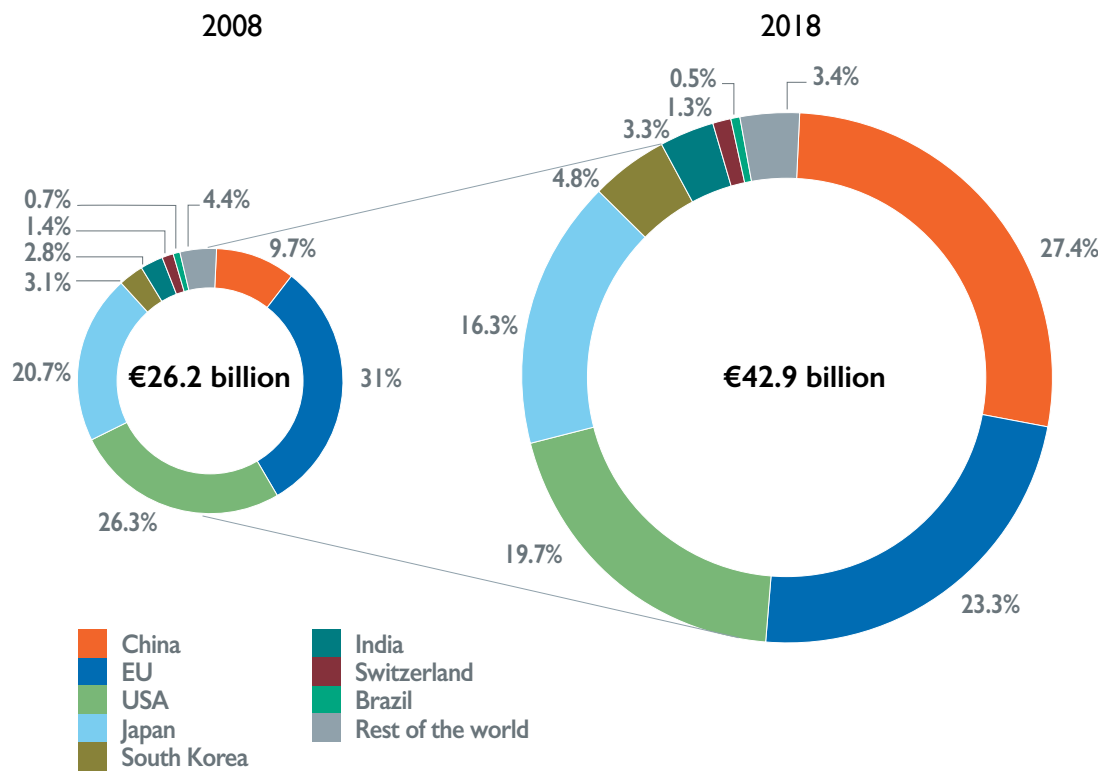
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Decreasing R&I spending for the EU, USA and Japan

Chemicals R&I spending by country, 2008 vs 2018 (% of total)



Source: Cefic Chemdata International 2019

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- In 2018, China contributed 27.4% of global investment, up from 9.7% in 2008. R&I spending in the European Union grew at an average rate of 2.1% from 2008 to 2018. The European Union ranks second, contributing 23.3% of global investment in 2018. The USA ranks third, representing 19.7% of global investment in 2018.
- The results show a decreasing share of chemicals R&I spending for industrial regions. The EU area, the USA and Japan reported a decline of their market share over the past 10 years.
- The EU share of global R&I spending went down from 31% in 2008 to 23.3% in 2018. A less spectacular result for the USA: 26.3% in 2008 to 19.7% in 2018. Japan reported a more dramatic decline from 20.7% in 2008 to 16.3% in 2018.

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Total greenhouse gas (GHG) emissions* fall nearly 60% since 1990

Total GHG emissions* in the EU chemical industry



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- Long-term data gives evidence of the EU chemical industry, including pharmaceuticals, having a solid track record from 1990 to 2017 in reducing its GHG emissions.
- According to the European Environmental Agency (EEA), the EU chemical industry, including pharmaceuticals, emitted a total of 135.2 million tonnes of carbon dioxide (CO₂) equivalent in 2017, down from a total of 324.9 million tonnes in 1990. This 58.4% decrease clearly illustrates how much importance the chemical industry attaches to reducing GHG emissions.
- Our industry's shift to less carbon-intensive energy sources has helped reduce GHG emissions. Much of the decline over the past 20 years is linked to abatement of nitrous oxide (N₂O), which has a higher global warming potential than CO₂ and is emitted by some chemical processes.

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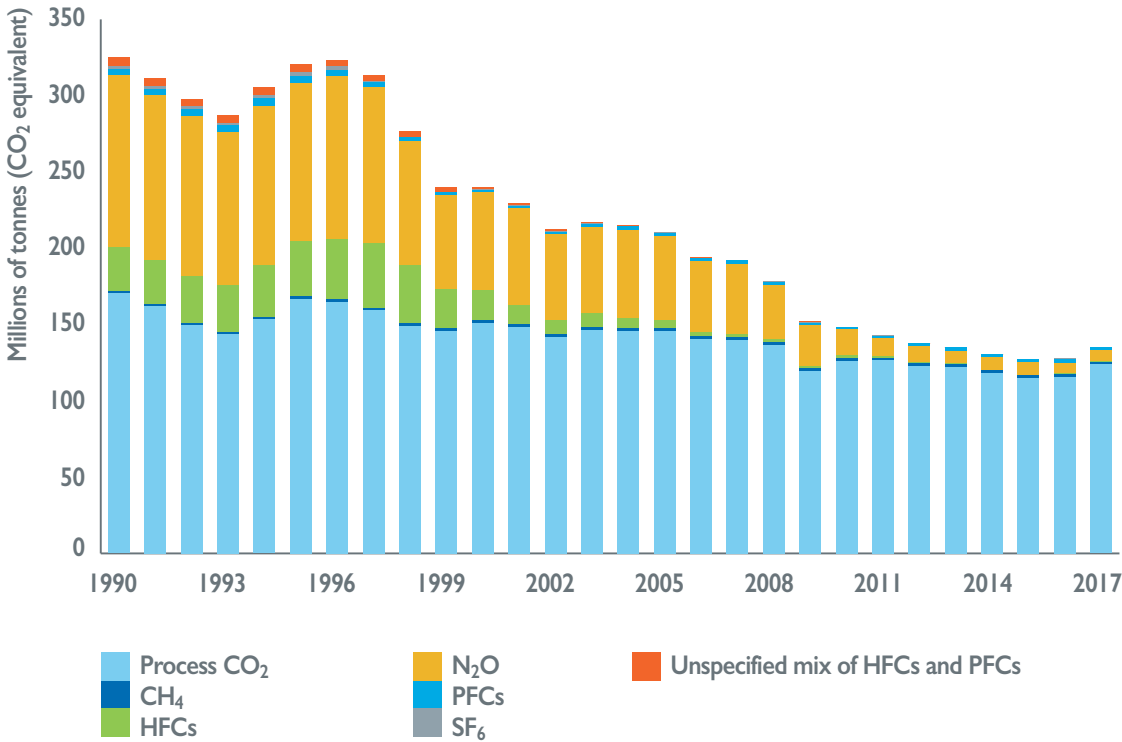
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Total greenhouse gas (GHG) emissions* fall by 189.8 million tonnes (CO₂) since 1990

GHG emissions* in the EU chemical sector, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- This chart gives an overview of the main trends in the EU chemical industry (including pharmaceuticals) GHG emissions for the period 1990–2017.
- According to the EEA, the most important GHG is CO₂ for the EU chemical industry (including pharmaceuticals). It accounted for 91.6% of total EU GHG emissions in 2017. In 2017, EU CO₂ emissions were 123.8 million tonnes, which was 27% below 1990 levels. Compared to 2016, CO₂ emissions decreased by about 7%.
- The second most important GHG is N₂O, accounting for 5.6% of total EU GHG emissions in 2017. EU N₂O emissions were 7.6 million tonnes, which was 93% below 1990 levels. Compared to 2016, N₂O emissions decreased by 6.3%.
- Total GHG have fallen by 189.9 million tonnes (CO₂) since 1990. Data shows that emissions of CH₄ increased whereas emissions of the other GHG such as CO₂, HFCs, N₂O, SF₆, and PFCs decreased during the same period.

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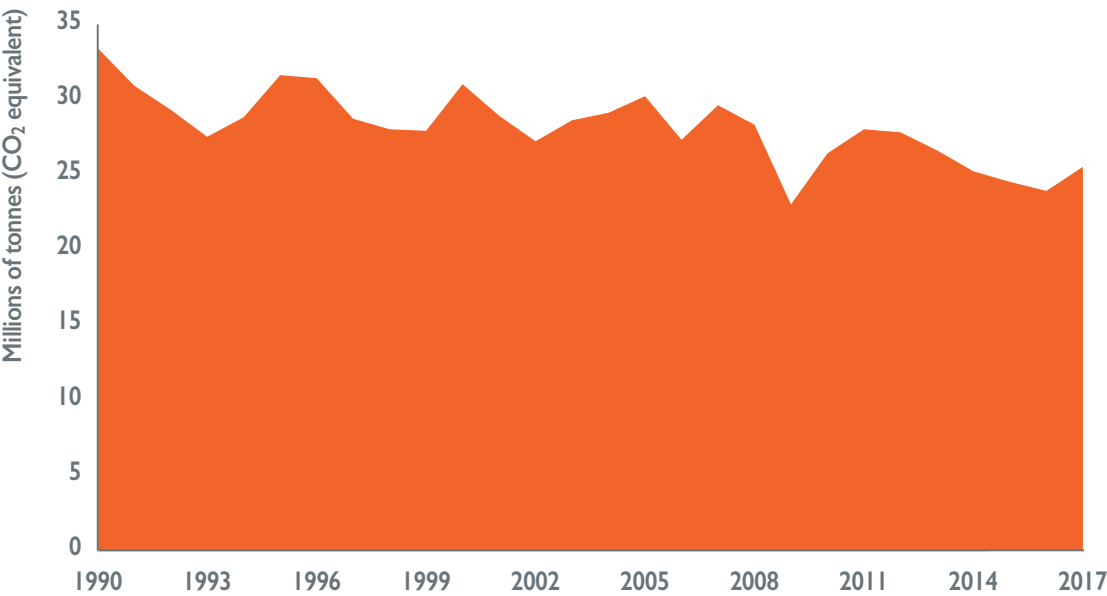
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Ammonia: Total greenhouse gas (GHG) emissions* fall 23 % since 1990

Ammonia production: Total GHG emissions*, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

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- The long-term analysis shows a strong decline in GHG emissions for the period 1990–2017. The chemical industry continues to devote much effort to reducing GHG emissions from ammonia production.
- According to the European Environmental Agency (EEA), EU production of ammonia by the EU chemical industry emitted a total of 25.5 million tonnes of CO₂ equivalent in 2017, down from 33.4 million tonnes in 1990.
- Total GHG emissions from ammonia production went down by an average of 1% per annum between 1990 and 2017, reducing 1990 emission values by about one fifth (23.5%).
- In relative terms, more than one third (38.6%) of total GHG emissions were attributable to ammonia in 2017 (25.5 vs 66.2, million tonnes); this is far above the 15.7% reported in 1990 (33.4 vs 212.7 million tonnes).

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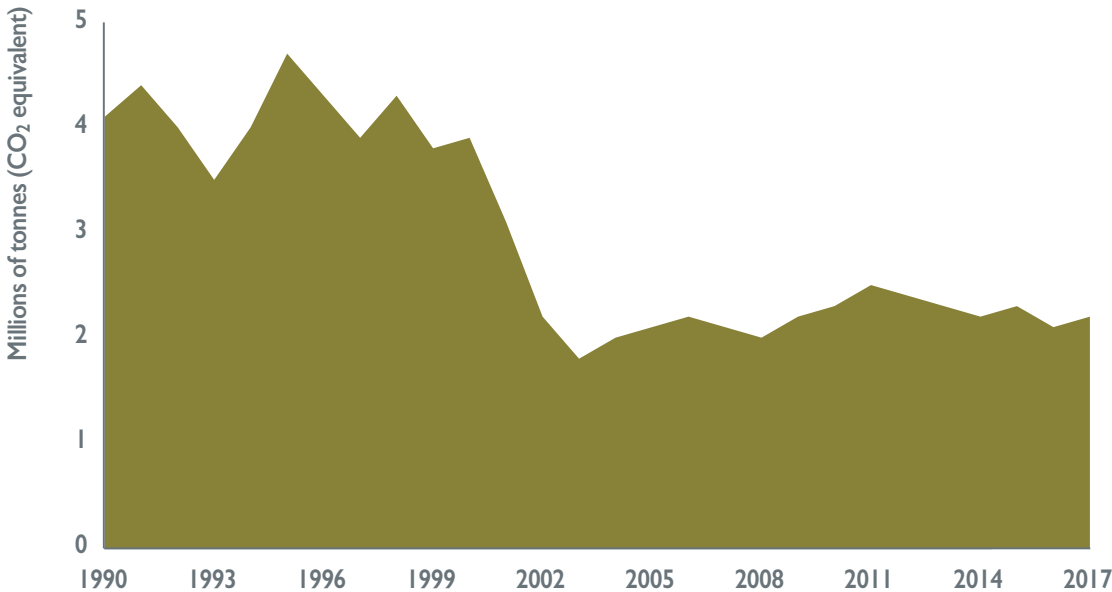
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Caprolactam, Glyoxal and Glyoxylic acid: Total greenhouse gas (GHG) emissions* fall 47% since 1990

Caprolactam, Glyoxal and Glyoxylic acid production: Total GHG emissions*, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU28

- According to the European Environmental Agency (EEA), the EU production of CGGA, (Caprolactam, Glyoxal and Glyoxylic Acid) by the EU chemical industry emitted a total of 2.2 million tonnes of CO₂ equivalent in 2017, down from a total of 4.1 million tonnes in 1990. Total GHG emissions from CGGA production went down by an average of 2.3% per annum between 1990 and 2017. Nearly half of the original emission values in 1990 have been reduced.
- Long-term data shows a significant reduction of GHG emissions between 1990 and 2003. Total GHG emissions from CGGA production went down by an average of 6% per annum between 1990 and 2003. Since 2004, GHG emissions have been relatively flat.
- In relative terms, GHG emissions from producing CGGA accounted for 3-4% of total GHG emissions in the EU chemical industry in 2017 (2.2 vs 66.2 million tonnes).

Profile

Trade

Competitiveness

Contribution

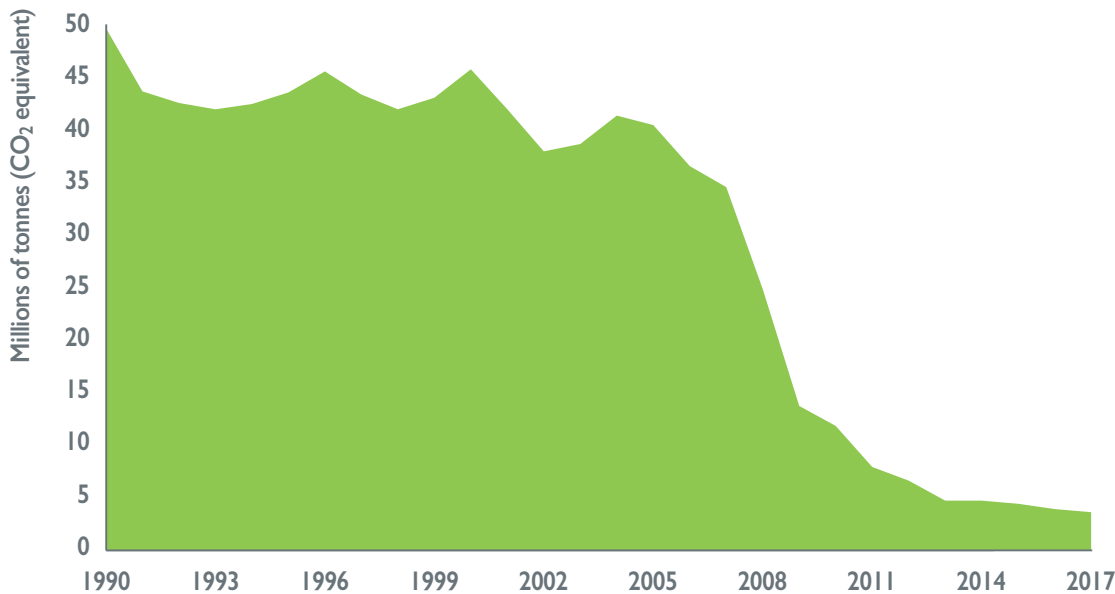
Energy

Spending

Environment

Nitric acid: Total greenhouse gas (GHG) emissions* fall 93% since 1990

Nitric acid production: Total GHG emissions*, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

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- According to the European Environmental Agency (EEA), EU production of Nitric Acid by the EU chemical industry emitted a total of 3.6 million tonnes of CO₂ equivalent in 2017, down from a total of 49.6 million tonnes in 1990.
- Total GHG emissions from Nitric Acid production went down by an average of 9.2% per annum between 1990 and 2017. More than 90% of the original emission values in 1990 have been reduced.
- Data shows a significant reduction of GHG emissions between 2006 and 2017. Total GHG emissions from Nitric Acid production went down by an average of 19% per annum between 2006 and 2017. Since 2013, GHG emissions have been relatively flat.
- In relative terms, 5.5% of total GHG emissions were attributable to Nitric Acid in 2017 (3.6 vs 66.2 million tonnes); this is far below the 23% reported in 1990 (49.6 vs 212.7 million tonnes).

Profile

Trade

Competitiveness

Contribution

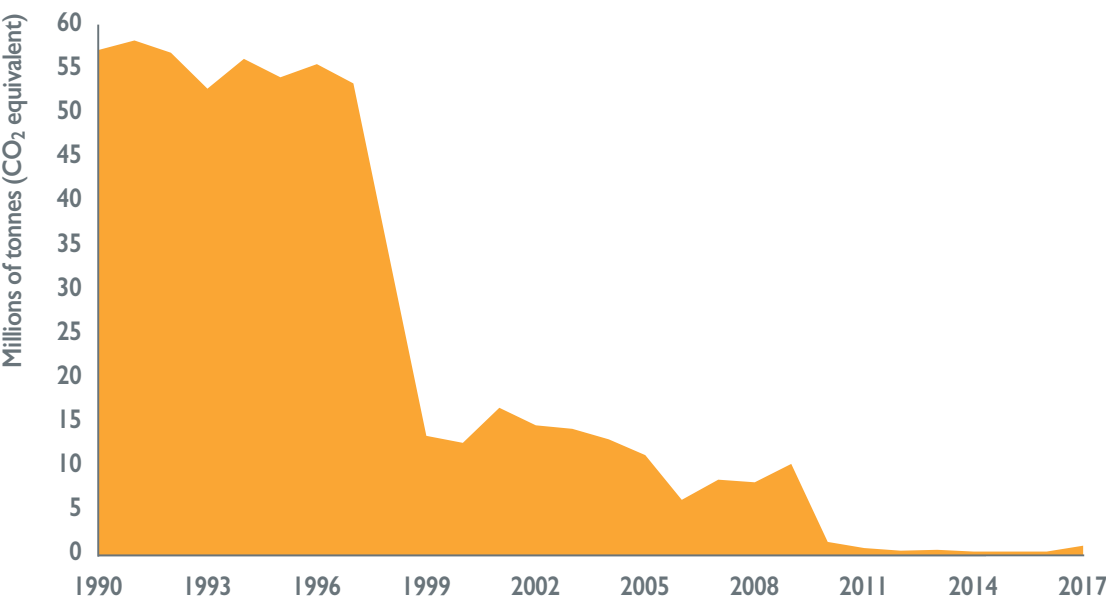
Energy

Spending

Environment

Adipic acid: Total greenhouse gas (GHG) emissions* fall nearly 100% since 1990

Adipic acid production: Total GHG emissions*, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

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- The long-term analysis shows a sharp decline in GHG emissions from 1990 to 2010. The chart shows an impressive reduction in total GHG emissions from Adipic Acid production between 1990 and 1999. This was followed by a gradual decline in GHG emissions between 1999 and 2009. Since 2010, there have been no significant changes.
- According to the European Environmental Agency (EEA), EU production of Adipic Acid by the EU chemical industry emitted a total of 1.07 million tonnes of CO₂ equivalent in 2017, down from a total of 57.6 million tonnes in 1990.
- Total GHG emissions from Adipic Acid production went down by an average of 13.7% per annum between 1990 and 2017. 98% of the original emission values in 1990 have been reduced.
- In relative terms, only 1.6% of total GHG emissions were attributable to Adipic Acid in 2017 (1.07 vs 66.2 million tonnes); this is far below the 27% reported in 1990 (57.6 vs 212.7 million tonnes).

Profile

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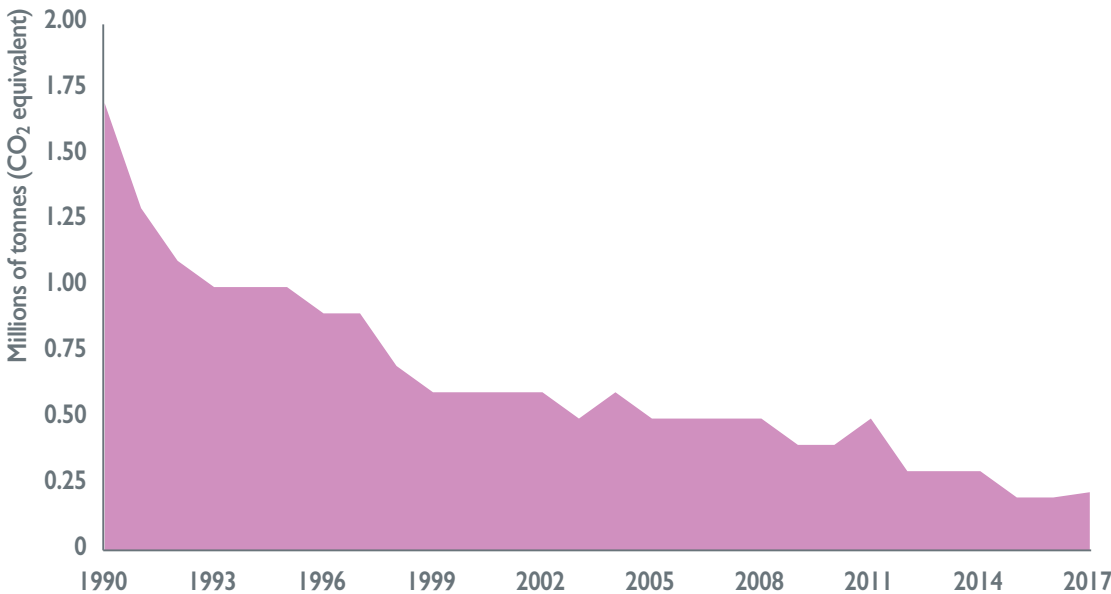
Energy

Spending

Environment

Carbide: Total greenhouse gas (GHG) emissions* fall 87% since 1990

Carbide production: Total GHG emissions*, million of tonnes (CO₂ equivalent)



Source: European Environment Agency (EEA)
* Energy (Fuel and Power CO₂) included

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- According to the European Environmental Agency (EEA), EU production of Carbide by the EU chemical industry emitted a total of 0.22 million tonnes of CO₂ equivalent in 2017, down from a total of 1.7 million tonnes in 1990.
- Total GHG emissions from Carbide production went down by an average of 7.4% between 1990 and 2016. 87% of the original emission values in 1990 have been reduced.
- In relative terms, less than 1% of total GHG emissions were attributable to Carbide in 2017 (0.22 vs 66.2 million tonnes).

Profile

Trade

Competitiveness

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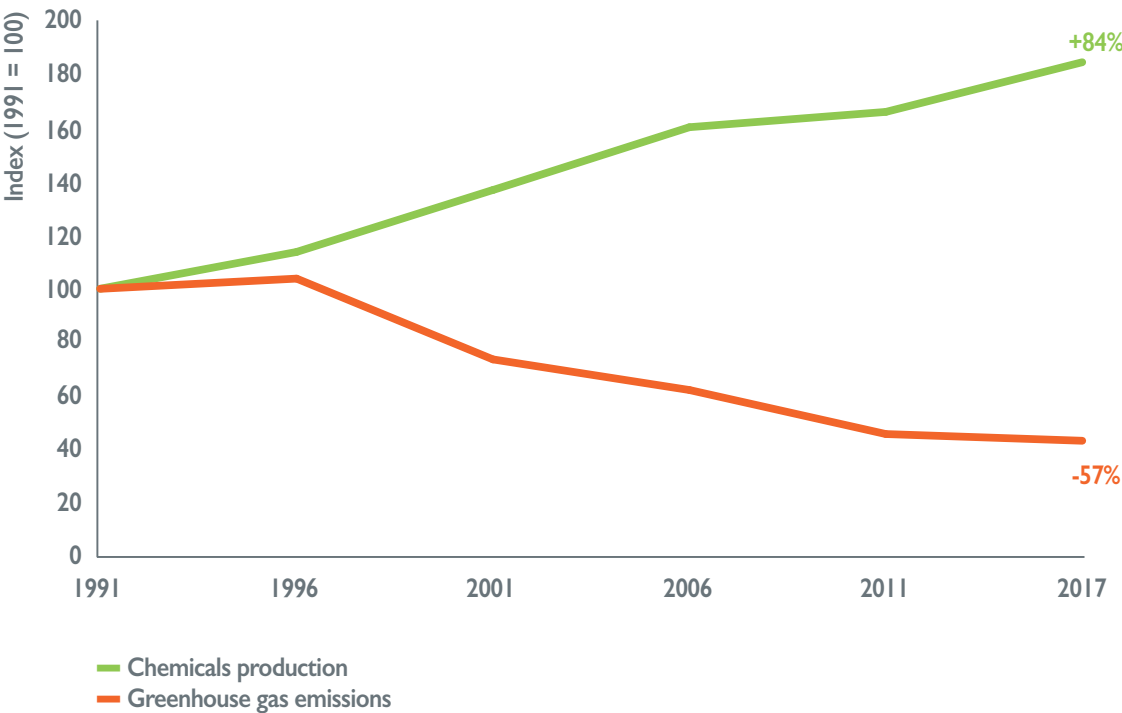
Energy

Spending

Environment

Chemicals production*, greenhouse gas (GHG) emissions**, decouple

GHG emissions* and production**



Source: European Environment Agency (EEA) and Cefic analysis 2019

* Including pharmaceuticals

** Energy (Fuel and Power CO₂) included

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- The 57% decrease in GHG emissions between 1991 and 2017 is even more remarkable given that, at the same time, production in the EU chemical industry, including pharmaceuticals, expanded by 84%.
- This was achieved thanks to the chemical industry’s conscious effort to develop cleaner technologies, and above all to increase energy efficiency. Besides increasing energy efficiency of its own processes, innovations in the chemical industry also help to increase the energy efficiency of downstream users and their products.
- Our products make a significant contribution to society’s capacity to reduce GHG emissions. A study from the International Council of Chemical Associations (ICCA) entitled “Innovations for Greenhouse Gas Reductions, 2009” found that the products of the chemical industry, over their lifecycle, save between 2.1 to 2.6 times the GHG emissions that are required to produce them. It also concluded that this ratio could increase to more than 4.1 by 2030.

Profile

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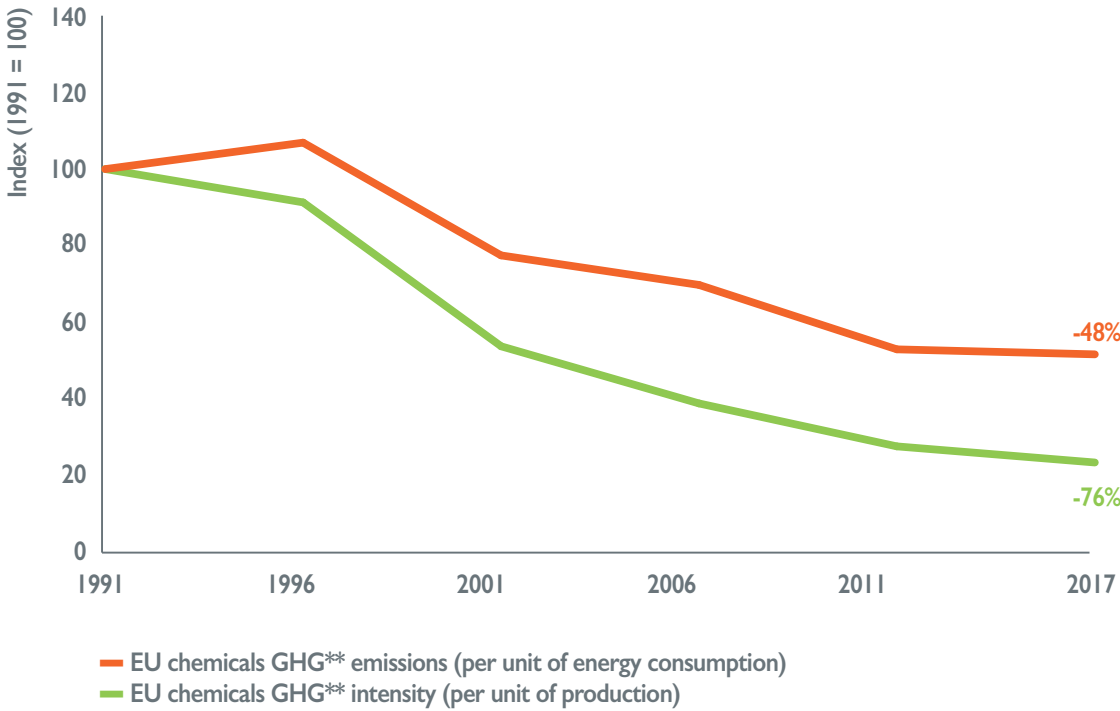
Energy

Spending

Environment

Greenhouse gas (GHG) intensity plummets 76% since 1991

GHG emissions* per unit of energy consumption and per unit of production**



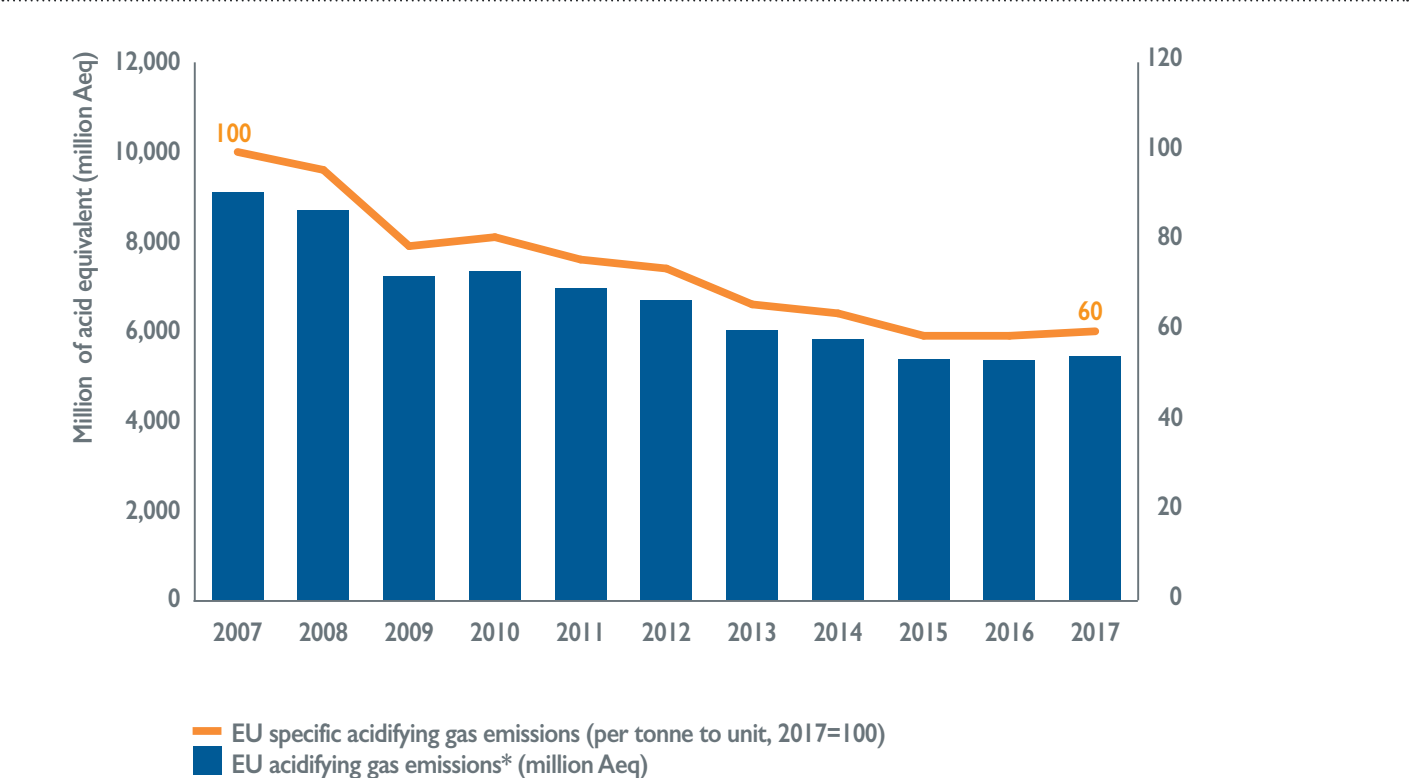
Source: European Environment Agency (EEA) and Cefic analysis
* Energy (Fuel and Power CO₂) included
** Including pharmaceuticals

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- Over the last two decades, the chemical industry, including pharmaceuticals, has made an enormous effort to minimise the environmental impact of its production.
- GHG emissions per unit of energy consumption fell by 48% between 1991 and 2017. GHG intensity – GHG emissions per unit of production – fell by 76% from 1990 to 2017.

Acidifying emission intensity falls by 40% since 2007

Acidifying* emissions in the EU chemical industry

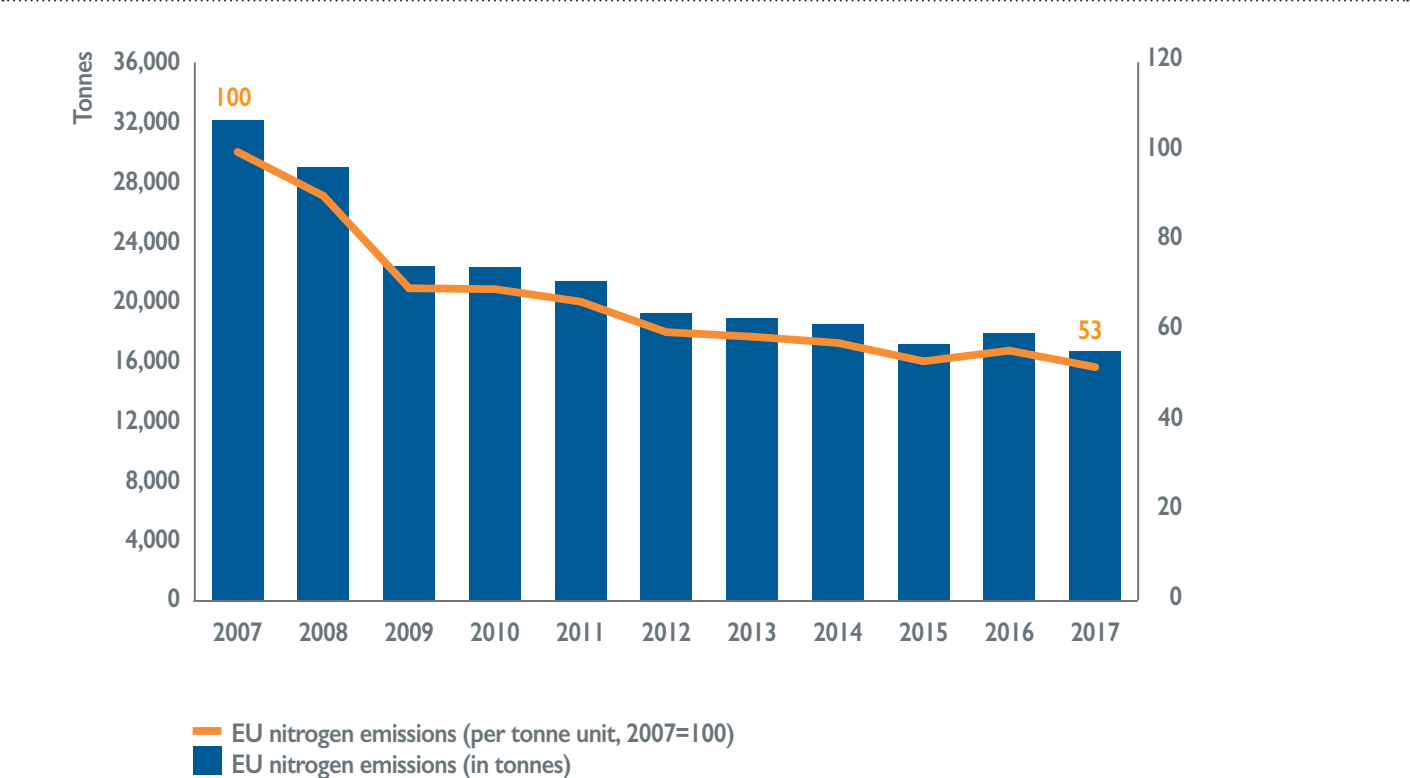


Source: EPER, E-PRTR, Chemdata international and Cefic analysis, 2019
* Ammonia (NH3) + Sulphur oxides (SOx/SO2) + Nitrogen oxides (NOx/NO2)
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- Between 2007 and 2017, the chemical industry achieved a 40 per cent reduction in its acidifying emissions intensity (acidifying gas emissions per tonne unit).
- Some emissions, such as sulphur oxides (SOx), nitrogen oxides (NOx) and ammonia (NH3), together with their reaction products, lead after their deposition to changes in the chemical composition of the soil and surface water.
- This process interferes with ecosystems, leading to what is termed 'acidification'. In the chemical industry, potentially acidifying gases originate mainly from combustion and the production of sulphuric acid, ammonia and nitric acid.

Nitrogen emission intensity falls by 48% since 2007

Nitrogen emissions in the EU chemical industry



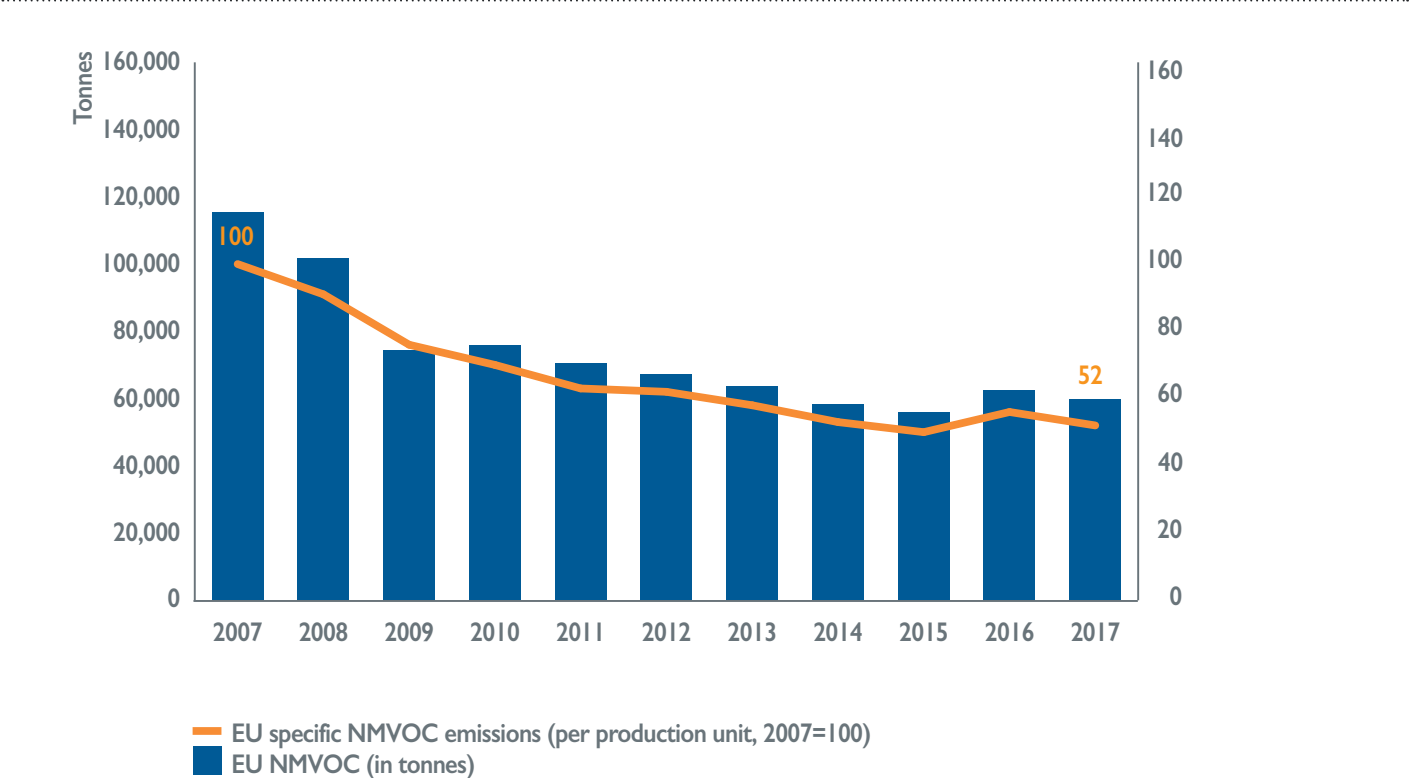
Source: EPER, E-PRTR, Chemdata international and Cefic analysis 2019

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- The chemical sector saw a fall of 48% in nitrogen emissions to water (per production unit) between 2007 and 2017.
- Nitrogen occurs naturally and is an essential nutrient for healthy ecosystems. Too high levels can lead to eutrophication of lakes, streams, rivers, estuaries and oceans. As well as successfully reducing its releases of nitrogen to water through end-of-pipe controls, the industry is also working on stewardship approaches with its partners down the value chain.

Non-methane volatile organic compounds (NMVOC) emission intensity falls by 48% since 2007

Non-methane volatile organic compounds emissions to air



Source: EPER, E-PRTR, Chemdata international and Cefic analysis 2019

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- The chemical sector has seen a fall of 48% in NMVOC emissions intensity since 2007 (European Pollutant Release and Transfer Register (E-PRTR) data). This is the result of a range of measures including process optimisation and improved emissions control during storage and transport.
- NMVOCs are ozone precursors, and exposure to high levels of ozone can cause health issues. The majority of NMVOCs are emitted from natural sources and the rest from man-made sources, such as road transport, dry cleaning and solvents use.
- The largest source of man-made NMVOC emissions (approx. 50% ¹) is from solvent and product use. The chemical sector contributed to this reduction through a change from solvent-based to water-based paints, process optimisation to reduce emissions, and higher levels of solvent recycling.

¹ European Environment Agency: Emissions of the main air pollutants in Europe, 2019

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Cefic, the European Chemical Industry Council, founded in 1972, is the voice of large, medium and small chemical companies across Europe, which provide 1.2 million jobs and account for about 17% of world chemicals production.

Cefic members form one of the most active networks of the business community, complemented by partnerships with industry associations representing various sectors in the value chain. A full list of our members is available on the Cefic website: www.cefic.org/About-us

Cefic is an active member of the International Council of Chemical Associations (ICCA), which represents chemical manufacturers and producers all over the world and seeks to strengthen existing cooperation with global organisations such as UNEP and the OECD to improve chemicals management worldwide.



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