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Chemical Industry Profile
World exports and imports of chemicals by regional shares

EU chemical industry sales by sectoral breakdown

EU chemical industry sales: structure by destination

EU chemical industry by sales structure

Contribution of the chemical industry to the EU economy
Asian chemicals production dwarfs other regions

World chemicals sales in 2012 are valued at €3,127 billion. The European Union accounts for 17.8% of the total.

Source: Cefic Chemdata International (2013)
* Rest of Europe includes Switzerland, Norway, Turkey, Russia and Ukraine
** North American Free Trade Agreement
*** Asia excluding China and Japan

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• World chemicals turnover was valued at €3,127 billion in 2012. This marks a significant recovery of the chemical industry compared with the previous years. Global sales went up in 2012 by 12.8 per cent compared with 2011. This is considerably higher compared to the average growth of 7 per cent during the last decade (2001 - 2011).

• World chemicals sales in 2012 grew by €356 billion compared with 2011. The recovery in the world chemical industry in 2012 can be largely attributed to China, where chemicals sales went up by 27.1 per cent compared with 2011, accounting for 57 per cent of additional global chemicals sales.

• The European chemical industry holds a good position. When including both EU and non-EU countries, total sales for the region were €673 billion in 2011 – 21.5 per cent of world chemicals sales in value terms. However, as the worldwide competition is getting fiercer, the European Union has lost its top ranking in sales to China. The graph shows chemicals sales in Asia are more than double those of the European Union.
World chemicals output more than doubles as emerging markets sales surge

Source: Cefic Chemdata International (2013)
* North American Free Trade Agreement
** Rest of Europe includes Switzerland, Norway, Turkey, Russia and Ukraine
*** Asia excluding China and Japan

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• During the years from 2002 to 2012 the European Union gradually lost its top spot in world chemicals sales to China and the rest of Asia (excluding Japan).

• The EU contribution to world chemicals sales between 2002 and 2012 declined by 12.7 percentage points. The total value of sales in the European Union has actually been continuously growing, however, while overall world chemicals sales have grown faster. World chemicals sales increased by 2.3 times in value terms in 2012 compared with 2002.

• China reached 30.5 per cent of world chemicals sales market share in 2012 – the same share the EU chemical industry held in 2002.
China dominates chemicals world top 10

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
In 2012, the 30 largest chemical-producing countries had a combined turnover of €2,784 billion.

Twelve of the top 30 biggest producers are Asian, generating chemicals sales of €1,550 billion – this makes up nearly 55.7 per cent share of chemicals sales in the 30 top-producing markets and 49.6 per cent in the world.

Eleven of the top 30 major chemicals producing countries are European, generating chemicals sales of €582 billion. This figure accounts for 20.9 per cent share of chemicals sales in the top 30 chemicals producing countries and 18.6 per cent in the world.
EU chemicals sales almost double in 20 years, while its world market share halves

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
Developments during the last 20 years from 1992 to 2012 indicate that the European Union was in a much stronger position than today. In 1992, the EU posted sales of €290 billion, which made up 35.2 per cent of world chemicals sales in value terms. From then on, chemicals sales have been growing continuously, reaching an overall increase of 92 per cent in value terms.

World chemicals sales have increased at a much faster pace than in Europe. Global sales posted a four-fold increase as from €826 billion in 1992 to €3,127 billion in 2012. As a consequence, the EU chemicals market share has halved in 20 years, down from 35.2 per cent in 1992 to 17.8 per cent in 2012.
Seven member states make up 85% of EU chemicals sales

Sales 2012: €558 billion

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
Germany is the largest chemicals producer in Europe, followed by France, Netherlands and Italy. Altogether these four countries generated 62.6 per cent of EU chemicals sales in 2012, valued at €349 billion. The share rises to nearly 87.7 per cent, or €489 billion, when including the United Kingdom, Spain, Belgium and Poland.

The other 19 EU countries generated 12.3 per cent of EU chemicals sales in 2012, valued at €51.7 billion, nearly half of which was attributed to four EU countries – Austria, Sweden, Czech Republic and Finland.
The European Union was the world’s top exporter and importer of chemicals in 2012

Sources: Eurostat and Cefic Chemdata International (2013)
* North American Free Trade Agreement
** Rest of Europe includes Switzerland, Norway, Turkey, Russia and Ukraine

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• The most important trading regions in 2012 were the European Union, Asia – including China and Japan – and the North American Free Trade Agreement countries.

• The European Union was the leading exporter and importer of chemicals in the world, accounting for nearly 38.1 per cent of global trade, defined as the total value of exports plus imports. Mainly for reasons of comparison with other regions, figures for intra-EU trade are included.
Petrochemicals and speciality chemicals account for half of EU sales

Sales 2012

Source: Cefic Chemdata International (2013)
Output from the EU chemical industry covers three wide ranges of products: base chemicals, specialty chemicals and consumer chemicals.

Base chemicals cover petrochemicals and their derivatives, and basic inorganics. They are produced in large volumes and sold within the chemical industry itself or to other industries. In 2012, base chemicals represented 63.1 per cent of total EU chemicals sales.

Specialty chemicals cover the auxiliaries for industry, paints and inks, crop protection, dyes and pigments. Specialty chemicals are produced in small volumes but they nevertheless made up 25.4 per cent of total EU chemicals sales in 2012.

Consumer chemicals are sold to final consumers, such as soaps and detergents as well as perfumes and cosmetics. Altogether they represented 11.5 per cent of total EU chemicals sales in 2012.

All in all, petrochemicals and specialty chemicals accounted for 53.1 per cent of EU chemicals sales in 2012.
EU chemicals sales driven by internal market

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Removing both trade and non-trade barriers inside the European Union helped boost growth and competitiveness in the EU chemical industry between 2002 and 2012.

• The internal market, numbering more than 500 million consumers, is a determining factor for competitiveness. The accession of new EU member states in 2004 and 2007 gave the internal market an extra boost for intra-EU trade.

• Total EU chemicals sales were worth €558 billion in 2012. Intra-EU sales (marked as “Intra-EU exports” on the graph) climbed up from €157 in 2002 to €270 in 2012 – a 72 per cent increase during the last 10 years.
Intra-EU sales (excluding home country sales) accounted for nearly half of total chemicals sales in 2012.

Source: Cefic Chemdata International (2013)
* excluding home country sales
• EU chemicals sales in 2012 were 34.5 per cent higher compared with 2002. During the period from 2002 to 2012, EU chemicals sales increased on average by 3 per cent per annum.

• By 2012, intra-EU sales – excluding domestic receipts – accounted for 48 per cent of total EU chemicals sales.

• While intra-EU sales are rising, the importance of domestic sales is decreasing. In 2012 the latter accounted for only 26 per cent of total EU chemical sales in 2012.

• Twenty-six per cent of chemicals are exported out of the EU market. The three primary markets for EU chemicals exports are the EU neighbour countries, the NAFTA trade bloc and Asia.
The EU chemical industry supplies virtually all sectors of the economy

Percentage of output consumed by customer sector

- Other business activities 7.4%
- Furniture 2.1%
- Electrical machinery and apparatus 2.2%
- Publishing and printing 2.3%
- Wood 2.6%
- Food and beverages 2.6%
- Machinery and equipment 2.8%
- Fabricated metal products 3.1%
- Other non-metallic mineral products 3.1%
- Textiles 3.2%
- Basic metals 4.3%
- Automotive 4.3%
- Pulp and paper 4.6%
- Service 4.9%
- Wholesales and retail trade 5.1%
- Other manufacturing 5.4%
- Agriculture 7.0%
- Construction 7.9%
- Health and social work 11.2%
- Rubber and plastics 13.9%

Sources: European Commission, Eurostata data (Input-Output 2000) and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
The chart illustrates how the chemical industry underpins virtually all sectors of the economy and its strategies impact directly on downstream chemicals users. The big industrial users of chemicals are rubber and plastics, construction, pulp and paper, and the automotive industry. Nearly two-thirds of EU chemicals are supplied to the EU industrial sector, including construction. More than one-third of chemicals go to other branches of the EU economy such as agriculture, services, and other business activities.

The chemical industry’s contribution to EU gross domestic product (GDP) amounts to 1.1 per cent. This may seem small at first, but should be reassessed taking into consideration the shrinking contribution by manufacturing in advanced economies coupled with a rise in service sector output.
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Extra-EU chemicals trade flows – detailed analysis by sector
Record trade surplus for chemicals in 2012

Source: Eurostat (Comext)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• As a historically important player in the global chemicals market, the EU chemical industry continues to benefit from trade opportunities.

• The EU chemical industry registered more than simply a solid recovery in 2012 after the 2008 economic crisis. It posted a record extra-EU net trade surplus of €49.1 billion.
Growth in extra-EU chemicals trade* with emerging markets

Sources: Eurostat and Cefic Chemdata International (2013)

* Trade = extra-EU exports + extra-EU imports
** North American Free Trade Agreement
*** Rest of Europe includes Switzerland, Norway, Turkey, Russia and Ukraine
**** Asia excluding Japan and China

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
Extra-EU chemicals trade flow, calculated as total exports plus imports, was mainly directed to the rest of Europe, with 26.2 per cent of total trade flow going to the region. It was followed by the North American Free Trade Agreement (NAFTA) market with 22.6 per cent.

Asia, excluding Japan and China, accounted for 22.1 per cent of EU trade flows. Taken together, the Rest of Europe – or non-EU-Europe – NAFTA and Asia markets contributed in 2012 to nearly 71 per cent of total chemicals trade flows.

Compared with 2007, the contribution to total trade activity from the rest of Europe, NAFTA and Japan declined, while the total contribution by China and the rest of Asia increased.
EU chemicals sector posted a record trade surplus in 2012

EU trade surplus of €49.1 billion

Source: Cefic Chemdata International (2013)
* North American Free Trade Agreement
** Rest of Europe includes Switzerland, Norway, Turkey, Russia and Ukraine
*** Asia excluding China and Japan

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• The European Union has a trade surplus with each of the main trading regions – NAFTA, Asia, China, Japan, Latin America, Africa, and the rest of Europe and Africa.

• The rest of Europe played a major role in 2012 EU chemicals trade activity. The EU chemicals sector had a €15.1 billion net trade surplus with other European countries. The two major geographic blocs trading with the European Union in 2012 were the rest of Europe and North America.

• The Trade Competitiveness Indicator (TCI) – an indicator that compares the trade balance to total trade activity of a region – reveals deteriorating competitiveness of the overall EU chemical industry. This means that total chemicals imports are growing faster than total chemicals exports.
Specialty and consumer chemicals: 78.5 per cent of extra-EU chemicals trade surplus

Sources: Eurostat and Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• The EU chemicals trade surplus in 2012 reached nearly €49.1 billion, 47.8 per cent of which came from specialty chemicals.

• The consumer chemicals subsector had the second strongest external trade performance, accounting for 30.7 per cent, followed by polymers at 19.1 per cent and petrochemicals at 6.3 per cent. Basic inorganics experienced a trade deficit of €1.8 billion – the only sector with a trade deficit since more than 10 years ago.

• Sectoral analysis shows that specialty chemicals and consumer chemicals performed well in 2012. The trade surplus in these sectors increased by 21.7 per cent and 8.1 per cent respectively in 2012 compared with 2011.
EU trade position is deteriorating with key countries in Asia for base chemicals


- Green: EU has a trade surplus and its healthy competitive position improved
- Orange: EU has a trade surplus but its positive competitive position weakened
- Blue: EU has a trade deficit but its weak competitive position improved
- Red: EU has a trade deficit and its competitive position weakened

Sources: Eurostat and Cefic Chemdata International (2013)
* Asia excluding China and Japan
• A look at the EU trade balance with a number of key countries and regions shows that the EU’s position is deteriorating, especially with certain key performers among emerging Asian countries for sectors such as base chemicals.

• Continued trade development with the Middle East indicates that this region has increasingly used its feedstock availability, namely petroleum, to develop an integrated chemicals value chain and to strengthen its position for trading a wider range of basic chemicals.

• Russia has up until now only been successful in using its competitive advantage in raw materials for base chemicals.
Petrochemicals trade shows signs of serious decline (2008 - 2012 compared with 2003 - 2007)

Trade Competitiveness Indicator (TCI, 2008 - 2012) = (exp - imp) / (exp + imp)

Sources: Eurostat and Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
The trade position of certain important sub-sectors shows signs of serious deterioration. In particular, raw materials and energy-intensive parts of the chemical industry, such as petrochemicals and fertilizers, find their global competitive position at risk.
Growth & Competitiveness
Extra-EU trade maintains high growth rate

Sources: Eurostat and Cefic Chemdata International

* Consumption = total sales - exports + imports
• Chemicals sales and consumption in the European Union registered little growth during the period from 2007 to 2012, while chemicals consumption increased by 0.7 per cent and sales by 1.3 per cent.

• In contrast to sales and consumption, trade activity grew by significantly higher rates during the five-year period from 2007 to 2012.

• Extra-EU exports experienced a growth rate of 6.0 per cent during that five-year period, exceeding the 4.8 per cent rate of growth in imports.
Production growth in the EU chemical industry slightly higher than manufacturing average

Sources: Eurostat and Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
During the 11-year period from 2001 to 2012, the chemical industry in the European Union had an average production growth rate of 0.6 per cent, a rate slightly higher than the 0.4 per cent for all of the manufacturing industry. The low five-year growth rate was mainly caused by the dramatic declines in chemicals production levels during the 2009 economic downturn as compared with pre-crisis levels. The EU chemical industry was profoundly affected by the spill-over effects of the economic crisis.

Both the chemicals sector and manufacturing industry as a whole have been following the recovery trend that occurred in 2010. The EU chemicals sector enjoyed a strong year 2010, posting a 10.6 per cent growth rate compared with 2009. The EU manufacturing sector also rebounded, recovering by 7.4 per cent in 2010 year on year. Even with strong growth rates, production in 2010 remained far below the pre-crisis level and will need an additional several years to surpass it.

EU chemical industry production in 2011 grew modestly by 1.9 per cent in volume terms compared to the year before. Growth in the first quarter of 2011 was encouraging, expanding by a robust 6.8 per cent compared with the first quarter of 2010. Production activity during the rest of the year, however, performed less well as it was largely affected by the downbeat economic and business climate during the last three quarters of the year.

EU chemical industry production in 2012 declined by 2.3 per cent in volume terms compared with 2011. Prospects for 2013 are showing a slight improvement but not enough to guarantee significant positive growth compared with 2012.
### Production of Petrochemicals Registers Fastest Decline in 2013*

![Graph showing EU chemicals production growth by sector]

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<td>-6.2</td>
<td>10.0</td>
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<td>-17.9</td>
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<td>-1.8</td>
<td>-1.5</td>
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<td>0.1</td>
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<td>-3.9</td>
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<tr>
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<td>-2.4</td>
<td>-2.3</td>
<td>-10.5</td>
<td>-2.3</td>
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*Based on data available from January to October 2013

Source: Cefic Chemdata International (2013)

**Unless specified, chemical industry excludes pharmaceuticals**

**Unless specified, EU refers to EU 27**
• Growth in EU chemicals production in 2010 was spectacular, reaching 10.6 per cent year on year. The overall economic recovery in Europe was fragile, however, with anaemic production growth in 2011 – 1.9 per cent in volume terms, followed by a 2.3 per cent year-on-year contraction in 2012.

• Production of petrochemicals remained under pressure as it registered the fastest decline in 2012 and looks to face an even deeper contraction in 2013. Latest data show that EU chemicals production decreased by 0.6 per cent during the first nine months of 2013 compared with the same period in 2012. Polymers and consumer chemicals were the only two sectors with positive growth during the first nine months of 2013 compared with the same period in 2012.

• Looking ahead, the European chemical industry continues to face relentless global competition. Access to raw materials and energy at globally competitive prices remains a prerequisite for a successful recovery of the EU chemicals sector.
Emerging economies outpace industrial countries in chemicals production

Sources: Cefic Chemdata International (2013) and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• During the 10-year period from 2002 to 2012, the EU chemical industry had an average growth rate of 0.4 per cent, which is slightly lower than the 0.5 per cent average growth rate for the US chemical industry during the same period. Chemicals production in Japan has been declining since 2007. Data show that Japanese production went down by 1.7 per cent on average during the past decade (2002 - 2012).

• Production in China increased considerably from 2002 to 2012, attaining nearly 14 per cent annual growth during that period. China is far and away above the performance of the other emerging economies such as India (5.0 per cent), Korea (4.0 per cent), Russia (3.6 per cent) and Brazil (2.0 per cent).

• Emerging economies are outpacing industrial countries in chemicals production and were pushing up the average growth rate of world chemicals production during the past years from 2007 - 2012. Apart from Japan, the European Union and the United States are still lagging behind the main regions.
Employment in the chemical industry

Labour cost per employee

Labour cost per employee: chemicals vs total manufacturing

Labour productivity

EU labour productivity: chemicals vs total manufacturing
Employment levelling off in the EU chemical industry

Source: Eurostat

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Chemical companies in the European Union employed in 2012 a total staff of about 1.19 million. In addition to that, the chemical industry generated an even greater number of indirect jobs – up to three times higher than through direct employment.

• Direct employment in the EU chemical industry decreased by an average annual rate of 1.9 per cent from 1996 to 2012. The number of employees in 2012 was nearly 25 per cent less compared to 1996. However, the level of direct employment in 2012 was slightly higher than in 2011, marking a break from this trend.

• Quarterly data shows that direct employment has been stabilised since the first quarter of 2010, and the level of employment in the second quarter of 2013 is nearly 10 per cent below the pre-crisis (Q3-2007) peak level.

• Employment is defined by Eurostat as the total number of people who work in the observation unit, including working proprietors, partners working regularly in the unit and unpaid family workers, as well as people who work outside the unit but belong to it and are paid by it, such as sales representatives, delivery personnel, and repair and maintenance teams. It excludes manpower supplied to the unit by other enterprises, people carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises, and those on compulsory military service (Source: European Commission, SBS database).
Labour cost per employee increased by 2.8 per cent per annum from 2001 to 2012

Sources: Eurostat and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• While the labour cost per employee in the EU chemical industry increased by an average of 2.8 per cent per annum from 2001 to 2012, employment fell by 1.8 per cent on average during the same period.

• Between 2001 and 2012, labour costs in the EU chemical industry rose by 11 per cent, while total employment fell by 17.8 per cent during the same period.
Labour cost per employee in the EU chemical industry increased by more than a third in 12 years

Sources: Eurostat and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• The labour force employed in the chemical industry is more qualified, trained and better paid than the average industrial worker.

• Labour cost per employee in the EU chemical industry increased by an average of 2.8 per cent per annum from 2001 to 2012. The average growth rate in labour cost per employee in the EU manufacturing sector was the same but it followed a slightly different pattern. Labour cost per employee in the EU chemical industry was 35 per cent more expensive in 2012 compared with twelve years ago.

• This cost factor – salaries – is a significant tool that attracts new and young talent to work for the EU chemical industry. A favourable public perception of the sector can make the chemical industry more enticing to young people who will one day enter the workforce.

• Labour 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 employees’ 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 employers’ social security costs (Source: European Commission, SBS database).
Labour productivity increased on average by nearly 2.4 per cent per annum from 2001 to 2012

Sources: Eurostat and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Highly educated and trained employees, coupled with continuously high investments in the workforce, have turned the EU chemicals sector into a leading industry with high labour productivity.

• As a consequence, between 2001 and 2012, labour productivity in the EU chemical industry rose at an average annual rate of 2.4 per cent.
Labour productivity in the EU chemical industry higher than the manufacturing average

Sources: Eurostat and Cefic analysis

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Due to intensifying global competition, the EU chemical industry has taken vigorous restructuring and cost-saving steps in order to improve its competitiveness over the last decade.

• As a consequence, labour productivity in the chemical industry grew at an average annual rate of 2.4 per cent between 2001 to 2012, faster than the 2.0 per cent labour productivity rate in the total manufacturing sector for the same ten-year period.
Energy

Fuel and power consumption in the EU chemical industry

A strong reduction of gas and oil consumption during the past 22 years

Energy intensity in the EU chemical industry

Energy intensity: chemicals vs total industry
Fuel and power consumption in the EU chemical industry has fallen by 17 per cent since 1990.

Sources: Eurostat and Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
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 2011, the fuel and power consumption of the EU chemical industry, including pharmaceuticals, amounted to 55.6 million tonnes of oil equivalent (TOE).

The EU chemical industry, including pharmaceuticals, significantly reduced its fuel and power consumption during the period from 1990 to 2011. The amount of energy consumed in 2011 was 17 per cent less than in 1990, according to the European Commission data.

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 also uses a wide variety of natural and processed feedstock, including metals, minerals and agricultural raw materials such as sugar, starch and fats.
Fuel and power consumption in the EU chemical industry.

**A strong reduction of gas and oil consumption during the past 22 years**

Energy intensity in the EU chemical industry.

Energy intensity: chemicals vs total industry.

EU chemical industry reduced gas consumption by 30 per cent from 1990 to 2011.

*Sources: Eurostat and Cefic Chemdata International (2013)*

Unless specified, chemical industry excludes pharmaceuticals.

Unless specified, EU refers to EU 27.
• In 2011, the EU chemical industry (including pharmaceuticals), used a total of 18.9 million tonnes of oil equivalent (TOE) of gas. This represents a sharp reduction in gas consumption of 30 per cent compared to 1990.

• At the same time, oil and electricity consumption decreased by 17 and 11 per cent respectively compared with 1990.
Fuel and power consumption in the EU chemical industry

A strong reduction of gas and oil consumption during the past 22 years

Energy intensity in the EU chemical industry

Energy intensity: chemicals vs total industry

Chemicals energy intensity halved in 20 years

Sources: Cefic Chemdata International (2013) and Eurostat

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

Unless specified, EU refers to EU 27
• 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 2011, energy intensity – energy consumption per unit of production – in the chemical industry, including pharmaceuticals, was 48.7 per cent lower than in 1990.

• Energy efficiency is subject to decreasing returns as the higher the level of energy efficiency, the more difficult it becomes to make further improvements. During the 22 years from 1990 to 2011, however, the chemical industry succeeded in continuously increasing its output while at the same time keeping its energy input constant. As a result, the EU chemical industry has excelled in significantly lowering its energy intensity - on average by 3.1 per cent per year.
Fuel and power consumption in the EU chemical industry

A strong reduction of gas and oil consumption during the past 22 years

Energy intensity in the EU chemical industry

Industry energy intensity reduction

Sources: Cefic Chemdata International (2013), Eurostat and European Environment Agency (EAA)
* including pharmaceuticals

Unless specified, EU refers to EU 27
Energy intensity in the EU chemical industry decreased by an average of 3.1 per cent per annum from 1990 to 2011.

As for the whole of the EU manufacturing sector, energy intensity went down by 2.4 per cent per year during the same period.

Energy intensity in the EU chemical industry was 48.7 per cent lower in 2011 compared with 22 years ago.
Flat capital spending

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Investments in innovation, including research and development (R&D) are key elements in securing the future of the chemical industry. They not only promote the adaptation to and the development of new technologies and innovation, but are necessary prerequisites for the continuous adjustment of corporate structures to the needs of the market. It is worth noting that currently available figures on R&D investments give only part of the picture, as they are only the starting point of the path to successful innovation. Innovation spending in companies is increasingly included under business development.

• In absolute figures, investment in the European Union had been increasing from 2004 to 2008, registering a positive trend at a consistent pace. Investment during 2009, however, experienced a steep decline compared to 2008, down by 22.5 per cent.

• Investment remained relatively stable in 2010. The chemicals sector registered a significant increase in investment in 2011, moving up from €16.7 billion in 2010 to €18.5 billion in 2011 and further up in 2012 to reach €19 billion.

• In relative terms, however, the ratio of capital spending to sales, or capital intensity, of the European Union chemical industry has been declining since 1999 and reached the value of 3.4 per cent in 2012, down from 5.7 per cent registered in 1996.
China dominates world chemicals investment

<table>
<thead>
<tr>
<th>Region</th>
<th>2006 Capital Spending (€ billion)</th>
<th>2012 Capital Spending (€ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>27.4</td>
<td>133.8</td>
</tr>
<tr>
<td>EU</td>
<td>13.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Russia</td>
<td>2.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Japan</td>
<td>3.6</td>
<td>9.8</td>
</tr>
<tr>
<td>South Korea</td>
<td>3.4</td>
<td>5.4</td>
</tr>
<tr>
<td>India</td>
<td>2.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.3</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Chemical industry capital spending in the European Union reached the level of €19 billion in 2012. It represents 9.4 per cent of the €203.3 billion spent by the eight largest chemicals-investing countries.

• China dominated world chemicals investment in 2006, spending €27.4 billion on its chemicals business. The situation in 2012 was even more spectacular when Chinese chemical industry spending reached €133.8 billion, representing close to two-thirds of the total amount invested by the eight largest countries in terms of chemical industry capital spending.

• China is the clear leader in capital spending. However, the United States and the European Union are in a better position compared with Japan, South Korea and also the other BRIC countries Brazil, Russia and India.
Low EU capital spending intensity

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
Capital spending intensity in China and other emerging economies is far higher than in the rest of the world. Capital intensity for China increased considerably from 11.5 per cent in 2006 to 14.1 per cent in 2012. All major chemicals producing countries increased their chemicals spending intensity from 2006 to 2012 apart from two regions: South Korea and the European Union. The European Union continues to lag behind leading chemicals-producing regions and has been registering a constant decline during the past ten years.
R&D spending

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU 27
• In absolute figures, spending on research and development in the chemical industry was valued at an average annual level of €8.3 billion in the European Union during the period from 1996 to 2012.

• In relative terms, the ratio of R&D spending to sales, or R&D intensity, of the European chemical industry has been declining, down from 2.2 per cent registered in 1996 to 1.6 per cent in 2012.
EU outspends industrial and emerging countries in chemicals R&D

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
In absolute figures, R&D spending in the European Union chemical industry was valued at an average annual level of €8.3 billion during the period from 2006 to 2012. In the United States, the average value of R&D spending per year was €6.6 billion during the same 7-year period and €6 billion for the Japanese chemical industry.
Chemicals R&D intensity highest in Japan

Source: Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
• Wide variations in research and development (R&D) efforts are observed across the world chemical industry. Turning R&D into innovation is becoming increasingly important for a region’s competitiveness.

• Analysing the ratio of R&D spending to sales of the chemical industry, the R&D intensity level in the European Union was far below that of Japan and slightly lower than in the United States during the 7-year time period from 2006 to 2012. Japan chemicals R&D intensity was more than double US and EU levels in 2012.

• The EU R&D intensity was 1.6 per cent on average during the years 2006 to 2012, while the same ratio equalled 4.1 per cent in Japan. China R&D intensity remains still far below US and EU levels.

• The high value-added products of the chemical industry continuously open up new fields of application, paving the way to progress and innovation in numerous other industries as well. Typical examples range from health, food, consumer goods, telecommunications, aerospace and car manufacturing, to electrical engineering and electronics.
Sustainable Development

- Total greenhouse gas emissions in the EU chemical industry
- Greenhouse gas emissions and production
- Greenhouse gas emissions per unit of energy consumption and per unit of production
Total greenhouse gas emissions from the EU chemical industry fell by 53 per cent between 1990 and 2011

Sources: European Environment Agency (EEA) and Cefic Chemdata International (2013)

Unless specified, chemical industry excludes pharmaceuticals
Unless specified, EU refers to EU 27
Long-term data shows the EU chemical industry, including pharmaceuticals, having a solid track record from 1990 to 2011 in reducing its greenhouse gas (GHG) emissions.

According to the European Environmental Agency (EEA), the European chemical industry, including pharmaceuticals, emitted a total of 153.9 million tonnes of CO$_2$ equivalent in 2011, down from a total of 327.3 million tonnes in 1990.

This 53 per cent decrease clearly demonstrates how much importance the chemical industry puts on sustainable development.
Greenhouse gas emissions decoupled from chemicals production

Sources: Cefic Chemdata International (2013) and European Environment Agency (EEA)
* including pharmaceuticals

Unless specified, EU refers to EU 27
• The two-fold decrease (53% from 1990 until 2011) in GHG emissions is even more remarkable given the fact that, at the same time, production in the EU chemical industry (including pharmaceuticals) increased by 61 per cent.

• This was achieved thanks to the chemical industry’s conscious effort to develop cleaner and safer technologies, waste recycling processes and new products to safeguard the environment, and above all to increase energy efficiency. As well as 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.
Greenhouse gas intensity fell by two-thirds since 1990

Sources: Cefic Chemdata International (2013), Eurostat and European Environment Agency (EEA)
* including pharmaceuticals

Unless specified, EU refers to EU 27
• Over the last two decades, the EU chemical industry has made an enormous effort to minimise the environmental impact of its production. Greenhouse gas (GHG) emissions per unit of energy consumption fell by 43 per cent between 1990 and 2011.

• GHG intensity – GHG emissions per unit of production – fell by more than two-thirds (71%) from 1990 to 2011.
Chemistry making a world of difference

Cefic is the Brussels-based organisation representing national chemical federations and chemical companies in Europe. Cefic represents, directly or indirectly, around 29,000 large, medium and small companies in Europe, which employ about 1.2 million people and account for around a fifth of world chemicals production.

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