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World chemicals sales: geographic breakdown

- World chemicals turnover was valued at €2353 billion in 2010. Data for 2010 confirms that solid recovery of the chemicals industry occurred during the year. Sales in value terms were up in 2010 by 26.9 per cent compared with 2009, a year when the economic and financial crisis was in full swing. Emerging economies contributed largely to the worldwide recovery of the sector in 2010.

- The European chemicals industry, including the European Union and the Rest of Europe, is still in a strong position, posting sales of €578 billion in 2010, one-fourth of world chemicals sales in value terms. Worldwide competition is getting fiercer, however, witnessed by the European Union losing its top ranking in terms of sales to China for the second consecutive year. Chemicals sales in Asia are more than double that of the European Union. Taken together, Europe, Asia and North American Free Trade Area account for 92.7 per cent of world chemicals turnover.

Source: Cefic Chemdata International

* Rest of Europe = Switzerland, Norway and other Central & Eastern Europe

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27

World chemicals sales in 2010 are valued at €2353 billion. The EU accounts for 21% of the total.
Emerging economies outpace industrial countries in chemicals production

- Developments during the previous 10 years from 2000 to 2010 indicate that the European Union was the clear leader in terms of world chemicals sales, but the region has gradually lost ground to China and Asia (excluding Japan).
- The European Union contribution to world chemicals sales declined in 2010 by 8.3 percentage points compared with 2000. In fact, the total value of sales in the European Union has been growing continuously, but overall world chemicals sales are growing at an even faster clip. The level of world chemicals sales in value terms increased by 63.7 per cent in 2010 compared with 2000.

Source: Cefic Chemdata International

*Asia excluding China and Japan

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Chemicals Industry Profile

Chemicals sales by country: top 30

In 2010, the 30 largest chemical-producing countries had a combined turnover of €2103 billion.

Twelve of the top 30 major countries are Asian, generating chemicals sales of €1026 billion. This figure represents nearly 49 per cent of the top 30 and 43.6 per cent of the share of world chemicals sales.

Eleven of the top 30 major countries are European, generating chemicals sales of €506 billion. This figure represents 24 per cent of the top 30 and 21.6 per cent of the share of world chemicals sales.

Source: Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Eight countries account for 90 per cent of EU chemicals production

- Germany remains the largest chemicals producer in Europe, followed by France, Italy and the Netherlands. Together, these four countries generated in 2010 64 per cent of EU chemicals sales, valued at €315 billion. The share rises to 88.9 per cent, or €437 billion, when including the United Kingdom, Spain, Belgium and Poland.
- The other 19 EU countries in 2010 generated 11.1 per cent of EU chemicals sales, valued at €54 billion, half of which was attributable to four EU countries – Sweden, Austria, Czech Republic and Finland.

Sources: Eurostat and Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Chemicals Industry Profile
World exports and imports of chemicals by regional shares

1. Chemicals Industry Profile
World chemicals sales: geographic breakdown
World chemicals sales by region
Chemicals sales by country: top 30
EU chemicals industry sales by geographic breakdown
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EU chemicals industry sales by sectoral breakdown
EU chemicals industry sales: structure by destination
EU chemicals industry sales structure
Contribution of the chemicals industry to the EU economy
Added value in the EU manufacturing sector (2007)

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7. Sustainable Development

The European Union is the world’s top exporter and importer of chemicals

- In 2010, the key trading regions were the European Union, Asia – including China and Japan – and the market comprising North American Free Trade Agreement countries.
- The European Union was the leading exporter and importer of chemicals in the world, accounting for 41 per cent of global trade, defined as the total value of exports plus imports. This includes intra-EU trade, mainly for reasons of comparison with other regions, as these figures include this type of trade activity as well.

Sources: Eurostat and Cefic Chemdata International
* Including intra EU trade

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Chemicals Industry Profile
EU chemicals industry sales by sectoral breakdown

1. Chemicals Industry Profile
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Petrochemicals and polymers account for about half of EU chemicals sales

- Output from the EU chemicals industry covers three wide ranges of products: base chemicals, speciality chemicals and consumer chemicals.
- Base chemicals cover petrochemicals and derivatives and basic inorganics. They are produced in large volumes, and are sold within the chemicals industry itself or to other industries. In 2009, they represented 59.7 per cent of total EU chemicals sales, increasing in 2010 to 61.6 per cent.
- Specialty chemicals cover the auxiliaries for industry, paints & inks, crop protection, and dyes & pigments. Specialty chemicals are produced in small volumes but nevertheless represented 23.6 per cent of total EU chemicals sales in 2010.
- Consumer chemicals are sold to final consumers, such as soaps and detergents as well as perfumes and cosmetics. Together, they represented 12.8 per cent of total EU chemicals sales in 2010.

Comparing 2009 to 2010 on the contribution of each sector to EU chemicals sales, data show that the polymers and petrochemicals sectors increased their contributions in 2010 compared with 2009. This is due to polymers and petrochemicals being seriously affected by the economic crisis in 2009 and experiencing a strong recovery in 2010. Consumer chemicals and specialty chemicals were less affected by the crisis, however, and registered a less pronounced recovery.

Source: Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27

![Chart showing sectoral breakdown of EU chemicals industry sales in 2009 and 2010]
Chemicals Industry Profile

EU chemicals industry sales: structure by destination

Intra-EU trade increased significantly due to success of EU internal market

- EU chemicals sales were valued at €491 billion in 2010. Sales to EU partner countries have more than doubled during the period from 1995 to 2010 (261.6 versus 97.5).
- The European internal market during that 15-year period had a profoundly positive effect on the chemicals industry. Removing both trade and non-trade barriers inside the EU area has been a key driver for growth and competitiveness of the chemicals industry in the European Union.
- The internal market, today numbering more than 500 million consumers, is a key competitiveness factor. With the accession of new EU member states in 2004 and 2007, the internal market has received an intra-trade boost.

Sources: Eurostat and Cefic Chemdata International

unless specified, chemicals industry excludes pharmaceuticals
unless specified, EU refers to EU-27
Intra-EU sales, excluding home country sales, account for more than half of total chemicals sales

- EU chemicals sales in 2010 were 48 per cent higher compared to the value in 1995. Over the period 1995-2010, EU chemicals sales have increased on average by 2.7 per cent per annum.

- By 2010, intra-EU sales – excluding domestic sales – accounted for more than half of total chemicals sales by the sector in the European Union.

- While intra-EU sales are rising, the importance of domestic sales is decreasing, however, only accounting for 18 per cent of total EU sales.

- Twenty-nine per cent of chemicals sales are exported outside of the EU market. European Union neighbour countries, the NAFTA trade bloc, and Asia are the three primary markets for EU chemicals exports.

Source: Cefic Chemdata International

Percentage shares

1995: €331 billion
- Home country sales 54%
- Intra-EU export 29%
- Extra-EU export 17%

2010: €491 billion
- Home country sales 18%
- Intra-EU export 53%
- Extra-EU export 29%
- Extra-EU import 29%

Intra-EU sales, excluding home country sales, account for more than half of total chemicals sales

- EU chemicals sales in 2010 were 48 per cent higher compared to the value in 1995. Over the period 1995-2010, EU chemicals sales have increased on average by 2.7 per cent per annum.

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2010: €491 billion
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- Intra-EU export 53%
- Extra-EU export 29%
- Extra-EU import 29%
The chemicals industry directly accounts for 1.1 per cent of total EU gross domestic product, down from 1.5 per cent in 1995.

- The chemicals industry’s contribution to EU gross domestic product, or GDP, amounts to 1.1 per cent. This may seem small at first, but should be reassessed taking into consideration both the shrinking contribution of industry as a whole to GDP in advanced economies along with a rise in the service sector. The manufacturing sector share of GDP in the European Union declined from 23.7 per cent in 1995 to 18.7 per cent in 2010.

- There is a wide contribution of chemicals products that are present in all branches of the economy. For example, the chemicals industry in Germany is the most important supplier of innovative materials for manufacturing. Chemicals represent 10 per cent of the supply of input and intermediary products and they show an above average research & development content.

### Sources:
- Eurostat and Cefic Chemdata International
- Unless specified, chemicals industry excludes pharmaceuticals
- Unless specified, EU refers to EU-27
Chemicals Industry Profile

Added value* in the EU manufacturing sector (2007)

1. Chemicals Industry Profile
   World chemicals sales: geographic breakdown
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   Contribution of the chemicals industry to the EU economy

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EU chemicals industry – the third largest manufacturing sector in terms of added value*

- Added value at factor costs is defined as the gross income from operating activities after adjusting for operating subsidies and indirect taxes. Value adjustments, such as depreciation, are not subtracted. (Source: EU Commission, SBS database)

- According to Eurostat data, 34.5 million people were employed in 2.3 million enterprises in the EU-27 manufacturing sector in 2007. Together they generated €1813 billion of added value.

- The chart above shows the largest three subsectors in 2007 in terms of added value, at the NACE division level. The three top subsectors were: machinery and equipment; food and beverages; and chemicals, including pharmaceuticals. Sectors such as tobacco, leather and office machinery & computers, however, contributed to less than one per cent of the EU manufacturing added value in 2007.

- There is great diversity between manufacturing subsectors in EU member states. Some manufacturing activities have relatively low labour productivity, personnel costs per employee and investment rates, such as the manufacture of textiles, leather products, wearing apparel, compared with those with considerably higher values for the same indicators, such as chemicals.

Sources: Eurostat (SBS, ebd_all) and Cefic Analysis
* Added value at factor cost
** Including pharmaceuticals
 Unless specified, chemicals industry excludes pharmaceuticals
 Unless specified, EU refers to EU-27

Added value in the EU manufacturing sector (2007)

Key sectors: Top 15
- Machinery and equipment
- Food products and beverages
- Chemicals**
- Metal products
- Motor vehicles & and (semi) trailers
- Publishing, printing and recorded media
- Basic metals
- Electrical machinery
- Other non-metallic mineral products
- Rubber and plastic products
- Optical instruments, watches and clocks
- Furniture; manufacturing n.e.c.
- Other transport equipment
- Radio, TV & communication equipment
- Pulp, paper and paper products

Sources: Eurostat (SBS, ebd_all) and Cefic Analysis
* Including pharmaceuticals
The EU chemicals trade surplus at record level in 2010

• As a historically important player in the global chemicals market, the EU chemicals industry has been, and continues to be in a position to benefit from trade opportunities.

• In 2010, the chemicals sector in the European Union generated an extra-EU trade surplus of €47 billion, €4 billion more than in 2009.

• The EU chemicals industry registered a solid recovery in 2010 after the economic crisis in 2009. The EU trade surplus with the rest of the world reached a record level in 2010 and remains a key driver for sector growth and competitiveness.

Sources: Eurostat and Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Extra-EU chemicals trade by region (exports & imports)

Half of all extra-EU chemicals trade now occurs with NAFTA and Rest of Europe

- Extra-EU chemicals trade flow, calculated as total exports plus imports, was mainly attributable in 2010 to “Rest of Europe”, with 26.2 per cent of trade flow, followed by the North American Free Trade Agreement market (NAFTA), with 24.9 per cent.
- Asia, excluding Japan and China, accounts for 20.6 per cent of EU trade flows with non-EU countries. Taken together, the ‘Rest of Europe’, NAFTA and Asia markets contributed in 2010 to 85.1 per cent, of total trade flows.
- Comparing 2010 to five years prior, NAFTA and Japan registered a decline in their contributions to total trade. The Rest of Europe, China and the Rest of Asia have increased their contributions.

![Graph showing extra-EU chemicals trade by region](image)

Sources: Eurostat and Cefic Chemdata International

* Asia excluding Japan and China

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
International Trade

Extra-EU chemicals trade flows with major geographic blocs in € billion (2010)

1. Chemicals Industry Profile
2. International Trade
   Extra-EU chemicals trade balance
   Extra-EU chemicals trade by region (exports & imports)
   Extra-EU chemicals trade flows with major geographic blocs in € billion (2010)
   EU chemicals trade surplus; sectoral breakdown
   EU chemicals trade competitive analysis broken down by region
   Extra-EU chemicals trade flows detailed analysis by sector
   Extra-EU chemicals trade flows detailed analysis by country
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EU chemicals sector posted in 2010 a significant trade surplus with main competing world markets

- The three major geographic blocs trading with the European Union in 2010 were: Rest of Europe, North America, and Asia (excluding China and Japan).
- Apart from China, the European Union has a surplus with each main trading region — NAFTA, Asia, Japan, Latin America, Africa, Rest of Europe and Africa. The EU chemicals sector broadly retained its market share in terms of global chemicals sales during the last decade.
- The Rest of Europe market played a major trade role in 2010 for the European Union. The EU chemicals sector had a €13 billion net trade surplus in chemicals with non-EU countries.
- The Trade Competitiveness Indicator (TCI) — an indicator that compares the trade balance to the total trade, namely exports plus imports of a region — reveals a deteriorating competitiveness, however, of the overall EU chemicals industry since 2003.
- Trade data from 1998 to 2010 show that the TCI for the EU chemicals industry went down from 25 per cent in 1988 to only 20 per cent in 2010. This means that total chemicals imports are growing faster than total chemicals exports.

Source: Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
EU chemicals trade surplus: sectoral breakdown

Specialty and consumer chemicals in 2010 accounted for 70 per cent of extra-EU chemicals trade surplus

- The EU chemicals trade surplus in 2010 reached nearly €47 billion. Specialty chemicals accounted for 36 per cent of the EU chemicals trade surplus, with a value of €16.8 billion.

- The consumer chemicals subsector had the second strongest external trade performance, contributing €16.1 billion to the EU trade surplus, followed by polymers at €8.4 billion and petrochemicals at €7.5 billion. Basic inorganics experienced a trade deficit of €1.9 billion – the only sector with a trade deficit since 1994.

- The sectoral analysis shows specialty chemicals and consumer chemicals performed well in 2010. The trade surplus in these sectors increased by 23 per cent and 18 per cent respectively in 2010 compared with 2009. Polymers registered a comparably low 10 per cent increase in terms of trade surplus in 2010 compared with 2009. Petrochemicals in 2010 registered a decline in overall trade surplus, however, of 20 per cent.

Sources: Eurostat and Cefic Chemdata International
EU trade position is deteriorating with key countries in Asia for almost all sub-sectors

- A look at the EU trade balance in relation to a number of key countries and regions shows that the EU’s position is deteriorating with certain key countries in Asia for almost all sub-sectors.
- China is the only country with which the European Union currently has a trade deficit for all chemicals sub-sectors except polymers.
- Continued trade development with the Middle East indicates that this region increasingly uses its feedstock availability, namely petroleum, to develop an integrated chemicals value chain and to strengthen its position in 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.

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<th>Sector</th>
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- EU has a trade deficit and its competitive position weakened
- EU has a trade surplus but its positive competitive position weakened
- EU has a trade deficit but its weak competitive position improved
- EU has a trade surplus and its healthy competitive position improved

Source: Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
International Trade
Extra-EU chemicals trade flows detailed analysis by sector

• The trade position of certain important sub-sectors shows signs of erosion. In particular, raw material and energy-intensive parts of the chemicals industry find their global competitive position at risk, namely basic organics such as petrochemicals as well as basic inorganics such as fertilizers.

Sources: Eurostat and Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27

Trade Competitiveness Indicator (TCI, 2010) = (exp - imp) / (exp + imp)
Extra-EU chemicals trade flows detailed analysis by country

Global trade competitiveness of the EU chemicals industry is at risk

- International trade is vital for growth and employment of the European chemicals industry. The industry has placed itself at the centre of global trade and thus depends vitally on open markets.

- As the most rapid growth is concentrated in the emerging economies, favourable access to these markets is highly important.

Sources: Eurostat and Cefic Chemdata International
Growth and Competitiveness
Production, trade and consumption growth

Sources: Eurostat and Cefic Chemdata International

* Consumption = total sales - exports + imports

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27

EU trade is a key driver of the EU chemicals industry

- During the period from 2005 to 2010, chemicals sales and consumption registered small growth. Chemicals consumption increased by 0.7 per cent, slightly less than the 1.1 per cent sales increase.
- Import growth during the same five-year period experienced a trend rate of 5.5 per cent, exceeding slightly the 5.3 per cent trend rate of export growth.
- In contrast to sales and consumption, trade activity grew by significant rates during the five-year period from 2005 to 2010.
Growth and Competitiveness

Chemicals growth performance against total manufacturing

In the 10-year period from 2000 to 2010, the chemicals industry had an average growth rate of 0.7 per cent, a rate slightly higher than the 0.2 per cent average growth rate for total manufacturing. These low growth rates were mainly impacted by the dramatic declines in chemicals production levels during the 2009 economic downturn as compared with pre-crisis levels.

The EU chemicals industry was profoundly affected by the spill-over effects of the economic and financial crisis. The magnitude of the economic crisis, which started during the second half of 2008, was much more severe than expected. Many companies were certainly not anticipating such a dramatic downturn. Data covering activity through 2009 indicates that chemicals companies are experiencing strong pressure on margins due in particular to the lack of demand from customers and weak consumer spending.

As expected, both chemicals and manufacturing have been following the recovery trend in 2010. The EU chemicals sector has enjoyed a strong 2010, posting a 9.8 per cent growth rate compared with 2009. The EU manufacturing sector also rebounded, recovering by 7.3 per cent in 2010. These figures appear spectacular and give the wrong perception that both sectors are performing well. The reality is that even with strong growth rates, production in 2010 was far below the pre-crisis level and will need an additional two years to come back to the pre-crisis level.
Growth and Competitiveness
EU chemicals production growth by sector

1. Chemicals Industry Profile
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Polymers and basic inorganics registered the fastest rebounds after steep decline in 2009

- Polymers and basic inorganics registered the fastest rebounds in 2010, but in all cases chemicals output remains well below pre-2008 levels. Petrochemicals production increased by 8.4 per cent in 2010 compared with 2009.
- Other chemicals sub-sectors less affected by the crisis – namely consumer and specialty chemicals – have been recovering at a more modest rate. Production rose by 6.1 per cent in specialty chemicals and 6.8 per cent for consumer chemicals during 2010.
- Growth in EU chemicals production in 2010 has continued more strongly than expected. However, the overall economic recovery in Europe remains fragile.
- The development of the EU chemicals industry will also depend on the effectiveness of consolidation measures taken in individual EU countries. The European chemicals industry continues to face relentless global competition. Access to raw materials and energy at globally competitive prices remains a prerequisite for a successful recovery.

Source: Cefic Chemdata International
Emerging economies outpace industrial countries in chemicals production

- During the period from 2005 to 2010, the EU chemicals industry (including pharmaceuticals) showed the second most modest growth rate compared with the biggest regions in the world. The EU chemicals sector grew by 1.6 per cent, well below the world chemicals industry average growth rate of 4.1 per cent.

- During the period from 2005-2010, the chemicals industry (including pharmaceuticals) in the North American Free Trade Agreement Area (NAFTA) showed a negative growth rate on average. This is due to the spill-over effects of the crisis in the United States in 2008 and 2009.

- The Asia-Pacific region outpaced growth in EU and US markets, with average growth rates of 10.8 per cent in chemicals, including pharmaceuticals, during the past five years. Asia is heavily influenced by the extraordinary performance of the Chinese chemicals sector and a booming economic climate in China, especially its industrial sector.

- Emerging economies are outpacing industrial countries in chemicals production and have been pushing up the average growth rate of world chemicals production during the past ten years.
Growth and Competitiveness
International comparison of production growth (continued)

Emerging economies outpace industrial countries in chemicals production (continued)

- The long-term trend for chemicals production, including pharmaceuticals, shows that apart from the Asia-Pacific region, chemicals production registered a negative growth rate in 2008 and 2009 in all regions.

- Observing the growth rates of world chemicals production since 1988, data confirms that annual chemicals production has always registered positive growth rates, except in two instances. The first period was 1990, when production declined by 0.3 per cent compared with 1989. The second year was 2009 when world chemicals production declined by 4.4 per cent compared with 2008 – the largest recorded decline in world chemicals production in 23 years.

- Chemicals production recovery occurred in all regions in 2010. World chemicals production has increased by 9.9 per cent in 2010 compared to 2009. The strong recovery was led by the Asia-Pacific region, where production grew in 2010 by 15.3 per cent.

Sources: ACC and Cefic Chemdata International
* Asia includes Japan, China, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Pakistan, Bangladesh and Australia

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
**Growth and Competitiveness**

**EU manufacturing industry: gross operating surplus rate (2007)**

The Gross Operating Surplus, or GOS, is a proxy of profitability. Data for 2007 confirm that the chemicals industry, including pharmaceuticals, contributed 13.8 per cent to the EU manufacturing GOS in absolute figures.

- The chart above shows that GOS intensity – calculated as the ratio of GOS to sales – in the EU chemicals industry, including pharmaceuticals, is the fourth highest among all EU manufacturing sectors. The chemicals sector follows non-metallic mineral products, medical & optical instruments and publishing & printing.

- GOS intensity in the EU chemicals industry, which includes pharmaceuticals, was 1.34 times the level of the overall EU manufacturing sector average. The coke, refined petroleum products and nuclear fuel subsector had a GOS of 3.8 per cent in 2007 – the weakest GOS intensity in the EU manufacturing sector.

**EU chemicals industry Gross Operating Surplus (GOS) far higher than overall manufacturing sector average**

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Employment

EU manufacturing industry: breakdown of employment (2007)

• In terms of employment, the food and beverages category was the largest EU manufacturing sector in 2007. About 4.7 million people were employed in the subsector, contributing to 13.5 per cent of total manufacturing employment.

• The latest available data, which covers the year 2007, shows that the EU chemicals industry, including pharmaceuticals, accounted for 5.4 per cent of the total number of employees generated by EU manufacturing. The chemicals industry generated additional indirect jobs via the value chain, which is two times higher than through direct employment.

• Employment is defined by Eurostat as the total number of people who work in the observation unit, inclusive of working proprietors, partners working regularly in the unit and unpaid family workers, as well as people who work outside the unit who 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, as well as those on compulsory military service (Source: European Commission, SBS database).
## Employment in the chemicals industry: European Union versus United States

<table>
<thead>
<tr>
<th>Year</th>
<th>Employment (EU, 000)</th>
<th>Employment (US, 000)</th>
<th>Sources: Eurostat, ACC and Cefic Chemdata International</th>
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<tbody>
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<td>2000</td>
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</tr>
<tr>
<td>2010</td>
<td>1157</td>
<td>507</td>
<td></td>
</tr>
</tbody>
</table>

Employment in the EU chemicals industry has decreased on average by 2.2 per cent per year during the past 10 years:

- Chemicals companies in the European Union employ a total staff of about 1.16 million. Employment in the EU chemicals industry has decreased by an average annual rate of 2.2 per cent from 2000 to 2010.
- Employment in the United States has experienced a steeper decline for chemicals over the same period, declining 3.3 per cent on an average annual basis.
- Due to the economic crisis, employment in the EU chemicals industry fell in 2009 by 4.6 per cent compared with 2008. Employment decreased in 2010 by 2.5 per cent, closely following the annual trend rate decline of 2.2 per cent.
Employment

EU manufacturing industry*: breakdown of labour cost per employee

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2. International Trade
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   EU manufacturing industry: breakdown of employment (2007)
   Employment in the chemicals industry: European Union versus United States
   EU manufacturing industry: breakdown of labour cost per employee
   EU labour cost per employee: chemicals versus manufacturing
   Labour cost per employee in the EU chemicals industry
   Labour productivity in EU chemicals and other manufacturing sectors
   EU labour productivity: chemicals versus total manufacturing
   Labour productivity in the EU chemicals industry
5. Energy
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Chemicals industry – the highest labour cost per employee in the EU manufacturing sector

- The labour force employed in the chemicals industry is more qualified, trained and better paid than the average industrial worker. Personnel costs for the EU chemicals industry are 56 per cent higher than the average of other manufacturing sectors.
- The chemicals industry is the leading sector in terms of labour cost per employee, including pharmaceuticals, followed by the sector categories automotive and other transparent equipment.
- This cost (salary) factor is a significant tool to attract new and young talents to work for the EU chemicals industry. On the other hand, public perception of the chemicals industry remains relatively negative and requires a strong improvement, especially to attract young talent 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).

Sources: Eurostat and Cefic analysis
* Data on coke and refined petroleum products is skipped
** Including pharmaceuticals
*** Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Labour cost per employee in the EU chemicals industry increased by 42 per cent during the period 2000 to 2010

- The chemicals industry has a highly trained and well educated workforce, which redistributes part of its economic profits to employees via high-wage, competitive salaries.
- Payroll accounts for 12.5 per cent of chemicals production costs.
- Labour cost per employee in the EU chemicals industry has increased by an average of 3.6 per cent per annum from 2000 to 2010. In the case of EU manufacturing, labour cost per employee grew by three per cent per annum during the same period.
- Labour cost per employee in the EU chemicals industry was 42 per cent more expensive in 2010 compared with 10 years ago. The EU manufacturing sector labour cost per employee was 34.9 per cent higher in 2010 compared with 2000.

Sources: Eurostat and Cefic analysis
Employment

Labour cost per employee in the EU chemicals industry

- Labour cost per employee increased by 3.6 per cent per annum from 2000 to 2010.
- Between 2000 and 2010, labour cost in the EU chemicals industry, including pharmaceuticals, rose by 14.3 per cent, while total employment fell respectively by 19.8 per cent from 2000 to 2010.

Sources: Eurostat and Cefic analysis

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Chemicals industry – the leading EU manufacturing sector in terms of value-added per employee

- Chemicals form the leading manufacturing sector in terms of value-added per employee in Europe, according to the latest data for the 2007 time period.
- The chemicals industry’s value added per employee is 98 per cent higher than the combined average of all manufacturing sectors.

**Labour productivity in EU chemicals and other manufacturing sectors**

![Graph showing labour productivity comparison across different sectors](chart.png)

- **Key sectors:**
  - Food products and beverages
  - Electrical machinery and apparatus n.e.c.
  - Machinery and equipment n.e.c.
  - Manufacturing
  - Automotive
  - Basic metals
  - Chemicals

**Sources:** Eurostat and Cefic analysis

* Including pharmaceuticals

**Unless specified:** Chemicals industry excludes pharmaceuticals

**Unless specified:** EU refers to EU-27
Labour productivity in the EU chemicals industry is far higher than manufacturing average:

- Due to intensifying global competition, the EU chemicals 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 chemicals industry has been growing at an average annual growth from 2000 to 2010 of 2.9 per cent, faster than the 2.2 per cent labour productivity rate in the total manufacturing sector for the same 10-year period.

Sources: Eurostat and Cefic analysis

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Employment

Labour productivity in the EU chemicals industry

Labour productivity has increased on average by 2.9 per cent per annum from 2000 to 2010

• The EU chemicals industry is a leading industry with a highly skilled and productive workforce, notably due to high investment per employee and highly educated and trained employees.

• As a consequence, labour productivity in the EU chemicals industry rose at an average annual rate of 2.9 per cent from 2000 to 2010.
**Energy**

**Fuel and power consumption in the EU chemicals industry**

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   - Fuel and power consumption in the EU chemicals industry
   - Gas and oil consumption in the EU chemicals industry during the past 20 years
   - Energy intensity in the EU chemicals industry
   - Energy intensity: European Union versus United States
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**EU chemicals industry fuel and power consumption has fallen by 27 per cent since 1990**

- The chemicals industry transforms energy and raw materials into products required by other industrial sectors as well as by final consumers. The cost of these two inputs is a prime factor in competitiveness on world markets.
- In 1990, the European chemicals industry, including pharmaceuticals, used a total of 69.2 million tonnes of oil equivalent (TOE) of fuel and power consumption.
- The EU chemicals industry, including pharmaceuticals, has constantly reduced its fuel and power consumption significantly during the period 1990 to 2009. The amount of energy consumed in 2009 was 27 per cent less than the level in 1990, according to the European Commission data.
- Data on feedstock are no longer available, but we know from historical data that feedstock consistently accounted for 60 per cent of total energy products, taking all sources of energy into account. This means that most of the energy used by the chemicals industry as feedstock is stored in products and can still be reused via recycling.
- Regarding other raw materials, the chemicals industry also uses a wide variety of natural and processed starting materials, including metals, minerals and agricultural raw materials such as sugar, starch and fats.

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**Sources:** Eurostat and Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27

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Energy
Gas and oil consumption in the EU chemicals industry during the past 20 years

EU chemicals industry reduced gas consumption by 37.4 per cent from 1990 to 2009
• Data on energy consumption by source confirms that the EU chemicals industry has significantly reduced its gas consumption from 1990 to 2009.
• In 2009, the European chemicals industry (including pharmaceuticals), used as energy a total of 16.9 million tonnes of oil equivalent (TOE) of gas consumption. This represents a sharp reduction in gas consumption of 37.4 per cent compared to 1990.
• Oil and electricity registered in 2009 a reduction of consumption of 31.4 per cent and 17.1 per cent respectively compared with 1990.

Sources: Eurostat and Cefic Chemdata International
Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Energy

Energy intensity* in the EU chemicals industry

The EU chemicals industry has reduced energy intensity by 54 per cent since 1990

- For many years, the EU chemicals industry, including pharmaceuticals, has made strenuous efforts to improve energy efficiency, reducing its fuel and power energy consumption per unit of production.
- In 2009, energy intensity, or the energy consumption per unit of production in the chemicals industry, including pharmaceuticals, was 54 per cent lower than in 1990.
- Energy efficiency is subject to decreasing returns: the higher the level of energy efficiency attained, the more difficult it becomes to make further improvements. During the previous 20 years from 1990 to 2009, however, the chemicals industry has succeeded in increasing continuously its output and at the same time keeping its energy input constant, and consequently lowered its energy intensity significantly by 4.1 per cent per year on average.

Sources: Eurostat and Cefic Chemdata International

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

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Energy

Energy intensity: European Union versus United States

- Energy intensity in the US chemicals industry has declined over the period 1990 to 2009, but not as much as in Europe where energy intensity slowed by 2.1 per cent per year on average.
- Energy consumption in the EU chemicals industry fell in 2009 by 27 per cent compared with 1990.

Sources: Eurostat, American Chemistry Council (ACC) and Cefic Chemdata International

* Including pharmaceuticals

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Investment and R&D

Investment* in the EU manufacturing sector (2007)

- Around 2.3 million enterprises were operating in the EU-27 manufacturing sector in 2007, generating together €262.4 billion of gross investment in tangible goods.
- Sectoral data show that the largest three subsectors in 2007, at the NACE division level, were food & beverages; chemicals, including pharmaceuticals; the category motor vehicles. Taken together, they contributed in 2007 to 35.3 per cent of total investment.
- The EU chemicals industry is the second largest contributor in the EU manufacturing sector, accounting for €28.9 billion in investment.
- Gross investment in tangible goods is defined as investment 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 are excluded (Source: European Commission, SBS database).

Key sectors: Top 10
- Food and beverages
- Chemicals**
- Motor vehicles
- Fabricated metal products
- Machinery and equipment
- Other non-metallic mineral products
- Basic metals
- Rubber and plastic products
- Publishing and printing
- Electrical machinery

EU chemicals industry – the second leading manufacturing sector in terms of investment (in € billion, 2007)
Investment and R&D
Capital spending in the Western European chemicals industry

- Investments in innovation, including research & development (R&D) are key elements in securing the future of the chemicals 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 marketplace.

- It is worth noting that the currently available figures on R&D investments give only part of the picture, as it is only the starting point on the path to successful innovation. Innovation spending in companies is increasingly included under business development.

- Western Europe covers the first 15 member states of the European Union, plus Norway and Switzerland.

- In absolute figures, investment in Western Europe had been declining from 1998 to 2001. The years from 2001 to 2008 registered and followed a positive trend at a consistent pace. Investment in 2010 recovered slightly, going up by 2.5 per cent in value terms compared with 2009.

- In relative terms, the ratio of capital spending to sales, or capital intensity, of the Western European chemicals industry, including pharmaceuticals, has been declining since 1998 and reached the value of 4.8 per cent in 2010, down from 7.5 per cent registered in 1998.
**Investment and R&D**

**International comparison of chemicals sector* capital spending**

- Capital spending in the chemicals industry in Western Europe reached a modest level of US$46.3 billion in 2010. It represents about 10 per cent of world capital spending in value terms, or US$464.3 billion.

- Comparing 2010 to 2000, the contribution of Western Europe to world chemicals spending in value terms declined dramatically by 12.2 percentage points, from 22.2 per cent in 2000 to about 10 per cent in 2010.

- The total value of capital spending in Western Europe has been growing continuously since 2000, but overall world chemicals capital spending has grown at an even faster clip. In value terms, world chemicals spending increased by 2.5 times in 2010 compared with 2000.

- China and the rest of the Asia-Pacific region are the clear leader in terms of capital spending, accounting for 72.8 per cent of world chemicals capital spending in 2010, up from 38.6 per cent in 2000. China and the rest of Asia-Pacific attract the bulk of chemicals investment, considered a key factor for overall competitiveness.

*Excluding Japan

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**Source:** American Chemistry Council (ACC)

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Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Capital intensity in China and the rest of Asia-Pacific far higher than in the rest of the world

- In absolute figures, capital spending in the world chemicals industry rose from US$131.7 billion in 2000 to US$464.3 billion in 2010. Capital intensity, or the ratio of capital spending to sales, also registered a significant increase from 7.6 per cent in 2000 to 11.3 per cent in 2010.

- Capital intensity in China and the rest of Asia-Pacific contributed greatly to positive changes on a world basis. Capital intensity in China and the rest of Asia-Pacific increased from 18.1 per cent in 2000 to 23.4 per cent in 2010.

- Capital intensity in China and the rest of Asia-Pacific is far higher than in the rest of the world. Western Europe and the North America are lagging behind, registering a constant decline during the past 10 years.

Source: American Chemistry Council (ACC)

* Including pharmaceuticals
** Excluding Japan

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
**Investment and R&D**

**International comparison of R&D spending**

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5. Energy
6. Investment and R&D
   - Investment in the EU manufacturing sector (2007)
   - Capital spending in the Western European chemicals industry
   - International comparison of chemicals sector capital spending
   - International comparison of chemicals industry capital spending intensity
   - International comparison of R&D spending
   - International comparison of R&D spending intensity
7. Sustainable Development

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**R&D spending in the European Union and United States higher than in Japan**

- With €8.1 billion in 2008, R&D spending in the chemicals industry in the European Union was significant and represented about 4.2 per cent of added value in value terms.
- In absolute figures, R&D spending in the chemicals industry was valued at an average annual level of €7.8 billion in the European Union during the period from 1998 to 2008. In the United States, the average value of R&D spending was €8.8 billion during the same period. The same variable amounted to €6.7 billion in the Japanese chemicals industry for a comparable 10-year period.

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**Source:** Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Investment and R&D
International comparison of R&D spending intensity

- The high value-added products of the chemicals industry continuously open up new fields of application, paving the way to progress and innovation in other industries. Typical examples are health, food, consumer goods, aerospace and car manufacturing, telecommunications, electrical engineering and electronics. Wide variations in research and development (R&D) efforts are observed across the chemicals industry. Turning R&D into innovation is becoming increasingly important in relation to the competitiveness of the region.

- Analysing the ratio of R&D spending to sales of the chemicals industry, it can be observed that during the 18-year time period from 1991 to 2008, the R&D intensity level in the European Union has been far below that of Japan and slightly lower than in the United States.

- Annual EU R&D intensity was equal to two per cent on average during the years 1991 to 2008, while the same ratio was equal to 2.8 per cent in the United States and to 5.1 per cent in Japan.

Source: Cefic Chemdata International

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Total greenhouse gas emissions from the EU chemicals industry have fallen by 49 per cent since 1990.

- According to the European Environmental Agency (EEA), the European chemicals industry, including pharmaceuticals, emitted in 2009 a total of 147.4 million tonnes of CO₂ equivalent, down from 286.8 million tonnes in 1990.
- Long-term data show that the EU chemicals industry, including pharmaceuticals, has significantly reduced its greenhouse gas (GHG) emissions on a consistent basis from 1990 to 2009.
- Total greenhouse gas emissions in the EU chemicals industry have fallen by 49 per cent since 1990. This historic trend clearly represents successful efforts made by the chemicals industry to reduce emissions.
Sustainable Development

Greenhouse gas emissions, energy consumption and production in the EU chemicals industry*

1. Chemicals Industry Profile
2. International Trade
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6. Investment and R&D
7. Sustainable Development

Total greenhouse gas emissions in the EU chemicals industry

Greenhouse gas emissions, energy consumption and production in the EU chemicals industry

Greenhouse gas emissions per unit of energy consumption and per unit of production in the EU chemicals industry

Greenhouse gas emissions per production: European Union versus United States

Safety at work – EU chemicals sector incidence rate of accidents (more than three days lost)
Incidence rate of accidents at work (more than three days lost)
Safety at work – incidence rate of accidents at work in the EU manufacturing sector (2005)

• Between 1990 and 2009, production in the EU chemicals industry, including pharmaceuticals, rose by 60 per cent, while total energy consumption and greenhouse gas (GHG) emissions fell by 27 per cent and 49 per cent respectively during the past years 1990 to 2009.

• The chemicals industry works to develop cleaner and safer technologies, waste recycling processes and new products to safeguard the environment including biotechnology processes, catalysts, membranes and desulphurisation. One aspect is increased energy efficiency. Besides increasing the energy efficiency of its own processes, the chemicals industry also helps to increase the energy efficiency of downstream users and their products through innovative inputs.

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

* Including pharmaceuticals

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Greenhouse gas emissions per unit of energy consumption and per unit of production in the EU chemicals industry*

- **Greenhouse gas intensity has fallen by 68 per cent since 1990**

  - Greenhouse gas (GHG) emissions per unit of energy consumption have been reduced by 29.4 per cent and GHG emissions per unit of production, or GHG intensity, have fallen by 67.9 per cent since 1990. These decreases show the enormous effort by the chemicals industry to minimise the environmental impact of its production.

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

* Including pharmaceuticals

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Sustainable Development

Greenhouse gas emissions per production*: European Union versus United States

- In comparison to the US chemicals industry, the EU chemicals sector has reduced its greenhouse gas (GHG) emission intensity, calculated as emissions per unit of production, by a relatively greater amount and is comparably more GHG emission efficient.
- The US chemicals industry has decreased its emission intensity by 39 per cent since 1990, whereas the EU chemicals industry has cut its GHG emissions by 67.9 per cent.

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

* Including pharmaceuticals

Unless specified, chemicals industry excludes pharmaceuticals

Unless specified, EU refers to EU-27
Sustainable Development
Safety at work – EU chemicals sector* incidence rate of accidents (more than three days lost)

Incidence rate dropped by more than one third from 1995 to 2005

- The incidence rate of accidents at work has fallen in the EU-15 chemicals industry from 2.43 in 1995 to 1.53 in 2005 (latest data available). Safety at work has been considerably improved from 1995 to 2005.
- The long-term data on safety at work show clearly that the EU-15 chemicals industry, including pharmaceuticals, has constantly reduced the number of accidents at work during the years 1990 to 2009.
- An accident at work is “a discrete occurrence in the course of work which leads to physical or mental harm”. The data include only accidents involving more than three calendar days of absence from work, also called ‘serious accidents’. The incidence rate of serious accidents at work is the number of people involved in accidents at work with more than three days’ absence per 100,000 people in employment (Source: European Commission).
- The harmonised data on accidents at work are collected by the EU Commission in the framework of the European Statistics on Accidents at Work, or ESAW, on the basis of a methodology developed in 1990.

Sources: Eurostat (health_safety_work) database and Cefic analysis
* Including pharmaceuticals

Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27

Incidence rate of accidents at work per 100 employees

<table>
<thead>
<tr>
<th>Year</th>
<th>Incidence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
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<td>1996</td>
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Safety at work – EU chemicals sector incidence rate of accidents (more than three days lost)
Incidence rate of accidents at work (more than three days lost)
Incidence rate at work – incidence rate of accidents at work in the EU manufacturing sector (2005)
Sustainable Development
Incidence rate of accidents at work (more than three days lost)

Between 1995 and 2005, the incidence rate of accidents at work in the EU-15 chemicals industry, including pharmaceuticals, decreased by 37 per cent from 2.4 in 1995 to 1.5 in 2005.

The EU-15 manufacturing sector performed less well compared to the EU-15 chemicals industry in terms of incidence rate of accidents at work, declining 29 per cent from 5.0 in 1995 to 3.5 in 2005.

Sources: Eurostat (health_safety_work) database and Cefic analysis
* Including pharmaceuticals
Unless specified, chemicals industry excludes pharmaceuticals
Unless specified, EU refers to EU-27
Sustainable Development

Safety at work – incidence rate* of accidents at work in the EU manufacturing sector (2005)

- As shown, the incidence rate of accidents at work in the EU-15 chemicals industry, including pharmaceuticals, is the third lowest in the EU manufacturing sector, behind the manufacturing categories coke & refined petroleum products and electrical & optical equipment.
- Safety at work in the EU-15 chemicals industry, including pharmaceuticals, was 2.2 times higher in 2005 than in the EU-15 manufacturing sector as a whole.

Source: Eurostat and Cefic analysis

* Incidence rate of accidents at work per 100 employee (more than three days lost)
** Including pharmaceuticals

Key sectors: Top 10

- Coke and refined petroleum products
- Electrical and optical equipment
- Chemicals**
- Textiles
- Transport equipment
- Leather
- Pulp and paper
- Machinery and equipment
- Manufacturing
- Rubber and plastic
- Food and beverage
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 21 per cent of world chemicals production.