

2011

SUSTAINABLE DEVELOPMENT REPORT



essencia

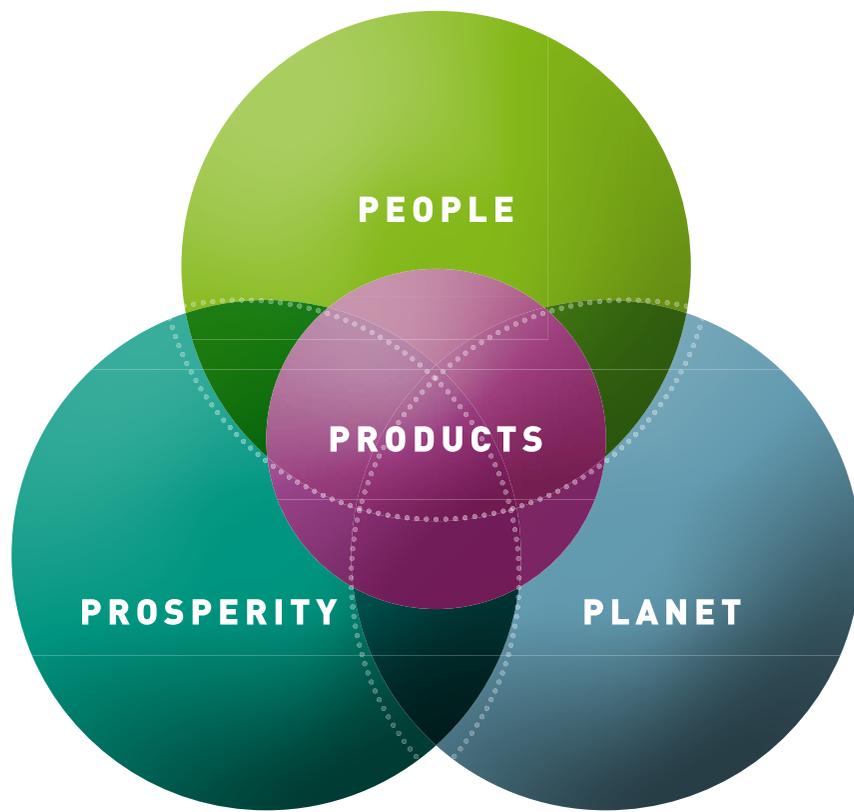
where chemistry meets life sciences





essencia

where chemistry meets life sciences



INTRODUCTION

In this second edition of its Sustainable Development Report, essenscia – the Belgian federation for chemistry, plastics and life sciences – highlights the sector's progress in the four areas of People, Planet, Prosperity and Products. Two important messages emerge through the numbers as reported under the various indicators.

Firstly, the Belgian chemical, plastics and life sciences industry is developing very much in line with the strategic agenda set out by the European Commission in its Europe 2020 Strategy for smart, sustainable and inclusive growth. Many of the targets set by the European Commission to measure progress against its strategic agenda are being met in full or to a large degree by the Belgian chemical and life sciences industry.

“This report is an invitation to work towards a more sustainable world.”

The sector generates smart growth as it is strongly R&D-driven (R&D intensity of 15%) and offers excellent employment opportunities to highly-skilled people, many with university education or equivalent (almost 40%). Student drop-out

rates are zero for all those studying for a degree in (bio)chemistry or related sciences.

The European sustainability targets of increased energy efficiency, reduced greenhouse gas emissions and increased use of renewable energy (the 20-20-20 targets) are a core priority for the sector. The Planet indicators illustrate the progress which the Belgian chemical and life sciences industry has achieved in this important area, in both environmental and economic terms. The chemical industry is particularly energy-intensive, and is therefore strategically determined to play a full role towards improving energy efficiency and mitigating climate change.

The sector is also committed to inclusive growth. The employment it has generated in terms of both direct and indirect jobs has shown a positive trend over the years. Salary levels are attractive as this industry needs and attracts skilled people. The sector therefore contributes towards protecting people against poverty and social exclusion, and encouraging higher levels of education and life-long learning.

Secondly, the Belgian chemical and life sciences industry is future-oriented as its products and innovations play a key role in addressing societal challenges that lie ahead. Better health and hygiene, provision of food and water to a growing world population, prudent use and re-use of scarce raw materials, climate mitigation through reduced CO₂ emissions during production, and in use, thanks to its innovative products, smarter mobility with light-weight engines and more powerful storage devices. These are just some of the leading challenges, but also market opportunities, on which essenscia member companies focus their resources and build their futures.

During the 2011 International Year of Chemistry, the sector has stepped up efforts to demonstrate – especially to young people – the fascinating world of discovery and progress embodied by this industry. This second sustainable development report is an invitation to readers to learn about the achievements and challenges of the chemical and life sciences industry and to engage with essenscia and its member companies to work towards a more sustainable world.



Wouter De Geest
President essenscia

The 'Who, What & How' of essencia's 2011 report

This section aims to provide readers with deeper insight into the stakeholder involvement and methodology used to compile this report.

Commitment to sustainability

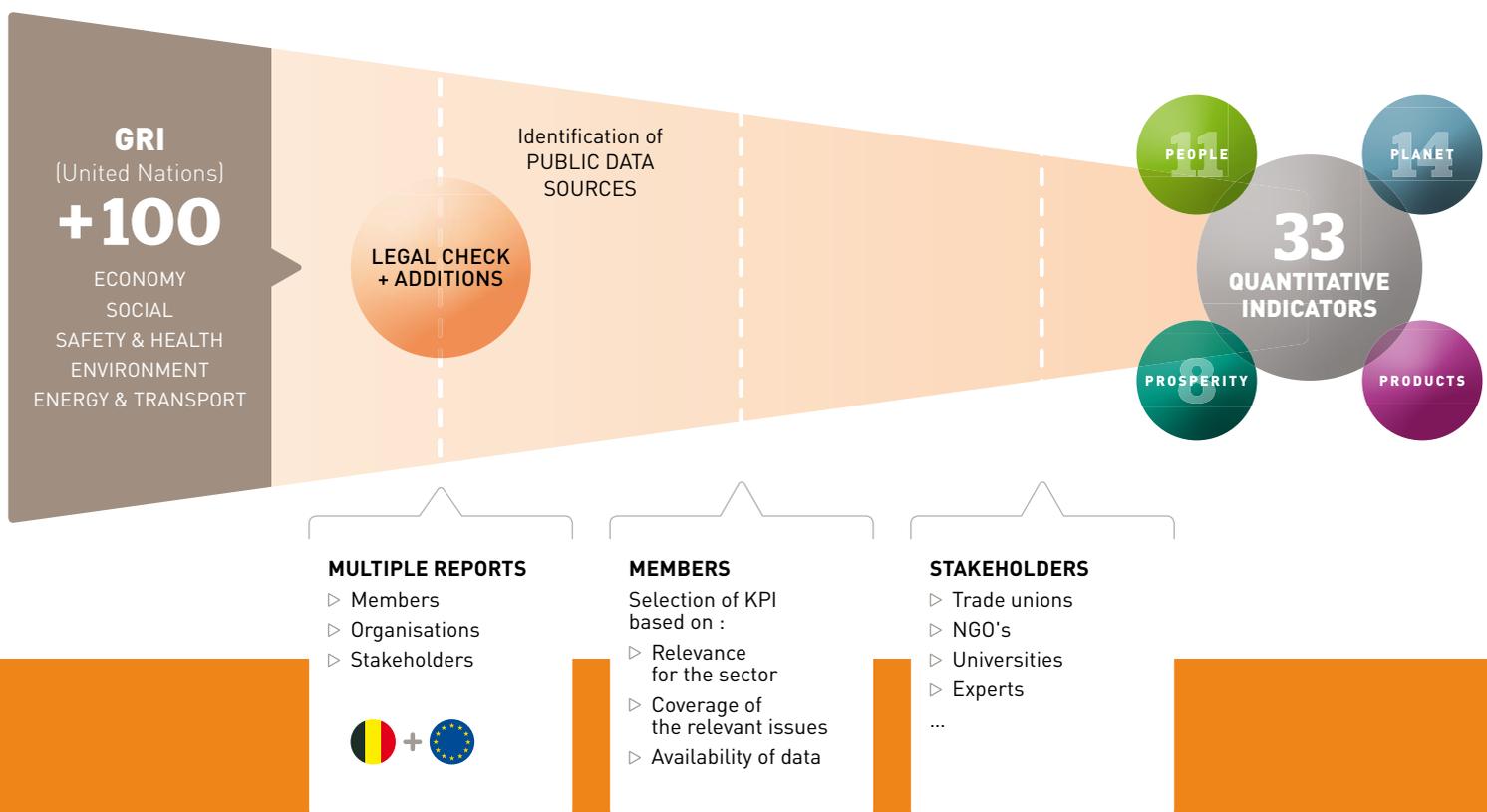
Building on the positive results of the Responsible Care performance initiative, the Belgian chemicals and life sciences sector has made a public commitment to publish its sustainable development report, based on the same base set of indicators, every two years. This edition covers the period 2000-2009.

The stakeholders

As with the first report two years ago, essencia ensured that the process involved an open and transparent dialogue with a number of key stakeholders including trade unions (both at sector- and multi-sector level), environmental NGOs, experts in the field of sustainable development, and academics.

An ongoing process with permanent stakeholder consultation

Grateful thanks go to the many stakeholders who gave their time and expertise to help essencia produce this report. There were several ad hoc and team meetings, and many consultations with experts, to ensure we had their input and feedback throughout the compilation process. Key messages and feedback from external stakeholders on the first edition were fed back into the process to further improve the dialogue.



The Key Performance Indicators (KPIs)

The selection of Sustainable Development indicators has been based on the Global Reporting Initiative (GRI) methodology developed by the United Nations. The GRI approach offers a comprehensive framework and is the most widely used method for organisations that have adopted sustainability reporting.

The same set of KPIs has been used for essenscia's sustainable development reports in 2009 and 2011. The original selection of KPIs was done in a transparent process open to members companies and external stakeholders following the GRI reporting protocol and basic principles.

Adapting to fit

essenscia had to make certain adjustments to take sector specificities into account and present a report for the entire sector in all its diversity, bearing in mind that the GRI methodology was principally developed for use by corporate entities. In the past few years GRI has begun development of Sector Supplements - tailored versions of the GRI Guidelines - but has not, as yet, covered the diversified chemical and life sciences activities embraced by essenscia.

Based on this approach, only the generic GRI indicators that apply to the sector were retained. Certain indicators related to issues that are not relevant were discounted such as child labour. On the other hand, essenscia has added certain indicators based on regulation or stakeholder requests, for example, process safety and product safety.

The quantitative indicators of the chemical and life sciences industry are benchmarked against the whole of the Belgian manufacturing industry and/or the private sector.

- ▷ The **materiality** and **control principles** recommend that the most relevant indicators be chosen, taking into account stakeholders' expectations.
- ▷ According to the **balance** and **completeness principles**, both positive and negative elements should be presented.
- ▷ The **comparability principle** requires comparison of performances against a standard and with other players.

At the origin, a big source of motivation came from the participants of the Roundtable on the Chemical Industry set-up by the former Flemish Minister of Economy Fientje Moerman in 2006. This resulted in the creation of an informal sectoral stakeholders platform (werkgroep maatschappelijk draagvlak). This initiative is still ongoing and provide a forum for exchange of new ideas.

The work done in the Sustainable Development Advisory Council (CFDD-FRDO), the "Dos and don'ts" guidelines from Business and Society, and the sustainable development report of the Federal Planning Bureau were also important motivators for essenscia.

*"The Belgian Federal Report on Sustainable Development 2009 recommends to avoid over-limitation of the number of indicators. A number that is too limited gives an excessively incomplete picture of society's progress and failures and does not allow to understand the logic of the system. Interconnections between flows and stocks, as well as social, environmental, economic and governance aspects of development should be known to monitor progress along the road of sustainable development."*¹

The valuable input of several "sustainable development experts" enabled essenscia to develop a set of indicators covering all dimensions of sustainable development – including products - instead of an aggregate "unique" indicator.

¹ Federal Reports on Sustainable Development of the Federal Plan Bureau



Stakeholders meeting at essenscia



Stakeholders meeting at essencia

Readers should be aware that 'multi-level' indicators are used in this report. The GRI methodology makes a distinction between quantifiable indicators (GRI-level I), qualitative indicators (GRI-level II) and so-called problematic indicators (GRI-level III). The latter are considered by the organisation as relevant, but are not substantiated to the same degree due to the absence of common methodology or data, as in the case of process safety and soil quality, for example.

Reporting is a dynamic process

As society changes, so do we, and so does what we report on. There are new issues to be covered such as security which will be addressed through the extension of process safety indicators; new quantitative data available for some areas such as mobility of staff, and taxes and subsidies; also the dropping of non-relevant indicators such as emissions of ozone depleting substances because Belgium's chemical and life sciences sector has fully implemented the Montreal protocol.

The information in this report is based on official data available to the general public. The use of verified statistics covering the activities of the whole sector is an important element in terms of **credibility and transparency**.

In addition, it avoids any additional third party validation or certification, or increasing the reporting burden on member companies. Use of official statistics means the most recent figures available are from two years ago; nevertheless, this provides a clear indication of trends and how issues are evolving.

Official data based on statistics covering the whole sector

The chemical and life sciences industry is defined according to the European classification of Economic Activities NACE, unless specified otherwise. Since 2008, the NACE rev. 1.1 has been replaced by the NACE rev. 2. The activity of chemical and life sciences industry is defined as the aggregation of NACE 20 - manufacture of chemical products, NACE 21 - Manufacture of pharmaceutical products and preparations and NACE 22 - Manufacture of rubber and plastic products. However, some data are still published based on the old classification NACE Rev 1.1. 24+25.

Foreign trade statistics are based on the Combined Nomenclature (CN) of the Harmonised System run by the World Customs Organisation. Products of the chemical and life sciences industry are regrouped under Section VI - Products of the chemical industry (including pharmaceuticals) and Section VII - Plastics and rubber and articles thereof.

Environmental data based on European legal requirements

The environmental indicators used in this report are based on the official data from the European reporting system EPER - EPRTR or on federal or regional official sources. Note that one should be cautious when comparing data from EPER (years 2001-2004) with E-PRTR data (years 2007-2009). The number of considered companies and pollutants and the thresholds for reporting can be different. This remark is also true for 1987, when the Responsible Care programme started. This means that the data before 2001 are for information only and that no definite trend can be concluded from them. The enterprises' emissions in this report are identical to all emissions registered in E-PRTR. This comprises the reported emissions from industry in general, business and agriculture.



Stakeholders meeting at essenscia

In total, 33 quantitative indicators are presented in this report: People (11), Planet (14), and Prosperity (8), together with several qualitative and some quantitative indicators for Products. Future work on Product indicators will further seek to establish the linkage between sustainable production and sustainable consumption (value chain approach); and to identify company and sector-based initiatives that seek to reduce the health, safety and environmental impacts of processes and products and encourage sustainable consumption.



Signing ceremony
Joint Sustainable
Declaration
(September 2011)

The representatives of the European social partners in the chemical sector - ECEG, the European Chemical Employers Group, and EMCEF, the European Mine, Chemical and Energy Workers' Federation - together with Cefic - the European Chemical Industry Council - have agreed in Brussels, September 6, 2011 on a common declaration on 'Framework conditions for a sustainable chemical industry in Europe'

“A sustainable chemical industry is vital to the sustainability of Europe.”

Jean Pelin, ECEG President

A common definition of sustainability is included in the declaration, reflecting the sector's track record and ambitions for the future in Europe as a

positive environmental and economic force, as well as a progressive social partner approach.

EMCEF Secretary General Michael Wolters, concluded: "This declaration highlights the urgent need to see sustainability as a way to safeguard and expand high-skilled, high value-added jobs in Europe through a comprehensive EU industrial policy."

To see the joint declaration in its entirety, go to Cefic web site: www.cefic.org/declaration or EMCEF - Joint Sustainable Declaration webpage: www.emcef.org

“The objectivity and the credibility of this sustainable development report increases thanks to the involvement of different stakeholders in the process. Preconceived ideas are questioned. This involvement process - and openness - should lead to new perspectives and action.”



Jan Turf, Managing Director About Society

01.

“ This report reflects the importance of social dialogue, close relationships and openness on several socio-economic issues and on environmental ones, as well as offering a positive vision for the future of the chemical and life sciences industry in Belgium.”



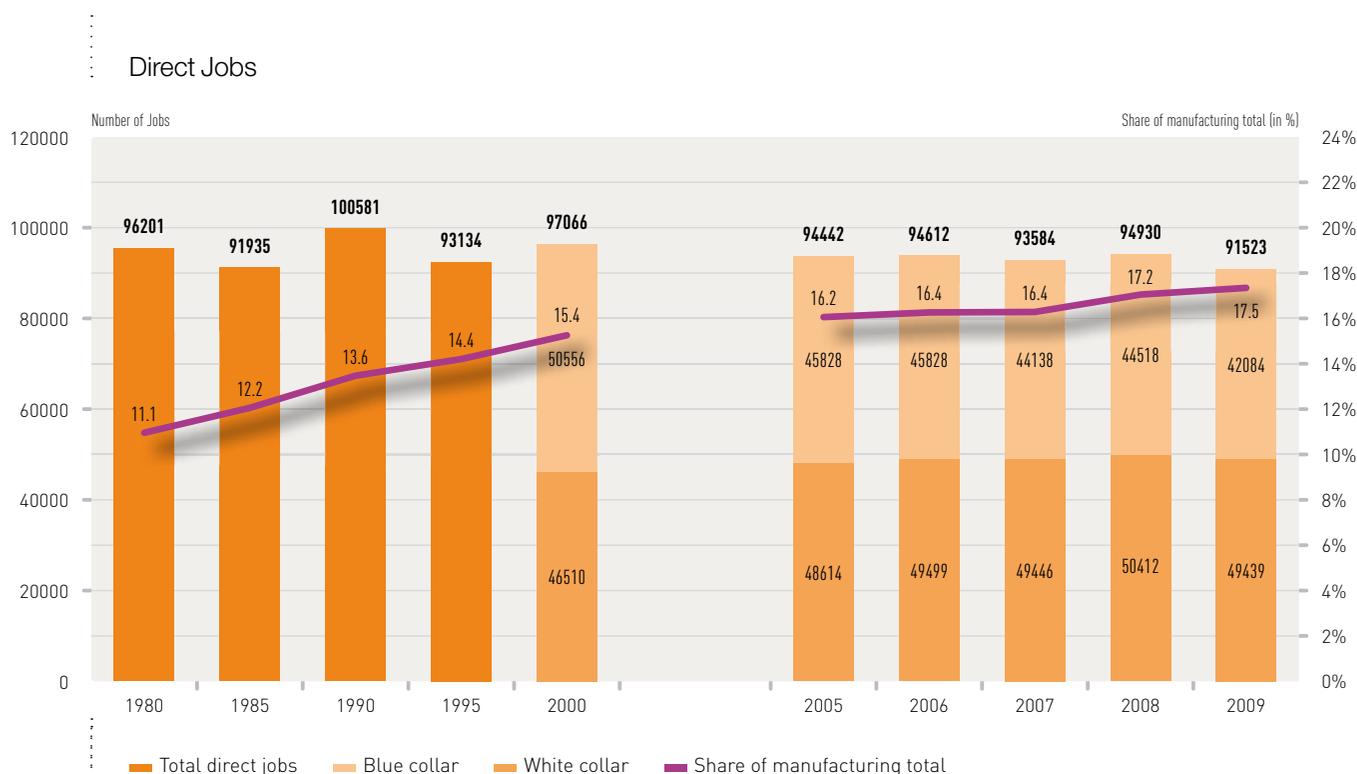
Luc Cortebeek
President ACV-CSC (trade union)

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PEOPLE

Employment

Chemical industry employment takes increasing share of manufacturing total



▶ **Over the last 30 years**, employment in the chemical and life sciences industry has remained **relatively stable, varying between 90,000 and 100,000 jobs**. This stability is remarkable taking into consideration significant job reductions for manufacturing as a whole when more than 340,000 jobs were lost from a total of 866,000 in 1980 to 523,000 in 2009.

▶ In 2009, tough economic conditions resulted in the number of jobs falling 3.6% on the previous year to some 91,500 direct jobs. However, job losses in the chemical and life sciences sector were lower than for general manufacturing which fell 5.2%.

▶ Part-time jobs represented 15.6% of total employment in the sector in 2009. Some 72% of part-time employees work at least 76% of full-time hours against 62% for general manufacturing. An analysis based on data from the social balance sheets shows that **96.5% of employees in the sector have a permanent employment contract**.

▶ **The share of overall employment** of the chemical and life sciences industry as a percentage of **total manufacturing** has risen steadily: from **11.1% in 1980**, to 15.4% in 2000 and **17.5% in 2009** (compared with 11.6% in the EU in 2009). This robustness can be attributed to our industry's ongoing pursuit for solutions to meet both current and future societal challenges in key areas including health, water, food, climate change mitigation, reducing energy consumption, and more efficient use of resources.

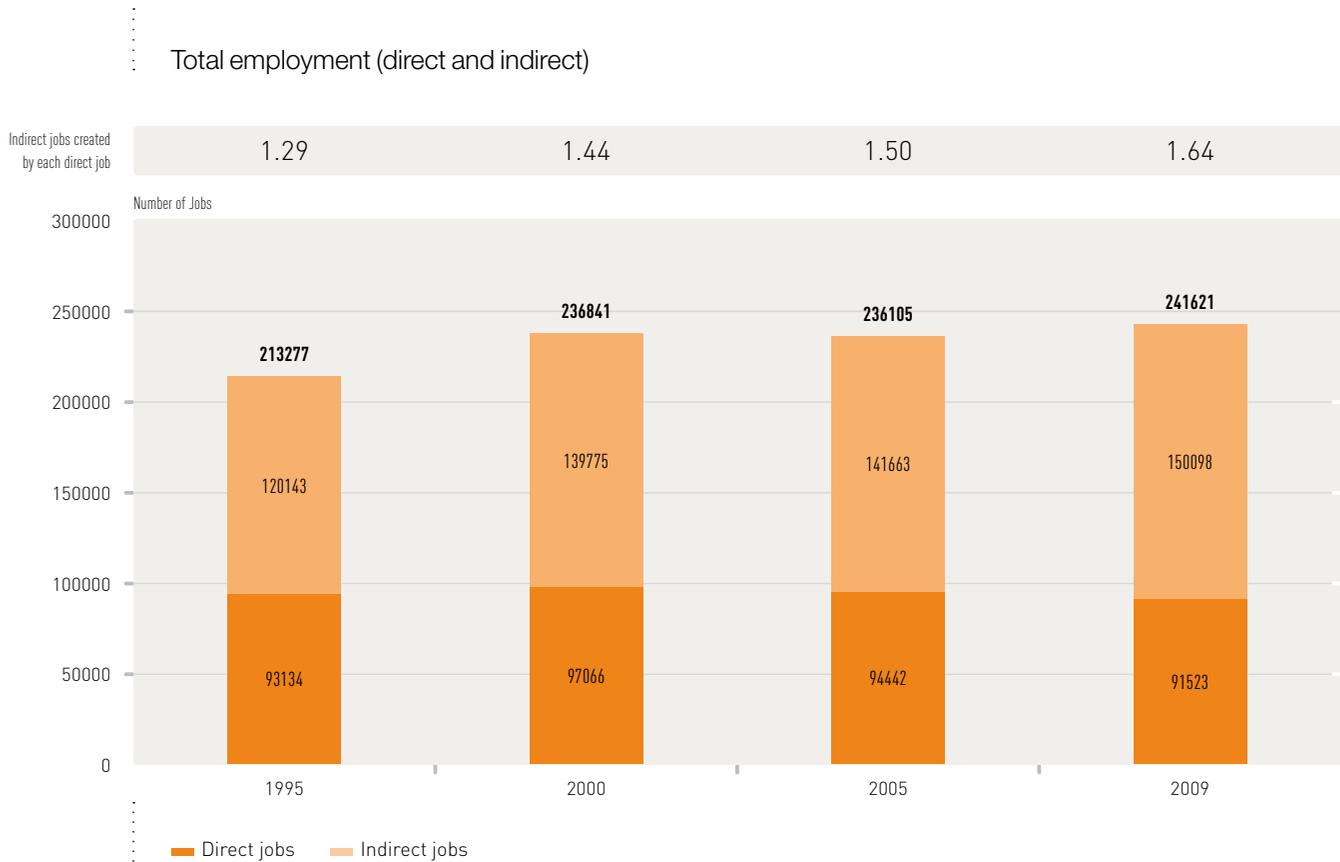
▶ **The number of white collar workers** as a percentage of all those employed in the chemical and life sciences sector has shown a consistent upward trend: **54.0% in 2009 compared with 47.9% in 2000**. According to a study by the University of Leuven (Prof. Sels, 2008), this increase can be explained by the industry's high intra-sectoral mobility (shift from blue collar to white collar), a trend that improves both employment quality and conditions. White collar workers account for one third of jobs in manufacturing as a whole.

SOURCE

National Social Security Office
decentralised statistics
(number of jobs on 30th June)

240,000 **direct and indirect jobs**

Total employment up as indirect employment grows



► The chemical and life sciences industry generates employment in other sectors in Belgium such as maintenance contractors, port activities, transport and logistics, and IT. A recent study by Econopolis, based on official national data, showed that each direct job in the chemical and life sciences sector generates **1.6 indirect jobs in Belgium**. In 2009, that meant a total of **240,000 direct and indirect jobs**. This ratio – amongst the highest when benchmarked against other sectors in Belgium – has increased steadily over the past decade. It reflects the growing impact of the sector on indirect employment, and has enabled total employment in chemicals and life sciences to grow.

SOURCE

National Social Security Office - decentralised statistics (number of jobs on 30th June)
For the indirect employment ratios: Econopolis based on Input-Output Tables National Bank of Belgium/ Institute of National Accounts

“The chemical industry is a strategic partner for Katoennatie. Nearly 50% of our turnover and employment is linked to the chemical cluster in Antwerp.”

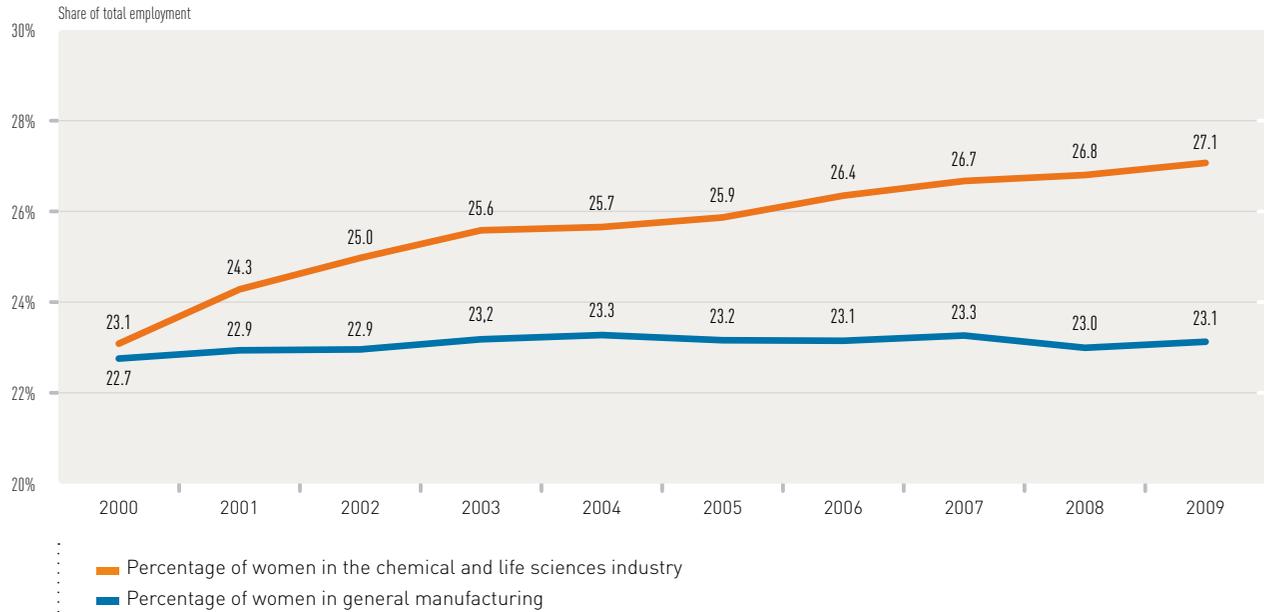
Fabian Leroy, Vice President Katoennatie



Women in the workforce

An industry open to gender diversity

Women in the workforce



▷ In 2009, almost **25,000 women** were employed in the chemical and life sciences industry.

▷ This represents **more than 27%** and is consistently higher in the chemical and life sciences industry than in general manufacturing (23.1%).

▷ The **percentage share of women employed** in our industry **has risen steadily** during the last decade from **23.1% in 2000 to 27.1% in 2009**, while it has remained relatively static in the manufacturing sector as a whole (22.7% in 2000 against 23.1% in 2009).

▷ In 2009, women accounted for **37% of researchers** working in the chemical and life sciences industry. With 49% achieving a higher degree, this is reflected in the high percentage involved in R&D.

SOURCE

National Social Security Office
(decentralised statistics)

“Diversity - in this respect employment of women - in the chemical and life sciences industry in Belgium is a key priority for many companies and Total in particular. We are competing to attract talented women to work in several functions, both for operational careers and plant management at site level as well as leadership roles and management positions in sales, HR, finance, and especially R&D.”

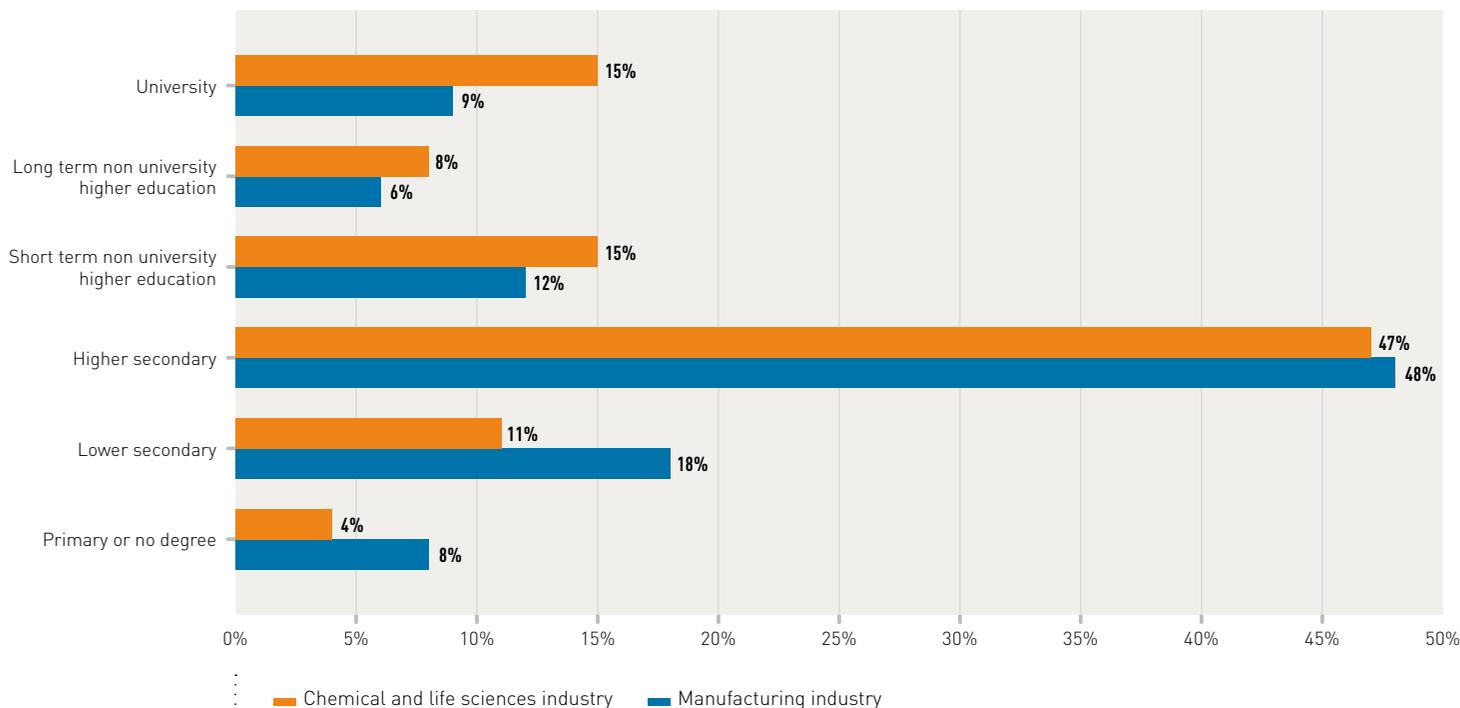


© Total - Michel Cincemalle

Employee qualifications

Highly qualified and specialised employees

Qualification level of personnel in 2009



— Chemical and life sciences industry — Manufacturing industry

▷ The chemical and life sciences industry offers a variety of jobs, often requiring **highly qualified and specialised employees** to meet the needs of sophisticated production processes, high standards of R&D in an innovative sector, commerce in the field of science, and so on.

▷ **38% of employees** in the chemical and life sciences sector **have a higher degree** (university and higher schools). That percentage is considerably greater than for general manufacturing industry (27% in 2009).

▷ The chemical and life sciences industry is on track to reach the EU 2020 target for inclusive growth of 40% of employees completing university education or equivalent.

▷ The percentage of highly qualified staff is even greater when focusing on **women: 49% have a higher degree**, compared with 34% for general manufacturing. Increasingly, women are occupying leadership roles and management positions in a range of functions including human resources (HR), finance, plant management and research. More than half (53% in 2009) the female researchers employed in manufacturing work for a chemical or life sciences company.

▷ Some 47% of employees have obtained a higher secondary education degree with the specialist skills required in process and manufacturing activities such as electrical engineering.

SOURCE

DG Statistics and Economic Information
(based on the labour force survey)

38%
completed higher education
in line with EU 2020 target of 40%

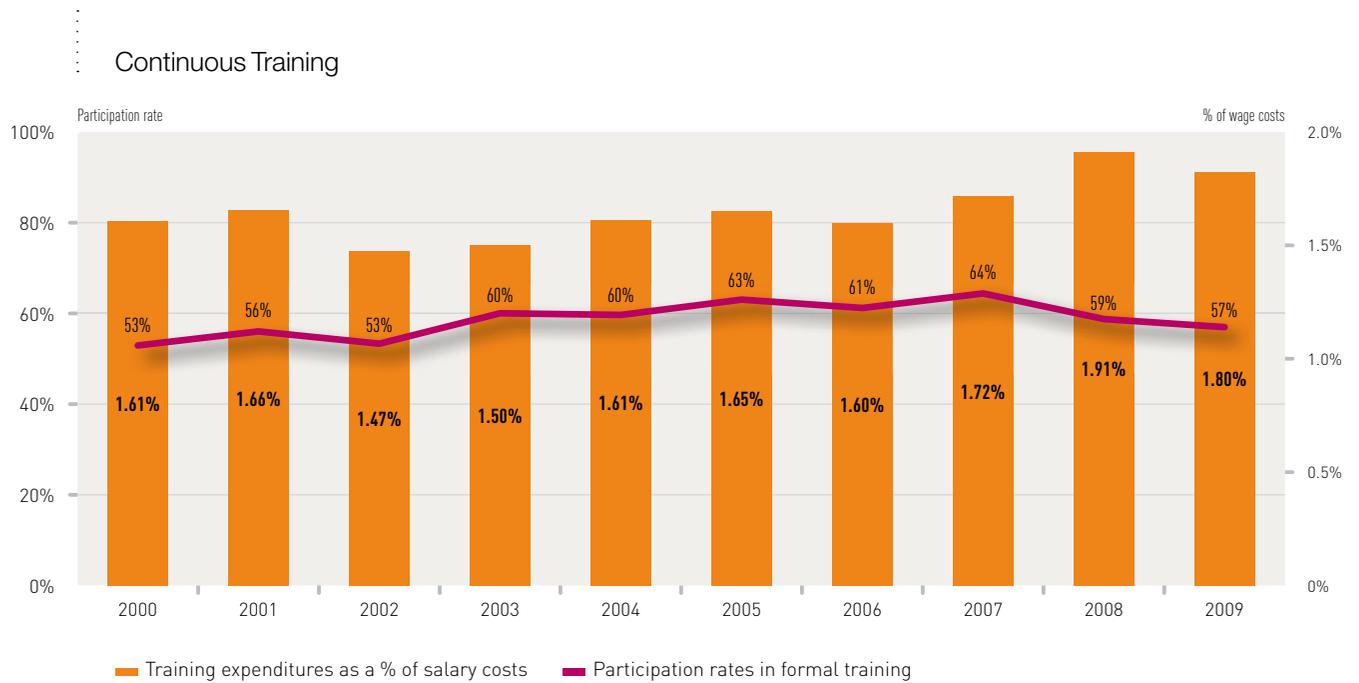


“The staff are highly qualified and training policies are crucial. The sector has developed effective collaboration with the public authorities to enable it to continue to meet this challenge.”

Pascal Lizin, President essencia wallonie

Employee training and education

Continuous training – crucial for an innovative sector



▷ Continuous vocational training of employees is crucial for success in a highly innovative and skill-based sector such as the chemical and life sciences industry.

▷ In line with the EU 2020 growth strategy for inclusive growth, in particular the flagship initiative for new skills and jobs, the chemical and life sciences industry in Belgium is creating the conditions for modernising the labour market with the aim of at least maintaining employment levels, and ensuring the sustainability of our social model.

▷ In 2009, companies in the chemical and life sciences industry spent €114 million on training and education programmes. Nearly two thirds of this was spent on formal training and the balance on informal (on-the-job) training. This means that more than **1.8% of total wage costs**

was spent on **continuous training and education programmes in the sector**, in line with the 1.9% target agreed between the social partners (employers and trade unions) in 1998. This ratio is higher than for general manufacturing, estimated at 1.55%. Social partners of the chemical and life sciences industry co-manage funds for the continuous training of workers, with a special focus on the promotion of training within SMEs.

▷ Nearly 51,000 people or **57% of all those employed in the chemical and life sciences industry participated in formal training** (compared with 39% for the manufacturing industry as a whole) and 30% participated in informal training (21% for manufacturing) in 2009. Analysis shows no substantial difference in participation rates between men and women in the sector.

SOURCE

National Bank of Belgium (data from the Central Balance Sheet Office)

57% of employees underwent formal training in 2009 against 39% for the whole of the manufacturing sector



Didactical miniplant at ACTA (Antwerp)



State-of-the-art pilot equipment at Cefochim (Seneffe)

▷ The chemical and life sciences industry has two dedicated training centres: **ACTA** and **Cefochim**. ACTA is a training centre for automation and process technology located near the heart of the chemical cluster in Antwerp. The rapid evolution in technology requires permanent ongoing training. In 2010, 13,505 hours of training were given to chemical industry workers. Cefochim, located in Seneffe, is a training centre for production and maintenance jobs in the chemical and biopharmaceutical industries. It provides state-of-the-art pilot equipment designed to enhance and refine learning skills. Around 100,000 hours/year of training were given in 2009-2010 not only to employees, but also to unemployed people, teachers and students. As well, the social partners from the plastics processing industry focus on continuous training for employees via Werk Vorming Onderwijs Kunststoffentechnologie (WVOK) in close collaboration with Vlaams Kunststoffencentrum (VKC).

▷ The chemical and biopharmaceutical industry was one of the first sectors in Wallonia to implement a system of cooperative education for a masters degree in analytical science combining high school education with practical work experience in companies on a 50/50 basis.

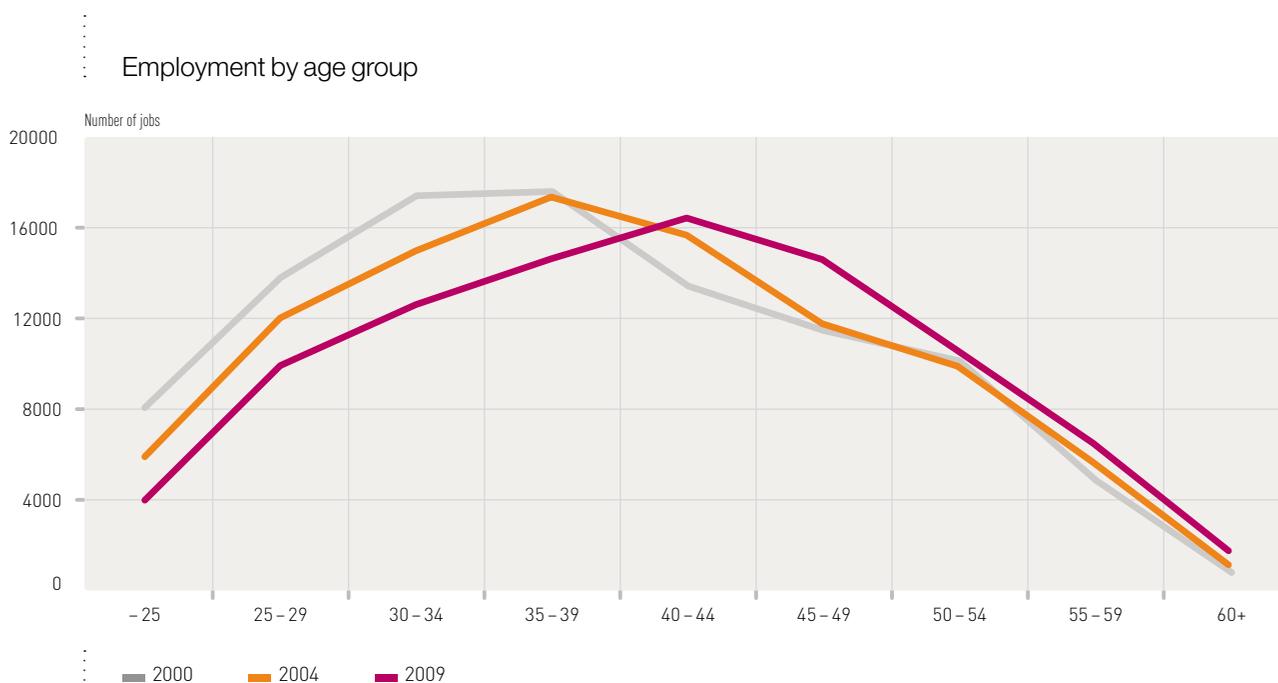
“It is clear that continuous staff training enhances the competitiveness of companies, enabling them to design and produce innovative, high quality products, and to operate under rigorous safety standards.”



Jean-Nicolas Pecqueur, Director Cefochim

Age Pyramid

20,000 new recruitments required by 2020



▷ In 2009, 18,772 jobs in the chemical and life sciences industry were held by employees aged over 50. This represents more than 20% of all employees in the sector. Between 2000 and 2009, this ratio increased by more than 4 percentage points (from 16.1% to 20.6%).

▷ Between 2000 and 2009, the number of employees aged under 30 has decreased by 37% in the chemical and life sciences industry, and is below average for manufacturing as a whole.

▷ A study by the Katholieke Universiteit Leuven (Prof. Sels, 2011) forecasts that a quarter of jobs in the sector in Belgium will be held by employees aged over 50 in 2014. This means that 20,000 people will have to be recruited to compensate for retirements over the next decade.

▷ Strong cooperation with the authorities responsible for education and employment will be needed to meet this challenge.

▷ Staying in further education to achieve better qualifications and higher-paid jobs only partly accounts for the lower proportion of employees aged under 30 in the sector: a study by University of Namur (Prof. Romainville, 2008) pointed to the low appeal of scientific and technical studies among younger people.

▷ Higher qualifications in the field of science offer good opportunities in the labour market. According to a survey of students (2008-2009) by government employment service VDAB, all school leavers with a science degree found employment within a year.

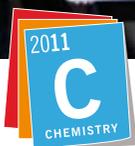
▷ According to a study by human resources consulting company Securex, employees in the sector have a high degree of company loyalty. Only 3.2% of employees quit voluntarily in 2010 against 7.8% for the private sector as a whole.

SOURCE

National Social Security Office statistics (according to place of residence of each worker)



“The chemical industry has a lot of assets to attract young talents. This will be the biggest challenge for the coming years.”



IYC 2011

International Year of
CHEMISTRY



Events of essenscia during the International Year of Chemistry



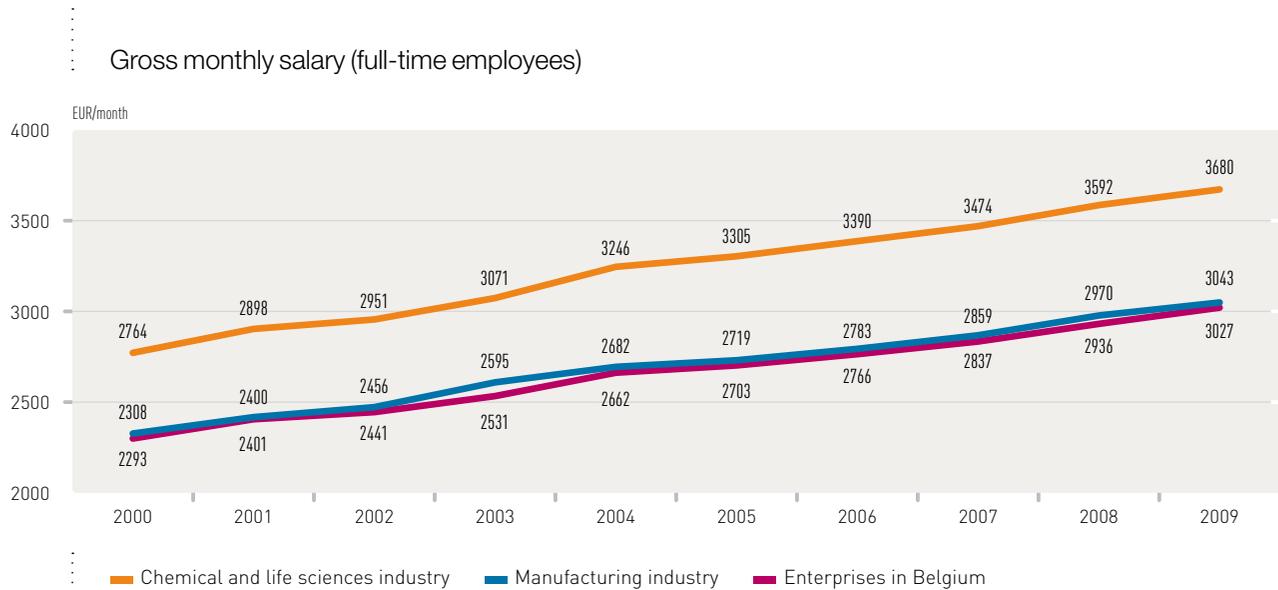
essenscia broke the world record of the largest chemistry lesson in the science centre Technopolis in Mechelen

100%

of school leavers with a science degree find a job within a year

Salaries

The sector offers attractive remuneration



▷ With an average gross salary of €3,680/month in 2009, the chemical and life sciences industry offers **attractive remuneration compared with** the average gross salary in **manufacturing as a whole**. Gross salaries are **on average 21% higher**, although there are variations between sub-sectors.

▷ In general, sectors that pay best are those having more highly qualified and specialised employees on board, as is the case with the chemical and life sciences industry.

▷ **The wage gap between men and women** employed full-time by the chemical and life sciences industry has been closing steadily over the past ten years: **from 19.4% in 2000 to 13.7% in 2009**. This can be partly explained by the fact that relatively more women achieve a higher standard of qualification which gives them access to more highly qualified jobs.

SOURCE
DG Statistics
and Economic Information

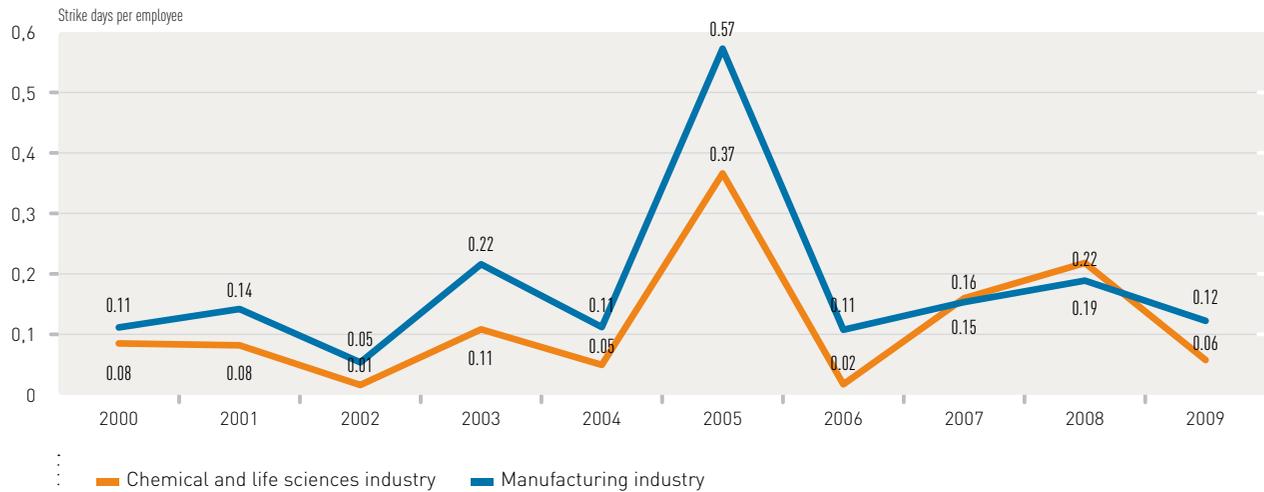
€3,680

**average monthly salary
for an employee in the chemical
and life sciences sector**

Social Climate

Constructive social climate but relatively high blue collar absenteeism

Average number of strike days per employee



▷ The social climate can be gauged by different elements such as absenteeism rates, number of days lost to strikes, employee satisfaction levels, and workforce retention.

▷ **Over the period 2000-2009, an average of 10,939 strike days per year** was registered in the chemical and life sciences sector. This represents **0.12 days per employee, as against 0.18 for total manufacturing industry**. This would indicate a generally better social climate for the sector, although this was not the case in 2007-2008 when several major restructurings were announced.

▷ According to a **recent study by human resources specialist Securex (2010), blue collar workers in the chemical and life sciences sector had the highest absenteeism frequency rate** in the Belgian economy in 2009 (**1.50 sickness notifications per worker against 1.18**).

The average duration of absences due to sickness was 12.56 working days for the blue collar workers in the sector.

The data does not specify the reasons for absenteeisms (illness, injury, stress, etc). Figures could be in part related to the generous social benefits provided by the chemical and life sciences sector, (sick pay, insurance etc) and to company size as well as to the age profile of workers.

▷ Together with Securex, essencia organised several **information sessions** in January 2011 in an effort to improve companies' ability to meet the challenge of reducing absenteeism.

▷ Absenteeism among the sector's white collar workforce is similar to the rest of the economy.

▷ A study by the Katholieke Universiteit Leuven (Prof. Sels, 2008) shows that employees in the chemical and life sciences industry tend to stay within the sector (low inter-sectoral mobility) and are more satisfied with working conditions.

SOURCE

National Social Security Office,
DG Statistics
and Economic Information

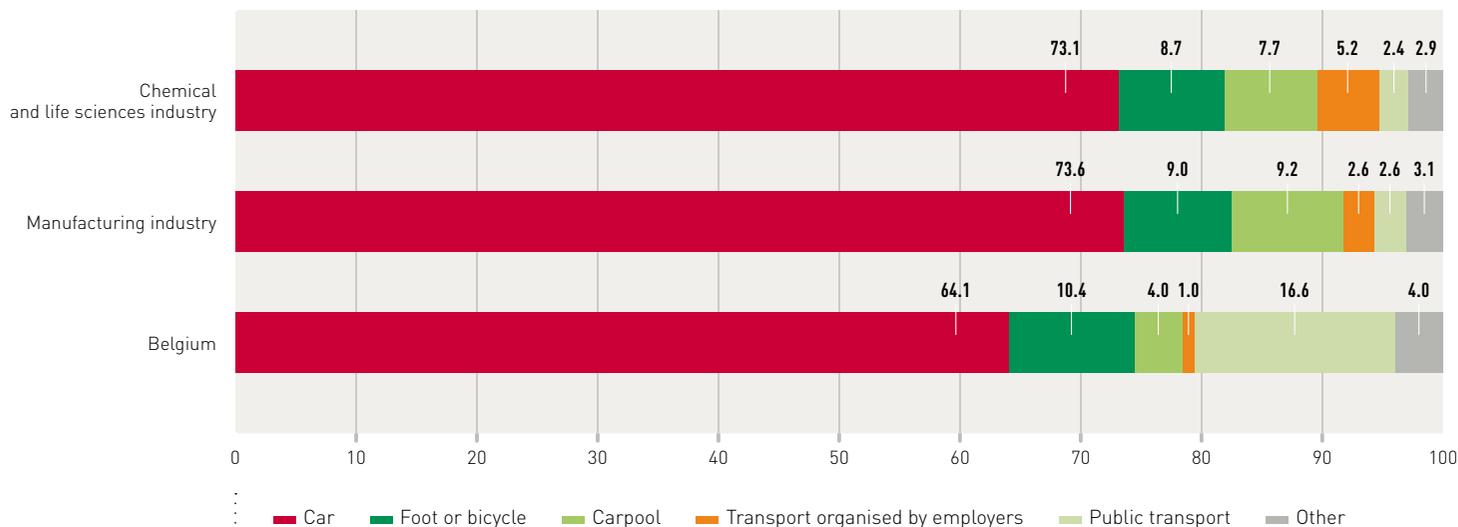
50%

**fewer strike days
per employee in 2009
compared with
manufacturing as a whole**

Home-to-work mobility of employees

Voluntary measures to improve commuting for employees

Home-to-Work Main Transport Mean – Modal split % (2008)



▷ Every three years, the mobility and transport administration in Belgium conducts a survey on commuting habits among companies employing more than 100 people. This analysis is based on data from the most recent survey (2008).

▷ Employees of the chemical and life sciences industry cover on average 16.9 km (as the crow flies) between home and work. This is comparable to the average distance covered by all Belgian workers (17.6 km) and slightly longer than for the manufacturing industry as a whole (15.7 km).

▷ **Just over 73%** of employees **use the car as their main means of transport** (excluding carpooling) to get to work. The figure is slightly lower than the 75.7% recorded in the previous survey. The rate is similar to that of total industry (73.6%) but significantly higher than for the total workforce

in Belgium (64.1%). An **additional 7.7% of the sector's workers use carpooling**. This share is nearly twice the Belgium average of 4%. Moreover 13.8% of companies run a carpooling scheme against 8.3% for all industry and 6.5% for Belgian employees as a whole.

▷ **Public transport (train, bus, metro, tram)** is less popular with the sector's employees, representing just 2.4% against the Belgian average of 16.6%. **More than 55% of respondents in the chemical and life sciences industry believe that public transport services are not well adapted to the sector's work practices**. The public transport system is not well-adapted to serve either the outlying locations of plant clusters and production sites, or the sector's labour patterns (shift regime, night work). About 40% of employees are on shift work compared with the Belgian average of 15%.

SOURCE

Federal Public Service Mobility and Transport

4,500

employees travel to work on transport organised by companies



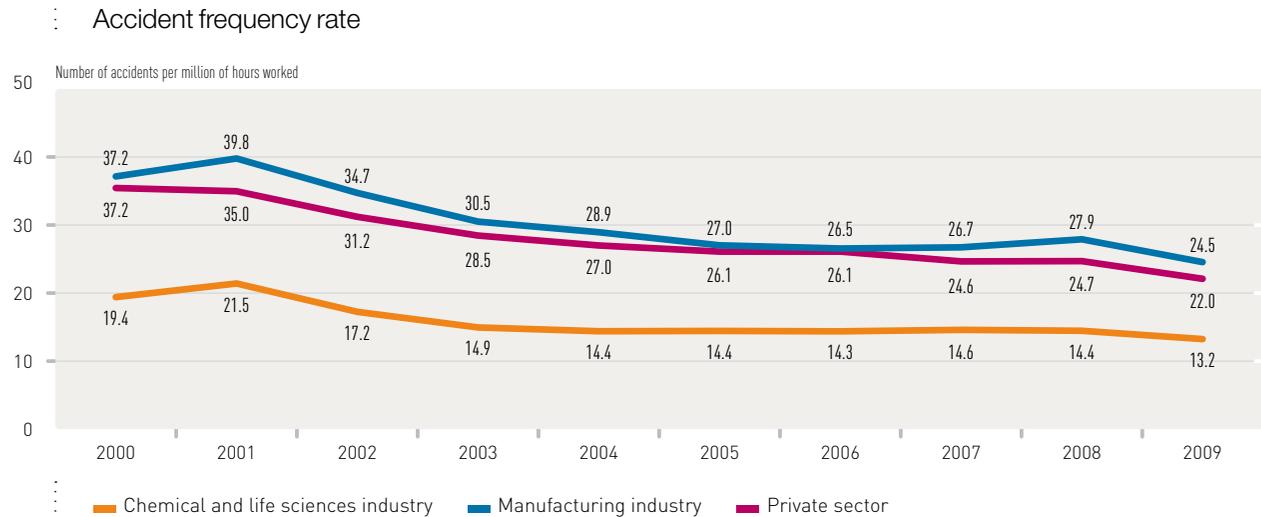
I-bus, bus network for collective transport of employees in the Antwerp chemical cluster especially adapted for shift work.

▷ To compensate, a number of chemical and life sciences companies, in particular those in remote clusters, cooperated in offering dedicated home-to-work transport for employees. About 10% of respondents provide transport for workers against 6.7% in general manufacturing and **5.2% of the workforce** (nearly 4,500 people) travel to and from work on **transport organised and financed by their employer**. This compares with 2.6% for total industry and just 1% for Belgium as a whole.

▷ The **bicycle is the second most popular means of commuting** for employees in the sector, and rose from **6.6% in 2005 to 8.4% in 2008**. More than 50% of responding companies provide changing-rooms and shower facilities for the workforce, and more than 60% have bicycle shelters. Road traffic safety for cyclists remains a matter of concern for respondents (50.9%). A potential measure that could be implemented is the improvement of the road infrastructure for cyclists in the vicinity of production sites.

Accidents at work

Safety management remains a key priority



▷ In the last ten years, the number of workplace accidents has steadily decreased in the chemical and life sciences industry, as result of the sector's well developed **safety culture**.

▷ According to the Occupational Accidents Fund, the **accident frequency rate in the sector is half the rate recorded for manufacturing as a whole**. Performance varies between sub-sectors.

▷ The frequency rate of accidents in the chemical and life sciences industry, including plastics and rubber processing, is estimated at 13 per million hours worked in 2009. This rate is well below that of the manufacturing industry average in Belgium.

▷ European statistics (Eurostat) show that the workplace accident rate for Belgium's chemical and life sciences industry, excluding plastics processing, was consistently lower than the same sector at EU15-level, and was significantly lower than that for manufacturing industry as a whole (data available up to 2006).

▷ As part of efforts to further reduce accident rates, essencia organised with Securex a number of information

sessions in 2011 to **raise SME awareness of accident prevention at work**.

▷ **The Samurai@work** project aims to provide SME's, with concrete awareness campaigns and pragmatic tools to enable them to improve safety performance within their daily operations. Measures including workplace self-assessments, in-house training, specific safety programmes, and a safety 'toolbox' demonstrate the sector's active implementation of **Responsible Care** and the sector's commitment to continuous improvement of safety, health and environmental performance.

▷ Safe practices are also applicable to the sector's **contractors** (including rigorous selection processes, evaluation before and after projects, frequent controls, etc). However, at this point in time, there are no reliable statistics covering workplace accidents for contractors.

▷ **Transport accidents** on the way to and from work are considered as workplace accidents and are included in official statistics. They represent a third of all work-related accidents (618 accidents per year or an incidence rate of 0.7% in 2009).

SOURCE
Occupational Accidents Fund

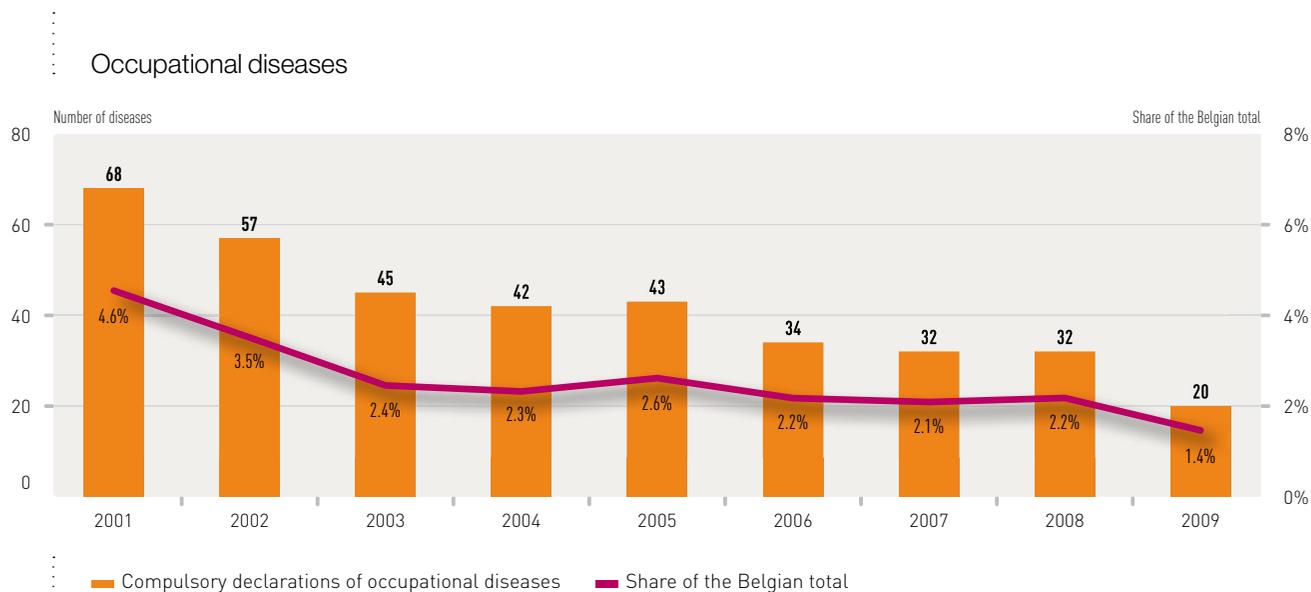


"Safety is one of Dow Corning's seven core values. All our employees understand that at all times 'Safe Work Is our Job'. In line with Responsible Care, our commitment to continual improvement, our 'What Good Safety Looks Like' programme has helped us reduce injuries and manufacturing incidents by 50% in the last 6-7 years."

Peter Cartwright, Dow Corning Global Executive Director Environment, Health and Safety (EHS)

Occupational diseases

Continuous decrease of occupational diseases



▷ According to Fonds de Maladies Professionnelles (FMP)/Fonds voor de Beroepsziekten (FBZ) statistics, the number of employees in the chemical and life sciences industry that have been officially declared as **potentially affected by an occupational disease is low (20 in 2009)** and has **shown a general decline** over the past ten years.

▷ This would indicate that the exposure of the chemical and life sciences industry's workforce to hazardous substances and to other events or activities (such as noise or vibrations) that can cause occupational illness or disease (due to noise, vibrations, radiation, handling of goods...) is being **correctly managed**.

SOURCE

Fonds de Maladies
Professionnelles (FMP)
Fonds voor de Beroepsziekten (FBZ)

▷ 1.4% of occupational illnesses among blue collar workers are attributed to the chemical and life sciences industry even though our sector accounts for 3.4% of all blue collar workers in the Belgian private sector.

“Concern for staff safety and health is clearly a reality in the chemicals and life sciences sector. Risks are managed in close cooperation with employees and results are on the right track.”



Daniel Van Daele, Federal Secretary FGTB-ABW (trade union)

1.4%

of occupational diseases even though the sector accounts for 3.4% of all blue-collar employment

Process safety



Launch of the Chair Process Safety Engineering between essencia and the Katholieke Universiteit Leuven (Wouter De Geest, President essencia and Prof. dr. Mark Waer, Rector Katholieke Universiteit Leuven)

Protection of people and the environment is an important objective of chemical enterprises worldwide. An effective Process Safety Management System that enables the identification, elimination, reduction and mitigation of risks resulting from operations, is a pre-requisite.

Process and Plant Safety performance can be evaluated through the use of key performance indicators that measure and analyse Process Safety Incidents (PSI). Whilst the use of key performance indicators is common at individual company level, their application across industry is restricted because they are not harmonized into a universally shared management model for Process Safety.

The European chemical industry recently agreed a common methodology and assessment tool that will be used internally in pilot programmes during 2011-2012. The decision tree to be followed is illustrated by the chart on page 25.

Continuous improvement of safety, health and environmental (SHE) performance is certainly not limited to big multinational companies. Chemical and life sciences companies are keen to share experiences and good practices with **SMEs**, as continuous improvement throughout the entire sector is critical for its sustainable future. As part of Responsible Care

a special toolkit for SMEs is available online and free of charge. This kit brings together validated tools on a range of areas including Health & Safety, Plant & Process Safety, Security, Environment, Energy Efficiency, Transport & Logistics, Chemicals Regulation, and Product Stewardship.

This indicator will in the future be extended in scope. Indeed, **security** covers all management practices of protection against criminal, malicious and cyber acts encompassing company activities associated with the production, storage, distribution and transportation of products as well as the liaison with suppliers and customers.

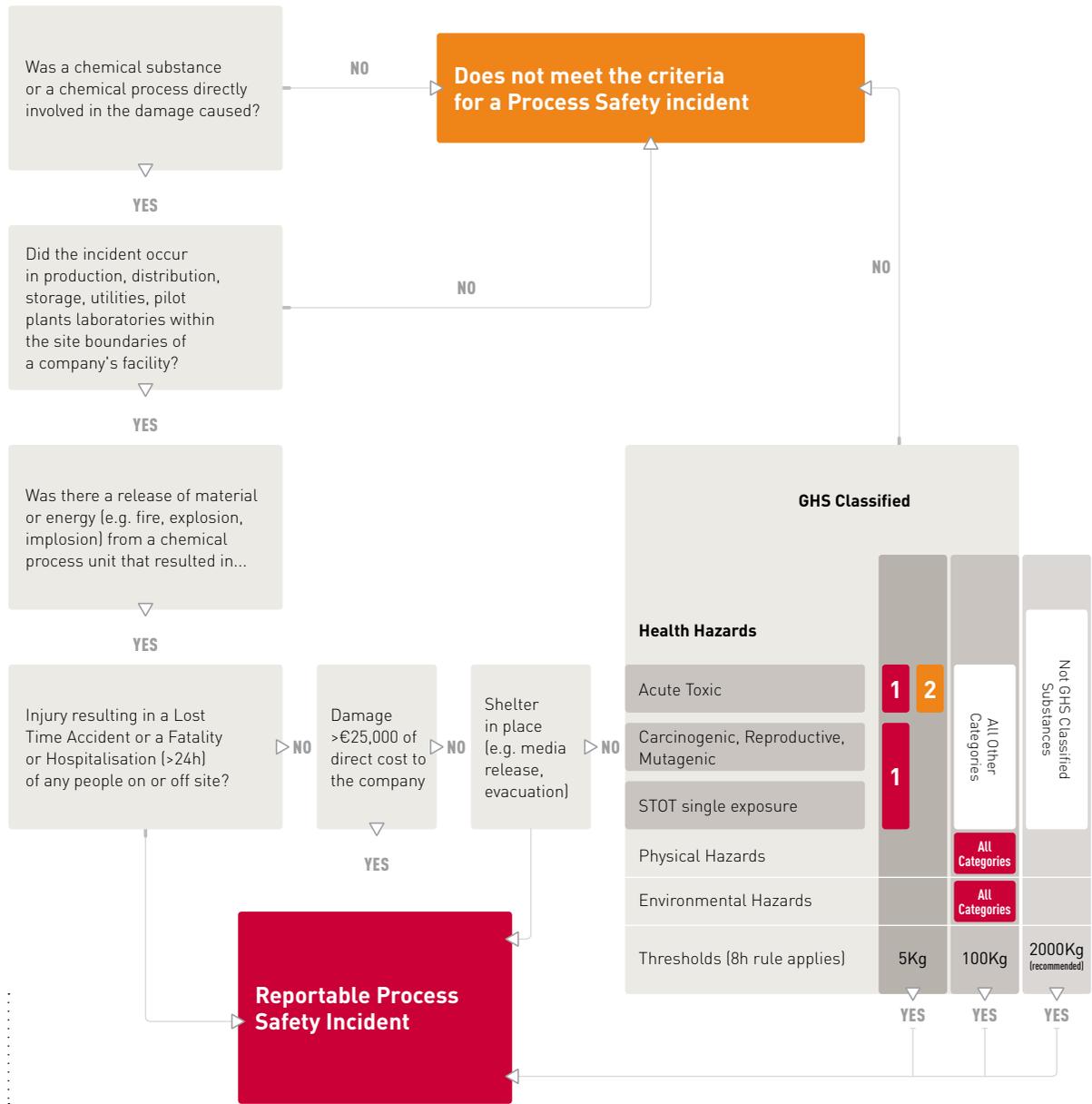
This issue is a new integral part of **Responsible Care** and will be implemented and monitored in the future.



“Sustainability means constant attention to safety and environmental issues. For years, the sector has been committed to this challenge, and with good results thanks to the exchanging of experiences and good practices between companies, mainly on process safety in order to prevent major incidents.”

Patrick Van Acker, President essencia vlaanderen

Determination of Process Safety Incident



SOURCE
Cefic

02.

“ Much progress has been made on the control of emissions affecting air, water, and soil. One of the key challenges now is to maintain or ensure further decoupling between production and impacts on the planet, with energy and resource efficiency being a key element.”



Jean-Pascal van Ypersele

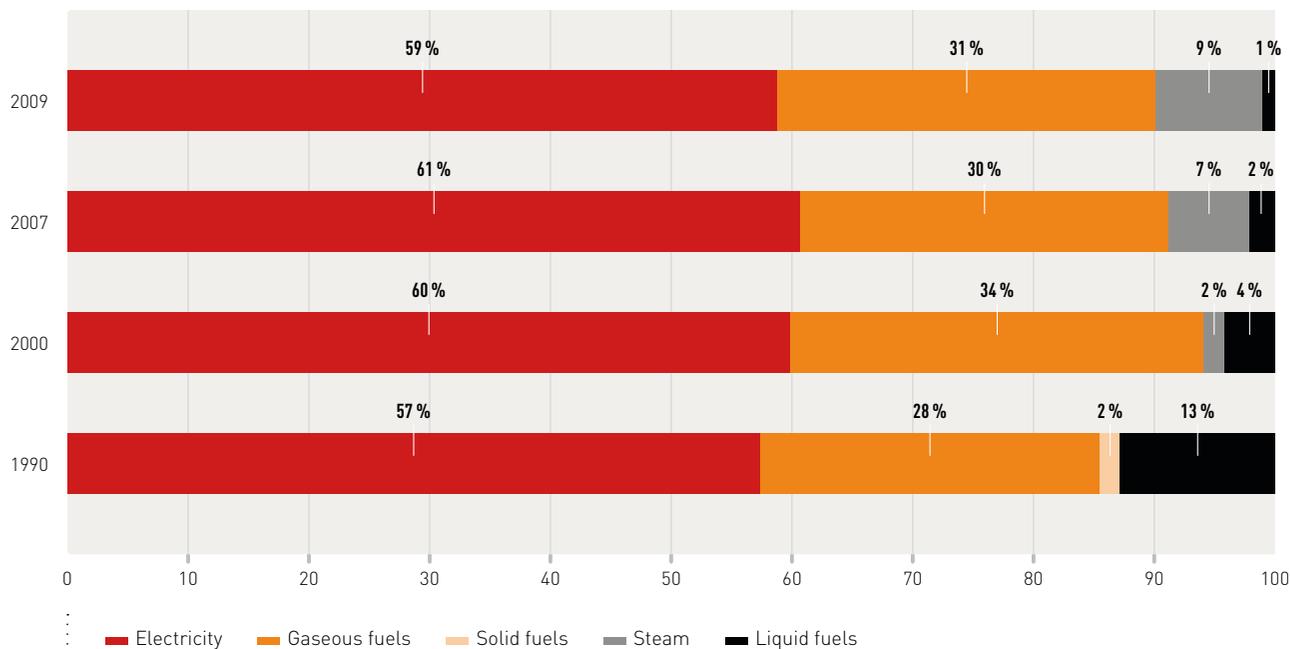
Vice-Chair of the Intergovernmental Panel on Climate Change (IPCC)
Professor Université Catholique de Louvain

Energy consumption	28
Energy efficiency	29
Greenhouse gas emissions	30
Cogeneration	31
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Energy consumption

Gas and electricity are predominant, just 1% of petroleum is used for combustion

Fuel mix* – Sector (2009): 188 PJ



* Figures based on purchased energy vectors

▷ The energy mix of the chemical and life sciences industry is primarily **electricity (59%)** and **natural gas (31%)**. Steam represents 9% of purchased energy. As the chart shows, petroleum use as fuel (1%) has virtually ceased and coal has been phased out completely.

▷ The **transition from petroleum to natural gas** dates from the period 1995 to 2000 and led to an impressive reduction of CO₂ emissions.

▷ The increase of natural gas consumption since 2005, as well as the extended use and exchange of steam between installations, is linked to the increasing number of cogeneration facilities.

▷ The sector is **energy-intensive**, in other words companies require a lot of energy for their production process. Energy represents an important part of production costs so optimizing energy efficiency (using less energy to make one tonne of product) is therefore crucial.

▷ In the Belgian chemical and life sciences industry, energy vectors are also used as feedstocks for industrial processes. In 2009 **roughly 99% of petroleum** (mainly naphtha) **and 40% of natural gas consumption were used as feedstock**. In the context of efficiency, this is much more sustainable than their use in combustion.

SOURCE

essencia/regional administrations (DGOARNE), VITO

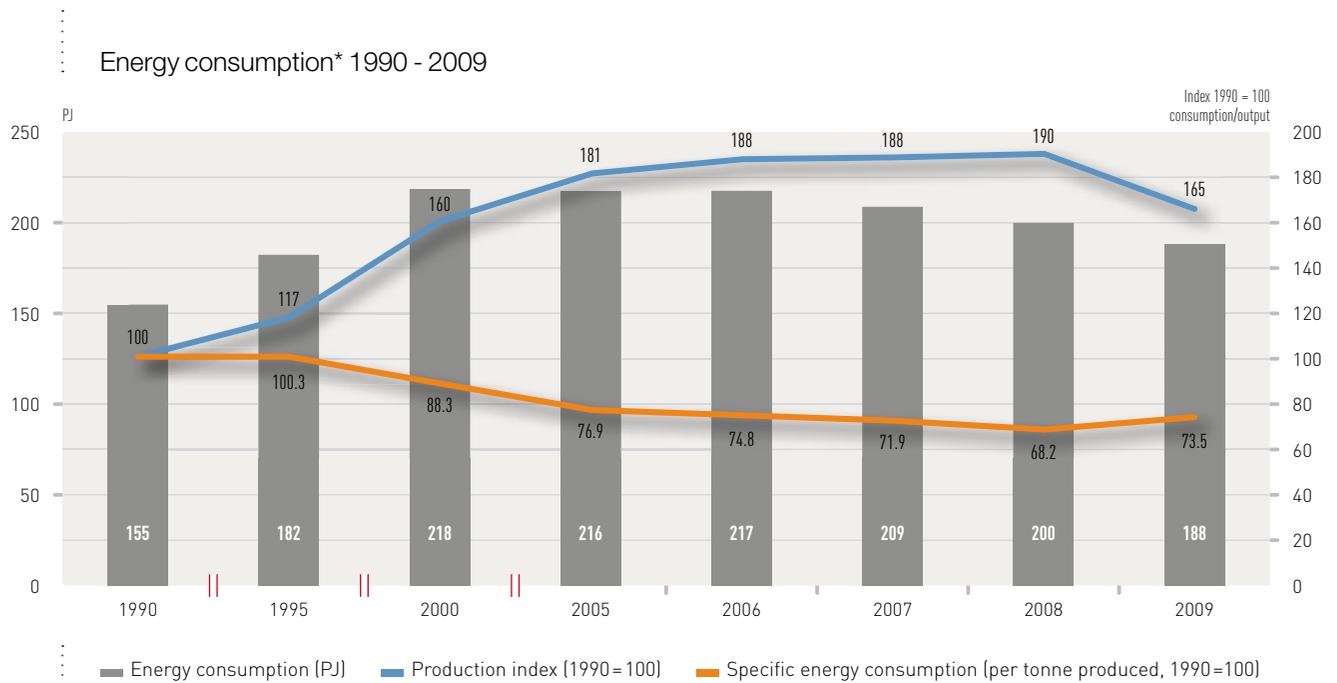


“The realisation of our “Together for Less CO₂ action plan” would not be possible without partnerships. The chemical and life sciences sector in Belgium is one of our key strategic partners. Its member companies are important customers striving for rational energy use. In some cases, they are even co-investors in new efficient production facilities.”

Sophie Dutordoir, Director General GDF Suez - Electrabel

Energy efficiency

Among the world's leaders, despite global recession



▷ Since 1990, total production of Belgium's chemical and life sciences industry has risen by 65%, while energy consumption increased by only 21% – a clear reflection of the sector's increasing energy efficiency.

▷ Companies in the sector have made **voluntary commitments** (accords de branche, covenant energy benchmarking, covenant energy auditing) to continuously improve energy efficiency since 2002, either by the realisation of energy efficiency improvement projects in their installations, or by committing themselves to remain world leader in terms of energy efficiency. Those bilateral agreements resulted in a continuous improvement of the specific energy efficiency by 1.5-2%/year, which represents a constant challenge for all of the companies. New covenants are currently being negotiated with the regional authorities for the period beyond 2012.

▷ As well as investments aiming at better **energy efficiency**, a number of other factors also contribute to improvements including: **production volumes, optimal use of production capacities, more synergies** between

chemical processes, **integration** of the various segments of the production process (from raw material to final products), **improved technologies**, etc.

▷ This strong integration of production processes means that any relocation of part of the production chain may lead to a decrease of overall energy efficiency.

▷ As part of **Responsible Care** and as part of the **EU Care+ project**, a new project **VLAREP** to promote energy efficiency amongst **SMEs** was launched up in 2011 using the mentorship concept. Monthly interactive sessions focus on an energy theme such as measuring, monitoring and tracking of the energy use in peak and off-peak times, technicalities of energy contracts, effects on the negotiated energy price... VLAREP draws from 2 EU approaches: the focus of Care+ on the monitoring and mapping of the energy use and information on specific energy efficiency measures promoted through the EUPlastVoltage and EURecipe initiatives.

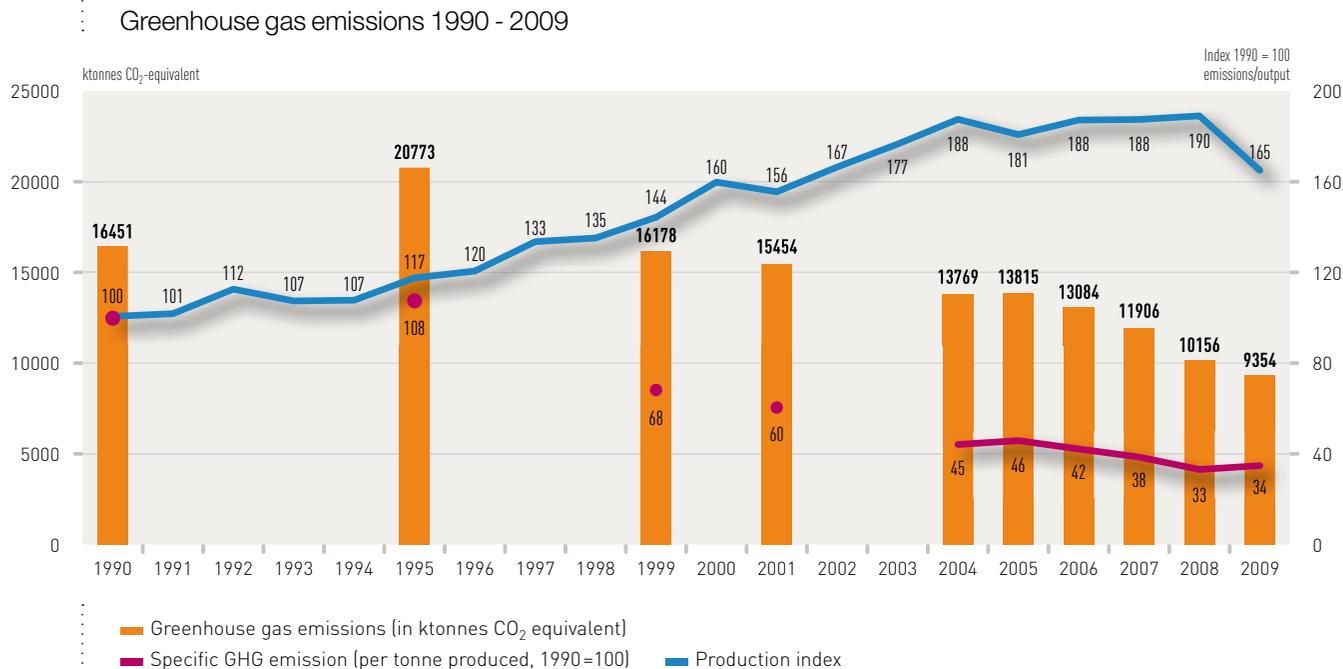
SOURCE
essencia/regional
administrations (DGOARNE),
VITO, DGSEI

1.5 / 2%

**annual improvement
targeted under bilateral
agreements
on energy efficiency**

Greenhouse gas emissions

Emissions per tonne of product down 66% in 20 years



▷ Greenhouse gases (GHGs) are accumulating in the atmosphere, leading to an increase in the average surface temperature of the Earth. This phenomenon is causing **climate change**.

▷ The main GHGs emitted by the chemical and life sciences industry are CO₂ related to the combustion of fossil fuels and to some industrial processes such as production of ammonia, **nitric acid (N₂O) and fluorinated gases (PFCs, HFCs, SF₆)**.

▷ GHG emissions per tonne of product (specific emissions) have **decreased by 66% since 1990**. This significant fall is due to a drastic abatement of N₂O emissions and the substitution of fluorinated gases, as well as to the continuous improvement of energy efficiency and the transition to natural gas which has lower GHG emissions than coal or oil (fuel switch).

▷ **Indirect CO₂ emissions** related to the use of purchased electricity or electricity self-produced by cogeneration are not included in these statistics, as they are traditionally attributed to the electricity sector. Those emissions depend on the energy mix used to produce electricity (nuclear and renewables emitting less GHGs than fossil fuels). The CO₂ costs related to these indirect emissions are included in the electricity price and thus paid by the industrial consumers.

SOURCE

EPRTR - National GHG inventory
DGSEI

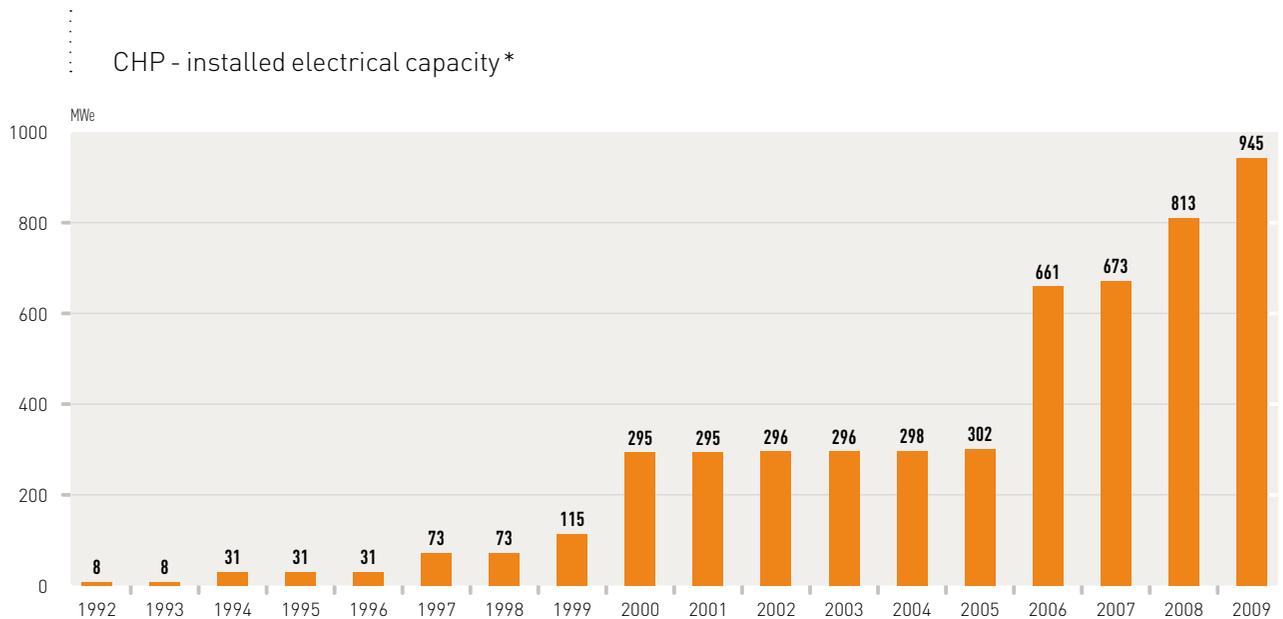


“The chemical sector is a key player in combating climate change, not only by reducing its own GHG emissions but also by providing products that help reduce GHG emissions in other sectors, such as transport and housing.”

Connie Hedegaard, European Commissioner for Climate Action

Cogeneration

40% share of total installed CHP electrical capacity



* Includes only those CHP plants that generate electricity

▷ Cogeneration (Combined Heat and Power or CHP) – the simultaneous production of heat and electrical or mechanical power – enables **primary energy savings** compared with separate production and consumption of electricity and heat.

▷ The **big increase in CHP plants** in the chemical and life sciences industry was driven by strong development of the sector in the 1990s and accelerated after the introduction of subsidy programmes.

▷ The electric power generated by CHP has increased significantly in the last five years: in 2009, capacity was **945 MWe, more than three times the CHP capacity of 2005**. This growth was encouraged by financial aid in the form of CHP-certificates, which remain essential to maintain and increase those CHP installations.

SOURCE
CWAPE - VITO

1,500,000

Cogeneration installations of the sector equivalent to consumption of 1,500,000 households

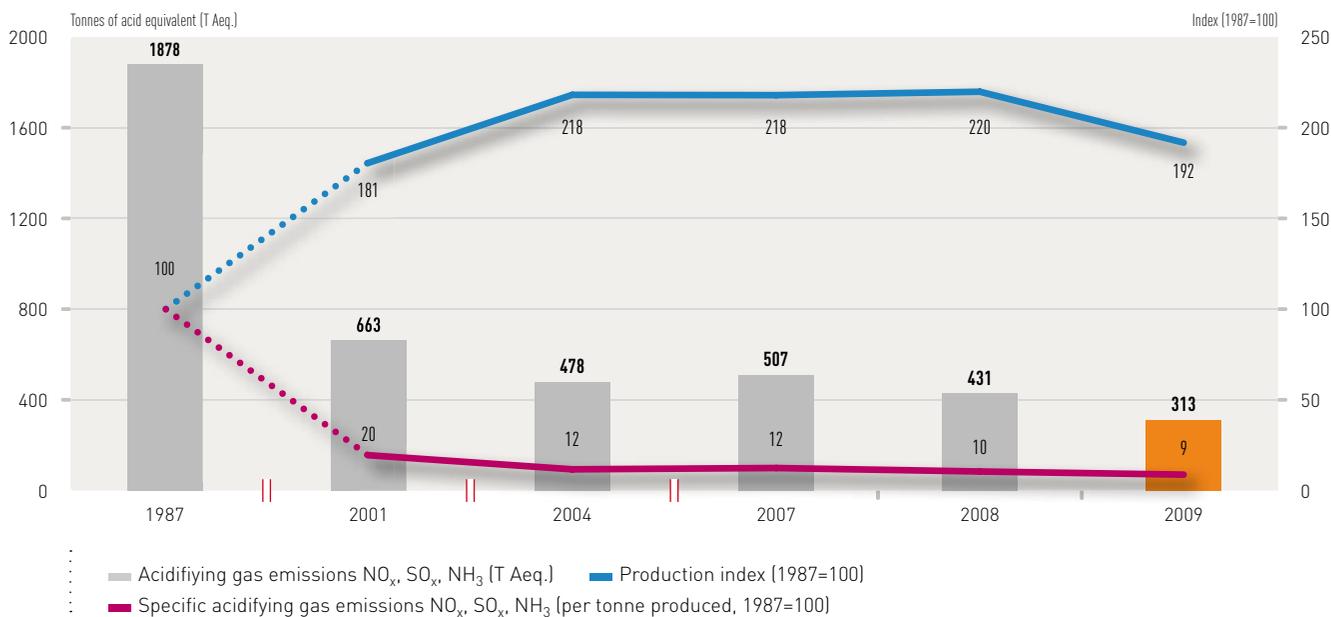


New cogeneration installation of Lanxess in Antwerp

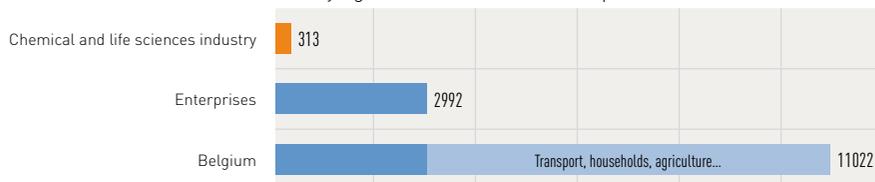
Acidifying emissions

Acidifying emissions fall more than 50% since 2001

Evolution of acidifying emissions (NO_x, SO_x and NH₃)



Acidifying emissions (2009) in T Aeq.



Some substances such as sulphur dioxide (SO₂), nitrogen oxides (NO_x) and ammonia (NH₃) can turn into acid or potentially acidifying components due to a chemical reaction in the atmosphere. These so-called acid rains can affect human health, ecosystems and infrastructure. The main contributors to these emissions are transport, industry, domestic heating and agricultural activities.

In the chemical and life sciences industry, **acidifying gases** originate mainly from fossil fuel combustion and the production of sulphuric acid, ammonia and nitric acid (used for the production of fertilisers, cleaners and in refrigeration).

As they have very different acidification factors, SO₂, NO_x and NH₃ are converted into acid-equivalent before being totaled. Sector NH₃ emissions are 10 times lower than SO₂ or NO_x emissions.

Since 2001, sector emissions have been **reduced by more than 50%** due to investments to improve production and combustion processes. This decoupling between production and emissions has continued in 2009, despite the global economic crisis.

Under a **voluntary agreement** with government, the chemical and life sciences industry has targeted a yearly emission cap on NO_x emissions to 2013. This has led to significant company investment in **NO_x reduction**. Since 2005, annual emissions have been reduced by 2 ktonnes. Further investments are planned to go beyond this and achieve a reduction of up to 3 ktonnes/year by 2013.

The acidifying emissions of the sector in 2009 represented about **11% of emissions from manufacturing as a whole, and less than 3% of the total for Belgium.**

SOURCE

E-PRTR, VMM, DGOARNE, Responsible Care data 1987, DGSEI

3%
Sector accounts for less than 3% of acidifying emissions



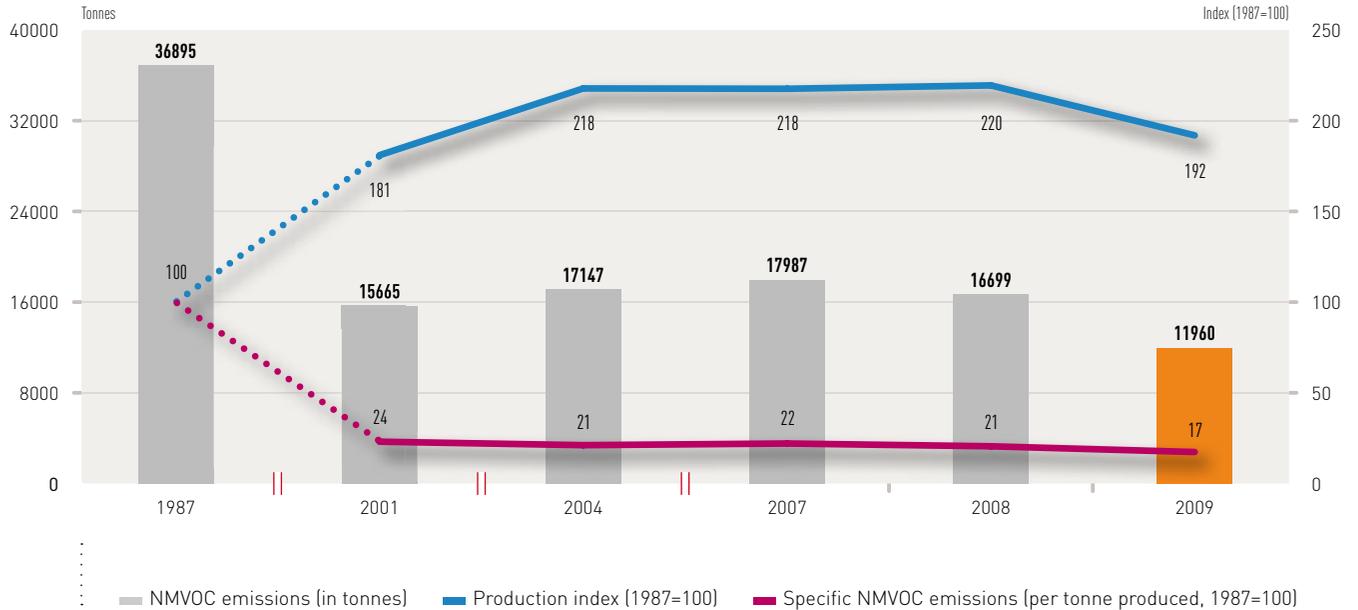
“The sector voluntary agreement with essencia seems already to be outperforming the 2013 target for NO_x emissions.”

Joke Schauvliege, Minister of Environment Flanders

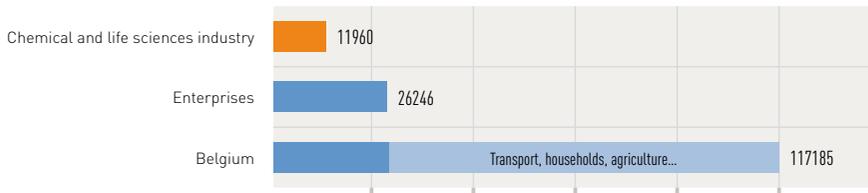
Organic emissions

Sector emissions show further decrease to 10% of Belgian total

Evolution of non-methane volatile organic compounds (NMVOC)



NMVOC emissions (2009) in Tonnes



▷ During the summer, we regularly observe “**ozone peaks**” on sunny days. This phenomenon is a concentration of ozone in the lower atmosphere resulting from photochemical reactions between oxygen in the air and nitrogen oxides (NO_x), driven by the presence of **volatile organic compounds (VOCs), an ozone precursor**.

▷ Exposure to high levels of ozone has negative effects on health, causing respiratory problems particularly among the very young and elderly people. In excessive concentrations, ozone also causes damage to plants.

▷ VOCs are organic chemicals that evaporate easily. Main sources are transport emissions (fuel vapours), and those emitted by the chemical and life sciences industry, mainly from solvents used in some industrial processes. The significant decrease in the sector's VOC emissions between 1987 and 2001 is a result of measures including good housekeeping, process optimisation, improved emissions control during storage and transport, as well as the introduction of water-based paints, Hi-solid paints and other solvent-free products.

▷ More recently these measures have been complemented by vapour recovery systems to further reduce or eliminate VOC emissions through dedicated emission treatment that re-uses combustion heat, and by detection and repair of fugitive leaks.

▷ In 2009, VOC emissions of the sector amounted to a historic low of **around 12 ktonnes**.

SOURCE

E-PRTR, VMM, DGOARNE, Responsible Care data 1987 (in tonne carbon equivalent), DGSEI

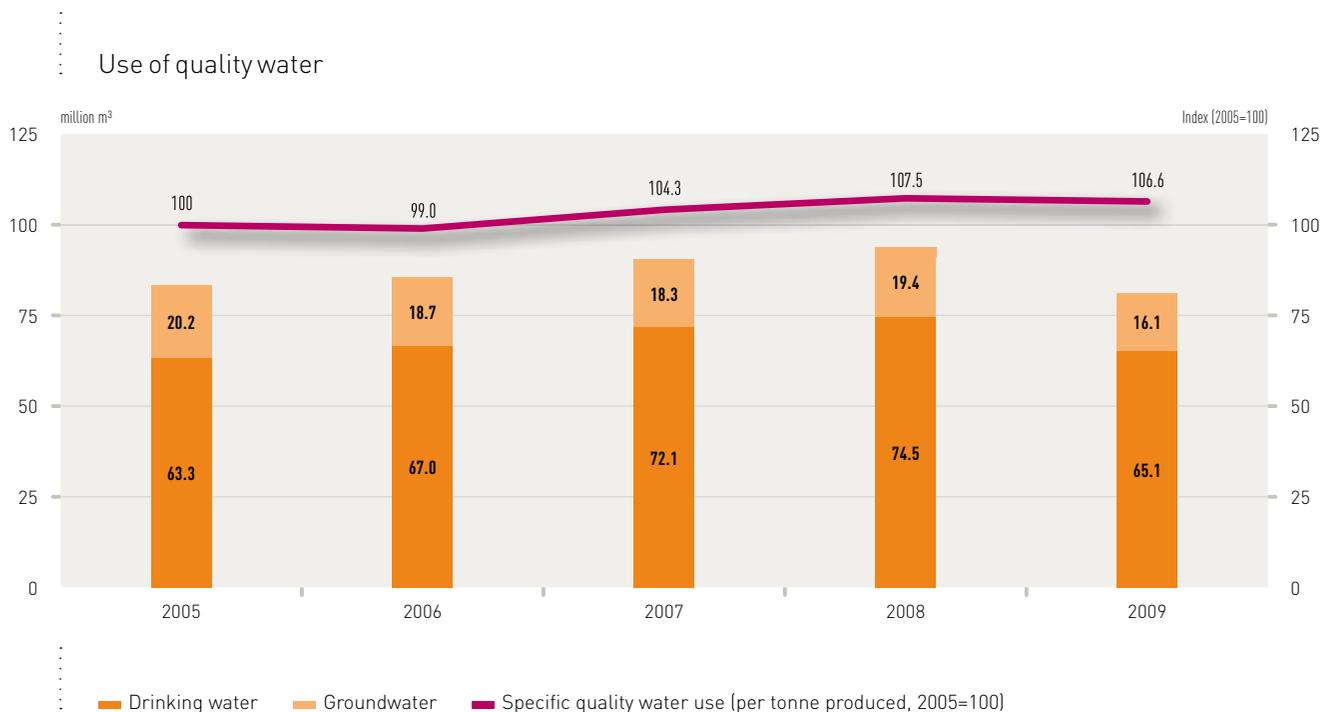
€4.7 million is a huge amount of money for a company like us, but with our investment in this state of the art thermal oxidizer we will achieve a drop of 80% in organic emissions.



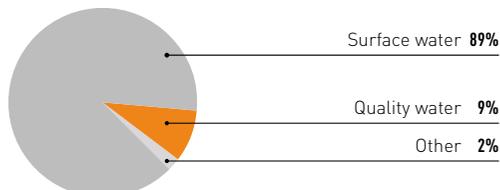
Regenerative Thermal Oxidizer (RTO) at Omnichem in Ghent

Water use

Increasing efforts to reduce water use



Water use by the sector (2009): 908.5 million m³



Water is essential for all life forms on earth. Only one millionth of all the world's water is fit for human use. Conservation of this precious natural resource, or "blue gold", begins with its judicious use.

The chemical and life sciences industry is an important industrial water user. **Nearly 90%** of the water used by the sector in Belgium is drawn from surface water and is used mainly as **cooling water** for industrial processes. When cooling water is returned to the **surface water source**, it is not polluted but it is warmer than before intake.

Water also serves as a raw material, as a cleaning agent, or to purify atmospheric emissions. Industrial wastewater that is potentially polluted is only discharged after purification in wastewater treatment plants.

In 2009, the sector used a total of **908.5 million m³ water**.

Sustainable water management is a key element of the EU Innovation partnership. Furthermore, usage of more surface water (rather than quality water - drinkable and/or groundwater) is clearly recommended by EU authorities. The chemical and life sciences industry is striving to **diversify its water sourcing according to its purpose or use**. In this way, the sector aims to reduce pressure on quality water sources. In 2009, drinking water accounted for 7% of the total water used by the sector, and groundwater for just 2%.

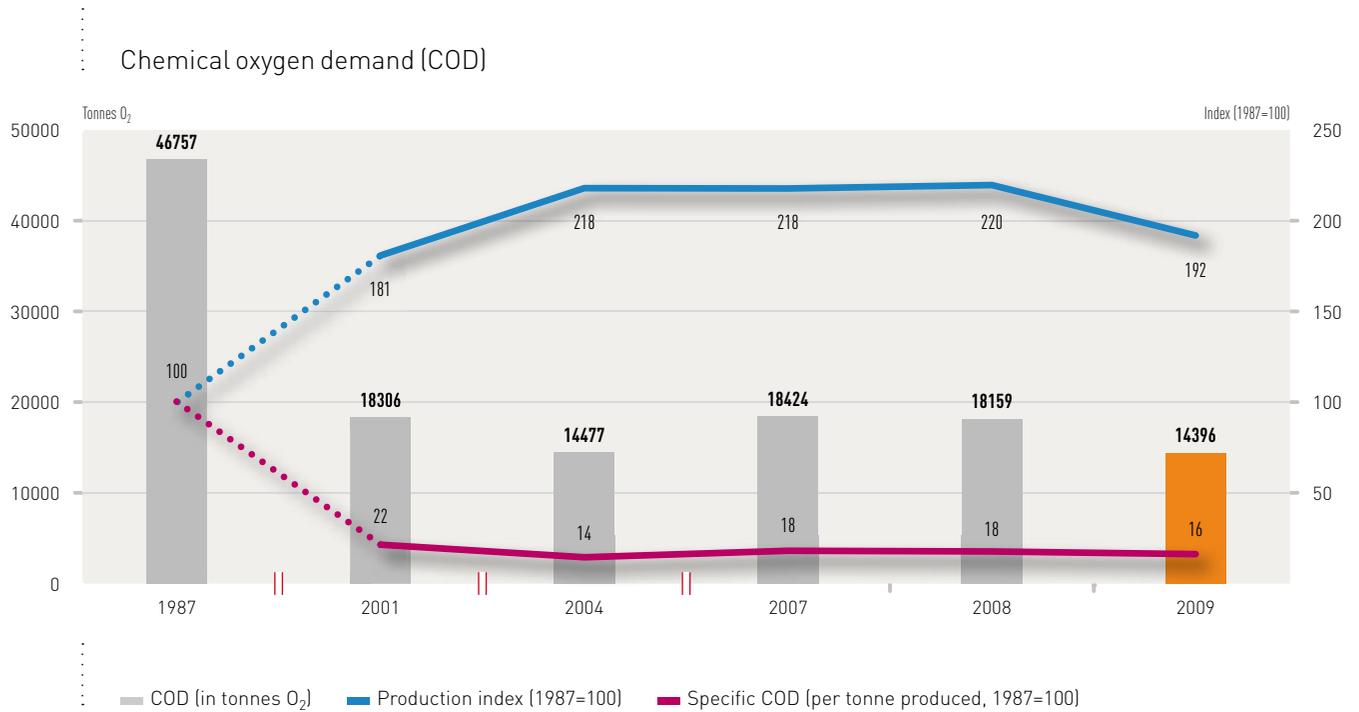
SOURCE
Regional administrations
(DGOARNE, VMM)
DGSEI

9%

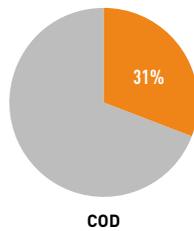
High quality water only accounts for 9% of the sector's total water use

Water quality

Wastewater is always treated before being discharged into the environment



Share of the sector in the total industrial emissions (2009)



- ▶ Water must be pure enough for ecosystems to thrive and fit for human use.
- ▶ Organic pollutants in water need oxygen to be completely chemically oxidized. Hence, the pollutant load of wastewater can be measured based on the chemical oxygen demand (COD). COD is expressed in tonnes of oxygen needed to oxidize the effluents.

- ▶ In 2009, COD of the sector's waste water amounted to around **14 ktonnes**, of which 57% was further treated in municipal plants before being discharged into the environment. The sector accounts for nearly **one third** (31% in 2009) of total industry COD including those from municipal waste water treatment centers.
- ▶ Process wastewater in our sector is typically treated either **in-house or in public wastewater treatment plants** against payment of taxes.

SOURCE

E-PRTR
Responsible Care data 1987, DGSEI



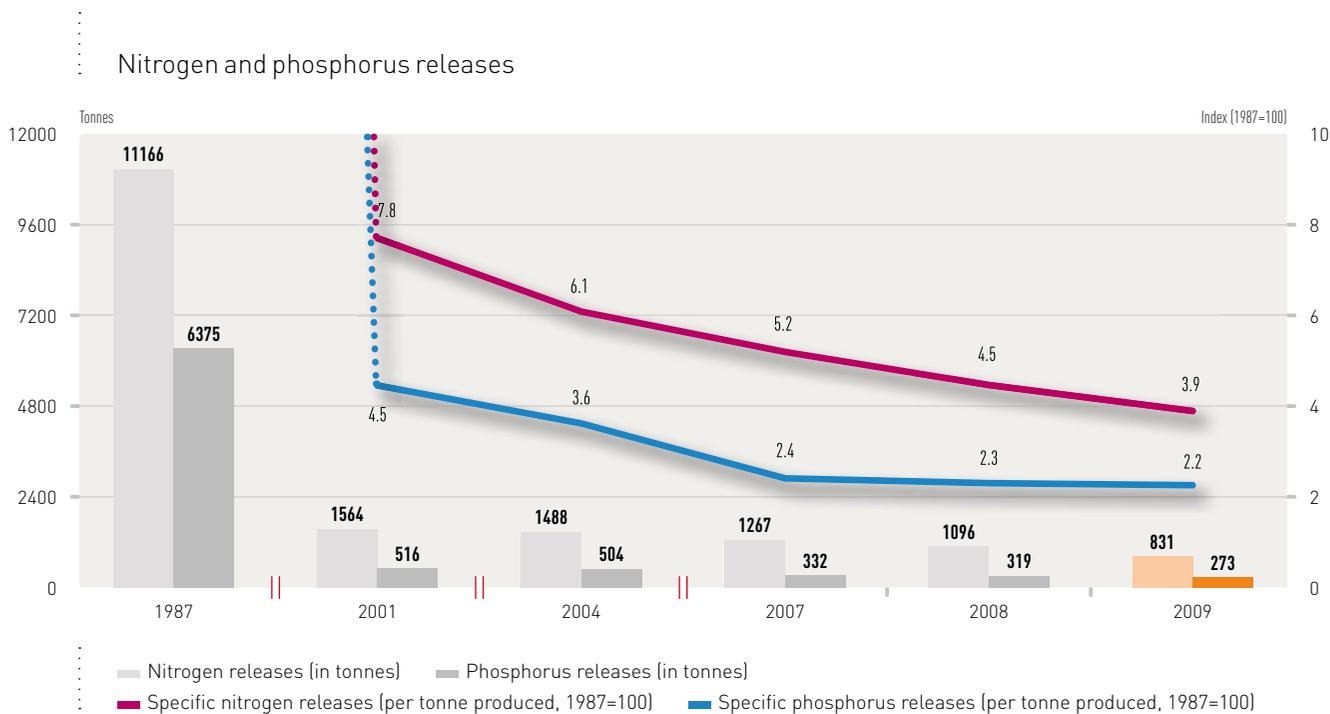
31%

Sector's share of total industrial COD

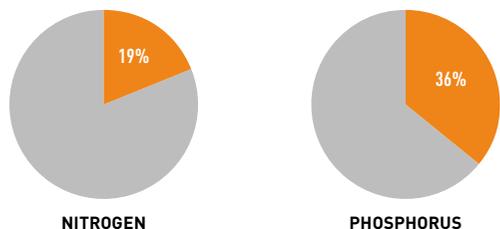
Wastewater treatment at BASF Antwerp

Nitrogen and phosphorus

Releases of nitrogen and phosphorus in water continue to fall



Share of the sector in the total industrial releases (2009)



▶ Healthy water ecosystems function in an equilibrium in which plant growth is sustained by nitrogen (N) and phosphorus (P) released as byproducts of microbial and animal metabolism. However, when those ecosystems are enriched with N and P, this balance is disrupted resulting in unnaturally high rates of plant production (and, in extreme cases, proliferation of algae) and accumulation of organic matter that can degrade water and habitat quality. This phenomenon is called 'eutrophication'.

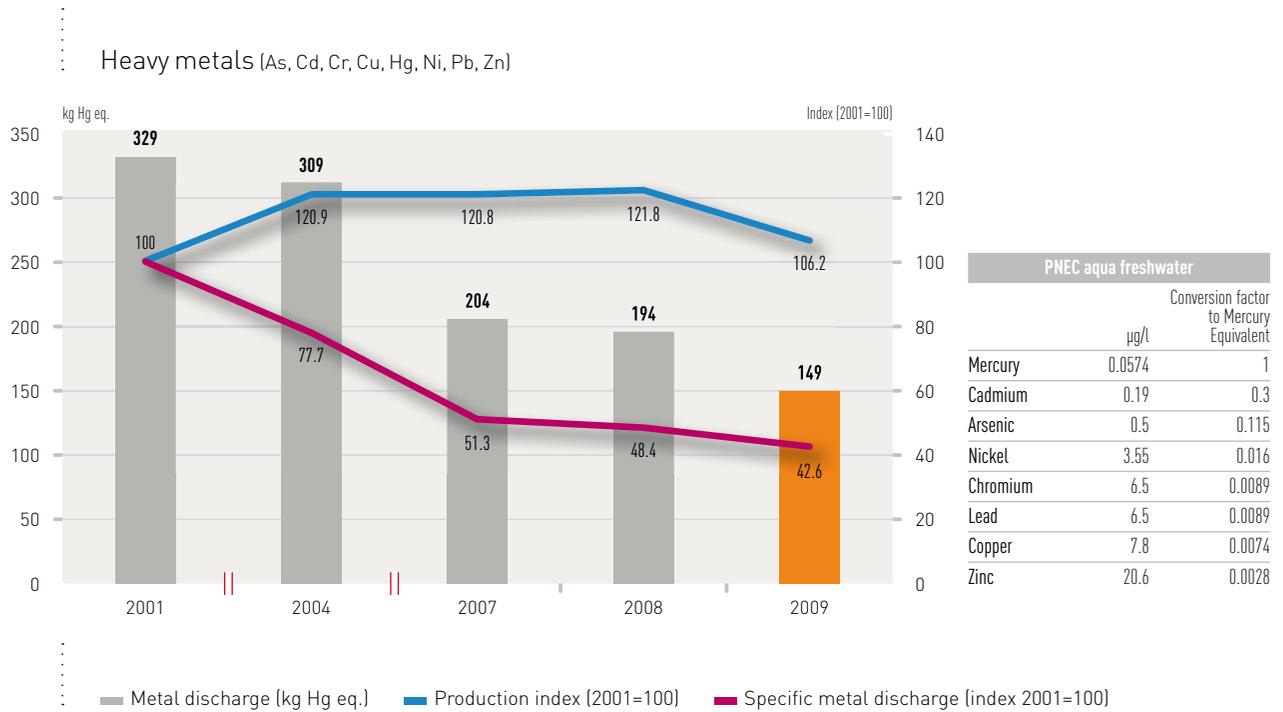
- ▶ One of the main sources of nitrogen emissions in the chemical and life sciences industry is from production of nitrogen-containing organic or inorganic chemicals like fertilizers, aniline (used for the production of polyurethane) and caprolactam (used for the production of nylon).
- ▶ In 2009, the chemical and life sciences industry released **831 tonnes of nitrogen** and **273 tonnes of phosphorus**. This represents respectively about one fifth and one third of total N and P emissions by all Belgian enterprises.

SOURCE

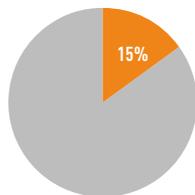
E-PRTR
 Responsible Care data 1987, DGSEI

Heavy metals

Decrease of metals discharged to water



Share of the sector in the total industrial emissions (2009)



HEAVY METALS (Hg eq.)

▶ Human activities contribute to increase the concentrations of heavy metals present in the environment by emitting particles into the air and releasing heavy metals in surface water.

▶ As the table shows, **ecotoxicity varies considerably** from metal to metal. Eight metals have been identified as priority elements by the third North Sea Conference: cadmium (Cd), lead (Pb), chromium (Cr), mercury (Hg), arsenic (As),

copper (Cu), zinc (Zn) and nickel (Ni). As metals have very different ecotoxicity, their concentrations are converted to mercury ecotoxicity equivalents before being totaled.

▶ Heavy metals discharged by the sector to water are decreasing over the years. It should be noted that only a few companies in the sector reach the E-PRTR reporting thresholds.

SOURCE
E-PRTR, ECHACHEM, DGSEI

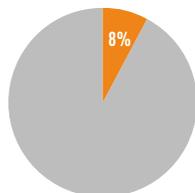
15% share of total industry discharges in 2009

Industrial waste

More and more waste reused as materials or valorised as energy



Share of the sector in the total industrial waste (2009)



Waste is generated almost every time natural resources are used or processed. **Resource efficiency** is a clear priority for the sector in line with the European flagship initiative. Increasingly, **closed loop projects** are developed by companies for specific product lines.

Waste production can be reduced to a minimum by targeting prevention at the source. Unavoidable waste must go through an optimal treatment to keep its environmental impact as low as possible. We distinguish hazardous from non hazardous waste and we give priority to recycling (same

application) and re-use (other application) before useful application (recycling of material with energy recovery).

In 2009, the Belgian chemical and life sciences industry generated **999 ktonnes** of waste. This is **less than 8%** of all industrial waste.

Belgium accounts for 7% of total European production of the chemical and life sciences sector, but for only 2-3% of its waste.

Of all waste generated by the sector in 2009, **18% was disposed of** and **82% was recovered** either as materials or as energy. The positive trend towards optimal use of waste is clear; in 2001, the recovery rate was just 43%.

About **21%** of waste generated by the chemical and life sciences industry is **hazardous**. It makes up 14% of the hazardous waste generated by all industry. **63%** of hazardous waste produced by the sector is **treated**, mainly in Belgium (79%), thus respecting the **proximity principle**. This is an improvement compared with 2007 (72%).

SOURCE
E-PRTR, DGSEI

“Waste is only the result of lack of creativity and innovation.”



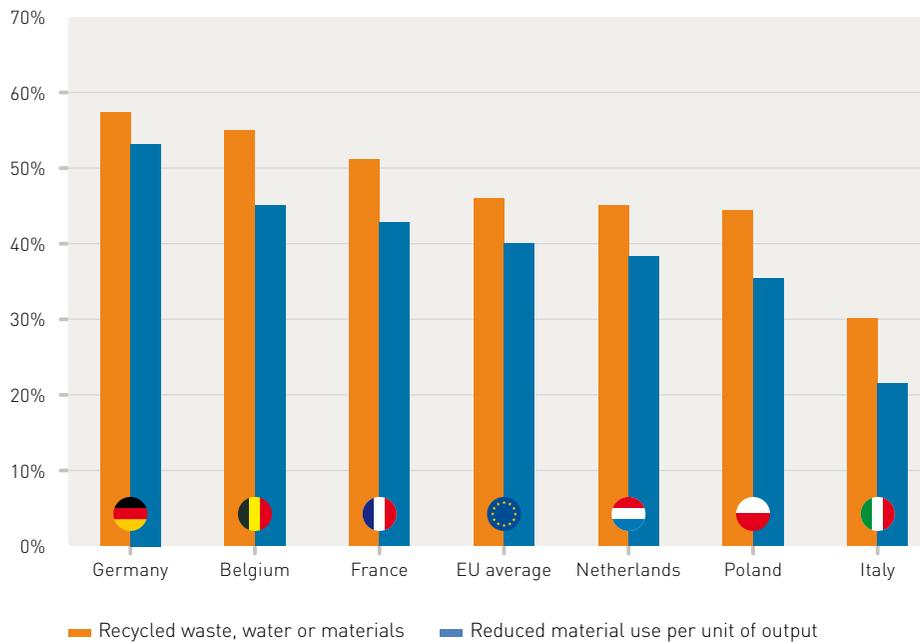
Frank Coenen, CEO Tessenderlo Group

The European Community Innovation Survey measures the innovation performance of companies in all branches of activity. According to the latest survey (2008), 76% of companies in the chemical and life sciences industry in Belgium innovated in products and processes in recent years (vs. 66% for EU average). The chemical and life sciences sector in Belgium is among the best performers in Europe in process optimisation and reduction of environmental impact.

- ▷ 55% of the companies demonstrating innovation in the chemical and life sciences industry in Belgium enabled the reduction of environmental impact through the recycling of waste, water and materials. This percentage is higher than both the sector's European average (46%) and the manufacturing industry as a whole in Belgium (44%).
- ▷ 45% of the companies demonstrating innovation in the sector in Belgium optimised their process through reduced material use per unit of output. This is better than the EU average of the sector (40%) and of total manufacturing industry in Belgium (33%).

This performance places Belgium just behind Germany which is generally accepted as the leader amongst the major European players in the field of chemicals, plastics and life sciences.

Innovations with environmental benefits
(in % of enterprises with innovation activity)



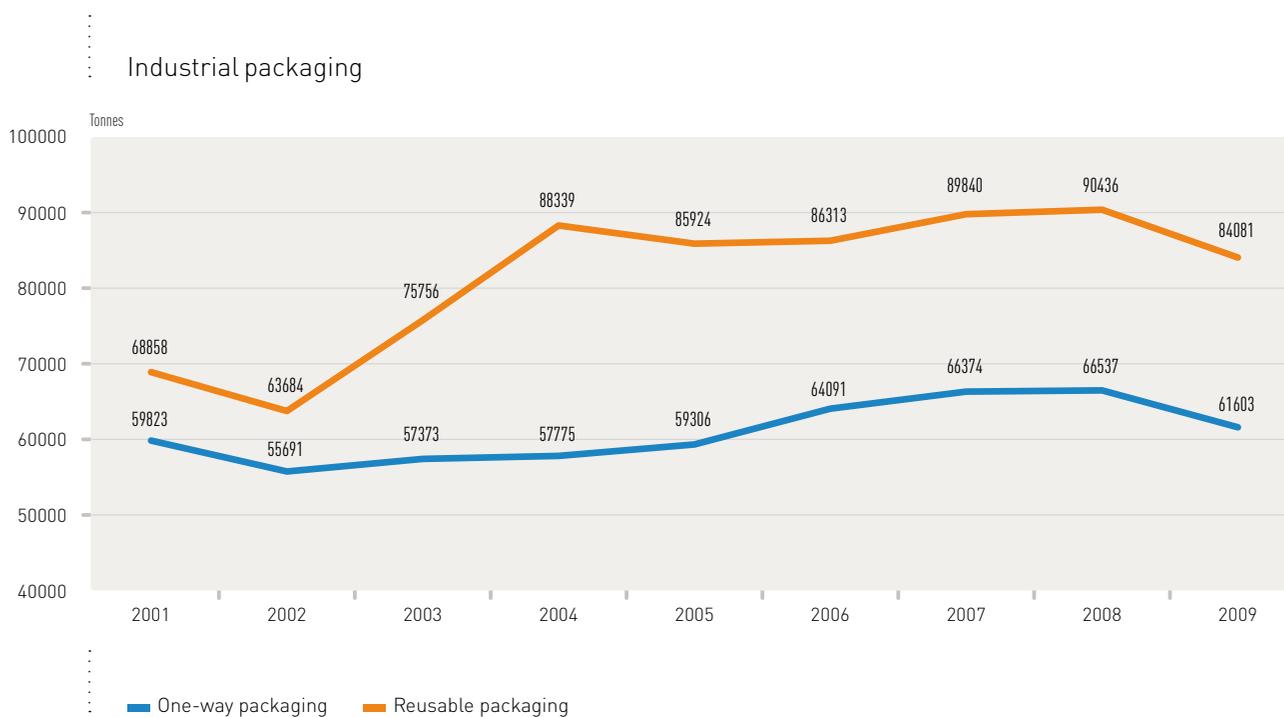
SOURCE
CIS Survey (2008) Eurostat



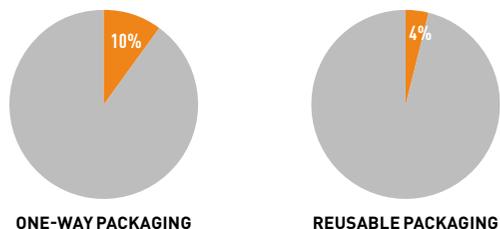
sector represents
less than 8%
of industrial waste

Industrial packaging

More reusable industrial packaging



Share of the sector in the total industrial packaging (2009)



▷ Two types of packaging are considered; industrial packaging (packaging of products materials used within the production process) and wholesale packaging (packaging of the final chemical products for the end consumer).

▷ In **2009**, the chemical and life sciences industry used **more than 145,000 tonnes** of industrial packaging (all packaging materials together), of which **nearly 60% was reusable**.

SOURCE
Val-I-Pac

▷ In the period 2001 to 2009, production of the sector increased by 6.1%, while consumption of industrial packaging for one-way use increased only by 3%.

▷ Since 2001, the sector has achieved a **major increase of reusable industrial packaging**, in particular wooden pallets and metal drums especially.

▷ The share of industrial packaging used by the sector compared with all industry is relatively small at 10% of one-way packaging and 4% of reusable packaging.

“Industrial packaging is not a critical issue for the chemical and life sciences sector in Belgium. This is probably related to the important use of pipelines, the strong integration of chemical activities, the clustering strategy. At Val-I-Pac, however, the chemical and life sciences sector remains one of the most important in view of its strong presence in Belgium.”



Johan Sneyers, Managing Director Val-I-Pac

Soil quality



▷ Soil quality is influenced by several factors. The **possible presence of pollutants** is obviously an important issue but their impact depends on the type of substance, volume and ecotoxicity. Geographic aspects such as soil characteristics, proximity of surface water or groundwater, and biodiversity are also important. As well, current and historic land use planning policies (area types, construction permits, exploitation permits, ...) can also have an important impact on the soil quality.

▷ **Effective soil management** means first identifying and, if necessary, implementing clean-up actions for historic pollution as part of a sustainable development strategy. This may include health management, job creation, re-use of

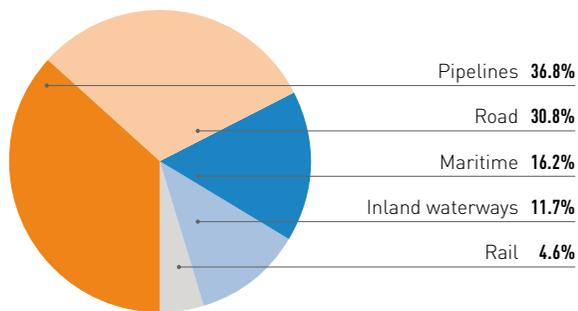
existing infrastructures, new investment, development plans, and re-use of excavated grounds. Steps need to be taken to prevent any further contamination and existing risks from pollutants must be effectively managed. Soil quality must be evaluated and a management strategy defined.

▷ Today, there is **no quantitative register of harmonised quantitative data** concerning soil quality in Belgium. Such data would involve the number and the type of evaluations, the expanse of the analysed surfaces, the type of retained and identified pollutants and the required quality standards. This prevents either quantitative trending or quantitative assessment.

Transport and logistics

Modal split

Transport activities of the chemical and life sciences industry : modal breakdown for 2009 by volume



SOURCE
 Statistics Transport SPF Economy (except pipelines);
 Study «Missing Links» UA (pipelines);
 calculation essencia

With a share of about **37%**, **pipelines** are the main transport mode used by Belgium's chemical and life sciences industry. The share of road transport and water transport (inland waterways and maritime) are roughly equal with volume shares of 30.8% and 28% respectively. Rail transport lags far behind with a share of less than 5%. According to essencia estimates air freight accounts for a fraction of total volumes transported, and is mainly used for high value added products such as pharmaceuticals.

These figures show how the chemical and life sciences industry makes use of **environmentally-friendly modes of transport** with low emissions factors (see table of CO₂ emissions below) for nearly **70% of its transport activity**, and does not add to worsening road congestion.

The chart below indicates that even if transport by pipeline is factored out, the chemical industry outperforms the manufacturing industry as a whole.

Modal breakdown for 2009 by volume



SOURCE
 Statistics Transport SPF Economy,
 calculation essencia

* Nomenclature NST-2007 classes 4 to 13
 ** Nomenclature NST-2007 classe 8 ("Chemicals, chemicals product, and manmade fibers; rubber and plastic products; nuclear fuel")

“The high degree of integration and strong collaboration between such a diverse group of production companies and logistics operators make the Antwerp chemical cluster unique in the world.”



Eddy Bruyninckx, Managing Director Port of Antwerp

CO₂ emissions

According to EU statistics, freight emissions account for approximately one third of total transport GHG emissions (freight & passengers); transport itself accounts for 20% of all EU GHG emissions. The chemical and life sciences industry is responsible for less than 10% of total freight emissions, meaning **less than 1% of all EU GHG emissions** come from the sector's transport operations.

At European level, the chemical industry has adopted a proactive approach to reduce the environmental impact of its logistics activities, in close cooperation with its logistics service providers.

Cefic and the European Chemical Transport Association (ECTA) have developed «Guidelines for measuring and managing CO₂ emissions from freight transport operations» which offer a **common methodology for the calculation of CO₂ emissions** and provide a generic overview of **opportunities** and approaches for companies. The guidelines provide chemical shippers with average emissions factors for the different transport modes (see table below) and enable the calculation of transport carbon emission.

The guidelines provide the information required by companies looking to use specific emission factors that better reflect their individual situation and the characteristics of their supply chain. They also help companies better understand their current carbon footprint and develop low-carbon strategies for their operations.

Recommended Average Emission Factors

Transport mode	gCO ₂ /tonne-km
Road transport	62
Rail transport.	22
Barge transport	31
Short sea	16
Intermodal road/rail	26
Intermodal road/barge	34
Intermodal road/short sea	21
Pipelines	5
Deep-sea container	8
Deep-sea tanker	5
Airfreight	602

SOURCE

Alan Mc Kinnon

Good practices

The Belgian chemical and life sciences industry has already made significant efforts to improve the energy efficiency of its transport operations:

▷ **The world's first "carpooling for cargo"** set up by Baxter and UCB, together with TRI-VIZOR and H. Essers. UCB and Baxter bundle their temperature-controlled pharmaceutical flows to Eastern Europe. TRI-VIZOR, as 'neutral orchestrator' and 'community manager', captures and synchronizes transport orders from both companies in real-time enabling improved truck load utilisation and even some modal shift from road to rail.

After a successful pilot test in Romania in April 2011, UCB and Baxter are implementing other Eastern Europe destinations and plan to expand the collaboration to other pharmaceutical companies. The project has already enabled a **44% reduction** in emissions of around 33,500 kg CO₂.

▷ The **'hub and spoke'** model and 'postponed customer order palletization' are two new concepts applied by 3M. The 'hub & spoke' model consists of consolidating in hubs various shipments to European customers enabling them to be dispatched in fully loaded trucks to their destination. Before implementing this concept, shipments were sent direct to customers from each 3M manufacturing plant or warehouse across Europe. The 'hub and spoke' strategy has doubled truck load utilisation up to 70% and resulted in an annual **reduction of 5,000,000 truck km**, equivalent to a 10% decrease in CO₂ emissions.

Another initiative that has improved truck load utilisation is **postponing** the point at which shipments to customers are prepared and placed on to pallets according to customer specifications. Indeed **palletising customer** order has a major effect on truck load utilisation: as pallets required by customers are of different sizes, and orders often include products of different sizes ..., so it is not always possible to stack pallets or to do it efficiently.

By postponing palletisation until products reach the region of destination, 3M can combine products for several customers on the same delivery route on the same pallet and hence optimize the truck load. 3M has been able to cut out between 30-50% of trucks (i.e. 11 lorries per day) accounting for 2.3 million km/year and **1,662 tons**

CO₂ emissions per year.

▷ Prayon opts for **inland waterway transport** when possible. Since end 2010 Prayon has transported maritime containers from Engis to Antwerp by barge instead of truck. So far, this project has saved over 80 tons of CO₂ emissions; annual savings are estimated at around **144 tons**. A similar project has been implemented in France. Prayon Puurs transports almost 70% of product by canal. At European level Prayon has changed its **distribution scheme** to optimize flows towards Spain. In the past Prayon used to stock goods from Morocco for the Spanish market in Antwerp and Rotterdam, and transport them by road. Now goods are stored in Spain for onward distribution to end consumers in Spain, meaning better management of transport costs and estimated **CO₂ emissions reduction of 1,720 tons/year**.

▷ Together with Hupac and IFB, and with the support of European and Flemish government, BASF has founded the **Combined Terminal Antwerp – Combinant**. Combinant is an open-access rail terminal for intermodal transportation, located in the port of Antwerp. By replacing road transport with rail, Combinant ensures 150,000 fewer trucks are on the roads over the course of a year, equating to a saving of **30,000 tons CO₂ emissions**, and **10 km/day less of traffic jams**.



Combinant, a multimodal (road-rail) platform in the Port of Antwerp

Antwerp

Antwerp lies at the centre of the western European **pipeline network**. Antwerp is connected to the PALL (Pipeline Antwerp-Limburg-Liège), to the ARG (Aethylen-Rohrleitungs-Gesellschaft) and to many other pipelines for Terneuzen, Rotterdam, Feluy, and the Rhine-Ruhr area. 88% of all transfers of industrial goods within the port are by pipeline.

As well as daily **barge** departures to Rotterdam and the Rhine (which represent more than 60,000 barge calls at Antwerp each year) together with regular rail shuttle services, Antwerp offers a wide range of barge and rail connections to the hinterland.

A **rail connection** for cargo between Antwerp and Chongqing (southwest mainland China) was launched in May 2011. Chongqing is an important Chinese logistics hub, well known for its automotive, chemical, pharmaceutical, electronics and IT industries. This 12,000 km route reinforces Antwerp's position as a hub not just for the whole of Europe but also West Africa, and North and South America.

1. The current route takes about 22 days which is already faster than the maritime route which takes more than 1 month.



The Belgian customs authorities are seeking to establish a "Green Lane" project along this rail connection in cooperation with different customs authorities along the rail route. A "green lane" enables minimal checks and customs formalities which can result in the **journey time being reduced by between 3-5 days**¹. This "**Green Train Lane**" would be a world first between China and Europe.

As a main European distribution hub, Antwerp is the **world leader in stainless steel tank capacity with 1,560 tanks**. The tank storage and logistics companies offer a wide range of services such as drumming, blending, warehousing and storage.

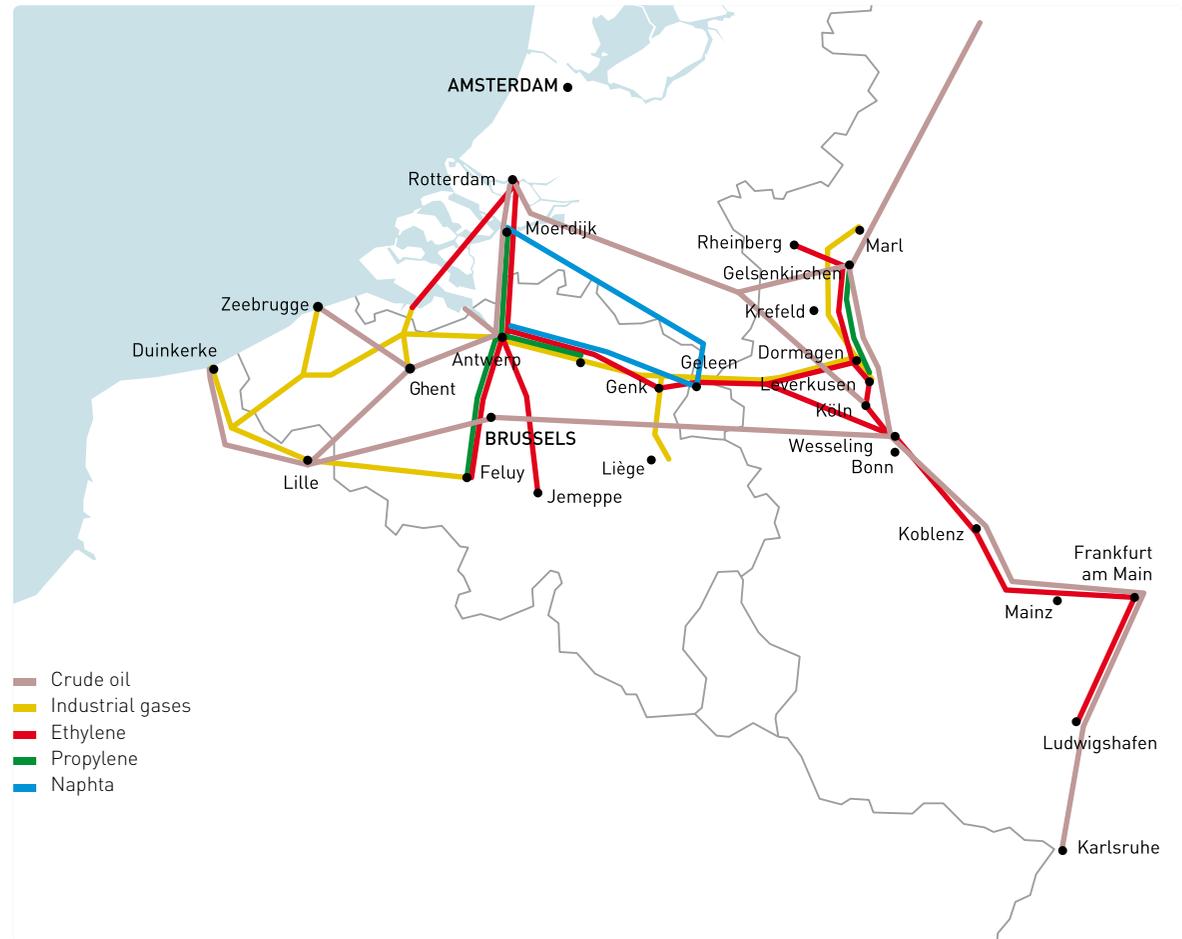
Antwerp is a prime example of the "clustering strategy" developed in the chemicals and life sciences industry and generally acknowledged as very sustainable because it:

- ▷ allows highly effective production,
- ▷ improves safety performance and emergency response systems by enabling coordination and cooperation of resources,
- ▷ optimises material flows, re-use and recycling,
- ▷ allows maximum energy efficiency, and
- ▷ minimises transport.

This approach can be hampered by undifferentiated environmental quality objectives (expecting the same environmental quality for each citizen worldwide, whether working in an industrial area, or walking in a natural park). Hence clustering requires differentiated environmental quality standards (e.g. ambient noise levels, or ambient air quality levels in order to maximise from the sustainable benefits noted above.

Direct rail connection between Antwerp and Chongqing (China)

Western European pipeline network



Pipelines

Pipelines are a very important mode of transport for the chemical industry. According to essencia estimates, **at least 30 million tons** of products produced or used by the Belgian chemical industry are transported by pipeline each year. This represents more than 11 millions tankers off the road annually.

The pipeline network is expanding all the time thanks to new customers or additional requests from existing customers.

SOURCE
EPCA

For example, in October 2011 a new pipeline between Solvay and Bayer enters into service for the transport of caustic soda.

The Air Liquide network for the transport of industrial gases (oxygen, nitrogen, argon, hydrogen and carbon monoxide) operates 1,800 km of pipelines in Belgium, transporting more than **4 million tons/year**. Thanks to the ongoing expansion of this network, there are on average about **10,000 fewer tankers** on our roads each year.

A new study has been initiated recently to free up more land space for future pipeline connections between Antwerp and North-Rhine-Westfalia.



“The central position of Antwerp in the dense pipeline network offers direct access to raw materials, safe transport of chemicals and first class connectivity between chemical clusters in Western Europe.”

Cathy Berx, Governor of the Province of Antwerp



BELINTRA **Effective emergency response system**

Within the framework of **Responsible Care**, the chemical industry makes every effort to transport goods to and from its manufacturing sites and storage locations safely and in full accordance with relevant regulations and codes of practice.

As well, the chemicals and life sciences sector has had a voluntary agreement with the Belgian authorities for many years under which it supports the emergency authorities in the event of a transport accident involving dangerous substances. This can range from telephone support offering specialist product information (level 1); to a company representative at the scene to give expert advice (level 2); to on site support with expertise and equipment (level 3). Support is requested on average three times a month, of which one involves on-site intervention. Typically, it involves (but is not limited to) transport incidents, and concerns a variety of substances and mixtures (sometimes belonging to Belgian chemicals companies, and sometimes not).

This voluntary support was formalised in 1998 under the **BELINTRA** protocol between the Ministry of Interior and essenscia. It is centralised around two national co-ordination centres – BASF in Antwerp, and Solvay in Jemeppe-sur-Sambre – and builds on product expertise and emergency response capabilities within member companies.

Emergency response and **protection of health and safety** is also organized at **local level** involving some 40 industrial (chemicals but also energy and logistics ...) companies (mainly chemical and life sciences but also in the energy and logistics fields) in the Antwerp Port area. This network (VIBNA) involves exchanging experience and good practices in safety management; improving health in the workplace and the availability of antidotes and further developments of a medical intervention plan.

03.

“The chemical and life sciences industry is a real engine for prosperous growth thanks to its proven leadership over the years in wealth creation, exports and innovation as well as its clear vision for positioning this key sector in the Belgian and in the global socio-economic landscape.”



Pierre Alain De Smedt

President Federation of Enterprises in Belgium (FEB)

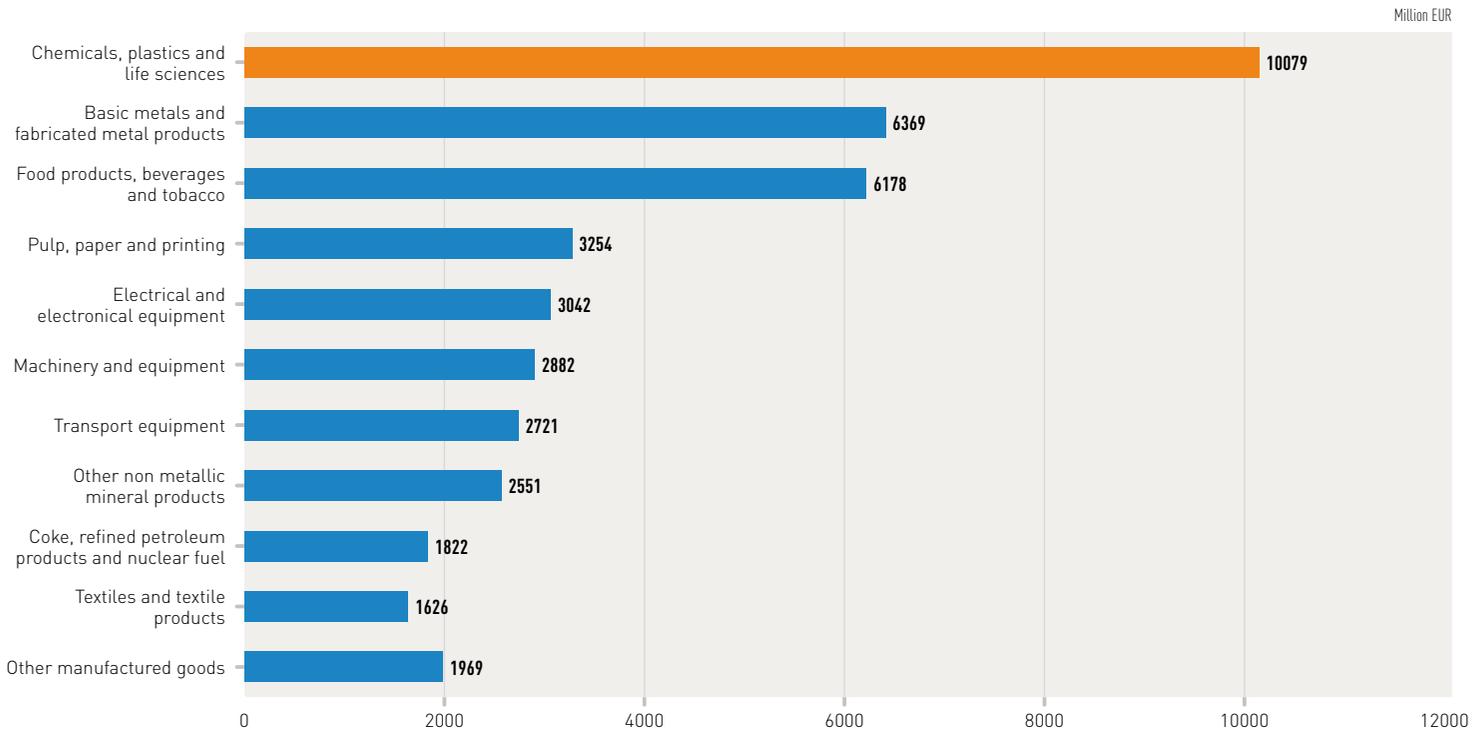
Value added	50
Profitability	51
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Number of researchers	57
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Labour productivity	60

PROSPERITY

Value added

The leading manufacturing sector in the creation of prosperity in Belgium

Value added* in the Manufacturing Industry (2009)



* Value added at current prices

▷ 'Value added' measures the sector's contribution to overall prosperity.

▷ In 2009, the chemical and life sciences industry generated value added of **€10 billion**. This is **nearly a quarter of the total value added of the Belgian manufacturing sector** (24% in 2009). At European level, the chemical and life sciences industry represents 15% of the value added of the total manufacturing sector.

▷ In late 2008/2009, the world experienced the strongest economic downturn since World War II. As a globalised industry, all chemical sub-sectors except pharmaceuticals were affected by this crisis, particularly in the fourth quarter

of 2008 and the first half of 2009. However the industry has recovered strongly since then. **Despite the decline in 2009, the share of value added of the chemical and life sciences industry in total manufacturing remained stable.**

▷ With only 10 million inhabitants, Belgium represents 2% of the European population and 3% of European Gross Domestic Product (GDP). However, Belgium is a major player in the European chemical and life sciences industry with about **5% of the value added generated by the sector in Europe (EU-27)**.

SOURCE

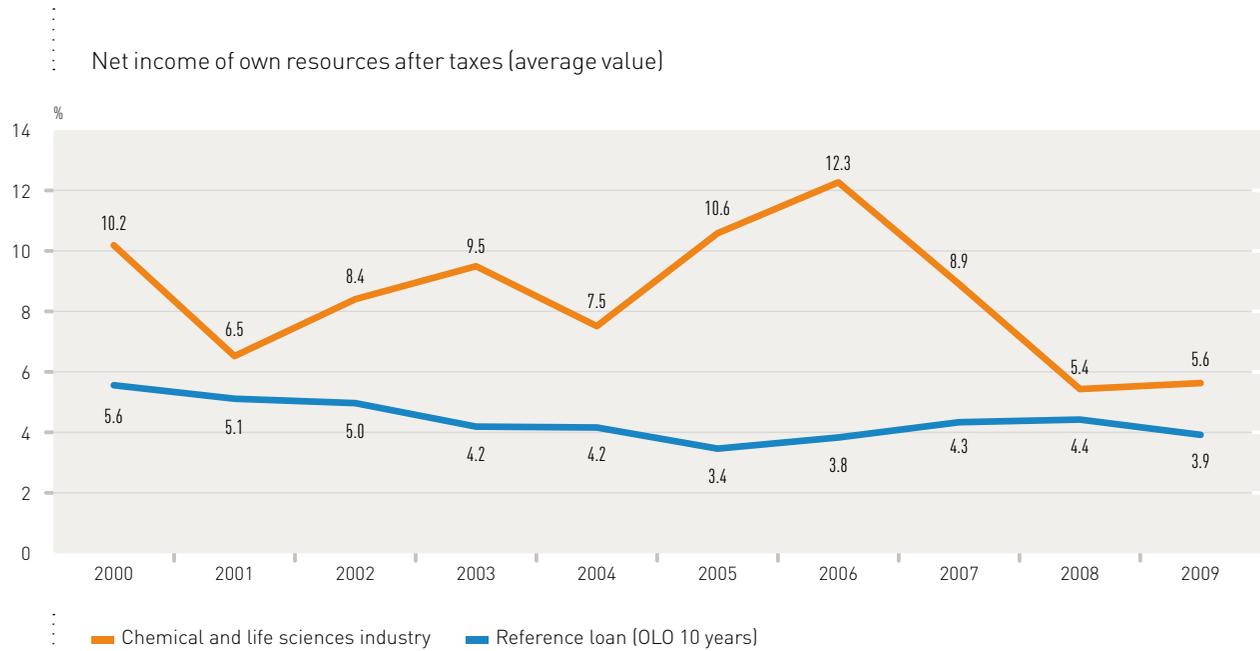
National Accounts Institute

24%

of total value added of the Belgian manufacturing industry vs. 15% for European chemical industry in EU-manufacturing

Profitability

Lower performance during the crisis but financially solid



▷ A company is economically sustainable if it can generate a profit. Financial profitability can be assessed by net income returned as a percentage of shareholders equity i.e. the return for the shareholders after deduction of all costs and taxes. This ratio measures how well a company or a sector uses the capital invested by shareholders to generate profit and thus future growth. This return on equity should be structurally higher than the return on low-risk government bonds. The differential is called the risk premium.

▷ The chemical and life sciences industry shows a long-term healthy financial structure. On average, the return on shareholder's investment amounted to **8.5% in the period 2000-2009, which is consistently higher than the return on investment of long-term government bonds.**

The difficult economic climate of 2008-2009 had a negative impact on this average.

SOURCE

National Bank of Belgium
(data from the Central
Balance Sheet Office)

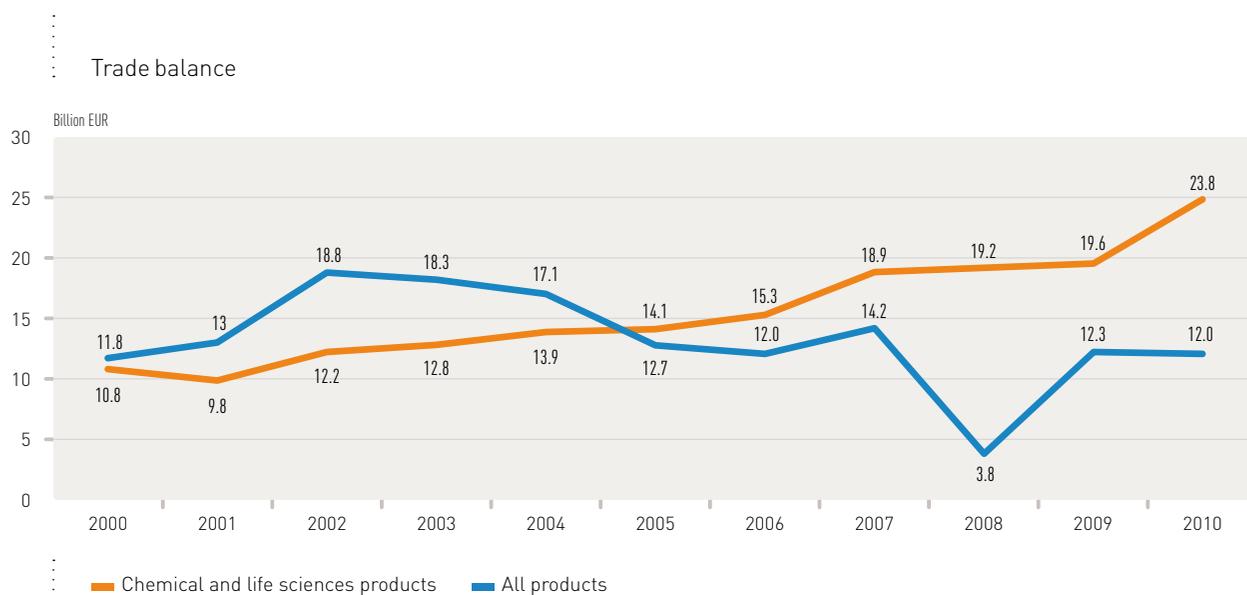
“The essenscia sectors have been one of the main generators of wealth creation and have shown to be attractive for investors. To maintain this leading position, a smart industrial policy is needed.”



Geert Noels, Chief Economist Econopolis

Trade balance

Top exporter in Belgium



▷ The chemical and life sciences industry is highly export-oriented. It **exports more than 75% of its production in terms of value.**

▷ **In 2010**, the export of chemical, plastic and life sciences products amounted to **€105 billion**. That is **34.1% of all products exported by Belgium**. The sector remains Belgium's leading exporter.

▷ Neighbouring countries are the main trading partners for the sector: 43% of exports go to Germany, France and the Netherlands, with Germany alone accounting for 23%. These countries are important benchmarks for the competitiveness of the sector. Outside Europe, North America (in particular the USA) remains the biggest trading partner.

▷ The chemical and life sciences industry contributes to the development of international trade with emerging countries. Today, about 13% of the industry's products are exported to emerging markets, mainly Brazil, Russia, India and China. **Exports to those countries increased by a factor 4.5** between 2000 and 2010, **mainly driven by China**. This reflects ongoing developments in a number of economies worldwide where the sector is helping to improve living standards.

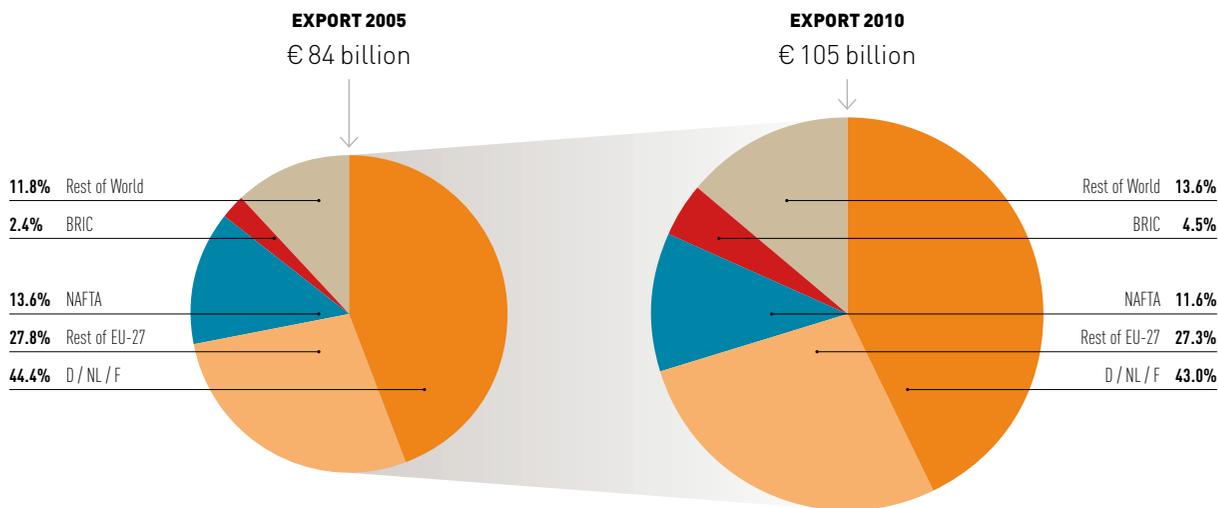
SOURCE

National Bank of Belgium according to the communautarian concept (including international distribution centres and transit activities)

“The impressive export performances of the chemical and life sciences industry during the last decade have contributed increasingly to the Belgian standard of living.”

Vincent Van Quickenborne, Minister of Economy and Reform of Belgium





► The chemical and life sciences industry generated a **positive trade balance** (the difference between exports and imports) of nearly **€24 billion in 2010**. Even during the difficult economic climate in 2009, this positive balance increased by nearly €400 million. The trade balance has more than doubled in the last ten years. The trade balance with all major partners is positive as illustrated in the table hereover.

Trade balance with major partners in billion €

D, F, NL	9.7
Rest of EU-27	3.0
NAFTA	3.5
BRIC	2.2
Rest of World	5.3

SOURCE

National Bank of Belgium according to the communitarian concept (including international distribution centres and transit activities)

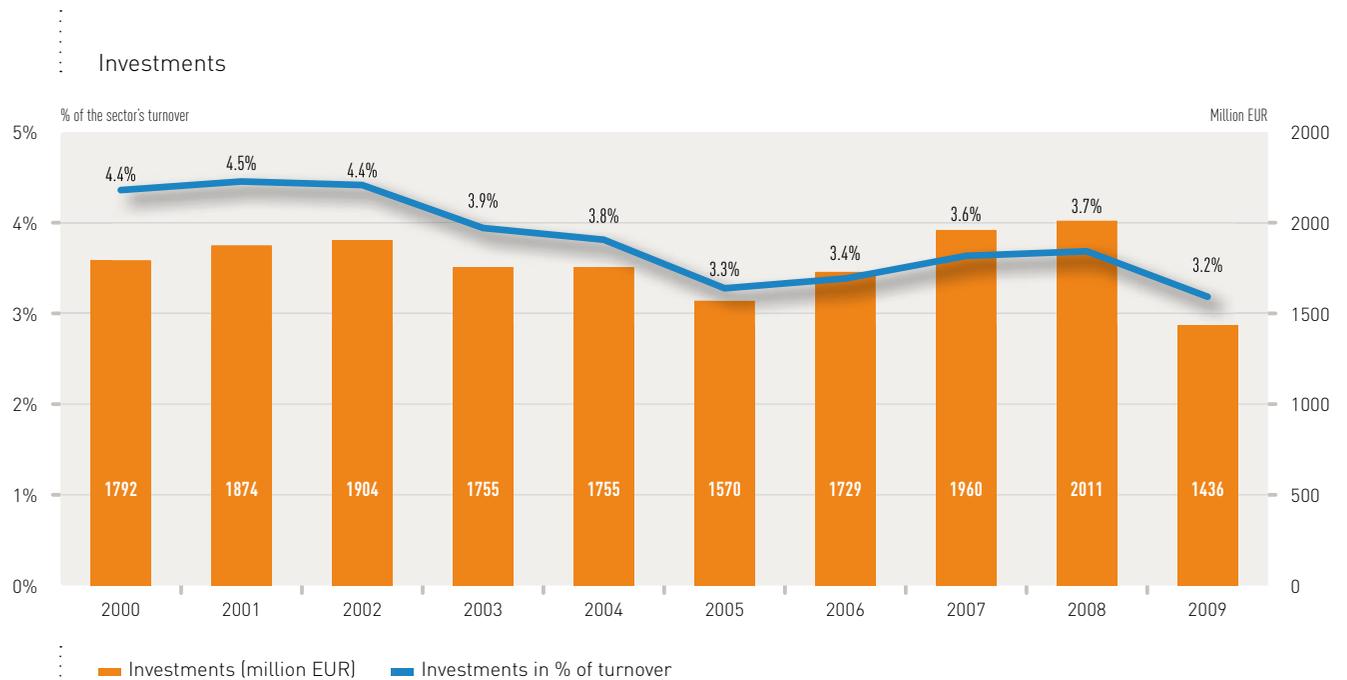
► Belgium plays a major role on the export markets of the European chemical and life sciences industry accounting for more than **11% of total EU-27 exports to countries outside Europe**.

BRIC: Brazil, Russia, India, China
NAFTA: United States, Canada, Mexico

€24 billion **trade surplus operated by the sector in 2010**

Investments

A longstanding industrial investor in Belgium



▷ The chemical and life sciences industry has invested an average **€1.8 billion per year from 2000 to 2009**. This demonstrates the sector's strong commitment to modernisation of its industrial equipment and to the improvement of its efficiency, particularly in the context of sustainable development.

▷ The chemical and life sciences industry is a key investor within the manufacturing sector: spending amounted to **25% of the total manufacturing industry in 2009**. In comparison, the investments of the sector at European level represented about 17% of total manufacturing industry.

▷ The sector invests **more than 3% of its turnover**, slightly higher than that of manufacturing industry as a whole (2.8% in 2009).

▷ In 2009, investment levels were lower than in previous years. The reasons for this decline were not only cash flow issues and uncertainties linked to the global economic crisis, but reflected the fact that a number of major investment projects were completed during the period 2006-2008. Several investment projects have been announced by the sector recently including new R&D centres and production capacity expansions.

▷ The biopharmaceutical industry especially has been a major investor in the recent years accounting for 32% of total investments by the sector between 2008 and 2010, equivalent to €515 million per year. Companies strengthened their position in Belgium through investments in new R&D-centres, pilot plants and corporate headquarters.

SOURCE

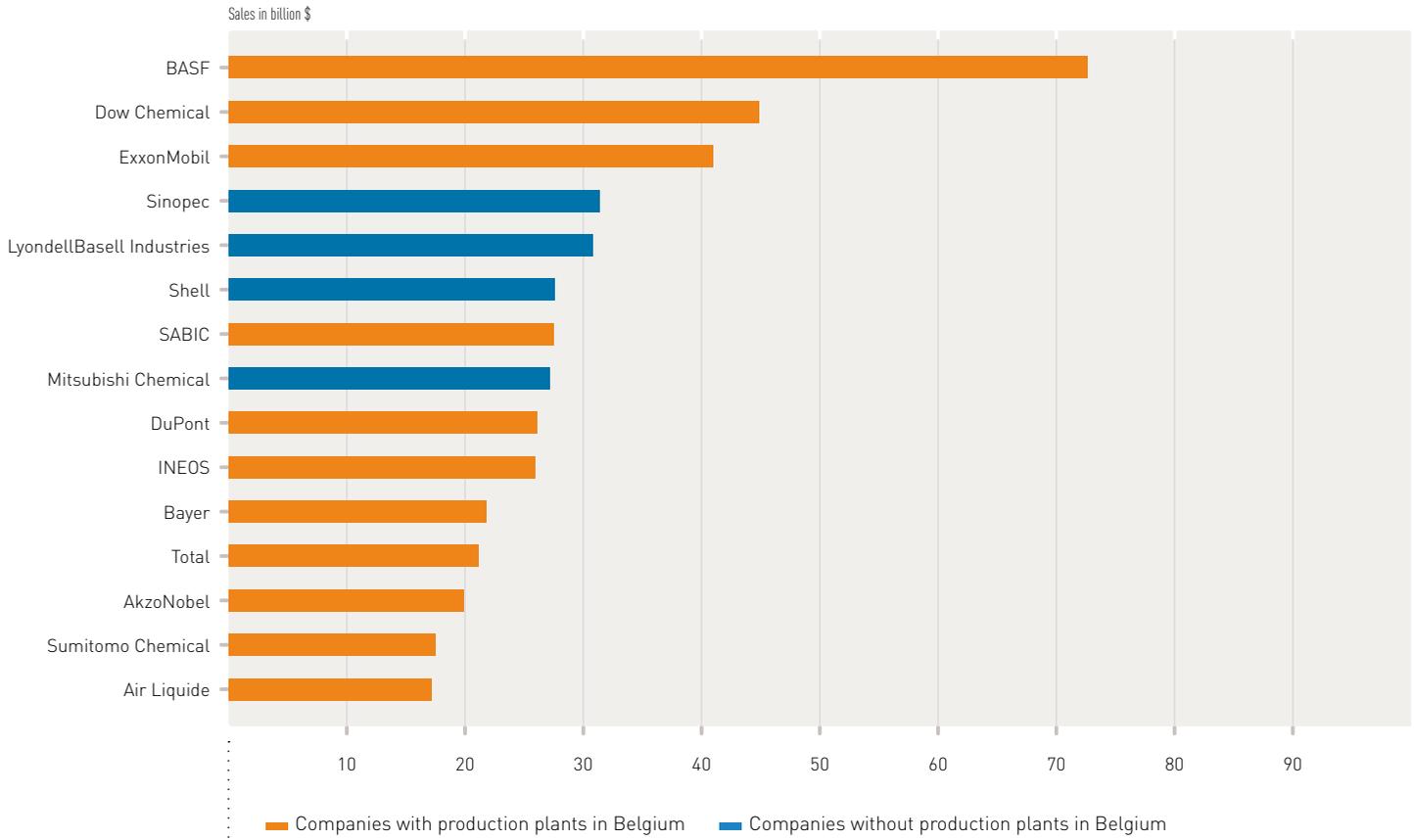
DG Statistics and Economic Information (based on data from the VAT-administration)



“The numerous investments in process and product innovation made in recent years show that chemical and life sciences companies in Belgium, and in particular Solvay, not only create sustainable value for their stakeholders, but are also invested with a real social mission. They have chosen the path of a chemistry that is modern and innovative, with a reduced environmental footprint.”

Christian Jourquin, CEO Solvay

Top chemical companies (2009)



► Of the world's top 15 chemical companies, 11 have invested in major production facilities in Belgium. These companies are longstanding investors in the country and continue to upgrade and extend their facilities.

SOURCE
ICIS Chemical Business,
September 2010



UCB's new biopharmaceutical pilot plant in Braine-l'Alleud

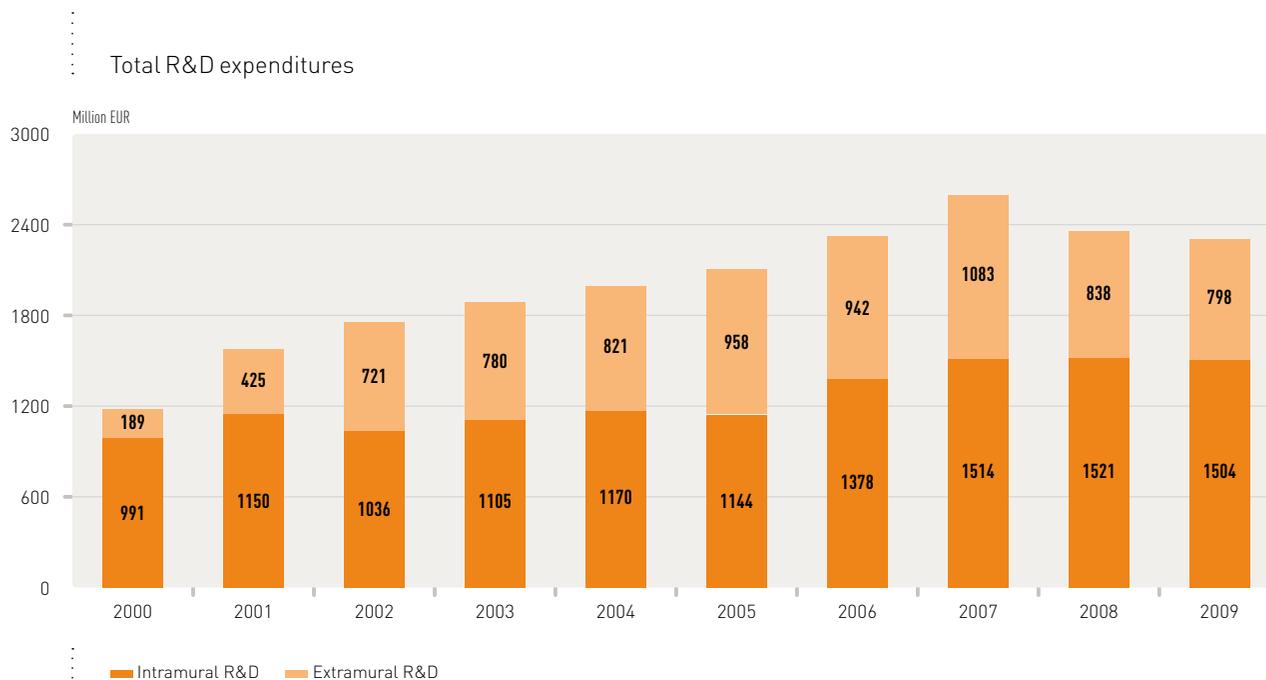


€1.4 billion investments in fixed assets in 2009

Soudal's new R&D Centre in Turnhout

R&D expenditures

More than half of total R&D expenditures in the manufacturing sector



▷ The chemical and life sciences industry spent **€2.3 billion on R&D in 2009**. It is the largest private investor in R&D. Life sciences companies account for more than 75% of the sector's total R&D expenditures. Industry spending on sustainable chemistry such as bio-based economy and green chemistry is increasing.

▷ About two-thirds of R&D expenditure takes place in-house while the balance is spent by third parties on behalf of a client company. The high level of third-party spending reflects the strong degree of collaboration between companies and technology centres to boost innovation.

▷ In 2010, the European Commission adopted EU 2020, a strategy which aims at smart, sustainable and inclusive growth in Europe. The chemical and life sciences industry in Belgium helps to achieve the European target of investing 3% of GDP in R&D (Barcelona-norm). The R&D-intensity of the Belgian economy (both private and public sector) amounted to 2% of GDP in 2009. The R&D-intensity of the sector (expressed as intramural R&D expenditures/value

added) reached 14.9% for the same period. Thanks to its efforts in R&D, the sector plays a key role in enabling Belgium to achieve its target.

▷ **During the last ten years, R&D expenditure** by the chemical and life sciences industry **nearly doubled**. According to own analyses based on a survey amongst member companies, this investment continued to rise in 2010 when R&D expenditure increased by 6% on the previous year.

▷ The sector accounted for **51% of the total in-house R&D expenditures** of all Belgian manufacturing companies in 2009.

▷ Belgian companies accounted for **6.5% of total in-house R&D spending of the European chemical & life sciences industry in 2008**. The share of the sector's in-house R&D expenditure in the manufacturing industry as a whole is more than twice as high in Belgium as in the EU-27 (46% vs. 20%).

SOURCE

Belspo-PPS Science Policy

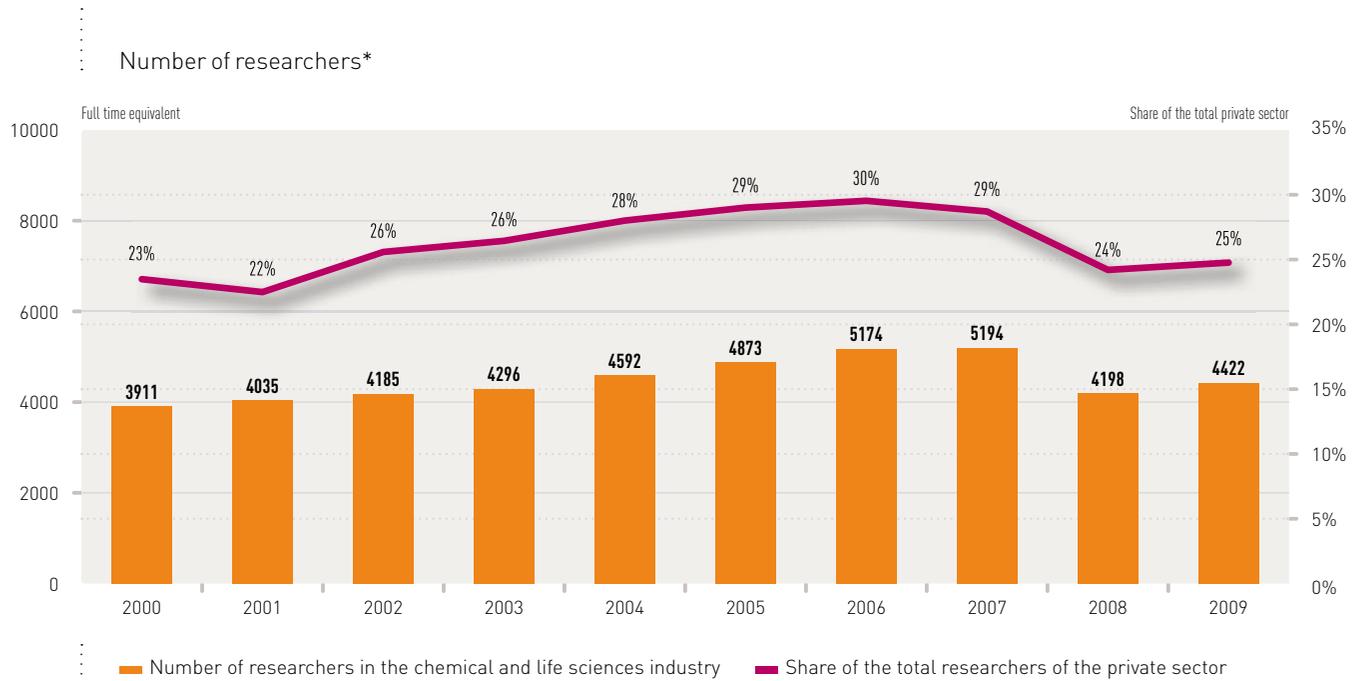


“The chemical and life sciences industry has taken the lead in realizing growth through innovation. The high level of R&D-expenditures, solidly embedded in a culture of open innovation, and linked to an excellent export performance, should guarantee a sustainable future for this industry in Belgium.”

Koen Debackere, Managing Director Research & Development Katholieke Universiteit Leuven

Number of researchers

A quarter of researchers in the private sector in Belgium



▷ The chemical and life sciences industry is an R&D intensive sector: **more than 7,000 people, or 8% of personnel in the sector**, are involved in an R&D-related activity or works for an R&D department.

▷ **More than 4,400 qualified scientific researchers** are working in the chemicals and life sciences field. This represents **25% of all researchers in the Belgian private sector**.

▷ Women play an important role in research. Indeed **37% of researchers in the chemical and life sciences industry are women** (against 24% in the private sector).

SOURCE

Belspo-PPS Science Policy
* According to ANRSE definition

“Belgium offers an attractive and multicultural working environment for highly qualified researchers with excellent research facilities in the field of chemicals and life sciences.”

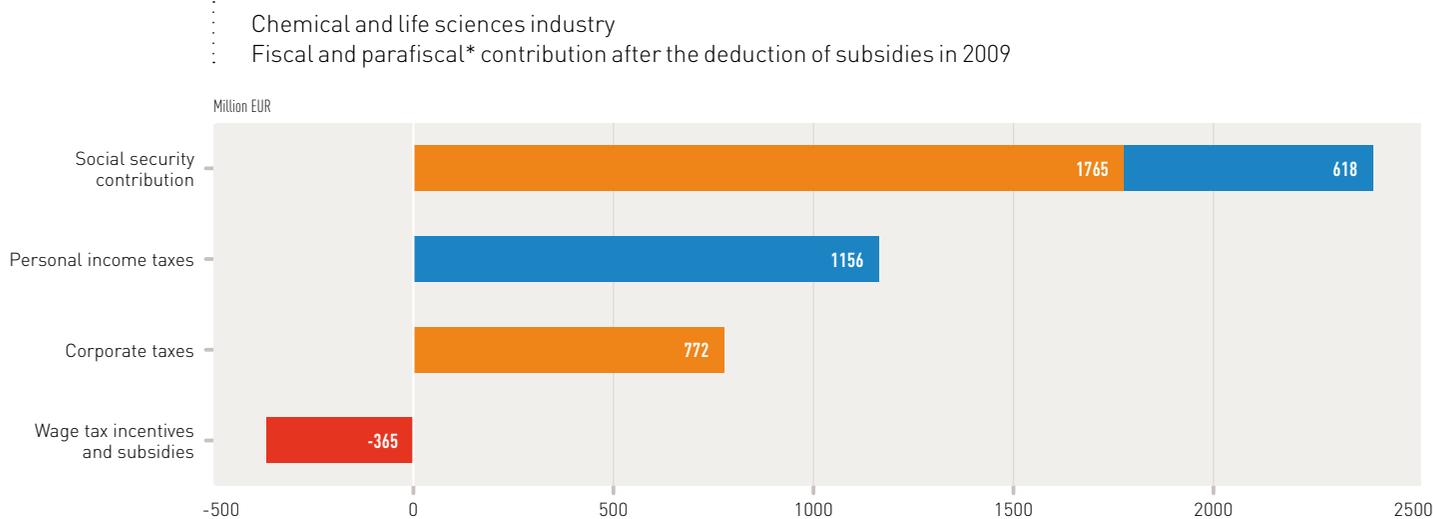


25%
of total researchers
in the private sector

Jean Stéphenne, President GSK Biologicals

Tax and subsidies

Nearly 40% of the sector's value added contributes to the state budget



*contributions to the social security system

▷ Companies from the chemical and life sciences industry contribute significantly to the budget of national, regional and local authorities through the payment of various taxes. This is a financing source for social, environmental and economic policies. At the same time, the chemical and life sciences sector benefits from subsidies and tax incentives which are often related to longer-term projects with a focus on the sustainable development of chemical and life sciences activities in Belgium.

▷ In 2009, companies and employees from the chemical and life sciences industry **contributed around €4 billion to the state budget** after deduction of subsidies and tax incentives. **This represents about 40% of the sector's value added.**

▷ The main contribution comes from **the payment by companies of social contributions (€1.8 billion in 2009)** which help finance the social security system and represent 45% of total net contribution.

▷ The sector's 90,000 workers also contribute to the state budget through **the payment of social security contributions (€618 million) and personal income taxes** estimated at **€1.2 billion for 2009**. As well, employees pay taxes such as VAT as end-consumers, and property taxes, etc. which are not considered in this calculation.

▷ **Corporation taxes** are also an important source of government financing and represented a total of **€772 million in 2009**. Taxes on corporate profits were impacted by the economic crisis in 2009 and amounted to €323 million after tax incentives. Furthermore, the sector paid taxes on its production activities (related to environment and property, etc) amounting to €192 million in 2009. Pharmaceutical distributors in Belgium pay an annual product tax for the right to sell pharmaceutical products on the Belgian market, which amounted to €257 million in 2009.

SOURCE

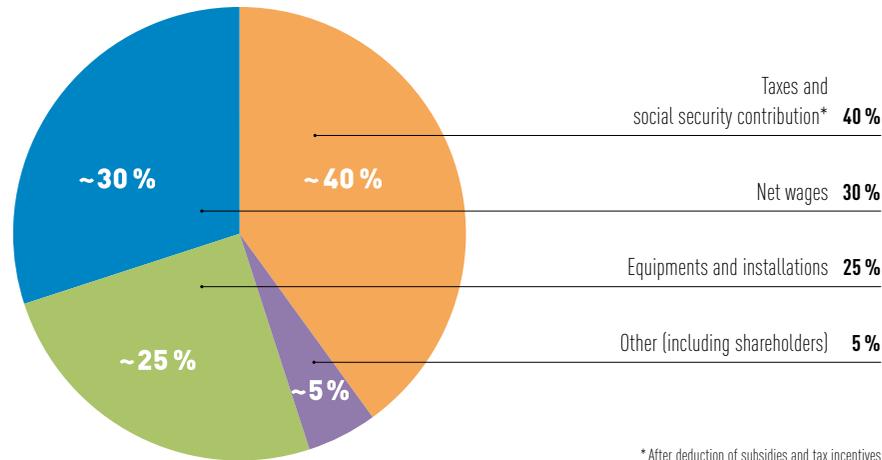
National Bank of Belgium, National Accounts Institute, National Social Security Office



“The most sustainable way to face the budgetary challenges of today and of the coming decades is, following the example of the chemical and life sciences industry, to increase the added value generated in our country.”

Etienne de Callatay, Chief Economist Bank Degroof

Breakdown of value added (estimate)



▷ The sector received an estimated **€365 million euro** in tax incentives on wages and **subsidies in 2009**, linked mainly to R&D and shift work. These are essential to maintain and enhance the competitiveness of the chemical and life sciences cluster in Belgium.

▷ According to a survey of international salary costs by Deloitte/Laga (May 2010), **a German process operator on full continuous shifts is 27% cheaper than his Belgian colleague**. Even after applying the tax exemptions related to shift work, Belgium remains, in most cases, the country with the highest salary cost. Therefore, one of the potential recommendations might be to increase the percentage of tax exemptions for shift labour in order to reduce the total cost for the employer in Belgium. Shift workers make up around 40% of Belgium's chemical and life sciences workforce.

SOURCE

National Bank of Belgium,
National Accounts Institute,
National Social Security Office/
Estimation by essenscia

▷ In addition, the sector contributes to the federal budget through the payment of indirect taxes and additional costs. For example, the sector pays taxes on its energy use (eg. federal contributions to electricity and gas, public service obligations, etc). The sector also pays additional levies for emissions trading (ETS), and Green Certificates for renewables including offshore. These have not been taken into account because there is no consolidated official public data available.

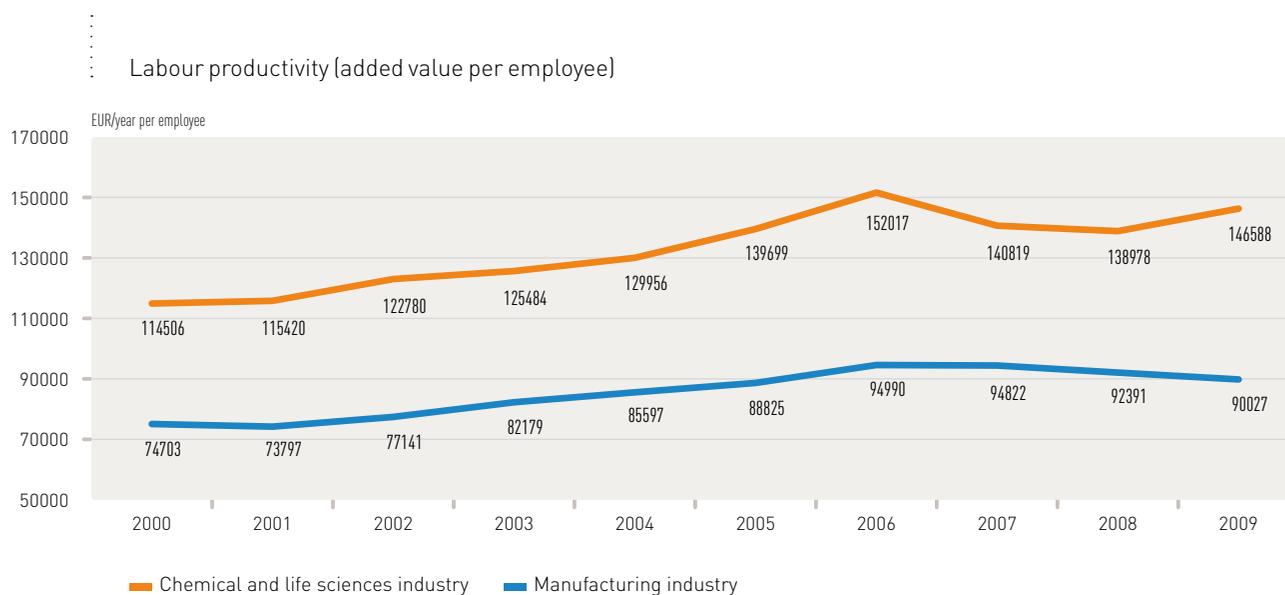
▷ All in all, **every employee in the chemical and life sciences industry contributes around €43,000 to the state budget compared with €29,000 for total manufacturing industry**.

€4,000,000,000

**net contribution
of the sector
to the state budget**

Labour productivity

Productivity higher than for industry as a whole



▷ The level of **labour productivity** in the chemical and life sciences industry is high. The average value added generated by each worker is more than **50% higher than for total manufacturing**.

▷ **Between 2000 and 2009, labour productivity** of the sector **increased** at roughly the same pace as gross salaries – **nearly 30%** or 2.8% per year.

▷ Each worker in the chemical and life sciences industry generated an average value added of more than **€146,000 in 2009**.

▷ According to a study by the Federal Planning Bureau (2010), **labour productivity growth** in the chemical sector in the period 1996-2007 was **lower** in Belgium **compared with that of neighbouring countries**, Germany, France and the Netherlands.

SOURCE

National Bank of Belgium (data from the Central Balance Sheet Office)

“In a context of rising energy prices, high labour cost and increased competition particularly between sites of a same company, further productivity gains are needed to improve the competitiveness of Belgium's chemical industry in Europe. At the same time we need a relentless effort to engage China and India in a more sustainable world economy.”



Ivan Van de Cloot, Chief Economist Itinera Institute

04.

“ Key challenges for the chemical sector are to continue protecting people and reducing impacts on the planet thanks to new approaches such as innovative products based on LCA, closing the loop, resources efficiency, network and partnerships with key actors.”



Roland Moreau

Director General Federal Public Service Public Health

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PRODUCTS

PRODUCTS

Product safety is our top priority

REACH – Europe's legal framework for chemical safety

European legislation covering the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) seeks to protect human health and the environment by assessing risks related to chemical substances based on the principle 'no data, no market'. REACH is a complex piece of legislation affecting the whole supply chain.

REACH requires all companies manufacturing or importing chemical substances into the European Union in quantities of one tonne or more per year to register these substances. Registrations are submitted to the European Chemicals Agency (ECHA) and contain information on the substance's properties, uses and risk management measures. This information must be passed **along the supply chain to downstream users** so they know how to use substances safely. REACH also restricts the manufacture, import, placing on the market and/or use of certain dangerous substances; and use-specific authorisation is required for 'substances of very high concern' (SVHC).

44% of essencia members are manufacturers and/or importers of chemical substances and must meet REACH registration obligations, as must the 'only representatives' of non-European companies, another 10% of members. Most member companies have downstream user obligations (65%). As formulators, 36% are also responsible for classifying and labelling, and drafting safety data sheets for mixtures. To help companies to meet their obligations, essencia has been working with the European Chemical Industry Council, Cefic, on the preparation of guidance documents. REACH obligations are also explained in detail and illustrated via case studies in the '**Practical guide for REACH implementation**¹', published by Kluwer beginning 2010. In addition, the experience gained through the actual implementation of REACH by all parties involved (ECHA, the authorities



and industry) will be evaluated and put to use for future registration deadlines in 2013 and 2018. In addition, **guidance projects** have been set up by essencia with help from Belgian local authorities to facilitate experience exchange and knowledge sharing.

New information on safe use

ECHA statistics show that the first phase of REACH registration for phase-in substances was successful. By the 1 December 2010 deadline, ECHA had received 24,675 registration dossiers, 8% of which were submitted by Belgium-based companies. Even some nanomaterials have been registered, but most of these dossiers are expected to be submitted by the next registration deadline of 1 June 2013.

The list of registered substances is available on the ECHA website² and most of the information submitted will be made publicly available. In June 2011, information on 75% of the registered substances could be accessed through the ECHA website. Nearly all registration dossiers (97%)³ submitted by lead registrants, are already disseminated on the internet. Moreover, suppliers must

1. Guide available in Dutch "Praktische gids voor de toepassing van REACH in uw bedrijf" and French "Guide pratique pour la mise en oeuvre de REACH dans votre entreprise"
2. www.napira.eu
3. <http://apps.echa.europa.eu/registered/registered-sub.aspx>



"Both as individual companies and industry associations, we are now really starting to understand the full complexity of REACH. The next phases will present an even bigger challenge to the industry as less-known substances and more inexperienced companies will be involved."

Erwin Annys, Director REACH and Chemicals Policy at Cefic

Nanomaterials

Nanotechnology and nanomaterials can help mitigate issues of global concern like climate change, water supply and health. Nanomaterials are tiny substances measured on the nano-scale (1-100nm). 1 nanometer is a billionth of a meter (10^9). At this size, properties can be different from the bulk form in many respects including increased strength, chemical reactivity or conductivity, enabling novel products. At the time of writing, there is no commonly accepted legal definition for a nanomaterial, but one is urgently needed to facilitate discussion. The European Commission is expected to present a definition in the near future.

Nanomaterials per se are not dangerous because of their tiny size. The safety assessment of these substances must be done on a case-by-case basis. General obligations under REACH (such as assessing safety in the registration

dossier and providing information in the supply chain) and under CLP (classification, labeling and packaging) apply to nanomaterials in the same way as any other substance, but there is strong political pressure for additional nano-specific regulation and safety testing.

Industry, together with the authorities, is gathering safety information on nanomaterials as a member of the OECD working party on manufactured nanomaterials. Data is stored in the JRC Nanohub⁴. In addition, to help ensure that industry's nano-based materials, products and technologies are researched, designed, manufactured and used safely and responsibly throughout their entire life cycle, Cefic has developed Responsible Care guidance with examples on **Responsible Production and Use of Nanomaterials**.

also provide this information in the so-called '**extended safety data sheets**'. This summarises key information from the product safety assessment carried out under REACH, extended with exposure scenarios. Exposure scenarios include the conditions of safe use for registered uses, i.e. the operational conditions and necessary risk management measures to use the substance safely. While the safety data sheet contains information on a product that is relevant to all users, the information in the extended safety data sheet is tailored to the different downstream users groups and sectors. Industry is working hard to familiarise itself with and effectively implement this new concept.

4. ECHA newsletter 3 – June 2011

5. ECHA report on the use of non animal test methods –30/06/2011 Ref.: ECHA-11-FS-06-EN

REACH introduced the '**one substance, one registration**' concept to avoid unnecessary animal testing. Companies must share their data on a chemical with any other company registering the substance via the Substance Information Exchange Platform (SIEF); the cost of the data is also shared. If no data is available, REACH ensures that animal testing is a last resort. Based on this, 574 registration dossiers submitted in the first registration phase included animal testing proposals amounting to 1,175 individual tests, of which 711 were proposals for vertebrate animal studies⁵. Before any new study can be conducted, ECHA assesses it and publishes the proposal for third party comments before agreeing to testing.

Practical tool to assess the effect of chemical combinations

The potential adverse effects on human health and the environment of cumulative exposure to multiple chemicals (man-made and natural) present at low levels in our environment – even if individual substances are below risk limits – have been identified as an emerging policy issue. The European chemical industry is committed to proactively address this concern by establishing which combinations of chemicals, if any, could create these toxic effects on human health and/or the environment. It developed a 'decision tree' screening tool, based on the WHO risk assessment framework, to offer a pragmatic approach for risk assessors to identify combinations of concern.

“Companies have shared data or made extensive use of alternative methods so as to avoid the need to test chemicals on animals.”

Geert Dancet, Executive Director European Chemicals Agency (ECHA)



The whole supply chain bears responsibility for safe use

By end 2009, information on how a substance is used and related risks through the supply chain was passed back up the chain to registrants by downstream users, enabling its inclusion in the registration dossier. Every downstream user must in turn assess the safe use of the substance for that particular application and must comply with the operational conditions and risk management measures described in the received exposure scenario. All necessary measures to protect workers and the environment must be taken within 12 months of receipt of the extended safety data sheet with registration number. REACH also foresees requirements for the safe use of substances in goods such as textiles and clothing, toys, cars, electronics, construction and decorative products. For European supply chains, use should be assessed in the chemical supplier's registration dossier. Importers need to be aware of their obligations, not only in meeting registration and/or restriction requirements but also regarding new provisions related to the notification and communication of substances of very high concern listed on the Candidate List for authorisation present in articles. Since beginning 2010, essenscia has organised more than **30 information sessions with downstream user organisations** to explain the new obligations for downstream users, reaching out to more than **750 participants**.



VLARIP information session



The "Knappe kapper/Coiffeur futé" campaign

The "Knappe kapper/Coiffeur futé" campaign is the result of cooperation between the Public Health Service, together with consumer association CRIOC, cosmetics organisation Detic and the UBK/UCB vzw/asbl, the hairdressers union. An information campaign has been launched in 2011. It seeks to draw attention to the basic precautions hairdressers need to take when working with potentially risky products such as hair colorants and perms in order to protect both themselves and their customers. The "Knappe kapper/Coiffeur futé" website gives advice on good practices for use as well as information about the potential risks of incorrect use for each hair-care product, and can be accessed by training instructors in the sector. For more details, visit www.coiffeurfute.be or www.knappekapper.be.

Good practices for professionals

The use of **adhesives and sealants** is important when it comes to their environmental and social (safety) impact. The sector is developing a programme to promote the proper use of adhesives and sealants by professionals including publication of a manual of "good practices" in electronic format, and a communication campaign aimed at professional users, their clients and architects. A website with the manual's contents presented as workshops is being developed at the same time. In the medium term, this site will make it possible to organise ongoing training for the construction industry.

MIGRESIVES

The European adhesives and sealants industry has developed a modelling tool for the **migration of substances contained in food packaging adhesives**. This open-access tool can be used to study highly complex packaging systems and the influence of factors such as temperature on substance migration. The MIGRESIVES project responds to increasing demands from the packaging and food industries to improve awareness of food safety while at the same time highlighting innovation.



REACH and CLP meeting at ECHA

Controls needed on imported products

To ensure a level playing field is created and human health and environment are protected, REACH enforcement should not only focus on the European production and use of chemicals, but also on imported chemicals and articles. In particular, it needs to ensure that human health and environment are not exposed via imported articles **to substances which are banned or restricted in Europe but not in the rest of the world.**

To this end, essenscia supports efforts through the Forum for Exchange of Information on Enforcement to reach a uniform, consistent, transparent and equal enforcement of REACH throughout the EU.⁶ To help the members check compliance, essenscia created a REACH self assessment tool which was discussed in the Forum. The tool includes a checklist with questions and suggestions in order to comply with REACH, an overview of penalties, and lists with REACH-required and recommended documentation. The tool is flexible and can be customized to company needs.

6. Forum for Exchange of Information on Enforcement (Forum), coordinates a network of Member State authorities responsible for enforcement.

Substances of very high concern: communication and substitution

Substitution of chemicals by safer alternatives is a continuous process and a natural consequence of the industry's **Responsible Care** ethic. REACH legislation further reinforces this development through the authorisation process. The ultimate objective of the regulators is to phase out SVHCs in Europe and to replace these substances by safe alternative chemicals or technologies.

Substances which are carcinogenic, mutagenic or reprotoxic (CMR), or which are persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative, or have properties of equivalent concern such as endocrine-disrupting properties, may become subject to authorisation. Member states are discussing a definition and criteria for endocrine-disrupting properties.

The publication of SVHCs on the Candidate List (after a dossier is submitted by a member state and public consultation) is the first step in the selection procedure, but already creates communication obligations for the producers and downstream users. When an article contains more than 0.1% by weight of a listed SVHC, REACH requires the industrial or professional user of this article to be automatically informed, and told how to use it safely. Consumers must be in receipt of the information on the presence of the SVHC in the article within 45 days after their request.

The listing of an SVHC on the Candidate List may result in the chemical being blacklisted by certain downstream users or retailers, and accelerated substitution by a safer alternative. Member company responses to an essenscia questionnaire on REACH confirmed that such a listing triggered most companies to investigate alternatives for specific uses and applications.



REACH information session

**Substitution and change
of substances are concrete
Reducing environmental impact**

For more than a decade, there have been dramatic reductions in the use of organic solvents in **consumer adhesives**. Aware of the impact of its activities and its responsibilities to customers, the adhesives and sealants sector is currently focusing its sustainability initiatives on projects related to food safety and good practices.

Since April 2008, the adhesives and sealants industry no longer uses di isobutylphthalate (DiBP), a SVHC listed on the Candidate List, in adhesives for paper or cardboard in order to avoid the accumulation of DiBP in paper during recycling, as this would represent a potential risk for applications involving contact with food. Industry's initiative thus facilitates the use of recycled paper by the food industry.

The Candidate List was first published in October 2008 and is updated every 6 months. By July 2011 it contained up to 53 substances; the European Commission aims to have 136 SVHC substances listed by end 2012. Among the listed SVHCs, six have been selected for the next step in the authorisation process and have been put on the Authorisation List beginning 2011, among others three phthalates mainly used as plasticisers for polymeric materials (DEHP, DBP, BBP) and a brominated flame retardant (HBCD). Substances on the Authorisation List cannot be placed on the market or used after the so-called "sunset date" (21 August 2015 for the initial batch of listed substances). These substances may only be placed on the market if authorisation has been granted for a specific use – granted only when the risks are minimised and well-managed and a substitution plan is provided – or when it can be demonstrated that the socio-economic advantages outweigh the potential risks. The Authorisation granted is temporary, but can be renewed.

A further eight substances are expected to be added to the authorisation list by the European Commission by end 2011. The authorisation consultation process on an additional 13 prioritised SVHCs began mid June 2011.

REACH also limits the exposure of humans and the environment to chemicals through production and use restrictions imposed on listed substances. Whereas authorisation aims for phase-out, the restriction process aims to control the risks presented by a substance by limiting its application.

Building on REACH with the Global Product Strategy (GPS)

The Global Product Strategy (GPS) aims to improve the safe management of chemicals, harmonise product safety assessment and communication between developing, emerging and industrialized regions, and strengthen public confidence that chemical products are **handled safely at all stages of the life cycle**. The GPS is a voluntary initiative developed by the International Council of Chemical Associations (ICCA) launched in 2006 and supported by essenscia. This strategy builds on the product stewardship elements of industry's voluntary **Responsible Care initiative, our commitment to sustainability**.

ICCA member companies are publishing GPS Safety Summaries to share relevant information on chemicals with the public and increase confidence that chemicals are safely handled throughout their life cycle. In Europe, chemical safety assessment and management are covered by REACH, so most of the information is available through the ECHA or in Safety Data Sheets (SDS). Nevertheless, GPS Safety Summaries will additionally provide information on the safety of chemical substances in commerce in easy-to-understand language that complements SDSs. For REACH-registered substances, **GPS Safety Summaries** should be available on both the company website and ICCA GPS portal within one year of registration. With the help of ICCA, Cefic, and experts from larger chemical firms, essenscia is providing companies with the support and tools they need to facilitate the translation of REACH dossiers into GPS Safety Summaries.

The GPS portal is located at:

www.icca-chem.org/global-product-strategy

Addressing the classification and labelling of chemicals in Europe

Chemical suppliers must establish the hazards of chemicals, and classify and label them, before they are placed on the market. The European Community regulation on classification, labelling and packaging of chemicals (CLP) was introduced at the start of 2009, and is aligned with the United Nations Globally Harmonised System (GHS). Due to new and more accurate information available through REACH registration dossiers, 20% of respondents to an essenscia survey indicated that some of their product portfolio could be less severely classified. On the other hand, as the CLP classification criteria have been tightened, more than 50% of respondents indicated their products would be more severely classified. One future implication is that, without substitution or composition change, more consumer products will be labelled and packed in containers with child-resistant fastening.

The staggered introduction of the new system (by 1/12/2010 for substances and 1/06/2015 for mixtures) means that two classification and labelling systems are currently in operation, potentially leading to confusion. essenscia is committed to work with the public services to raise public awareness of safe use of chemicals. The vast majority of member companies (95%) had received products using the new CLP labelling by the beginning of 2011, and have already provided employee training on the system. Together with ACTA, essenscia has also organised CLP training in 2010 for **436 employees from 80 companies**.



EXPLOSIVE



FLAMMABLE



OXIDISING

GASES
UNDER PRESSUREENVIRONMENTAL
HAZARDS

HEALTH HAZARDS



TOXIC

HARMFUL,
IRRITANT, SENSITISER

CORROSIVE

Classification and labelling information publicly available

CLP requires companies to notify hazardous substances to a **central inventory**. Manufacturers and importers of any hazardous substance (whether subject to REACH registration or not) must submit the CLP classification and labelling to ECHA within one month of being placed on the market.

Since this came into force on 1/12/2010 more than 3 million notifications covering more than 100,000 substances have been submitted, 6 % by Belgian companies.⁷ The Agency will make the Classification & Labelling Inventory available to the public.

7. ECHA newsletter 2011 n°1

Safeuseicons

The detergents industry has developed pictograms showing how to safely use products. These pictograms, which appear on the labels of detergents and cleaning products, have been given a new look in 2011 to make them even easier to understand. They are often accompanied by a few words of advice, but have been developed to be understood without any accompanying text. For more details, visit www.cleanright.eu & www.sustainable-actions.be.

SAFE USE - ICONS



Keep away from children.



Rinse hands after use.



Do not ingest. If product is ingested then seek medical advice.



Do not mix with other products



Keep away from eyes. If product gets into eyes rinse thoroughly with water.



People with sensitive or damaged skin should avoid prolonged contact with the product.



Do not change container to store contents.



Ventilate the room after use.

Transfer refill content in the original container only.

www.cleanright.eu

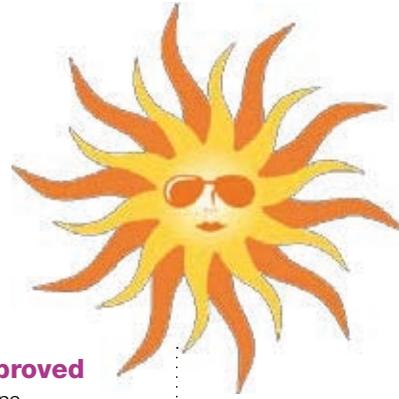
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essencia guidance projects successful

To help the Belgian industry, especially **SMEs**, with the implementation of REACH and CLP, essencia created a unique concept with support from the regional governments. Over the past four years, mentors from larger companies have helped guide their smaller counterparts through their REACH and CLP obligations under regional implementation projects: **VLARIP** for Flanders and **WALRIP** for Wallonia. The exchange of information and experience between participants, who meet monthly in groups, is reinforced by 'learning by doing', and has proved an effective approach. It will continue to be an important tool, especially for unexperienced SMEs, with the approach of the 2013 deadline for substances manufactured or imported at or above 100 tonne/year.

In total, nearly **200 companies** (manufacturers, distributors, importers, as well as downstream users from different sectors, and service providers) participated in experience sharing working groups, including 60 textile companies in the VLARIP textile project run in cooperation with Fedustria and Centexbel. Around 80% continued their participation in the second wave of projects

The four stages of the WALRIP project - awareness sessions, implementation of REACH, CLP regulation, and experience sharing work group - attracted more than **477** people from **282** different companies. The vast majority were downstream users from various industry sectors.



Declaration to Poison Centre improved

Despite safe handling and use instructions, accidents with chemical products still happen. The Belgian Poison Centre received 53,272 calls in 2009, of which 48% were related to pharmaceuticals, 28% to exposure to household chemicals, 4% to exposure to pesticides and biocides, and 4% to cosmetics. Half the incidents involved children who were mainly exposed through accidental ingestion or mouth contact (88% of cases) due to products left within reach, products left unattended (e.g. plugged in airfresheners, pills on the table, ...), products decanted into other containers (e.g. waterbottles, cups, ...). Half of the incidents related to adults were due to ingestion or mouth contact. A further 20% were inhalation exposure (e.g. solvents in a confined space, chlorine gas due to mixing hypochlorite and other products during toilet cleaning) and another 20% from products coming into contact with the skin or eyes.



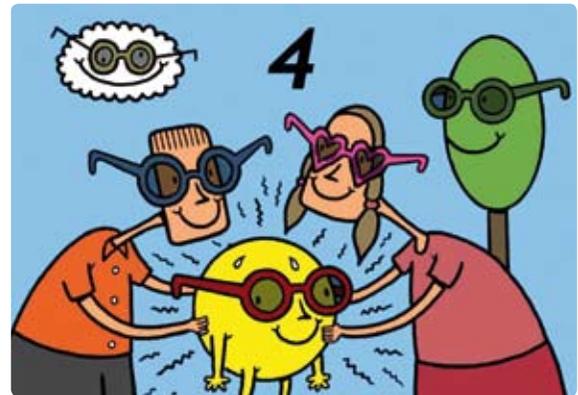
Industry provides the Poison Centre with the information needed by doctors answering calls related to incidents involving products placed on the market in Belgium. In 2009, 70% of some 19,000 declared products were notified electronically to the Poison Centre by the industry, the rest on paper. From 2010, essenscia worked together with the centre to improve and distribute the updated electronic declaration form (EDF 2.0) to be used by industry to notify dangerous preparations, resulting in a 10% increase in electronic notifications.

The Belgian chemical and life sciences industry is committed to further collaborate to provide additional information to make communication easier; for example companies are also advised to provide a picture of the label so doctors can view and refer to the same information that callers are using.

The “Veilig in de Zon/Soleil Malin” campaign

This is an information campaign developed by consumer and cosmetics associations, the trade and services federation and the Department for Public Health, Food Chain Safety and the Environment. Launched in 2006, it aims to reach as wide an audience as possible with information on safe exposure, the need for adequate protection, choosing the right products and using them properly. The campaign is relayed by national television channels (RTBF and VRT) and the Cancer Foundation. From summer 2011, a new Facebook page also delivered the campaign messages.

For more details, visit www.veiligindezon.be, www.soleilmalin.be and www.detic.be



Sustainable construction needs sustainable chemistry

European Commission statistics shows that the building and construction industry accounts for 40% of total European energy consumption. Construction is also responsible for **40% of total European CO₂ emissions** and consumes **50% of all extracted raw materials** in Europe. Together with the transport sector, efficiency improvements in the building and construction industry are therefore key to achieving the **European climate and energy 2020 targets**. Belgian households consume on average 348 kWh m²/year electricity, **72% more than the European average**. Belgian housing stock is renovated at the rate of 1% per year. A domestic home has an impact over a period of about 75 years, so **efficient insulation and well dimensioned ventilation** of existing properties and a stringent approach to overall energy-efficiency in new builds is essential.



Since 2002, the world of construction has changed dramatically. Today, the European energy performance directive already requires better insulation and less energy use, but more is needed: by 2020, buildings will need to be virtually carbon neutral to achieve energy-saving targets, and increasingly experts must work together in multidisciplinary teams.

Efficient building materials fulfil a key role – they ensure buildings are air-tight and ventilation systems provide clean air at controlled temperatures; building products must be stable so there are no emissions of dangerous substances to the indoor environment; effective insulation ensures heating and cooling are not lost.

A range of new European regulatory and voluntary initiatives seek to ensure these objectives are achieved. The Ecodesign directive examines all products which influence energy consumption. The European Ecolabel system promotes sustainable products. The impact of building materials is reported in Environmental Product Declarations (EPDs) together with standards governing the sustainability assessment of buildings based on cost-benefit measuring instruments. Dangerous substances are governed by REACH and new methods are helping better evaluate emissions to air, soil and water. The European Commission's Green Public Procurement policy encourages authorities to purchase more sustainable products and services, to accelerate the move to sustainability.

First passive hotel in Heusden-Zolder.

The hotel will be a bit more expensive to build, but this extra cost will be recovered by future energy savings.

Plastics play an important role, as they do more with less

Plastics use petroleum, but without depleting the reserves.

Today, on a worldwide basis, only 4% of all petroleum is used as a long term raw material for plastics. 87% of available petroleum is burned relatively fast for transport (45%), energy production or heating of buildings (42%). The remainder is raw material used in the chemical industry and other applications such as pharmaceuticals. Market prices are the main reason that plastics still use petroleum today.

Plastics do not necessarily use petroleum.

Ever increasing amounts of traffic and construction raise energy consumption even further, making reductions in petroleum combustion more and more difficult to achieve. The plastics sector has explored the use of **alternatives** for a long time. These days increasing quantities of hydrocarbon compounds are recovered from natural gas and biomass. Other alternative renewable raw materials for plastics are starch, cellulose, sugars, lactic acid, organic waste, vegetable oil, micro-organisms and algae. With its **Bio Base Europe cluster**, Belgium is a pioneer in the search for alternative raw materials for sustainable chemistry.

Plastics enable Water Management Systems.

As groundwater levels decline, Belgium has to prepare for shortages by improving rainwater collection to meet at least part of the country's requirement. Plastics play a key role in enabling a sustainable water policy whether as filtration systems, drainage pipes or rainwater collection tanks, for example. The harvesting of rainwater to flush toilets is just one option that would reduce the average Belgian's water consumption of 110 litres/day by 30 litres; there is scope for far greater reductions bearing in mind that only about 17% of that 110 litres is actually used for drinking water.

Plastics recycling is on the increase, as the industry works intensively with OVAM and other competent authorities to close the loop. Today, **30% of post-consumer plastic waste in Belgium is recycled**, making it a leader in Europe. The Belgian plastics sector also collaborates on initiatives such as the Clean Site System, FOST Plus, Val-I-Pac, BEPSRA, Kurio Emso, Febelauto, Recupel, Recovynyl, and Roofcollect.

Despite efforts to increase recycling rates, plastics are also used in energy recovery processes because of their high calorific value – 63% of all plastics are incinerated prematurely. The sector is moving towards a better balance of plastics derived from petrochemicals, biochemicals, and reused as producers aim for a **mixed, closed loop model**.

Optimising the unique properties of plastics

(malleability, imperviousness to water, phonic and thermal insulation, recyclability etc) enables savings of natural resources and energy. The thermal conductivity of plastics is 1/1000th that of stone.

Insulation products save 233 times more CO₂ during their use than the CO₂ emitted during the whole production process. They also help to save energy and therefore contribute to climate policy and programmes such as the Kyoto protocol. Plastics producers push for stronger climate legislation at global level. For instance, the plastics industry has campaigned since 2007 for further reduced the Uw-value of frames to 1.5 W/m².K. Doing so, Belgium would enable to save 37% on the energy loss through window.

Plastics have a long lifetime. For example, plastic pipes for water supply systems have a lifetime of at least 100 years and suffer fewer flaws than other materials thus minimising water loss. When no longer fit for purpose, pipes are collected by the Belgian non-profit association KURIO EMSO. Plastic joinery, eg for window frames, has a lifetime of 50 years and more. When replaced, the frames are recycled by one of the many initiatives supported by Recovinyl. Plastic roofing membranes have an average life of 22 years, although this figure keeps rising as technologies and techniques improve: in the last 15 years, the life of PVC roof covering has been extended by 50%. Roofcollect, a collecting and recycling initiative for end-of-life roofing membranes, ensures that more and more roofing is recycled. The 2008 figure of 954 tonnes rose to 1,586 tonnes in 2010.

Plastics offer light weight solutions.

It is increasingly difficult for older buildings to comply with the latest building regulations, which grow stricter year on year in terms of safety, sustainability, energy-use, etc. Too often buildings are demolished and housing stock lost because of safety issues regarding the increasing weight of materials needed for modifications. Lightweight plastics can play an important role, as they did when renovating the Main Hall of Antwerp railway station, for example.

Plastics enable the use of less material.

Due to their unique properties, plastics enable miniaturizing applications, such as computers, cooling installations, and communications media, as well as thermal interruption in metal and wooden frames.

Plastics are the basis for high-performance building components. Buildings are an assembly of different building components (roof, walls, flooring) made of different materials. Many building components are a combination of plastics and other materials, and different suppliers discuss with others how building materials can be further optimized to **shorten construction time and lengthen product lifetime**, while enabling rapid disassembly and maximum reuse at end of life. Successful initiatives include the 'massive passive' house (ultra low-energy), external wall insulation, and air-tight joinery.

Replacement of plastics is counterproductive.

The Denkstatt report (2010) calculated that substitution of plastics in 173 applications by an alternative would multiply the total mass of those products by nearly four. Energy consumption would increase 57% and GHG emissions by 61%. It would represent 39% of the EU15 Kyoto target (2012). In other words, an impossible choice.

Plastics respect nature. Today, plastics produced in Europe no longer contain ozone-depleting CFCs or HCFCs. The HFCs and other propellants used in plastic production do not affect the ozone layer. Plastics produced in Belgium no longer contain heavy metals such as cadmium or lead. All in all, plastics have substantially reduced their impact on the environment.

In many applications, plastics make an active contribution to save scarce raw materials.

Calculating the sustainability of a building means not just looking at the entire life cycle of the construction and its building materials, but also taking into account the **lifestyle of occupants**, including their way of travelling. Sustainability includes its **location**, and volume. Other factors include the transport needs of occupants: work, school, hobbies and sport facilities as a result of its location. The annual energy consumption of a passive house is already exceeded if just one person uses his car every day to travel a distance of 13 km or more.

Making a positive contribution to sustainability can only be calculated based on the whole life cycle, and plastics score particularly well because of their properties. The plastics industry has two important aspirations: to prolong the product lifecycle of plastics as much as possible, whilst recycling the product as often as possible in order to realise a **new life cycle with the same raw material**.

Chemicals and climate change

The International Council of Chemical Associations (ICCA) commissioned McKinsey to conduct a study on the global chemical industry's carbon footprint¹.

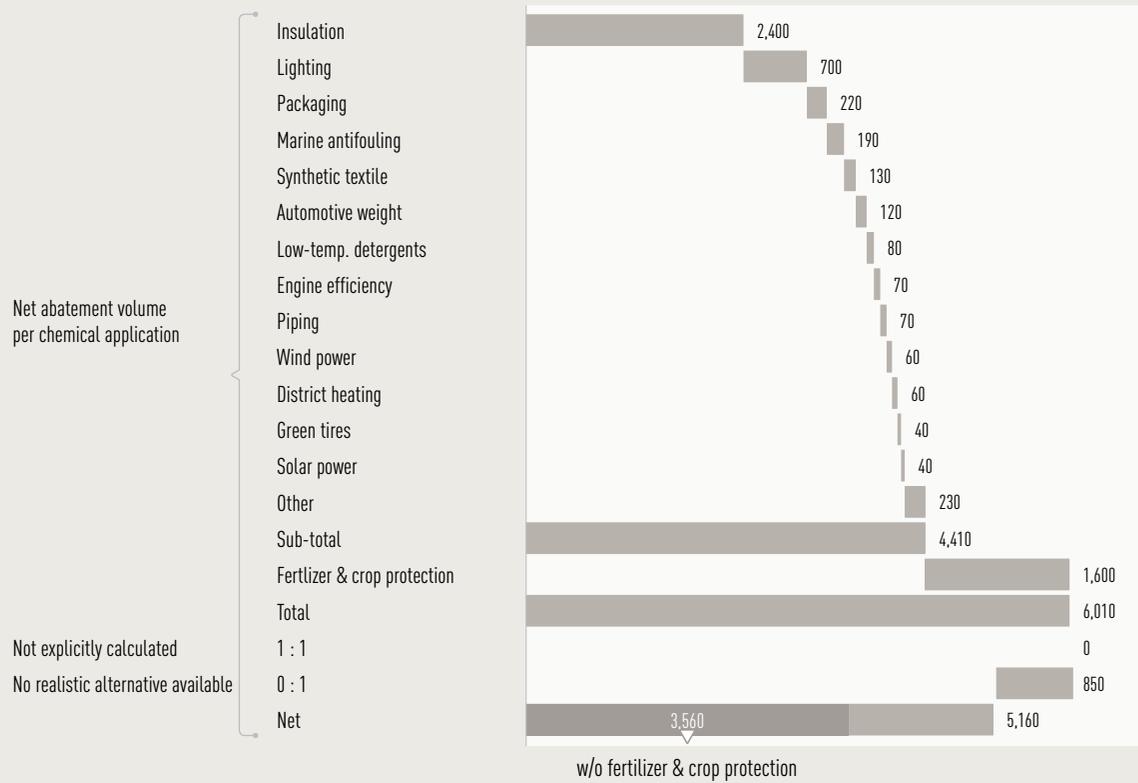
The methodology and the results of this study, which were reviewed by the German environmental research institute Öko, were published in July 2009.

According to this study, the global chemical industry emitted 3.3 gigatonnes of CO₂ in 2005. The products manufactured by this same industry allowed savings of 8.5 gigatonnes of CO₂ via the products and technologies it provides to other industries.

This represents a net CO₂ abatement of 5.3 gigatonnes. For each tonne of CO₂ emitted directly or indirectly to make chemical products, up to 2.6 tonnes of CO₂ are saved during the use of these products. The study highlights the **pioneering role of the Western European chemical industry**, and points out that its carbon efficiency is 40% higher than the industry in North America and a massive 60% higher than in Asia.

The study highlights the **pioneering role of the Western European chemical industry**, and points out that its carbon efficiency is 40% higher than the industry in North America and a massive 60% higher than in Asia.

The main contributors are insulation, fertilizer & crop protection, and lighting
Net abatement 2005 (MtCO₂ eq.)



SOURCE ICCA / McKinsey

1. "Innovations for Greenhouse Gas Emission Reductions – A life cycle quantification of carbon abatement solutions enabled by the chemical industry", International Council of Chemical Associations, July 2009. Download from www.icca-chem.org.

“Chemical products contribute significantly to the global reduction of GHG emissions. The chemical industry is therefore vital to achieve the climate goals. This contribution can increase even more if Europe and its Member States choose a smart climate policy.”



Philip Eykerman, Principal McKinsey

Innovating for greater resource efficiency

FISCH

the innovation platform for sustainable chemistry in Flanders

A feasibility study conducted among the chemical and life sciences sector and potential partners led to the setting up of the FISCH platform at the end of 2010. FISCH stands for **Flanders' Strategic Initiative for Sustainable Chemistry** and its aim is to drive the transition of industries in the chemical value chain to become sustainable. Sustainable chemistry spearheads the 'New Industrial Policy for Flanders' white paper approved by the Flemish Government in May 2011. FISCH has been approved by SusChem Europe, the EU commission-chemical sector sustainable chemistry technology platform, giving FISCH international visibility and creating new opportunities for cooperation.

Major commitment

The FISCH feasibility study showed that a large-scale strategic initiative for sustainable chemistry is not only desirable but also feasible from a technical and organisational point of view. Flanders has a great many knowledge centres and universities whose activities are linked to sustainable chemistry. In order to reinforce these initiatives and increase their output, it quickly became clear that a powerful platform was required. FISCH came into being thanks to the commitment made by **more than 620 people from over 360 companies, knowledge institutions and universities** that are linked to chemistry.

Mission and strategy

FISCH's mission is to enhance innovations in the field of sustainable chemistry and bring them to market more quickly, thus speeding up the sector's move to sustainability. In this way, industry creates new value chains, and contributes towards its global competitiveness; FISCH is intended to reinforce Flanders' position among Europe's leaders in sustainable chemistry.

FISCH's main aim is twofold:

- to develop **new value chains** based on sustainable chemistry in the disciplines outlined in its strategic innovation agenda;
- to build **collective and cooperative sustainable chemistry skills** to enable these new value chains.

The FISCH logo – a ferryboat with three sails – symbolises this three-pronged strategy:

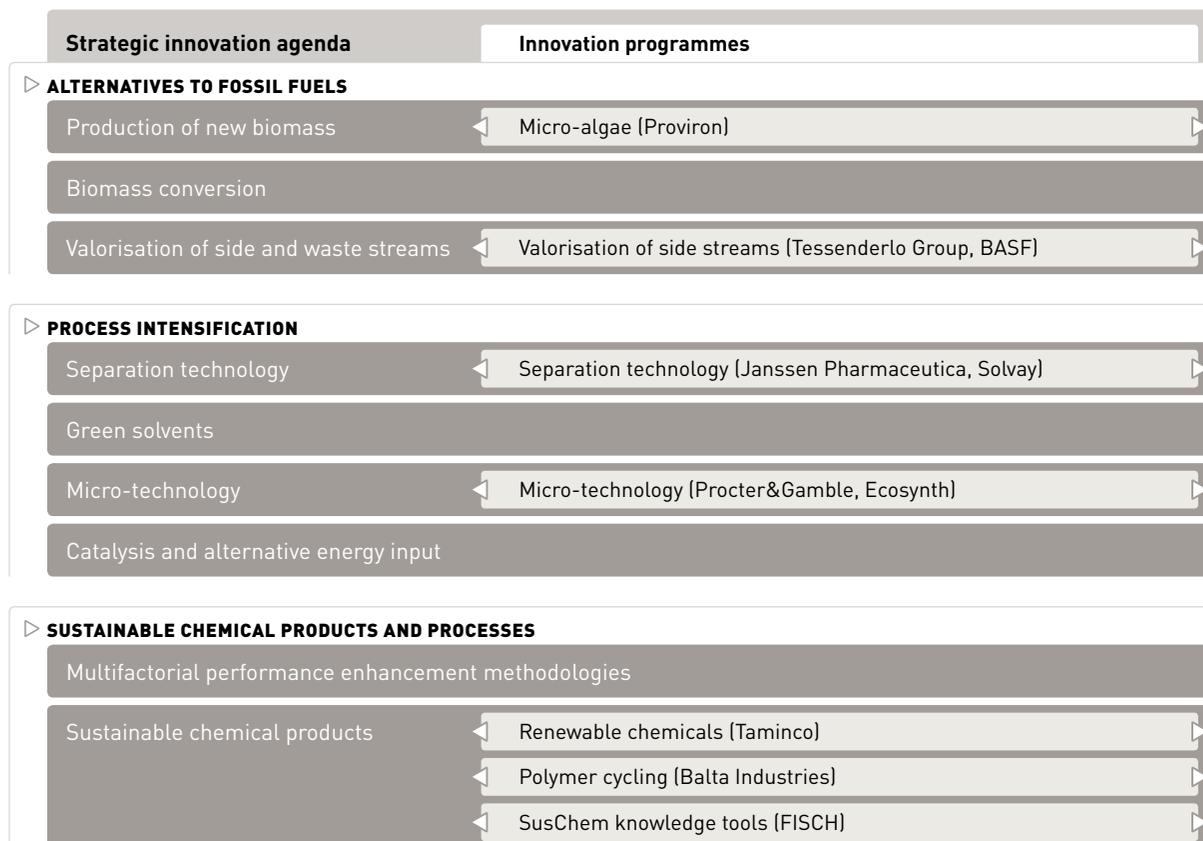


a strategic innovation agenda for sustainable chemistry, an enabling open innovation infrastructure cluster, and a sustainable chemistry knowledge centre.



“The Flemish Government is determined to firmly anchor the chemical sector in Flanders via the 'New Industrial Policy' project. I am delighted that essencia is firmly committed to further transform its activities to more sustainable innovative actions with a clear focus on sustainable development. For its part, the Flemish Government is devoting the resources needed.”

Kris Peeters, Minister President of Flanders



1 Strategic innovation agenda for sustainable chemistry

▷ FISCH has selected nine of the 80 research topics covered by SusChem Europe, and groups companies, knowledge institutions and universities into consortiums under three 'breakthrough domains'. Seven innovation programmes have already started. **The efficient management of scarce natural resources** is central to the research fields.

2 Open innovation infrastructure cluster

▷ The implementation of innovative sustainable chemistry projects requires high-tech and often expensive infrastructures to facilitate the whole process including, for example, up-scaling. The FISCH open innovation infrastructure cluster will list, group together, manage and optimise all available innovation equipment. The infrastructure will be made available to participating companies, knowledge centres and universities.

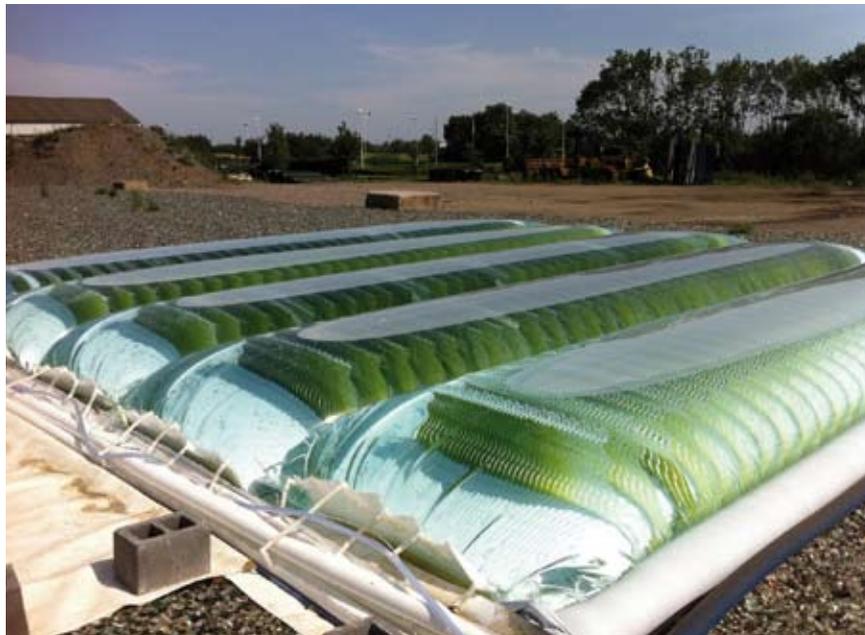
3 Sustainable chemistry knowledge centre

▷ The sustainable chemistry knowledge centre will combine all existing efforts and skills with a view to creating a database for research and development which will be circulated among sustainable chemistry stakeholders. To achieve this objective, FISCH is cooperating with existing knowledge centres and institutes of higher education to provide complementary activities. The knowledge centre will strive to promote and facilitate the initiation and development of new value chains for sustainable chemistry.

“Thanks to the excellent partnership between Indaver and the chemical industry, Belgium has acquired a leading position in the field of sustainable total waste management through the valorisation of energy and materials. This is the best guarantee for enabling the sector to continue its development in Europe successfully, with an open mind to the challenges of the future.”



Paul De Bruycker, CEO Indaver



Microalgae are the feedstock of the future. With the ProviAPT photobioreactor, Proviron's R&D team has researched and developed an efficient and simple method to grow these minuscule plants.

It is currently producing algae on pilot scale mainly as feed for baby fish as well as for scientific research.

Flemish Government support for FISCH

The R&D investments of industries in the chemical value chain in Flanders currently account for over half of all private R&D expenditure. FISCH activities will increase this still further, making an important contribution to achieving the Lisbon and EU2020 targets.

In addition, the huge importance of the sector to the well-being and economic growth of Flanders is recognised by the Flemish Government. Sustainable chemistry occupies a central position in its 'New Industrial Policy for Flanders' white paper: FISCH is one of seven innovation hubs, together with the automotive sector, eco-innovation, energy innovation, care innovation, sustainable mobility and logistics, and social innovation.

FISCH is part of a vibrant, growing regional and European network. In Wallonia, a strategic exercise has recently led to the establishment of the GreenWin competitiveness centre which has green chemistry at its heart, as does the Netherlands' equivalent 'Groene Chemie'. In the United Kingdom, Spain, France, Germany and Italy, sustainable or green chemistry is also a priority in the economic and innovation policy of their respective governments.

www.suschem.be

Leverage effect of FISCH

The expectation is that FISCH will provide substantial added value for the further development of the chemical and life sciences industry. Arthur D. Little assessed the potential impact of FISCH on chemistry in Flanders. The annual economic leverage by 2020 is estimated at €7.4 billion in supplementary turnover, the creation of 13,000 additional direct jobs, and €300 million in new R&D investment. FISCH will also have positive spill-over effects that are less easy to quantify, such as creating a more positive environment for innovation; the growth of new innovation-oriented small and medium-sized enterprises and service companies; the strengthening of companies through international, multidisciplinary and multisector cooperation agreements; and development of training courses focused on sustainable chemistry.



“Resource efficiency should become the strategic priority for companies. Potential for improvements exist in different areas and will clearly lead to win-win situations. Companies should take a leading role, using approaches such as system innovation, product stewardship, closing the loop, circular economy.”

Lieze Cloots, Policy Coordinator Bond Beter Leefmilieu

BIOCHEM

Today, the chemical and life sciences industry is in transition towards **a knowledge-based bio-economy**. With reduction of CO₂ emissions and the replacement of fossil fuels as the two main drivers, this transition is an important contribution towards a more sustainable industry.

In order to make the bio-economy a reality, innovation is needed in all parts of the value chain of a bio-based product. This value chain includes agriculture, biomass processing, chemical and/or biotechnological conversion, further downstream processing and commercialization.

Europe's BIOCHEM project, backed by the European Commission, seeks to support companies, especially **SMEs**, to innovate in the bio-based products sector, particularly in the production of bio-lubricants, bio-surfactants, bio-plastics, enzymes and pharmaceutical products.

BIOCHEM combines the expertise of 17 partners, including essenscia, from seven European countries into **one online business support toolbox**. This toolbox includes market information, individual audits, business planning tools, an online partnering and innovation resources system, and an online private and public funding directory. The major activities of essenscia in the project are coordinating its network of SMEs and other entities, and performing individual SME audits.

BIOCHEM is a Europe INNOVA Eco-innovation project co-funded by the Competitiveness and Innovation Programme of the European Commission DG Enterprise & Industry.

More information at www.europe-innova.eu/biochem and www.biochem-project.eu

Eco²Chem

It is important to understand exactly what is meant by "sustainable" when implementing a sustainability strategy. A look at the large number of widely-used "sustainability indicators" covering people, prosperity and planet clearly shows that the meaning is not always clear or consistent. A multitude of models and methods exist seeking to quantify or measure sustainability. Because of the complexity of the sustainability concept, assumptions and choices have to be made in every method.

The Eco²Chem project aims to help chemical and life sciences companies, especially **SMEs**, to better understand the different methods available. It focuses on those methods that measure ecological and/or economical impact and can be applied to either products or processes. A major goal of the Eco²Chem project is to develop a web-based tool to help companies select the eco-efficiency measurement method best suited to their specific needs. This involves developing an inventory of all available methods, and categorizing them according to parameters covering scope, objectives and preconditions. **A selection of available methods is being pilot tested by six companies in the chemical value chain.**

The Eco²Chem project is an open collaboration project with different parties from industry and research institutes, led by VITO, the University of Ghent and essenscia, and co-funded by the Flemish government and the European Fund for Regional Development.

More information: www.suschemanswers.be

"The chemical industry, as a responsible and innovative sector, offers solutions to the challenges faced by society. Hence, our active involvement in the development of corresponding legislation is crucial. Communication and cooperation with the authorities and other stakeholders have increased over the years, built on indispensable mutual trust and science-based information."

Raf Bouckaert, HSEQ Manager Bayer and Chairman of essenscia Product Policy working group



GreenWin

GreenWin has been recognized as one of six competitive clusters in the Walloon region. It serves the economic development of Wallonia by boosting the industrial dynamic. GreenWin brings together, in a collaborative venture, small and large enterprises, universities, research centres, training operators and collectives involved in the development of a green economy and convinced of the benefits of sharing skills and resources. Each year, the public authorities issue a call for collaborative projects in innovation training or investment. GreenWin makes an initial selection of the projects in the fields of sustainable materials and chemistry, use of sustainable materials (sustainable building), and waste management.

GreenWin is organised around three strategic axes focusing on the life cycle of materials, thus offering a strategic umbrella and a common vision.

1. Development of sustainable products and materials

Green chemistry is based on two fundamental principles :

- Process intensification (optimisation of materials performance and of energy consumption involving a reduction of the carbon footprint)
- Use of renewable (biosourced and recycled) raw materials

2. Sustainable integration and implementation of materials

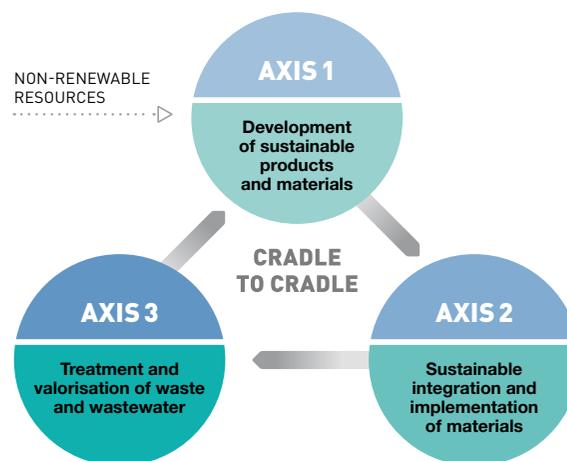
Development of new implementation processes for innovative materials in buildings and their integration in components or systems reducing the environmental footprint

3. Treatment and valorisation of waste and wastewater

The environmental sector is developing new methods for wastewater treatment and valorisation of secondary materials from human activities

A transversal axis: training

The development and organisation of trainings is essential for the success of GreenWin. The skills developed within the cluster are taught with a view to help economic development and employment.



Trainings are of two types: either directly linked to a project, or transversal to several projects and linked to one of the strategic axes of the cluster.

The first objective of the cluster is to strengthen the Walloon industrial fabric by ensuring the identification of skills and new ideas as well as the development, selection and support of projects led by enterprises, in partnership with other members of the cluster. The selected dossiers constitute a portfolio of quality projects with a global reach **validated by independent experts** and in accordance with the principles of sustainable development.

GreenWin has a solid operational unit that leans on a network of experts directly in contact with all the actors of sustainable development. Its permanent structure offers effective guidance. It offers a tailor-made service with due respect for confidentiality.

GreenWin involves around **70 entities** throughout the Walloon region, including leading industry players like Solvay, Dow Corning, AGC, Carneuse, BASF, Prayon, Holcim, CFE, Shanks, Maison Blavier and many **SMEs**: Vandeputte oleochemical, Realco, Chemont, Plasturgie Lazzarini, Galactic/Futero, Imperbel... The ambition is to position Belgium and the Walloon region as a leader with key players in sustainable chemistry.



“GreenWin represents a real opportunity to further anchor the Walloon chemical and life sciences sector on the way of sustainable development.”

Jean-Claude Marcourt, Vice Minister President and Minister of Economy, SMEs, Foreign Trade and New Technologies Wallonia

BioWin

Where Science meets Business

BioWin is the health competitiveness cluster of Wallonia, also known as one of the most innovative biotech hubs of Europe with **more than 100 health companies** specializing in health biotechnology and medical technologies. Domains covered by these companies include biopharmacy, cell therapy, radiopharmacy, diagnostics, biotech products, services, medical devices and medical equipment.

Major strengths in the field of biotechnology linked to health include: excellence in academic and industrial research; a unique academic and industrial collaborative network; a high concentration of university hospitals; and a broad offering of science parks with incubation and innovation centers at a reasonable cost.

Created in July 2006, focusing on the health sector, the development of this competitiveness cluster aims to provide regional economic growth by creating companies, extending existing ones and by creating jobs in the region. Its initiative was and still is **to federate all stakeholders** from Wallonia who are contributing to innovation and training in the field of biotechnology and health, and who have the ambition to accelerate innovation, by encouraging universities and industry -mostly **SMEs**- to partner with one another.

www.biowin.org

Biotechnologies

One technology with great potential to reduce GHG emissions for a range of activities is industrial (white) biotechnology. **Industrial or white biotechnology** uses enzymes and micro-organisms to make bio-based products in sectors such as chemicals, plastics, food and feed, detergents, paper and pulp, textiles and bio-energy. Its application can reduce the environmental impact of products and processes, not only through reduction of GHG emissions, but also reduced consumption of fossil fuels, energy and water, and reduced generation of toxic waste. In September 2009, **WWF and Novozymes** jointly published a report "GHG emission reductions with industrial biotechnology: assessing the opportunities". Potential emission reductions for bio-refineries, for example, are estimated to be as high as **668 million tons of CO₂ by 2030**.

Red or pharmaceutical biotechnology helps treat unmet medical needs by providing vaccines for diseases such as Hepatitis B and HPV (cervical cancer), as well as providing an unlimited supply of insulin for treating diabetes in humans.

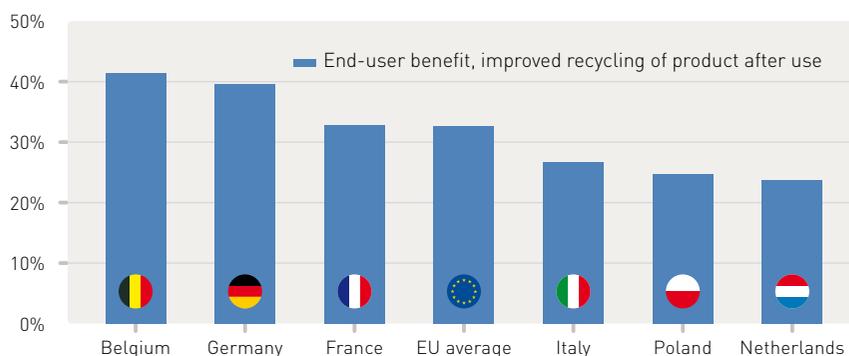
Green biotechnology can drive the move towards sustainable agricultural practices, and will help feed the world with fewer inputs and more outputs.

Innovation for greater resource efficiency

The European Community Innovation Survey (CIS) measures the innovation performance of all types of businesses throughout Europe. According to the latest survey (2008), 76% of companies in the chemical and life sciences industry in Belgium innovated in terms of both product and process in recent years against 66% for the EU average. Belgium's chemical and life sciences industry, particularly plastics processing, is **a leader in product innovation** providing key environmental benefits for end-users in terms of recycling.

41% of companies demonstrating innovation in Belgium have taken steps to improve the recycling of products after use, compared to the EU average of 32%, and just 25% for the manufacturing industry as a whole in Belgium.

Innovations with environmental benefits (in % of enterprises with innovation activity)



SOURCE CIS Survey (2008), Eurostat

Sectoral initiatives towards a more sustainable planet

Marine Litter

Marine debris prevention and awareness-raising activities

Plastic materials deliver significant societal benefits, including energy and resource savings, consumer protection and innovations that improve healthcare, reduce food spoilage and enhance quality of life. For society to enjoy the benefits that plastics can provide, it is essential to properly recover them so that litter does not threaten our natural environment, including marine ecosystems.

Investigations by marine scientists highlight the extent to which discarded plastic and other materials end up as debris in our oceans, and the consequences for the marine environment. The chemical and life sciences industry and its many partners are firmly committed to the principle that plastics do not belong in the world's oceans – these products should be responsibly used, reused, recycled and finally recovered for their energy value.

Plastic is present as debris in the marine environment as **a result of poor or insufficient waste management, lack of recycling / recovery and general bad practices.** These are large and complex issues with societal and economic challenges, and are more than any single entity, industry, or government can solve alone.

Since the beginning of the 1990s, the Belgian plastic product manufacturers, represented by Federplast.be, have been actively engaged in a number of initiatives to promote prevention, selective collection and recycling of plastics waste. These measures also contribute to reducing marine debris. Activities have been carried out in collaboration with the plastics manufacturers, members of essencia, with whom financial resources and staff are shared. Starting from a level near 0% for post-consumer plastics waste recycling in 1990, Belgium today has a **30% recycling rate.** Additionally 65% of plastics waste is incinerated with energy recovery, leaving only 5 % going to landfill.

Continuous improvement has been achieved through the following:

- ▷ **1990:** pilot project to collect plastic bottles for recycling with 10 local communities in Flanders.
- ▷ **1993:** founding member of **Fost Plus**, the Belgian recovery organisation for domestic packaging waste. Fost Plus also provides financial support for awareness-raising campaigns to prevent littering.
- ▷ **1995:** setting up of **Plarebel** (formerly Belvoplast), a non-profit association to manage the recycling of plastic bottles collection with Fost Plus and Valorlux (Luxembourg).
- ▷ **1999:** founding member of **Febelauto**, the Belgian recovery organization for end-of-life vehicles.
- ▷ **2000:** creation of **KURIO** to organise take-back and recycling of plastic pipe waste. Creation of the non-profit organisation PVC Info to implement, at Belgian level, the European PVC industry's voluntary commitment under Vinyl 2010 to increase post-consumer PVC recycling in EU by 200,000 tons/year.
- ▷ **2004:** assists the Belgian retail sector federation Comeos with drafting of a voluntary commitment **to reduce the use of one-way carrier bags** through the promotion of reusable bags and crates. Consumption has been reduced by 86% (equivalent to 4,902 tons of bags).
- ▷ **2006:** signing-up to the waste management plan for **agricultural films** in the Flemish region, jointly managed with the Belgian farmers' unions.

Marine debris awareness-raising started in 2009 with expressions of support for the **'Fishing for Litter'** campaign in the North Sea and encouraging the Belgian authorities to promote and share their expertise on plastics waste management at international level. Federplast.be joined a spin-off research committee to catalogue the presence of marine litter on the Belgian coast.



“It is vital that industry takes its responsibility seriously and plays an active role in fighting marine litter; increased recycling of plastics can help. It is something that I hope can spread to other countries, including my own where most plastic is still incinerated instead of being recycled.”

Anna Rosbach, Member of the European Parliament and Chairwoman of the Waste Free Oceans Foundation

Financial support was obtained from other plastics industry associations in Europe to finance the extension of this programme to study of the presence of microplastics in marine organisms (mussels and lugworms). An initial report was presented at the European Parliament in March 2011. In July 2010 Federplast.be organized a marine litter study tour of the Belgian coast with the Ministry of Environment and the EU plastics converters association EuPC to kick-start the drafting of a Life+ project focused on best practices for marine litter prevention and management along the European Atlantic coast. Although this project did not pass the Life+ evaluation committee, these contacts resulted in the Waste Free Oceans initiative of EuPC (www.wastefreeoceans.eu).

Federplast.be started discussions with stakeholders at Belgian level to implement a local **Waste Free Oceans** project (fishing for floating debris) complementing the existing Fishing For Litter initiative to recover debris from the sea floor (www.kimonderlandbelgie.org).

Federplast.be signed up to the “Joint Declaration for Solutions on Marine Litter” at the 5th International Marine Debris Conference in Hawaii in March 2011. This Declaration, a worldwide initiative of plastics industry organisations, outlines a set of clear objectives for action, and advocates close **cooperation with a broad range of stakeholders** to achieve substantial progress in reducing damage to the marine environment (www.marinedebrissolutions.org).

In the near future Federplast.be will prioritise:

- ▷ Implementation of the marine litter strategies developed by the plastics industry at European and global level, including introduction of the **'Clean Sweep'** programme in Belgium, a voluntary industry commitment to avoid spills during operations and transport.
- ▷ Support for **research** on plastics marine pollution of the Belgian coast.
- ▷ Initiating national stakeholders' collaboration on marine litter prevention and management, with the objective to innovate developments and promote Belgian plastics waste management expertise at international level.
- ▷ Support for **post-consumer plastics waste recovery and recycling initiatives** in Belgium, including the extension of plastic bottle recycling to household plastics waste recycling in general.



And in Belgium

To promote the global Marine Litter campaign, 16-18 year old students (Qualification Plasturgie de l'Athénée Royal of Ciney-Havelange) set up an **awareness campaign** aimed at 6 to 7 year-olds demonstrating the importance of collecting and recycling plastics.

Jérémy "You can easily see that lightweight materials like plastics float on the surface, while heavy materials such as glass or metals, sink".

After some practical demonstrations, students crushed plastics bottle tops collected by the youngsters and made plastic fish using an injection moulding process.

The children visited the research lab and workplace to discover more about how plastics are produced. Back at school, the awareness-raising session continued with drawing and colouring exercises based on the **"save a fish"** theme.

VinylPlus

The European PVC industry launched an ambitious set of sustainable development targets on 22 June 2011. The VinylPlus programme is centred on five commitments aimed at:

- achieving a quantum leap in recycling rates of PVC and the development of innovative recycling technologies;
- addressing concerns about organochlorine emissions;
- ensuring the sustainable use of additives;
- enhancing energy efficiency and the use of renewable energy and raw materials in PVC production;
- promoting sustainability throughout the whole PVC value chain.

The launch builds on the success of the Vinyl 2010 ten-year voluntary commitment to enhance the **sustainable production and use of PVC**. Vinyl 2010 is widely regarded as a leading example of effective industry self-regulation that is delivering concrete results. Among its most significant achievements was the establishment of an infrastructure for the annual collection and recycling of over 250,000 tonnes of PVC, which prior to 2000 had been dismissed by many as an “unrecyclable” material destined for landfill (www.vinylplus.eu).

“At Deceuninck, we believe in 'building a sustainable home'. We produce long lasting, low maintenance innovative building products with top insulating properties. Our systems are created with the lowest ecological footprint, and can be 100 % recycled at end-of-life.”



Tom Debusschere, CEO Deceuninck

The detergents and cleaning products sector

Long aware of the challenges of sustainable development, the detergents sector has put in place a number of industry initiatives aimed at improving companies' sustainability both in terms of manufacturing activities and products, as well as providing relevant information for users on the sustainable use of products including safety aspects and environmental impact. The industry has made a practical commitment to sustainability embodied in a charter and a sectoral agreement.

The sustainable cleaning charter

This EU-level initiative is fully implemented in Belgium and covers the companies active in the detergents and cleaning products business.

Companies in the detergents sector have produced an **annual sustainability report** based on the results of the Sustainable Cleaning Charter since 2005. This charter, which is monitored by independent auditors, has been signed by **130 companies**, including 68 producers in Europe, 51 of them with operations in Belgium – accounting for over 80% of the detergents market.



These companies have implemented sustainability procedures throughout product lifecycles and have undertaken to improve their sustainability performance. New “product” criteria were introduced in 2010 to increase the relevance of the charter. To find out more, visit www.sustainable-cleaning.com/en.home.orb

The steady increase in the reporting base means that direct data comparisons, especially against earlier years, should be made with care. Fluctuations in the overall KPI results do not always accurately reflect changes in performance. Nevertheless, in the Charter's first four full years of operation (2006-2009), verified returns from companies demonstrate that members' commitment to continual improvement has yielded positive results across Europe:

- Energy consumed per tonne of production, down 5.5%,
- CO₂ emitted per tonne of production, down 8.9%,
- Packaging per tonne of production, down 1.5%.

For more details, visit www.sustainable-cleaning.com/en.publicarea_sustainabilityreport.orb

Sustainability indicators – Sustainable cleaning charter – Extracts – European figures

Indicators	2005	2006	2007	2008	2009	2010
Participating companies (Be)(EU)	(11)(28)	(16)(45)	(30)(70)	(36)(89)	(40)(108)	(51)(130)
Occupational health and safety**	0.57	0.55	0.83	0.90	0.98	0.80
Consumed energy*	1.34 GJ/t	1.09 GJ/t	1.10 GJ/t	1.05 GJ/t	1.03 GJ/t	0.95 GJ/t
CO ₂ emitted*	80.9 kg/t	66.9 kg/t	64.6 kg/t	64.3 kg/t	60.9 kg/t	57.3 kg/t
Consumed water*	1.60 m ³ /t	1.44 m ³ /t	1.47 m ³ /t	1.59 m ³ /t	1.49 m ³ /t	1.40 m ³ /t
Waste*	10.2 kg/t	12.9 kg/t	11.1 kg/t	10.8 kg/t	12.4 kg/t	11.9 kg/t
Packaging use*	78.0 kg/t	92.7 kg/t	88.6 kg/t	84.6 kg/t	91.3 kg/t	89.9 kg/t

* per tonne of production | ** lost time accidents at member sites, expressed per 100,000 man-hours worked by all employees

The detergent and cleaning product sector agreement

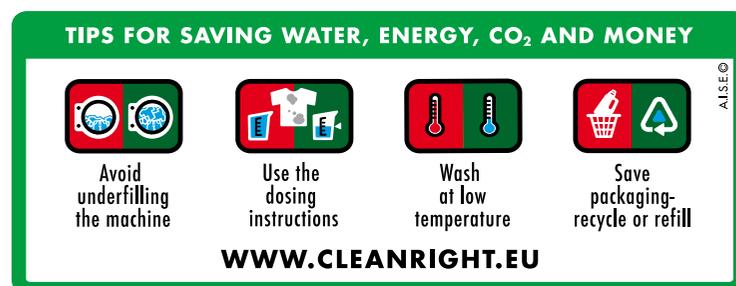
In 2011, companies in the detergents sector, along with the authorities and distributors, signed a **voluntary agreement** aimed at increasing the range of more environmentally friendly products on the Belgian market and improving consumer habits through awareness campaigns. The agreement includes clear targets for 2019 from a 2008 baseline, including a five-fold increase in market share for the range of **ecolabelled products** available to consumers, and a sixfold increase in market share for **concentrated products**. Concentrated laundry detergents are more compact so their transport generates less CO₂. Use of laundry detergents has a substantial environmental impact so communication campaigns encourage consumers to machine wash at **lower temperatures** (aiming to reduce the current average of 43°C to 38°C by 2015) and to check they are using the **correct dosages** of laundry detergent. For more details, visit www.detic.be.

Consumer information

Detergents producers and distributors can draw on a number of initiatives to inform consumers about the safe and sustainable use of detergents.

The “Washright” panel

The “Washright” panel contains four series of pictograms on **saving water, energy, CO₂ and money**. The aim is to draw consumers’ attention to four key messages: avoid underfilling the machine (filling the machine properly reduces water and electricity consumption and saves money); follow the dosing instructions (the quantity of detergent to be used depends on the hardness of



the water and how dirty laundry is); use the lowest recommended temperature (most detergents are effective at low temperatures and washing at higher temperatures often serves no purpose, but uses more energy); reduce packaging waste (keep the original packaging and buy refills when available).

The “Cleanright” website

Since 2010 the website www.cleantight.eu has provided comprehensive information on a range of issues including good practices, regulations, product composition, tips for detergent use and sustainability, respect for the environment, and safety. Information is available in French, Dutch and German as well as 23 other European languages.



Compacting detergent products

- In 2009, 2010 and 2011, the detergents industry launched an ambitious programmes to compact liquid and powder detergents.
- Participating companies undertook to **concentrate**



detergents to a recommended washing dose of a maximum of 75 ml for liquids and 85 g for powders without any loss of efficacy. Packaging has been optimised and manufacturers are ensuring consumers are aware of the correct dosages. These moves contribute towards sustainable development, among other

things by reducing CO₂ emissions. The programmes have the potential for significant impact in Europe – by the time they are implemented in full, they could achieve annual savings of 400,000 tonnes of liquid detergent, 200,000 tonnes of powder, 21,000 tonnes of packaging and 19,000 road transport journeys.

For more details, visit www.detic.be. You can also follow the page “Concentrated laundry detergents: use the right dose” on Facebook.

“With this initiative on detergent products that are more environmentally sound, the Belgian federal state is the first in Europe to set up a legal mechanism with a view to guiding the product range available on the retail market. I hope that this type of agreement, based on an active partnership among industrial sectors, will succeed in promoting similar initiatives in Europe and thereby strengthen the market for more environmentally friendly products.”



Paul Magnette, Minister for Energy and Climate of Belgium

The pharmaceutical sector

Lasting partnerships are essential for the (bio) pharmaceutical industry. An intense cross-fertilization process involves interaction and exchange of know-how between, among others, the medical and academic world and health institutions, before safe and high quality therapeutic innovations are brought to market. The synergy between the different partners runs throughout the entire life cycle of a drug, from clinical trials up to and including patient monitoring.

The Initiative to Promote Clinical Trials in Belgium

In February 2010, pharma.be in cooperation with its partners in clinical trials (Belgian Association of Clinical Research Professionals, Belgian Association of

Phase-1 Units, and Belgian Association of Pharmaceutical Physicians) launched 'The Initiative to Promote Clinical Trials in Belgium' (The Initiative). The partners are committed to the goal of **retaining clinical trials in Belgium and attracting new ones.**

However, recent years have seen a decline in the number of clinical trials carried out in Belgium as they shift to developing countries such as China, Russia and Eastern European countries where costs are cheaper.

pharma.be cannot over-emphasise the importance of clinical trials for Belgian patients whose participation gives them access to the latest treatments backed up by careful

monitoring of care providers and the innovative medicines sector. Every effort is made to guarantee patient safety and the quality of care while meeting patient expectations for constantly improved treatments with minimum side effects. The administrative procedures (licence application, price and reimbursement) can, however, have a delaying effect on the availability of new treatment in Belgium.

The Initiative has focused attention on clinical trials in Belgium, highlighting national know-how and its well-developed, high-quality network of academics, university and non-university hospitals, pharmaceutical companies, spin-off activities and biotech companies. These partners want to work with government and the medicines agency to define an effective strategy that capitalises on the sector's strengths and protects its role as host country for clinical trials. In this respect the **e-health project** can help speed up identification of suitable patients for inclusion in clinical trials.

Clinical trials in 2010

In 2008, 624 clinical trials were carried out in Belgium; by 2010 it was down to 517. During these trials treatments were refined for cancer, the stomach and intestinal canal, the metabolism, the nervous system, cardiovascular complaints and respiratory diseases. Belgium has **an average of 54 patients per clinical trial** which, relative to total population, is one of the higher figures for Europe.

Further information at www.theinitiative.be

Belgian pharmaceuticals association

The (bio)pharmaceutical research industry and pharma.be pursue their core objectives in cooperation with various health partners to protect the population's health with the most suitable, effective and innovative medicines.





Mdeon provides all the partners in the Belgian healthcare sector with a common ethics platform. This platform is the basis of a modern, transparent, effective and powerful self-regulation system covering information on, and the promotion of, medicines and medical devices. Mdeon has made great progress since its 2006 launch.

In November 2006 Mdeon adopted the pharma.be 'visa' procedure to grant 'visa' to every producer and supplier of medicines and medical devices seeking to sponsor the attendance of doctors and/or pharmacists at a scientific congress. Over the years Mdeon membership has grown from 12 to 18, including doctors, pharmacists, veterinary surgeons, dentists, nurses and representatives of the medicines industry. Mdeon continues to provide a broadly supported ethical framework for the continuous training of care providers.

Today Mdeon is embarking on its sixth year of activities with renewed recognition from the Minister for Public Health and Social Affairs following a positive evaluation of the previous year's work, including an independent audit by the Medicines and Health Products Agency.

Almost 9% more visa applications in 2010

In 2010 Mdeon handled more than 6,400 visa applications, an 8.7% rise on the previous year; 85% of applications - which came from 656 companies in 75 countries - met with a positive evaluation. About half the applicants are based outside Belgium. The pharmaceutical and medical devices industry last year invested €62 million in the continuous training of Belgian healthcare professionals, essential for the benefit of all patients.

Future challenges for pharmaceuticals

Partnerships and synergy with stakeholders remain key to successfully meeting the current challenges for a healthier society. Efforts have reached a crucial phase in two areas: veterinary use of antibiotics and rare diseases.

National plan for rare diseases and orphan drugs

In the EU, a rare disease is one which affects fewer than 5 people in 10,000. The number of sufferers may still be high, however, as there are some 7,000 known rare diseases, most caused by genetic defects. The healthcare partners in each EU member state have developed recommendations for an integrated and global approach to patients suffering from rare diseases. In Belgium, implementation of this approach by the Ministry of Health involves raising awareness, empowering patients, informing health professionals, encouraging R&D of new orphan drugs, access to treatments, and codification and inventory of rare diseases.

AntiMicrobial Consumption and Resistance in Animals (AMCRA)

A knowledge centre of antibiotic use and resistance in animals (AMCRA) was opened in Belgium in June 2011. AMCRA is an unprecedented industry-wide initiative with a mission to collect, analyze and communicate all information related to the **use of and resistance to antimicrobial agents in animals**. Aim is to safeguard both human and animal health and welfare and achieve a sustainable antibiotics policy for the country.

Together with pharma.be the founders and funders of AMCRA are the agricultural Flemish and Walloon farmers organizations, the Association of Feed Manufacturers (Bemefa), the Supreme Council of the Order of Veterinarians in conjunction with the Faculty of Veterinary Medicine of Ghent University, the Federal Agency for the Safety of the Food Chain (FAVV) and the Federal Agency for Medicines and Health Products (FAGG).

Fertilizer Europe Stewardship Programme

For the fertilizer industry, Product Stewardship is ensuring that fertilizers and their raw materials, additives and intermediate products are processed and manufactured, handled, stored, distributed and used in a safe way with regard to health, occupational and public safety, environment, and security. The **Life cycle approach** entails R&D, Sourcing, Production, Packaging, Transport, Storage, Marketing, Farming and Recycling.

The compliance system consists of three phases:

- ▷ Preparation for auditing by the company
- ▷ Auditing by an independent third party
- ▷ Ranking and judgment on compliance

The Product Stewardship Program is not a "One-Go" exercise. It is continuously updated.

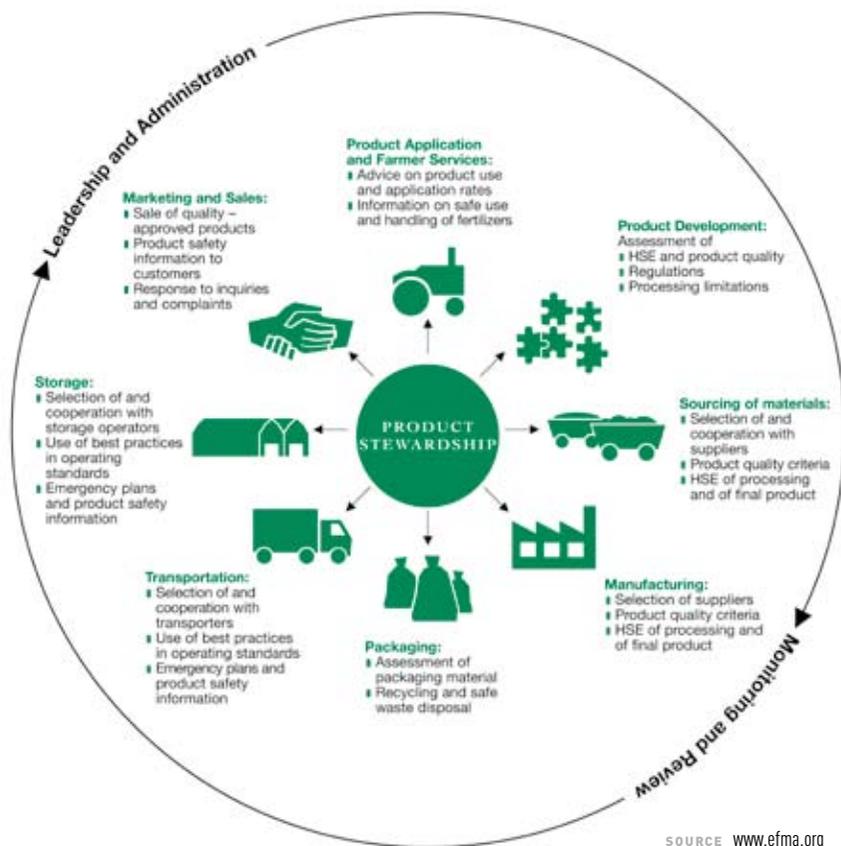
It commits companies to the following :

- Make and sell safe products;
- Operate plants based on best manufacturing practices;
- Store and distribute products under rigorous control;
- Work together with others in the supply chain to ensure the efficient, safe and environmentally correct manufacturing, distribution and use of fertilizers;
- Openly share knowledge on Health, Safety and Environment for products with the community at large;
- Use scientific facts and risk-based assessments to contribute to the development of regulations;
- Work together to implement this Product Stewardship program.

This is the commitment of the fertilizer industry to the community at large and to farmers in particular.

In Belgium, Phytofar Institute awards prizes to sustainable projects

The Phytofar Institute for Research and Development in Sustainable Agriculture is managed by an independent Scientific Council and aims to obtain objective and scientifically-based data to contribute to the development of a **sustainable agriculture** which cares for well-being. The members of the Council are renowned experts in crop production, the environment, ecology, food, public health, biochemistry, genetic engineering, toxicology and economics. The continuing objective of sustainable agriculture (ecologically, economically and socially), with respect for the environment and consumer and farmer health, led to the introduction of the Phytofar Institute Prize in 2000. Every other year, one scientific and one professional prize worth €15,000, are awarded.



Phytofar-Recover : a reliable partner for the professional industry

Phytofar-Recover has been organising empty packaging collection for the professional industry in Belgium since 1997. With a collection rate of 90% of all empty packaging, Belgium is world leader.

Since 2007, Phytofar-Recover has placed the emphasis on the importance of proper rinsing and sorting. By requesting professional users to rinse and sort, the amount of unclean fraction decreases while the amount of rinsed fraction, which can be processed increases considerably. Since 2009, caps have been collected separately. They can be cleaned industrially and also recovered for energy. Moreover, users can also take multipack cardboard to the Phytofar-Recover collection points. The waste processing partner makes sure these materials are recycled 100%.

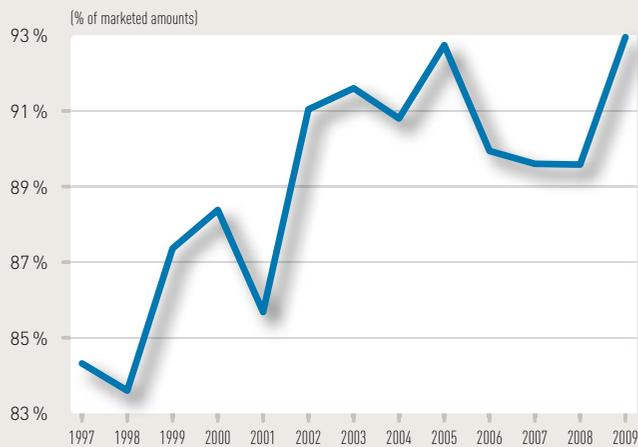
In 2008, Phytofar-Recover joined the European recycling project "Close the loop".

Since the start of the nuPPP (non usable Plant Protection products) collection, 923 tonnes have already been collected, including 2 very large collections in 2007 (198 tonnes) and 2009 (228 tonnes).

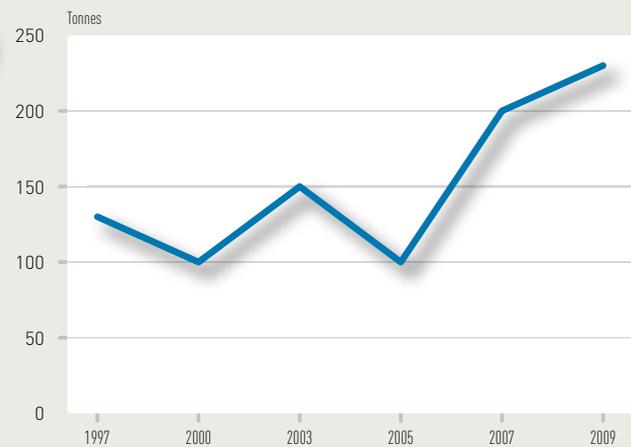
Honorary list of the Phytofar Institute Prize

- ▷ **2001**: Scientific prize: KULeuven - Development of a targeted sprayer for weeds
- ▷ **2003**: Scientific prize: UGent / CODA - POCER-indicator for the assessment of plant protection products
Professional prize: CARAH - Warning system for Phytophthora
- ▷ **2005**: Scientific prize: UCL - Development of PROCULTURE, an aid in the treatment of Septoria on winter wheat
Professional prize: ILVO - Knowledge and advice centre Spraying technique
- ▷ **2007**: Scientific prize: STEDULA - Centre for Sustainable Agriculture for their book "Erven van de toekomst" (inherit from the future)
Professional prize: Joost De Paepe, chicory grower - Sustainable treatment of water and organic waste
- ▷ **2009**: Scientific prize: FUNDP and spin-off Fytofend - stimulator for natural resistance mechanisms in plants
Professional prize: Ignace Vercreyusse, farmer - Fytobak in practice

Collected/processed amounts of empty PPP packaging



Collected amount of Unusable Plant Protection Products (UPPP)



SOURCE Phytofar-Recover

Aerosol technology

Most areas of the industry deliver a number of products in aerosols. DETIC members have developed two specific initiatives aimed at improving the compatibility of aerosol technology with sustainable development.

The aerosol charter

This "aerosol charter" applies to all their products that make use of aerosol technology and includes safety and sustainability criteria as well as practical commitments in terms of user protection and responsible communication.

Freeware for LCA analysis of aerosols !

To reduce the environmental impact of aerosol technology, the French aerosol organisation CFA developed an LCA tool (life cycle analysis tool) specifically for aerosol producers and cleared Belgium's soaps and cosmetics association, DETIC, to make the tool available to members free of charge. The software provides 12 indicators such as air acidification, eutrophication, fresh water aquatic ecotoxicity, fresh water sedimentary ecotoxicity, climate change, human toxicity, destruction of the ozone layer, photochemical oxidation, non-renewable primary energy, land ecotoxicity and waste production. This software program aims to enable R&D departments to take account of environmental criteria when directing product development.



The cosmetics sector

The cosmetics sector has embraced sustainable development as good business sense. In Belgium, in addition to individual company initiatives, the sector has adopted "social responsibility" actions implemented in cooperation with public authorities and consumer associations.

"Good sustainability practices"

The cosmetics sector has developed a guide to "good sustainability practices". The aim is to provide all cosmetics companies with a comprehensive tool that can be used to implement key elements needed to improve sustainability. This is an extensive guide that includes economic criteria, social and management criteria, and ethical and environmental criteria. In Belgium, SMEs are involved in a pilot "sustainability code" project enabling companies to improve sustainability performance.



“ Our future in a global economy will be determined by technology breakthrough and development. Chemicals and life sciences in our country are critical for this. No other industrial sector is more innovative and highly dependent on R&D than the chemical industry. The innovative and high tech characteristics of our Belgian economy are therefore closely related to chemicals and life sciences.”



Yves Leterme
Prime Minister of Belgium

CONCLUSION

The road towards sustainable development is one of relentless effort. The member companies of essenscia have made good progress in numerous areas over the last years, as shown in the indicators published in this report. But there is no room for complacency. The world around us is changing fast, and the challenges ahead are across the board: economically with the growing importance of Asia and the Middle East; socially as a result of the ageing population and workforce; and environmentally because of increasing pressure on scarce resources.

In order to maintain a truly sustainable presence of the chemical and life sciences sector in Belgium, continued efforts are required by all the players involved:

- **by the companies**, first and foremost, in pursuing a growth agenda which is smart, sustainable and socially inclusive;
- **by the public authorities** in balancing the “licence to operate” with the necessary attention to the competitiveness of our companies at international level;
- **by the social partners** in confronting with open minds and shared responsibility the pressing need to reform the labour market against the “greying” profile of our society;
- **by the NGOs** in maintaining a constructive and challenging dialogue with our industry on many subjects of common interest, but diverging opinions;
- **by society at large** encouraging today’s youngsters to engage in science education with the ambition to help shape the world of tomorrow.

Belgium’s chemical, plastic converting and life sciences companies have demonstrated commitment and perseverance in the ongoing development of their operations and activities. The industry remains confident in its continuing contribution to sustainability in our country and invites all stakeholders to work towards this common goal.



Yves Verschuere
Managing Director essenscia

SOURCES

ACTA
Belspo-PPS Science Policy
Cefic
Cefochim
CWAPE (*Walloon Energy Commission*)
Deloitte/Laga
DGOARNE (*Operational Directorate General of Agriculture, Natural Resources and the Environment of the Walloon Region*)
DG Statistics and Economic Information
ECHACHEM
Econopolis
EPCA (*European Petrochemical Association*)
EPER (*European Pollutant Emission Register*)
E-PRTR (*European Pollutant Release and Transfer Register*)
essenscia R&D survey
European Commission
Eurostat
FPS Economy, SME, Self-employed and Energy
FPS Mobility and Transport
FUNDP of Namur
Fund for Occupational Diseases (FOD)
Heriot-Watt University
ICIS Chemical Business
Katholieke Universiteit Leuven
National Accounts Institute (NAI)
National Bank of Belgium (NBB)
National Social Security Office (NSSO)
Occupational Accidents Fund
OVAM (*Public Waste Agency of Flanders*)
Securex
University of Antwerp
Val-I-Pac
VDAB (*Flemish Public Employment Service*)
VITO (*Flemish Institute for Technological Research*)
VMM (*Flemish Environment Agency*)



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where chemistry meets life sciences

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