



essenscia

where chemistry meets life sciences

Sustainable Development Report 2015



PEOPLE



PLANET



PROSPERITY



PRODUCTS

www.essensciaforsustainability.be



RESPONSIBLE CARE
OUR COMMITMENT TO SUSTAINABILITY

3 ABOUT THIS REPORT

Editorial	3	Methodology	5
In dialogue with stakeholders	4	Indicators	6

8 PEOPLE

Vision - People	9	Salaries	16
Employment	10	Social climate	17
Diversity	12	Mobility	18
Employee qualifications	13	Accidents at work	19
Education	14	Occupational diseases	20
Age pyramid	15	Process safety	21

22 PEOPLE

VISION - ENERGY

Energy consumption	24	GHG emissions	26
Energy efficiency	25	Cogeneration	27

VISION - ENVIRONMENT

Ressource efficiency	29	Nitrogen and phosphorus	35
Acidifying emissions	31	Heavy metals	36
Organic emissions	32	Industrial waste	37
Water use	33	Industrial packaging	38
Water quality	34	Transport and logistics	39

42 PROSPERITY

Vision - Prosperity	43	R&D expenses	48
Added value	44	Innovations	49
Trade balance	45	Number of researchers	50
Profitability	46	Taxes	51
Investments	47	Labour productivity	52

53 PRODUCTS

Vision - Products	54
-------------------	----

PRODUCT SAFETY

Product safety CLP	56	Sustainable use	62
Product safety REACH	58		

CHEMISTRY IN EVERYDAY LIFE

Circular economy	67	Health and welfare	77
Pioneering innovations	70	Pioneering innovations	80
Sustainable agriculture	74		

The full sustainability report with more illustrations, detailed figures and the sources used for the charts is available on www.essenciaforsustainability.be

Innovative services to benefit today's ever-changing society

The chemical, plastics and pharmaceutical industry is playing a leading role within our society, striving to become more sustainable. The solutions it offers are numerous and varied. Agriculture, transport, the construction sector, health care, household goods, the climate ... all of these are areas where the contributions by chemistry and life sciences are of paramount importance towards the creation of a better and more sustainable future.

This fourth sustainability report presented by essenscia illustrates, on the basis of many examples, how rapidly science is evolving and being at the service of solutions that make the integration of the three most significant pillars of sustainable development possible: "People", "Planet" and "Prosperity". Furthermore, essenscia fully subscribes to the United Nations' global goals concerning sustainable development (Global goals www.globalgoals.org/news/goals). These goals are stated in the present report when they are related to the indicators used.

Chemistry is a fantastic science that enables us to modulate and adapt matter in function of its capacity to enhance our societal well-being in a constantly changing world. The risks that accompany innovation need to be assessed objectively and correctly estimated within a framework of preventative parameters. The chemical and pharmaceutical industry is investing major sums in research and development in order to be able to offer guarantees in a number of essential areas such as maximum consumer safety, minimum environmental impact and more efficient performance.

The industrial activities within the chemical and pharmaceutical sector in Belgium continue their progress towards sustainable development. This journey is never quite at an end. Hence, the current issue presents, for the first time, a new indicator on resource efficiency. This report thus offers you, by means of a simple, easily accessible structure, an overview on the progress that has been realized in Belgium by an industry that remains convinced of its undoubted growth potential within our country.

Yves Verschuere,
Managing Director essenscia



Yves Verschuere, Chief Executive Officer essenscia

In dialogue with stakeholders

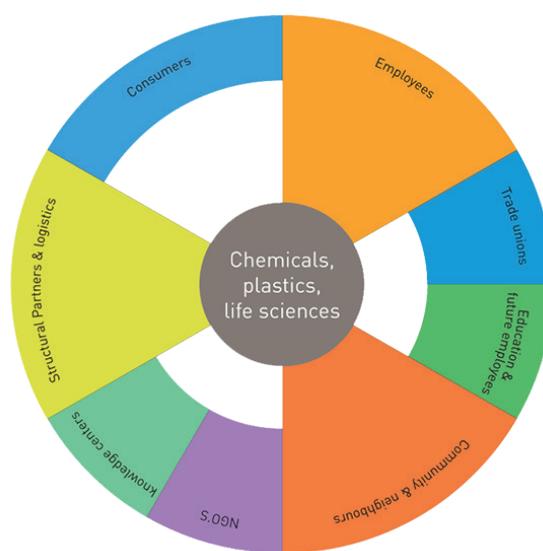
Constructive dialogue with stakeholders

As the chemical, plastics and life sciences industry plays an important role in society, essenscia attaches great importance to a **constructive dialogue with stakeholders**. Consultation with the various parties involved is therefore an essential aspect of the functioning of essenscia.

Consultation is a constant that can be found throughout the activities of the federation. Examples include social and bilateral consultations and events in which different stakeholders are involved. The participation of our federation in all kinds of regional, Belgian and European advisory and consultative bodies is a further indicator of the importance we attach to dialogue.

The various stakeholders were also involved in the preparation of the sustainability report. From the first sustainability report they have been consulted about the choice of the indicators. During several meetings with the stakeholders they were asked for their input. This took place both in the preparatory phase and after the publication of the sustainability report.

updated and supported with various initiatives taken in practice. This report also shows concrete examples that illustrate how the federation and the companies realise these visions in practice.



ESSENSCIA'S MAIN STAKEHOLDERS

Vision development

At the stakeholders' request vision statements were developed for this edition for each of the four P's: People, Planet, Prosperity and Products. These **visions reflect the main ambitions of the industry** and at the same time constitute **the guideline for many initiatives of the federation, the professional sections and companies**. The long-term objectives have been

A new indicator

After the publication of the previous sustainability report the stakeholders suggested the idea of studying the possibility to develop an **indicator for resource efficiency** for the sector. Such an indicator is becoming increasingly important, especially because the interest in resource scarcity is growing, as is the need to switch from linear to circular business models. In this report, this is mentioned for the first time in the 'Planet' section. The fact that essenscia is the first sector to deal with this subject once more underlines **the long-term commitment of the sector for a sustainable society**.

Methodology

This methodology was used

Classification of economic activities

Unless specified otherwise, the **economic activities** of the chemical, plastics and life sciences sector fall under:

- NACE 20: manufacture of chemicals and chemical products;
- NACE 21: manufacture of basic pharmaceuticals products and pharmaceutical preparations;
- NACE 22: manufacture of rubber and plastic products.

The NACE code is a numerical code of the European Union used for classifying economic activities. Since 1 January 2008, the revised NACE code 'Rev. 2' has been in effect.

Statistics from foreign trade

The **products** of the chemical, plastics and life sciences sector fall under:

- section VI: products from the chemical and related industries;
- section VII: plastic, rubber and their derivatives.

Statistics in this report concerning foreign trade come from the Combined Nomenclature, which is a classification used by the World Customs Organization (WCO).

Environmental indicators

With regard to environmental indicators, this report employs either those reported in the European Pollutant Release and Transfer Register (E-PRTR; 2007-2013), or the official federal or regional sources.

The E-PRTR replaces the European Pollutant Emission Register (EPER). That system gathered data from 2001 to 2004. The number of companies and pollutants, but also the reporting thresholds may differ, which means that the old and new data must be interpreted with the necessary caution. This is certainly the case for data dating from before the initial year of the 'Responsible Care' programme (1987).

Production index

The present sustainability report uses the production index in the environmental graphs to demonstrate the decoupling between production and consumption or emissions.

The production index are statistics describing the changes in an industry's production volume. Since the Sustainable development report 2013, the most recent reference year, i.e. 2010, has been used.

Indicators

Aiming for sustainability

Since the start of the voluntary Responsible Care programme, the Belgian chemical, plastics and life sciences sector has closely monitored the impact of its activities on health, safety and the environment, taking a number of initiatives within this context to improve the sector's performance. essenscia went a step further in 2009 by publishing the first sustainability report, which describes a current state of affairs of social, economic and ecological factors. This fourth edition provides an overview of activities up to 2013.

Key Performance Indicators (KPIs)

The selection of indicators of sustainable development is based on the **Global Reporting Initiative** (GRI) method. The GRI method provides a general collective framework and is the most frequently used method for reporting on sustainability.

The Key Performance Indicators (KPIs) were originally selected in 2009 through a transparent process open to members, companies and external stakeholders that **respected the GRI reporting protocol and associated basic principles**. Today's report is based on the same set of KPIs with the addition of one additional indicator.

The essence of the basic principles can be summarised as follows:

- The principles of **materiality** and **verification** recommend the selection of the most relevant indicators keeping in mind the expectations of all involved.
- The principles of **balance** and **completeness** emphasise the inclusion of both positive and negative elements.
- The principle of **comparability** requires that performance can be compared in order to build up a standard that can be applied consistently.

Tailor made indicators for our sector

However, essenscia needed to make a number of **adaptations** to ensure that the indicators reflected the specific nature of our sector. A report for the whole sector was compiled, which took account of its great diversity. This meant that only the general GRI indicators applicable to the sector were considered.

Certain indicators refer to issues that are not relevant and these were therefore not included.

An example of this is child labour within the Belgian chemical sector. On the other hand, essenscia also added certain other indicators based on existing regulations or on questions from interested parties.

The quantitative indicators for the chemical and life sciences sector are assessed against the entire Belgian production and/or private sector where possible.

This report uses **indicators with 'multiple levels'**. The GRI method distinguishes between quantitative indicators (GRI level I), qualitative indicators (GRI level II) and 'problematic' indicators (GRI level III). The organisation considers these level III indicators relevant but does not review them with the same detail. The main reason for this is that this kind of indicator – such as process safety – does not involve a common method or dataset.

Reporting: a dynamic process

Due to the growing concern around particulate matter, the previous edition included an intention to report on this at the sector level. Recent studies have shown that traffic, industry and agriculture are the main sources of PM10. However, studies from VMM and VITO indicate that only a handful of companies in this sector contribute significantly to particulate matter emissions. These figures also reveal that the emissions from these companies are only a minor contribution to the total particulate matter emissions in Belgium, with the majority related to transport. Based on these findings, while also noting that the



RESPONSIBLE CARE[®]
OUR COMMITMENT TO SUSTAINABILITY

studies are largely founded upon literature data for emission factors, it was decided that such an indicator would not be material in this report.

Following the publication of the third edition, stakeholders expressed an interest in whether and in what manner the sector's resource efficiency could be reported on. Owing to the increasing global pressure to treat raw materials sustainably, the entire European industry is being urged to transition from a linear to a circular economy. This is where materials are recovered wherever possible after processing and where waste from one producer serves as base materials for another. In order to quantify this, essenscia has drawn up a 'resource efficiency' indicator.

Eurostat defines resource efficiency or **resource productivity as the relation between economic growth and the depletion of natural resources**. Natural resources include biomass, metal ores, non-metallic minerals and fossil fuels. Within the context of the European 2020 strategy, resource productivity is defined as a key indicator for the 'flagship A resource efficient Europe'. This is where GDP (Gross Domestic Product) is measured against DMC (Domestic Material Consumption). Because this information has never been available at a sector level before, **essenscia has developed a new indicator** based on energy vectors used as raw materials in these Belgian sectors such as petroleum, naphtha, biomass and natural gas. The source of this information is essenscia's annual energy survey in collaboration with VITO (Flanders) and DGOARNE (Wallonia). These resources, expressed in tonnes of oil equivalent, are highly representative because they cover the majority of the sector's material requirements in volume. Products from the sector may also be directly imported

instead of locally produced in Belgium. Therefore, in order to generate a complete picture of material requirements,

it is necessary to account for the evolution of imports in volume of non-energetic products that are also used or processed by the sector. These import statistics expressed in tonnes are derived from foreign trade statistics published by Eurostat and include transit activities and international distribution centres.

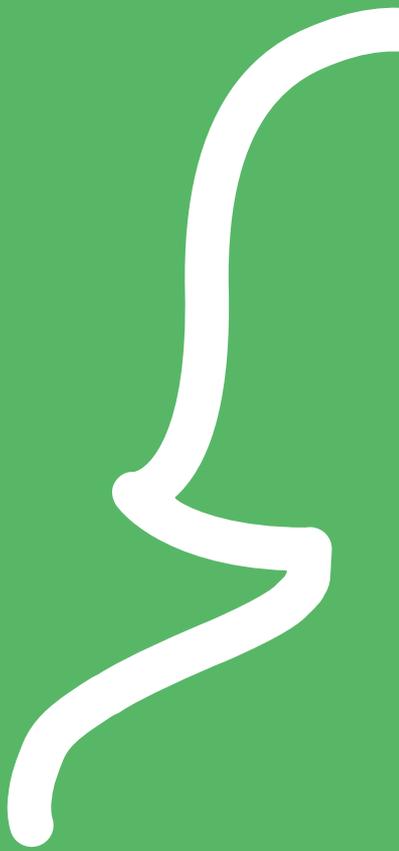
As with the majority of environmental indicators included in essenscia's sustainability report, the aforementioned resource indicators are related to the evolution of the sector's production index in volume. This allows for a calculation of resource usage per unit produced (or specific usage), leading to **an indication of resource efficiency**.

The sector and society

Besides reporting on the sector's performance in social, economic and ecological matters, the report also contains a **fourth component: 'Products'**. This section illustrates **essenscia and its members' engagement with product stewardship**. It shows how the sector takes responsibility for its products and demonstrates this consistently throughout the value chain.

This is put in practice by means of various initiatives that the sector is taking in the field of **safety. The safe handling of chemicals remains a priority, for industrial users as well as professional users and the consumer**. The 'Products' section also provides an insight into the **innovative and sustainable solutions our sector is developing to tackle the social challenges of the 21st century effectively** and, in so doing, to contribute to a more sustainable society worldwide.

People



Vision – People

This is how we counter the potential outflow of knowledge

essenscia wants to respond to the ageing of the population, which is also present within the workforce of the chemical, plastics and life sciences industry. Recent studies have shown that the average age of our workforce is rising and that the inflow of young workers in a competitive market is becoming harder and harder. Hence, we are faced with the huge challenge of a considerable outflow of knowledge, which could be noticeable quite soon.

Our sector has always been known for its highly qualified and very skilled workers. This has often allowed our companies to create an advantage over their competitors. It is essential that we keep this advantage, as it is the key to establish our sector in a lasting way. In this context, we are therefore taking a number of important initiatives:

essenscia works to **raise awareness among young people**. Via partnerships with secondary and higher education institutions we want to bring young people into contact with the fascinating aspects of science, engineering, and, in particular, chemistry. To do so we work together with popularising scientific organisations such as Technopolis, Le Pass, Sciences Adventure, the Science Olympics, Jeunesses Scientifiques, Vlaamse Jonge Ondernemers, etc. Together we can set up interesting initiatives that appeal to young people and increase their enthusiasm for our industry.

We commit to reducing the gap between **the education system and the chemical, plastics and life sciences industry**. By joining forces, we want to offer school-leavers and jobseekers the opportunity to become familiar with our sector and discover its attractive side. Talentfabriek is such a project we fully support. It is a particularly valuable initiative of the sectoral social partners because it manages to bring jobseekers into contact with the sector in a positive way through specific training courses.

We also aim to guarantee the **knowledge transfer** between older and younger employees. This comprises job content, product and process safety and preventive behaviour. Via specific training courses we want to keep our employees' knowledge up to date and, at the same time, encourage them to continuously improve their knowledge and skills.

Together we can set up interesting initiatives that increase young people's enthusiasm for our industry.

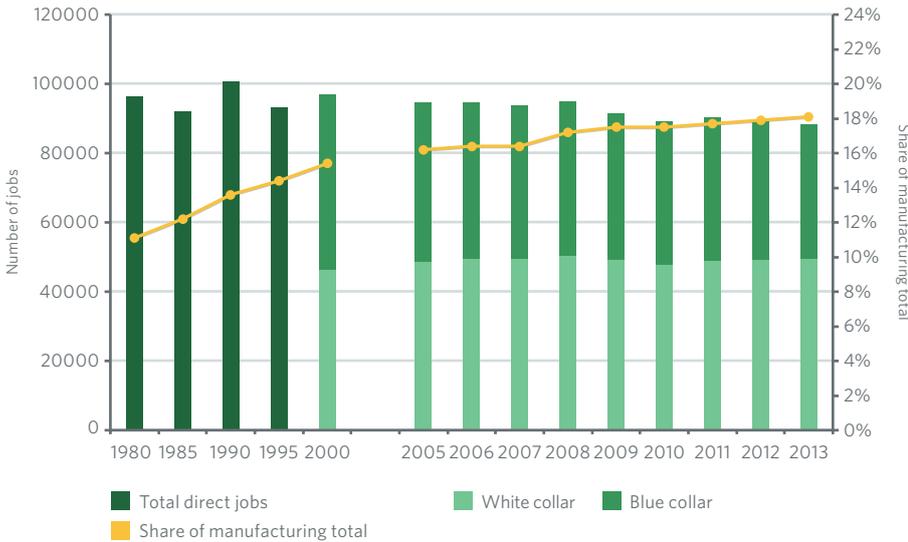
Staying active for longer in a qualitative manner is also one of our focal points. That is why we pay a lot of attention to adapted training and education plans, a renewed competition policy, the right career guidance, etc., because these allow our employees' competencies to evolve together with the new technologies that drive the sector forward.

If the chemical, plastics and life sciences industry wants to remain a long-term player in the industrial fabric of Belgium, it is crucial for all stakeholders involved – employees, companies, social partners, educational institutions and the authorities – to join hands to achieve all these goals together.

Employment

Industrial employment relatively stable

Direct jobs



- **Over the last 30 years**, employment in the chemical and life sciences industry has remained **relatively stable, hovering around 90,000 jobs**. This stability is remarkable bearing in mind the significant job reductions for manufacturing as a whole, with more than 380.000 jobs lost between 1980 and 2013.
- In 2013, employment decreased in a less favourable macro-economic context. Despite this relapse, the sector has resisted relatively well; **the share of employment of the chemical and life sciences industry as a percentage of total manufacturing has risen continuously**: 11.1% in 1980, 15.4% in 2000, 17.5% in 2010 and 18.1% in 2013. This is well above the European average of 11% in 2013. This robustness can be attributed to the attraction of new investments and the ongoing efforts in product and process innovation.
- Part-time working represented about 15% of total employment in the sector in 2013. About 75% of part-time employees work 4/5 time. An analysis based on companies' social reports shows that **95.9% of employees in the sector have permanent employment contracts**.
- **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: **55.9% in 2013 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 from blue collar to white collar**. This trend shows that individual development and career growth opportunities exist in the sector. In comparison, white collar workers account for one third of all manufacturing jobs.

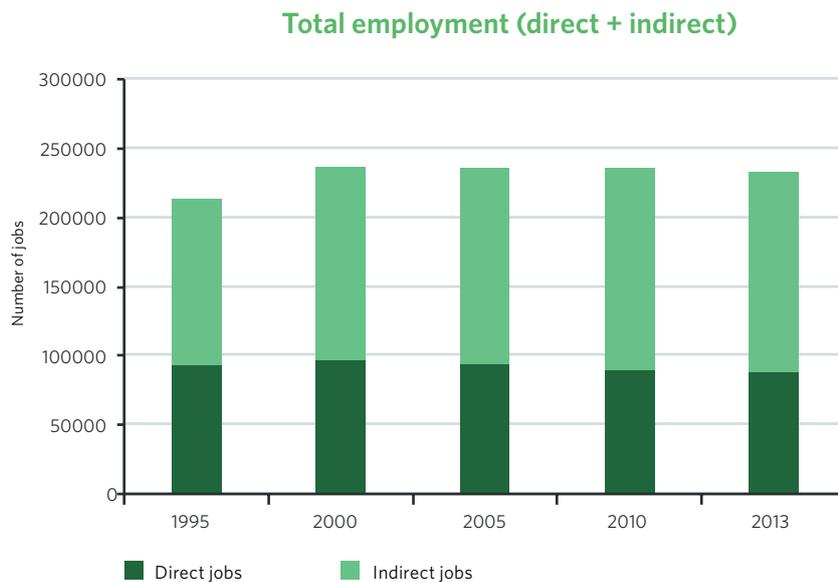
INITIATIVES



Dow Corning wins 2015 "Best Workplaces" award in Belgium



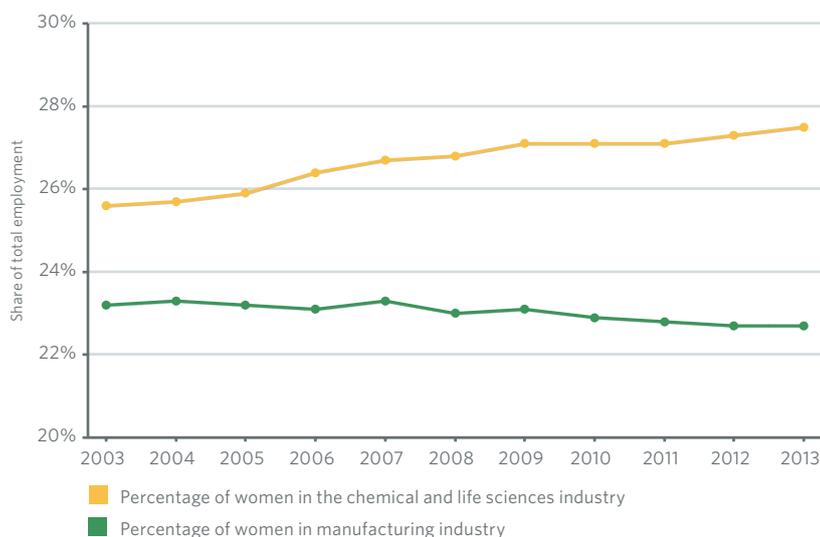
- The chemical and life sciences industry generates employment in other sectors in Belgium such as maintenance contracting, port activities, transport and logistics, and IT. A study by Econopolis (2011) based on official national data, showed that each direct job in the chemical and life sciences sector generates **1.6 indirect jobs in Belgium**. In 2013, this meant a total of **233,000 direct and indirect jobs**. This ratio – amongst the highest of any sector in Belgium – has increased steadily over the past decade, reflecting the sector’s growing impact on indirect employment, and enabling total employment in chemicals and life sciences to grow.



Diversity

Diversity high on the agenda

Women in the workforce



- In 2013, more than **24,000 women** were employed in the chemical and life sciences industry.
- This represents **27.5% of total workforce in the sector**. This percentage is consistently higher in the chemical and life sciences industry than in general manufacturing (22.7%).
- The **percentage share of women employed in the chemical and life sciences industry rose steadily** on the medium term, whereas this share has constantly diminished in the total manufacturing industry.
- **63% of women working in the chemical and life sciences sector had a higher degree** compared with 41% for general manufacturing. Increasingly, women are occupying leadership roles and management positions in a range of functions including human resources, finance, plant management and research.
- More than half (57% in 2013) the female researchers employed in manufacturing work for in the field of chemicals and life sciences. In 2013, women accounted for **43% of researchers** working in the chemical and life sciences industry.
- According to a recent study (2013) from the research institute HIVA of 177 companies of the sector, ordered by Co-Valent, the training funds of chemistry and life sciences, diversity lives in the chemical and life sciences sector. Diversity is larger than just the gender issue and covers also the employment of older workers, persons with a handicap, persons of foreign origin. About half the respondents claim that they pay attention to the issue of employing target groups. One organization out of three even has a specific person who is responsible for stimulating diversity. Moreover, companies claim that vacancies for critical functions can be a lever to attract workers with a profile that is different from traditional groups.

INITIATIVES



Why employees with a disability do not necessarily constitute a limitation



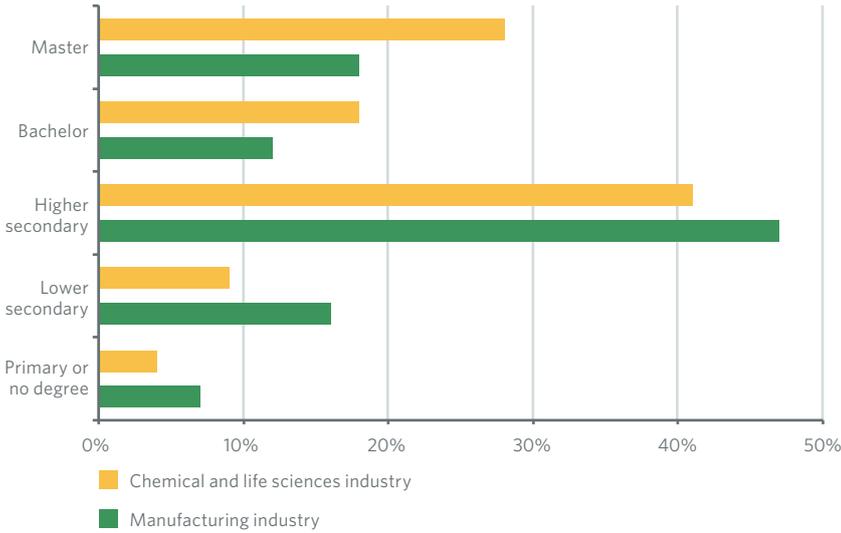
How diversity in the labour market can be turned into an asset



Employee qualifications

Highly qualified and specialised employees

Qualification level of personnel in 2013



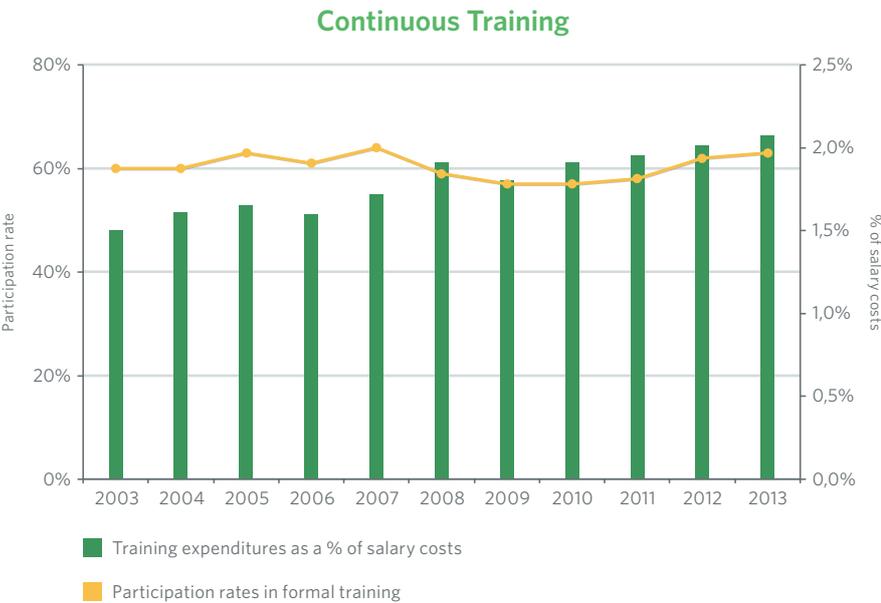
- The chemical and life sciences industry offers a variety of jobs, often requiring **highly qualified and specialised employees** to meet the needs of sophisticated production processes, high standards of R&D in an innovative sector, commerce in the field of science, and so on.
- **46% or nearly half of employees in the chemical and life sciences sector have a higher degree** (university and higher schools), 28% have a master (at least) and 18% have a professional bachelor. That percentage is considerably greater than for general manufacturing industry (30% in 2013).
- Some **41% of employees have obtained a higher secondary education degree** with the specialist skills required in process and manufacturing activities such as measuring technicians, process operators, electrical engineers, ... Young people with these profiles will continue to have opportunities in the chemical industry due to high replacement demands. Over the past five years, the first year enrolments in so-called SE.



Education

Continuous training crucial for the future

INITIATIVES



- 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.
- More than 54,000 people or **62% of all those employed in the chemical and life sciences industry participated in training in 2013** compared with 45% for the manufacturing industry as a whole. Additional analysis shows no substantial difference in participation rates between men and women in the sector.
- In 2013, companies in the chemical and life sciences industry spent no less than €47 million on continuous training of their employees. Two thirds of this amount was spent on formal training and the balance on informal (on-the-job) training. This means that **2.1% 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. A report on competitiveness and employment published in July 2013 by a group of experts points out the insufficient consideration of some training cost components such as remuneration of personnel while in training (Personnel Absence Cost). Companies' training efforts would be much bigger according to results from a survey carried out on European level (CVTS), which takes those elements better into account. The financial index would be 2.6% of total wage costs in 2010 in the chemical, rubber, plastics and construction material sector for formal training only.

- Social partners of the chemical and life sciences industry co-manage Co-Valent, the training funds of the sector, with a special focus on the promotion of training and skills development within SMEs.



Co-valent banks on talent



The added value of sector-specific training centres ACTA and PlastIQ

- The chemical and life sciences industry has two dedicated training centres: **ACTA and Cefochim**. ACTA, which is located in Antwerp, organises training on automatisisation and process technology. Cefochim, located in Seneffe, is a training centre for jobs in production, maintenance and research in the chemical and biopharmaceutical industries. Cefochim has also developed a system of work-linked training for job-seekers. As well, the social partners from the plastics processing industry in Flanders rely on a broad offer of tailor-made training for the sector via PlastIQ.
- The chemical and biopharmaceutical industry is the first sector in Wallonia to implement a system of cooperative education for a master degree in analytical science combining high school education with practical work experience in companies on a 50/50 basis. The sector also offers traineeships in 'production management' and 'facility management'. Also in Flanders a project 'werkplekieren' (Avogadro) has been initiated in close collaboration with two high schools and four companies in the Antwerp chemical cluster.



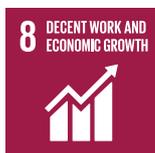
Age pyramid

Each year 2,600 new recruitments required

Employment by age group



- In 2013, 22,023 jobs in the chemical and life sciences industry were held by employees aged over 50. This represents nearly 1/4 of all employees in the sector. Between 2003 and 2013, this ratio increased uninterruptedly from 17% to 25%.
- At the same time, the number of employees aged under 30 decreased with 40%. In ten years, the share of young employees in the total working population in the sector has declined from 20% to 13%. This is far below the manufacturing average (16% in 2013).
- A study by the KULeuven (Prof. Sels, 2012) forecasts that 2,600 people will have to be recruited on an annual basis to compensate for retirements in the coming years assuming the employment level remains stable in the sector.
- Strong cooperation with the authorities responsible for education and employment will be needed to meet these challenges and to continue to attract young talents. In this context, an agreement (onderwijsconvenant) has been signed beginning 2012 between essenscia vlaanderen, the four representative educational organisations, the unions and the Minister for Education.
- Higher qualifications in the field of science offer good opportunities in the labour market. According to a survey of students (2013-2014) by government employment service VDAB, nearly all school leavers with a science degree found employment within a year.
- In a context of demographic evolution, labour shortage in the job market and the relatively low activity rate, we shall need to work longer if we want to maintain the level of well-being in Belgium. essenscia published, with Dehora, a practical guide about "Working longer, it is possible", in which they put forward four proposals for actions.



INITIATIVES



De instroom op peil houden



Structural cooperation between education and the industry



Awareness campaigns to attract young people

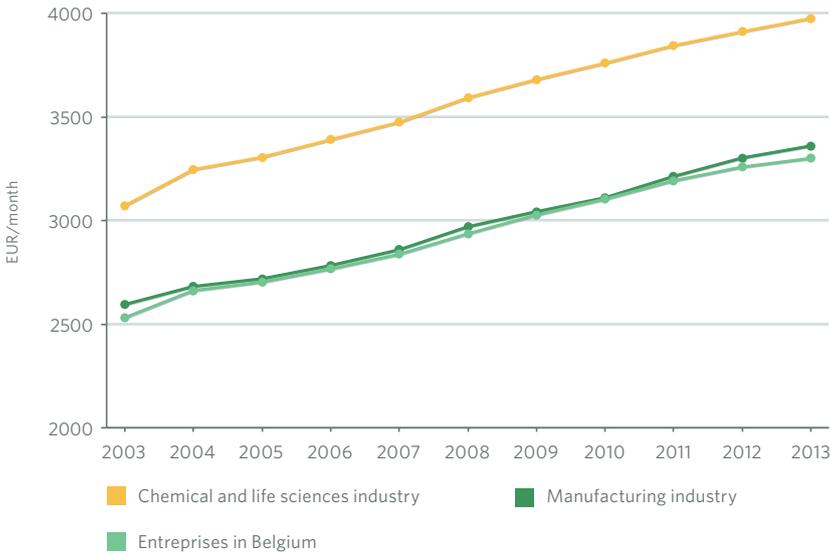


Raising enthusiasm for sciences among young people

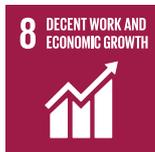
Salaries

The sector offers top salaries

Gross monthly salary (full-time employees)



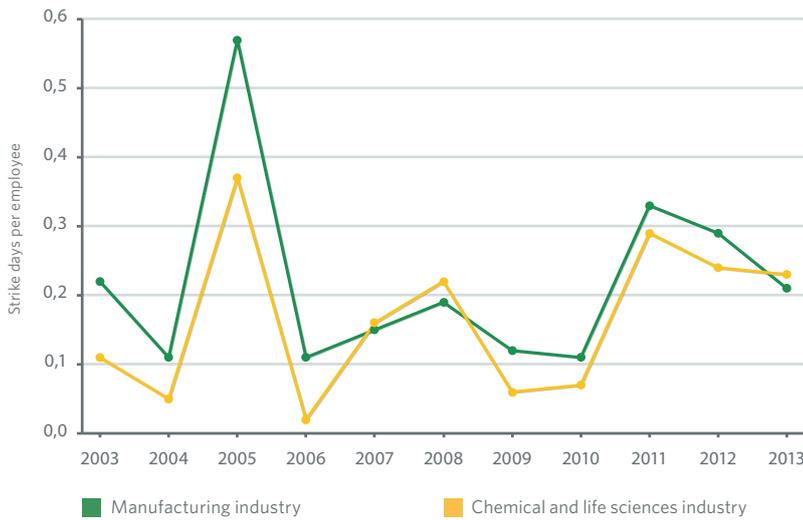
- With an average gross salary of **€3,975/month in 2013**, the chemical and life sciences industry offers **attractive remuneration compared with the average gross salary in manufacturing as a whole**. Gross salaries are **on average 18.3% higher**, although there are variations between sub-sectors.
- The wage gap between men and women** employed full-time by the chemical and life science industry has been closing steadily over the past ten years: **from 17.3% in 2003 to 12.2% in 2013**.
- 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.



Social climate

Serene social climate contributes to competitiveness

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 2003-2013**, an average of **15,145 strike days per year** was registered in the chemical and life sciences sector. This represents **0.16 day per year per employee**, as against 0.22 day per year for total manufacturing industry. In 2013 the social climate remained rather stable compared with 2012, with about 20,100 strike days or 0.23 day per employee, but this figure is above the trend level of the last decade.
- According to a recent study by human resources specialist Securex (2015), blue collar workers in the chemical and life sciences sector had among the **highest absenteeism frequency rate** in the Belgian economy in 2014 (**1.3 sickness notifications per blue-collar against 1.0 for the average of Belgian employees in 2014**). This difference remained quite constant in the recent years. Absenteeism among the sector's white collar workforce is similar to the rest of the economy.
- The study by Securex about staff turnover (2015) confirms that employees in the sector have a high degree of company loyalty: only 3.2% of employees quitted the company on a voluntary basis in 2014 against 6.6% in the private sector.

INITIATIVES



Academic study on the future of social dialogue



Innovation is central in the social dialogue



Industry agreement focusing on sustainable careers

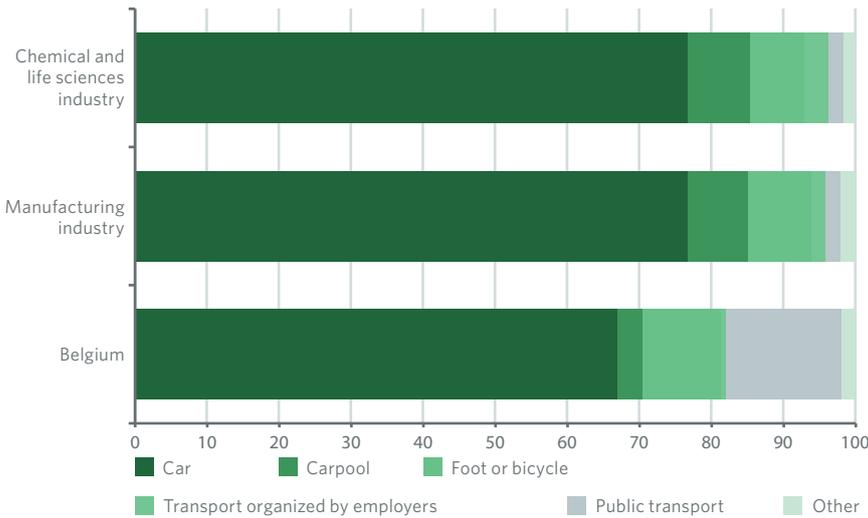


International solidarity in action

Mobility

Voluntary measures to improve commuting for employees

Home-to-Work Main Transport Mean Modal split % (2011)

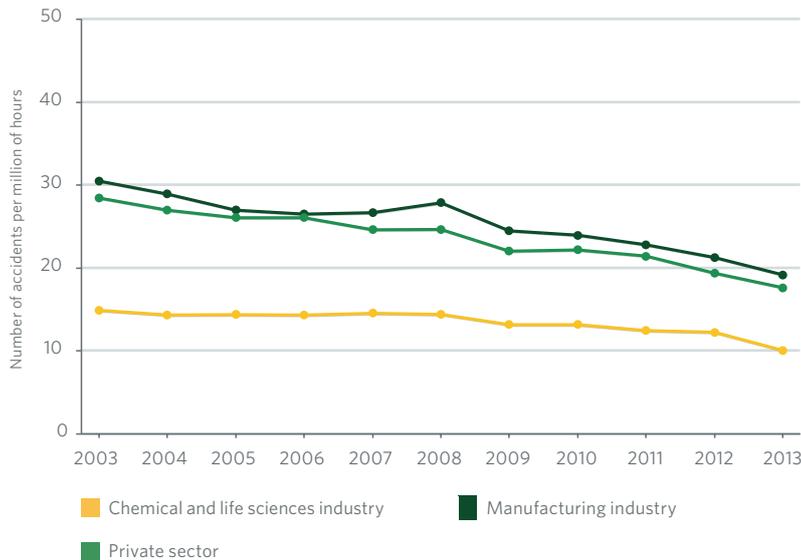


- Three-fourth of employees **use the car as their main means of transport** (excluding carpooling) to get to work. The figure is quite the same as that of total industry but significantly higher than for the total workforce in Belgium (67%). An **additional 8.6% of the sector's workers use carpooling**. This share is more than twice the Belgium average of 3.4%. Moreover 12.5% of companies run a carpooling scheme, far more than the Belgian average (5.9%).
- **Public transport (train, bus, metro, tram)** is less popular with the sector's employees, representing just 2% against the Belgian average of 16%. 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 35% of employees are on shift work compared with the Belgian average of 14%.
- To compensate, a number of chemical and life sciences companies cooperated in offering dedicated home-to-work transport of employees (8.8% in the sector against 6.2% in general manufacturing). 3.4% of the workers or nearly 2,500 people travel to and from work on **transport organised and financed by their employer**. This compares with 1.9% for total industry and just 0.8% for Belgium as a whole.
- 7.3% of the employees use their bicycle in the sector. The **bicycle is the third most popular means of commuting** for employees in the sector, just after the car and carpooling. About 60% of companies provide changing-rooms and shower facilities for the workforce, and more than two-thirds have bicycle shelters. Road traffic safety for cyclists remains a matter of concern. 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 at work remains a key priority

Accident frequency rate



- **Safety remains a top priority** for the sector. In the last ten years, the number of workplace accidents has steadily decreased in the chemical and life sciences industry.
- According to the Occupational Accident Funds, the frequency rate¹ of accidents in the chemical and life sciences industry, including plastics and rubber processing, is estimated at 10.1 per million hours worked in 2013. This rate is **nearly half the rate recorded for the manufacturing industry as a whole**. Performance varies between sub-sectors.
- 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.

¹ Lost Time Injury Frequency Rate is the number of lost time injuries occurring in a workplace per 1 million man-hours worked. Lost time injuries include all on-the-job injuries that require a person to stay away from work more than 24 hours, or which result in death or permanent disability.

INITIATIVES



Safety: always on the agenda at Indaver

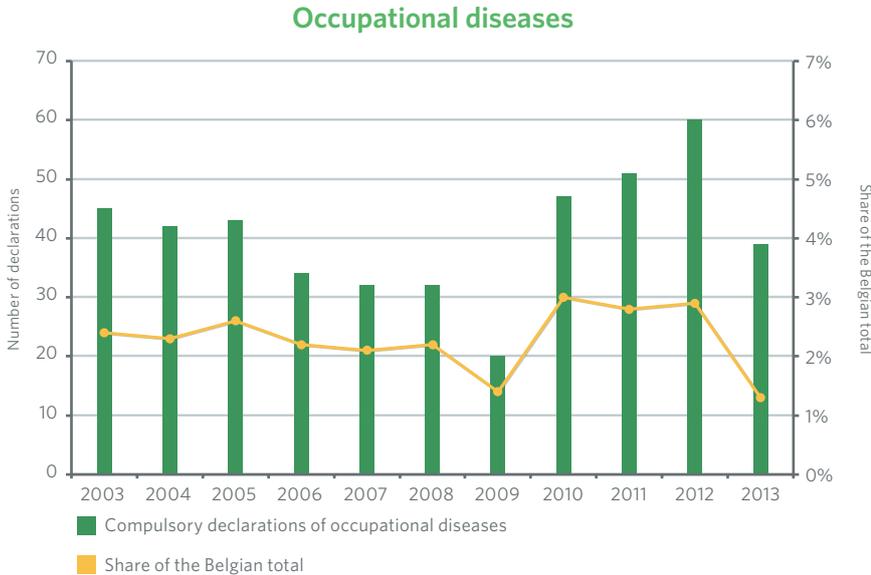


Solvay is aiming for maximum safety with 'behavioural safety'



Occupational diseases

Number of declarations of occupational diseases down



Beside security, protection of workers exposed to chemical substances is also of major importance. According to the 'Fonds de Maladies Professionnelles (FMP)' 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. In 2013, 39 declarations were made in the sector. This means 1% of the total number of declarations of occupational diseases in Belgium.

The increase that can be observed in 2010-2012 can be explained, on the one hand, by a more intensive awareness campaign (congress, electronic newsletter, ...) organised by FMP among the medical profession around the improvement of declarations. On the other hand, there is an increasing number of declarations related to joints, tendons and muscles pathologies (tendinitis, back problems, carpal bones) and hearing problems. The increase is by no means attributable to an increased exposure of workers to hazardous substances.

INITIATIVES



Health: more and more a business priority



HR plan to guarantee well-being at work



Process safety

Process safety: an essential part of the training process

The importance of process safety in the chemical sector cannot be emphasised enough. How can an effective process safety management system be achieved? A fundamental part of this kind of system is the provision of integrated training throughout the whole organisation.

essenscia is undertaking a number of initiatives in this context. The aim is to achieve a good balance between academic training, partnerships with the industry and exchanges of experience. The training process comprises a combination of short and longer courses.

What exactly is essenscia's role in this? The federation invests in integrated training on process safety. In fact, essenscia contributes to the master after master programme on Process Safety Engineering organised by KU Leuven. Two short programmes were distilled out of this: the Advanced Course on Process Safety and an ATHENS Course on Process Safety. Last year around 120 students followed these two courses. The first course is aimed at industry employees. The second is aimed at future master's degree students in Engineering from the ATHENS network.

However, the exchange of experiences between company experts is at least equally important. essenscia organises this exchange process via the Delta Process Academy (DPA). This comprises 4 to 6 workshops per year, the aim of which is to share experiences of process safety and incidents within the sector. As industrial sites often work with subcontractors, they too recently joined the exchange of experiences. Each year, the DPA initiative reaches 260 people.

Another important link, which is required for effective process safety on sites, are the operators. In cooperation with Acta and Co-valent, essenscia supports a course that specifically focuses on operators. It's a three-day course, which explains the theory of certain important process safety concepts, using a number of concrete examples, thereby making terms such as HAZOP, LOPA and SIL intelligible and tangible for each employee.

In real life, incidents are often caused by small things. That's why it is important to identify these minor causes in time to prevent them causing problems. So it's crucial that everyone in the organisation is committed. This kind of engagement can only be achieved if courses are modelled on clear standards, if they are based on realistic risk analyses and if they clarify the rules on process safety.

The content and teaching methods of the current courses are being evaluated. We are examining ways to broaden content in the future, in order to include subjects such as crisis management. We are also examining how these courses can be created in a European or international context.

Testimonial of a student from the 'Politecnico di Milano':

"I really liked the Athens week in Leuven. It was a very friendly environment in a beautiful historical city. I already had a background on the topic (Safety Engineering), but I gained more insights and increased my knowledge on the subject. The social program was great! It gives a good idea of student life in Leuven. Everyone was nice. I spent a great week in Leuven. And also the coffee and cake were great:-)"

INITIATIVES



Safety, a top priority for Exxon Mobil



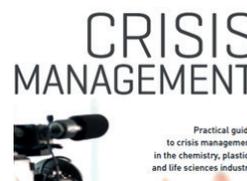
A club of experts focused on process safety



Process safety: an essential part of the training process



Belintra: The sector's commitment to provide help in case of transport accidents



Professional crisis communication essential in the event of incidents

PLANET

Planet



PEOPLE

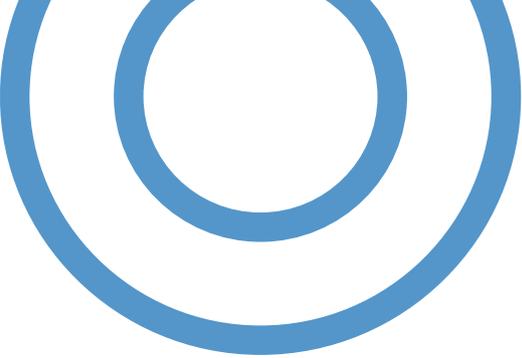
PLANET

PROSPERITY

PRODUCTS

ESSENCIA SUSTAINABLE DEVELOPMENT REPORT 2015

22



Planet

Vision – Energy

A competitive framework in a rapidly changing energy environment

Energy products such as petroleum, natural gas and electricity are essential for the chemical, plastics and life sciences industry. They provide the energy that is necessary to produce all kinds of products that are part of our daily life. It goes without saying that we must use these energy products in an efficient way. It is crucial that we keep energy costs as low as possible to maintain the profitability of our industry.

The energy landscape is changing rapidly. Although prices of fossil energy are going down in large parts of the world, Europe is faced with price increases. Hence, developing sustainable energy is of crucial importance to Europe. Today, the European Union is focusing too one-sidedly on CO₂ reduction. The United States, on the other hand, are focusing on competitive energy prices, for instance by investing in the extraction of shale gas.

However, the climate problem does not stop at the EU borders. There is a global challenge that demands a new approach. It requires a new way of thinking that can shift energy consumption from fossil energy to sustainable solutions. Solutions that result in a win-win, both for the climate and the economy. In this new approach innovation is key. It requires to develop technology that is able to compete with the current technology and is capable of reducing CO₂ emissions beyond the EU borders as well.

essencia urges Europe to shift from its current high cost strategy towards the development of innovative solutions. Finding

But achieving a healthy balance also implies that energy efficiency remains an important point of attention within our industry. Therefore, we commit by signing, once more, the energy policy agreements.

the right balance between competitive and reliable forms of energy and reducing CO₂ emissions on a global level; this is – without a doubt – the challenge for the future.

How can we achieve this balance? By focusing our efforts on innovation, which allows us to create added value and give the European economy a new boost. Concretely, this means, for instance, putting energy efficiency into practice. In this context, essencia – together with various other industries – has signed the Renovation Pact of the Flemish Government.

But achieving a healthy balance also implies that energy efficiency remains an important point of attention within our industry. Therefore, we commit by signing, once more, the energy policy agreements (add link).

We continue to focus on energy efficiency in both large and small companies. That is why the European project SPICE³ (add link) has been set up in our sector. It is a project that provides guidance to SMEs based on a sector-specific approach to further increase energy efficiency.

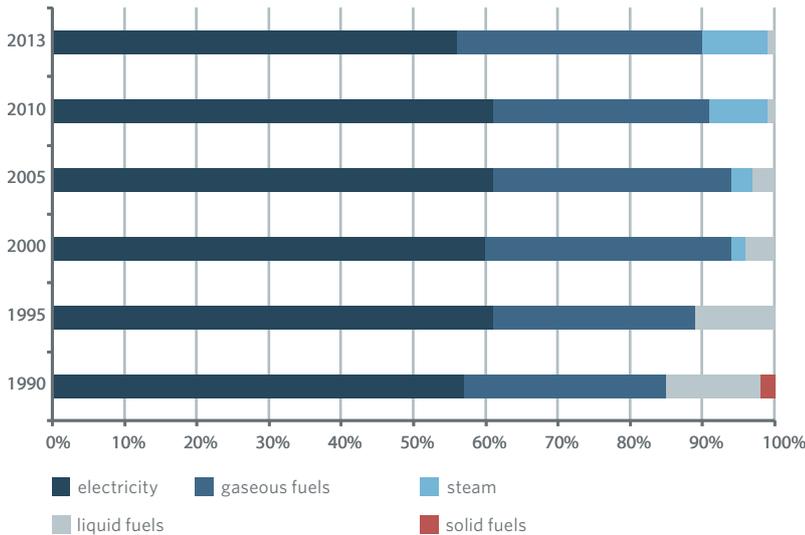
We continue to look for ways to reduce CO₂ emissions as much as possible. Where necessary, we participate in the optimisation of certain working methods within our industry. We do this without losing sight of the growth perspectives and profitability of our companies. Our goal is an economically valuable emissions trading scheme which is a driver for climate action and at the same time offers a perspective for growth for sustainable production by taking into account climate-related obligations of the industry in the other global economies.

This way, we strengthen the chemical, plastics and life sciences industry, and hence also the European economy. What is more, we prevent a shift of CO₂ emissions to other parts of the world, and we actively contribute to innovative solutions that guarantee a sustainable future.

Energy consumption

Energy products, a source of energy and raw material

Fuel mix for energy use
Sector (2013): 212 PJ



- The main energy vectors are **electricity (56%)** and **natural gas (34%)**. Steam represents 9% of purchased energy. 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 (link naar indicator).
- Energy efficiency improvements occurred thanks to a higher integration of production processes, involving exchanges of steam. This happens on site, but also between companies.
- An important part of the sector is **energy intensive**. High energy needs are intrinsic to the products made by the companies. Consequently, energy represents an important part of production costs and optimizing energy efficiency remains a priority for companies.
- Additionally, energy vectors such as petroleum, natural gas and electricity are also used as a raw material for industrial processes. In 2013 **99% of petroleum (mainly naphtha) and 37% of the natural gas consumption of the sector were directly converted into higher value materials**.

INITIATIVES



Energy Policy Agreements: a framework for energy efficiency



Solvay focuses on increased energy efficiency



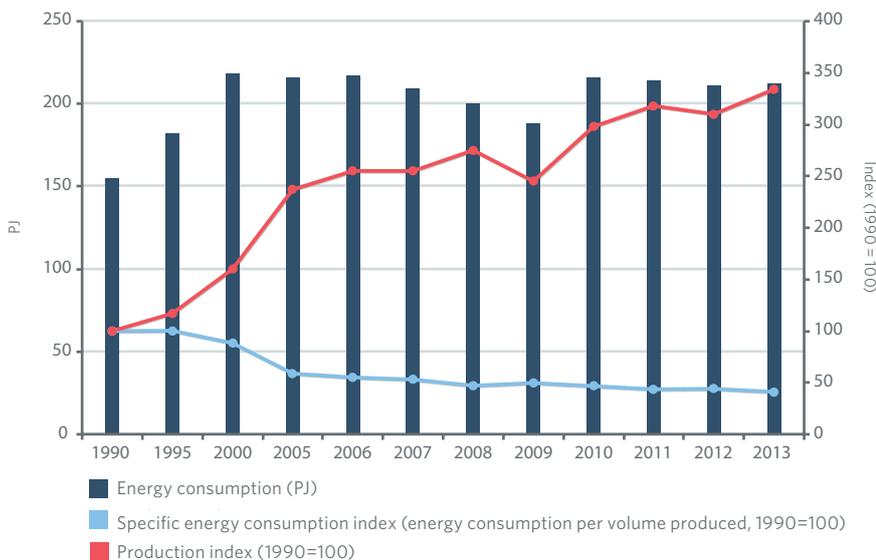
EOC employees save more than 740,000 kWh of energy in one year



Energy efficiency

A model of energy efficiency

Energy intensity 1990-2013



- Improved energy efficiency throughout the sector led to a clear decoupling between production and energy use. Since 1990, total production¹ of Belgium's chemical and life sciences industry has tripled. In the same period, energy consumption increased by only 37%.
- The continuous focus on energy efficiency was strengthened by the voluntary commitments of the sector (accords de branche, covenant energy benchmarking, covenant energy auditing). Those agreements cover about 90% of the energy use in the sector. A large number of enterprises of the target group has also joined the new generation of voluntary agreements.
- Between 2013 and 2015, essenscia took part to a European project named **SPICE³** (Strategic Platform for Industrial Chemicals in Energy Efficiency Excellence) aiming to promote energy efficiency among **SMEs**.

¹ based on the production index (cfr methodology)



INITIATIVES



SPICE³ strives for energy efficiency excellence



Improving energy efficiency step by step



Saving energy: a daily reflex at Zoetis

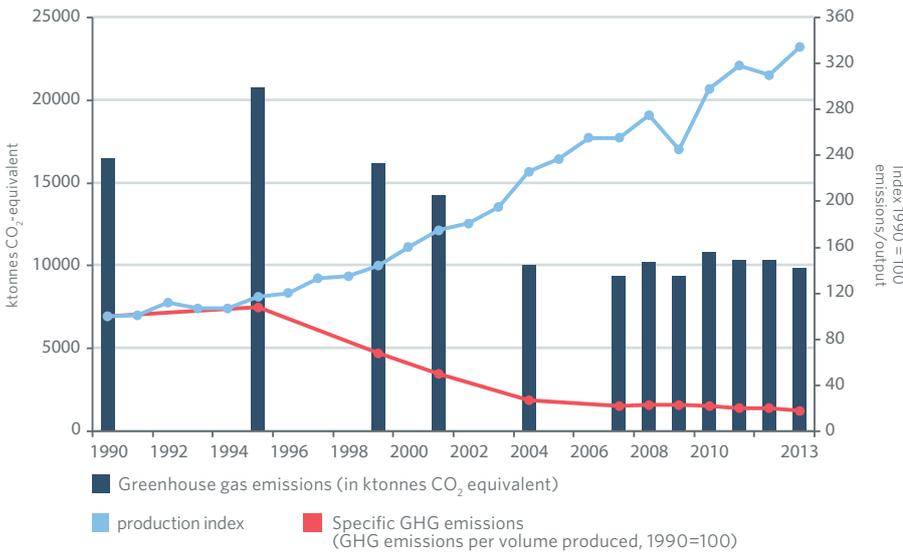
ExxonMobil

ExxonMobil invests in energy efficiency for its processes and products

GHG emissions

80% greenhouse gas emission reduction per production volume

Greenhouse gas emissions 1990-2013



- Greenhouse gas emissions per production volume¹ unit have **decreased by 80% since 1990**. This significant fall is due, among other things, to a drastic investment in abatement measures for N₂O emissions and the substitution of fluorinated gases. Further emission reductions have been achieved by the continuous improvement of energy efficiency and the switch to natural gas.
- The main greenhouse gases emitted by the chemical and life sciences industries are **carbon dioxide (CO₂), nitrous oxide (N₂O) and fluorinated gases (PFCs, HFCs)**. Indirect CO₂ emissions related to the use of electricity are not included in these statistics, as they are traditionally attributed to the electricity sector.

¹ Based on the production index (cfr methodology)



INITIATIVES



Janssen pushes boundaries using deep geothermal energy

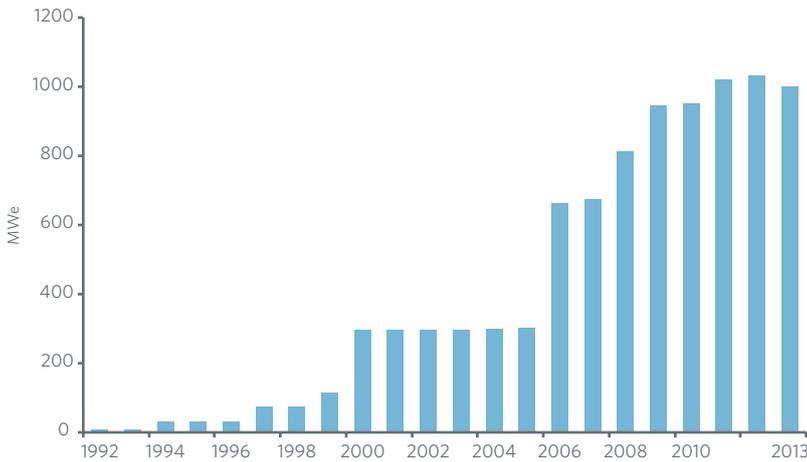


Indaver creates one of the largest industrial heat clusters in Europe

Cogeneration

41% of total installed CHP electrical capacity

CHP - installed electrical capacity



- Cogeneration (Combined Heat and Power or CHP) - the simultaneous production of heat and electrical or mechanical power - offers **primary energy savings** compared with separate production and consumption of electricity and heat. Primary energy savings made by the sector in Belgium thanks to quality cogeneration are estimated at 5300 GWh. This is about the quantity of energy that is necessary to supply 150,000 households.
- In the meantime, under the current economic circumstances and energy needs, the development of cogeneration in the sector seems to have stabilised. With an installed cogeneration capacity of **999 MWe in 2013** (the equivalent of one nuclear power plant), the sector represents 41% of the total electrical cogeneration capacity in Belgium.
- The **big increase in CHP** plants in the chemical and life sciences industry was driven by the strong development of the sector in the 1990s and accelerated by the switch from oil to gas and after the government promoted cogeneration in its policy.

INITIATIVES



Greater energy efficiency with the Kaneka combined heat and power installation





Planet

Vision – Environment

A sector committed to the environment

The chemical and pharmaceutical industry is committed to innovating responsibly and with respect for the environment. This innovation is realised thanks to the continuous optimisation of production processes and the systematic analysis of the impact which products cause throughout their whole lifecycle.

Limiting our industry's ecological footprint in a sustainable manner ...

Our industries:

- use the best available techniques, and at European level, contribute to the development of ambitious and realistic standards;
- are committed to optimising their energy efficiency and consumption of raw materials, by reducing their emissions during the manufacturing process and safeguarding natural resources;
- wherever possible, prioritise bulk transport by pipelines and waterways or rail,
- in order to reduce emissions and to contribute to improved mobility and road safety.

The continuous improvement of environmental performance in our sector also entails a reduction in the use of drinking water in the manufacturing process, and efficient management of its consumption. Thus, the sector is involved in the European research project 'E4Water' and the groundbreaking 'Water Matters' initiative of Cefic (the European Chemical Industry Council).

All of the efforts of the past 25 years have made a major contribution to the achievement of Belgium's environmental targets.

... while we continue to optimise the design and use of our products ...

As an absolute proponent of the European policy on the resource efficiency, essenscia calls for an improved integration of companies in industrial areas, to enable better use of sidestreams. Numerous intersectoral partnerships have been realised, including Symbiose and CORE (<http://www.ctrl-recycling.be/>).

The chemical industry is constantly seeking alternative resources. It also has the ambition to develop a part of the chemical industry and a number of plastics by using renewable resources, on the basis of the cascade principle: biomass must first be used for food applications, then as a bio-based raw material, and finally as an energy source.

... up to and including their recycling ...

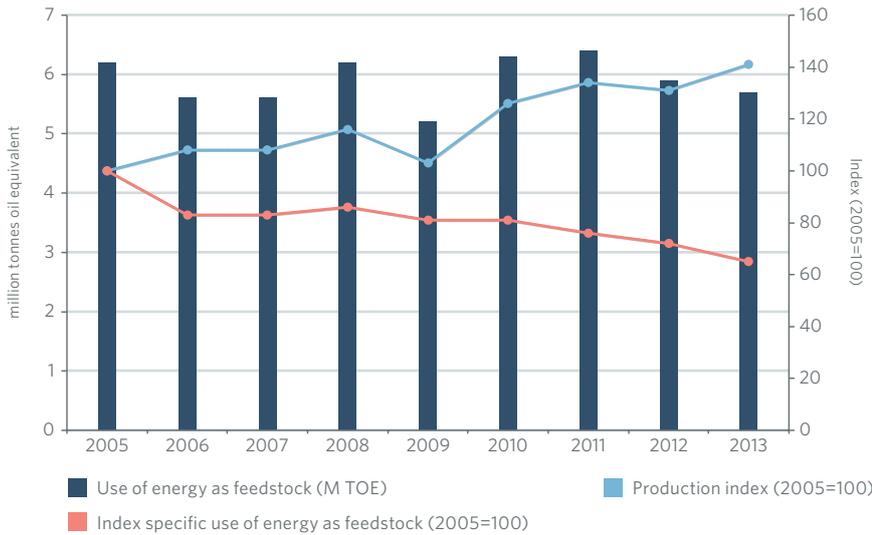
To encourage the recycling of plastics, essenscia is promoting a policy of cooperation right from the product development phase up to and including the recycling phase. This fits in with the framework of initiatives such as Curio, Roofcollect, FISCH and GreenWin.

... in order to prepare the way for new economic opportunities, which arise thanks to innovative chemical products and which fit in perfectly with a policy of reindustrialisation, while at the same time ensuring the protection of our planet.

Resource efficiency

Producing more with less raw materials

Evolution of the use of energy vectors as feedstock



For the chemical, plastics and life sciences sector the efficient use of raw materials is a given. It's part of our DNA. The Belgian petrochemical cluster is a prime example of this. This cluster is characterised by its interconnectivity, in which side streams of one production unit are used as raw materials for others.

The optimisation of manufacture processes is a continuous priority. Wherever possible, waste is avoided, recycled or recovered in the form of energy. This approach is substantially reducing the consumption of primary raw materials and energy.



INITIATIVES

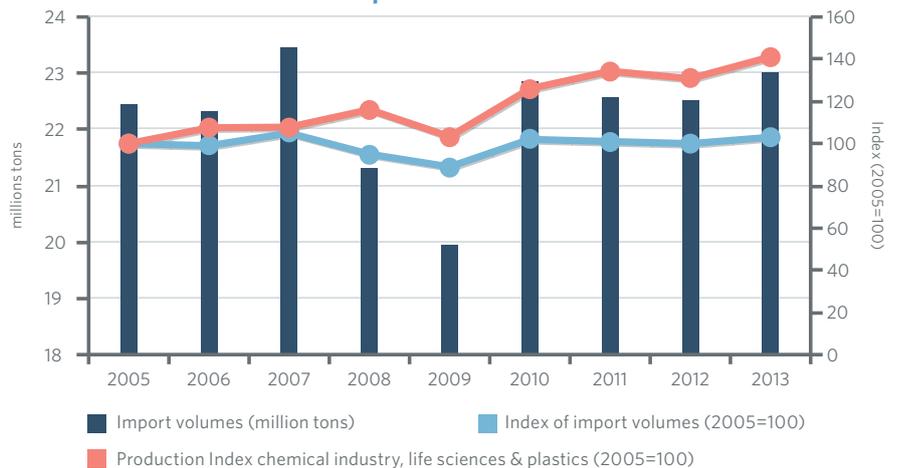


CINBIOS: a catalyst for industrial biotechnology



Sustainable boehmites thanks to Dequenne Chimie and Certech

Import volumes



Over a period of 8 years, the production index has increased by 41% while the proportion of energy used as a raw material has decreased by 8%. These figures show clearly that an increasing amount of value is being created per quantity of raw material used.

At the same time, we note that in that same period, there was no dramatic increase in imports of chemical products or half-finished chemical products. Therefore, the increased productivity of the Belgian chemical industry is not being cancelled out by increased imports of chemicals.

Aside from optimising current manufacture processes and further closing of cycles via initiatives such as Symbiose, the

sector is also creating innovation through increased use of industrial biotechnology. The roadmap study 'industrial biotechnology' performed by FISCH and CINBIOS, and commissioned by the Flemish government, shows that industrial biotechnology in Flanders is highly specialised. Four promising new value chains have been identified within it:

- the manufacture of fine chemicals from sugars and starch;
- the manufacture and use of second-generation sugars;
- the use of lignin-rich raw materials for high quality materials and chemicals;
- the conversion of CO₂ into chemicals.

A recent study by CEFIC showed that around 10% of manufacture is bio-based. Indeed, this is a figure that can also be extended to Belgium.

INITIATIVES



SYMBIOSE: New applications for side streams



Indaver Molecule Management: An innovative solution for waste streams



Intense4Chem: The search for innovative chemical processes

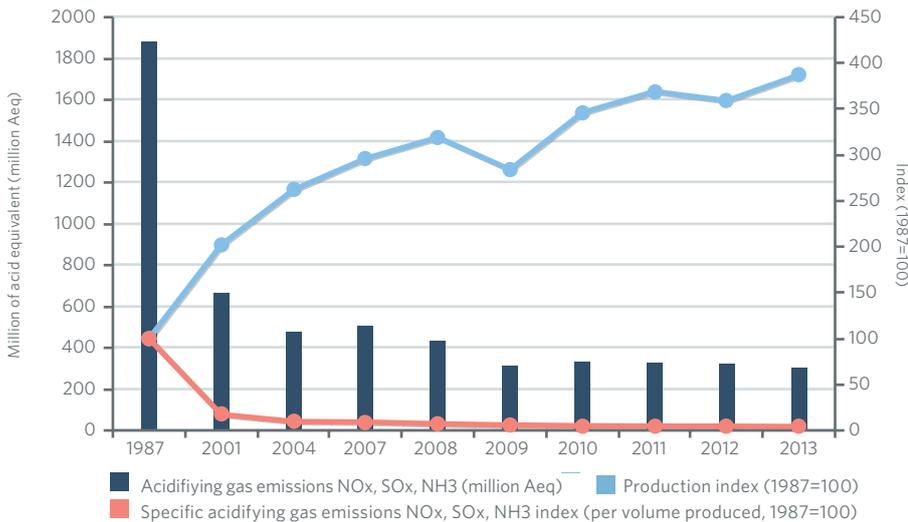


Recticel spares raw materials for its dashboard

Acidifying emissions

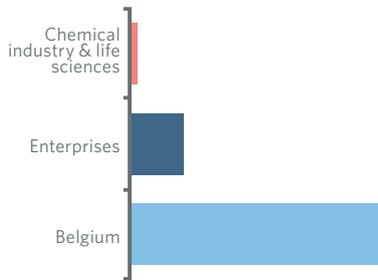
Barely 3% of all acidifying emissions in Belgium

Evolution of acidifying emissions (NOx, SOx and NH3)



- Since 1987, specific acidifying emissions of the sector have decreased with more than a factor 20 and are getting close to an asymptotic minimum. The sector continues to take into account the environmental impact - among other the NOx and SOx emissions - in its investment projects.
- The sector accounts for only 14% of emissions from manufacturing as a whole, and 3% of the total for Belgium.
- The sector in Wallonia has already reached its best possible results in the reduction of acidifying emissions. **The voluntary agreement** reached by the sector and the Flemish government has come to an end in 2013. The sector emitted 25% less **NOx** than the agreed ceiling.
- Investments in process innovation have also led to SOx reductions in the sector. This has resulted in new business opportunities and resource efficiency improvements.

Acidifying emissions (2013) in million Aeq



As they have different acidification factors, SO2, NOx and NH3 are expressed in acid-equivalents (Aeq).

- Substances such as sulphur dioxide (SO2), nitrogen oxides (NOx) and ammonia (NH3) can turn into acidifying components in the atmosphere. The so-called acid rains can affect human health, ecosystems and infrastructure.
- In the chemical and life sciences industries, acidifying emissions originate mainly from fossil fuel combustion and the production of sulphuric acid, ammonia and nitric acid (used in producing fertilizers, cleaners and in refrigeration).

INITIATIVES



Substantial reduction of nitrogen oxide emissions at Akzo Nobel Chemicals



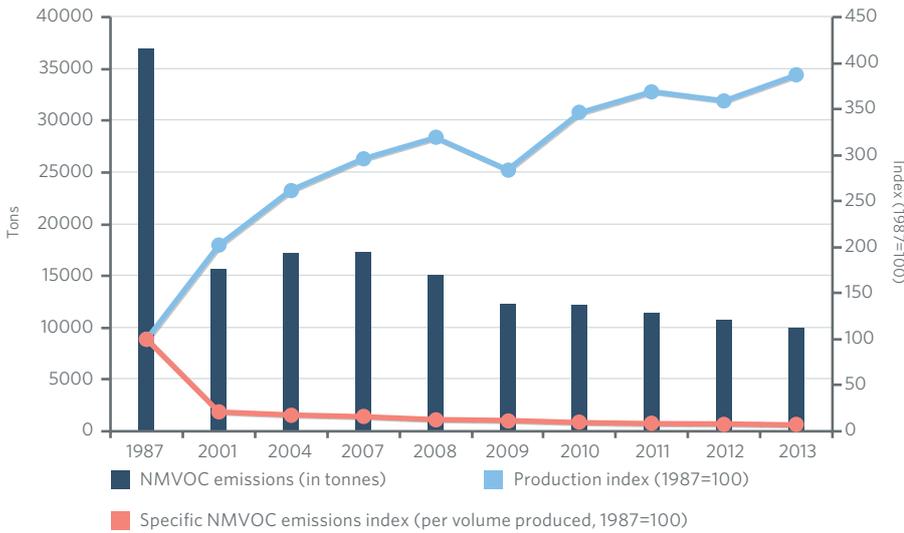
Successful environmental agreement limits NOx emissions



Organic emissions

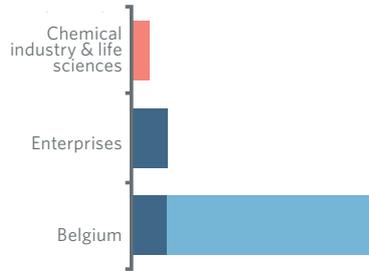
Organic emissions historically low

Evolution of non-methane volatile organic compounds (NMVOC)



- In 2013, the volatile organic compounds (VOC) emissions of the sector reached a new historic low of **10 ktonnes**, and this despite increased production. This is an absolute decoupling between production and emissions.
- The sector specific emissions have **dropped by 60% within the last ten years**.
- Volatile organic compounds (VOC) contribute to ozone peaks owing to photochemical reactions in the lower atmosphere.
- VOCs are organic chemicals that evaporate easily. The main sources are transport emissions (fuel vapours), and the use of solvents in some industrial processes. The significant decrease in the sector's VOC emissions between 1987 and 2001 is a result of good housekeeping, process optimisation, improved emission control during stor-

NMVOC emissions (2013) in tonnes



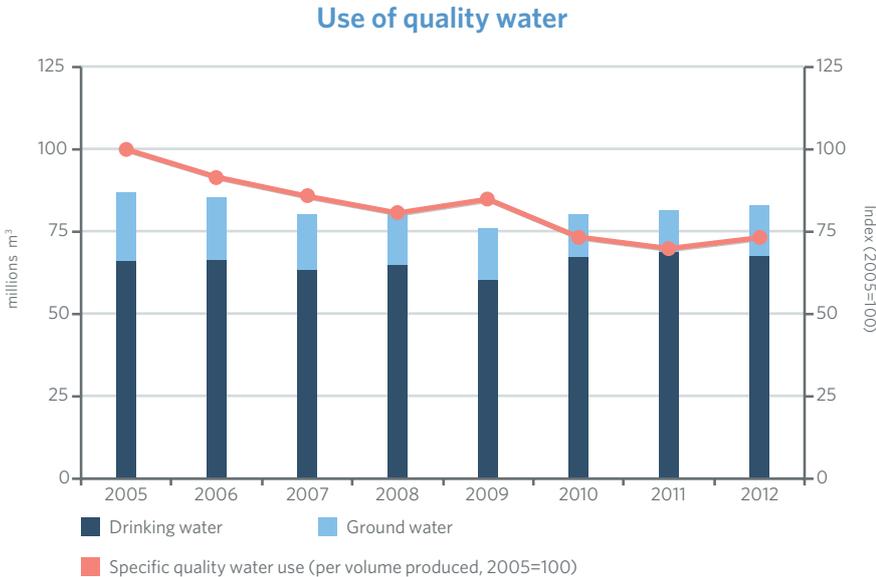
age and transport, and the introduction of water-based paints, Hi-solid paints and other solvent-free products.

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



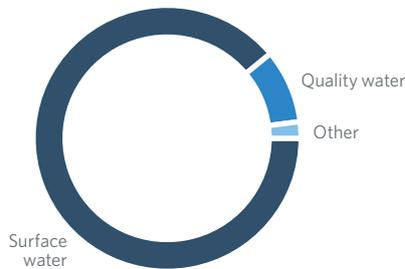
Water use

Use of quality water down



- In 2012, the sector used a total of **943 million m³ of water**.
- The sector aims to **reduce pressure on quality water sources**. In 2012, drinking water accounted for 7% of the total water used by the sector, and groundwater for just 2%.
- Several companies (for instance Monsanto, BASF Antwerpen, Inovyn and Agfa) made important investments to reduce their quality water consumption.
- Water is essential for all life forms on earth. Only one millionth of all the world's water in its natural state is fit for human use. Conservation of this precious natural resource, or 'blue gold', begins with its judicious use.

Water use by the sector (2012): 943 million m³



- The chemical and life sciences industry is an important industrial water user. **90%** of the water used by the sector in Belgium is **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 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.

INITIATIVES



INOVYN receives a European Award for closing the loop to reduce water consumption



Covestro: Intensified efforts to reduce water consumption



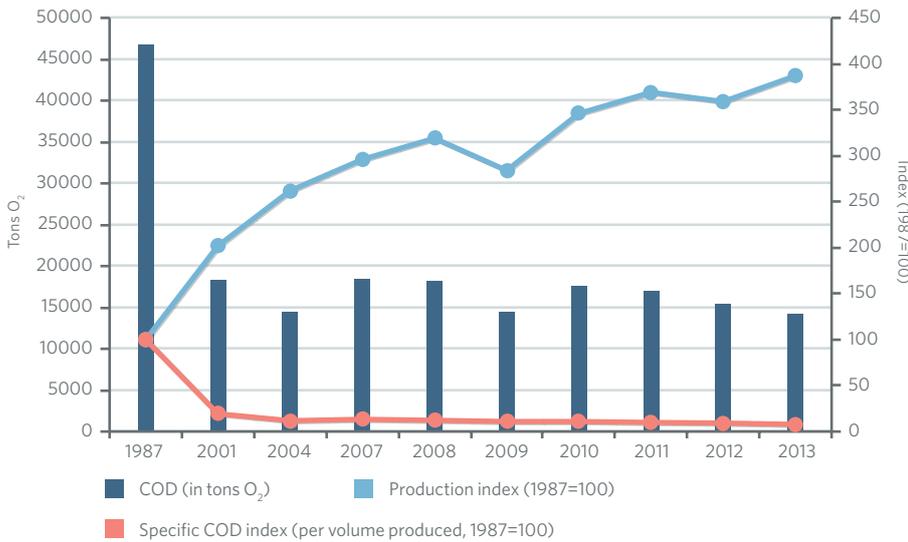
Monsanto is honoured for its sustainable water management



Water quality

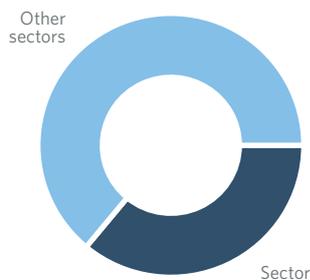
Water quality keeps improving

Chemical oxygen demand (COD)



- By implementing the best available techniques for wastewater treatment, the sector has continued to reduce the chemical oxygen demand (COD) of its effluents, despite an increasing production. The decoupling between COD and production is going on and has reached a new record.
- The sector has **reduced its specific COD load** by more than 90% since the reference year 1987.
- Process wastewater in our sector is typically treated either in-house (about 40% of organic load) or in **public wastewater treatment plants (about 60%)** against payment of taxes.

Share of the sector in the total industrial emissions (2013)



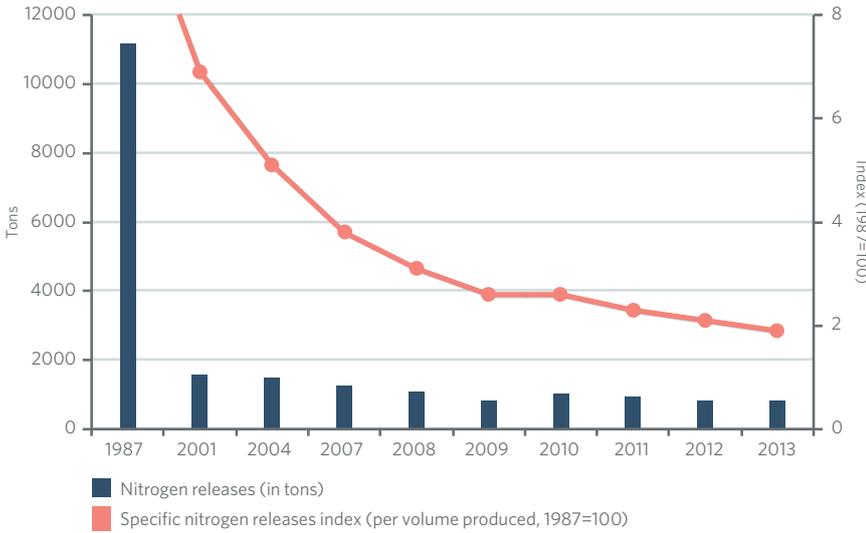
- Organic pollutants in effluent need oxygen to be completely chemically oxidized. Hence, the pollutant load of wastewater can be measured from the chemical oxygen demand (COD), expressed in tonnes of oxygen needed.



Nitrogen and phosphorus

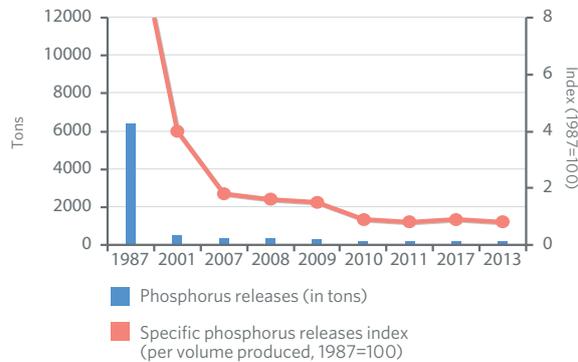
Continuous improvement in nitrogen and phosphorus releases

Nitrogen releases



- In 2013, the chemical and life sciences industry further decreased its impact on the water ecosystems by limiting its **nitrogen and phosphorus releases** to respectively **810 tonnes** and **207 tonnes**.
- This represents respectively about 18% and 34% of total nitrogen and phosphorous releases by all Belgian enterprises.
- The specific nitrogen and phosphorous discharges continue to decrease slowly and are close to an asymptotic minimum.
- When water ecosystems are enriched with nitrogen and phosphorus, this triggers unnaturally high rates of plant production (and sometimes proliferation of algae). This results in accumulation of organic matter that can degrade water and habitat quality. This phenomenon is called **'eutrophication'**.

Phosphorus releases

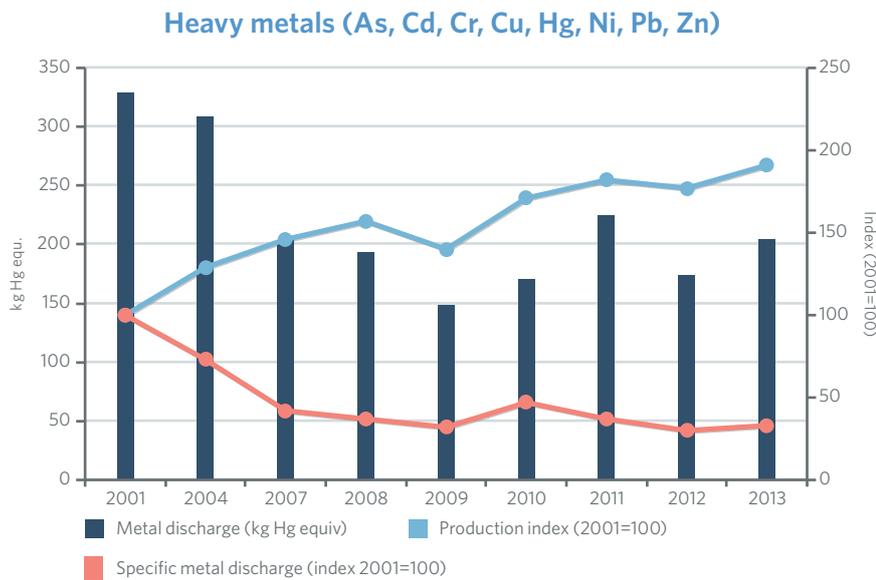


- One of the main sources of nitrogen emissions in the chemical and life sciences industry is from production of nitrogen-containing organic or inorganic chemicals like fertilizers, aniline (used for the production of polyurethane) and caprolactam (used for the production of nylon).



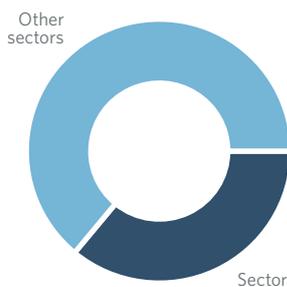
Heavy metals

Stabilisation of specific releases



- After a decrease between 2001 and 2007, the sector succeeded in stabilising its specific heavy metals discharges to about 200 kg Hg equivalent, while the production index continued to increase.
- Despite the implementation of the best available technologies, the sector will need to make additional efforts to reduce its heavy metals releases. The development of viable new technologies is essential to meet the requirements of the water framework directive.
- Human activities increase the concentrations of heavy metals in the environment by emitting particles into the air and releasing heavy metals in surface water.

Share of the sector in the total industrial emissions (2013) Heavy metals (Hg eq.)

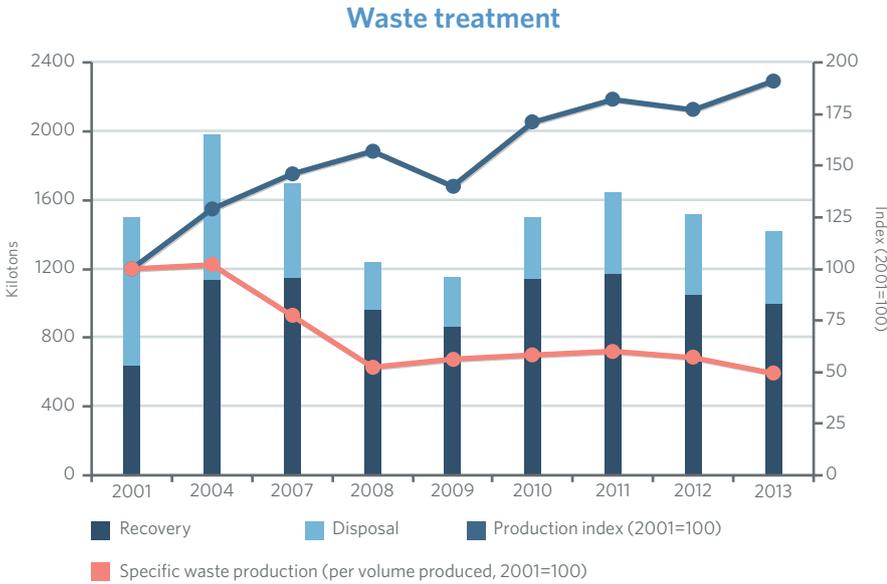


- Eight metals have been identified as priority elements for discharge reduction by the third North Sea Conference: cadmium (Cd), lead (Pb), chromium (Cr), mercury (Hg), arsenic (As), copper (Cu), zinc (Zn) and nickel (Ni). Owing to their **different ecotoxicity levels**, the various heavy metal releases are converted into kg Hg equivalent (mercury equivalent) based on the PNEC (Predicted No Effect Concentration) values.



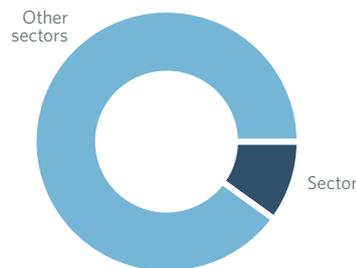
Industrial waste

Most industrial waste is recovered



- In 2013, the Belgian chemical and life sciences industry accounted for **1,419 kilotonnes** or **10%** of all industrial waste.
- **Substantial efforts were made in the field of material and energy recovery.** Of all waste generated by the sector in 2013, **70%** 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 24%** of the waste generated by the chemical and life sciences industries is **hazardous**. **68%** of hazardous waste produced by the sector is recovered. The treatment of hazardous waste takes place mainly in Belgium (77%).

Share of the sector in the total industrial waste (2013)



- Waste production can be minimized by targeting prevention at the source. Unavoidable waste must go through **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) ahead of useful application (energy recovery).

INITIATIVES

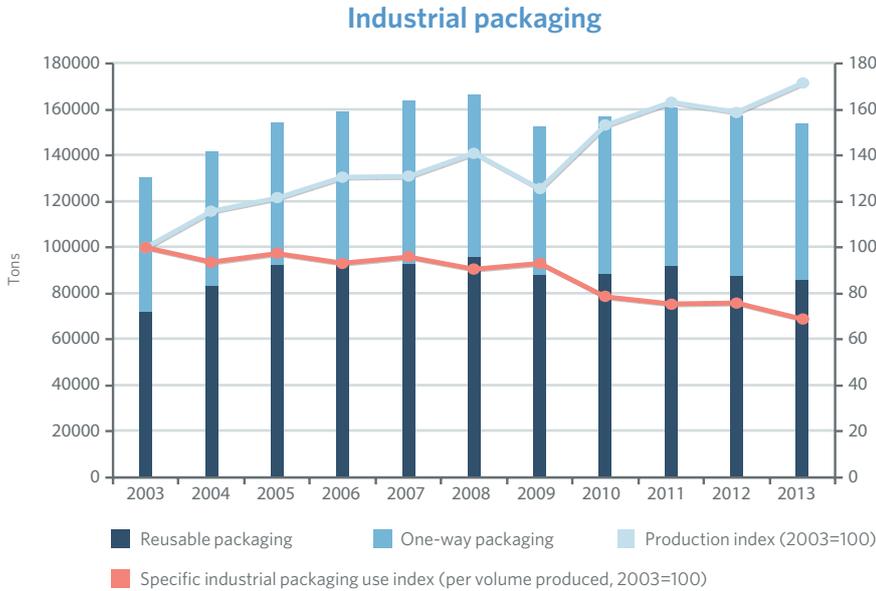


BASF proceeds consistently further on the road to sustainable waste and materials management



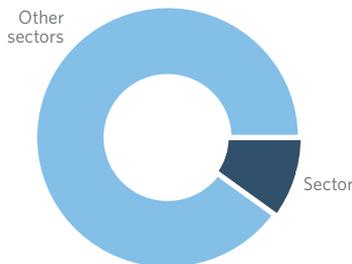
Industrial packaging

More than half industrial packaging is reusable

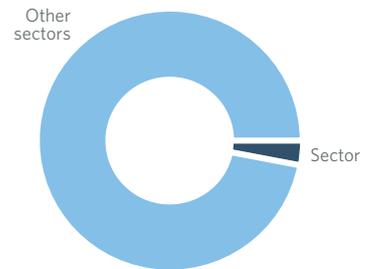


- In **2013**, the chemical and life sciences industry used **more than 150,000 tonnes** of industrial packaging, of which **56% was reusable**.
- Between 2003 and 2013, production in the sector increased by 71%, while consumption of one-way industrial packaging rose by only 17%. Among other reasons for this decoupling is the use of pipelines, larger packaging and bulk, thinner and lighter packaging.
- Over the last ten years, the sector has achieved a **major increase of reusable industrial packaging**, in particular plastic pallets and containers, wooden pallets and metal drums.
- The sector's share of packaging is a relatively small 10% (one-way) and 3% (reusable) of that of industry as a whole.

One-way packaging



Reusable packaging



- Only industrial packaging, i.e. packaging of products used within the production process – for instance wooden pallets, metal drums, cardboard boxes, plastic films, ... – is considered here. Wholesale packaging (packaging of final chemical products for the end consumer) is out of this scope.

INITIATIVES



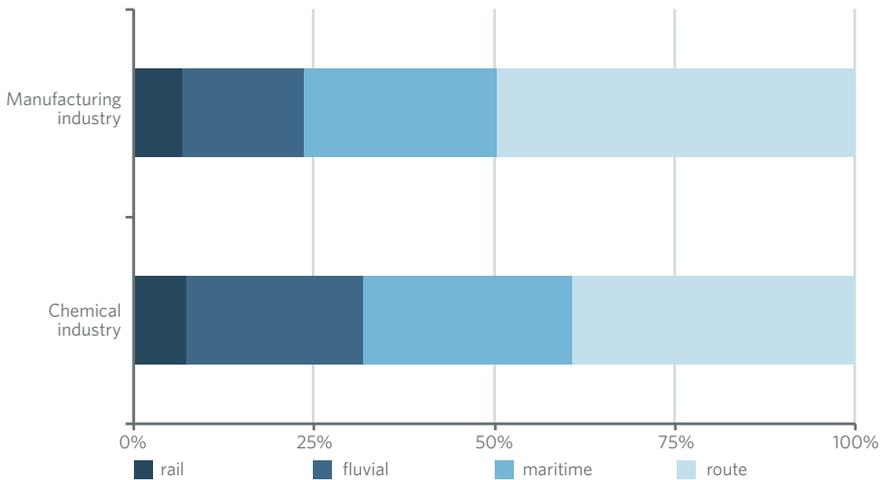
200 'dormant' gas cylinders found



Transport and logistics

The chemical industry mainly uses eco-friendly transport

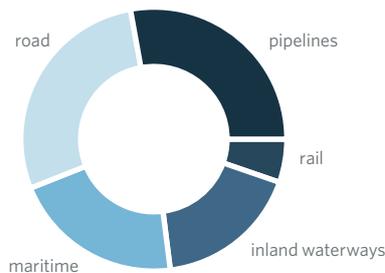
MODAL SPLIT 2013 in volume (air freight and pipelines excluded)



For **nearly 75% of its transport activity**, the chemical, plastics and life sciences industry makes use of **environment-friendly modes of transport** with low emission factors (see table below CO₂ emissions).

Pipelines remain a very important mode of transport for the chemical industry with more than 25% of the volume transported. With a share of about 5%, **rail** transport seems to be a minor mode of transport for the chemical industry but statistics are misleading. Rail transport is of vital importance for the ones using it. **Air freight** accounts only for a tiny part of the volume transported and is mainly used for high value added products such as pharmaceuticals.

MODAL SPLIT 2013 in volume (air freight excluded)



INITIATIVES



Safe and sustainable transport: a top priority for the sector



Tupperware and Procter & Gamble: Going together to Greece



Exchanging know-how in transport en distribution safety



Even without considering pipelines, the chemical industry performs better than the whole industry. The share of road transport for the whole industry almost reaches 50% while **60% of volumes** of the chemical life sciences sector are transported **by water or by rail**.

Towards new logistics models

The “**horizontal supply chain collaboration**” – the bundling of freight flows across multiple companies operating at the same supply chain level and having the same or complementary transport needs, creates logistics synergies and thus helps maximize asset utilisation, reduce costs and improve service level and sustainability.

The project between Tupperware and Procter & Gamble is a good illustration of horizontal collaboration.

This new business strategy potentially offers significant improvements. However, the greater challenge is promoting its acceptance and making it work in practice. These tasks have been undertaken by the EU-funded project **Collaborative Concepts for Co-modality** (CO3). The CO3 consortium, which gathered logistics specialists, manufacturing industry and transport service providers, worked on the topic of collaboration and co-modality for two years and produced a model framework with legal and operational guidelines for collaborative projects in the supply chain.

The bundling of cargoflows from several shippers (Baxter, Eternit, Ontex and Colruyt) between Belgium and Spain is a good example of test case which resulted in a +30% CO₂ savings at equal costs.

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 McKinnon

Rail

With almost 50,000 wagons per year, the sector’s products are first taken to one of the 360 picking points located in Belgium, from where they are transported all round Europe.

Rail transport is vital in the supply chain of the chemical sector. This is partly due to the fact that “just-in-time” has become the norm for companies using rail transport. Rail transport is crucial and road transport is not really an alternative, as:

- Road transport could not cope with the additional demand, given the high volumes transported by rail (1 wagon= 3 trucks);
- CO₂ emissions are significantly lower for train transport;
- Companies currently using train transport do not possess sufficient truck handling capacity ((un)loading stations) on their sites;
- Road transport is not allowed for certain dangerous products;
- Switching to road transport would further worsen traffic congestion.

Therefore, many companies in our sector wish to maintain rail transport as part of their commitment to sustainable development.

INITIATIVES



Lean & Green Award for Group Van Loon’s efforts to reduce CO₂ emissions



Transpharma Express - exploring the new Silk Way for sustainable conditioned rail transport

Therefore, many companies in our sector wish to maintain rail transport as part of their commitment to sustainable development.

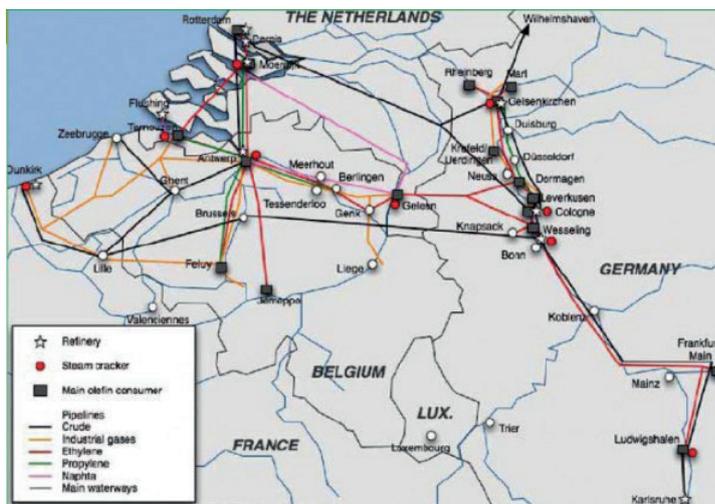
Most of these volumes are transported in single wagons (i.e. vs. full train) mode. Companies in the sector have invested millions of euros in infrastructure, materials and training in Belgium over the past years to guarantee the single wagons future.

Given the importance of the port of Antwerp for single wagon transport, the Antwerp Port authority Alfaport Antwerpen and essenscia have together created a port railway operator under the name "Antwerp Railport". This new player will focus on the traffic challenges (continuity, quality) in the port of Antwerp. "Antwerp Railport" is a neutral operator which will help any company proposing its services to the port/harbour to organize the related intra-port rail transport. This will create more efficient rail transportation and guarantee the continuity and the improvement of rail transport.

Pipelines

Pipelines are a very important mode of transport for the chemical industry. According to FETRAPI, about 25% of the 96 millions of tons of all products transported by pipelines are chemicals products. Furthermore important raw materials for the (petro)chemical industry such as crude oil are also transported via pipelines.

Antwerp lies at the center of the western European **pipeline network**. The pipelines network is evolving continuously thanks to new customers or additional requests from existing customers.



In Belgium the major bottleneck is the lack of a route for pipelines from the Port of Antwerp to the chemical companies in Limburg, The Netherlands and the German Ruhr area. The Flemish government and the Port of Antwerp started early 2015 together with the pipeline federation Fetrapl and essenscia a feasibility study to investigate the options for implementing an underground pipeline street between the Port of Antwerp and the Ruhr area. Results of this study are expected end 2015.

Results of the Think Tank Sessions, August 2007

Bundling pipelines in a dedicated "pipeline streets" offers many advantages:

- It is much safer: pipelines streets avoid densely populated areas. During future infrastructure works it is easier to avoid the pipelines;
- Compared to other transport modi, pipelines occupy less space;
- Further economic developments between the largest oil- and chemical cluster of Europe and the Ruhr area requires additional space for pipelines.

INITIATIVES



Eastman helps clients use methylamines safely



A substantial reduction of CO₂ through Bayer's Lean and Green action plan

Prosperity



Vision - Prosperity

Sustainability creates new opportunities

These days, successful businesses are resolutely focussing on **sustainable development**. After all, 'sustainability' is the answer to the many challenges we are facing. By 2050, not only will 9 billion people be living on the Earth, but also the demand for natural resources, energy, food, drinking water, improved quality of life and health will continue to increase exponentially. And the reality - if appropriate actions are not taken - is that this increase will lead to the 'overconsumption' of our planet.

That's why European and local policymakers are deliberately opting for sustainable growth. However, sustainable development is **not possible without innovation**, and the chemical, plastics and life sciences industry plays a crucial role in this. So the sector is constantly seeking out more efficient processes, high-quality, innovative products and appropriate business models. Companies are focussing on renewable raw materials, closing material cycles, and actively collaborating in the development of more energy-efficient buildings. The interesting thing about all of these efforts, is that each one creates new opportunities and markets.

essenscia believes that bundling **knowledge and skills** creates the necessary leverage to allow innovation to actually break through. Because breakthroughs are achieved by creating new value chains in the context of open collaboration. Our country is already one step ahead in this: having a strong industrial fabric, within reach of many universities and research centres. This cross-border approach generates an innovative force within our SMEs and multinationals. Their broad ranges of new niche products and services are the best evidence of this.

At the sector's instigation, the Flanders Innovation Hub for Sustainable Chemistry (FISCH), a competency pool on sustainable chemicals was set up in Flanders, and the competitiveness clusters Greenwin and Biowin were set up in Wallonia. These are concrete interpretations of open innovation. These innovation platforms act

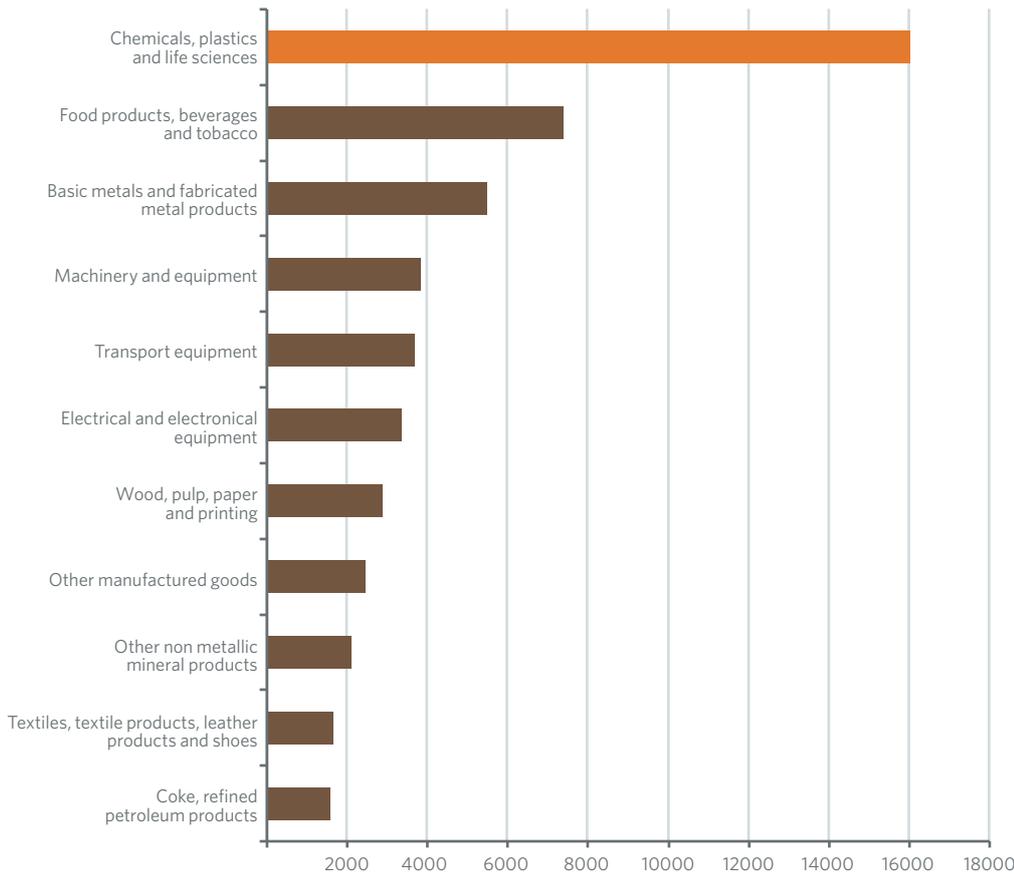
as a forum in which small and large companies from diverse sectors of industry exchange their knowledge and expertise through open cooperation with knowledge centres and universities, thereby developing sustainable solutions for chemicals and (bio) pharmaceuticals. Together, in collective projects, they are making a tangible and positive contribution to the many social challenges.

In addition to innovation, **industry-friendly, supporting policy** is required to keep chemicals, plastics and life sciences firmly anchored in our country. After all, the transition to a sustainable, innovative chemicals sector must be borne by companies, the government and all other stakeholders. Our sector plays a pioneering role in this area. essenscia was the first industrial sector to conclude an agreement with the trade unions, in which the social partners acknowledge that innovation and structural transformation are of vital importance for meeting the challenges and guaranteeing sustainable growth. In recent years, the sector has also cooperated constructively with the government. This occurred via a structural consultation platform (High Level Group) tasked with creating the right preconditions for an optimum investment and innovation climate. Amongst others, this cooperation resulted in a patent unit (Octrooicel) set up by essenscia and the government. The aim of this unit is to protect intellectual property and to continue to support innovation. In addition, essenscia is organising its biennial *Innovation Award*. This initiative intends to highlight the pioneering ideas of companies, and to encourage Belgian companies to keep on innovating.

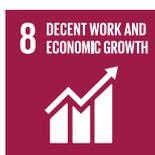
Added value

Industrial driving force for prosperity in Belgium

Value added in the Manufacturing Industry (2013)

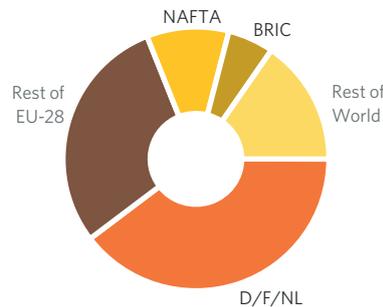
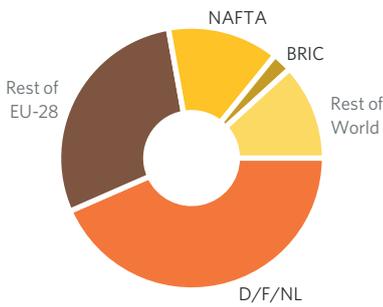
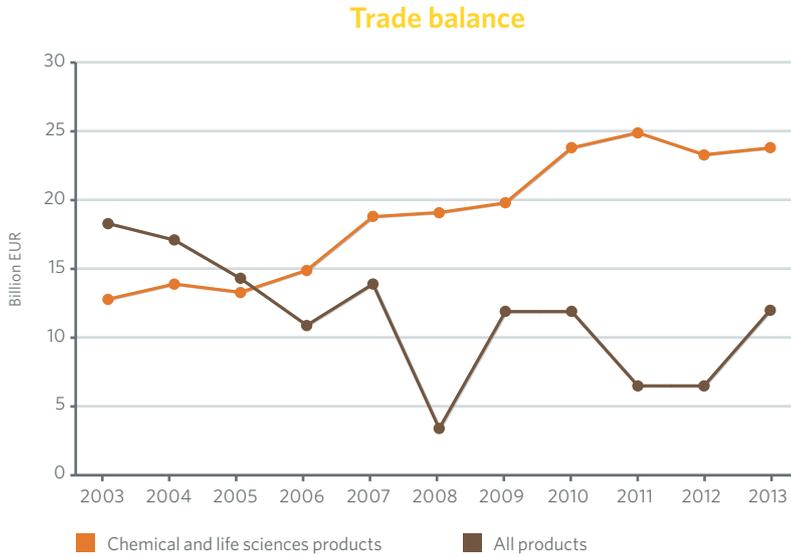


- In 2013, the chemical and life sciences industry generated value added of **16 billion €**. Value added measures the sector's contribution to overall prosperity.
- Over the last decade, the sector has grown in importance within the Belgian industrial fabric, not least thanks to the strong growth of the biopharmaceutical industry. The sector's share in the total value added of the Belgian manufacturing industry increased from **28% in 2003 to 32% in 2013**. This is twice that of chemistry and life sciences in the manufacturing industry in the euro area (16% in 2013).
- Belgium represents only 2% of Europe's population and 3% of its Gross Domestic Product (GDP). However, with more than 5% of the added value of the European chemical industry, Belgium is Europe's 8th largest chemicals producer.
- Change of methodology in value added. Now based on ESA 2010 instead of ESA 1995. Expenses in R&D are accounted for in another way. This has an impact on value added.



Trade balance

Number one export sector for more than 10 years



- Belgium's chemical and life sciences industry is highly export-oriented. **More than 75% of its production is exported. In 2013, the export of chemical, plastic and life sciences products amounted to 111 billion euro. That is one-third of Belgium's exports, making it Belgium's number one export sector. Belgium accounts for nearly 11% of total EU-28 exports.**

- The chemical and life sciences industry generated a **positive trade balance of more than 23 billion euro** in 2013. This trade balance has nearly doubled in the last ten years.
- Neighbouring countries are the sector's main trading partners: 40% of exports go to Germany, France and the Netherlands, with Germany alone accounting for one-fifth. Outside Europe, North America (in particular the USA) remains, with a 10% share, the biggest trading partner.

INITIATIVES



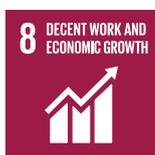
Chemical industry reinforces collaboration with Shanghai



International promotion of Belgian chemical and life sciences sector

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

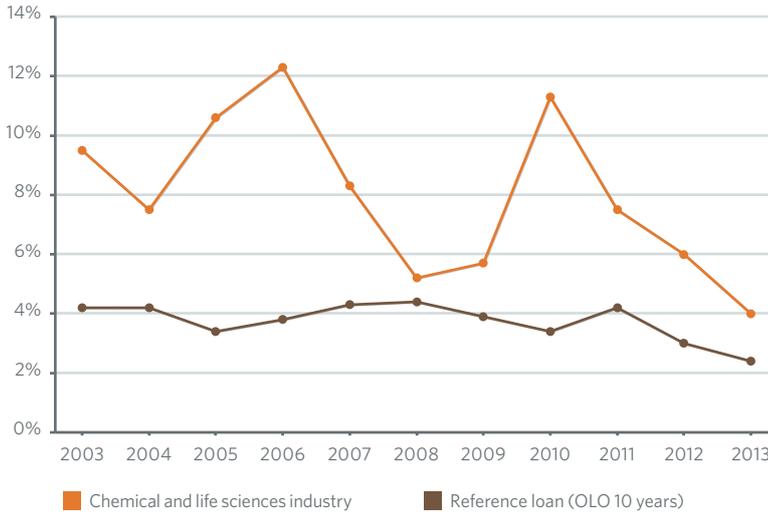
- The chemical and life sciences industry contributes to the development of international trade with fast-growing countries. Today, about 6% of the sector's products are exported to Brazil, Russia, India and China in particular (BRIC). **Exports to those countries increased by more than a factor of 4 between 2003 and 2013.**



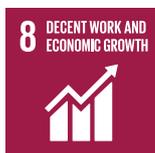
Profitability

Financial situation structurally healthy despite increased costs

Net income of own resources after taxes (average value)

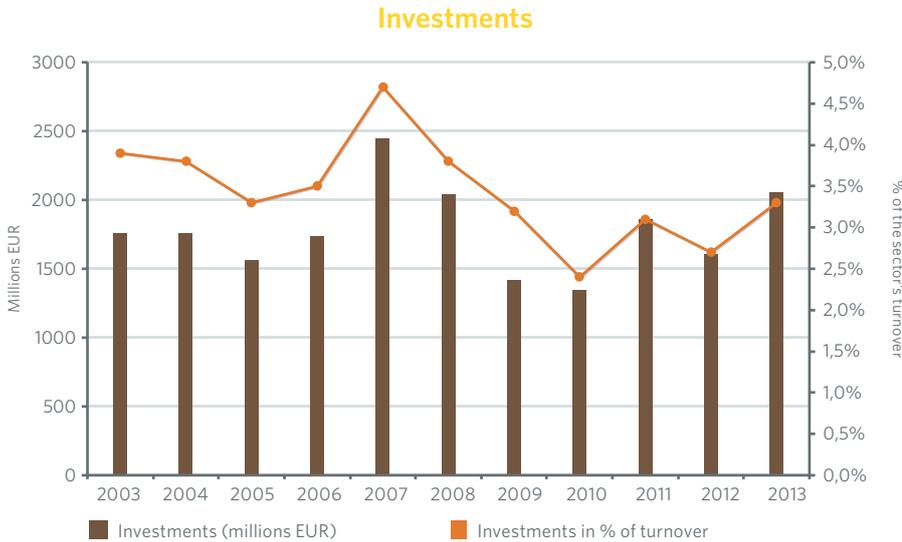


- The chemical and life sciences industry shows a healthy financial structure. On average, the return on shareholder’s investment has amounted to 8% over the last 10 years. In 2013, this ratio decreased to 4%, **but it remained structurally higher than the risk-free return on long-term government bonds**. The decrease after 2010 is the result, among other things, of higher raw material and energy prices on the one hand and the strong decrease of financial and/or exceptional incomes of some large companies on the other hand. The median value, which is less influenced by extreme figures of some large companies, increased slightly in 2013 in the chemical and pharmaceutical industry.
- 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 uses the capital invested by shareholders. This return on equity should be structurally higher than the return on long-term government bonds. The differential is called the risk premium.



Investments

Investments continue in spite of shale gas development



- The chemical and life sciences industry invested on average nearly **€ 1.8 billion** a year from 2003 to 2013. Investments even climbed back above the trend level in 2013, with € 2 billion. These investments are both green field projects and also expansions and modernisation of production capacities to improve industrial efficiency and environmental performance.
- The chemical and life sciences industry is a key investor within the manufacturing sector accounting for **30% of the total manufacturing industry investment in 2013**. The chemical and life sciences industry in Belgium is very capital intensive. Belgium accounts for nearly 8% of total investments of the sector in the EU in 2013. These figures underline the strength of the sector in spite of the development of the petrochemical industry in North America due to shale gas exploitation.
- Of the world's **top 15 multinational chemical companies, 11 have invested** in major production facilities in **Belgium** and continue to invest.

INITIATIVES



Attracting new investments in the oil and chemical cluster

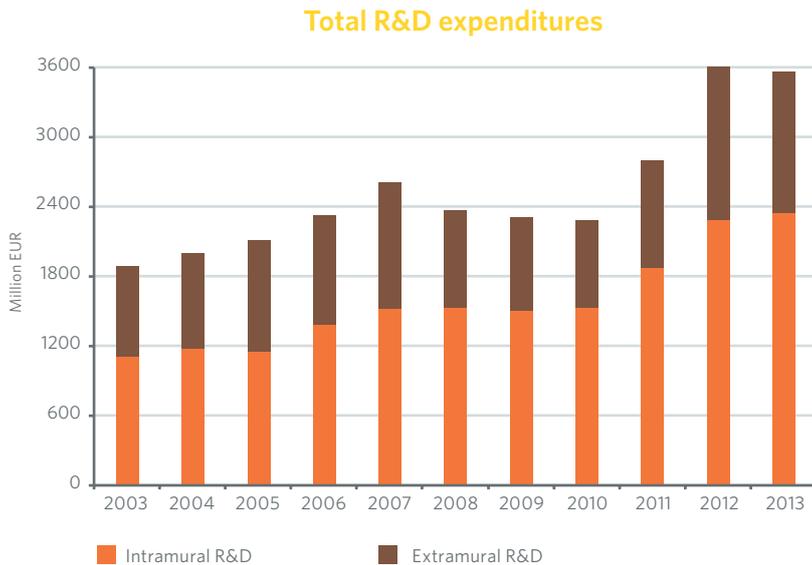


FIT Lifetime Achievement Trophies for ExxonMobil and Janssen Pharmaceutica



R&D expenses

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



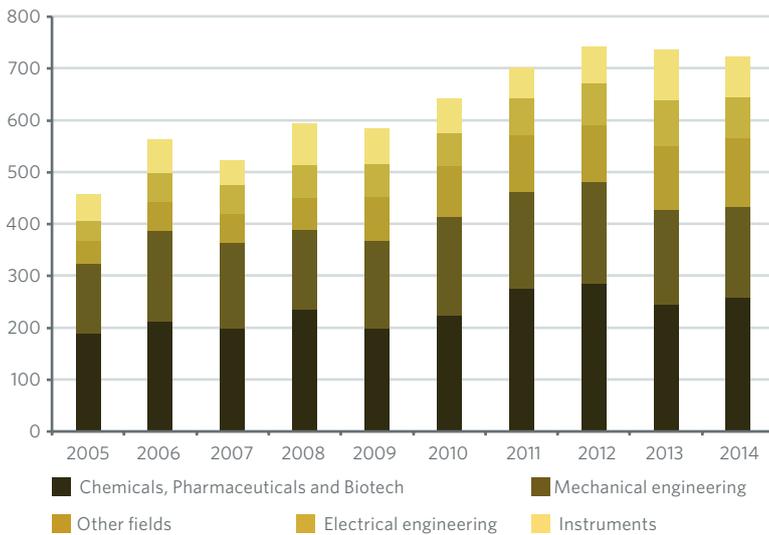
- The chemical and life sciences industry spent **€ 3.6 billion on R&D in 2013**. It is the **largest private investor** in R&D. Life sciences companies account for more than 3/4 of the sector's total R&D expenditures. Industry spending on sustainable chemistry such as bio-based economy and green chemistry is increasing.
- About two-thirds of R&D expenditures 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.
- 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 2.4% of GDP in 2013. The R&D-intensity of the sector (expressed as in-house R&D expenditures/value added) reached 14.6% 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 expenditures** by the chemical and life sciences industry **nearly doubled**.
- The sector accounted for **65% of the total in-house R&D expenditures** of all Belgian manufacturing companies in 2013 compared to 53% in 2003.
- Belgian companies accounted for **8% of total in-house R&D spending of the European chemical and life sciences industry in 2013**. 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-28.



Innovations

Increasing awareness of protection of innovation

Number of patents granted by the European Patent Office (EPO) per field of technology - Belgium



The sector plays a major role in research and development. One way to measure innovation output is the number of patents. Patents are an essential means of protecting inventions that lead the way to new products and processes. In 2014 1,900 patents were applied for at the European Patent Office (EPO), i.e. 182 per million inhabitant. With this result, Belgium is number 8 on the world list of number of patents per capita.

Still more important is the number of patents applied for which are eventually granted. This number has increased structurally in the last few years. In this field too, the chemical, plastics and life sciences industry is a predominant sector in Belgium. With no less than 258 patents granted in the field of chemistry, pharmaceuticals and biotech in 2014, the sector represents more than one third of all pat-

ents granted to Belgium by the European Patent Office.

In order to stimulate and still better protect innovation, essenscia created in 2011 with SPF Economy the Innovation cell. This is a permanent contact point where companies, in particular SMEs, can ask all their questions about intellectual property rights. The strategic focus on innovation is the best guarantee for the anchoring of the sector's future.

Position	Country	Numbers of patent applications*	Ratios per million inhabitants
1	Switzerland	6.833	847,6
2	Finland	2.193	416,2
3	Netherland	6.844	405,5
4	Sweden	3.837	394,6
5	Denemark	1.973	354,3
6	Germany	25.621	316,3
7	Austria	1.963	238,7
8	Belgium	1.900	181,8
9	Japan	22.018	173,2
10	France	10.557	159,3

* European patent applications filed with the EPO

INITIATIVES



FISCH and its impact on sustainability



essenscia Innovation Award highlights sustainable innovations

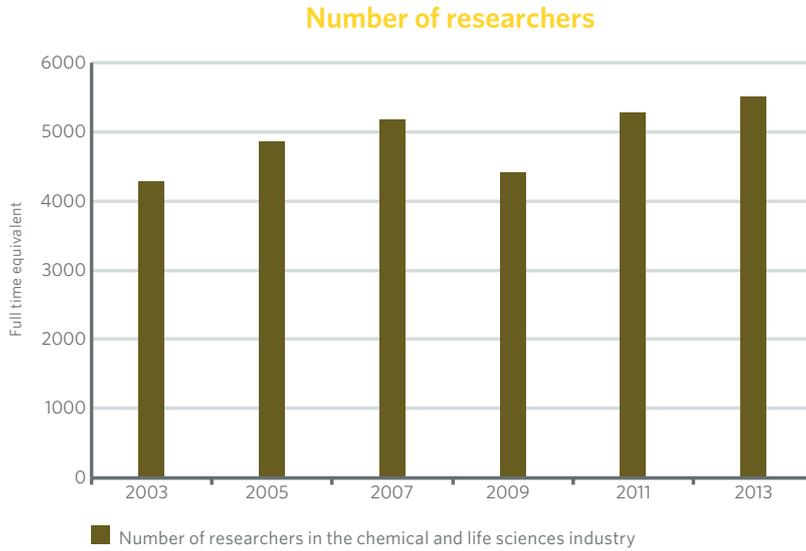


Patents Cell helps companies familiarise themselves with intellectual property legislation



Number of researchers

A quarter of Belgium's private sector researcher population

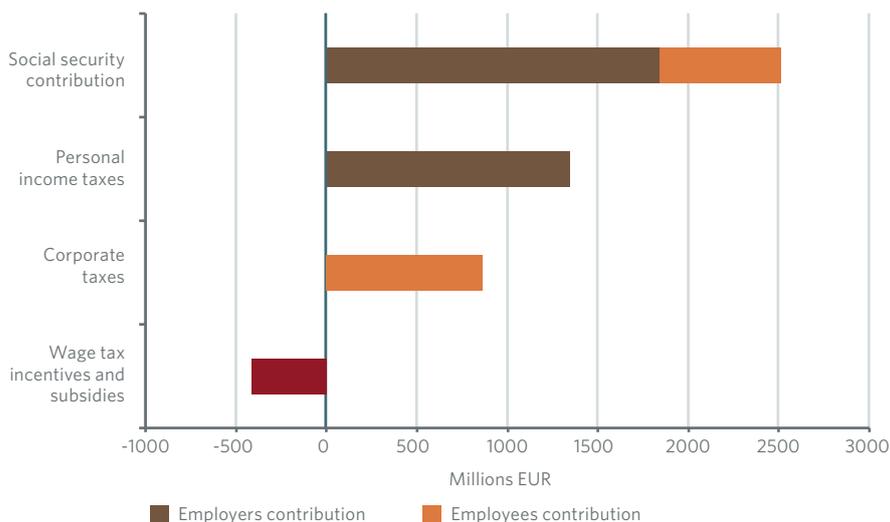


- The chemical and life sciences industry is an R&D intensive sector: **more than 8,000 people (FTE), or 9% of personnel in the sector**, are involved in an R&D-related activity or work for an R&D department.
- This includes **5,500 qualified scientific researchers**, amounting to **23%** of Belgium's **private sector researcher population**.
- Women play an important role here. **43% of researchers in the chemical and life sciences industry are women** (against 25% in the private sector).

Taxes

More than € 4 million of taxes and levies go to the state budget

Chemical and life sciences industry Fiscal and parafiscal contribution after the deduction of subsidies in 2013



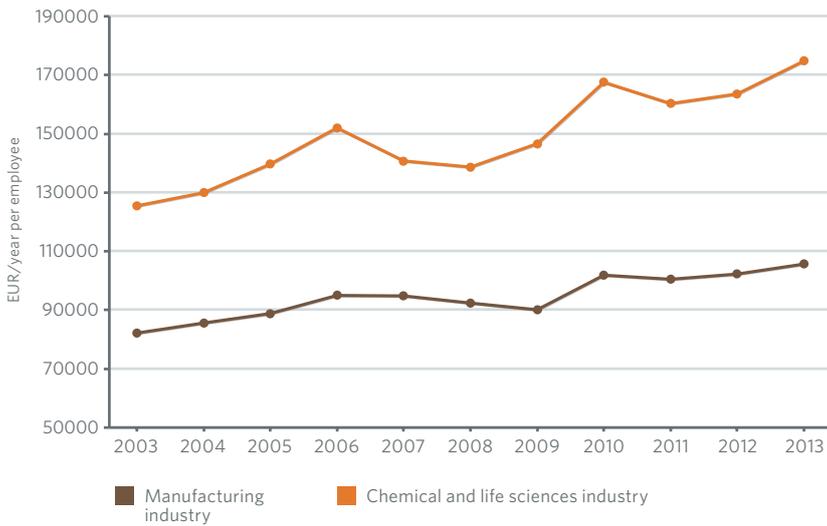
- Companies from the chemical and life sciences industry contribute significantly to national, regional and local authority budgets through the payment of various taxes and levies. At the same time, the chemical and life sciences sector benefits from subsidies and tax incentives which are often related to long-term projects directed at the sustainable development of chemical and life sciences activities in Belgium.
- In 2013, companies and employees from the chemical and life sciences industry contributed € 4.3 billion to the state budget net of subsidies and tax incentives. This is **27% of the sector's value added in 2013**.
- The main contribution comes from the payment by companies of social security contributions (**€ 1.8 billion in 2013**) which serve to finance the social security system and represent more than 40% of the sector's total net contribution to the state.
 - The sector's 90,000 workers contribute also to the state budget through the payment of employee social security contributions (**€ 674 million in 2013**) and personal income taxes on their salaries (**estimated € 1.3 billion in 2013**).
- **Corporate taxes** are also an important source of state financing and represented in total **€ 862 million in 2013**. **Corporate taxes on profit** amounted to **€ 445 million** after tax incentives. The balance consists of other taxes on production activities (€ 177 million in 2013) (environmental, property and other taxes). Pharmaceutical distributors in Belgium also pay annually a product tax on the sale of pharmaceutical products on the Belgium market (€ 240 million in 2013).
- Inversely, the sector received tax incentives on wages and subsidies, particularly in respect of R&D and shift work for a total estimated € 414 million in 2013. These measures are crucial to maintain and enhance the competitiveness of the chemical and life sciences cluster in Belgium.
- In addition, the sector contributes indirectly to the state budget through the payment of **indirect taxes and additional levies**. Hence the sector pays, as an intensive energy consumer, taxes on energy via its electricity bill such as the federal levies on electricity and gas, and increasing additional levies related to renewable energy. In the absence of consolidated official public data, these sums have not been taken into account.
- All in all, **every employee in the chemical and life sciences industry contributes € 49,000 to the state budget** compared with € 33,000 for the total manufacturing industry.



Labour productivity

High productivity remains an asset

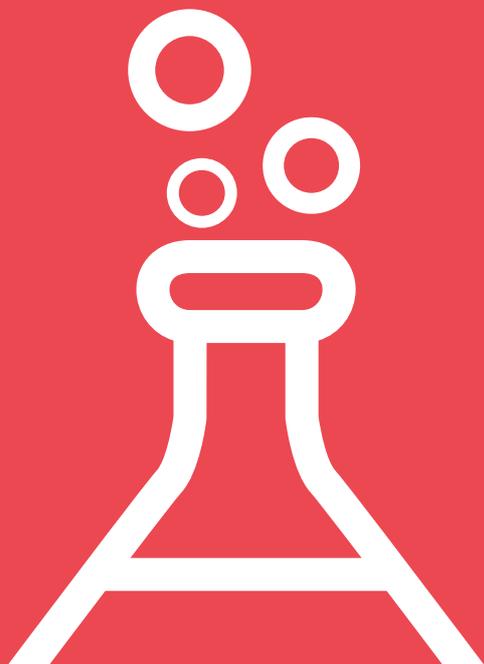
Labour productivity
(added value per employee)



- Labour productivity** in the chemical and life sciences industry is very high. The average value added created by each worker is **65% higher** than for manufacturing as a whole. Each worker in the chemical and life sciences industry generated an average value added of nearly € 175,000 in 2013. **Between 2003 and 2013**, labour productivity of the sector increased by 39% or 3.4% per year.
- According to a study published in July 2013 by a group of experts on competitiveness and employment, the level of nominal hourly productivity in the chemical industry was slightly higher in the chemical industry in Belgium than in neighbouring countries Germany, France, The Netherlands on average in 2010. The labour productivity growth between 1995 and 2010, however, was lower.



Products



Vision - Products

Developing sustainable solutions & products

The sector of chemicals, plastics and pharma provides answers to the global challenges which are due to the growing and ageing population, increasing living standards, climate change or resource scarcity. The chemical and life sciences industry plays a crucial role in developing innovative sustainable solutions and products to respond to these challenges. Innovations focus on improving the performance of the end products, extending product lifetimes, improving comfort, healthcare. The sector also works closely with other sectors to transition from linear business models to a circular economy.

A qualitative communication regarding health and safety ensures that customers are not only able to choose the most suitable product for a given application, but also that this product is both manufactured and used in a correct and safe way. The chemicals, plastics and pharmaceutical industry is committed to ensuring that the people and the environment do not suffer harm as a result of exposure to its products.

Protection through product safety legislation

essenscia is actively cooperating in developing and implementing an efficient regulatory framework for product safety. Product legislation should be science-based and harmonised through at least all European Member States. essenscia is working hand-in-hand with the authorities such as the European Chemical Agency, to put the complex legislation on hazard assessment and communication (CLP) and risk assessment and management (REACH) into practice. The sharing of experience among all industry players, and especially SMEs, through the VLARIP and WALRIP training programmes, is a perfect example of their commitment.

Given all these efforts, it is paramount that all imported products comply with European standards too.

The sector is not only controlling the risks of substances of very high concern, but is also committed to develop more sustainable alternatives.

Proper and safe use of chemicals

Health and safety information is shared with customers through the CLP label on the products and the safety data sheets. The industry also provides detailed information to the authorities. The European Chemical Agency is, for example informed on the substances via the registration dossiers and the Poison Centres receive extensive information on hazardous mixtures.

Together with ECHA, and in outroll of the Global Product Strategy (GPS), the sector is committed to develop a tool to inform consumers on the substance registration.

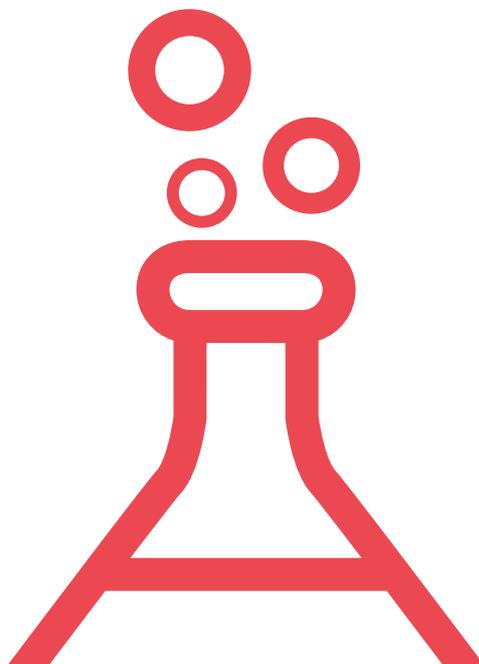
Moreover, through several sector-based initiatives, the chemical, plastics and life sciences industry is committed to informing the various users on the proper use of products, the associated hazards and risks, and on the measures to reduce these risks.

Products

Product safety

Product safety, a prerequisite condition

The chemical, plastics and pharmaceutical industry is committed to ensuring that neither people nor the environment suffer any damage as a result of its products. essenscia works closely with the authorities in order to implement the complex legislation in relation to hazard evaluation and communication (CLP) and risk assessment and management (REACH).



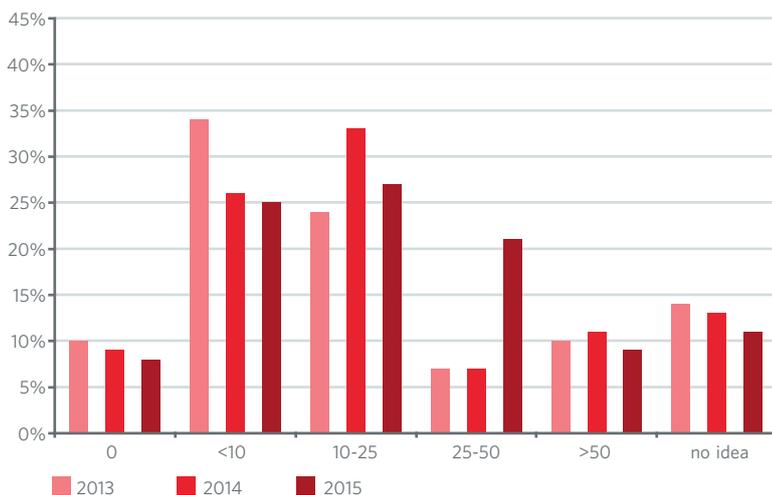


Discover 3 sector initiatives on the following page

Product safety CLP

Communication on dangerous products is becoming increasingly important

Estimation of the % of the product portfolio with more severe hazards (formulators)



More and more products are being classified in a higher hazard category. On the one hand, this is due to stricter criteria applying in the CLP (Classification, Labelling and Packaging of dangerous substances and mixtures) regulation; on the other hand because there is a tendency to place on the market more concentrated products. The latter is the result of a growing awareness regarding the environment whereby, for instance, preference is given to smaller packaging involving less transport.

The CLP labels are already well established in the industry, with 93% of essenscia members having made the switch to CLP. There is still a **transition period until June 2017 for consumer products**, meaning both hazard communication systems will be visible. More information on this is available on www.symbolesdanger.be or www.symbolesdanger.be.

Nevertheless, products labelled 'hazardous' can still be used safely, provided the correct precautionary measures are applied. This is why carefully reading the label is important. The website www.gevaarsymbolen.be summarises this effectively: 'recognising symbols can save lives'. This awareness-raising campaign by the government is also supported by essenscia.

The detergents sector has also undertaken several initiatives to help consumers take the correct precautionary measures, so that detergents can be used safely, for which it developed Safe Use Icons. These symbols visualise the measures you have to take to use these products safely. Because all of this entails considerable changes, essenscia is supporting its members through:

- a CLP manual offering a summary of the different classification criteria;
- an annual five-day CLP course with the support of various experts collaborate. More than 220 employees from 97 companies have already taken part in this.

As a result of the altered criteria and stricter classification of products, a great deal of legislation - including VLAREM (Flemish Regulation concerning Environmental Permits) - was amended. The new frame of reference has a clear impact on the sector, with one third of members stating that certain matters are changing in relation to storage and the environmental permit.

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.			
 Use with dry hands.	 Close the bag properly.	 Close the lid properly.	 Do not pierce, break or cut.

www.cleanright.eu

© AISE

▶ FPS Health – Danger symbols

Watch the video on www.essenciaforsustainability.be

Chemical companies and national Poison Centres working together on prevention

Each time a chemical product is brought onto the market, the chemical companies notify the Belgian Poison Centre of its hazardous characteristics. They do this at the latest 48 hours before the product reaches the market. This is a legal obligation that applies to hazardous mixtures, pesticides, biocides and cosmetics.

Why do they do this? Because – despite the warnings on the label – incidents involving chemical products still continue to occur both at home and in the workplace. For this reason, it is essential that the correct information passes quickly from the chemical sector to the Belgian Poison Centre. In 2014, there were 5.639 notifications from 358 companies.

The European Commission wishes to harmonise this type of data passing between the different national poison centres, in order to align it internationally. The chemical industry favours working with a central notification system. This notification would take place online, and would be passed on automatically to the relevant national poison centres. As a matter of fact, the composition of cosmetic products are already been notified at European level since 11 July 2013.

The Belgian Poison Centre is available by telephone 24 hours a day, on the free number 070 245 245. Around half of the calls which they receive relate to medicines. 28% relate to chemical products, 5% to cosmetics and 4% to plants.

One third of the calls involve a child aged from 1 to 4 years. This is the age at which children start to explore their environment, and may ingest and swallow hazardous products within their reach. Calls involving adults mostly concern situations in which they accidentally ingest or inhale a hazardous product. 42% of these ‘accidents’ are caused by inhalation or splash- es on the skin or the eyes. 50% of the calls relate to the swallowing of a hazardous substance, which was transferred into an unlabelled bottle or glass. So always keep products out of the reach of children, even during use, and protect yourself with gloves and/or safety goggles.

More information about the Belgian Poison Centre can be found at www.centre-antipoisons.be



Working safely with plant protection products

As usual Phytotar, the Belgian Federation of the phytopharmaceutical industry, has developed in 2015 a communication campaign for sustainable agriculture and a sensible use of plant production products.

To raise the awareness of professional users of plant protection products on the new safety pictograms on the packaging, Phytotar have provided them for free a poster and a booklet when they brought their empty packaging to an Agri Recover pick up point.

- The **poster** “Working safely with plant protection products” contains information on the new CLP pictograms, the use of the right protection clothing and the emergency numbers. The poster which also calls for a proper reading of the labels, can be used in the phytoroom.
- The **booklet** “New CLP classification” also contains besides the new CLP pictograms, all the safety and precau-

tionary statements. (H, P and EUH). It gives a convenient overview for the agricultural and horticultural farmers to quickly look up the exact meaning of the phrases on the new CLP labels.

The new pictogram and statements were developed in the framework of the CLP legislation (Classification, Labelling and Packaging) to better communicate the hazards and the precautionary measures for chemicals to the users. This European legislation implements an international system developed by the United Nations.

The new white and red CLP-pictograms will gradually replace the also orange products with new pictograms will be available.

VEILIG WERKEN MET GEWASBESCHERMINGSMIDDELEN
Nieuwe CLP-pictogrammen
Lees het etiket!

Draag de juiste beschermkledij!
KIES ALTIJD VOOR BESCHERMENDE KLEDIJ VAN GOEDE KWALITEIT!

Noodnummers
Antigifcentrum: 070-245 245
Europees noodnummer: 112

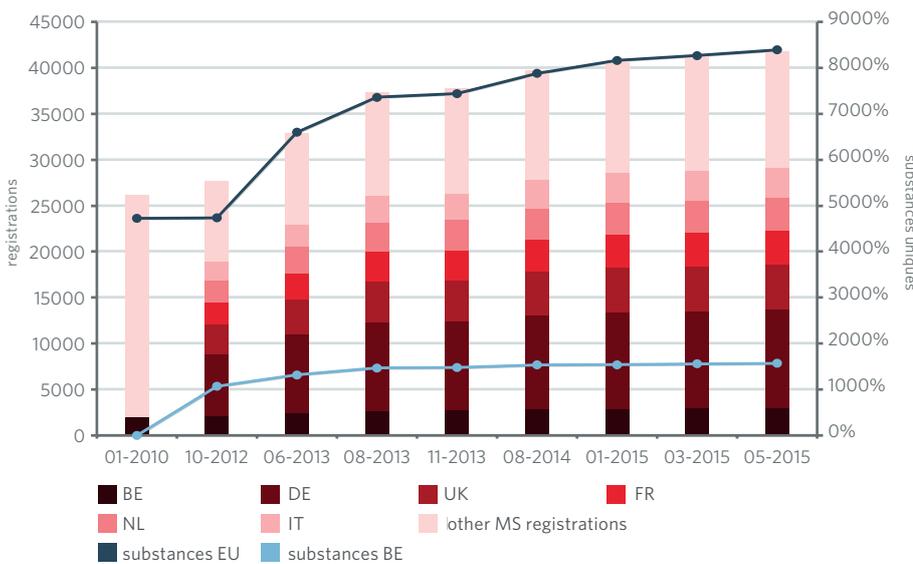


Discover 6 sector initiatives on the following pages

Product safety REACH

REACH registration figures confirm the leading role of the Belgian chemical sector

Overview of REACH registrations



Producers and importers of chemical substances have already submitted over 51,000 **REACH registration dossiers** to the European Chemicals Agency (ECHA). **7% of these dossiers came from Belgium.** In concrete terms, this means that, in total, the Belgian industry submitted around 2,967 registration dossiers for 1,568 substances, and paid ECHA 48 million Euros in fees. This data can be found on the ECHA website.

One third of Belgian registrations was performed by the 'Only Representative' of a non-European company. It is to be remarked that Belgian branches often take responsibility for the registrations of their non-European mother company or subsidiaries. Only the United Kingdom surpasses Belgium in this: 41% of British registrations come from 'Only Representatives' which are often consultants.

In 16% of the Belgian dossiers submitted, a Belgian company takes the leading role as 'Lead Registrant'. This is comparable to the numbers for the French industry. Only Germany precedes us, with 25%

lead dossiers in the total number of German registrations. These figures confirm the **leading role of the Belgian chemical industry in Europe.**

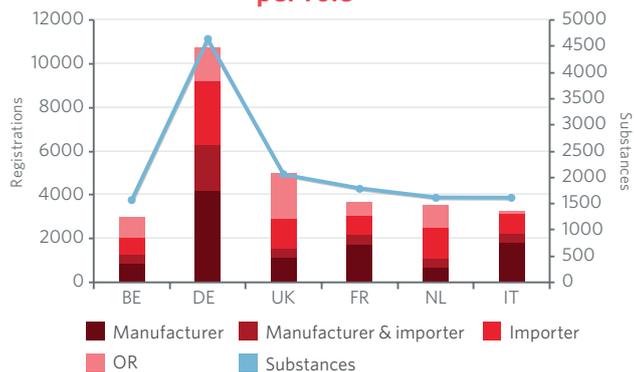
The annual *essencia* survey shows that once a chemical substance has been included in the candidate list of substances of very high concern**, companies consider stopping using this substance or **replacing it with a safer alternative.** At

the beginning of 2015, around half of respondents reported that they produced, imported or used at least one of the 163 substances mentioned on the candidates list. One fifth of respondents does the above with a substance which is subject to authorisation. This concerns a total of 33 substances.

*echa.europa.eu

** echa.europa.eu/web/guest/candidatelist-table

Registrations in Member States per role



▶ Eastman innovate to safer alternatives

Watch the video on www.essenciaforsustainability.be

REACH also applies to nanomaterials

For maximum transparency in information regarding nanomaterials

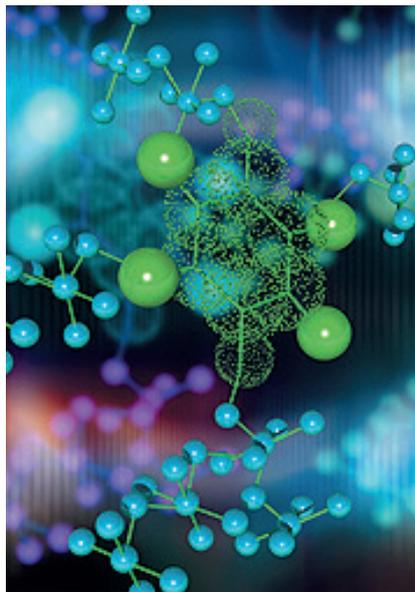
The European Commission evaluated the legislation on nanomaterials at the end of 2012. Although the Commission deemed the current regulations to be sufficient for **informing users of the risks of nanomaterials**, a number of extra measures were still put in place. These concerned:

- the clarification of the guidelines for registering nanomaterials under REACH (Registration, Evaluation, Authorisation and restriction of Chemicals). A proposal linked to the clarification of tests contained in the REACH appendices is expected in the course of 2015. Meanwhile, ECHA (European Chemicals Agency) is adapting the guidance documents with a view to the registrations in 2018.
- even more transparency in connection with the information available on nanomaterials. In 2014 the European Commission held a public consultation on the possible policy options. The final decision is not yet available, but is expected in 2015.

October 2011 saw the first definition of nanomaterials by the European Commission. It concerned Recommendation 2011/696. This definition is currently under evaluation by the Joint Research Centre (JRC). What are the most important challenges?

- identification of **accepted and validated methods** and means to measure and analyse nanomaterials;
- refining of methods to **evaluate** the degree of exposure to nanomaterials;
- **completing of existing information** with the dangers which nanomaterials involve, but also on classification, labelling and packaging (CLP).

In the context of these challenges, the chemical industry is collaborating on various research projects, including those under the Organisation for Economic Co-operation and Development (OECD).



essencia argues for an approach at the EU level

Nanotechnology and nanomaterials offer solutions for a plethora of worldwide issues such as sustainable energy, public health and water supplies. However, society has many doubts about the safety of these products.

Nevertheless, nanomaterials are just like any other material: some materials are toxic and some are not. Thus these materials must be registered under REACH and therefore there is a need for safety data sheets and specific procedures for the classification and labelling of dangerous nanomaterials.

Some European member countries (like Belgium) have already implemented a mandatory registration of nanomaterials. *essencia* holds the opinion that the need for transparency requires a Europe-wide approach. For in this way interpretation problems between the member countries and a disrupted market can be avoided.

The mandatory Belgian registration essentially requires that materials in a nanoparticle state that are to be brought onto the Belgian market must be registered in the national register before 1 January 2016. Mixtures containing nanoparticles must be registered before 1 January 2017. Registrants are obliged to inform their professional clients of this Belgian registration number.

The complete European Commission evaluation of the legislation concerning nanomaterials is available on the following websites: www.eur-lex.europa.eu

REACH: A need for a scientific approach on endocrine disruptors

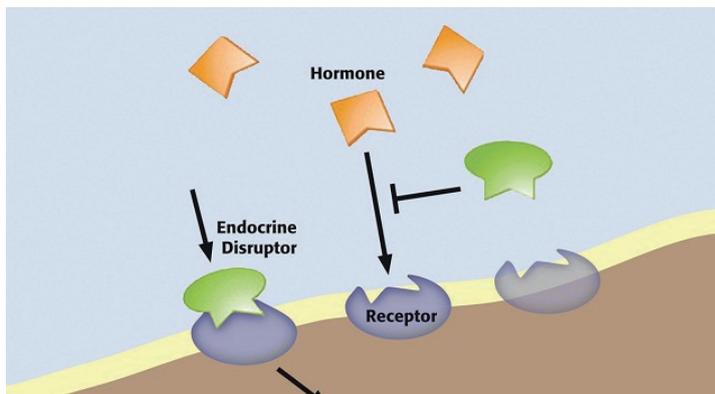
What are endocrine disruptors?

Within the European Union, currently no definition exists for 'endocrine disruptors'. At the moment, the definition as determined by the World Health Organisation in 2002 is used: 'an endocrine disruptor is an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny or (sub)populations.'

To define which substances are endocrine disruptive, it is essential that some criteria are specified. This process is still ongoing. For the industry it is important that this is clarified as soon as possible. Concerning the criteria, it is important to make a clear distinction between hormonally active substances - these are substances that are secreted by our metabolism before any damage is done - and substances that have a negative effect on a healthy organism or a population.

Europe is already taking steps

Where do we stand today? The European Commission has prepared a roadmap.



This is a step-by-step plan in which the policy on endocrine disruptors is developed. Meanwhile, a number of legislations already includes measures in respect of endocrine disruptors. This is already the case for the legislations on pesticides, biocides, REACH.

In the existing REACH legislation endocrine disruptors are viewed in the same way as other substances of concern. Specific reference is made to carcinogens, mutagens and reprotoxic substances are referenced. In 2014, five substances on the candidate list for authorization were identified by the expert committee of the

Member States for the first time. They were described as endocrine disruptive and harmful to the environment. For all of these substances, limitations or a ban on use were already in place (unless authorization was obtained).

Currently, about 29 substances are being evaluated in terms of potential endocrine disrupting properties through different REACH processes. When considering additional measures for these substances, it is important that factors such as the exposure to and the potency of these substances are considered.

essencia helps SMEs in implementing chemicals legislation

essencia guidance projects are still a success

Since 2007, essencia has been guiding SMEs in applying REACH and CLP, the mandatory information and communication concerning risks and hazards of chemical products.

For this purpose essencia has set up two regional projects:

- Flanders REACH Implementation Projects (VLARIP) and
- Wallonia Reach Implementation Programme (WALRIP)

In both projects **exchanging experiences** is a key element.

Among other things, the projects support SMEs with:

- REACH registration deadlines and other REACH obligations
- creating safety data sheets for users
- classifying dangerous substances and mixtures according to CLP
- obligations for nanomaterials.

Every year 45 companies actively participate in VLARIP, supervised by 11 sponsor companies, while 70 companies took part in WALRIP. The evaluation of these two projects revealed considerable satisfaction among participants.

essencia also collaborates with Fedustria and Centexbel in the TEXCHEM project for the sustainable and safe use of chemical products in the textile sector, with 40 textile companies and their suppliers participating.



essenscia shares its knowledge

The essenscia product policy team organises **training sessions on obligations when marketing chemical products**.

Amendments to legislation and staff changes create the need for reliable and regular training. The product policy training team focuses in particular on training on chemical legislation (amended or otherwise) with little or no commercial availability.

The following trainings are provided:

- What chemical products to register according to REACH? How to label and package hazardous substances? How to edit a safety data sheet? What rules apply when transporting dangerous substances?
- All of this is offered in the **basic training** on product policy.

- The current state of affairs is examined during the annual **study days**. These information and networking sessions always attract around 100 interested parties from the industry and government.
- Every year, 150 companies take part in the thematic regional **breakfast sessions**.
- For the last two years, 83 employees from 66 companies have taken part in the annual five-day training on **Classification, Labelling and Packaging (CLP)** of dangerous substances and mixtures. Due to the large demand, this training was even organised three times in 2014. The course was realised in collaboration with Ghent University and other knowledge centres, and provides more background and insight into the different tests and criteria for CLP classification and labelling.

These trainings are open to everyone, and in 2013 and 2014 essenscia thus reached 902 participants.

essenscia's experts also make their expertise available to other training providers, with around 20 training sessions provided for 362 participants at 10 external training providers in the last two years.

The training team is recognised with the Qfor quality label since 2010, and is an accredited training provider for the SME portfolio. This was successfully extended in 2013, and also extended with training organised by the social department. The course is also eligible for reimbursement of employees' training costs through Co-valent.

The essenscia training team's calendar is available at <http://www.essenscia.be/nl/opleidingen>

PhytoTrans An essential tool for the safe distribution of plant protection products

Phytofar¹ has provided an internet tool for the use of the distribution sector since 2005, called 'PhytoTrans'. This tool supplies downstream users with useful information on the necessary documents for the packaging and transport of phytopharmaceutical products and also makes these transport documents available per product. Information is given on the criteria to be met by transport documents and safety data sheets (SDS). As a result this tool helps to meet the REACH requirements.

The content is kept up to date by members who have authorization to work with these products. That is to say, all members of Phytofar, but also non-members who strive to comply with the service level agreement. This tool and the complete list of organisations with authorization to work with these products can be consulted on the http://www.phytofar.be/nl/home/home_distributie

Aujourd'hui, cet outil est connu par des professionnels distributeurs de produits phytosanitaires. Dans le futur d'autres utilisateurs en aval auront également accès aux données SDS.

made available through PhytoTrans. This service will also be offered on the Phytofar website.

Phytofar's web tool comes at a very opportune time given that the plant protection products market will be officially divided into professional and non-professional sections from 25/11/2015. This instrument will undoubtedly contribute to a coherent information and communication strategy.



¹ Phytofar: the Belgian Association of the Plant Protection Products Industry



Discover 8 sector initiatives on the following pages

Sustainable use

Committed to sustainable use of chemical products

SECTOR INITIATIVES

A concentrated detergent in a sustainable capsule

The Belgian company CHEMBO has developed an innovative concept in the world of detergency: the BCAP capsule. This refill of concentrated product can be screwed onto a spray containing water to prepare a ready-to-use cleaner. This innovative system is available in several formats which are all within the reach of consumers and cleaning professionals. The dilution can take place at home or in the workplace in a re-usable bottle.

This solution offers many advantages in terms of sustainability:

Resources

- Reduction of the CO₂ impact as less transport is needed: 1 truck of BCAP = 18 trucks of 500mL sprays
- Reduction of water consumption during the production process
- Energy saving during manufacturing

Waste

- Less plastic waste to be transported and to treat

Production

- Space-saving manufacturing and storage
- Reduction in manufacturing lead times and faster packaging

Consumer

- Economical and practical in terms of transportation, space for storage, reuse of spray...
- Total security during the preparation and use of the detergent: no direct contact with the concentrated product



KitoZyme develops a unique non-animal and sustainable chitosan

TRULY UNIQUE

Keen to get away from traditional chitosan production using crustacean shells, KitoZyme, a Belgian biotech SME based in Liège active in biochemistry and health, has developed an innovative technology to produce high-purity non-animal chitosan, exclusively from renewable, non-GMO sources without any synthetic manipulations.

KitoZyme has patented the process for the production of animal-free biopolymers and particularly chitosan, chitin-glucan and their derivatives.

For a better health

The chitosan is produced from non-edible mushrooms and is the main component of

food supplements produced by Kitozyme in three main areas:

- Weight Management
- Digestive Health
- Cardiovascular Health

SUSTAINABILITY

Sustainable development has been a guideline since the origin of KitoZyme

1. At the time of incorporation of the company ...

Valorization of co-products derived from the production of citric acid and edible mushrooms. The company works with major players in those fields, buying their co-products to manufacture truly innova-

tive biopolymers with an important added value.

2. ... and ever since

Some of the achievements:

- Phase-out of ethanol usage in our production
- Co-products valorization -> 15% reduction of organic load in wastewaters
- Renewable packaging
- Waste sorting for recycling (e.g. 1,800 kg/year of plastic films, 1,500 pallets/year etc)

Safe use icons for detergents

In 2005, the detergent industry created a range of pictograms. They were applied to the labels of detergents and household products, and provide advice on safe use of these products. Each pictogram is accompanied by a short sentence of advice, but these icons can be understood even without the short text. Indeed, the pictograms were developed to be comprehensible without words.

In 2012, they were revised and improved further in order to make them communicate more effectively. The aim is to have them indicate very clearly how products can be used safely. This mainly concerns products sold in gel capsules or tablet form. A stewardship program was also de-

veloped in this context. The advice shown on them, must be systematically respected, in order to allow detergents to work effectively and completely safely.

Links:

- http://www.detic.be/content.asp?menu_id=&id=57&langue_id=2
- http://nl.cleanright.eu/index.php?option=com_weblinks&catid=43&Itemid=832



'I prefer 30' campaign

The use of laundry detergents has a considerable impact on the environment. Due to this impact, DETIC, COMEOS, the FPS Environment and a number of other partners are conducting an awareness campaign, which specifically targets consumers. The aim of the 'I prefer 30' campaign is to change certain practices in the use of laundry detergents, and to encourage people to wash at low temperatures. What advantage does this bring? It lowers energy costs and decreases CO₂ emissions.

In 2014, this campaign reached over 2.420.823 people (20% of the Belgian population).

IP30 on Facebook:

www.facebook.com/iprefer30belgie

IP30 online;

<http://www.iprefer30.eu/be-fr>

<http://www.iprefer30.eu/be>



Cosmetics industry goes for truthful communication



The cosmetics industry in Belgium applies the DETIC Advertising Code. This code was extended to include a charter that seeks to achieve responsible advertising and communication. By accepting the text of this charter, the cosmetics industry acknowledges that it is important that advertising and commercial communication concerning cosmetics occur in an ethical and responsible manner.

Through the charter, the cosmetics industry undertakes to conduct commercial communication in a manner which complies with European and national regulations, and also with the self-regulation in force. In other words, communication must be sincere and truthful, and cannot be misleading. It must provide the consumer with information which enables him/her to make an informed choice.

In a nutshell, the charter aims at creating a common framework for a socially-responsible advertising and commercial communication on cosmetics in Europe.

Links:

www.cosmeticseurope.eu/responsible-industry-the-european-cosmetic-cosmetics-association/responsible-advertising.html

Safe use of hair dyes

Hair dyes are consumer products, which are subject to strict rules. As there is a risk of causing allergic reactions, it is very important that they are used safely and with care. However, the risk can be dramatically lowered by taking a number of basic precautions. The website www.mijnhaarkleuren.be was developed to help the user with this. It is an initiative of DETIC¹, the FPS Health, Food Chain Safety and Environment, and CRIOC². On this site you will find information on hair dyes, and tips on how to use these products safely?



1 DETIC: Belgian-Luxembourgish association of producers and distributors of soaps, cosmetics, detergents, cleaning products, hygiene products and toiletries, adhesives and related materials and equipment
2 CRIOC: Centre de Recherche d'Information des Organismes de Consommateurs

Plant protection products continue the environmentally-friendly trend

Our gardens form a valuable habitat for humans and animals. Many people like gardening or using the garden for reading, playing with the children, growing vegetables ... Gardens are also favoured territories for birds, bees, butterflies ...

All this garden pleasure can be seriously disrupted by harmful insects, moulds or weeds. As a gardener, you have the freedom to choose how to protect yourself against these nuisances and to choose which products to employ in the fight against certain plagues. Mechanical methods can be used (e.g. weeding or hoeing), organic methods (e.g. introducing beneficial insects such as ladybirds) or chemical methods (e.g. use of plant protection products). This concerns the IPM (integrated pest management) principle, or the integrated application of different techniques to best protect the garden!

Plant protection products for use by non-professionals have evolved greatly in recent years. The plant protection sector is one of the most regulated in Europe. A product is only released onto the market after 10 years of research and development, strictly controlled studies that the industry must provide, €200 million of investments in trials and tests and an extensive assessment by the government. In other words, there is a whole set of measures that guarantee the safety of the products that are correctly used (as instructed on the label).

Plant protection products were divided into two groups on 18 August 2014. Products for professional use are indicated by the letter P on the label. Products for non-professional uses must be indicated by the letter G. This move is intended to better protect garden enthusiasts. From now on, non-professional gardeners have access only to garden products that meet specific conditions. These must have child-proof lids and a dosing system by which the customer can determine an exact dose. The advantage is that only the amount required is poured out and that these ready-to-use products no longer have to be mixed with water but can be used straight out of the container. Other stipulations are small containers (e.g. 150 ml) and labels containing all useful information. The use of small containers prevents product wastage.

The plant protection industry has a high innovation rate: 8% of turnover goes to



Research & Development each year. New molecules and compounds are developed to reduce the impact of these products on the environment and to increase the safety of the consumer.

Increased consumer safety has been proven by the PRIBEL study (Pesticide Risk Indicator for Belgium) commissioned by Phytofar and carried out by UGent. This study found that the total negative impact has fallen dramatically. The negative impact on water organisms fell by 20%. In addition, the possible harmful effects for the user fell by 55%. For bees the negative impact dropped by no less than 60% in the period 2005-2012.

That plant protection products are becoming more and more environmentally-friendly is due to the efforts made by the government and industry. Toxic products are being replaced by less toxic ones and a great deal is being invested in safer use. The great challenge for the industry lies in bringing on to the market less toxic

products but the same guaranteed efficiency.

From 25 November 2015, shop assistants in retail outlets will require a phytology licence. This is a certificate that shows that they have the necessary knowledge of plant protection products and so are able to give correct advice to customers. Phytofar and Comeos will also provide a call centre and website through which non-professionals will be advised in the best way about the correct and safe use of plant protection products.

Sustainable Cleaning: from charter to practice

Indicatoren	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ondertekenende bedrijven (Be) (EU)	(11) (28)	(16) (45)	(30) (70)	(36) (89)	(40) (108)	(51) (130)	(72) (175)	(82) (200)	(85) (210)	(91) (226)
Gezondheid en veiligheid op het werk**	0,57	0,55	0,83	0,90	0,98	0,80	0,83	0,79	1,05	0,85
Verbruikte energie*	1,34 Gj/t	1,09 Gj/t	1,10 Gj/t	1,05 Gj/t	1,03 Gj/t	0,95 Gi/t	0,91 Gi/t	0,91 Gi/t	0,81 Gi/t	0,79 Gi/t
Uitstoot van CO ₂ *	80,9 kg/t	66,9 kg/t	64,6 kg/t	64,3 kg/t	60,9 kg/t	57,3 kg/t	52,0 kg/t	53,0 kg/t	55,6 kg/t	54,3 kg/t
Waterverbruik*	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	1,35 m ³ /t	1,44 m ³ /t	1,30 m ³ /t	1,23 m ³ /t
Afval*	10,2 kg/t	12,9 kg/t	11,1 kg/t	10,8 kg/t	12,4 kg/t	11,9 kg/t	12,0 kg/t	12,1 kg/t	11,0 kg/t	12,6 kg/t
Gebruik van verpakkingen*	78,0 kg/t	92,7 kg/t	88,6 kg/t	84,6 kg/t	91,3 kg/t	89,9 kg/t	91,3 kg/t	89,8 kg/t	84,3 kg/t	91,4 kg/t

Each year since 2005, companies active in the detergents sector have published a report on sustainable development. This report is based on the results of the Charter for Sustainable Cleaning. This charter was inspected by independent auditors, and signed by more than 200 companies. Of the 68 European manufacturers which signed the charter 51 are active in Belgium and 31 in the Grand-Duchy of Luxemburg. Check the figures In total, they represent over 85% of the detergents market.

The signatory companies have implemented procedures for sustainable development, and this, throughout the whole lifecycle of the products which they make. In addition, they are making serious efforts to improve their performance in sustainability. Each year, they publish a set of indicators of sustainable development. In 2012, new criteria were introduced for the products, in order to increase the charter's relevance. You can find more information about this at www.sustainable-cleaning.com.

The signatories participated voluntarily over the eight years of the charter's existence (2006-2014). In all of those years, the charter has proved its usefulness, for instance, decreasing energy consumption by 27% and reducing CO₂ emissions by 19%. You can find more information about this at www.sustainable-cleaning.com/en.publicarea_sustainabilityreport.orb.

Indicators of Sustainable Development - Charter for Sustainable Cleaning - Excerpt - European Figures.

* per ton produced

** number of accidents compared to the total number of hours worked. This figure applies to the companies which signed the charter, and is expressed in 100.000s of hours worked/person

Products

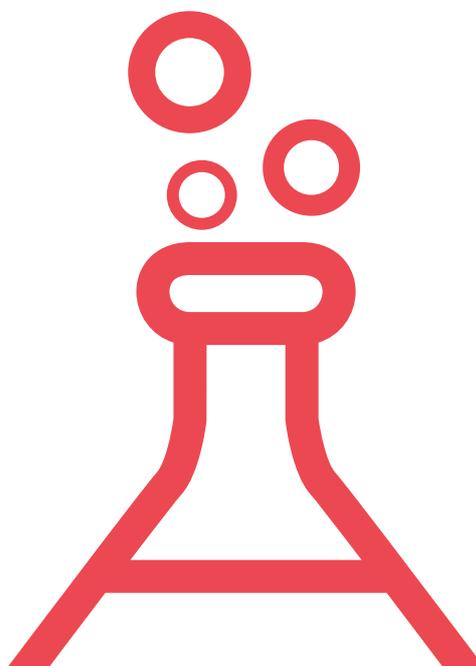
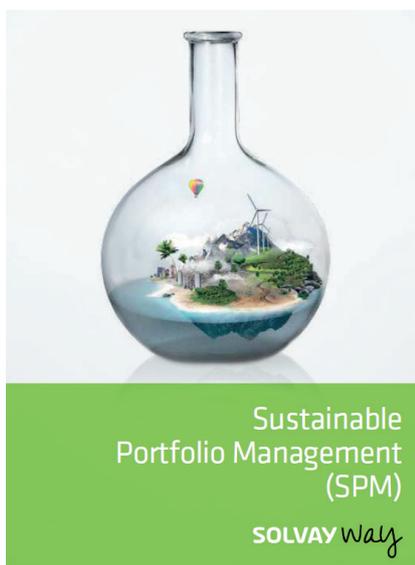
Chemistry in everyday life

Chemistry helps in building a sustainable society

Innovations in the chemical, plastics and life sciences sector reach way beyond factory walls. The growth in the world's population, reaching an estimated 10 billion people by 2050, brings many challenges in the areas of health and well-being, nutrition, housing and mobility. **Innovative products** from companies in the sector **help to tackle these massive challenges in our society**. A number of practical examples in this report illustrate this.

In developing these new products it is also essential to take into account all aspects of **sustainability** and to cover the **product's entire life cycle**. Often the ecological impact of a product is greater during its usage than during the production phase. That's why it's always crucial to evaluate a **product's sustainability in its final application**.

Increasingly the sector is **switching to a circular economy** in which materials are recycled or alternative raw materials are used. This is illustrated in the sustainability report through a number of examples.





Discover 5 sector initiatives on the following pages

Circular economy

Working on a circular economy

The use of side streams from one production process as a raw material for another production unit, whether or not within the same company, is a well embedded principle in the sector. The integration of businesses in chemical clusters is an economic reality in Belgium. The recycling of

our own production waste is also a common practice. The businesses in the sector are taking the next step in closing the cycles. How? By collecting, reusing or recycling more and more 'post-consumer' waste. Several initiatives are presented here.

SECTOR INITIATIVES

A 100% recyclable cork made with biopolymers

Nomacorc Select Bio is the world's first zero carbon footprint wine closure made from renewable, plant-based polymers.

How does it work? The cycle starts in Brazil when sugar cane plants sequester CO₂ from the atmosphere and convert it to sugar. Sugar cane is harvested and the sugar is fermented into bio-alcohol which is normally used as bio-fuel.

In our case, bio-alcohol serves as a renewable feedstock for biopolymers. For that,

the supplier in Brazil, Braskem, transforms bio-alcohol into bio-ethylene, and subsequently it is polymerized to bio-polyethylene in conventional production equipment.

The bio-polyethylene is shipped to Nomacorc and used to produce Select Bio closures with 100% renewable energy. At the end of this production process, the Select Bio closures are transported to wineries to bottle their wines.

These bottles of wine get purchased by a consumer and after opening, will discard of the closure. Nomacorc Select Bio can be 100% recycled with polyethylene waste stream, or can be ending up in municipal waste incineration where it can serve as a valuable energy source to produce heat and electricity. The CO₂ which is released upon incineration can be bound by sugar cane plants to start a new cycle.

Everything runs smoothly at Valorlub

Companies importing foreign lubricants for trading on the Belgian market or importing lubricants for their own use fall under the take-back obligation concerning used lubricants. This means that they need to meet legally determined collection and recycling objectives.

Since it is difficult for individual companies to satisfy this requirement, the federations concerned have made environmental policy agreements with the different regions. These environmental policy agreements allow companies to carry out their duties correctly via the non-profit organisation Valorlub.

Valorlub aims to satisfy all the terms, commitments and objectives determined by the environmental policy agreements for lubricants. Indeed, in 2014 this organisation achieved its allocated collection and recycling objectives.

Taking into account the losses which naturally occur during use, in 2014 more than 92% of the oil brought onto the Belgian market was collected as used oil. This result is higher than the collection objective, which was set at 90%.

The 90% recycling objective for refining and alternative reuse was easily achieved. In total 94% of the collected used oil was valorised. The remaining 6% consists primarily of water, which is reused via the water purification installations and a small remainder of sludge, which in many cases can also be recycled.

Valorlub is making both consumers and professional users aware of how to go about using used oil correctly. Furthermore, Valorlub informs them of how biodegradable lubricants can be a sustainable alternative solution for certain applications.



Recycled beer crates for animal housing

Paneltim NV, a SME based in Lichtervelde, is a pioneer and specialist in the production of synthetic sandwich panels and grills for the Belgian, European and worldwide agricultural and construction markets. These sandwich panels are used within the agricultural sector, for example to sty partitions or as doors in pigsties.

Paneltim works predominantly with recycled material. Recently, more than 1 million Heineken beer crates were bought for this

purpose. These crates are ground and, after a thorough clean and quality inspection, transformed into semi-panels. Then two semi-panels are welded into one closed sandwich panel, which satisfies the strict hygiene levels for animal housing. These panels are closed off so well that no water, dirt or bacteria can get inside. The internal cellular structure offers the additional advantage that the panels are both light but strong. Furthermore, they can be made with a minimum of material.



A sustainable way to transport Vaccines

GSK set up a special project to optimize vaccines' distribution and deliver significant environmental benefits.

1. Better fit for purpose Cold Chain Packaging (CCP) solution for transportation

In the past, the same CCP solutions were used all year round. Now, they are different CCP solutions adapted to the season and temperatures. Since July 2014, cold chain packaging solutions have the same external size but the interior padding is being adapted. Thanks to this innovation, up to 30% more products are now shipped. This leads to reduced CO₂ emissions, less packaging waste, lower costs and more airlines capacity.

Outcome: reduction of +- 13.500 Tonnes CO₂/year

2. A new design for the boxes shipped to Singapore

The design of the polystyrene box have been reviewed: 12 bottles of Synflorix bulk can be shipped in 1 box instead of 4 bottles previously.

Outcome: reduction of 1067 Tonnes CO₂

3. From single use to re-use of the Cold Chain Packaging

The quality and robustness of the single use CCP solution allowed GSK to consider its re-use. Through an initial quality check at destination, a return shipment by sea container and qualification of the returned units, the CCP solutions are used a second time, thereby avoiding carbon emissions and waste of the same number of new units.

Outcome: reduction of 150 Tonnes CO₂/year

4. Transportation by road instead of by air to Morocco

Morocco was identified as an opportunity to optimize shipments costs by switching air to road transport. As from a minimal shipment of 8 pallets of finished vaccines, the road freight costs are lower than air freight. Side-benefits of the projects are reduced CO₂ emissions, less airline capacity dependency and less preparation time.

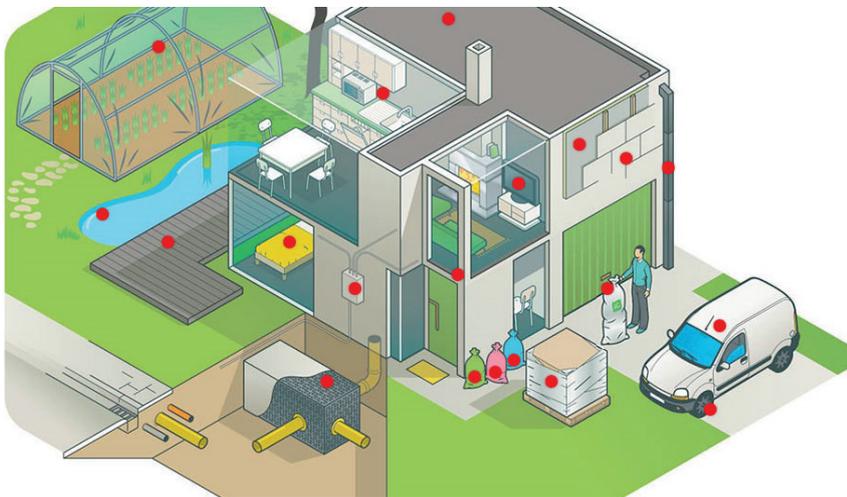
Outcome: reduction of 1350 Tonnes CO₂/year

5. Return program for Temperature Monitoring devices

A partnership with our supplier of the temperature monitoring devices, used in cold chain packaging, led to an innovative solution to return the single use devices to the closest located partner affiliate for recycling instead of going to the local waste stream.

Outcome: 3.5 Tonnes/year to landfill avoided

The plastics industry is committed to a circular economy



The CORE project (Controlled Recycling) by Federplast, Febem and VKC is focused on controlling recycling in the industrial value chain, supplying and/or utilising recycled materials for the production of plastics and/or textile fibres. Partners in the project are aiming to decrease the amount of incineration of post-consumer plastic waste using energy recovery and instead increase the amount of recycling. On the website www.werecycle.be various initiatives for the selective collection and recycling of plastics are identified and explained in an interactive manner.

In order to guarantee the quality of the recycled plastic as well as the quantity of recyclate in a product, CORE has developed a new certification system, QA-CER. The certification is based on ISO9001 and is issued by the BQA (Belgian Quality Association). This QA-CER quality system demonstrates that when the collection and recycling of secondary raw materials is carried out in a qualitative way, these materials are equivalent to 'virgin' raw materials and are equally suitable for use in the plastic converting industry. This high-quality recycling is necessary to achieve a genuine circular economy.



Discover 5 sector initiatives on the following pages

Sustainable building

Sustainable construction with chemistry and plastics

Almost 40% of fossil fuels are used for heating buildings. That is why the process of 'sustainable construction and living' must prioritise saving energy and thorough, energy-related renovations. Plastic insulation is ideal for limiting energy consumption and, in turn, CO₂ emissions. For every ton of CO₂ that is emitted during the production of plastic insulation material, 233 tons are saved

over the life cycle of the products. In order to build in a sustainable manner, it is vital to analyse the sustainability of the building project in its entirety rather than focussing on evaluating the properties of each individual material.

The initiatives below illustrate how innovative plastics and sustainable construction go hand in hand.

SECTOR INITIATIVES

▶ Chemicals & plastics for sustainable construction

Watch the video on www.essensciaforsustainability.be

Nearly Zero Energy: Isofinish® is right on the mark

In 2013 the Flemish Energy Agency (VEA) launched the 'Ik BEN mee' sign. The aim of this campaign is to prepare people in Flanders for the Nearly Zero Energy (in Dutch: Bijna-EnergieNeutraal) principles that will apply to all new construction projects from 2021 onwards. The 'Ik BEN mee' sign is an initiative of the Flemish Government intended to recognise the efforts of consumers who are already making sensible energy choices today. To receive such a sign, first you need to submit an energy-friendly project or concept, which will then be thoroughly screened by the Flemish authorities.

Isofinish® was one of the first award-winning initiatives to receive the 'Ik BEN mee' recognition from VEA. It is an initiative of six manufacturers of building materials. Together they have developed a complete innovative concept for outside wall insulation and finishing. With their idea they have managed to make the outside walls of houses much more energy-efficient. Thanks to this new exterior wall concept not only the energy cost drops, the aesthetic value of the building increases as well. What is special about the Isofinish®



concept is that it provides a continuous insulating shield. As this shield is not interrupted, energy leaks are prevented. Moreover, it is a concept that can be applied in both new construction and renovation projects.

A project such as Isofinish® offers the advantage that the principles of building and renovating in an Nearly Zero Energy way are made visible to possible builders and renovators, which at the same time renders the objectives of the Flemish Energy Agency tangible.



ISO.finish™

Sustainable building: Kingspan innovation

Aside from the initial costs of a building project, during a construction process considerable attention is paid to a building's energy consumption, CO₂ emissions and life-cycle management. Kingspan has developed various simple yet innovative systems for reducing the effect on the environment, while at the same time lowering costs.

The Kingspan Sol-Air Integrated Collector is not only a fully-fledged insulation panel, but it also acts as a solar energy collector for heating the building. The façade panel, which is ideally provided with a dark coating, easily captures the solar energy through the outer plating, with the air in the panel's open crowns thus heating up. The heating will cause the air in the crowns to rise, whereby fresh air enters the system from below. The warm air is fed into the building at the top of the façade panel. Inside the building, the heated air is spread further by light, energy-saving ventilators for optimal heat distribution. Temperature sensors in the system ensure that the ventilators are only activated when this is necessary for keeping the building at the desired temperature.

Large-scale tests of this simple yet extremely effective system reveal that heating costs can in fact be reduced by 20%, even in moderate climates. In certain cases, alongside this energy saving it will also be possible to install a lighter conventional heating system, thus costs can also be saved in this respect. These savings, together with the product's long lifespan and the low purchase costs compared with conventional sustainable energy solutions, mean this investment soon pays for itself.

The reduction of energy consumption means the building's CO₂ emissions are decreased considerably, and the air quality inside the building is furthermore improved by the influx of fresh, heated outside air.

GreenWal: The centre of excellence for sustainable construction

Greenwal, the Walloon centre of excellence, brings together all the players in the field of sustainable construction. The purpose of this centre? To stimulate the renovation and construction industry and to build bridges between education, research and innovation taking place in this area.

Greenwal was started in 2013. In 2016, their headquarters will be officially moved to a totally new facility, the cornerstone of which was laid in May 2015. This facility consists of 4,000 m² of office space, workshops, conference and demonstration rooms.

Greenwal is an initiative of the Work-Environment Alliance of the Walloon Region.

Its objective is to create economic opportunities and employment by focusing on improving the environment.

The Work-Environment Alliance strives to ensure that the construction and renovation industry becomes a sustainable industry. This is possible thanks to insulation and improved energy efficiency of buildings.

As a signatory of the Alliance and major economic player in terms of innovation and production of efficient building materials, essenscia wallonie has participated in the realization of the Alliance programme and the establishment of the Greenwal centre of excellence.

Sustainable plastics in Ghelamco Arena

The Ghelamco football stadium in Ghent (Belgium) is a real eye-catcher: impressive, fashionable in design and an architectural beauty. The stadium, however, is more than just design, it is above all environmentally friendly.

The undulating roof was made waterproof by means of the ecological, reflective RENOLIT ALKORBRIGHT membrane. The special protective coating on this roofing membrane ensures a high reflection of the sunlight, which in summertime has a positive impact on the interior of the building. On this large project no less than 13,000 sqm of roofing membrane were installed. At a later stage, solar panels will be mounted on the roof, again a special energy saving effort.



Quite important as well ecologically speaking is the collection and re-use of rainwater for this stadium. Therefore, three large buffer reservoirs and two water storage tanks were installed. And also here RENOLIT played an important part. About 5,200 sqm of RENOLIT ALKORPLAN membrane were used to make the basins waterproof.

(Image: night capture of the Ghelamco football stadium-Picture copyright KAA Gent)

Former industrial site transforms into sustainable city district

The Vaartkom site in Leuven (an old industrial site bordering the canal) has been transformed into a vibrant new neighbourhood. After the construction of flats with a view on the water, the building of a cultural centre and a hub for creative companies, there is now the new residential neighbourhood 'Tweewaters'. The whole area covers around eleven hectares and is being transformed into an ecological neighbourhood by project developer Ertzberg. In the past, Ertzberg already attracted big names with its striking designs, such as Xaveer De Geyter and Stéphane Beel. The project of Stéphane Beel, Balk van Beel, which is in full swing, was awarded the **BREEAM certificate 'outstanding'** at the end of 2012.

Recticel Insulation entered the project, thus contributing to this unique undertaking. The BREEAM certification means that the project complies with a number of criteria. These criteria can be divided into nine categories, the main ones being energy, use of resources, waste management and health. The score 'outstanding' is rarely awarded. What is more: this is **the first time** it has been awarded **to a building on the European continent**. Therefore, it was a real honour for Ertzberg to receive this BREEAM International Award in London at the beginning of 2013.

For this project Ertzberg teamed up with reliable partners that not only deliver high-quality products but also attach great importance to sustainability and environment conservation. Recticel Insulation was invoked for the roof insulation. The West Flemish company covered the flat roofs of the Balk with Powerdeck F., an insulation slab with a core of 'TAUfoam by Recticel'. This is a hard PIR foam with a special cell structure. It is covered on both sides with a mineral-coated glass tissue. Thanks to their excellent insulation capacity 'TAUfoam by Recticel' products need only a small thickness to offer thermal resistance. Hence, their high-performance insulation package contributed to the high score in the BREEAM category 'energy and CO₂ emissions'.

Special attention was paid to waste management on the site as well. During the



works, different waste streams were kept separate and removed separately to give them a new use. To this end, Recticel - together with waste processing company Van Gansewinkel - worked out a solution. The contractor, Willemen, made sure the waste on the site was collected separately in containers. After that, these were collected by Van Gansewinkel and taken to a processing plant. There, the clippings from the insulation slabs were ground to granules so that they could serve as a source of energy for a steam plant, where they were converted into electricity.

(Images: View by night and by day of the Balk van Beel with the silos in the background, the way it will look after the renovations. Recticel Insulation insulated the flat roofs of the Balk van Beel building with Powerdeck F insulation.)

An innovative cooperation agreement on sustainable building

The renovation project **RenoseeC** came into being within **Buildchem**, a cooperative partnership between the federations Federplast.be (the Belgian federation of producers of plastic and rubber products), Vlaamse Confederatie Bouw (the Flemish professional federation of building contractors) and essenscia (the federation of the chemical, plastics and life sciences industry). In this way Buildchem brings all actors of the construction industry together. The starting point of these three federations is the **need for innovative cooperation throughout the entire value chain of 'construction'**.

The RenoseeC project, as a 'Flemish pilot project for building renovation', receives public funding from the IWT, the Agency for Innovation by Science and Technology. The aim of the project is to **roll out a business model for collective, sustainable and affordable renovation of private single-family homes**. Cooperation and innovation throughout the entire construction chain are central. That is why the project involves a wide range of actors: manufacturers (Cantillana, Derbigum, FTB Remmers, ISOVER, Sto, SVK, Recticel Insulation), contractors (Alpas, Beneens, Durabrik), their federation (Vlaamse Confederatie Bouw), architects (BAST) and



social profit organisations (Domus Mundi vzw) and researchers (KU Leuven, VITO).

RenoseeC focuses on the terraced house type in the 19th-century belt of Ghent, in particular on Sint-Amandsberg. The target audience is a mix of homebuyers without financial means, owners/inhabitants and owners/landlords who own a home that does not comply with the current requirements for living comfort and energy performance. Bearing in mind the social focus of RenoseeC a lot of attention is paid to **intensive process guidance. Unburdening, awareness raising and activation adapted to the neighbourhood are important themes**. Moreover, the project fits into Ghent City Council's objective to become a climate-neutral city by 2050. The renovation of the 19th-century belt is a priority within this project. In this neighbourhood quality housing is a major



Discover 2 sector initiatives on the following pages

Sustainable agriculture

In order to secure food supply across the globe, food production needs to increase within the existing agricultural areas. The crop protection agents sector argues for an appropriate use and minimum dosing of crop protection agents and nutrients. The negative impact on man and the environment can thus be limited and biodiversity can be retained.

The initiatives below demonstrate how the phyto-pharmaceutical sector is working with the agricultural sector in order to create a sustainable agriculture.

SECTOR INITIATIVES

BeeHappy: How healthy are our bees?



It is a fact that we have been faced with an increased number of bee deaths over the past few years. There is no certainty about the causes of this yet. Moreover, European bee death rates vary strongly from one region to another. Therefore, specific and systematic research has been performed in Belgium into causal relationships between bee deaths and variables present in each region.

In 2014 the Flemish Institution for Technological Research (VITO, Guy Engelen) and the Zoological Physiology department (UGent, professor Dirk De Graaf) carried out a project. This was financed by the Flanders Innovation Hub for Sustainable Chemistry (FISCH) and the Agency for Innovation by Science and Technology (IWT) and co-financed by the crop protection industry. This study fits into the framework of the Consultation Platform on Bees, which was launched at the end of 2013 and is intended as a platform where agricultural associations and the machinery, seed, pharmaceutical and phytopharmaceutical industries can discuss, together with the beekeepers, how all partners – each within their field and expertise – can contribute to improving the health of bees.

At the beginning of 2015 the first part of the study was completed. This focused on Flanders and looked for possible rela-

tionships between increased death rates in winter and all kinds of factors. Matters such as varroa and other diseases present in beehives, practices of beekeepers, the use of crop protection products (pesticides), electromagnetic radiation, fine particles, urbanisation, available food, nesting possibilities, biodiversity and landscape fragmentation, but also weather and climate conditions were looked at and assessed from a scientific point of view.

Conclusions could be drawn from this BeeHappy study only to a limited extent. The results show that varroa, a mite that affects bees and severely debilitates them, is the factor that can explain most bee deaths. This factor corresponds to 15%. When varroa infestation is combined with the use of certain crop protection products and with electromagnetic radiation from mobile telephone masts, up to 23% of bee deaths can be explained.

This means that further research is necessary. In a next phase of the project the same study will be performed in Wallonia. Besides validating and refining the model used, it will also be studied whether the quality of the data used in the model (e.g. bee death rates, landscape map details, etc.) can be improved. In this way, the researchers hope to be able to find a better explanation for a larger share of bee deaths in winter.

PhytofarRecover becomes AgriRecover



In 1997 the association PhytofarRecover was founded by the phyto-pharmaceutical industry. This organisation is in charge of collecting packaging of professional plant protection products. Belgium was one of the first countries in Europe to set up this type of collection. Eighteen years after the founding of PhytofarRecover these collection services were so embedded in the sector of agriculture and horticulture that the question arose to extend this service provision to the collection of packaging of other products.

This was discussed with producers of primary agricultural biocides, fertilisers and seeds. A number of those companies have joined the association, and it looks like more will follow.

The fact that the name of this association has changed to AgriRecover is a logical consequence of this evolution. As the name indicates, AgriRecover offers producers and end users a solution for the packaging of agrochemical products. In this area as well, we are supported by our neighbouring countries France and Germany, where the extension to other sectors has been a reality for quite some time.

In practice, the packaging is rinsed and recycled into cable protection pipes (product recycling). This is done in collaboration with our German colleagues of RIGK – Pamira. Packaging that cannot be rinsed is incinerated. The energy recovered in this process is used in the furnaces of the cement industry (thermal recycling). This is a good example of how waste can be processed into a secondary raw material. Hence, this type of initiative provides companies in the agrochemical sector with a positive and environment-friendly image.

The purifying power of Sentinel®

5 years ago, **Phytofar, VOLSOG** (Alliance of former students of the public regional school for spraying entrepreneurs in Ghent) and **Inagro** started the **Sentinel® project**. This project enables several **professional sprayers to use Sentinel®** for purifying the residual water retained in their spraying equipment. Their efforts contribute effectively to a **higher water quality**.

Fighting contamination by processing residual water

Plant protection products sometimes enter the surface water through residual and rinsing water and this can have a negative impact on the aquatic life. The presence of certain plant protection products in surface water not only poses a problem for the environment; it can also result in a prohibition or severe restriction on using those products. This can be prevented by collecting the residual and rinsing water which contains elements of plant protection products and treating it with a system such as Sentinel®.

Sentinel® purifies

Sentinel® works on the basis of chemical processes: after adding chemical substances (iron sulphate, sodium hydroxide and polyelectrolyte), the residue of the plant protection products starts to form flakes. The flakes sink to the bottom and are filtered from the residual water. An active carbon filter takes care of post-purification. During each processing round - which lasts approximately 6 hours - around 900 litres of water is purified. The purified water can be used for a first rinsing round or a treatment with a total herbicide. The remaining sludge fraction is collected by Agri Recover and processed by a specialised firm.



More and more residual water is being purified

The Sentinel® project was launched in 2009 as a cooperation effort between Phytofar, Volsog and Inagro. The initial aim was to help contracted spraying companies and farmers purify the residual water remaining in their spraying equipment. Phytofar (The Belgian Association for the Crop Protection Products Industry) invested in the purchase of the Sentinel® system. Volsog contributed by providing financial support to its members who participated in the Sentinel® project. Inagro supplied the practical and logistics framework.

Approximately 315 m² of residual water has been processed over the past 5 years. This volume represents the residual water of 12 different contracted sprayers and 5 companies/research centres. The first three years (2010, 2011, 2012) were key in discovering and optimising the functions of Sentinel®. Sentinel® has enjoyed increasing popularity in the past two years. 91 m² of residual water was processed in 2013, and a record volume of 110 m² was achieved in 2014.

Sentinel® contributes to the protection of our waterways

To which extent has Sentinel® been able to contribute effectively to a better quality of our water? Each litre of residual water contained an average 3.7 mg of active substance, equalling 1165.5 g of active substance in the total amount of 315,000 litres of residual water collected over a period of five years. If this quantity of active substance had ended up in the surface water, the legal standard of 0.1 µg/l would have been surpassed in 23,310 km of waterways (1 metre wide and 0.5 m deep). In other words: Sentinel® managed to protect 23,310 kilometres of waterway.

Using and promoting Sentinel® also positively influences the quality of our water in an indirect manner: contracted sprayers show their increased awareness of water pollution by working with or talking about Sentinel®. This results in more thought-through working methods and greater efforts towards restricting the quantity of residual water wherever possible.

Integrated crop protection gains ground

New crop protection rules were introduced in 2014 as a result of a European Directive with respect to the sustainable use of plant protection products. One of the rules imposes the application of Integrated Pest Management (IPM). According to the principles of Integrated Pest Management, farmers must apply any control techniques in an integrated fashion to ensure that any damage to plants is kept below the economic threshold. In the event of diseases or plagues in their crops, farmers must give preference to non-chemical control methods.

The European Directive dictates that 'sustainable biological, physical and other non-chemical methods' must be preferred to chemical plant protection products. It adds the condition that these methods should provide satisfactory pest control. In the spirit of this European Directive, spraying with herbicides replaces mechanical weed control, while insects are controlled by using natural enemies rather than insecticides. An example is the use of ladybugs against aphids.

However, IPM is more than just replacing chemical plant protection products by natural disease or plague control methods. It also embraces the use of resistant plant species and varieties in a healthy soil, as well as promoting biodiversity. Examples include hanging up nest boxes, introducing flower borders or small pools in a meadow, and applying anti-erosion methods to sloping terrain.

To further encourage IPM, the plant protection industry in Belgium has established two experimental farms. One farm is located in Huldenberg (Flanders) and results from a partnership between farmers Josse and Jan Peeters and Bayer Crop-Science. The other experimental farm is located in Ittre (Wallonia) and is the result of cooperation between farmer Ferdinand Joly and Syngenta. The two experimental farms use several IPM methods and demonstrate them to stakeholders, politicians and competent authorities, but also to the press and other farmers.



What can you see in these farms?

- how creating micro-dams between potato rows can help prevent erosion;
- how hanging up falcon nest boxes on a fruit farm can help control the mice population;
- how pheromones can be used to confuse the harmful fruit moth so that it stops procreating. These pheromones have made the use of insecticides against the fruit moth superfluous;
- how a phytocontainer can process residual water remaining after spraying with plant protection products, so that the processed residue can be recycled on site and no longer ends up in the water;
- how crop rotation forms a natural barrier against soil insects and diseases. The principle of crop rotation is to grow a specific crop on a specific piece of land no more than once every 3 to 4 years. Crop rotation helps towards healthier crops but also towards reduced use of plant protection products.

The tours arranged at the demonstration farms allow farmers and other interested parties to find out, on site, about the different methods available, how they are applied and what is their added value.



Discover 4 sector initiatives on the following pages

Health and welfare

Belgian chemical and life sciences sector frontrunner in pharmaceuticals and biotechnology

A growing world population and rapidly ageing Western population are increasing the need for healthcare and welfare. The Belgian chemistry and life sciences sector is leading the way in the development of new medicines, vaccines, deter-

gents, anti-bacterial soaps, ... Alongside the production via traditional chemical synthesis routes, the sector is also frontrunner in terms of biotechnological production processes.

Below are a few of many examples.

SECTOR INITIATIVES

www.goedgewassen.be: a site full of tips on environmentally-friendly cleaning



The use of detergents is necessary for general hygiene. Just think about the washing and cleaning of clothes, tableware, floors and other surfaces. However, we must not forget that using these products has an impact on the environment, water and energy consumption, the quality of surface water, and the creation and dumping of waste.

But we can limit this impact by selecting appropriate products and then using them in accordance with specific guidelines. The FPS Public Health, Food Chain Safety and the Environment, COMEOS and DET-IC in collaboration with CRIOC have created the website www.goedgewassen.be on this subject. On this site, you will find useful tips to help you reduce the impact of detergents and cleaning on the environment. Amongst others, you can find good practices which help you make positive changes to your cleaning and consumption habits.

Optimal conservation of vitamins for a better health

Fat-soluble vitamins are usually unstable by their very nature. Since these are organic molecules that deteriorate easily under light, oxygen and heat, they should be protected - especially when used in food products. Moreover, these vitamins are fat soluble only, meaning they cannot be easily deployed in products containing water.

To this end, Prayon has developed an innovative process that guarantees optimal protection for the vitamin and stability over more than a year. It also distributes the vitamin evenly throughout the product by fixing the fat-soluble vitamins to the phosphate salt.

Prayon's new product, called FortiprayTM, consists of a calcium phosphate salt (calcium phosphate, E341) and fat-soluble vitamins complex. It provides vitamins D2 and D3v while improving the intestinal absorption of the vcalciumv delivered by the phosphate salt (tricalcium phosphate).

Fortipray is used in **enriched drinks** to guarantee the vitamin stability and in **processed cheese** to ensure good dispersion of a fat-soluble product in an aqueous environment.



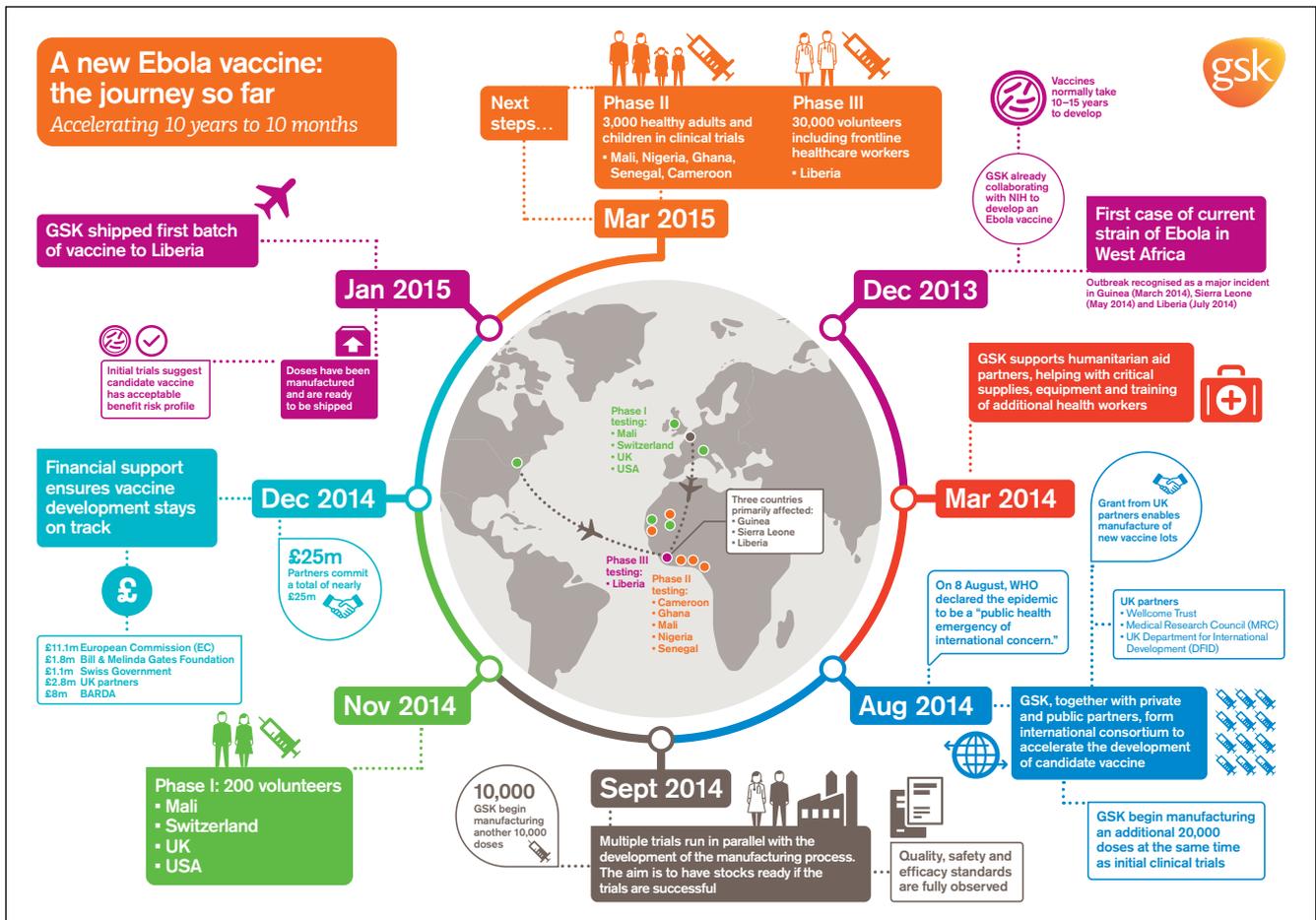
GSK contributes to the fight against Ebola and Malaria

GSK is striving to develop innovative vaccines for those who need it the most – such as in the case of Malaria and Ebola:

A vaccine candidate against Ebola

In August 2014, an international consortium including the WHO and other stakeholders was formed to accelerate collaborative multi-site trials of candidate Ebola vaccines. The GSK candidate vaccine was investigated tested in four phase 1 studies. Initial data from these trials have shown it to have an encouraging safety and immune profile, and have enabled GSK to select the most appropriate dosage level to advance to the next phases of clinical testing.

In January 2015, **the first hundreds doses of the candidate Ebola vaccine** was shipped from **Brussels to Liberia** to be tested in the first large-scale efficacy trial of experimental Ebola vaccines led by the US National Institutes of Health. Knowing that it usually takes around a decade to discover and develop a new vaccine, the clinical development of this vaccine candidate is progressing at an unprecedented rate, highlighting the commitment of numerous stakeholders to control this or future Ebola outbreaks.



A 30 year fight against malaria

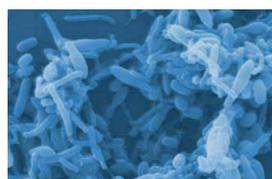
For the past 30 years, GSK scientists have been working with others across the globe to try to develop what could be **the world's first vaccine to help protect children in Africa from malaria**. This vaccine candidate - RTS,S - is being developed in partnership with the global program PATH MVI, supported by grants from the Bill & Melinda Gates Foundation. It aims to trigger the immune system to defend against the malaria parasite. GSK submitted a regulatory application for the vaccine to the European Medicines Agency in July 2014. If the required regulatory approvals are obtained, WHO has indicated that a policy recommendation for this vaccine candidate is possible by the end of 2015. If approved, GSK has committed to offer the **vaccine on a not-for-profit basis**.

In July 2014 GSK submitted a request to the European Medicines Agency to regularise the vaccine, receiving a positive response in August 2015. In light of this decision - and once national regulatory bodies have approved the vaccine - the World Health Organisation (WHO) will make a recommendation to include it in national vaccination programmes. GSK has already committed to producing the vaccine at cost price on approval, with a minimal return of around 5%. These funds will then be reinvested into the research and development of second-generation anti-malarial vaccines or vaccines against other tropical diseases that have thus far been neglected.



(Photo of Nahya Salim - Nahya Salim is a Research Scientist & paediatrician, Ifakara Health Institute, Tanzania. She is a project leader on phase 3 of GSK's RTS,S malaria vaccine trials, paediatrician (medical specialist concerned with the diagnosis, treatment and overall care of children) and a clinical researcher)

Realco develops innovative products to detect biofilms



Watch the video on www.essenciaforsustainability.be

Eurogentec, leading manufacturer in plasmid DNA vaccines

Watch the video on www.essenciaforsustainability.be

Janssen Pharmaceutica frontrunner in TBC treatment



Watch the video on www.essenciaforsustainability.be



Discover 2 sector initiatives on the following pages

Pioneering innovations

Frontrunner in innovation

The sector of chemicals, plastics and life sciences looks into the future. Companies are developing game changing innovations in many different fields. The research and development work of today will drastically change our way of living of tomorrow.

SECTOR INITIATIVES



Agfa Graphics wins Innovation Award with low migration inks

Watch the video on www.essenciaforsustainability.be



Solvay invests in pioneering research in Solar Impulse project

Watch the video on www.essenciaforsustainability.be

The potential of microalgae oil

The Omega-extract project from FISCH-ICON perfects the downstream processing of long-chain omega-3 oils from autotrophic algae. The ultimate aim is to produce pilot quantities of oil (10-50 litre scale) suitable for application in the food, feed, pharmaceutical and cosmetics industries. These findings will be crucial in estimating the viability of implementation – both economically and technologically – on an industrial scale.

The main commercial source of long-chain omega-3 fatty acids is fish oil, but this resource can be problematic. Autotrophic microalgae could provide an interesting alternative to fish oil as a source of these molecules (EPA and DHA). The advantages of this 'autotrophic microalgae omega-3 oil' are the presence of EPA and DHA in the form of polar lipids and a substantial concentration of carotenoids and phytosterols. These substances could potentially aid in oxidative stability and bio-availability.

Besides these advantages offered by its composition and other properties, there is a further major benefit of microalgae



oil over fish oil: it does not lead to over-fishing. These algae are cultivated under controlled conditions and a wide range of

soil types can be employed. This approach also avoids issues of heavy metal contamination and persistent organic pollutants.

In addition to the downstream processing of algae, applications for the extracts and algae cultivation are actively being sought. The subsequent findings will no doubt be of use in determining which species of algae should be supplied, and in what quantities. The project partners in this research are Proviron, Ecotresures, Gova, KU Leuven, VITO and UGent.

A public hydrogen charging station in Zaventem



The energy world is undergoing rapid change and hydrogen is one of the available solutions to help meet the challenges of clean transport, namely reducing greenhouse gases, urban pollution and oil-based fuel dependency.

The Air Liquide Group has extensive experience with the entire industrial chain for hydrogen. Involved from the very earliest stages of the process, Air Liquide is committed to producing at least 50% of the hydrogen dedicated to energy applications by 2020 without CO₂ emissions. To achieve this, the Group will be combining the use of technologies such as biogas reforming or water electrolysis.

In terms of its end use, hydrogen is the fuel of the future. It offers an alternative to fossil fuels. Used in a "hydrogen fuel cell" it combines with oxygen from the air to produce electricity, with the only emissions being in the form of water.

Hydrogen-powered electric cars today offer enhanced performance as it takes less than five minutes to charge them, giving them a range between charges of more than 500 km. For this reason, Air Liquide is actively participating in encouraging the take-up of hydrogen as a means of clean energy by contributing among other things to the creation of a network of charging stations. To date, 75 hydrogen charging stations have been designed and supplied by the Group.

As part of a European financing project, Air Liquide is building a hydrogen charging station in Zaventem on the Toyota site. The deployment of this project in-

volves regular contact with the relevant authorities with responsibility for the environment, external security, mobility and local development. In July 2015 they issued the necessary environmental and construction permits.

The Air Liquide station will have a hydrogen charging capacity for 20 to 30 cars per day. In addition to private vehicles, coaches will also be able to charge there.

The environmental impact

Promoting hydrogen as an energy source makes it possible to combat various forms of pollution. A hydrogen-powered electric vehicle is not only silent (no noise pollution) but generates no NO_x, CO₂ or fine particle emissions, which contributes to:

- Reducing global warming (with a 20% reduction in greenhouse gas in comparison to combustion-powered vehicles for an equal distance covered).
- Reducing the impact of fine particles for those suffering from respiratory problems such as asthma for example.

The impact on the Belgian economy

By reducing our dependency on fossil fuels, the hydrogen industry can have a positive impact on our trade balance by reducing imports. Similarly, improvements in air quality through reductions in fine particle emissions will make it possible to reduce health expenditure.

Insects as a source of biopolymers



Chitinsect is a FISCH-ICON project to develop a new value chain for chitosans based on insect biomass. The project encompasses a great many facets, including cultivation of the insects, extraction and reprocessing of the chitosans and testing their applications within two domains: pre-sowing seed treatment and coatings for netting and ropes.

The use of insects matter is a promising new approach, providing a further source of renewable resources. This is due to its composition of proteins, fats and biopolymers on the one hand, and to the cultivation methods and capacity to convert bio-organic by-products on the other. Flies, among other insects, contain an interesting component: the biopolymer chitin. Chitin is currently harvested from crustaceans and fungi and represents an annual world market of no less than \$45 billion. This market is growing largely due to the demand for quality derivatives, with applications across a wide range of sectors including healthcare, agriculture and scores of commercial industries.

A consortium of five companies, including four SMEs, is involved in developments across the entire value chain including both laboratory and piloting work. They are supported by research institutes to professionalise the cultivation of flies, refinement of the insects for the extraction of chitin, proteins and fats, the subsequent reprocessing into chitosan and chemical modifications to the end product. The partners participating in this project are Millibeter, Avore, Chemstream, I-Coats, Globachem, KU Leuven, VITO and UGent.