REGIONS & LOCATIONS GUIDE

CHEManager INTERNATIONAL

1/2017

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Europe

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Regaining Competitiveness in the Global Market

Unlocking a Competitive, Low-carbon and Energy-efficient Future for the EU Chemical Industry

The European chemical industry is of major importance for economic development and wealth, providing modern products and materials and enabling solutions in virtually all sectors. Nearly two-thirds of EU chemicals are supplied to the EU industrial sector, including construction. The big industrial users of chemicals are rubber and plastics, construction, pulp and paper, and the automotive industry.

Dr. Moncef Hadhri, CEFIC

René van Sloten, CEFIC

With a workforce of 1.2 million and sales of €507 billion (2016), the EU chemicals sector is one of the largest industrial sectors and an important source of direct and indirect employment in many regions of the European Union.

Europe Has Its Own "Success Story"

The European chemical industry is a wealth generating sector of the economy; it is a valuable part of Europe's economic infrastructure. Having ridden out the recession, the European chemical industry is continuing its recovery. It aims to provide solutions for the achievement of a competitive, low carbon and circular economy in Europe and beyond. In many ways, the European chemical industry is highly successful. Traditionally, it has been a world leader in chemicals production. Today, with 15.1% market share (data 2016), the EU chemical industry ranks second, along with the United States (14.2%). China continues to dominate chemicals world ranking in 2016, and contributed to nearly 40% of global chemicals sales.

Europe Still Has a Healthy Trade Surplus of Chemicals

As a historically important player in the global chemicals market, the EU chemical industry continues to benefit from trade opportunities, the trade surplus with non-EU area reached a significant level in 2016 (€47.3 billion). The EU area is still the largest chemicals exporting region in the world. It has also the world's largest chemicals surplus. Trading chemicals around the world stimulates competition, provides an incentive to develop new markets through innovation and stimulates production efficiency. The two largest chemicals trade partners of the European Union are the USA and China; taking together, they contributed to nearly one-third of extra-EU global chemicals trade. To stimulate the trade business environment, the EU institutions can do much. An ambitious, balanced and free trade agenda with key trading partners is really needed to help our sector to play its part on a global basis, and to boost trade and economic growth via the open market agreements.

Chemicals Made in Europe Lose World Market Share

While European chemical sales have continued to grow over the past 20 years, Europe's share of global sales over the same period has declined dramatically. EU chemical sales increase by more than 50% in 20 years, while its world market share halves from 32% in 1996 to 15% in 2016. The loss of EU chemicals market share decrease is primarily due to declining competitiveness, as opposed to slow-growing destination markets. This is a so-called "dilution effect", a trend expected to continue in the future. Data analysis showed strong chemical demand growth in China, and other emerging countries and low growth in Europe and North America, where Europe sells most of its chemicals. Overall growth of chemicals demand and production as well as faster growth in emerging regions is a trend that is expected to continue in the future. Growth in post-recession Europe remains low, mainly due to mature markets and an ageing population.

Investments in new production capacity increasingly flow to other parts of the world which leads to "investment leakage" in the chemicals industry. Recognizing the chemical industry's strategic importance for a successful industrial strategy, China, the Middle East and India have all made successful efforts to build up large and increasingly sophisticated production facilities and attract high investments by putting industry at the very top of their political agendas. The same applies to the USA where the recent shift towards "America First" will inevitably have further strong impacts on their industrial policy. Consequently, the EU's share of global chemicals production is decreasing in several segments.

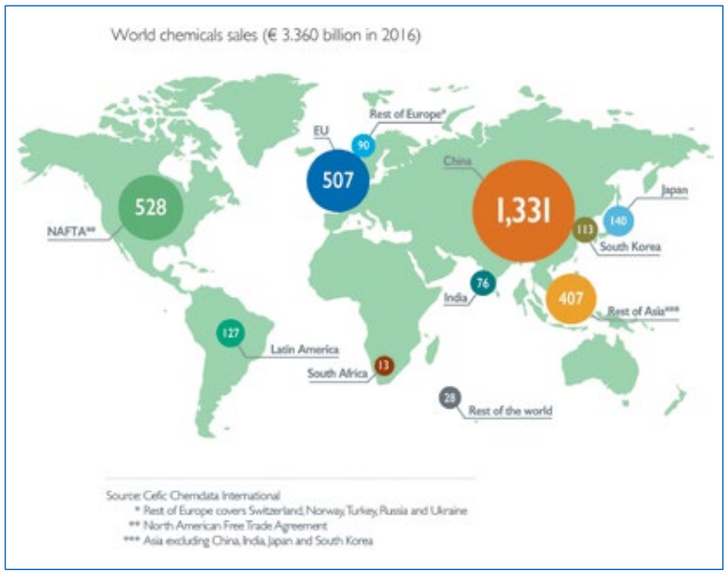

Fig. 1: Geographic breakdown of world chemical sales

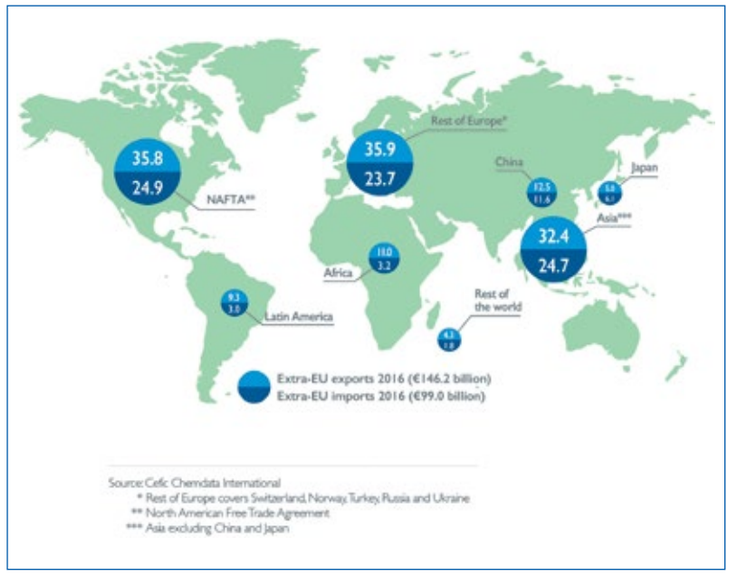

Fig. 2: EU chemical trade flows with major geographic blocs

China Dominates World Chemicals Investment

Capital investment is a key factor in securing the future development of the chemical industry. And, in many cases, major equipment or plant renewals require long-term planning. Such investments are not only related to the improvement of productivity or introduction of new products but are also due to the need to comply with regulations or reduce operating costs. Data shows that chemical companies in the world invested a global value of €212.8 billion in 2016, up from €83.8 billion in 2006. On a global basis, the level of chemicals investment was 2.5 times higher in 2016 compared to 10 years ago. As expected, China continues to dominate world chemicals investment and is far away outpacing the other economies in the world. The European Union is still, however, lagging behind the main regions in the world. The EU investment market share has lost more than two-thirds of its original value in 20 years — down from 33.8% in 1996 to 10.2% in 2016. These results are totally in line with the declining EU market share of chemicals production illustrated above.

On the R&D spending side, the EU chemicals sector showed a similar story. The EU R&D market share has lost more than 25% of its original global market share in 20 years. The key question is: What can Europe do to reverse the depicted trend? Creating a favorable business environment and stimulating innovation and investment in Europe is more than necessity. To this end, Europe must act urgently to contribute to a real industrial renaissance by deploying the recently adopted EU industrial policy strategy.

Coming back to the loss in competitiveness, there are other potential causes for this dilution effect: Energy and feedstock prices are a critical factor for the competitiveness of the chemical industry. The shale gas boom in the United States has reduced energy and feedstock costs greatly.

Feedstock Costs are the EU Industry's Achilles' Heel

Energy costs are the European industry's Achilles' heel, especially compared to the oil and gas-rich Middle East, and more recently to the United States, riding on a shale gas boom. High EU energy and feedstock costs, compared to other regions, and policy-induced surcharges are a particular barrier to investment. While industry is strategically aligned towards a smart, energy-efficient low-carbon transition, such a development must not weaken EU industries' competitiveness. This can best be supported by having a fair ETS driving down carbon emissions at the lowest cost, and a truly functioning well connected liberalized energy-only market — phasing out feed in tariffs etc. — and market development opportunities through building renovation measures. Better regulation that will also reduce regulatory burden, complexity and unpredictability, will help to maintain EU competitiveness and support investment and innovation.

Implications for an EU Industrial Policy Strategy

As shown, energy and feedstock prices are critical factors for the EU chemicals sector. Given the chemical industry's role of providing the solutions needed to enable the transition to a low-carbon and circular economy, it is important that the chemical industry is taken into account when developing EU climate and circular economy policies that are to create jobs in Europe. Today, there is a strong risk that Europe's transition to low-carbon and circular economies will hurt EU industrial production and benefit producers located elsewhere. Therefore, it is important that the EU strategy recognizes the importance of value chains and should ensure attractive operating conditions in Europe. To ensure Europe's continued role in the global economy, the potential of individual European value chains to be integrated into global value chains should be clearly recognized, i.e. European suppliers should be able to compete globally and not just in Europe. It is crucial that the future EU Industrial Policy Strategy represents a coherent action plan that brings together and streamlines measures in a variety of EU policy areas and departmental responsibilities. For an Industrial Policy Strategy to be successful it must enable the industry to transform, by creating a favorable business environment that stimulates innovation and investment in Europe.

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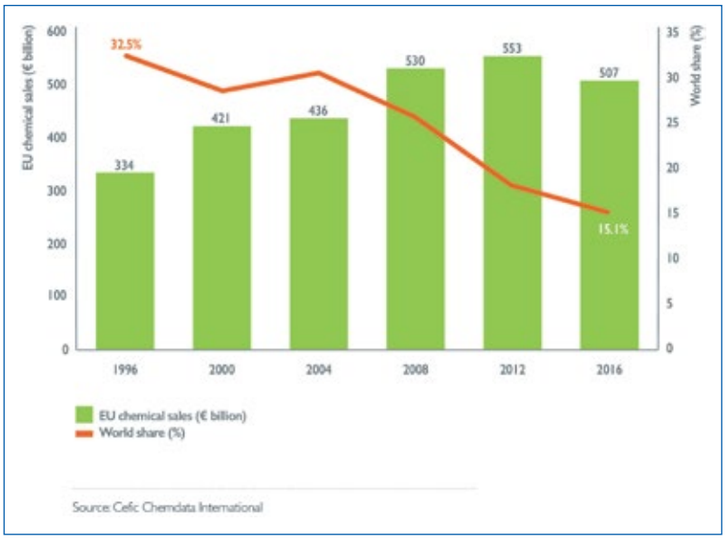

Fig. 3: EU share of global market

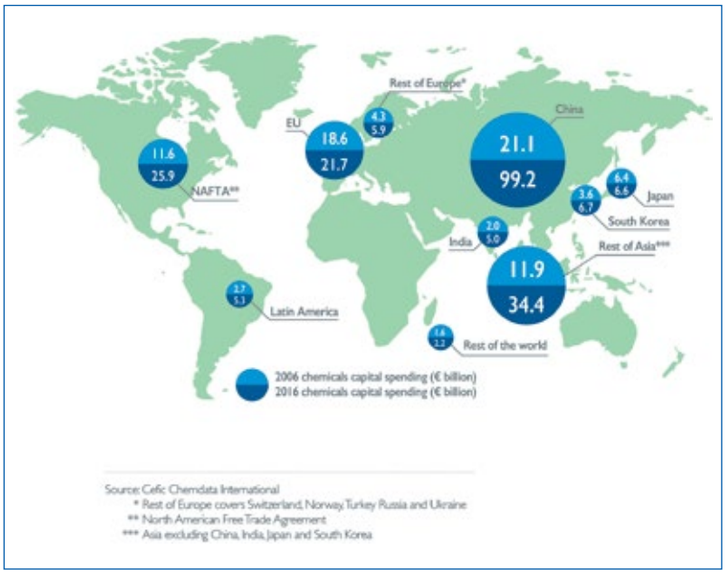

Fig. 4: Capital spending by region

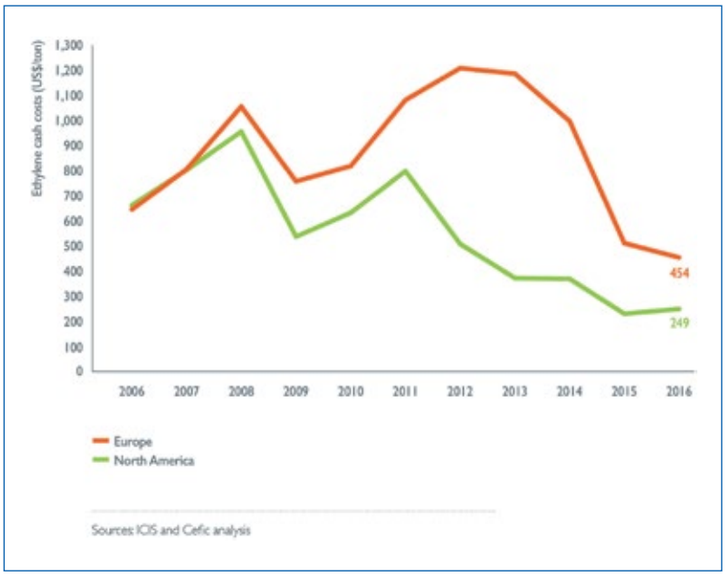

Fig. 5: Average ethylene cash costs in the EU vs. North America (US$/ton)

Steeled for Competition

Germany is an Attractive Chemical Production Location due to Innovative Capacity and Productivity

Germany is known for its rigorous environmental standards, its obsession with renewable energy, and high labor cost. Yet Germany's chemical industry continues to be number one in Europe by a large margin and local companies export more chemicals than any other European country, and even China. Here is why:

The global chemicals market is in excellent shape. This is reflected primarily in the huge increase in global sales from €1,622 billion to €3,534 billion during the decade from 2005 to 2015, equivalent to an average annual growth rate of more than 8%. However the balance of power in the global industry has shifted. The chemical industry in China — with revenue of €1,409 billion and a global share of about 40% — was the biggest market in 2015, followed by the US (€519 billion), Germany (€148 billion), and Japan (€136 billion) according to CEFIC. The German Chemical Industry accounted for 28% of the €519 billion in sales in the total European market in 2015, thereby maintaining the lion's share of revenue — twice as much as its nearest European counterpart. The industry not only maintained its position within Europe over the past few years, it actually improved it.

> *"Germany has one of the highest R&D intensity levels in Europe."*

Growth-Driving Industries

One of the largest contributors to the industry's success in Germany is the presence of strong client industries including the automotive sector with sales of more than €400 billion in 2016. As a result of close collaboration between chemical suppliers and their industrial clients, and the global expansion of Germany's industrial manufacturers, the chemical industry has been able to expand into new markets with them. This is reflected in the export numbers of the chemical industry. In 2015, Germany was the world's second largest exporter of chemicals — with a value of around €100 billion and global market share of 9.3%, numbers surpassed only by the US.

Another success factor of Germany's chemical industry is its capacity for innovation. As the largest chemicals market in Europe, Germany has one of the highest R&D intensity levels in Europe, with 2.8% of revenue spent on R&D in 2015 making it the continent's innovation hub. As a result, the second-highest number of patents (18%) in the chemical industry at the European Patent Office originate from Germany.

This strength in innovation combined with productivity has helped establish Germany as an attractive chemical industry production location. In the latter respect, Germany's chemical companies were able to reduce their energy needs by 20% between 1990 and 2010 — with output over the same period increasing by almost 60%. As a result of these efforts, the production output of basic chemicals — including ethylene, chlorine and ethylene oxide — has remained constant since 2000.

Germany's Chemical Parks: The Old Retainer

The traditional chemical production sites — some of them more than a century old — have, through good strategic investment and production optimization, been integrated into a network of highly integrated production sites: Germany's unique Chemical Parks. The country's chemical complexes are served by excellent logistics networks — from road and rail to waterway and pipeline (see map on page 8). Investments are constantly being made to improve provision across the existing logistics infrastructure.

Dr. Thorsten Bug, Germany Trade and Invest

With their 'plug and play' concept, Germany's chemical parks are able to offer state-of-the-art conditions for international investors. Investors can choose the services from a site operator that suits their business model best. The new production site, developed sites and site security services are all made available for the investor's core activities. Optional services such as warehousing, logistics, and analytics can also be requested as needed. German Chemical Parks increase cost effectiveness by splitting cost and overhead — a benefit to both the site operator/owner and investor.

Chemical parks offer a wide range of business models. Subject to the investor's individual requirements, land can be leased or purchased in order to establish a production unit. At the other end of the scale, a site operator invests in and operates the new plant for the investor on a custom or toll manufacturing basis. Investors are supported by a number

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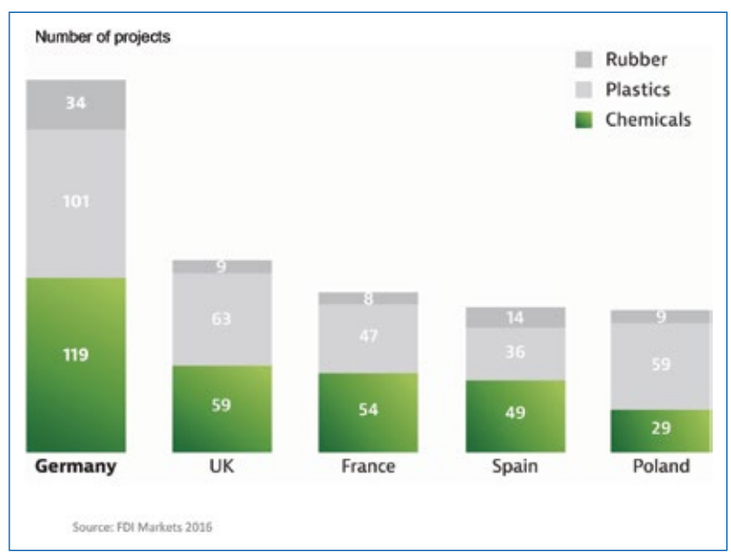

Fig.1: Top-5 chemical industry FDI destinations in Europe (2011–2015)

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of investment planning and construction services. The most sought-after service is for permit applications. Licensing procedures are completed quickly and efficiently with the competent public authorities assisting in the process from a very early stage.

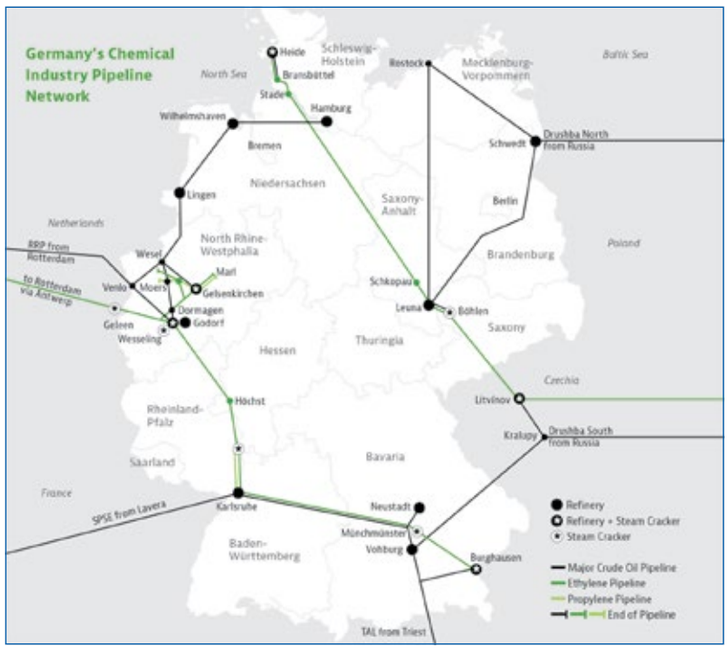
High-Quality Energy on Tap

A secure power supply is imperative for profitable industrial plant operation. Chemical parks secure their energy through the provision of a number of redundant supply lines. Most chemical parks operate their own on-site power plants in order to secure supply. A continuous supply of steam and overall energy are also key cost success factors. On-site power plants utilize the high efficiencies found in combined cycle heat and power (CHP) generation, thus further optimizing energy production

The reliability of Germany's electricity supply is very high by international standards. Unlike some countries in Europe where major blackouts are recurrent, power outages are definitely the exception in Germany, where grids lose just 14 minutes per year in interruptions.

German Workers: Never Strike Out

One of the largest cost drivers in production processes is the cost of labor, including critical cost aspects such as



motivation and days lost to industrial action. According to the IMD World Competitiveness Yearbook 2016, German employee motivation levels are very high. This can be derived from the fact that Germans work more than

> *"The last strike action in the chemical industry in Germany took place in 1971."*

their international peers (41.2 hours per week) and lose less days per annum due to industrial action than other market-determining European nations. There were a total of 19 strike days per thousand employees (equal to about 220,000 working days per year in Germany) in the seven-year period between 2009 and 2015 — exactly half of the European average. The high level of workforce satisfaction is further illustrated by the fact that the last strike action in the chemical industry in Germany took place in 1971. This reflects the good cooperation between the IGBCE trade union and companies in the sector.

Similar to the low strike numbers, wage increases have been very moderate in Germany compared with other countries in the EU. The overall labor cost gap between Germany and its eastern European neighbors has been significantly reduced in the past decade. Since 2006, wages in the European Union have grown on average by 2.5%.

Steeled for Competition

The presence of strong client industries, cost-efficient production, and sensible labor market reforms prior to the financial crisis in 2008, which gave corporations higher labor flexibility, have allowed the German chemical industry to consolidate its market-leading position within Europe. This is best evidenced by a strong increase in foreign direct investment in Germany (fig. 1, page 6). Much of this investment is in basic chemicals, against public perception. The goal of these investments is to ensure the global competitiveness of the respective facilities, which is why so many of the investments involve keeping technology up to date.

Amid global competition, production capacities with sensitive cost structures will further migrate away from industrial regions. However, because of its specific strengths, particularly in innovation, productivity, and resource efficiency, Germany, alongside the US and Japan, will continue to be a highly attractive production location for the chemical industry.

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Covestro Expands Capacity for Polyurethane Dispersions

Covestro has begun operations at a new production facility for aqueous polyurethane dispersions (PUDs) at its Dormagen site. Along with a current expansion of production in Barcelona, the company is thus boosting its capacities in Europe significantly. In order to meet global demand, Covestro is also building a new facility in China, as well as planning to resume production in the United States and at the same time modernizing and expanding facilities there.

According to Covestro, the new capacity is primarily needed to satisfy rising demand from the coatings and adhesives industry: manufacturers remain determined to replace solvent-based products with more sustainable waterborne systems. (rk)

BASF Invests in Third Plant for Specialty Zeolites

BASF invests in a new production plant for specialty zeolites at its Ludwigshafen, Germany, site. These specialty zeolites will be used to produce emissions catalysts for heavy duty and light duty diesel vehicles. Production is scheduled to begin in 2019. According to BASF the new plant will will double its global specialty zeolites production capacity. "Our new specialty zeolites plant is a cornerstone for our long-term growth strategy for our mobile emissions catalysts business," said Kenneth Lane, president of BASF's Catalysts division, which operates the new plant. "This investment will allow us to strengthen the reliable supply for our production of leading-edge diesel emissions catalysts solutions for our customers in the heavy duty diesel, but also the light duty diesel industry." (rk)

Vinnolit Expands Gendorf Chlorine/VCM Capacity

German PVC producer Vinnolit has announced plans to expand capacities for chlorine and vinyl chloride monomer (VCM) at its site in Gendorf. The company, which has been part of the US Westlake Group since July 2014, will implement Thyssen-Krupp Uhde's energy-efficient single-element membrane technology at the chlorine plant, which currently has a capacity of 180,000 t/y. At the same time, Vinnolit will expand VCM capacity in two steps through 2021. (eb, rk)

Evonik Opens New Membrane Production Facility

Evonik Industries has opened another membrane production facility at its Austrian plant in Schörfling.

The new hollow fiber spinning plant predominantly produces membrane modules for efficient nitrogen generation and for process gases.

Nitrogen accounts for roughly 40% of the estimated global gas separation market, making it the second-largest market after natural gas. (rk)

Asahi Kasei Launches R&D Center in Germany

Asahi Kasei is enhancing its presence on the European market. Since the establishment of the group's European operational headquarter in Duesseldorf, Germany, in April 2016, Asahi Kasei has continuously been intensifying its cross-divisional marketing and technical service activities to strengthen the relationship with the European automotive industry. In October 2017, Asahi Kasei launched its new R&D Center in Dormagen in the German federal state of North Rhine-Westphalia. The R&D center will be an internal unit of Asahi Kasei Europe and will focus on enhancing the technical service support for the European customers and serve as the main driver for developing new businesses, product grades and applications for the European market, in close cooperation with Asahi Kasei's R&D headquarter in Japan. (mr)

AlzChem Invests in Further Growth

AlzChem Group, the Trostberg, Germany-based vertically integrated specialty chemicals company, is investing €50 million in the further growth of the company. The funds will be used to build a new Creamino production facility at its main site in Trostberg, Bavaria, trippling the production capacities for the feed additive from 7,000 to 21,000 t/y. The growth of the markets for feed additives and growth regulators in crop plants is being driven by the growing world population. (mr)

Vetter to Expand Packaging Capacity

Vetter, the Ravensburg, Germany-based provider of prefilled drug-delivery systems and expert in complex packaging projects, announced a major expansion of its secondary packaging capacities. The need for expansion is a response to rising customer needs and market demands for complex packaging solutions, Vetter says, and is also a result of the company's continuous growth in new filling lines and new lyophilizers, which is driving the need for increased downstream secondary packaging capacity. The project, already underway, is occurring within the second floor of Vetter's existing Secondary Packaging (VSP) facility and will result in an increase of approximately 32,000 square feet of new packaging capacity. (mr)

Roche: Expansion at Penzberg Completed

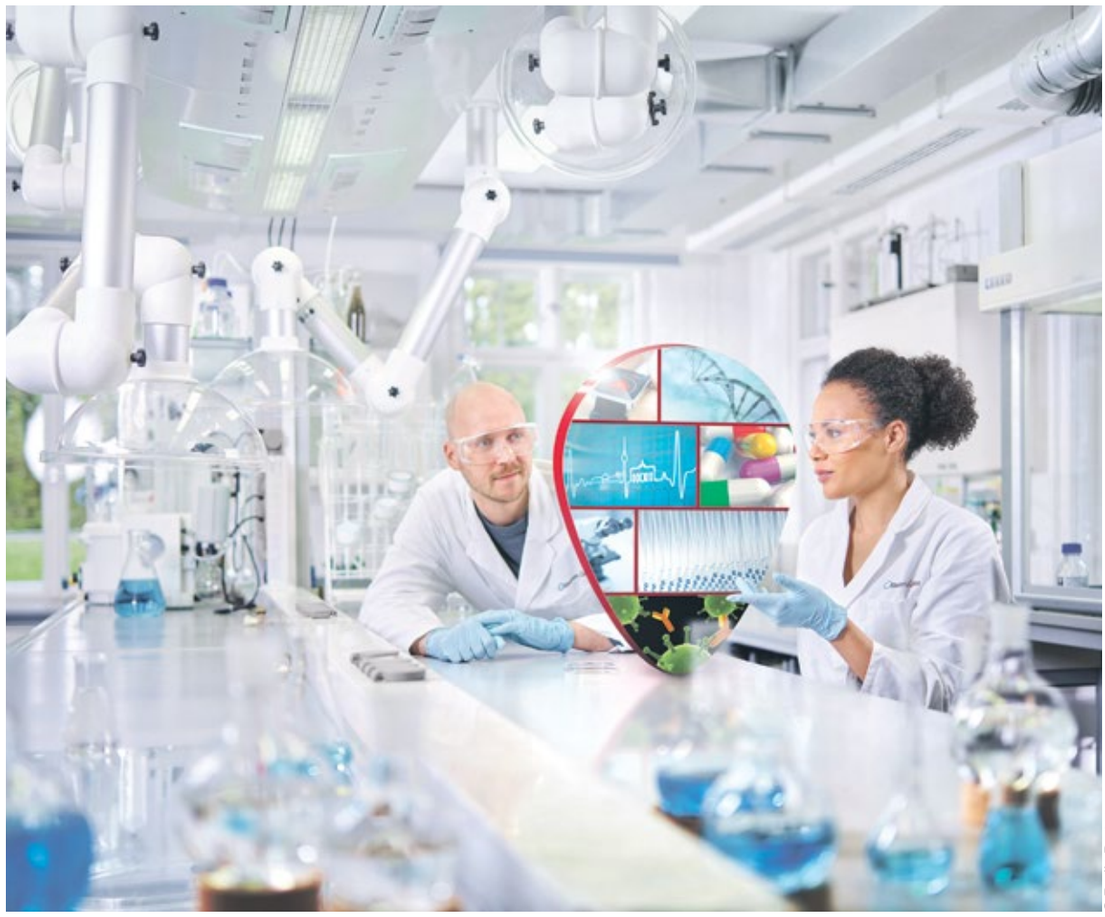
With an investment of around €600 million in the past three years, Roche has expanded its biotechnology center in Penzberg, Germany. The expansion at the Bavarian site aims at focusing on the close interlinking of pharmaceuticals and diagnostics, the opportunities for the future in personalized medicine and the use of digitization.

Projects completed in the course of the site expansion included the extension of the pharmaceutical production capacities (investment: ca. €330 million), the construction of a new laboratory and office building including a biotech training center (investment: ca. €119 million), and the construction of a new production facility for diagnostics (investment: ca. €55 million) along with expansions of energy, media and water treatment facilities. (mr)

The German Capital Region

A Leading Hub for Life Sciences and Digital Health

The German capital region is one of the leading life sciences and healthcare industries centers in the world. A total of around 30,000 employees work in more than 500 companies in the pharma, the biotech and the medtech industry.



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The region's distinction is anchored in its unique research and clinical landscape, as well as its ability to closely link the key players in the life sciences and healthcare. Biotechnology is a strong driving force within the Berlin-Brandenburg healthcare industries cluster — HealthCapital — generating innovation and growth there and beyond. More than 80 % of the around 230 biotech companies are active in biomedicine. The focus of biotech activity within the region are biomedicine and diagnostics, therapeutics and regenerative medicine.

In addition to the biotech and medtech landscape, the capital region has a longstanding tradition of pharma drug development. Global players, such as Bayer, Pfizer, Sanofi, Takeda or Berlin-Chemie (as part of the Menarini group), and more than 20 medium-sized companies, are offering jobs for a total of around 10,600 employees.

They all benefit from close cooperation, both with science and with more than 130 hospitals. Customers from research and industry have access to patient cohorts of urban and rural populations of about 180 ethnicities, covering all medical indications.

Excellent Conditions for Transfer and Translation

The German capital region is home to over 40 renowned scientific institutions, including the Charité — Universitätsmedizin Berlin, the Robert Koch Institute, the Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC), the German Heart Center Berlin, and other well-known Fraunhofer, Helmholtz, Leibniz and Max Planck Institutes. The Charité is one of the largest university hospitals in Europe. More than 4,500 physicians and scientists carry out research, teach, and treat patients here at the cutting edge of international medicine.

The Berlin Institute of Health (BIH) is a world-class research institution. Scientists from Charité and MDC have been carrying out research together at BIH since 2013. BIH is a scientific institution for translational research and systems medicine and is being established as a unique structure in Germany's biomedical research landscape. The BIH, the Charité, the MDC and Sanofi Germany signed a joint research framework agreement in Berlin on October 4, 2017. In the future, the institutions will work together closely on the development of novel therapies for various diseases. In addition, the partners will support talented young researchers and projects with economic and medical potential.

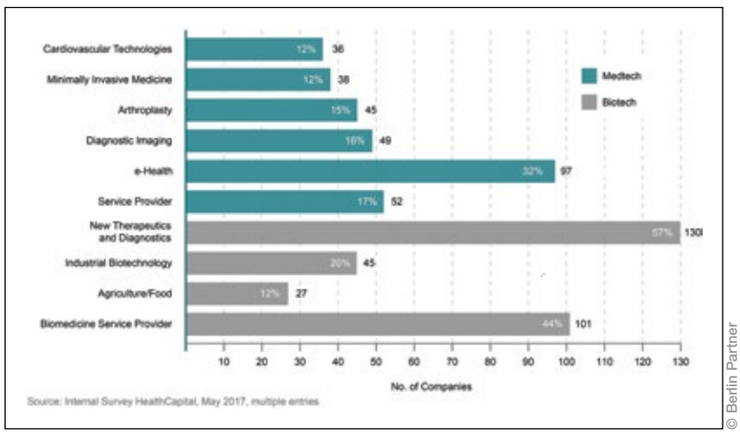
For translational research and the interdisciplinary transfer of knowledge between researchers, for close networks between science and business, and the exchange between creative minds on the one side and financial backers on the other — in the German capital region, there are transfer and translation centers for a variety of topics and technologies, such as the Berlin-Brandenburg Center for Regenerative Therapies BCRT and the Experimental and Clinical Research Center ECRC.

The many technology parks and networks create an excellent infrastructure and technological support for transforming the latest scientific findings into innovative products for the healthcare sector. These include Germany's largest Biotech Park Berlin-Buch and Europe's leading technology park Berlin-Adlershof.

Strong networks such as the new formed "Network for Pharma Solutions" (Net PhaSol) and the "glyconet Berlin-Brandenburg (BB)" offer plenty of opportunities for collaboration along the entire value chain. Both networks are not limited to the Berlin-Brandenburg region, but are also open to national and international partners and projects.

See you in Berlin at Bionnale 2018

Representatives from academia, industry and finance attend Bionnale, the annual life sciences conference in Berlin to identify, engage and enter into strategic partnerships. The networking character is one strength of the multi-sessional, international event with 1,000 attendees from 30 countries in the last year. Bionnale 2018 will take place on June 20, 2018.
https://bionnale2018.b2match.io/



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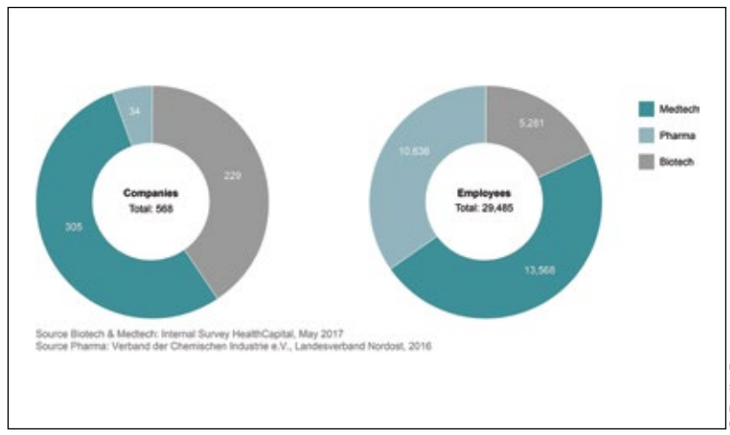
Life sciences companies located in the German capital region by market segments.



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Number of life science companies and employees located in the German capital region.

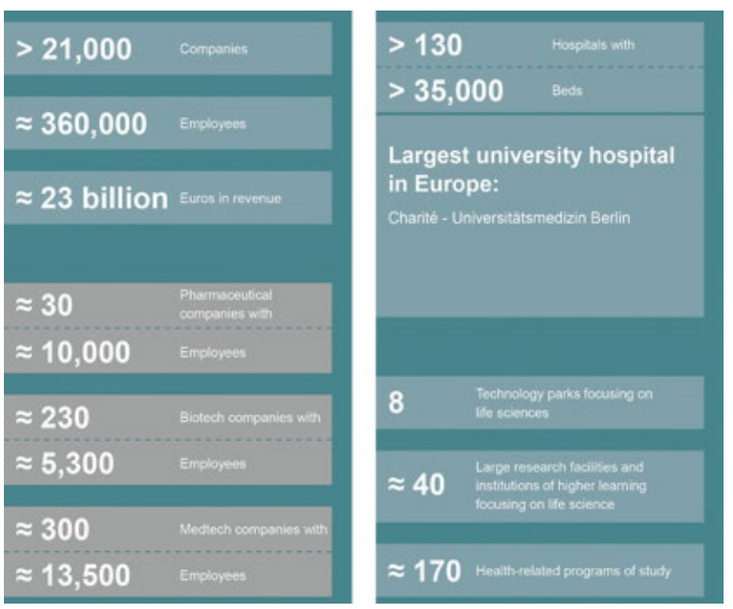
A Place To Be for Start-ups and Digital Health

The lively mix of economic players and scientific institutions, the diverse selection of initiatives, the beneficial location factors and the growing number of IT companies make the capital region a unique hub for start-ups and digital health solutions.

Over the last five years, more than 100 life sciences companies have been founded in Berlin-Brandenburg. This dynamic is still ongoing. Visible indicators include not only the number of new start-ups, but also the wide range of networking activities and services for start-up founders. The main start-up engine is the fact that the fields of life sciences and digital technologies are merging more and more. Digitization is advancing all segments of the healthcare industry, and has seen outstanding development over the last few years. The trend towards app-based applications for prevention, diagnostics, and treatment has only just begun, but the potential and demand involved indicate it will develop substantially into a strong market.

The over 60 incubators and accelerators in the German capital region offer founders and start-ups a leg up in developing their ideas and networking with other players. More and more, large pharmaceutical and IT companies are working with start-ups.

Bayer was one of the first movers in this area, with Grants4Apps (G4A). This program was successfully launched in Berlin in 2012, and has now been expanded to many other cities around the world. G4A is a web-based crowdsourcing initiative. It provides financial support to start-ups for their software, hardware and technology projects which contribute to improve health outcomes or pharmaceutical processes.



Numbers of the healthcare industries cluster Berlin-Brandenburg.

With its CoLaborator Bayer offers young companies in the chemical and biosciences field suitable and complete laboratory and office spaces in close proximity to their own researchers. The company's goal in doing so is to drive research and innovation forward and to serve as initial contacts for start-ups searching for potential cooperative partners.

Pfizer also supports digital health solutions for better patient care through their Healthcare Hub Berlin. Another initiative by the US pharmaceutical company is the Berlin Research Lab (BRL). The BRL supports biotech innovation and diversity by bringing together companies and researchers from different areas of expertise, such as biotechnology, biopharmaceutics or biomedicine.

Industrial Biotechnology

Industrial biotechnology in the German capital region bears the potential of bringing forth innovative products and new production processes that save energy, costs and greenhouse gases and contribute towards becoming less dependent on fossil raw materials. Therefore, the industrial biotechnology has interfaces to numerous sectors.

The regional expertise covers various fields like enzyme technologies, natural compound extraction, microbial expertise, metabolic engineering and analytical technologies for the optimization of bioprocessing.

One focus in the industrial biotechnology sector lies on methods and procedures for the production of biopolymers for biobased and biologically degradable plastics. New paths are sought for producing basic and specialty chemicals from biomass as well as to optimize processes and to make them more sustainable. Regional know-how is offered to the pharmaceutical and fragrance industry, for example re-using methods for catalysts. Technologies are being developed for bio-refineries, which produce diverse intermediate and end products based on biogenic raw and residual material for the industry as well as energy sources.

Industrial players benefit from the region's strong research facilities, such as the Leibniz Institute for Agricultural Engineering and Bioeconomy Potsdam-Bornim, the Max Planck Institute of Colloids and Interfaces in Potsdam-Golm and the Fraunhofer Institute for Applied Polymer Research and its processing pilot plant for biopolymers at BASF's Schwarzheide site.

Offering Service and Support for Life Sciences in the Capital Region

The central contact and coordination office for all issues concerning life sciences and healthcare industries in the German capital region is the HealthCapital cluster management. At the interface of business, science and clinics, the cluster management drives networking and the technology transfer and supports companies interested in relocating to the region. Berlin Partner for Business and Technology and the Brandenburg Economic Development Corporation (WFBB) are responsible for managing the cluster.

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Excellence in Plastics & Chemistry

Promoting Growth in the German Federal State of Brandenburg

With some 600 companies employing around 13,000 people, the plastics and chemicals cluster is one of the state of Brandenburg's industrial mainstays. There is virtually no other branch of industry in Brandenburg that is as closely interwoven with other economic sectors.

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As a supplier of many starting products, the plastics and chemicals industry plays a key role in innovative development of the medical technology/pharmaceuticals, power engineering, information and communications technology, optical, automotive engineering and many other sectors. Brandenburg products, such as fibers, films, tires, domestic appliances and wind turbine components, as well as polyurethane base products, pesticides, water-based coatings and technical plastics, have made the region around the German capital famous far and wide.

Networking within the sector and the value-added chains, as well as constant use of existing know-how in associated scientific institutions, are essential for long-term success. Targeted activities are intended to integrate participants in the cluster, as well as across clusters and states, closely into the network, actively support the transfer of knowledge and technology and thereby generate added value for participants.

Fountain Town of Neuruppin

The district capital of Neuruppin is synonymous with diversity and development. As a regional growth center, it offers a highly productive economic infrastructure. It is home to the Neuruppin-Treskow industrial and commercial area and Temnitzpark, offering optimum conditions for innovation and cooperation. Regional market leaders and global plastics industry players are already based at this location. Ruppiner Papier- und Folienwerke (papers and films), REA Plastik Tech, ESE Industrie and Atotech Deutschland have also established themselves here in addition to PAS Deutschland, the leading developer and manufacturer of white goods cabling and faceplates. One major reason is the good supply of labor. Innovation plays an important role here: in recent years, PAS Deutschland has won the Brandenburg Innovation Award for Plastics and Chemicals on several occasions.

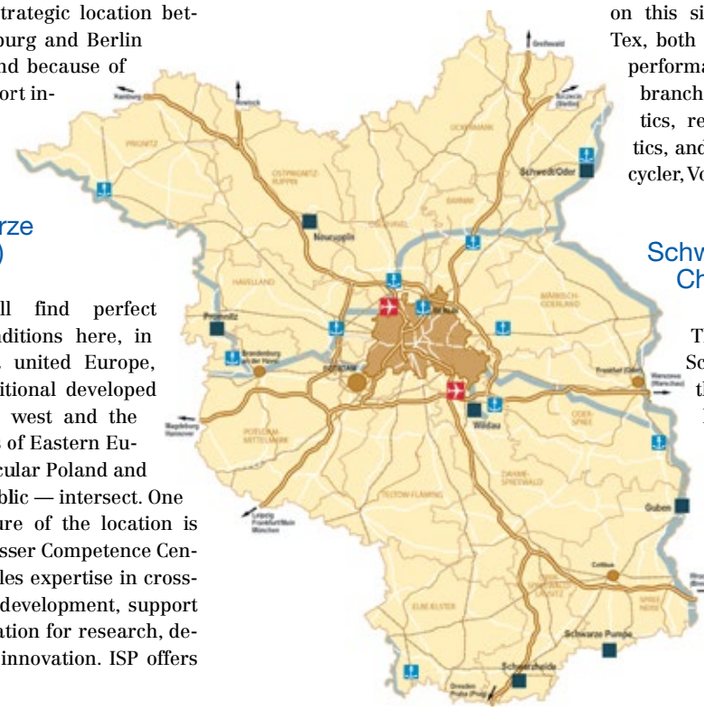
The fountain town of Neuruppin is extremely close to research institutions and universities, renowned medical facilities and a comprehensive range of cultural and leisure services. The region is an attractive location for innovation and industry due to the favorable strategic location between the Hamburg and Berlin conurbations and because of the good transport infrastructure.

Industriepark Schwarze Pumpe (ISP)

Businesses will find perfect framework conditions here, in the heart of a united Europe, where the traditional developed markets in the west and the growth markets of Eastern Europe — in particular Poland and the Czech Republic — intersect. One particular feature of the location is the Industriewasser Competence Center, which bundles expertise in cross-cluster project development, support and implementation for research, development and innovation. ISP offers cutting-edge technology and extensive experience in the area of water supply and waste water disposal.

More than 120 businesses employing in the region of 4,400 people in production and development benefit from the opportunities offered by ISP for cooperation and from the potential for synergy which ensues from the proximity to many other innovative companies. The area's biggest employer is Lausitz Energie Bergbau AG (LEAG), which also drives innovation and cooperation in ISP.

Another major advantage of the site is its proximity to the Brandenburg University of Technology Cottbus-Senftenberg (BTU), a university which focuses on the practical applications of its research.



Industriepark Premnitz

Premnitz can thank the development of artificial fibers for its reputation as an industrial base. This industrial park offers superb conditions for chemicals companies as a result of its modern technical infrastructure and innovative entrepreneurs on site.

Märkische Faser is still manufacturing here today. Alongside this long-established company, there are two companies from the Blücher Group on this site: Adsor-Tech and SmarTex, both active in the field of high-performance materials and fibers. A branch of DOMO Engineering Plastics, representing technical plastics, and south German plastics recycler, Vogt-Plastics, are also here.

Schwarzheide Chemicals Hub

The historic town of Schwarzheide is located in the heart of Lausitz. It has been a home to industrial firms for more than 80 years, with BASF leading the way since 1990.

The chemicals hub features a rail network which joins the main Deutsche Bahn network. Shipments can be transshipped from

rail to road, and vice versa, at STR Tank-Container-Reinigung's sophisticated intermodal transport terminal. Raw materials and goods are shipped from the North Sea to the Black Sea, from the Iberian Peninsula to Asia, via the logistics hub at Schwarzheide. Companies which benefit from this include Feurer Febra, Proseat Schwarzheide and Ineos Styrolution Schwarzheide.

BASF Schwarzheide promotes the region on an ongoing basis and accepts its social responsibility. As a structurally important company, it contributes to positive development of the environment, from training to location. There are scientific institutions close by, including BTU Cottbus-Senftenberg on the doorstep.

The Fraunhofer Biopolymer Technical Processing Center in Schwarzheide, an outpost of the Fraunhofer Institute for Applied Polymers (IAP) in Potsdam-Golm, represents a powerful research and development institution in a practical field of industry which supports SMEs and, in this way, facilitates market access for bioplastics. Cooperation with local universities has been intensified and a supply of junior employees for the plastics processing industry ensured through appointment of the head of the Technical Center by the Fraunhofer IAP and BTU Cottbus-Senftenberg.

Industriepark Schwedt (IPS)

Schwedt industrial park lies to the north-east of Berlin, beside the frontier river of the Oder. The PCK refinery means that Schwedt is one of the largest industrial sites in the state of Brandenburg.

Schwedt industrial park is strategically and conveniently located in the north-east of the Berlin-Brandenburg area, on the Berlin-Szczecin axis, right next to the Polish border. It is an ideal launch pad for the Eastern and Central European markets, Scandinavia and the Baltics. The industrial park is next door to the PCK refinery and is one of Brandenburg's largest industrial areas. It is home to the petrochemical industry.

North Brandenburg is becoming a leading region in the field of renewable energies and sustainable raw materials, primarily photovoltaics, wind power, biogas and biofuels. A bioethanol plant, biodiesel plant and wood pelleting plant are already in production. This makes it possible to exploit potential synergies. The PCK refinery uses biofuels for production. The production of second-generation biofuels offers prospects for interesting and innovative developments. The conditions already exist in the region for continuous availability of agricultural biomass. The interface between traditional industry, agriculture and forestry offers diverse opportunities for new product development. Northeast Germany offers great potential for biomass cultivation. Contact with industrial partners in Poland also offers additional opportunities to access new sites for biomass cultivation. The lengthy, successful cooperation with Eberswalde University for Sustainable Development is another plus in the field of biogenic raw materials.

Industrial Town of Guben

The attractiveness of Guben: trilbies and nappa leather were invented in Guben. Until 1945, the town was the most important base in Germany's hat-making industry and thereafter played a major role in the production of chemical fibers until reunification. Nowadays, the companies based there mainly develop and produce high-tech plastics and high-performance textiles.

As a result of this expertise, Guben has developed into a modern, fully developed industrial area. German and foreign chemicals and plastics companies now determine the economic profile.

In addition to the long-established company Trevira, which operates in the fibers industry, other major employers include Grupa Azoty ATT Polymers from Poland and Megaflex Schaumstoff. The speciality yarns produced by Trevira are used in car interior furnishings, amongst other things. Potential uses for these fibers are constantly being expanded as part of a joint venture with external institutions and the BTU Cottbus-Senftenberg. One result of the development work at Trevira is dual-component fibers, which can be used, amongst other things, to create three-dimensional, sound-absorbing surfaces. These can be used as sun protection, for example, or as wall panels, and can be printed digitally. There is also a permanently inflammable version available of the yarns used.

Wildau — an Industrial and Scientific Center

The attractive industrial and scientific center of Wildau, which offers great quality of life, also primarily serves as a gateway to Northern Europe from its heart.

The city of Wildau has an industrial heritage which dates back more than one hundred years. Since the 1950s, Wildau has developed into a center of learning and research. The Aerospace Technology Center (ATC) — a site with attractive halls and offices — has become an innovative environment for high-tech firms and start-ups on the former heavy engineering site. The Technical University of Applied Sciences and Technologie- und Gründerzentrum (TGZ) are also based here. The TGZ provides attractive opportunities for start-ups, technology companies and research establishments.

Even now, the Fraunhofer IAP, which undertakes research into polymers and composite PYCO, and Wildau Technical University of Applied Sciences act as magnets for new businesses and, as a result of new research cooperations, will expand further through the future "Competence Center for Energy and Resource-efficient Lightweight and Composite Materials".

More than 60 companies have already relocated to Wildau, with its heavy concentration of lightweight materials technologies, and they will work closely with recognized technological research experts to promote this location's continued dynamic development.

The Zentrum für Zukunftstechnologien (ZFZ) will be constructed next door to the Wildau Technical University of Applied Sciences and a walk away from the ATC. The four-story building, covering approximately 7,000 m² of offices, halls and workshops, should be ready by 2020.

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Swiss Biotech Sector Stimulates Growth

For many years, Switzerland has held the top spot in the World Economic Forum (WEF) competitiveness index. Compared to other countries, Switzerland maintains high levels of Foreign Direct Investment (FDI). In 2016, FDI in the country amounted to $750 billion, according to Switzerland Global Enterprise (S-GE), the Swiss promotion agency.

One reason why Switzerland has become a special place for business is that it offers good framework conditions for complex industries. This holds true for industries such as the chemical, pharmaceutical or the highly specialized flavor and fragrance sector, in which Swiss companies occupy a world leadership role, according to Dr. Jan Lucht, spokesperson for biotech at Scienceindustries, the Swiss business association Chemistry Pharma Biotech. For the sector, biotechnology plays an increasingly important role, as it does for the chemistry, healthcare and life sciences sector in general.

Over the past two decades, the biotech industry in Switzerland has matured into an established business with numerous commercial products generating high returns on investment. In parallel, novel technologies, new players and additional fields of application have continued to increase overall diversity.

All along, patents have been instrumental in protecting products and encouraging investment in this high-risk/high-potential industry. According to the Swiss Biotech Report 2017, Switzerland provides a fertile ground for new ideas. In no other country are technologies and inventions better protected than in Switzerland.

Switzerland's success in biotechnology relies on the diversity of its knowledge networks in research, industry, finance and industry development. The Swiss have developed an economic and social system that is built on the four pillars of innovation, technology, security and trust; thus creating a spirit that embraces diversity to deliver innovation and quality.

In addition, the comprehensive education system provides a motivated workforce at different qualification levels. Publicly funded education and research institutions are well equipped, internationally connected, and draw top scientists from all over the world. The research landscape stretches from academia, through innovative start-ups and SMEs, and on to big, multinational companies. Efficient knowledge and technology transfer between basic and applied research and industrial applications further stimulates innovation. And since 2013 the National Thematic Network (NTN) Swiss Biotech, led by Biotechnet Switzerland and the Swiss Biotech Association, has made it a goal to foster transfer activities in biotechnology. (mr)

www.s-ge.com/invest-biotech
www.scienceindustries.ch
www.swissbiotech.org

The Central German Chemistry Triangle Network 4chiral

The network 4chiral was founded in 2006 in Bitterfeld-Wolfen, located in the Central German chemistry triangle, by seven regional established middle sized enterprises with the main objective to collaborate within the field of chiral compounds as well as to show presence on a highly volatile market.

The reasons for the foundation of this network date back to the time of the German reunification. The early nineties were a period of radical change for the Eastern German industry. The successful privatization of former state-owned companies was followed by a time of consolidation and the opening up of new markets at the end of the nineties.

In 2006, there were already indications of the economic downturn which then led to the worldwide economic crisis of 2007/2008. At that time, Organica — one of the founding members — already had gained insight in the fine chemicals sector but, in a lot of cases, did not know (or not know exactly) about the activities, capacities and plans for the future of its neighbors in the Central German chemical triangle Leune-Buna-Bitterfeld.

In this situation the concept of a network was formed with the aim to combine the Central German fine chemicals industry with the research capabilities in that region. Based on the interest of the pharmaceutical industry in the synthesis of chiral compounds, the network 4chiral was established.

In 2015, the narrow scope on the synthesis of chiral compounds was abandoned and the network open up to the whole fine chemicals and biotechnology industry in Eastern Germany.

Meanwhile the network comprises 28 Eastern German fine chemicals and biotechnology companies, seven universities and two public research institutes spread all over Eastern Germany.

4chiral's main activities and efforts are on the development and optimization of new products and technologies and the ordered compound synthetization and production of well-established or new products as well. The development, optimization and production of catalysts are also vital parts of this network's expertise.

In addition, 4chiral presents itself with shared exhibition booths at trade fairs, offering a broad range of business activities for its customers. (rk)

Green Chemistry and Smart Chemistry

The Chemical Industry Drives Innovation in Austria

As Austria's second largest sector, the chemical industry is also among its most important. Spending on chemical research and innovation also surpasses that of other sectors. At present, it represents around 11% of all investments made in research and development within Austrian industry.

An ad hoc survey of senior managers at member companies of the FCIO (Association of the Austrian Chemical Industry) also showed that companies in the chemical industry drive innovation, promoting Austria as a business location. According to the survey, around 82% of innovations were granted the "highest" and "high" priority levels. Around one in four companies generate over 30% of their turnover from products or solutions that have been on the market for less than five years.

Yet three-quarters of those surveyed also feel that there is a need for political action. For about half of respondents, the factor inhibiting innovation the most was excessive bureaucracy. For 44%, insufficient resources were a hindrance. Many companies also feel that innovation culture in Austria is woefully lacking.

Chemistry 4.0: The Research Priority

Two distinct trends are emerging as research priorities, which we summarise below under the term Chemie 4.0 [Chemistry 4.0]: Green chemistry involves replacing crude oil-based raw materials with what are known as biogenic substances. Examples of these include solvents based on fermentation, or high-quality fibres made from recycled materials. Smart chemistry is about developing smart products and materials. With their special functional properties, they can offer innovative applications with increased benefit — personalised medical care is a classic example, as are the first anti-allergenic surgical gloves, which won an award at the European EARTO Innovation Awards.

A Sector Marked by Strong Exports

Austria's chemical industry has close international ties: over two-thirds of production is for export, with the majority remaining in the EU. Numerous companies have foreign subsidiaries worldwide, or are the subsidiaries of multinationals operating as headquarters for Central and Eastern Europe.

The chemical sector in Austria mainly consists of SMEs. This structure and the small number of (research-relevant) corporate head offices are detrimental to research, and must be compensated for in other ways. That is why Austria needs framework conditions and a funding system to gain the edge over larger countries. Thanks to low labour costs and a wealth of raw materials, Asia, the Middle East and Eastern Europe offer a more cost-effective starting position for competing on the global market.

Hubert Culik, Association of the Austrian Chemical Industry (FCIO)

Emerging countries are no longer thought of purely as cheap production sites for the industry, but are now gaining ground as important centres of innovation. Their domestic markets are also growing considerably faster than the European markets.

Investment Incentives are Vital

Investment incentives must be put in place to secure Austria's future as a

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viable location for industry. The Austrian system, which indirectly funds research through tax initiatives and directly funds specific projects, is therefore a crucial means of supporting industry research. The chemical industry views direct and indirect research funding as complementary in nature: while indirect research funding is based on location, direct funding is concerned with the specific technology being researched. Austria has a need for both.

Planning Security is Crucial

Planning security is essential if companies are to minimise investment risk. It is affected by restrictions on raw material availability due to chemical legislation, as well as short-sighted climate policy that creates huge uncertainty in Austria as an industry location and stifles investment efforts before they get off the ground. That is why we are campaigning for transparent, comprehensible and far-sighted legislation.

Legislation Threatens Competitiveness

The results of a cumulative cost assessment clearly demonstrated that the chemical industry is suffering under the overwhelming financial impact of chemical legislation. This calls for urgent, policy-based action. It can only be hoped that political decision-makers will consider the results of the study. Given the structure of the circular economy and the upcoming REACh Review, measures need to be taken to minimize the administrative burden companies face due to legislation. Otherwise, the competitiveness and innovative power of European companies in the chemical industry will be jeopardized.

The Austrian Chemical Industry in Figures

Austria's chemical industry generates a total of €14.8 billion in production value (2016). The plastics processing industry, which in Austria is also monitored by the FCIO, contributes over one-third of this figure (36.6% in 2016). Some distance behind is the pharmaceutical sector, contributing 14.5%, and plastics production at 13.2%. Chemical production also contributes a double-digit percentage to the chemical industry's overall turnover. Synthetic fibers come in at fifth place (6.1%) (tab. 1).

Around 44,500 people work in Austria's 247 chemical industry companies. This figure has increased by 0.3% on the previous year. The sector is shaped by SMEs that have an average of 150 employees. Almost one in three employees in the chemical industry works for an SME. Of the 247 companies, only about 50 organizations employ more than 250 people.

Economic Situation: The Beginnings of an Upturn

For the previous five years, there had been no real movement in turnover in Austria's chemical industry. However, as of this year there has been a noticeable upturn and the sector is looking to the future with confidence. In the first half-year, turnover increased by 2.5% to €7.7 billion. Synthetic fibers performed particularly well, with growth of 10.4%, as did pharmaceuticals (up 5.9%) and rubber products (up 5.6%). Other sectors also showed slight signs of improvement. Only organic and inorganic chemicals, agrochemicals and plastic raw materials continued to lag behind relative to the previous year's results.

"Austria's chemical industry has close international ties."

The balance of trade in the Austrian chemical industry was very even in 2016, with only marginally more imports than exports. Around two-thirds of exports remain within the EU (tab. 2). Globally, Germany is Austria's most significant trade partner, receiving 21% of total export volume. In second place is Switzerland, with the USA, France and Italy some way behind.

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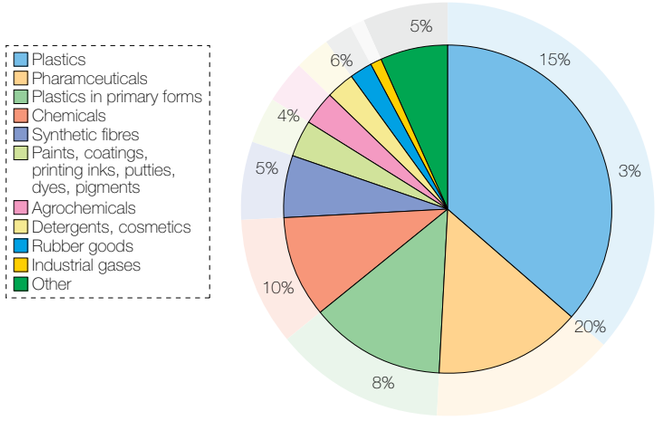
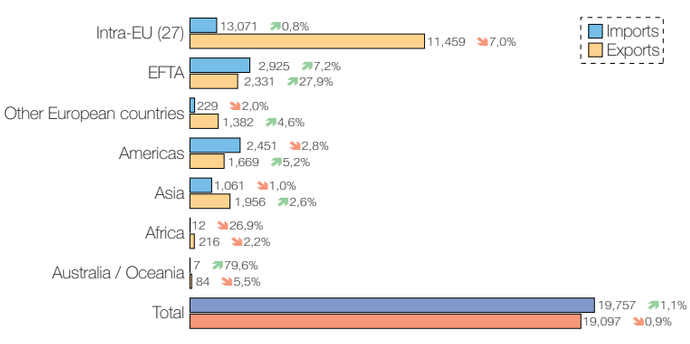
Share of Austrian chemical industry sub-sectors in 2016 — Fig. 1



Source: Statistik Austria © CHEManager

Foreign trade balance of the Austrian chemical industry in 2016 — Fig. 2

Value in million euros



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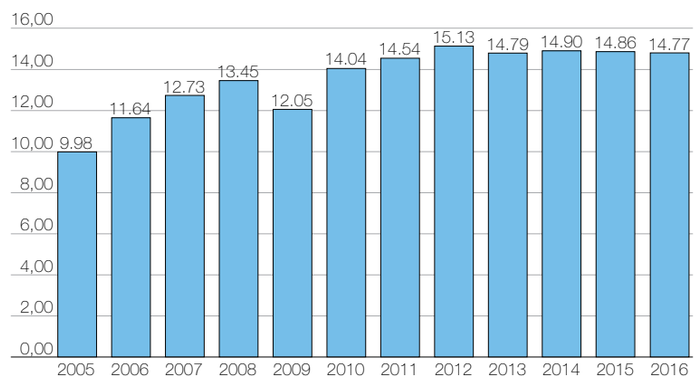
Production value of the Austrian chemical industry, 2005 – 2015 — Fig. 3

in billion euros



Source: Statistik Austria © CHEManager

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Life Science Valley in the Heart of Europe

The Swiss Canton Ticino is an Ideal Platform for International Business

Located just south of the Swiss Alps, Ticino is the Italian-speaking region of Switzerland. The canton's strategic geographic position represents a bridge between northern and southern Europe and between two of the strongest and most dynamic economic areas in Europe: Lombardy in Italy — with Milan at its heart — and the Basle-Zurich area in Switzerland.

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Ticino is one of the furthermost touristic locations in Switzerland, but at the same time it showcases a wide array of business activities. The local economy ideally balances the industrial and the service sectors. Alongside a leading tertiary sector there is a solid industrial sector with internationally competitive and highly innovative companies. The backbone of the industrial sector, composed by a number of SMEs in the fields of life sciences, mechanics and electronics, has recently been complemented by rising new sectors like renewable energies and advanced logistics.

The Life Sciences Sector

Ticino's industry sector, especially in the electrical engineering and chemical-pharmaceutical areas, is heavily export-oriented. In the life sciences field the pharma industry plays an important role, and top-quality niche producers located in Ticino cover the entire pharma supply chain.

The Farma Industria Ticino (FIT) association of chemical and pharmaceutical industries, founded in 1980, is a private organization that currently counts 26 member companies, with a combined workforce of 2,900 employees and a total annual turnover of approximately CHF 2.3 billion (ca. €2.1 billion and $2.4 billion), more than 80% of which being derived from export.

Quality, technology, innovation and sustainable growth represent the core assets of the pharma industry. Several FIT member companies have been certified, in addition to Swissmedic, by many foreign authorities such as US-FDA, and participate in programs such as OSHA, ISO, responsible care and certified sustainability.

Several investments accounting for almost CHF 500 million have been planned for Ticino from 2016 to 2018, mainly in R&D and innovation. Activities of the associates range from preclinical and clinical drug development to chemical and formulation process development to industrial manufacturing of different classes of APIs and of a great variety of drug products forms. The vast majority of FIT companies also offer services such as contract research and manufacturing.

Representing the vast majority of the companies active in this Italian-speaking part of Switzerland, FIT has a great network of know-how and access to skilled and qualified, multilingual human resources. In Ticino, the presence of world-class high schools and research institutes integrated into the enterprise system and the proximity to the Swiss and Northern Italy universities and pharmaceutical expertise provide a significant technical, scientific, logistic and cultural asset.

A main area of focus to which Farma Industria Ticino contributes with its own expertise is vocational training. A commitment also based on the constant need to discover and train future co-workers. The Association's activity in this specific area hinges on the promotion of

all training opportunities which are tied to careers in the sector, and targeted at new generations of technicians, organizing introductory courses aimed at young people who are serving apprenticeships in the professions of chemical laboratory technician, biology laboratory technician and manufacturing operators. For the middle management teams, mini-MBA training courses in pharmaceutical management are organized in collaboration with a local university school (SUPSI).

Business Advice and Support

The success of the local industrial companies is based, on one hand, on the advantages offered by the "Swiss system" in terms of political and institutional stability, a flexible labor market, and a mild taxation. On the other hand, the availability of highly skilled labor force with exceptional multilingual skills and the opportunity for companies to collaborate with top-notch research institutes stimulates the local enterprises to constantly invest in innovation and remain competitive.

The local authorities are equipped to advise and support business ventures at their various stages. Particular attention is paid to the general framework conditions, in order to provide a business-friendly and unbureaucratic environment.

The Economic Promotion Agency informs foreign companies about the business opportunities in our region and simplifies their settlement by providing practical and direct support. Start-ups and innovative entrepreneurial projects are supported by the AGIRE Foundation through coaching, technology advisory, networking and financial support. AGIRE promotes and fosters the transfer of technology between companies and the academic or research centers. AGIRE manages the Technology Park (the network of technology parks ("Tecnopolo Ticino") that offers office spaces and support to innovative companies targeting international markets from Ticino. The main hub located in the proximity of Lugano consists of 2,700 m^2 of offices and conference rooms, and, so far, more than 50 companies have settled there. Additional locations, dedicated to specific business sectors, including biotech and medtech, are in preparation.

TiVenture is a newly established venture capital fund that invests in innovative companies with high growth potential strongly collaborating with the local stakeholders of the local innovation ecosystem.

Existing companies and newly settled enterprises active in manufacturing and innovative fields are also offered various direct incentives and support mainly aimed at fostering R&D, innovation and export.

High Competitiveness

Ticino's socio-economic elements offer an attractive and highly competitive environment. Attention to quality of life is of paramount importance in Ticino and is reflected in the personal security provided to citizens, the quality of the health system, the efficiency of public transport and of financial services. These distinguishing social factors, together with a mild Mediterranean climate and a spectacular natural landscape, represent great assets for investors and entrepreneurs in the heart of Europe.

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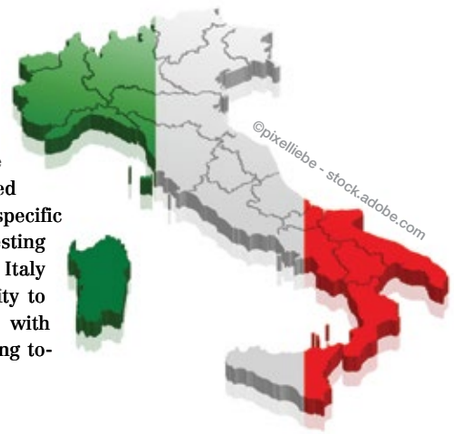
Italian Jobs

With Thousands of SMEs Chemical Activity Concentrates in Northern Italy

Italy, given its relevant industrial manufacturing base, represents a large market for chemical products accounting for about €59 billion. With a turnover of about €52 billion in 2016 (€82 billion including pharmaceuticals) the country's domestic chemical industry represents the third largest producer of chemicals in Europe. Almost 3,000 companies are active in the sector providing jobs for about 108,000 employees (172,000 including pharmaceuticals).



Industrial districts — agglomerates of small and medium-sized firms, specialized in a single-product business, concentrated in a specific geographic area — constitute a characteristic feature of the Italian economic system. Approximately 150 of such clusters — most of them showing strong connections with chemicals — represent productive systems that enable companies to face competition despite their limited dimension. Chemical companies located in industrial districts are known for their sophisticated products responding to any specific customer requirement. Investing in the chemical industry in Italy means taking the opportunity to find numerous customers with high propensity to risk testing together new products.

Thousands of SMEs

Small and medium-sized enterprises (SMEs) play a very important role in many European countries but their presence is particularly important in Italy. The chemical industry in Italy is characterized by the fairly balanced presence of Italian SMEs, which

continue on **Page 21** ▶

Securing Supply Chains, Identifying New Revenue Drivers in Logistics

The economic damage of Hurricane "Harvey" can only be roughly estimated so far. The assessed costs represent around 120 billion dollars. One of the consequences looking at the industrial sector was the collapse of supply chains in the chemical industry. Approximately 33 percent of total US chemical production was interrupted in 2017 due to storms and floods. The impact on the affected companies can be truly drastic, potentially resulting in contractual penalties, production stoppages, sales losses and even insolvency.

New DHL Risk Management Module

DHL has developed a new module of the risk management solution "DHL Resilience360" for the chemical industry to provide companies with a comprehensive overview of potential risks in the supply chain and enable them to take action at an early stage. The tool links information on natural catastrophes, theft, cyber-attacks, geopolitical and other risks for the customer's global production and distribution network. "The tool visualizes the entire supply chain and provides actionable insights for immediate countermeasures," explains Tobias Larsson, Head of Resilience360 at DHL. "It also complements the analysis of downstream industries that could as well suffer from bottlenecks in the event of a disruption."

Michael O´Hara

New DHL Logistics Strategy Tools

But it is not only through the use of digital control systems that processes in supply chains can be optimized and risks can be minimized. With differentiated logistics solutions, chemical companies can gain competitive advantage on their market. This is the key conclusion of DHL Global Forwarding's new white paper „Differentiated Logistics Services". To support their customers within the chemical industry, DHL Global Forwarding introduces two new tools: the „DHL Logistics Service Cube", which systematically identifies the right logistics service for each customer segment, and the „DHL Cost-Benefit Scale", which simply quantifies risk assessments in terms of sales, selling prices and logistics costs to define effective logistics strategies.

"The two tools help decision makers to successfully develop complex supply chain scenarios. Flexible, demand-driven logistics services are a must and a decisive differentiation factor," explains Michael O'Hara, Senior Director, Head of Chemical Sector at DHL Global Forwarding.

Friederike Horst, Key Account Manager Chemical Sector, DHL Global Forwarding

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Download DHL white paper:
www.dhl.com/chemical-logistics

◀ continued from **Page 20**

account for 38% of the total value of production, medium-large Italian companies, which represent 24% of the chemical production, and foreign-owned companies, which stand for 38% of the Italian chemical production value. SMEs are predominantly active in fine and specialty chemicals where economies of scale are not very relevant and the key of success often consists in offering tailor-made products to customers.

Geographic Distribution of Chemical Activity

The Italian chemical industry is concentrated in the North of the country, close to down-stream European markets and local customers. Northern Italy accounts for about 78% of chemical employment, according to the Italian chemical industry council, Federchimica. Lombardia, representing almost 68,000 chemical and pharmaceuticals employees, is among the top five chemical regions in Europe in terms of employees and also number of companies. The country's major chemical sites offer interesting foreign investment opportunities thanks to their logistics feature, availability of highly qualified workforce and investment support schemes.

R&D Activity and Innovation Network

R&D represents a key activity for Italian chemical enterprises in order to be considered valuable partners by their customers. In Europe, Italy is second only to Germany for number of chemical companies (nearly 700) with R&D activity. These companies constantly innovate also to improve processes and environmental standards. Not only major companies but also smaller ones are strongly engaged in innovation. In Italy, a good number of graduates in chemistry and chemical engineering are available. Doing research means more and more maintaining strong relationships with universities and research institutes. In particular, there are opportunities to cooperate with the National Research Council (CNR), whose activity encompasses base research as well as technology transfer and the development of new applications. Moreover, about 30 scientific and technological parks with specific competencies in chemicals and bio-medicals are located in Italy.

Advanced Industrial Relations

High quality employees, competitive labor costs and industrial relations with strong innovative content and collaborative bargaining attitude with trade unions are strong assets of the Italian chemical industry. With the objective of pursuing the necessary efficiency of labor in the awareness of the importance of human resources, Italian chemical companies benefit of a wide flexibility with regard to working time, wages, and a job classification system with simplified rules for SMEs. Italian employees are generally appreciated for their creativity and flexibility, professional skills that foster innovation propensity, problem solving capability, and high responsiveness to changes. Moreover high-level technical and scientific skills are available in Italy. (mr)

www.federchimica.it/en

Limiting The Damage

UK Chemical Companies Start to Fear the Worst with Brexit

In a little over a year the UK will be withdrawing from the European Union. Yet the future of the country and its chemicals industry is even more uncertain now than it was when a majority of UK voters decided in June 2016, to back Brexit.

The extent of the increasing gloom in the country's chemicals sector was reflected in a vote at a conference on Brexit on November 16 organized by the UK Chemicals Industries Association (CIA). 62% of participants thought Brexit would have a negative effect on the industry. This compared with 50% expecting a negative impact at the same conference in November 2016.

Only a few months ago UK-based chemical companies were optimistic that after Brexit due to take place on March 30, 2019, the country's trade with the European Union would be governed by rules much the same as they are now for the EU single market and customs union.

Furthermore this arrangement, dubbed a "soft" Brexit, would endure through a transition period of at least two years, during which the UK and the EU would draw up a permanent free trade agreement (FTA).

But in recent weeks this hope has been fading as expectations of a "hard" Brexit strengthen, mainly because of splits in the UK's ruling Tory party that have undermined progress in the UK-EU negotiations on a withdrawal agreement. It is generally recognized that this has to be clinched by October next year to allow time for the government of the 27 EU member states and the European Parliament to endorse the deal.

Now "No Deal" — which has been described previously by some experts as an impossibility — is becoming a genuine prospect. This would mean there would be no withdrawal agreement covering the key issue of financial settlement payments and the rights of EU citizens in the UK and a "frictionless" border between the UK's Northern Ireland and Ireland, an EU member state.

Also there would be no transitional arrangement or even the start of negotiations on an FTA between UK and EU.

World Trade Organization Rules

Instead, immediately after Brexit in 2019, the UK will be trading with EU and other countries under the rules of the World Trade Organization (WTO). Chemicals traded between the UK and EU would be subject to WTO tariffs of 5.5-6.5%.

With the EU accounting for 60% of UK chemical exports and 75% of imports, tariffs of that size would seriously weaken the industry's competitiveness, particularly in supply chains that involve the re-exporting and re-importing of chemicals as raw materials, intermediates and final products.

Nonetheless the main worries of UK-based chemical producers and distributors will be less focused on the complexities of WTO tariffs and the accompanying customs procedures.

The big concern — with or without a withdrawal deal or even with an agreement on a transitional period — is the impact on post-Brexit trade of non-tariff barriers, in particular regulations. "Sorting out the regulatory uncertainties is becoming a top priority for UK-based chemical companies," Steve Elliott, CIA chief executive, told the London conference.

In a recent Q&A on its website the European Chemicals Agency (ECHA) made clear the post-Brexit legal position of the UK in respect of EU chemicals regulations. These included REACh, the Biocidal Products Regulation (BPR) and the Classification, Labelling and Packaging (CLP) Regulation.

> *"Sorting out the regulatory uncertainties is becoming a top priority for UK-based chemical companies."*
>
> Steve Elliott, CEO,
> UK Chemical Industries Association

As after March 30, 2019 the UK will no longer be an EU member state, it will have the legal status of a "third country" similar to that of other non-EU countries. As a result any REACh registration, for example, by a company in the UK would be regarded as being "non-existent".

"Unique" Free Trade Agreement

The UK government contends that the UK should not be given the status of a third country like other non-EU states because it is in the unusual position of already having the same rules and standards of the European Union. This, it argues, should be reflected in a "unique" UK-EU free trade agreement which would be finalized during the transition period.

However, according to EU documents leaked to the media in mid-November, EU leaders believe that the UK has sacrificed its right to a "unique" status because of its insistence that it would not stay in the EU single market or customs union post-Brexit.

The UK government's plan is to transfer by the end of March, 2019, all the REACh registrations of companies in the UK to a register administered by a UK equivalent of ECHA. In the same legislation a UK central

body, probably an existing government department, would take over the roles of the European Commission in the REACh legislation such as the endorsement of ECHA recommendations.

A key issue then would be how the EU would treat chemical exports with UK registrations. Currently since the UK is still a member of the single market, checks on the compliance of EU chemical exports with EU regulations, including REACh, are done, like with those of all EU member states, at points of sale or production. Post Brexit these checks on UK products will be conducted at the EU border.

There is also at the moment a conformity assessment system under which EU-approved agencies in each member state certify products as being compliant with EU regulations, including REACh. These certificates will also, under EU law, no longer be valid.

One option is a UK-EU deal on a mutual recognition of the equivalence of each other regulations, including REACh registrations.

Otherwise without a mutual recognition arrangement, UK exporters of chemicals into the EU will either have to persuade their EU-based customers to register the chemicals themselves, relocate the manufacturing of the substance to an EU member state or use an Only Representative (OR) in an EU or the three states of the European Economic Area (EEA) — Norway, Iceland and Liechtenstein — that are members of the single market.

Second Substance Registrations

The UK is a leading user of the OR system in the EU under which importers, usually distributors, undertake REACh registrations of chemicals being imported from a non-EU/EEA country. For OR distributors in the UK Brexit could cause a big loss of business unless, as some are already being reported to be doing, they move their operations to an EU/EEA state.

> *"We don't want companies to be put in a position where they have to change their registrations twice."*
>
> Susannah Storey, director general for economic partnership, UK Department for Exiting the European Union

UK chemical companies do not wish to undergo the financial and administrative burden of making second, identical registrations.

"Companies have spent a lot of money and time on making their REACh registrations so they don't want to go through the process again," Tom Crotty, CIA president and Ineos group director, told the meeting.

The need to avoid duplication seems to be accepted by the UK government. "We don't want companies to be put in a position where they have to change their registrations twice," said Susannah Storey, director general for economic partnership at the UK Department for Exiting the European Union. (DExEU).

Lawyers are claiming that as long as the UK keeps EU regulations, like REACh, virtually unchanged in its post-Brexit legislation EU officials will not be able to block UK chemicals and other products on the Union's borders without breaching WTO rules on non-discrimination.

The UK would be complying with the same regulations as it was before Brexit. Thus on the basis of WTO regulations EU would not have ground for barring entry of UK goods.

However the UK could soon start to diverge from EU rules as result of a failure to incorporate in UK legislation post-Brexit amendments and other changes to EU regulations. Then the EU would be in a stronger position to restrict or even ban UK exports on the grounds that regulatory equivalence no longer existed.

Contingency Plans

The level of uncertainty about the post-Brexit future of the UK chemical industry is now becoming so serious that companies are reluctant to commit themselves to further investments in the country.

A large proportion — as many as two thirds — of foreign-owned chemical producers with UK assets are understood to have contingency plans for cutting investment or even reducing production capacity if some key issues in the UK-EU negotiations have not been resolved by the spring.

"Why should we invest in uncertainty?" asked Peter Huntsman, president and chief executive of Huntsman, which has several manufacturing sites in the UK.

He told the meeting of his concern about the effects of Brexit on intra-European supply chains which involved process steps with multiple border crossings. "We can do these processes on single sites elsewhere — such as Geismar in the US or at one of our locations in China," he said.

Several speakers warned about the harm that Brexit would cause not just the UK but the whole of the European chemical industry. "We have got to stick together in what is a damage limitation exercise," said Heinz Haller, executive vice president for Dow Chemical in Europe and chairman of the Brexit task force of the European Chemical Industry Council (CEFIC).

Sean Milmo, CHEManager

UK: Ineos Buys more Offshore Gas Licenses

The increasingly acquisitive Ineos is pumping more money into the search for offshore oil and gas reserves in the North Sea. In its latest move, the Swiss-based chemical producer has signed an agreement with Siccar Point Energy to acquire two-thirds of the exploration licenses the Aberdeen, Scotland-based company holds for areas 150 km north of the Shetland Islands under 1,600 meters of water.

Buying the Shetland licenses represents a further step in Ineos' drive, beginning in 2015, to extend its presence in the offshore gas sector, in addition to possessing the largest number of onshore shale gas exploration licenses in the UK. In that year it announced plans to buy 12 gas fields in the southern North Sea owned by DEA, the former oil and gas arm of German energy group RWE.

In May of this year, Ineos said it would acquire stakes in more gas fields in the southern North Sea, this time from Denmark's DONG Energy, for $1 billion. Approved by EU regulatory authorities in July, the purchase made the chemical group by its own account the UK's largest privately owned oil and gas explore.

The DONG holdings include ten gas and oilfields operated by the Danish energy company in Norway and Denmark, along with the UK. The fields reportedly pump 100,000 bb/d and have 570 million barrels of viable reserves.

Earlier in the year, Ineos clinched a deal with oil and petrochemicals giant BP to buy the Forties Pipeline Network (FPS) that transport 575,000 bbl/d of oil from the UK's first major offshore oil field. The 169-km system links 85 North Sea oil and gas assets, with around 20% of the throughput going to feed Ineos' refinery at Grangemouth, Scotland. (dw, rk)

Croda Opens Centre of Innovation in Liverpool

UK speciality chemicals company Croda International has announced the opening of its Centre of Innovation for Formulation Science at the University of Liverpool's new Materials Innovation Factory (MIF).

Croda commented that the investment in this permanent laboratory facility at the MIF will enable it to utilize state-of-the-art automated technologies to further enhance its formulation science knowledge and capability across all market sectors.

With the capabilities available at the MIF Croda wants to gain a more detailed understanding of ingredient interactions, actives delivery and optimised formulation development for any given application, through design of experiment, faster robotic formulating platforms, high-throughput analytical testing and advanced data analysis. This should also allow the company to better exploit the functionality of existing and new products in a wider range of formulation systems, giving its customers greater choice of innovative formulations.

Dr. Surinder Chahal, global vice president Long Term Innovation for Personal Care at Croda said: "This is a hugely exciting time for us; access to the cutting-edge capability at the MIF will allow us to further enhance our reputation in innovative formulation by adopting high-throughput technologies and computer aided materials science to fully realise the potential of our existing and future products, as well as enabling us to develop new ways to meet consumer needs in fast moving marketplaces."

The MIF is a unique facility that has been supported through a public/private partnership between the University of Liverpool, Unilever, and the Higher Education Funding Council for England, as part of the UK Government's Research Partnership Investment Fund. (rk)

Pharmaceuticals Leading Force

Ireland's Thriving Pharma and Chemicals Producers Optimistic about Brexit

Of the remaining post-Brexit 27 member states of the European Union, Ireland looks likely to suffer the most economically, and also possibly politically, as a result of the UK's withdrawal from the EU in March, 2019.

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But its thriving pharmaceuticals and chemicals sectors could come through Brexit relatively unscathed. In fact they might actually gain from Brexit because of the strong possibility that companies outside the British Isles considering putting money into UK projects in pharmaceuticals and chemicals will instead switch their investment to Ireland.

However, this seemingly bright outlook is not one being shared by other parts of the Irish economy, except in areas like financial services. Brexit could seriously impact the Irish economy as a whole, which could cause difficulties for pharmaceutical and chemical producers in the country.

Among the EU member states, Ireland is the closest geographically since it is the only one with an UK-EU land border, which divides it from the UK region of Northern Ireland.

It also has close cultural ties, symbolized by the fact that after Brexit it will be the only English-speaking country left in the EU. Since Ireland gained its independence in the early 1920s after centuries of British rule, the two countries have had a Common Travel Area (CTA) so that travelers between the two do not need passports. The Dublin-London air route is the busiest in Europe and the second busiest in the world.

Economically Ireland has had a history of dependence on the UK. When Ireland and the UK joined what was then the European Economic Community (EEC) in 1973, it was sending over half of its exports to the UK. This has since dropped sharply to around 13 – 14%.

Nonetheless, with a population of only 4.5 million and a 1.6% share of the EU's GDP against the UK's 13.8%, it still has a high degree of economic reliance on its much larger neighbor.

Predicted Fall in Ireland-UK Trade

The UK remains Ireland's biggest trading partner in the EU while Ireland is also among the top three for the UK along with Germany and Netherlands. In fact the UK's trade with Ireland is higher than its total trade with the BRIC states of Brazil, Russia, India and China combined.

In 2015 while the UK accounted for just under 14% of Irish exports, a lot of them pharmaceuticals and chemicals, it also had a 26% share of Irish imports, according to figures from Ireland's Central Statistics Office.

Some economists are predicting that after Brexit there could be a fall in Ireland-UK trade of over 20%, although this will be in line with expected worse-outcome decreases in trade with other EU countries. A few are even warning that if Brexit goes really badly for the country its GDP could fall, even by as much as 7%.

The British-Irish Chamber of Commerce has warned about a potentially serious impact of Brexit on Irish SMEs for whom the UK can account for as much as 40% of exports.

"Despite the assertions of some commentators there are very few, if any, positives to be gained for Ireland (from Brexit)," said Neale Richmond, chairman of the Irish Senate's select committee on the UK withdrawal from the EU, which issued a report on the implications of Brexit in June.

"Minimizing and managing the impact on Ireland of this decision will be arguably the most significant challenge the (Irish) State has faced in its short history," he added in a comment on the report.

Pharmaceuticals Leading Force

However, Ireland's flourishing pharmaceuticals and chemicals producers remain comparatively optimistic about the effects of Brexit on their sector.

Ireland's pharmaceutical industry has been built up as part of an economic diversification strategy since the 1960s to become a leading force in medicines and active pharmaceutical ingredient (APIs) production not only in Europe but also globally. Its success has boosted the Irish chemical sector, a majority of whose business is in supplying raw materials and intermediates to pharmaceutical producers in the country and in making APIs.

"A major concern about Brexit for us is how our supply chains for pharmaceuticals and chemicals will be affected," said Matt Moran, director of Biopharmachem Ireland, a business association representing the country's pharmaceuticals, biopharmaceuticals and chemicals producers, and which is part of Irish Business and Employers Confederation (IBEC), Ireland's main business representative organization.

"We have a land bridge across the UK which is used to transport our exports and imports into the UK itself and to continental Europe," he continued. "There is a danger that that part of our supply chain may get dis-

rupted if trade barriers are put up between the UK and the EU."

Under the worse case scenario for Brexit which is a No Deal after negotiations between the UK and the EU on a Brexit agreement break down, the UK would have to trade with Ireland and the rest of the EU under the rules of the World Trade Organization (WTO). There would also be no transitional period of at least two years during which the details of an UK-EU free trade agreement (FTA) would be negotiated and UK-EU trading arrangements would continue much as at present.

Fast Growing Medical Devices

The application of WTO tariffs could be as high as 50% on sales to the UK of some food products which after pharmaceuticals is Ireland's biggest export. But under WTO rules no tariffs are imposed on pharmaceuticals.

On the other hand tariffs may be placed on other Irish-made products from sectors, such as medical devices, which are customers of chemical producers in Ireland and are growing in importance to the Irish economy. The medical devices segment has been one of Ireland's fastest growing exporters.

Much of the impetus behind the expansion of the pharmaceutical industry and its chemicals suppliers has come from the country's Industrial Development Agency (IDA). It has helped persuade nine of the world's 10 large pharmaceutical companies to invest in manufacturing facilities in Ireland.

Around $8 billion in capital investment has been put into new pharmaceutical production facilities in Ireland, most of it in the last 10 years. Around 120 overseas pharmaceutical companies now operate in Ireland.

> *"A major concern about Brexit for us is how our supply chains for pharmaceuticals and chemicals will be affected."*
>
> Matt Moran, director, Biopharmachem Ireland

Ireland is the largest net exporter of pharmaceuticals in the EU, according to the Irish Pharmaceutical Healthcare Association (IPHA). Last year its exports totaled around €30 billion, which when combined with those of organic chemicals, most of them APIs or other pharmaceutical materials, account for over 40% of the country's total overseas sales.

The industry started in Ireland as a bulk products manufacturer but has since moved into the higher end of the market. It has helped establish an R&D platform in the country in pharmaceutical, biotechnology and chemistry in which the industry works closely with Ireland's universities and research institutes.

This broad-based structure should help attract investment which without Brexit would have been destined for the UK or will come from UK-based companies wanting to have a continued presence within the EU.

Broadening Chemicals Appeal

For businesses relocating from the UK, Ireland would have the familiarity of a similar business culture, language, laws and regulatory environment. At 12.5% it also has one of the lowest corporate tax rates in the EU.

IDA has been forging new Brexit-driven marketing strategies and allocating increased resources to promoting Ireland's suitability for UK-based companies looking to maintain easy EU market access.

The Irish government usually targets, through the IDA, the US and EU countries for foreign direct investment (FDI). But recently there has been greater focus on Asia, especially Japan.

Also IDA is wanting to appeal to a wider range of chemical companies, especially those needing R&D capacity for new technologies.

Henkel announced in October (2017) an additives manufacturing or 3D printing project in Tallaght, Dublin, where it already has a manufacturing and R&D operation in adhesive technologies for the global market. It will be employing scientists and engineers to develop new advanced materials for use in precision manufacturing industries, such as medical devices, automotive and aerospace.

"Additive manufacturing will be a significant disruptor to future manufacturing methodologies and it is important for the team in Ireland to help shape this change," said Matthew Holloway, Henkel Technology center director. "Henkel recognizes the strength of relationships with the research community in Ireland."

A key issue with Brexit, both economically and politically, is the future of the Irish-Northern Ireland border. It has become so open that it is virtually invisible, which is mainly a result of the peace process triggered by the 1998 Good Friday Agreement which ended years of conflict between Irish nationalist and pro-UK paramilitary groups.

If the necessity for a post-Brexit "hard" border with customs, passport and other controls leads to new inter-communal tensions, then even the pharmaceutical and chemicals sectors may not avoid the economical and political consequences.

Sean Milmo, CHEManager

Borealis Studies European PP Expansion

Major polyolefins producer Borealis is to undertake a feasibility study on a series of PP capacity increases during the next nine months. The study will assess a program of debottlenecking at the Austria-based producer's existing European PP plants, initially targeting the three plants at Kallo and Beringen, Belgium.

The additional propylene feedstock from Borealis's proposed propane dehydrogenation (PDH) plant at Kallo will feed the extra PP output. Borealis said the envisioned total PP capacity increase would equate to a new world-scale plant.

No capacity figures have been given as Borealis said the exact increase in production will be determined by the study. A final investment decision is planned to be taken in the fourth quarter of 2018 with the expansions anticipated to go on stream from Q1 2020 through to early 2022. The PDH plant is targeted to start up in the second half of 2021, provided the final go-ahead is given, which is due in the third quarter of 2018.

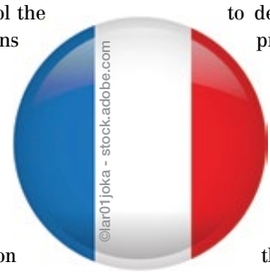
Jacobs Engineering is currently performing the feasibility study for the PDH unit.

"In Europe, polypropylene supply is not keeping up with increasing demand. With the market tightening and the continuous application expansion for PP materials, additional investment is needed to ensure a reliable platform for continuous, long-term growth in polypropylene," said Maria Ciliberti, vice president, marketing & new business development at Borealis. (eb, rk)

Stiplastics Opens New Factory in France

Stiplastics, a provider of plastic solutions for the pharmaceutical, healthcare and e-health sectors, opened a new factory in Saint-Marcellin, France.

A total of €8.6 million has been invested in this site to pool the company's its operations and meet its customers' various requirements.



The 10,000 m² site in the department of Isère includes the company's administrative headquarters, design office and production workshops (injection, assembly, storage).

In response to the rise of e-health, Stiplastics has also set up a new electronics workshop equipped with special tools including test benches. This 150 m² space is protected from Electro Static Discharge (ESD) by a controlled environment essential for handling electronic components.

The increasing prominence of connected care has also prompted the company to set up Internet of Care (IoC). This unit is dedicated to designing, developing and producing e-health medical devices.

Stiplastics said that it is therefore now able to design and manufacture medical devices, add electronic components, test them and then pack them ready-to-use for delivery.

"In 2013, we drew up a development plan forecasting almost doubled sales in 5 years. This investment will enable us to meet our targets since we are still on track for turnover of €23 million by the end of 2018," said Jérôme Empereur, CEO of Stiplastics. (rk)

The Middle East – More Opportunities than Risks

Saudi Arabia Boasts Cheap Energy and Raw Commodities, Iran Offers Diversified Structures and a Qualified Workforce

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Martin Erharter, senior partner and global head Chemicals & Pharma, Roland Berger

Heiko Ammermann, senior partner, Roland Berger

The Middle East chemical industry makes good money selling basic chemicals and uses local oil and gas in manufacturing. Hopes are high that the many major investments made by the sector in recent years will pave the way for higher value added products. But there is no sign yet of a resounding success on this front. Martin Erharter, senior partner and global head Chemicals & Pharma, and Heiko Ammermann, senior partner, from Roland Berger, discuss with CHEManager the various prerequisites and obstacles faced in Middle East chemical nations.

CHEManager: Mr. Erharter, which are the key chemical nations in the Middle East region?

M. Erharter: The first are the GCC, the Gulf Cooperation Council states — foremost among them Saudi Arabia, then the United Arab Emirates, Kuwait, Qatar and Oman. And there's Iran. Lebanon has gas production but the chemical industry is less relevant there.

And who are the biggest players in the chemicals market?

H. Ammermann: The biggest by far is SABIC. There is also Saudi Aramco, the big oil company with plans to operate as a producer of basic chemicals, and there's ADNOC in Abu Dhabi. Then we have the big state-owned concerns in Iran, all of which are seriously restructuring their business right now. Some of them are active in everything from oil and gas exploration to the refinery business to fine chemicals production. Kuwait and Oman have national oil companies, too. Most of the private sector chemical companies in the region operate in a totally different league, way below these big players.

What are the main challenges for these companies?

M. Erharter: Many of those companies are in the process of focusing their business models downstream along the value chain and are making huge investments. Take Aramco, for example. They have teamed up with Dow in the Sadara joint venture to invest €20 billion in the creation of the region's biggest integrated chemicals complex. This comes at a time when the Middle East chemical industry can hardly be said to be getting more competitive. On the one hand we have falling oil prices, going hand in hand with a reduction in income for the oil-producing companies. And then we have the rising price of gas, which still makes up 70% of the primary input used in chemical production in the region. Added to that, Saudi Arabian firms in particular are compelled by national regulations to keep value creation within their national borders so as to promote local employment.

> *"Iran is an interesting market offering much higher growth opportunities after the end of the embargo."*

H. Ammermann: While we have seen some successes with downstream activities in the Middle East, with local production of standard plastics and fertilizers and so on, many companies are still working within their old business models and operating huge plants with massive investments and small workforces. They are a million miles away from achieving the kind of high-margin production that German fine chemicals or specialty chemicals firms manage. One of the reasons for that, in my view, is the lack of customer industries with supply chains for the Middle East chemical industry to integrate into.

Does that also apply to Saudi Arabia?

M. Erharter: Yes. Saudi Arabia's chemical sector does not have the

kind of customer markets that the German chemical industry has in the automotive sector, for example. There is a lot of talk about smart mobility in Saudi Arabia but in reality, people are thinking two steps ahead of where they actually are. Because not only do they lack the customer industries, they are also missing the innovation mindset. Unlike in nearby Israel, for example, where the desire for sustainable R&D processes is strong. You can't fail to be aware of Israel's high-tech firms if you're working on e-mobility today.

H. Ammermann: That's right. They have a successful start-up scene there, too, with a financing landscape similar to the United States. But what's missing in Israel is a strong production base of the kind the German automotive sector has.

You mentioned Iran as one of the Middle East's chemical nations. How would you characterize the structure of Iran's chemical industry, for instance in comparison to Saudi Arabia's?

H. Ammermann: Iran differs from Saudi Arabia in that Iran already had a highly differentiated economy 30 years ago. To stick with our automotive example, Peugeot and Renault cars were being produced there under license. And the chemical industry was fully differentiated, with paint and varnish manufacturers, producers of active pharmaceutical ingredients, and many more besides. The years of sanctions against Iran have created a situation where companies there are behind the times on technology and have a huge investment backlog.

That said, what Iran does boast, then as now, is a range of significant cultural factors, such as a mature university structure and a pool of well-educated engineers. And the Iranians know how a supply chain works. That is why I think we will see a more differentiated chemicals landscape emerge in Iran sooner than in Saudi Arabia.

> *"Companies choosing to operate in Iran risk losing Saudi Arabia, Bahrain, Kuwait and Qatar as markets."*

M. Erharter: The situation in the chemical industry in Iran after the lifting of sanctions is comparable to what it was like in East Germany after the fall of the Berlin Wall, the only difference being that they have not yet sorted out the question of financing in Iran. Saudi Arabia's chemical industry, on the other hand, is more like that of an emerging economy where certain infrastructures and cultural standards still need to be developed. However, the country does have the advantage of an enormous sovereign wealth fund to fall back on.

What are Iran's chances of attracting the investors it needs?

H. Ammermann: There have already been a great many positive declarations of intent between Iranian firms and European companies, especially German ones. But there hasn't been much in the way of actual foreign direct investment yet. And that is unlikely to change any time soon. That's partly down to the political uncertainty in the region, given that companies choosing to operate in Iran risk losing Saudi Arabia, Bahrain, Kuwait and Qatar as markets. Another reason is that Western banks are holding back from any investments for fear of potential US sanctions. And it's not only investments that are being hit by that fear: even long-term supply relations are difficult for companies to establish if their bank is threatening to pull out of the business relationship. Right now there is absolutely no market for bank-financed investments in Iran.

So what kind of potential investors remain?

H. Ammermann: Private equity investments from Europe, China or Russia would be possible. Iranians in exile are also investing in their homeland, so we think there might be a bit of progress here in the next 12 to 18 months. After all, Iran is certainly an interesting market offering much higher growth opportunities after the end of the embargo than other markets in the region.

What would be your advice to German companies looking to get involved in the Middle East?

H. Ammermann: Saudi Arabia offers opportunities for companies with a dependence on low-cost raw commodities and high energy consumption levels. But it's a difficult market for small and medium-size enterprises to get into. Local companies are mostly looking to partner with large firms like BASF and Linde.

An involvement in Iran may be an interesting option for any SMEs not dependent on bank financing and not active in the US market. The country boasts numerous private sector SMEs as potential business partners. And there is a qualified workforce ready and waiting.

M. Erharter: The market opportunities in this region are much greater than the risks. German companies who have been reliable partners in the region over the decades, unlike many UK or North American firms, are in a good position to profit from this potential. (mr)

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Oman: OOC and KPI to Co-develop Duqm Site

Oman Oil Company (OOC) and Kuwait Petroleum International (KPI) have signed agreements for the co-development of the Duqm Refinery and Petrochemical Complex. The project, which is expected to start operations in 2021, is coming up in the Duqm Special Economic Zone of the Al Wusta region. Three major EPC contracts have been awarded to multinational companies for building the refinery, with Amec Foster Wheeler being the project management consultant for the EPC phase. (mr)

Bahrain: NOGA, Schmidt Open Logistics Facility

The National Oil and Gas Authority (NOGA) in Bahrain and Schmidt-Group, Heilbronn, Germany, have inaugurated a new joint venture logistics facility, The $20 million facility will create around 100 jobs in the logistics sector. Located in the Bahrain Logistics Zone, it will support the zone's expanding operations, particularly in the chemical and petrochemical logistics market. Schmidt said, they chose Bahrain because of the strong transportation links with neighboring countries. (mr)

Converging Developments?

The Transformation of Chemical Parks in Europe and in China

In Europe as well as in China, chemical parks host the most important production plants of the chemical industry. Although the reasons for their emergence and their development paths were different, their destination might coincide due to the dynamics of the industry and the financial markets.

Dr. Kai Pflug, Management Consulting — Chemicals

Dr. Yorck Dietrich, Camelot Management Consultants

In the early days of the Chinese chemical industry, many chemical plants were built more or less randomly at individual locations throughout the country. However, with the rising importance of both safety and environmental issues in China, there has been a strong trend to move chemical production into dedicated chemical parks. This is one of the key points in the current Five-Year Plan for the chemical industry (for the period of 2016 – 2020).

The concept of chemical parks originated in Europe in the 1990s. European chemical companies started to focus their huge business portfolios on higher margin businesses by divesting commodity businesses and acquiring specialties. In that transformation, former single-user sites became multi-user sites as plants belonging to a specific business changed ownership. The resulting challenge was how to deal with infrastructure and service operations used by all chemicals companies on site. The answer was to transfer those activities to separate site operating companies which were either owned by the incumbent producer or by the major users on site.

Thus, a new business model, the dedicated site operating company, was established. There were three major reasons for that:

- Cost and risk related to infrastructure and service operations were shared between major users either through ownership or through service pricing
- By establishing more neutral and transparent service relationships, pressure was to be exerted on the site service organization to become more efficient
- The site operating company was to render the site more attractive for new tenants by — ideally — offering a "plug and play" environment to facilitate new plants without additional infrastructure investment

The first objective was achieved just by organizational nature of the new business. To achieve the second objective of optimizing cost was sometimes a long and painful way. But after two decades, site operators are now much leaner and more responsive to customer requirements. The third objective, to attract new investments, was the most challenging one. The construction of new plants shifted to East Asia and, fueled by shale gas, to North America while the chemical industry in Europe saw considerable restructuring. That caused underutilization in some chemical parks. On the other hand, building new plants outside chemical parks becomes more difficult due to environmental and safety regulation. So, instead of enticing new tenants, chemical parks are now primarily vying for replacement or enlargement investments from incumbent players.

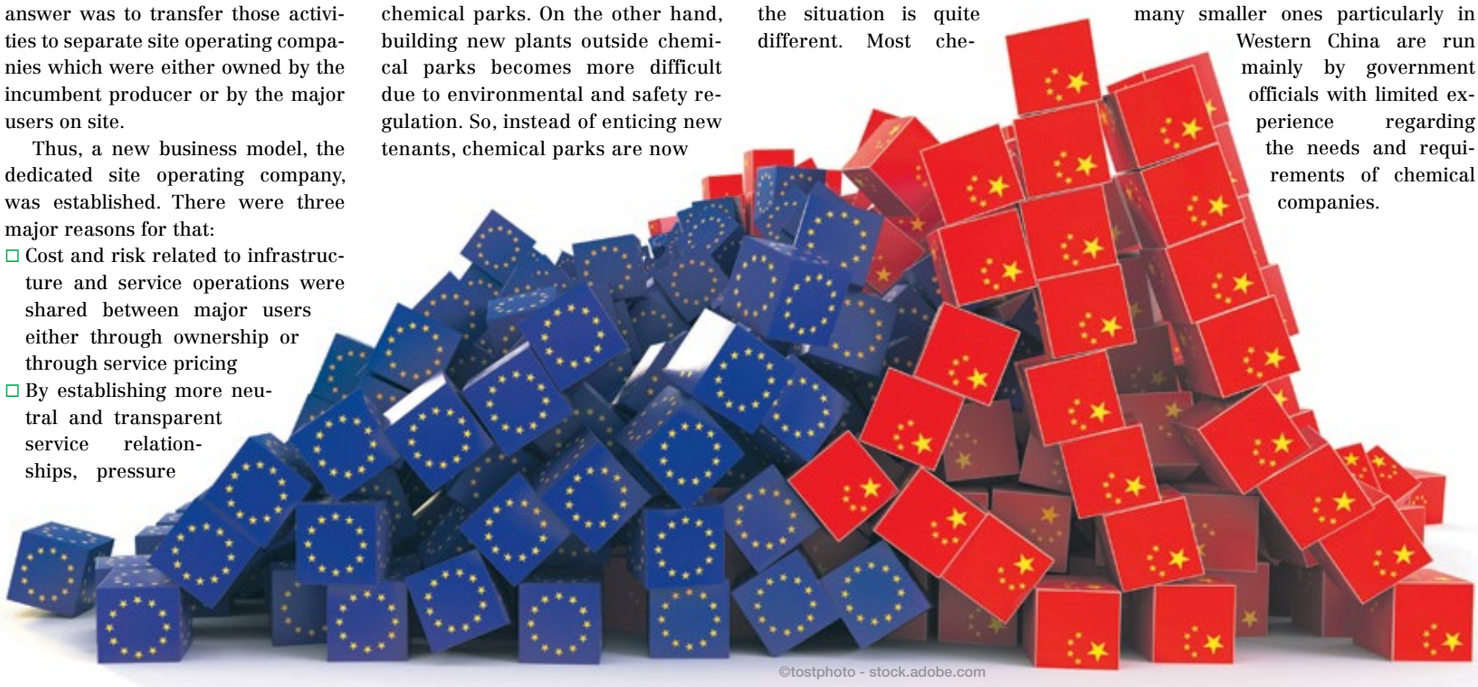
The risk of stagnating or even shrinking chemical production volumes in European chemical parks may also explain why many chemical companies still tend to hold their shares of site operating companies. Their reluctance to completely release chemical park operations to independent players might seem paradox, as they willingly become tenants at chemical parks in East Asia. But Asia, and China in particular, are growth markets, whereas plant closures and related idle infrastructure cost are a challenge for many European chemicals parks. The incumbent players apparently prefer to manage those restructuring processes themselves instead of relying on third parties that might exploit their dependency on monopolistic infrastructure and services.

> *"The next step in the transformation of chemical site operations may well be triggered by mutual inspiration."*

Compared to Europe, in China the situation is quite different. Most chemical parks in existence now have expressly been established with the goal of attracting multiple chemical companies. However, this has not led to an ideal situation either. Some of the issues currently encountered with regard to chemical parks include

Large number of parks: There are currently 381 national key chemical industrial parks and probably at least the same number of local parks — in total, this is more than 10 times the number of parks in Germany. This means that many of them are still fairly empty and lack the critical mass to gain real economies of scale from shared services.

Low management skills: While a number of national-level parks have highly professional management, many smaller ones particularly in Western China are run mainly by government officials with limited experience regarding the needs and requirements of chemical companies.



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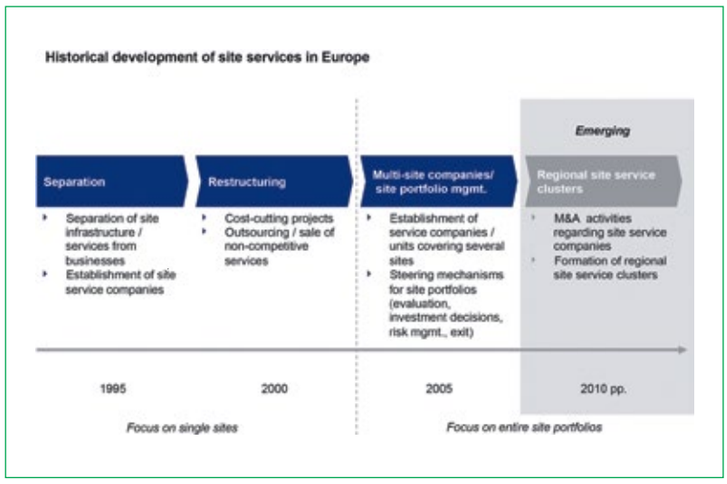
Limited level of planning: As a consequence of the above, many of the smaller chemical parks are not optimized with regard to planning and integration of services.

However, these limitations of current Chinese chemical parks also highlight the benefits that may be gained from utilizing Western experience. This is particularly relevant as there is strong government support for establishing a common standard for chemical parks, and to create an independent service infrastructure for the chemical industry.

In this regard, China can benefit from the experience gained at European chemical parks. While no truly standardized operating model for chemical parks has emerged yet, the existing proven models show significant similarities and thus allow identification of key factors that render chemical parks successful. Site service companies would be the most effective if they could roll out their blueprint across multiple sites and thus realize synergies in terms of cost and know-how. This perspective should be even more appealing for China. Chemical parks might even become a new asset class that is attractive for industrial infrastructure investors.



Here East and West may be complementary: in Europe, chemical parks are rarely for sale as the owners are reluctant to sell, but also because no potent strategic or financial investors have uncovered the value of those assets so far. In China and East Asia in general, there are entrepreneurial infrastructure investors looking for opportunities, but targets in the shape of independent chemical park operating companies do not exist.

What are the potential combinations? Established European site service companies can support Chinese chemical park owners in establishing site service companies. The opportunities range from mere consulting to co-branding. The European know-how may be leveraged by Asian infrastructure investors who acquire chemical park operators and transfer their expertise to China. Chemical park owners in China can develop their own model of site operating companies, roll it out across Asia and acquire European chemical parks later. Last but not least, Chinese chemical parks can use European experience to improve their attractiveness for new tenants, whether through specialization and improved service offerings or through more professional site marketing.

It is time for the next step in the transformation of chemical site operations. And this may well be triggered by mutual inspiration — by combining know-how and financial power across two continents. If and when this happens, the provision of chemical site services in China and in Europe may well converge — hopefully allowing China to bypass some of the painful steps Europe had to go through.

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ExxonMobil to Build Petchem Complex in China

ExxonMobil plans to build a petrochemical complex in the Chinese city of Huizhou. The city's government said that the oil major had signed a partnership agreement aimed at investing billions of US dollars and creating a "world-class petrochemical industry base" in the Daya Bay area on China's south coast. The complex will include a world-class steam cracking device and a matching olefin derivative processing unit, the Huizhou government said.

ExxonMobil will apply leading technologies, highest safety standards and optimal operation experiences, according to Neil Chapman, president of ExxonMobil Chemical. He said the company's goal was to ensure its investment and operations meet economic development needs and environmental protection requirements, in order for it to positively impact the region.

Huizhou is located in the southeast of Guangdong province, part of the industrial Pearl River Delta region. The city's Daya Bay economic and technological development zone currently houses several refineries and petrochemical production facilities for CNOOC, China's largest offshore oil producer, and CNOOC and Shell Petrochemicals Company, a joint venture between the industry majors. (mr)

Saudi Aramco Plans China Distribution Hub

Saudi Aramco subsidiary, Aramco Asia, has agreed with Chinese Communist Party officials to build a chemical distribution hub for products it manufactures in the Chinese provinces of Fujian and Yunnan. This latest step in the Saudi group's plan to expand its downstream engagement in the country is the outcome of talks between Aramco's president and CEO, Nabil Al-Nuaim, and Pei Jinjia, secretary of the party's China Xiamen Municipal Committee.

"Xiamen is one of the prime candidates for this chemical hub as we can leverage the benefits from China's Free Trade Zone initiative," Nuaim said. Aramco's chemical sales office is based in the coastal city of Xiamen in southeast Fujian province and also in close proximity to Fujian Refining & Petrochemical Company, in which the Saudis hold a 25% stake.

"Considering the strong alignment between the Belt and Road initiative and Saudi Vision 2030, our two countries have made significant progress toward strategic partnerships, including the development of a special industrial park for Chinese investors in Jazan Economic City," Nuaim said, adding that Xiamen could play an important part in this development, given its role in the Maritime Silk Road. (dw, mr)

BASF Invests in New China Amines Plant

BASF has announced plans to build a new specialty amines plant at its site in the Nanjing Chemical Industry Park in China. The facility will have a capacity of 21,000 t/y, mostly producing 1,2-propylenediamine (1,2-PDA), n-octylamine (n-OA) and polyetheramine (PEA), and will go on stream in 2019. Investment costs were not disclosed.

In March, BASF announced it would build a 42,000 t/y antioxidants plant in China. The new facility will be located at Caojing in Shanghai with production also scheduled to start in 2019. (eb, mr)

AkzoNobel Plans Peroxide Expansions in China

AkzoNobel's Specialty Chemicals business has started the next phase of a project to double capacity for dicumyl peroxide (DCP) in Ningbo, China. DCP is used as a crosslinking agent in polymers manufacture. An initial project has already lifted capacity at the China site by 40% in August and this latest phase will raise capacity to a total of 38,000 t/y.

Johan Landfors, managing director of AkzoNobel's Polymer Chemistry business, said the expansion is necessary to meet demand as the DCP market is strong and continues to grow globally. (eb, mr)

Investment in the Future

Trade and Industry Investment of the US Chemical Sector

The American chemical industry is a dynamic, forward-looking industry and a keystone of the domestic economy. One of the oldest industries in the United States, the US chemical industry is the world's second largest (after China) with 14% of global chemical shipments. The chemical industry is also a large exporting sector in the US, accounting for more than ten cents out of every dollar of American exports.

Billions of dollars are invested in the US chemical industry each year. Since 2010, companies have announced more than $185 billion in new chemical investment in the US, more than half of which is foreign-direct investment. In addition, investments are routinely made in intangible assets, such as employee knowledge, brands, process technology, and data as well in physical assets, such as property and equipment. These investments help ensure that chemical companies in the US continue to be leaders on a global basis.

US Trade

The globalization of chemical industry investments and markets has spread capital resources, technology, and managerial capabilities around the world, resulting in a growing population of multinational chemical companies. As such, the international trade of chemicals reflects an intense competition for markets by producers in an increasingly global industry. Indeed, during the past decade, world trade in chemicals grew faster than global output. Total global chemicals trade is astounding, representing $215 billion in 2016, a significant portion of which is between related parties (intra-company).

The US chemical industry, with abundant natural resources and a highly skilled workforce, has long been a major exporter of chemistry products. The industry has consistently posted a large surplus in chemicals trade, peaking at $44.6 billion in 2010 — more than three times the surplus two decades earlier. Although the trade surplus has moderated since then, US imports and exports have, in general, exhibited a positive growth trajectory.

On a regional basis, there is a good deal of trade within North America. Canada, the largest single national market for US chemical exports, and Mexico, the second-largest, together account for one-third (nearly $40 billion) of US chemical exports. Canada is also one of the largest sources of chemical imports to the US, most of which are plastic resins and commodity chemicals.

Heather R. Rose-Glowacki, American Chemistry Council

Nearly one-fourth of American chemical production is exported. Outside North America, the largest markets for US chemistry exports are China, Belgium, Brazil, and Japan. While imports account for a slightly lower percentage of domestic consumption, more than half of US chemical imports are essential inputs used for domestic chemical production. After Canada, the top countries for US chemical imports are China, Germany, Ireland and Japan.

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Investment in the Future: Knowledge

In order to maintain its position as a major trade partner, the US chemical industry must continue to innovate. Innovation — putting ideas into action through knowledge to create new products and services to meet the needs of current and future customers — is a long-term driver of financial performance and value creation in the chemical industry. From research and development (R&D) to business processes to customer relationships and knowledge, the leading-edge technologies made possible by chemistry improve functionality, reduce costs, and increase productivity.

In 2016, the American chemical industry — one of the largest private-sector industry investors in R&D — spent an estimated $12 billion on R&D. US chemical companies typically allocate 2 – 3% of their annual sales toward R&D and, over the last century, R&D efforts in the chemical industry have expanded, even in times of lower profit margins. Successful research in the chemical industry requires intensive effort and

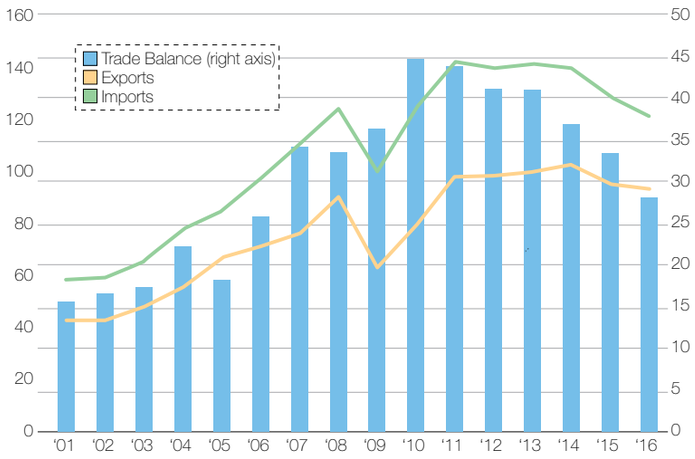

Fig. 1: US Trade in the Business of Chemistry, excluding Pharmaceuticals ($ billion)

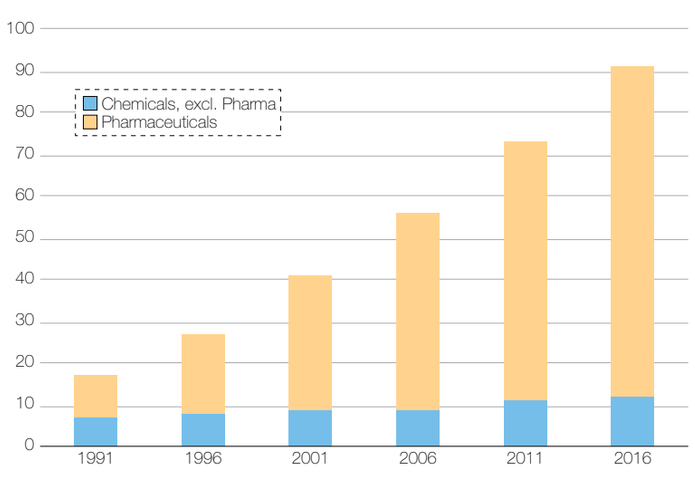

Fig. 2: R&D Spending in the Business of Chemistry ($ billion)

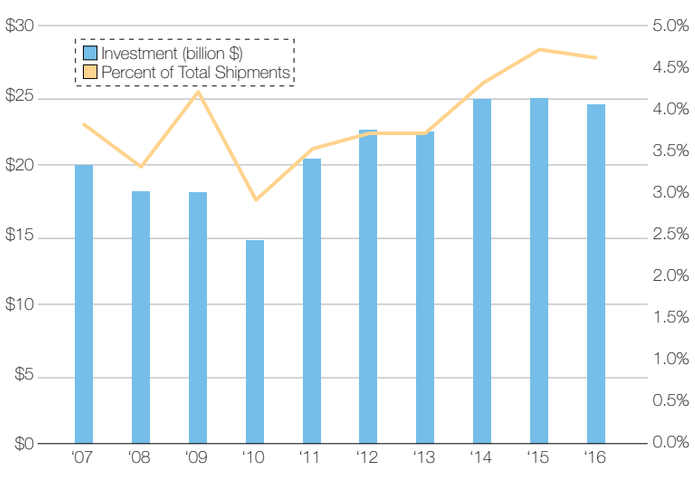

Fig. 3: Capital Investment — Chemicals, excl. Pharma

major expenditures; it can take years from the time a project is conceived to the time a chemical product is brought to the marketplace. For each success, there may be as many as 100 failures. Rates of return on successful innovations, however, can be quite high, often in the range of 20 to 30%.

Beyond products and processes, an increasing importance is placed on service innovations and many chemical companies have added management services to their portfolio in addition to — and sometimes instead of — chemical products. Specialty chemical and performance materials companies, in particular, require extensive technical servicing components with highly-trained service and sales representatives, knowledgeable customer service problem-solvers, and EH&S professionals.

Service innovations in the chemical industry are especially prominent in the automotive and electronics industries. Automobile manufacturers require specific properties when considering paint and coating applications (e.g., anti-corrosion properties). Rather than purchasing paint by the gallon, automobile companies engage with coatings manufacturers to meet individual requirements. The coatings companies are often integrated in the automotive manufacturing, running complete coatings operations at body plants. In the electronics industry, a chemical supplier may "lease" chemicals to a semiconductor company to process the chips, so that the semiconductor company is free from the management of used chemicals.

Investment in the Future: Capital

As companies continue to innovate, it remains critical that the chemical industry invests in the physical structures and equipment needed to maintain high levels of production. The chemical industry is capital intensive due to the large plant capacities and amount of equipment needed, the intricate nature of the equipment and processes, the high degree of process automation, technology requirements, and depreciation of process plants, among other factors.

In 2016, the US chemical industry was one of the largest private-sector investors in new plants and equipment (P&E) in the country, with over $24 billion in capital investment. Equipment investments, in particular, are notably important to long-term growth potential because equipment (e.g., instrumentation, computers, and automation technologies) is directly involved in the chemical production process. To a large degree, structures in the business of chemistry protect chemical processes from the elements, and support process equipment. Investments in P&E are made for a number or reasons, such as expanding production capacity for both new and existing products, replacing worn-out or obsolete plant and equipment, and improving operating efficiencies. It is common for existing chemical plants to undergo complete modernization programs that utilize the latest process technologies.

The financial-resources-employed-per-worker ratio is a good indicator of the adequacy of capital formation. Increasing levels of capital employed per worker have long been noted as a key to improved productivity, indicating that workers are equipped with the latest technological innovations embodied in the acquisition of new capital (and capacity). Higher productivity is, in turn, typically accompanied by higher real wages for workers. Among US manufacturing industries, chemistry is second only to petroleum refining in terms of capital employed per worker.

As the chemical industry becomes more integrated on a global basis, companies around the world strive to maintain, and hopefully grow, their market share. However, the valuation of companies goes beyond annual sales. It is the intangible assets — brands, technologies, and data and information about products, customers, and business processes, as well as more traditional intellectual property, such as patents, trademarks, and regulatory licenses — that increasingly define "real value." As the dynamics of the global economy change, the US continues to be a leader in the global chemical industry and an integral part of the domestic economy.

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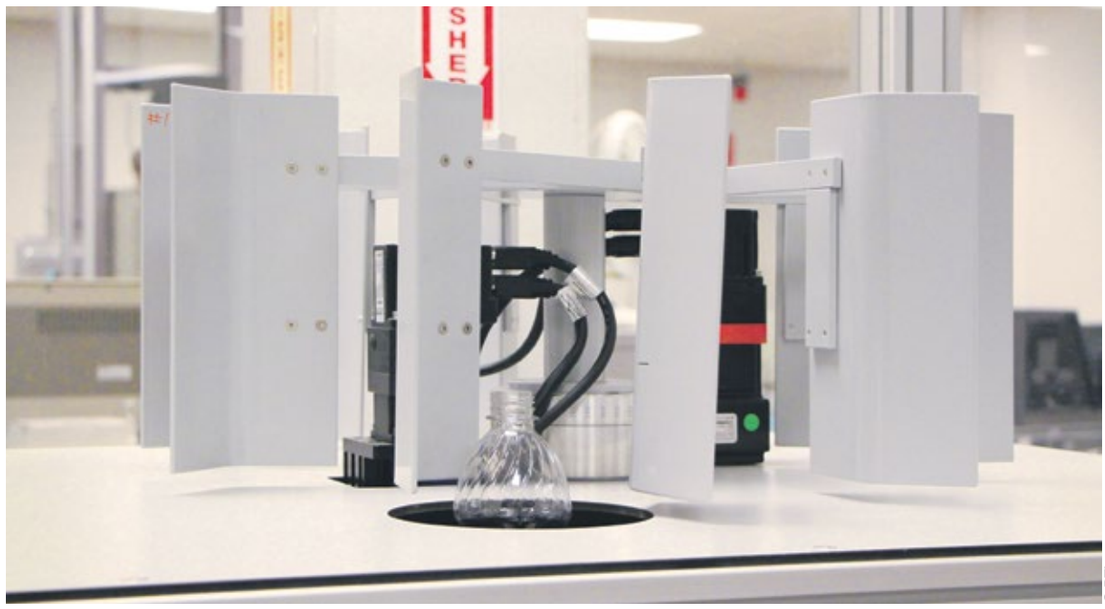
Business Opportunities in the US

Chemical Industry in Ohio is Driving Engine for many Added Value Chains

Integrated circuits, construction materials, medicine, home entertainment, and solar panels, automotive, aerospace, and sports equipment: The chemical industry is key for many B2B and consumer products. It is starting point as well as driving engine for many added value chains of emerging as well as developed economies. From a global perspective, the US as the largest single economy in the world plays a vital role as a market place for production, processing and consumption of goods.



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The economic performance in the USA is expected to increase by 2.8% per year between 2011 and 2030, chemical production even by as much as 3.3% — growing more dynamically than in other industrial countries and also more strongly than in the European Union. This strengthens the leading position of the USA as the world's largest economy, also in attracting foreign investors who recognize opportunities to expand their businesses.

Leading Investment Location

The state of Ohio is the no. 1 US location for plastics and rubber product manufacturing. In an area only 1.5 the size of Ireland, Ohio has gathered the largest number of chemical enterprises within the USA, totaling 1,800. Enterprises in Ohio benefit from the state's strategic location in the heartland of the heavily industrialized Midwest. Ohio has been attracting businesses and employees for years due to one of the top five business climates in the entire US, a versatile economic environment, talents and human resources, and affordable cost of living.

"Low taxes, the lowest in the Midwestern US for new manufacturing capital investment, and strategic logistics options keep the cost of doing business in the state low," says Glenn Richardson, Managing Director for Advanced Manufacturing and Aerospace of JobsOhio, the state of Ohio's private economic development corporation. JobsOhio facilitates market access for foreign enterprises. As a non-profit organization, it supports them in finding a location, establishes contacts to local banks, legal advisors and tax consultants and gives access to incentive programs.

"Enterprises in Ohio are well-positioned also for the future."

Glenn Richardson, managing director Advanced Manufacturing and Aerospace, JobsOhio Economic Development

Key Industries Plastics and Rubber

As a key player not only in plastics and rubber industries with nearly 70,000 people employed, Ohio is ranked a nation-wide leader in hosting related key manufacturing industries such as advanced manufacturing with 690,000 workforce, automotive sector with a workforce of 110,000, and the aerospace industry being the nation's no. 1 supplier for Airbus and Boeing.

Due to the state's stable economic base, its longstanding European heritage and central location, European companies have more than 2,000 establishments in Ohio. From chemical industry for example, there are world-famous companies like Goodyear, Parker Hannifin, PolyOne, BASF, Henkel, and Omnova. Glenn Richardson: "As the seventh most populous state in the US, Ohio has a labor force of 5.7 million and more than 200 higher education institutions."

Opportunities for Enterprises

A few of the future-oriented new developments are smart mobility applications, such as "Smart Columbus", a milestone project which explores in Ohio's capital various smart mobility technologies covering innovative logistics, pedestrians, public transport and private car solutions.

Ohio is home to the TRC, the largest independent automotive proving ground in the USA. Its new 451-acre SMART (Smart Mobility Advanced Research and Test) Center tests new technologies and highly automated vehicles on high-speed intersection, roundabouts, traffic signals, an urban network of intersections, and a rural network including wooded roads.

A third example of advanced innovation is carbon-fiber-reinforced plastics. Its entire value chain can be found in Ohio — from the raw material, via production, composites and end use, including access to low-priced energy and production infrastructure. The basic material carbon fiber revolutionizes light-weight construction and has two-digit growth rates. At present, automotive and aircraft applications are the most well-known.

Glenn Richardson: "With the industries and research in the surrounding area and the highly industrialized Midwest nearby, enterprises in Ohio are well-positioned also for the future."

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Fostering Innovation

Brazil is Dedicated to Facilitating Investments in its Biotech Sector

In Brazil, the innovation dynamics is highlighted by the interdependency of agents representing industry, research institutions, and government. Scientific research is concentrated within public research institutions, which are mainly financed by the State; however, it focuses on partnerships with the industry for further product and services development.

In 2004 was approved in Brazil the Law of Innovation, which ensures incentives for innovation and scientific and technological research in the productive environment. Its main objective is to stimulate: the creation of specialized and cooperative innovation environments; the participation of Scientific and Technological Institutions (ICTs) in the innovation process; innovation in companies; the independent inventor; and the creation of investment funds for innovation.

In this environment of innovation and cooperation between ICTs, was created in 2008 the program "National Institutes of Science and Technology" with the main goal of mobilizing and gathering research groups of excellence in strategic areas for the country's sustainable development. The program, which counted with 126 universities and research centers, received investments of approximately BRL 850 million (€225 million) in eight different scientific areas for fostering basic research and its articulation with private institutions. The Biotech sector is included in this initiative, which is coordinated by the Ministry of Science, Technology, Innovations and Communications (MCTIC), as biotechnology projects are an important part of several supported areas such as the agroindustry, energy, ecology, nanotechnology and health.

According to Brazilian Pharma Solutions, a project for the internationalization of the Brazilian pharma sectors jointly developed by Abiquifi and Apex-Brasil, the Biotech development is also supported by other initiatives, such as PIPE (Innovative Research in Small Companies) which supports financially the execution of scientific research within micro, small and medium-sized companies in the State of São Paulo. The São Paulo Research Foundation is responsible for PIPE's execution.

Other programs, such as the "Inova Saúde" and "Legal Amazon", promoted by the Brazilian Innovation Agency (FINEP), also aim to foster the Biotech sector by financing projects in several companies, small or big, from lab to market. The MCTIC considers biotechnology as an important part of the current National Science and Technology Strategy and international collaboration essential for the development of Biotech in Brazil.

Its importance is represented by the formation of structured technology networks, such as several Biotech Research Networks and Technology Service Providers, that were launched in the last decade. A more recent initiative was the structuring of SulBiotec network, which aims to solve current industry technology issues through innovative biotech solutions.

FINEP numbered Biotech investments since 2003. In general, 101 biotechnology projects were financed by non-refundable resources of over BRL 173 million (€45 million) in 12 open calls. According to FINEP, the project selection criteria for biotechnology and health projects funding includes evaluation of the consistency of the innovation strategy; the technical, managerial and entrepreneurial capacity of the team; and the technological and productive content. Substantial results in the Biotech sector are expected for the next years by the agency, which selects competent companies and follows these projects execution to success.

FINEP has a series of firmed collaborations with other countries financing agencies, such as Canada, Spain, France, The Netherlands and others, for the development of joint open calls for technology support, including biotechnology projects financing and international technological partnerships. (mr)

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Venezuela's Emerging Pharma Markets Threatened by Economic and Political Turmoil

Venezuela is one of the emerging pharmaceutical markets in South America, with a major dependence on imports. However, economic and political turmoil along with inefficient patent laws and drug pricing policies are major barriers according to GlobalData. The data and analytics company's latest report: "CountryFocus: Healthcare, Regulatory and Reimbursement Landscape — Venezuela", reveals that the country's total pharmaceutical market value was $12.6 billion in 2015, increasing from $5.7 billion in 2009, at a compound annual growth rate (CAGR) of 14.1%.

However, Venezuela's current economic crisis may reverse this healthy growth rate with healthcare services now becoming more expensive in the country. In 2015, the average price of healthcare services increased by 38.5% from the previous year. Out of pocket expenditure in 2015 was also high at 67.3% and drug prices are now considerably higher than the region average of $7.86. In 2016 the average drug price in Venezuela was $21.95, the highest in the entire Latin America region.

The supply of pharmaceuticals in the country is heavily dependent on imports with the market growing significantly from 2009 to 2012. Since then pharma imports have dipped with pharmacies facing a shortage of essential medicines despite the efforts of the government to maintain supply. As of May 2017, about 85% of the country's required drug demand was not being met.

Tathagata Ghosh, Healthcare Analyst at GlobalData commented: "As well as pharmaceuticals, the medical device market is heavily dependent on imported products. The US is the major supplier for medical devices, although in recent times Cuba, Mexico and Brazil have replaced some US exports. Disposable healthcare items such as syringes, surgical clothes and hospital furniture are all manufactured domestically."

Inefficient healthcare infrastructure, shortage of medicines in pharmacies and a high level of private healthcare expenditure leave plenty of room for improvement in the healthcare system.

Venezuela is ranked 187 out of 190 countries in ease of doing business. In July 2017, the rating firm Standard & Poor's downgraded Venezuela's economy (CCC = extremely high risk bond or investment) with a negative outlook, and so did Moody's and Fitch. (mr)

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BIO International Convention 2018

The BIO International Convention, hosted by the Biotechnology Innovation Organization (BIO), represents more than 1,100 biotechnology companies, academic institutions, state biotechnology centers and related organizations across the USA and in more than 30 other nations.

The annual BIO convention, which takes place again in Boston, Massachusetts/USA, on June 4–7, 2018, is known for its networking character and as a premium platform for initial business and investment contact.

Recordbreaking BIO 2017 hosted over 41,400 partnering meetings. The key benefits of attending the 2018 BIO International Convention are access to global biotech and pharma leaders, exposure to industry thoughtleaders, and unparalleled networking opportunities with 16,000+ attendees from 74 countries.

http://convention.bio.org/2018

Informex 2018

InformEx, to take place again on April 24–26, 2018, in Philadelphia, Pennsylvania/USA is a marketplace designed to bring key business leaders together in order to foster dynamic business relationships. The event is the epicenter for innovation, emerging trends, insights, and education in North America. InformEx 2017 brought together the entire fine & specialty chemical industry, from early discovery to commercialization, under one roof, offering 7,500+ attendees access to the right partners at any stage of development.

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