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'No Free Lunch'

Bjørn Lomborg on the Give and Take in Greenhouse Gas Reduction

New Thinking – Bjørn Lomborg might not be a household name in the chemical industry, but the mention of his name in environmental activist circles seems to provoke one of two reactions: adoration or disdain. Lomborg, a Danish academic who rose to notoriety in 2001 with his controversial book "The Skeptical Environmentalist," can be found on a handful of top 50 or top 100 lists for the world's top intellectuals and leaders; however, he also once found himself on the receiving end of a real-life Three Stooges scene when a critic of his theories smashed a pie in his face at a book signing.

Lomborg argues that current measures to halt global warming — specifically the Kyoto Protocol — are too expensive and non-effective, but he generates most of the ire against him with his standing that the climate changes that are underway are not as grave as many claim. His mantra is, "panic is rarely a good basis for smart policy." Lomborg often takes the media and environmental activists to task for what he describes as exaggerating the numbers on climate change in order to scare the general population into action.

"There is a tendency in the activist camp to sort of keep pushing that and keep only talking about the upper limit," he says in an interview with CHEManager Europe. While Lomborg doesn't deny that there are scientists who have projected, for example, a drastic rise in sea levels, he says there are also scientists who claim won't be any rise. This is why he says he prefers to defer to the UN's Intergovernmental Panel on Climate Change as being the most reliable source for such prognoses. However, the IPCC has come under fire recently after publishing its Fifth Assessment on Climate Change in September. According to Spiegel Online, several renowned scientists say the report is riddled with inconsistencies. Some have called the report too optimistic, while others have said the report includes imprecise calculation on the role humans play in global warming. Regardless, Lomborg says, "There is a good argument to be made that panic actually makes for really bad policy outcomes which, of course, is what we have been seeing over the last 20 years."

Lomborg, Al Gore and the Kyoto Protocol

By bad policy, Lomborg is referring to the Kyoto Protocol. In a recent article for the Telegraph entitled "Keep Calm and Save the Earth," he starts off with "Bad news sells — that's why we hear so much of it. But it can leave us with a panicked sense that the world is full of problems that urgently need to be fixed." In essence, Lomborg isn't the climate-change denier that many claim he



Bjørn Lomborg, Director, Copenhagen Consensus Center

is; perhaps a critic of current environmental policy would be a better description.

"The only place where I've changed my pitch since 2001 was my take on the Kyoto Protocol," Lomborg says. "Twelve years ago, I pointed out that for every dollar spent, probably 25 cents worth of good was being done for the environment. Not a great investment ... and in reality, it ended up being much, much worse than that."

Criticism of the Kyoto Protocol, which was created in 1997 in an effort to throttle human-made greenhouse gas emissions, is nothing new in both environmental and economic circles. Many say the protocol doesn't go far enough in limiting emissions while others, such as Lomborg, argue that the costs by far outweigh the benefits. Rather than spending money on frameworks for greenhouse gas reduction, Lomborg says money spent on R&D of green energy sources is a more effective method of halting climate change.

"For every dollar spent on this kind of R&D, we can probably avoid about \$11 of climate damage," he says. "This is much more than can be done with climate policies."

However, the protocol also has its popular proponents, such as Former U.S. Vice President Al Gore, who personally negotiated for it in the U.S. in 1997. It was signed by President Clinton that year, but was never ratified by the Senate, and the U.S. was never a participant in the protocol.

"When I debate with Al Gore or any other of my opponents, I do believe that they are motivated by goodwill," Lomborg says. "I'm not questioning their morals or intentions, rather whether their policies are the right ones to move ahead."

Since his time as U.S. vice president, Gore has become a symbolic figure in the fight against climate change, culminating in his 2006 documentary "An Inconvenient Truth," which sought to expose the myths and misconceptions about "global warming's deadly progress." So does Lomborg really consider Gore to be an opponent?

"I think he is arguing for a very different set of solutions," Lomborg says. "His proposals, such as stopping the use of coal-fired power

plants over a 10-year period, betray the fact that there is no sense of economic reality. We are not going to cut carbon emissions significantly, as long as it is very, very costly."

Lomborg On The Energy Transition

The 2011 Fukushima disaster rocked many countries using nuclear power to the core; it seemed that no one was more chilled than German Chancellor Angela Merkel and her reigning party of Christian Democrats. The German government ultimately decided to successively take all of its nine active nuclear power plants off the grid by 2022. Germany, like many other Western countries, is working toward a transition to a sustainable economy through renewable energy, energy efficiency and sustainable development. However, the country's abrupt departure from nuclear power has proven costly for consumers; according to a recent article in the Financial Times, the cost subsidizing green energy is expected to pass \$100 billion next year.

Lomborg says, "Germany is one of few countries in the world that has significantly reduced its carbon emissions, but it has also been done at very, very great cost." And he says what works for Germany cannot work for its less-affluent European neighbors. Spain, for example, has seen its subsidies for renewables go up to €8.1 billion, almost 1% of the country's GDP.

"Spain obviously is not in a good place economically to be spending more on green subsidies than they are for higher education," Lomborg argues. He then makes the kind of calculation he is famous for: "The net effect of all that spending over the next 20 years will postpone global warming by the end of the century by 62 hours."

This argument goes hand in hand with Lomborg's main thesis.

"We need to focus spending on R&D; the only way you are going to get people to switch to green energy in the long run is by making sure that the technology becomes so cheap that everyone wants to buy it. If we could make solar cells and wind turbines and all the other green energy sources cheaper than fossil fuels, everyone would switch, also the Chinese and the Indians. And as long as they are much more expensive, no one will switch in any significant way."

'No Free Lunch'

Lomborg has often praised fracking — a controversial method of unlocking underground gas deposits — as "this decade's green solution." Fracking has been an absolute boon for the U.S., freeing enormous amounts of feedstock and making production there viable for chemical companies once again. Dow, for example, will be building two shale gas-fed plants on the U.S. gulf coast. However, communities located near fracking sites have reported problems such as water contamination earthquakes and damage to water



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tables. At what point do the environmental benefits on one side outweigh the detriments on the other side?

"There is no such thing as a free lunch," he says. "With fracking, as well as with anything else we do, there is always going to be a trade-off. There is no such thing as risk-free energy. Good regulation here is key to minimizing the risks."

Lomborg argues that fracking has the potential to cut carbon emissions dramatically; it has probably cut U.S. carbon emissions about 400 to 500 megatons per year over the last three or four years, he says. He compares that to the entire impact of the Kyoto Protocol, which he says has cut emissions by 250 megatons per year.

"So, the U.S. has done twice as much as what the rest of the world has done over 20 years, and they have not done it by giving up money," he says. "In fact, the U.S. has made \$125 billion a year through fracking. Compare that with the \$280 billion dollars the EU spends each year to cut carbon emissions."

But Lomborg stresses that he doesn't think fracking is the long-term solution to CO₂ reduction. Rather, he says it's a bridge to "getting to a world where we don't emit CO₂ at all."

"Fracking is not the solution," he says. "But in the environmental conversation, there seems to be a sense that if it's not perfect, it's not worth doing. But, in reality, we've been trying for the perfect solution to carbon emissions for 20 years and have gotten almost nowhere."

Lomborg's road to cutting carbon emissions is paved with compromises, and his argument always circles back to cost.

"The simple point is, as long as green energy is so much more expensive than fossil fuels, we are not going to get most of the world to switch," he says.

Paris 2015 And Beyond

Governments of the world will try once again to cobble together a successful global warming pact in Paris in 2015, where the next UN Conference on Climate Change will take place. It is widely agreed that the 2009 Copenhagen conference was a complete flop, setting back the world's movement to get a handle on global warming. While many UN officials have presented themselves as optimistic, Lomborg has his doubts. "They are setting it up a little bit like Copenhagen in 2009, where we are going to solve the climate change and again have this grand treaty," he said. "We need to get beyond that and look for another solution."

However, Japan's recent acknowledgement that its greenhouse-gas reduction target of 25% below 1990 levels is impossible to attain has buoyed Lomborg's hope that the world will come around to the idea of an R&D-based approach to global warming.

"Japan has simply given up on the approach to climate policy that has failed for the past twenty years. Instead it has promised to spend \$110 billion over five years for innovation in environmental and energy technologies," he says. "The economics show that the smartest long-term solution would be to focus on innovating green energy. This would push down the costs of future generations of wind, solar and many other amazing possibilities. Everyone would switch to green energy, not just a token number of well-meaning rich Westerners."

Brandt Schuster,
CHEManager Europe



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Merck KGaA Offers £1.6 Billion for AZ Materials

PORTFOLIO German Group to Strengthen Speciality Chemicals Business

In a bid to expand its portfolio of products for flat panel displays, German chemicals and pharmaceuticals group Merck KGaA has offered £1.6 billion (nearly €2 billion) in cash to acquire AZ Electronic Materials.

Germany/Luxembourg — The Luxembourg-based firm with sales of \$794 million (€584 million) in 2012, manufactures anti-reflective coatings used in hard disc drives, as well as specialty chemicals for the graphic arts sector and shrink coatings used in memory devices.

Merck's offer, contingent on antitrust authority approval and the tender of at least 95% of outstanding shares, represents a premium of around 41% on the company's three-month volume-weighted average price. On news of the bid, AZ's value soared by 52% on the London stock exchange to £1.5 billion, and Merck's share price rose 4.1% in Frankfurt trading. AZ is a spin-off of Swiss specialty chemicals producer Clariant, sold to private equity investor Carlyle in 2004 and floated in 2010.



Dr. Karl-Ludwig Kley
CEO, Merck KGaA

The Luxembourg company's board of directors has recommended that shareholders accept the offer. Individually, the directors have pledged to tender their own shares, worth some 0.7% of the total. The offer period will run for 60 working days until mid-February. Merck said to realize expects annual synergies of around €25 million from the deal by 2016, with integration costs of €50 million expected between 2014 and 2016.

For 2012, AZ reported EBITDA of \$262 million. Its IC Materials division, which produces process chemicals for integrated circuits used in electronic devices, accounted for about 70% of sales revenue and had an EBITDA margin of 41%. The Optronics division, which manufactures photoresists for flat panels

along with silicon-based products for optoelectronics, accounted for 30% of overall sales and had an EBITDA margin of 29%.

Merck is already the world's leading producer of liquid crystals for displays. "With this move, we are strengthening the portfolio by adding a premium business to our existing business of high-margin specialty chemicals," said CEO Karl-Ludwig Kley. He added that the offer "marks another milestone" toward Merck's transformation into a highly specialized technology firm.

Even after a successful acquisition of the electronics specialist, pharmaceuticals will still account for more than half of the company's sales. "Our philosophy has always been to never put all eggs in one basket," CFO Matthias Zachert told a media conference.

"The current strategic opportunity for AZ to combine with Merck is compelling," said board chairman John Whybrow, remarking that the deal will reinforce his company's "strong market position and focused product development capability." (dw)

EPA Fines Elementis Chromium

U.S. — Elementis Elementis Chromium, one of the world's largest manufacturers of chromium chemicals in the world, has been fined \$2,571,800 for failing to disclose information about the negative health effects on workers of exposure to hexavalent chromium.

Disclosure is required by the Toxic Substances Control Act (TSCA) as the substance has been identified as a carcinogen.

The EPA's complaint against the New Jersey-based specialty chemicals producer was filed with the Office of Administrative Law Judges

in September 2010. The company has manufactured and distributed chromium-based chemical substances and mixtures for more than 35 years and has plants in Castle Hayne, North Carolina and Corpus Christi, Texas. (dw)

Allessa to Cut a Third of the Workforce

RESTRUCTURING German Chemicals Maker to Merge with ICIG's WeylChem

Allessa, the Frankfurt, Germany-based fine chemicals producer sold to private equity investor International Chemical Investors (ICIG) for an undisclosed sum in October, plans to cut the 900-member workforce by about a third.

Germany — The company cited the need to streamline operations to remain competitive. Where the cuts will be made is to be announced during the week of Dec. 17.

The streamlining, already in progress, will go hand-in-hand with the planned merger of Allessa with WeylChem, a Frankfurt-based detergents and intermediates producer acquired by ICIG from Swiss specialty chemi-

cal producer Clariant, also in October. Combination of the two portfolios would create a company with annual sales of around €500 million.

Rafael Reiser, current CEO of WeylChem has been appointed head of Allessa.

Both chemical companies were part of the now defunct Hoechst group. The WeylChem activities were among the fine chemicals businesses merged into Clariant by Hoechst CEO Jürgen Dormann after the multinational group's breakup in the 1990s. Allessa emerged from Hoechst subsidiary Cassella. Both have production facilities in the Höchst industrial park in Frankfurt, and Allessa has its base at another Frankfurt location.

With the dissolution of the Hoechst conglomerate, many of the synergies between the two portfolios were destroyed, and "it is time to enable them again," said Allessa supervisory board chairman Karl-Gerhard Seifert, a former Hoechst managing board member.

Allessa has been operating under an austerity program for some time, with employees working at wages 6.7% below the chemical industry wage and executives taking a 10% pay cut. Authorities of Frankfurt and the German state of Hesse have pledged to provide support for the struggling business and the redundant employees. (dw)

DuPont to Spin Off Performance Chemicals

PORTFOLIO Company to Benefit from Consistent Earnings Growth, Lower Volatility

DuPont will spin off its \$7 billion Performance Chemicals division, including the titanium dioxide and the chemicals and fluoroproducts businesses, to shareholders over the next 18 months. No job losses are planned.

U.S. — The separation, which follows a "thorough strategic review process over the last year," is "clearly the best option to deliver enhanced value to shareholders," CEO Ellen Kullman said when announcing the plans. The company

did not say whether it would divest the business nor did it identify potential buyers. Huntsman is in the process of acquiring the Sachtleben TiO2 business of Rockwood.

Following the spin-off, Kullman said DuPont will have the optimum portfolio, will benefit from more consistent earnings growth and lower volatility and will have world-leading businesses, solid fundamentals and well established positions in attractive markets. The TiO2 market has been on a rollercoaster ride, with prices falling more than rising but recently has been seen as headed for recovery. Shortly before

announcing the separation, DuPont said the fluoroproducts business, one of the traditional pillars of DuPont's portfolio, was improving. In Q3 2013 quarter, volume sales increased 25%.

DuPont also has agreed to sell its Glass Laminating Solutions/Vinyls activities, part of its packaging & industrial polymers division, to Japanese specialty chemicals and fibers producer Kuraray for \$543 million, plus the value of the inventories. The sale is expected to close during the first half of 2014 pending regulatory approvals. (dw)

Energy Costs and the European Chemical Industry

EC Debates Legality of Subsidies for Energy-Intensive Manufacturers

Competitive Edge – The European chemical industry would like to be exempted from any additional energy costs stemming from state subsidies of renewables. Without being freed from the need to pay surcharges on their electricity bills to pay for the development of renewables, it fears its energy intensive plants will in the long term suffer a damaging loss of international competitiveness.

The German system under which producers with energy intensive sites making chemicals and other products like steel and cement are excused from renewables-related payments is seen by the industry as providing a benchmark. Much of the costs of renewables subsidies have been shifted in Germany onto the shoulders of residential electricity consumers.

“We consider exemption systems like that in Germany as being necessary where European countries are going down the path of subsidized development of renewables as a source of energy,” says Peter Botshek, energy, health, safety and environment director at the European Chemical Industry Council (Cefic), Brussels.

Relief from the costs of renewables development could be incorporated within a uniform energy policy across the European Union, which would prioritize the need to alleviate the energy costs of key manufacturing sectors like chemicals. However Cefic’s strategy of pushing for German-style exemption schemes in the face of the strong growth in the subsidies for renewables is beginning to become unstuck.

Reform in Germany

Following the German general election in September, the prospective partners in a new coalition government – Christian Democratic Party (CDU) and Social Democratic Party (SDP)—have been thrashing out an agreement on a reform of the 2011 Renewable Energy Sources Act (EEG).

The EEG lays down rules for both feed-in tariffs that grid operators must pay for renewable energy and exemptions for energy-intensive manufacturers from surcharges imposed on electricity consumers to pay for the tariffs. The difference between the feed-in tariffs and the market value of the energy provided by renewables has amounted to an annual subsidy of around €20 billion. Heavy electricity users like commodity chemical producers may now have to pay a larger share of the subsidy bill following a deal by the coalition partners.

At the same time, the European Commission is investigating whether the EEG exemptions for producers of petrochemicals and base chemicals and other energy-intensive manufacturers are legal under European Union rules on state aid.

Inappropriate State Aid?

If the Commission’s investigations conclude that the exemptions are inappropriate state aid, it will then carry out a further examination about whether they breach competition rules. The result could be that by early next year not only will the Commission prohibit the exemptions but also demand repayment of the EEG surcharge reductions amounting to millions of euros.

“If the Commission decided that European regulations had been broken to that extent it could do a great deal of financial harm to the German chemical industry,” said Dr. Kurt Bock, chairman of BASF and Cefic president, at a press briefing organized by his company in London in November.

BASF, the world’s chemicals company, could stand to lose considerable sums merely as a result of possible changes to the EEG introduced by the coalition government partners.

They could, for example, abolish a provision in the legislation which grants relief from surcharges for self-generation plants like the two the company has at its main site at Ludwigshafen, Germany.

“That would add as much as €350-400 million to the costs of the running the plants, which would make them uneconomical,” said Bock.

He stressed that the biggest danger of an abolition of the exemptions for energy-intensive plants would be that they made the German petrochemical and base chemicals sector uncompetitive internationally and handicapped in their ability to attract investment. Bock’s statements in London echoed views he expressed at the Cefic general assembly in Munich in October where he warned about the impact of high energy costs on the future of the German and the European chemical industries.

BASF Demands Level Playing Field

“If the new German government’s reform of the renewables schemes is not done properly, it could have dramatic consequences for the international competitiveness of the German industry,” Bock stated during a panel discussion of experts at the assembly on energy costs. “The European chemical industry must have a level playing field internationally with energy issues. We are a global industry competing against companies outside Europe as well.”



BASF's Ludwigshafen headquarters from above. “If the new German government’s reform of the renewables schemes is not done properly, it could have dramatic consequences for the international competitiveness of the German industry,” said BASF CEO Kurt Bock.

He stressed the need for a more closely integrated energy sector in Europe. A disjointed market has led to Germany, for example, paying neighboring countries to take excess output from renewable sources like wind and solar power which could not be absorbed by its domestic users.

“Belgium has been shutting down gas-fired power plants because it has been able to get energy from Germany for nothing,” said Bock at the Munich meeting. “We are in favor of a more European approach on energy policy. Yet what we are seeing is a fragmented one in which EU countries are following their own agenda and setting their own priorities.”

Chemical industries in countries like the UK have been trying to persuade their governments to set up for heavy electricity users’ exemption schemes from renewables surcharges similar to the EEG system in Germany.

“We would like to achieve levels of exemptions similar to those in Germany, where energy intensive industries are paying only 5% of total costs of the development of renewables,” Nick Sturgeon, energy, trade and competitiveness director at the UK Chemical Industries Association (CIA), told a press briefing in London in October.

The CIA is seeking compensation for the extra energy costs passed on by power companies as a result of having to pay an obligatory basic feed-in tariff for renewables. It also wants rebates for higher electricity prices resulting from the building in the country of new nuclear power capacity.

Shale Gas Expectations

The association is also strongly supporting moves by the UK government to encourage energy companies to start drilling for shale gas in the country with the aim of commercial production before 2020.

“Shale gas will not be a magic bullet in the UK,” said Steve Elliott, CIA chief executive. “But the reserves of it in the country are large enough to have an impact on energy prices and to boost the chemical industry. A UK energy policy which

did not take into account shale gas would not be credible.”

“We expect that as a result of exploration drilling next year, commercial production schemes will go ahead to come on stream by 2018,” he added.

Cefic believes that shale gas production in the main European countries with shale gas reserves — like France, Denmark, Sweden, Germany, Netherlands, Poland, Romania and the UK — will put downward pressure on gas prices, although not to the extent it has in the U.S. where

gas prices are around half to a third lower than in Europe.

“It would be unrealistic to expect gas prices to drop as much as they have in the US because of shale gas,” said Bock at the BASF press briefing in London. “But additional supplies of gas from shale gas reserves will introduce more flexibility in the European gas market.”

“The UK government is more supportive of shale gas production than the German government is,” he continued.

Wintershall, BASF’s oil and gas subsidiary, had been using fracking techniques in Germany for extracting natural gas from tight reservoirs with the aid of pressurized water, sand and chemicals.

“In 50 years we have not had one single incident of fracking causing ground water pollution,” Bock explained. “Yet the German authorities will not give us a permit to drill for shale gas because of the public’s worries about fracking.”

The shale gas boom in the U.S. had highlighted the vulnerability of energy intensive sectors, like chemicals, in Europe to competition from countries with low-cost energy resources.

Europe needs to develop its own shale gas supplies to underpin the future of its own base chemicals sector. But it also requires measures to protect the chemicals industry from the long-term additional costs of establishing a decarbonized economy.

Sean Milmo, freelance science and business journalist, Essex, UK



Uniform EU Framework for Shale Gas Needed

FEEDSTOCK Commissioner Demands Clear Regulatory Approach to Unlocking Gas Reserves

EU environment commissioner Janez Potocnik has called for a uniform risk management framework for shale gas exploration across member states.

Brussels —Addressing a recent energy summit, Potocnik said it is “extremely important” that the public accept unconventional fossil fuel exploration. He cited recent European Commission surveys, in which three-quarters of respondents said they would be worried if a shale gas project were to be located in their neighborhood. This, he said, was because of the lack of adequate legislation and proper risk management. The commissioner said EU officials are eyeing proposals along the lines of

those suggested in the Golden Rules of the International Energy Agency. Along with establishing legal clarity, the objective would be to establish good practices such as disclosure of chemicals, baseline monitoring of water, hydrogeological modeling, well integrity and capture of methane, along with monitoring and cleanup.

Potocnik noted that the existing EU framework, while “appearing to apply to shale gas,” does not necessarily address the specific impacts and risks, as it was designed before the technology became widely available.

The European approach to regulating shale gas must be clear and simple to understand, implement and achieve, he said. As member states have taken differing approaches to regulation, it has created a “frag-

mented and complex operating framework” that is not helpful to those seeking to reap the benefits. While creating a level playing field within, the commissioner stressed that a “certain degree of flexibility” also is needed. “We are well aware that local features matter a lot, as many of the risks depend on the geological and geographical features of a project.” One of the dangers of not having a uniform framework, Potocnik said that national interpretations could be legally challenged and the internal energy market jeopardized.

“Whether shale gas becomes a success story in Europe,” the environment commissioner said, “we need to be consistent with our long-term strategy of a low-carbon, resource-efficient economy.” (dw) ■

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China's Quest for Sustainable Growth

In Move Toward Consumption-Led Economy, Specialty and High-End Chemical Segments Will Further Expand

A World Leader – The chemical industry in China is both a key driver and prime beneficiary of remarkable GDP growth. In the last decade, significant investments in capacity and technology have propelled China's chemical industry to the forefront of world producers. In 2010, Chinese chemical output exceeded American output for the first time.



Vir Lakshman
Head, Chemicals & Pharmaceuticals Germany, KPMG



Rita Duran
Senior Manager, Chemicals & Pharmaceuticals Germany, KPMG

Moving to Modest Growth Rates

Between 2007 and 2012, revenues for China's chemical industry grew at a compound annual growth rate (CAGR) of 21% to reach \$1.2 trillion in 2012. In comparison, over the same period, the Japanese and Indian markets grew at a pace of 4% CAGR to \$230.2 billion and 13.8% CAGR to \$100 billion respectively.

Despite a changing policy environment and slowing economic growth in China, the long-term growth prospects for the chemical industry remain high and are expected to reach a volume of \$1.9 trillion in 2016 — at a CAGR of 13% from 2012 to 2016. This is a more modest growth rate as a more mature economy orients itself away from an investment-led model to a model that focuses on consumption and services.

Driving Growth with Chinese Urbanization

To improve the geographic spread of its industries, the Chinese government plans to develop its inland infrastructure. It has set an urbanization target level of 60% by 2020 with less developed internal provinces catching up with the more developed southern and eastern coastal provinces. According to China Development Research Foundation, by 2020 investment in infrastructure is expected to reach more than \$3.6 trillion.

Steady urbanization, infrastructure investments and a large Chinese middle class with growing household income driving demand for consumer, auto, IT and electronic products will provide ample growth opportunities for the chemical industry.

Shifting to Higher Value Specialty Chemicals

The more China moves toward a consumption-led economy, the higher the demand for high-end sophisticated products and advanced materials will be, resulting in the growth of specialty and high-end chemical segments. The chemical sector in China is still a net import market. During 2012, the country imported almost 10% of its specialty chemicals and more than 50% of its electronic chemicals. To close the gap, China plans to increase its self-sufficiency in new chemical materials from 56% in 2009 to 76% in 2015.

By 2020, China aims for 15% of its gross domestic product to come from seven strategic industries (new-generation IT, energy saving and environment protection, new energy, biology, high-end equipment manufacturing, new materials, and hybrid and electric cars), the majority of which use products from the chemical industry. In response, industry managers are now focused on strengthening and developing electronic chemicals, fluoro coatings, food additives, eco-friendly adhesives, plastic additives and water-treatment chemicals.

Investing in R&D

Chinese companies spend 3% to 5% of their revenues on R&D, improving their ability to innovate and incorporate technological changes into their production processes. For example, in 2012, the Wanhua Chemical Group spent 4% of its revenues on R&D. It focused on revitalizing the national polyurethane industry through the acquisition of technology and developing intellectual property rights of MDI manufacturing technology. Another example is Rising Sun Holdings (Risun) Group, China's largest coal chemical product manufacturer. Risun established its strength in a new sector using advanced technology from Germany and other patented technology from international research institutes.

China's commitment to R&D has risen and is expected to increase by 11.6% in 2013, following an 11.3% increase in 2012. The country is investing in all aspects of R&D at record rates. It already has more scientists and engineers than the U.S. and its share of technical papers has steadily increased in the past 10 years. Much has been said about the modest quality of China's technology paper output, but in many areas, such as materials science, chemistry and engineering, China is now a global leader.

Investing in Fixed Assets

To capitalize on the growth prospects, Chinese as well as foreign chemical companies have made significant capital investments. Fixed asset investments in the first half of 2013 were up 20.1%, year on year.

Many multinational chemical companies operate and earn a significant portion of their revenue in



China. Giants such as BASF, Dow, Evonik, LG Chem and Mitsui Chemicals have announced aggressive Chinese investment plans in both production and R&D. For instance, BASF plans to double sales in China to €12 billion by 2020 and will invest €10 billion in the Asia Pacific region, mainly in China, from 2013 to 2020. Evonik, a specialty chemicals company, plans to double revenues to €2 billion by 2015. From 2011 to 2015, Evonik will invest more than €350 million in specialty chemicals in China.

Examples of major chemical investments, sorted by capacity, are listed in the table below.

Investing in Internationalization

To establish themselves as world-class chemical companies, domestic chemical companies also look to overseas investments. In a break from the past, natural resources now account for around 60% of overseas investments, compared with 75% in 2010. Although Asia remains the leading investment destination, acquisitions in Europe and North America have noticeably increased in the last few years. China started making a move toward Europe in 2007, and the trend of focusing on targeted downstream acquisitions will continue.

For example, in 2011, the Wanhua Industrial Group, a Chinese polyurethane raw materials producer,

entered the European market and expanded downstream by acquiring for €1.26 billion a majority stake in BorsodChem Zrt, a Hungary-based chemical group involved in production and processing of plastic raw materials and isocyanate.

Zhejiang Longsheng Group (Lonsen) has a bold strategy of internationalization. In 2010, it acquired German-based DyStar. With this acquisition, Lonsen became the world's largest textile chemical producer, controlling more than 20% of the global market, and also contributed to improving Chinese chemical brands internationally. Lonsen benefited highly from DyStar's valuable patents, brands, network, sales channel and technology.

Securing Feedstock For Growth

China's technically recoverable reserves are estimated at 25 trillion cubic meters, 50% larger than those of the U.S.

China has recently made significant investment in leveraging its large coal reserves (about 115 million tons) as a feedstock for the petrochemical industry. According to IHS Chemical, more than 120 coal-to-chemical projects have been announced in China. From 2013 to 2020, almost 20 million metric tons per year of coal-based olefins capacity will be online in China. The coal-to-chemicals development faces sig-

nificant challenges such as remotely located reserves, fresh-water scarcity, financial constraints, and environmental concerns around excess waste and carbon emission.

Over the past few years, several foreign oil and gas companies, including Shell, Chevron, Hess and ExxonMobil, have partnered with China's state oil firms PetroChina and Sinopec Corp. to explore and eventually produce shale gas. China's goal to produce 6.5 billion cubic meters of natural gas from shale by 2015 is proving a challenge. High well costs and poor investment returns have held back digging. Reserves are located in difficult-to-access hilly terrain and are much deeper (4-6 kilometers, compared with 2-4 kilometers in the U.S.). Moreover, fracking technologies that proved successful in the U.S. require large amounts of fresh water, which is a constraint in China. Also, the ethane content from these reserves remains unknown, being a potential logistical and transportation challenge.

Environmental Protection

China has pledged to reduce carbon dioxide emissions by 40% to 45% per unit of GDP by 2020, compared with the levels in 2005, but it still relies heavily on energy-consuming, high-polluting industries for economic development and poverty relief. Pilot carbon-emissions trad-

ing schemes to curb greenhouse gas emissions with the help of a market mechanism are planned. The challenge for the government is to persuade heavy industries, including the chemical sector, to balance profit growth with environmental protection. Companies in the chemical, steel and cement sectors have expressed willingness to participate in carbon-emissions trading, but fundamental structural problems need to be resolved before the scheme can succeed.

Despite the challenges, continued urbanization, public and private investments as well as industrial restructuring ensure the chemical industry in China is well poised for sustainable growth.

Vir Lakshman, head of Chemicals & Pharmaceuticals Germany, KPMG

Rita Duran, senior manager, Chemicals & Pharmaceuticals Germany, KPMG

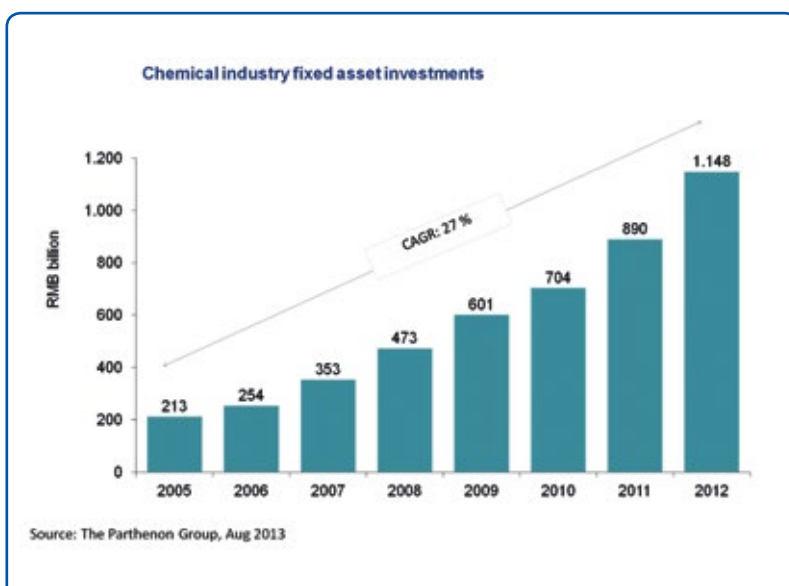
Contact:
Vir Lakshman, KPMG, Düsseldorf, Germany
Tel.: +49 211 475-6666
vlakshman@kpmg.com
www.kpmg.com

www.bit.ly/China

Examples of major chemical investments, sorted by capacity

Company	Location	Product	Capacity (mt/y)	Region	Capex	Start-up
Jinling Huntsman New Materials	Jiangsu, China	methyl tertiary butyl ether (MTBE)	726,000	East	Part of €600m	2015
Keyuan Petrochemicals	Guangxi, China	acrylonitrile-butadienestyrene (ABS)	400,000	South	NA	Q4 2014
BASF	Chongqing, China	methyle di-para-phenylene isocyanate (MDI)	400,000	Inland	€1bn	2014
INEOS Nitriles/Tianjin Bohai Chemical	Tianjin, China	acrylonitrile	260,000	Northeast	NA	Q4 2016
Jinling Huntsman New Materials	Jiangsu, China	propylene oxide (PO)	250,000	East	Part of €600m	2015
Xingjian Tianye	Xinjiang, China	MEG (mono ethylene glycol)	250,000	Northwest	NA	Q3 2014
Invista	Shanghai, China	hexamethylene diamine (HMDA)	215,000	East	NA	2015
Lanxess	Jiangsu, China	ethylene propylene diene monomer (EPDM)	160,000	East	€235m	2015
Vinythai	Jiangsu, China	epichlorohydrin (ECH)	100,000	East	NA	H2 2014
Negromex	Jiangsu, China	styrene-butadiene rubber (SBR)	100,000	East	NA	2014
BASF-YPC	Jiangsu, China	ethylene oxide; acrylic acid; butyl acrylate	NA	East	NA	2014
Evonik	Shanghai, China	isophorone	NA	East	€100m	2014
Evonik	Shanghai, China	hydrogen peroxide (H2O2)	NA	East	€100m	2014

Source: ICIS, company websites
Note: The list is not exhaustive



Growth of fixed asset investments in China (c.f. table on the right).

Cooperation Or Conflict?

The Chemical Industry in China and the Middle East

Challenging The West – For most of the 20th century, the global chemical industry was dominated by the Western world (Western Europe, North America and Japan as an honorary member of the club). However, in the first decades of the 21st century, other countries and regions — in particular the Middle East and China — are challenging this dominance.



Dr. Kai Pflug
CEO, Management
Consulting

reduced the dependency of at least North America on imports.

In terms of production capabilities, some distinction can be made between physical assets (i.e., existing chemical plants) and production knowledge (both on a high level such as technologies for license and on the level of the skills of typical chemical engineers). However, in both aspects Western companies have a clear lead as they have both a much deeper base of intellectual property and related knowledge and a broader and more highly developed portfolio of production assets.

In contrast, the Middle East is comparatively weak regarding production capabilities and still primarily relying on Western expertise as the region historically lacks both experiences with production in general and a long-established education system to provide a sufficient number of qualified scientists.

China's expertise is already a bit more developed, but focused mostly on basic chemicals, particularly in the state-owned companies. In contrast, in high-value areas such as specialty chemicals, China still lacks the knowledge and assets to provide a broad and diversified portfolio despite strong political will to move in this direction.

Overall, the West is still the key knowledge-carrier the rest of the world relies on, be it via imitation, licensing or hiring of expats.

As for customers and markets, the main development in the last decade has been China becoming the biggest chemicals market in the world. This is China's biggest asset, and it obviously includes not only those chemical products consumed by Chinese end customers but also those used for production of finished goods that are later exported from China.

In contrast, the local chemicals markets of the Middle East are relatively irrelevant.

Finally, the Western world is certainly an important market for chemicals, particularly for those focusing on higher-end market segments.

Simplistically speaking, the chemical industry turns raw materials into marketable products via industrial processes that require both physical assets and technological know-how (fig. 1). In this regard, the chemical industry does not fundamentally differ from other producing industries.

Strengths And Weaknesses

For the chemical industry, oil and gas will probably remain the most important bottleneck among the raw materials in the next few decades. Of course there are other important raw materials as well, particularly for inorganic chemicals and for specific areas such as fluorochemicals or rare earths, but generally these are either more evenly distributed globally, or of lower importance to the industry, or both. In addition, there are attempts to replace petrochemical value chains by those based on bio-sourced materials, but at current prices these are probably not fully competitive yet.

Among the three regions examined, the Middle East clearly has the best position regarding the most important chemical raw materials. The abundance of oil and gas is the region's main competitive advantage as these resources by far exceed the resources of these and related raw materials (e.g., coal) in other regions.

In contrast, China — though a big oil producer itself — strongly depends on import of petrochemical raw materials, and this is unlikely to change despite the strong political will to self-sufficiency and progress in coal chemistry and bio-based materials.

The Western world is also generally a net importer of petrochemical raw materials, though the more recent developments in shale gas have



Table 1 summarizes the relative contribution of the three regions to the global chemical industry.

Trends

In the medium term, these contributions are likely to change somewhat (table 2). China is likely to develop much stronger production capabilities both on the level of assets and the level of know-how, while the Chinese chemicals markets will also further increase in importance. (Despite the recent slowdown of the Chinese economy, growth is still much higher than in most other regions).

The Middle East is massively expanding its production assets, trying to move downstream in the chemicals value chain to capture a larger share of the overall value created in petrochemicals. However, in the near future this shift will be more on the level of assets (which can be established in a few years) than on the level of knowledge on all relevant levels (which will probably take decades or more).

For the Western world, shale gas will lead to a divergence in development between the U.S. on one side and Europe/Japan on the other side. Shale gas increases the raw materials supply in the U.S. and will therefore also lead to higher investment in production assets while the larger scarcity of suitable raw materials in Europe and Japan will probably lead to a long-term loss in production assets there.

Consequences

Currently each of the three regions has a fairly specific contribution to

the overall global chemical industry: raw materials (Middle East), markets (China) and production technology (West). This opens the way for collaboration between the regions, which has already begun, for example the three-way cooperation between Shell, PetroChina and Qatar Petroleum to build a refinery in Zhejiang.

In the long run, given the developments anticipated in table 2, there is also a distinct possibility for cooperation only between the Middle East and China. As both these regions (and particularly China) in-



creasingly develop production technology and assets, the current role of the West as a contributor will be threatened. For the resulting two-way cooperation between the Middle East and China, the technology component will probably determine the stronger position as the advantage in raw materials will always stay with the Middle East while China will always have better market access. The most likely outcome is a situation in which most of the upstream technology up to base chemicals lies with the Middle East and the downstream/specialty technology with China. However, it is not clear whether this will be acceptable for the chemical state-owned enterprises, whose current strength is more on basic chemicals technology.

In conclusion, both the Middle East and China need each other as their strengths in raw materials and market access complement each other. Cooperation may be facilitated by the somewhat similar governance status of the key companies on both sides — the respective governments heavily dominate both.

Conflicts may arise over where exactly to hand over the value-creation process from the Middle East to China. This will be decided both by the alternatives both parties have (and thus their respective bargaining positions), and their technology level. Very high-volume bulk chemicals will likely be more suited to production in the Middle East while highly specialized or customized, low volume, labor- and research-intensive chemicals are more suited to production in China. Chemicals somewhere in between will be the most interesting to watch.

Dr. Kai Pflug, CEO, Management Consulting — Chemicals

Contact:
Dr. Kai Pflug
Management Consulting — Chemicals
Hong Kong, China
Tel.: +86 1 36 81 87 39 92
kai.pflug@mc-chemicals.com
www.mc-chemicals.com

www.bit.ly/China

Raw Materials

Production Assets
Production Technology

Marketable Products

Fig. 1: Schematic Value Creation Process of the Chemical Industry

China Targets New Markets for Fuel

China — From Africa to Australia, Chinese refiners are exploring new markets to ship surplus oil products such as jet fuel and diesel, putting them on track to compete with global trading houses and refining centers such as Singapore.

The switch to being a growing exporter of fuel comes despite China recently becoming the world's largest net oil importer. The opening of more refineries to process oil has emerged just as the world's second-biggest economy shifts down a gear so there is less demand for some transport and industrial fuels, which are more sensitive to the pace of growth.

This has driven China's biggest refiner Sinopec Corp and its domestic rivals to look outside traditional markets, such as Vietnam and Hong Kong, to sell surplus cargoes, sources close to the matter said.

Chinese diesel exports could reach 3.7 million barrels a month

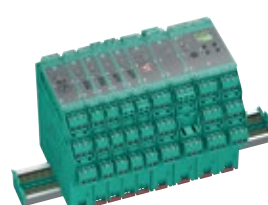
by next year, traders said, more than double the average so far in 2013.

This sharp turnaround could mean refining margins in Asia are squeezed by the new supply, which could also make prices of fuel exports cheaper. The increased shipments come just as new refineries are also coming on stream in the Middle East next year and with higher U.S. exports.

China's refining capacity was close to 12 million barrels per day by the end of 2012 and is set to grow by about 3 million bpd between 2013 and 2015, according to industry officials and media, more than double India's capacity. Overall fuel demand in China was about 9.79 million bpd last month, according to Reuters calculations based on preliminary government data.

Demand for gasoline and diesel is set to rise by 617,000 bpd and 718,000 bpd, respectively, over the next five years, according to estimates by JBC Energy. ■

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Effect of Global Shale on the GCC

Assessment of Regional Shale Development

Hydrocarbon Building Blocks

– Exploitation of shale deposits in the U.S. has risen quickly and will continue to intensify in the coming years as technology and expertise improve and extraction costs decline. Gulf Cooperation Council (GCC) countries must build on their hydrocarbon background to extend their coverage of the chemical value chain until they may be able to tap into their own shale plays.

Before discussing any implications of the shale boom on GCC countries, it is reasonable to briefly describe global developments in this field. While the U.S. had negligible production rates of shale gas and shale/tight oil as recently as five to 10 years ago, production rates from shale in 2012-2013 are impressive:

- Methane: 170 million tons/year (≈ 8.5 trillion cubic feet [tcf]/year)
- Natural-gas liquids (NGLs): 18.5-37 million tons/year (≈ 0.5-1 million barrels/day)
- Shale/tight oil: 95 million tons/year (≈ 1.9 million barrels/day)

Among other reasons, significant improvements in drilling, fracking and overall extraction technology have made this boom possible. Learning-curve effects (typical example in Marcellus: decrease of well costs from \$8 million to \$4 million within a larger project) will lead to further cost reductions and yield increases, which will ensure that the boom will last beyond the period of picking only the lowest-hanging "unconventional fruits."

Because of the massive increase in domestic oil and gas production,



Dr. Sven Bugarski Stratley

the U.S. is forecast to become a net liquefied natural gas (LNG) exporter by 2020 at the latest, and in the same year will satisfy domestic oil demand to a large degree via its own regional sources. Furthermore, polyethylene exports are expected to nearly double in the period from 2013 to 2020.

Other countries pursue exploration activities and production plans for unconventional gas and shale/tight oil to very different degrees. Countries with expected commercial projects for unconventional gas production in the long term include (all figures are estimations for 2020 in tcf/year, with shale gas being a substantial part in most cases) Canada: 3.5 tcf/year, China: 2.8 tcf/year, Australia: 2.1 tcf/year, Europe (all countries): 0.3 tcf/year, Mexico and Argentina: 0.2 tcf/year each. In contrast, shale gas production in the U.S. is expected to exceed 11 tcf/year by 2020 and hence will dominate global production volumes in shale gas.

As the wetness of the basins outside the U.S. is not yet sufficiently known, NGLs and shale/tight oil production projections outside the U.S. remain highly speculative. However, given the time required for exploration and developing the infrastructure to produce, fractionize and transport NGLs from shale and/or tight oil, it is reasonable to state that no region outside the U.S. will reach production rates with a global market effect until 2020 at the earliest.



Oliver Gawad Stratley

The U.S. will maintain its competitive advantage in shale gas as a feedstock and energy carrier at least until 2020, in particular when compared with Europe and East Asia. Prices for natural gas in 2013 are (average January-June) \$4 per million British thermal units in the U.S., \$12 per million Btu in Europe and \$16 per million Btu in Japan.

Because of the high costs for liquefaction and transport of LNG, global arbitrage will reduce these interregional price differences only by a few dollars per million Btu.

Availability of large volumes of hydrocarbons at low prices drives investments in power production from gas, ethane crackers and chemical plants producing ethylene derivatives, fertilizers and other products that have the "shale gas advantage." As a consequence, a number of affected production sites, especially in Europe, are already experiencing declining margins and it is expected that older and less efficient crackers and basic chemicals capacities in Europe will be shut down in the medium term.

Opportunities in the Unconventionals Boom

Investments in involved companies, plants and other related projects in North America are an obvious option to participate in the U.S. boom. Qatar Petroleum, for example, has acquired exploration and production assets from Suncor Energy together with its partner Centrica.

The problem is that the time for bargains in this market is over, thus any investments require careful evaluation.

Despite this, there are presumably significant unconventionals opportunities in the GCC countries. From both geological analysis and already existing exploration data, it is clear that the likelihood of high concentrations of gas, NGLs and oil in shale formations is highest in areas with abundant conventional resources. Indeed, first estimations of shale resources in the GCC confirm that, with more than 700 tcf of shale gas, including supposedly significant amounts of NGLs and shale/tight oil, the regional resource opportunities are tremendous.

Resources are only real opportunities if they become reserves (economically extractable), and this is the critical issue. Why should a region historically blessed with one of the world's largest concentrations of inexpensively accessible conventional oil and gas deposits be interested in extracting more-costly unconventionals?

There are four main reasons:

- Deposits of cheaply extractable oil and gas are declining, especially outside Qatar.
- Production rate of associated gas is limited by oil production rate.
- Demand for gas in the region is high and increasing.
- Access to Qatar's gas surplus is in competition with global demand.

These reasons explain why there is a gas shortage among GCC countries (except Qatar), both for methane as an energy carrier and for ethane as a feedstock for regional ethane crackers. Regions with shale gas and shale/tight oil

deposits have already been identified, mostly in Saudi Arabia, Oman, Kuwait and the UAE (fig. 1).

Development of unconventionals in the GCC is in its infancy. Only a few exploratory measures and test wells have been performed so far. Promising indications of available resources and manageable costs are expected to drive further exploration and yield more detailed data.

Assuming that abundant resources lie below the Arabian Peninsula, the main success factors for large-scale production of unconventionals are supportive politics and regulations, as well as competitive production costs. Due to the long history of the hydrocarbon business, high dependence on energy and downstream feedstock, and the lack of strong public opposition (unlike, for example, in Europe), GCC governments have a supportive mindset and will presumably handle regulations pragmatically to enable large-scale projects. The cost issue is more challenging and certainly deserves a quick analysis of the influencing factors.

Costs for shale gas production are driven by the geology (especially depth of shale formation), topography, water availability, technology and infrastructure. A significant part of the deposits in the GCC (for example, in the empty quarter) is located in unfavorable desert environments, which is a serious obstacle for profitable well development. Moreover, 5 million to 20 million liters of water per well are currently required, and water is scarce.

Despite the challenges, there is room for optimism. Because of their large conventional oil and gas sector, GCC countries have oil and gas infrastructure, services and staff that facilitate building up an unconventionals business. In addition, sufficient unconventionals areas are accessible and new concepts are being developed to reduce water requirements through recycling or fracking without water ("dry-fracking"). According to our analysis and experiences from other regions, shale gas extraction costs might initially be around \$15 per million Btu, slightly above the costs in the early U.S. shale boom days. These costs are expected to decrease in the short term to \$10 per million Btu in favorable locations and might further decrease with progress on the regional and local learning curve.

Commercial Production

Experts frequently give 2020 to 2030 as the time frame in which unconventionals will be broadly produced commercially in GCC countries. It is important to keep in mind that, while local unconventional gas will not be cost-competitive compared with regional conventional

gas in the foreseeable future, it can be cost-competitive compared with imported LNG and hence fill the gas gap in concerned countries like Kuwait, Saudi Arabia and United Arab Emirates (figure 2). Using oil as a substitute for gas, e.g., for energy production in countries with abundant oil, is not reasonable because of the much higher price per million Btu for oil.

If shale resources in GCC countries are wet, as experts assume, the incentive to explore and extract NGLs in addition to methane becomes even more attractive. Firstly, NGLs are priced well above methane, and byproduct credits could reduce break-even costs by up to \$5 per million Btu. Secondly, ethane would be available as cracker feed. This is very important for cracker operators in Saudi Arabia, who have had difficulties with allocation of sufficient ethane for full-capacity utilization in previous years. The current approach to base new cracker projects on more-expensive mixed feedstock could in the long run be replaced by a trend to use ethane as a predominant feedstock again. Ethane from shale may cost up to \$700 per ton (≈ \$15 per million Btu) to yield ethylene at similar cost to ethylene from regional naphtha crackers. The quick cost assessment above indicates that if prospective wet basins are found in GCC countries, ethane production costs below \$700 per ton are realistically possible (fig.3).

According to recent forecasts, the gas shortage will become more severe in the GCC (except Qatar) in the coming years. This will presumably drive exploration for unconventionals and — if first findings are promising — lead to large-scale commercial projects across GCC closer to 2020 than 2030. Oman even has ambitions to go commercial in the production of unconventionals already in 2017.

Dr. Sven Bugarski and Oliver Gawad, Stratley

Contact:
Dr. Sven Bugarski
Stratley AG
Cologne, Germany
Tel.: +49 221 977 655 0
s.bugarski@stratley.com
www.stratley.com

Stratley has co-published parts of this article with GPCA for the 8th Annual GPCA Forum in Dubai.

www.bit.ly/shale-gas

Impact of global shale developments on the GCC - Assessment of regional shale resources: Figure 1

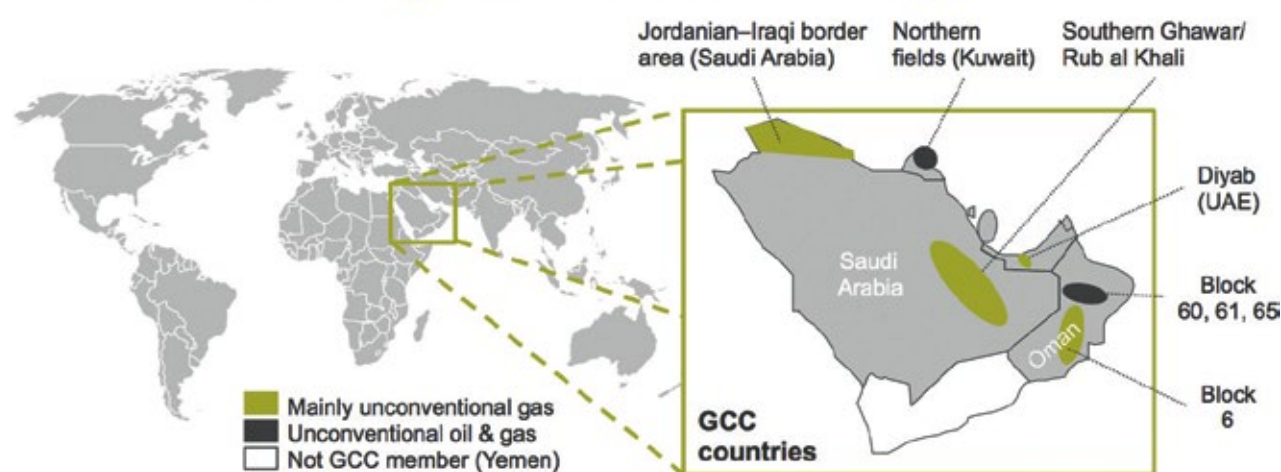


Fig. 1: Unconventional gas (mostly shale/tight gas) and unconventional oil (mostly shale/tight oil) areas in GCC countries. As exploration data so far is very limited, only selected and prospective plays are shown.

Impact of global shale developments on the GCC - Assessment of regional shale resources: Figure 2

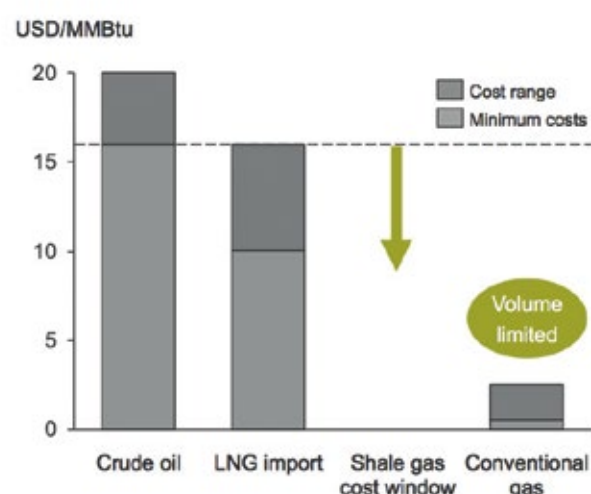


Fig. 2: Comparison of costs per energy content: oil, LNG imports in the GCC, the resulting shale gas cost window and conventional gas produced in the GCC. Byproduct credits not considered.

Impact of global shale developments on the GCC - Assessment of regional shale resources: Figure 3

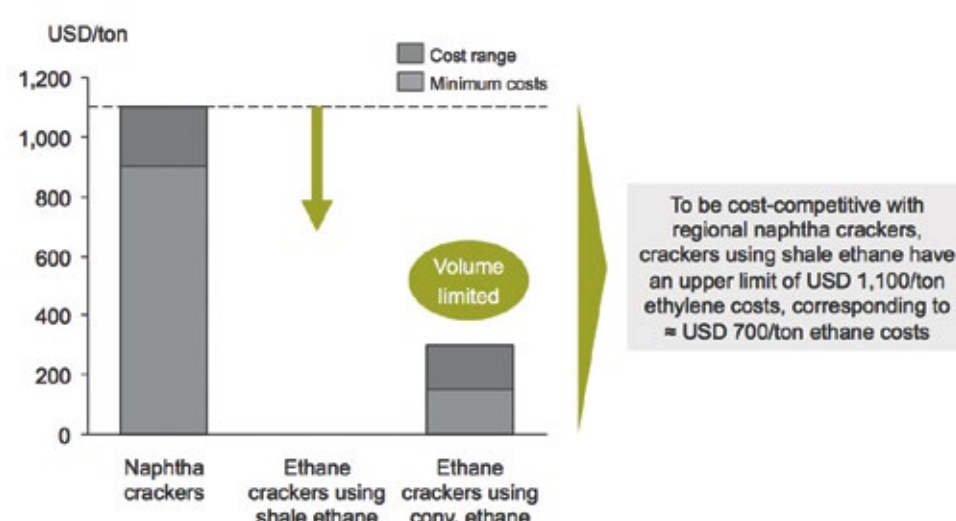
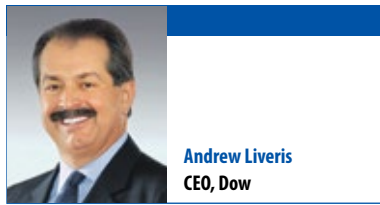


Fig. 3: Ethylene cash costs in the Middle East for the feedstocks naphtha, ethane from shale and conventional ethane.

Dow Prepares to Sell Chlor-Alkali and Epoxy Units

PORTFOLIO Company to Break Business into 3 Parts to Facilitate Sale

As part of plans to "right size" its chlorine footprint to meet its needs in downstream markets, Dow Chemical said it will carve out "a significant portion" of its chlorine value chain over the next two years.



Andrew Liveris
CEO, Dow

U.S. — Concretely, this will involve disposal of assets with \$5 billion in annual revenue, including more than 40 production units at 11 sites employing nearly 2,000 people.

To facilitate a sale, the businesses will be broken up into three parts: epoxy, chlorinated organics and the North American chlor-alkali business.

Affected assets include the chlor-alkali and chlor-vinyls facilities at Plaquemine, Louisiana, and Freeport, Texas, U.S., including Dow's

stake in the joint venture with Mitsui, which is currently building chlor-alkali facilities at Freeport. The global chlorinated organics production facilities at Freeport and Plaquemine as well as Stade, Germany, also are on the chopping block as is the global epoxy business with assets in the U.S., Germany, Italy, South Korea, China and Brazil. Supporting operations, including energy facilities, also are to go.

Altogether, Dow said it will shut down around 800,000 t/y of older

chlorine and caustic soda capacity at Freeport, replacing volumes with output from the start-up of the joint venture with Mitsui in 2014.

The chemical giant has retained financial advisers to explore alternatives for the affected businesses, including joint ventures, spin-offs and divestitures. "Due to the highly integrated nature of the chlorine value chain, we are conscious not to leave any stranded costs or negative synergies," said executive vice president Jim Fitterling, who will oversee the separation process and transaction activities.

Explaining Dow's forward strategy, CEO Andrew Liveris said the plans reflect a continuation of the company's shift toward downstream high-margin products and technologies that generate higher returns. (dw)

Altana Places €200 Million Promissory Note to Refinance Loan

Germany — German chemical producer Altana said its promissory note with a volume of €200 million issued to partially refinance its acquisition of Rockwood's rheology business was four times oversubscribed. Due to the strong demand, the loan amount was increased from €160 million during the issuing process.

Altana's chief financial officer Martin Babilas said the success of the paper is "a further consistent step in our financing strategy that aims at a sound basis for further growth and flexible repayment options, along with favorable financing terms." The new loan bears an interest rate of 2.1% and has debt maturities of three and a half to seven years.

The Bad Homburg-based firm completed its acquisition of the business on Oct. 1 for \$635 million. To finance the deal, a consortium of seven banks provided financing of €300 million. Altana said the portion of the loan not refinanced via the note will be settled within the next two to three years directly from its cash flow. (dw)

Carbon Black Producer Cabot Fined Nearly \$1 Million by EPA

LEGAL Company Ordered to Invest in Antipollution Equipment

Cabot Corporation, the second largest carbon black manufacturer in the U.S., has been fined \$975,000 by the Environmental Protection Agency (EPA).

U.S. — Cabot has been ordered to invest some \$84 million in state-of-the-art antipollution equipment. The company also will be obliged to spend \$450,000 on energy saving and pollution reduction projects that will benefit the communities surrounding the facilities.

In its action against Cabot, the agency alleged that between 2003 and 2009 the company made major modifications at its three production facilities in Franklin and Ville Platte, Louisiana, and Pampa, Texas, without obtaining pre-construction permits and without installing and

operating required pollution technology. This, it said, was in violation of the New Source Review (NSR) provisions of the Clean Air Act (CAA) and resulted in increased emissions of NOx and SO2.

The case is the first to result from a national enforcement initiative aimed at bringing carbon black manufacturers into compliance with the antipollution legislation. The Louisiana Department of Environmental Quality, a co-plaintiff in the case, will receive \$292,500 of the penalty.

At all three plants, the settlement requires that the carbon black producer improve existing controls for particulate matter or soot, operate an early warning detection system that will alert facility operators to any particulate matter releases and comply with a plan to control "fu-

gitive emissions" result from leaks or unintended releases of gases. To address nitrogen oxide (NOx) pollution, Cabot will be required to install selective catalytic reduction technology, install continuous monitoring systems and comply with stringent limits. At the two larger facilities in Louisiana, it must address sulfur dioxide (SO2) pollution by installing wet gas scrubbers as well as installing continuous monitoring. In addition, the Texas facility is required to comply with a limit on the amount of sulfur in feedstock which is the lowest for any carbon black plant in the United States. The EPA said the measures should reduce NOx emissions by about 1,975 t/y, SO2 emissions by around 12,380 t/y, and "significantly improve" existing particulate matter controls. (dw)

Two Bidders Believed Still in the Running for Kem One

France — Two bidders are believed to be still in the running to acquire insolvent PVC producer Kem One from its current owner, the Klesch group. Reports from France suggest that U.S. private equity company OpenGate Capital has the inside track and is already in talks with the PVC producer's current ethylene supplier Total about deliveries.

OpenGate, which has acknowledged that it plans to exit the former Arkema business as soon as feasible, is said to have pledged €70 million, including a €50 million loan, to get the company back on a secure footing.

French industrialist and former Rhône-Poulenc executive, Alain de Krassny, who currently owns Austrian chemical producer Donau Chemie, is said to be still in the race, while a bidding consortium of French trade unions under the leadership of Confédération Générale du Travail (CGT) is not given much of a chance, and a second private equity firm, Sun European Partners may have dropped out of the bidding.

The latter two bidders had declared themselves not yet ready to present their turnaround propos-

als to a recent meeting of the Kem One Joint Consultative Committee, which includes employee representatives. The future owner of the PVC producer, which entered insolvency proceedings at the end of this year's first quarter, is expected to be announced at a hearing of the Commercial Court of Lyon on Dec. 12. Only the polymerization activities are up for grabs. The separately held downstream processing business will be retained by Klesch. (dw)

Germany's Merck Adds Israeli R&D Partners

Germany/Israel — Merck KGaA has added two new partners, the newly created Metabomed and the start-up ChanBio, to its €10 million Merck Serono Israel Biocubator research partnership focused on pre-seed and seed opportunities arising in Israel.

Metabomed, established by scientists at Tel Aviv University and the Technion Israel Institute of Technology, specializes in cancer metabolism and computational biology. ChanBio plans to concentrate on discovery of antibodies selective for ion channels considered to be

significant therapeutic targets for treatment of multiple sclerosis (MS).

Strategic investments in external innovation are key elements of Merck's strategy, said Stefan Oschmann, managing board member responsible for pharmaceuticals. "Our MS Ventures fund demonstrates our commitment to creating long-term relationships with and tapping into the innovative entrepreneurial spirit of biotech companies," he added.

Merck recently increased its stake in Jerusalem-based Qlight Nanotech and said it may apply with "selected Israeli partners" for research grants

in the Nofar program of Israel's Ministry of Industry and Trade.

The company's biopharmaceuticals arm, Swiss-based Merck Serono, earlier this month signed a memorandum of understanding to cooperate with Israeli biotech firm Kadimastern, which develops human pluripotent stem-cell related products. The aim is to find new compounds as remyelinating agents for MS and possibly to expand the collaboration into treatments for amyotrophic lateral sclerosis (ALS), popularly known as Lou Gehrig's disease.

La Seda Asset Sale Now in Progress

Spain — The sale of assets owned by bankrupt PET producer La Seda de Barcelona continues apace. The Barcelona commercial court handling the insolvency proceedings recently opened the liquidation process for the company's wholly owned recycling subsidiary Arternius Green. As the court-appointed

receiver, Forest Partners has said the recycling firm, which operates a plant at Beaune, France, is strong enough to stay afloat if given an injection of fresh equity and a credit line observers see some hope that a buyer will be found. Recycling subsidiary APPE in the UK is not in liquidation. Interested buyers are

reportedly waiting in the wings for at least one of the La Seda group companies already being wound up, with four companies said to be planning bids for the 200,000 t/y PET plant at San Giorgio di Nogaro, near Udine. Other assets in liquidation are based in Spain, Italy and Turkey. (dw)

Styrolution Consolidates Indian Holdings

India — Germany-based styrenics producer Styrolution, the joint venture of Ineos and BASF, is merging its two Indian subsidiaries, Styrolution ABS (India) Ltd and Styrolution India PVT Ltd to realize operational

synergies, in particular in administration, raw materials sourcing and supply chain management.

The company said the asset merger will allow it to evaluate options for future capacity expansion

of capacity at the Dahej site to meet growing demand from the white goods and E&E markets. (dw)

German Firms Spend More in U.S. Than at Home, Says VCI

Germany — In another communication expressing its growing frustration with the lack of clarity as to the energy policy of the new German federal government still being negotiated, the chemical industry association Verband der Chemischen Industrie (VCI) has published figures suggesting that German chemical firms are investing increasingly abroad, where energy is cheaper.

The association said foreign fixed investments by German chemical companies rose by around 25% in 2012 to €7.7 billion, while domestic capital spending stagnated at €6.3

billion. For the first time since 2001, it noted, foreign investments by German chemical company were higher than at home.

Much of German chemical producers' capital spending is apparently being shifted to the U.S. Over the past three years, the companies spent €6.5 billion on building new plants there or expanding existing facilities, said VCI. Spending in 2012 rose 54% to around €3.2 billion.

The fact that over 41% (compared with only 28% in 2005) of German chemical investment abroad now is earmarked for the U.S. underlines the

renewed attractiveness of the country as a location for business, said VCI. It attributes the increased interest to the start of the shale gas boom in 2009. At present, electricity prices are two and a half times higher than in the U.S., gas prices three times higher, the association believes.

Cost increases for energy in Germany "put our companies under strong pressure," said VCI's general manager Utz Tillmann, calling on the German political sector to make the country's move away from nuclear power and toward renewable resources "affordable." (dw)

BASF Produces First Commercial Renewable Butanediol

U.S. — BASF has begun offering its first commercial volumes of 1,4-butanediol (BDO) produced from renewable raw material produced with dextrose-based fermentation technology licensed from U.S. bioplastics producer Genomatica. It said the quality of renewable BDO is comparable to petrochemical prod-

uct based on natural gas, butane, butadiene and propylene.

The German chemical giant currently produces BDO and equivalents at its sites in Ludwigshafen, Germany and Geismar, Louisiana, U.S., as well as Chiba, Japan, Kuantan, Malaysia and Caojing, China. In July of this year, BASF

announced plans to lift global capacity for BDO to 650,000 t/y and for PolyTHF to 350,000 t/y over the next two years.

BDO and derivatives go into plastics, solvents, electronic chemicals and elastic fiber for the packaging, automotive, textile, and sports and leisure industries. (dw)

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Internet: http://www.dickow.de



Accelerate Competency Assurance

Tips for Faster Qualification, Expertise and Innovation

Speed = Advantage – Abundance of natural gas in the U.S., an aging workforce, increased globalization and tighter regulations have created new competitive pressures on the European chemicals industry.



Rethink Competency Mapping

Skills development, knowledge retention and innovation have been identified as solutions. All three require a deeper understanding of existing and missing workforce competencies. This article shows how to get better at mapping competencies and implementing successful competency assurance programs.

Current Competitive Landscape

In the mid- to late '90s the European chemicals industry began responding to a rising product demand in Asia, decreasing margins and mounting environmental pressures by restructuring, divesting and moving commodity petrochemical operations to the Middle East and Asia. As a result, the European chemicals industry retains the more knowledge-intensive parts of the chemical value chain, making it even more susceptible to the loss of know-how from the impending exodus of retiring baby boomers.

The promise of shale gas, biofuels and biotechnology has not yet blossomed in Europe. Therefore, recent investments in new large-scale ethane crackers across the pond have the potential to tip the cost advantage back to the U.S. and further catalyze brain drain from Europe. Nonetheless, Europe continues to be the center for chemicals know-how and has a large installed base for cracking naphtha, which gives higher yields of C3s and C4s. It has land connections to major markets, a reliable infrastructure and higher levels of public education. Geopolitical events and export levels of liquefied natural gas (LNG) and coal from the U.S. are the unknowns in this dynamic landscape.

Innovation, knowledge retention and skills development have been identified as possible solutions to address competitive challenges, opportunities and uncertainties. Each of these proposed solutions requires a deeper understanding of existing and required future workforce competencies. The process for competency mapping and assurance is well established.

- Define existing and future job roles
- Perform job task analyses
- Define a list of competencies for each job role
- Define performance, knowledge and skills standards for each competency
- Assess workers to discover competency gaps
- Bridge gaps with appropriate training interventions

Competitive advantage lies not in "what needs to be done" but in "how to do it?" The following tips will help organizations avoid common mistakes and navigate swiftly past critical decision points.

Get The Semantics Right

Many competency-related projects have failed because of cognitive barriers. The domain of competency mapping is complex, but it does not have to be complicated. Clarity, consistency and accuracy in labeling are important.

A job role combines disciplines, functions and assets and typically has multiple levels. For example, a mechanical engineer may support plant operations or may do research in R&D. The discipline is the same, but the functions are different. Alternatively, a technician, an operator and a process engineer may support



a plant. The disciplines are different, but the function is the same.

While this article uses the word competency, the preferred term in Europe is competence. Competence is a stage in the development of a worker from a novice to an expert. Competency is knowledge, skills and other attributes (KSOA) required to execute actions in a job context that meet certain defined standards. The "other attributes" part of KSOA includes all the deeper or hidden dimensions of competency, such as attitude, values, traits, self-image and self-regulation.

A standard includes judging criteria, measures, targets and indicators. There is confusion about the use of these terms. Google any of these terms and the next phrase you are most likely to search is "remedies for headache." Criteria include elements such as safety, speed and accuracy. Measures include variables like number of accidents or near misses. Targets define what needs to be achieved to meet the different standards. Indicators can be quantitative or more behavior-based.

Fix The Foundation

Mapping and developing competencies takes time. Executive commitment is important to this phase. Subject matter expert (SME) time is important in the design phase. Do not expect the SMEs to support the project in their "spare" time. Set up program sustainability measures right at the start.

In addition, human resources and operations need to be in sync. Often HR lacks the credibility around technical competencies. On the other hand, operations teams tend to undervalue the importance of the psychosocial competencies. It is important to bridge the divide. Using a single extensible model for hiring, training and development and one that works for all job types helps in bridging the chasm.

A common question about any new system is, "Does it work with an existing ERP (enterprise resource planning) system?" Competency assurance programs facilitate the workforce planning process and sit on top of the learning management systems. The integration between the systems is important, but, unlike

business transactions, workforce competency data do not change every minute and can be transferred in a batch fashion.

Accelerate Qualification and Expertise Attainment

A fine or a detailed approach to mapping competencies thrives on precision but takes time. In some cases, a detailed approach can quickly reach a point of diminishing returns. A coarse or a big-picture strategy may work faster but also has the risk of being too broad or too general. The trick is to know how and when to use the two approaches. For compliance-mandated situations and for tasks that involve high business risks, deploy the detail-oriented approach. For worker retention, planning and expertise development, the big-picture approach works better. Here a set of competencies is mapped to a range of activities performed at each job level, rather than at each task or step level of each activity.

Be creative in defining job roles. It is important to define existing as well as future job roles. Strive to depict job roles visually rather than in words to make them easy to understand and explain.

Information and communications technology (ICT) has given us more options and efficiencies in developing and presenting content. Recent discoveries in cognitive sciences, neurosciences and psychology have provided new insights on learning. Yet, even today, the chemical industry relies mainly on classroom training and unstructured on-the-job training (OJT) for workers. This is a problem.

To make training more effective for the qualification step, use a combination of the following methods: lectures, reading, demonstrations, group discussions, shadowing, case-based reasoning and simulators. For developing expertise, shift the emphasis from training to learning. Use

combinations of games, project- and problem-based learning, structured coaching and mentoring, communities of practice, and self-study.

Retain More Knowledge and Innovate Faster

Compared with qualification and expertise attainment, the processes for expertise transfer and for developing innovation capability are more chaotic. Their success depends on competency assurance and other systemwide factors like organizational design, policies and culture. Here are a few recommendations specific to the training and development part of the solution:

- Coaching and mentoring are effective modes for transferring implicit knowledge. Do not assume that coaching and mentoring will happen naturally and effectively without support. Define coach and mentor as two separate job roles, and develop competency standards and training for those roles just as you would for other technical jobs.
- Future innovations needed are likely to be distributed rather than centralized, multidisciplinary, opportunistic and in nontechnical areas. Include knowledge of cognitive sciences, social psychology, crowdsourcing, ethics, IP protection, finance, contracting, supply chain, legal and customer relationship management in the underpinning knowledge standards. Include systems, statistical, creative and critical thinking in the list of skills requirements for leaders and innovation team members.
- Incorporate some levels of leadership and innovation functions in all job definitions. Meta competencies and other attributes play a significant role in the development of leaders and innovators. Meta competencies are best developed in authentic learning environments. Create multiple multidisciplinary innovation teams and ask them to work on new problems and opportunities.

By following the advice presented here, the European chemicals industry can leverage the power of competency mapping and assurance to accelerate workforce qualification and expertise attainment processes, retain more knowledge and improve its capability to innovate.

Dr. Saidas M. Ranade, Director, GP Strategies

Contact:
Dr. Saidas M. Ranade
GP Strategies
Houston, Texas, USA
Tel.: +1 800 727 6677
sranade@gpstrategies.com
www.gpstrategies.com

www.bit.ly/competitiveness

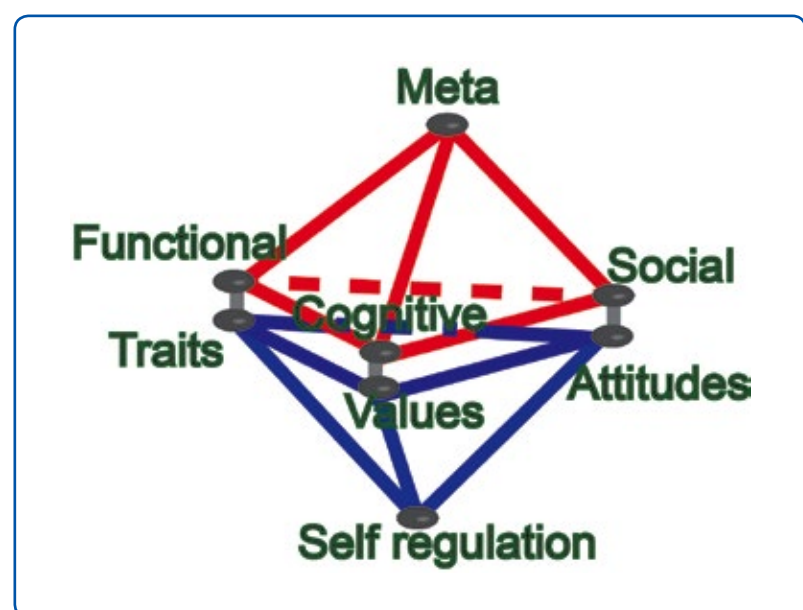


Fig. 1. A Unified Competency Model

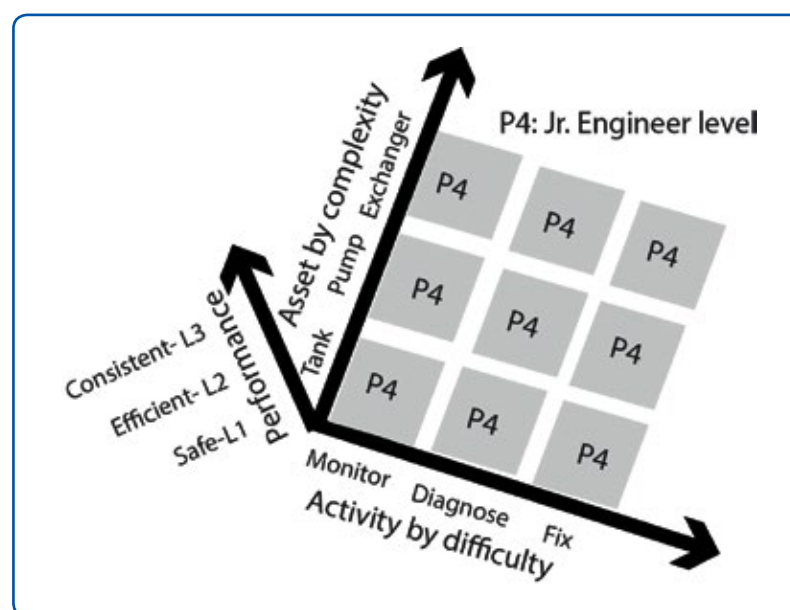


Fig. 2. A Visual Job Representation

Bayer Preparing a Bid for Norwegian Drug Partner Algeta

Germany/Norway — Bayer has confirmed that it is preparing a bid to acquire Algeta, the sales partner for its prostate cancer treatment Xofigo.

The pharmaceuticals, agrochemicals and plastics group initially offered 306 Norwegian crowns (\$49.90) per share for the company. This is a nearly 16% premium to Algeta's closing price of 264.60 crowns on Nov. 25 and values the Norwegian company at 13.4 billion crowns, or roughly €1.63 billion. According to reports, it also is nearly 30 times the company's 2012 EBITDA. Fol-



lowing a German newspaper report on Bayer's bid, the share price shot up by more than 30%. Algeta and Bayer Healthcare, which have cooperated since 2009, are co-promoting Xofigo, with the active ingredient Radium-223 dichloride,

in the U.S. market. The drug is designed to target bone metastases from prostate cancer that cannot be treated by standard hormone therapy.

Xofigo, which according to Bayer could become a blockbuster product with annual sales of least €1 billion, has some properties of calcium. That makes it cling to cancerous bone cells and then destroy them via alpha rays, which is said to be more targeted than the shotgun approach of conventional radiotherapy. (dw)

First Shanghai Carbon Permits Trade as China Moves on Emissions

China — The first carbon permits in Shanghai traded at 27 yuan (\$4.43) recently as the financial hub launched China's second such trading scheme in a bid to cut its fast-growing greenhouse gas emissions.

Three trades for a total of 9,500 permits for 2013 compliance, known as Shanghai Emissions Allowances (SHEAs), went through in the first half-hour after the market opened. A third carbon market will open in Beijing on Thursday.

China is the world's biggest emitter of greenhouse gas emissions, but it has pledged to reduced its emis-

sions per unit of GDP to 40-45 percent below 2005 levels by 2020.

Bin Hui, vice director at the Shanghai Environment and Energy Exchange, told reporters that state-owned power company Huaneng was one of the companies involved in the Tuesday deals, but gave no further details.

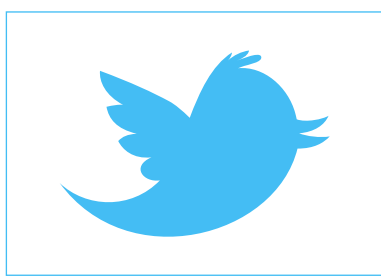
The opening price matched the first trades that went through when the Shenzhen emissions market opened in June, but prices there have since risen to around 60 yuan.

A batch of 4,000 permits for use in 2014 also traded in Shanghai at

26 yuan, and 500 for 2015 changed hands at 25 yuan.

Shanghai's scheme caps carbon dioxide emissions from 191 big energy users in the financial centre, spanning electricity generation, manufacturing, airlines, harbours and commercial buildings.

Participants get free permits from the government to cover most of their expected emissions. If they exceed those levels they must buy permits in the market from companies that have a surplus, or from offset projects elsewhere in China regulated by the central government. ■



Next Generation Manufacturing

Holistic Business Approach Supports 'Industry 4.0' Principles

Survival of the Most Adaptable – "It is not the strongest that survives, nor the most intelligent. It is the one that is the most adaptable to change." Charles Darwin's statement from the 19th century is still valid today and applies to industry as well as nature.

Companies that foresee trends and adapt their business accordingly will be successful. They need a holistic business approach that covers all steps from the idea to the manufacturing of a product and then beyond to services.

Adaptability is more important than ever as we are entering a fourth industrial revolution. The first three industrial revolutions came about as a result of mechanization, electricity and IT. Now, the introduction of the Internet of Things and Big Data coupled with a transition to service revenues is ushering in a fourth industrial revolution, also known in Germany as "Industry 4.0." In the "smart factories" that are already beginning to appear, smart machines, storage systems and production facilities autonomously exchange information, trigger actions and control each other.

The embedded manufacturing systems are vertically networked with business processes within factories and enterprises and horizontally connected to disperse value networks that can be managed in real time — from the moment an order is placed right through to out-bound logistics. This leads to a completely new approach to production, one that not only enables manufacturers to meet changing customer demands, but also addresses global challenges, such as resource scarcity and demographic shifts.

Trends Driving Change

A variety of market trends are leading to changes in the business environment: Companies are pressured more than ever to reduce time-to-market and increasingly must do so on custom orders — giving rise to the concept of the "batch of one."

- Service-driven models are taking off as companies not only sell a product but also services around it. Leading companies are going so far as to sell outcomes.
- Global regulations need to be fulfilled, and sustainability challenges need to be considered, even before starting to produce a product.

Technology is helping the industry address these new challenges and opportunities in an unprecedented way: In the future, machines, products and materials are becoming "smart" through sensor technology. Sensors can automate tasks, report performance levels, flag anomalies and generate alerts. Companies get insight into their business processes, measure performance, and run predictive analytics to forecast future outcome ("connected planet").

Sensor-driven data coupled with enterprise data will lead to a data explosion. According to market analyst firm IDC, the "digital universe" will grow from 2005 to 2020 by a factor of 300. This is driving the need for faster database technology to manage and analyze big data.

The frequent use of social media and innovation networks is another trend. This leads to a change



in communication with customers, employees and business partners and to new business models. As an example, companies may ask their customers about their opinion on a new product, even before they start the development process, and they will leverage sentiment analysis to gain insight to rapidly modify their products to keep pace with changing requirements.

Turning Challenges Into Opportunities

SAP is adapting Industry 4.0 principles through the development of "Idea to Performance," a holistic business approach and a solution bundle to increase product and service performance. The approach enables full management of a product's entire life cycle from design to service within distinct scenarios.

Box 1: Idea to Performance Integrated Solutions

Idea to Performance enables fully integrated processes. The offering is a solution bundle of:

- R&D/engineering
- Manufacturing (e.g., manufacturing integration and intelligence, manufacturing execution systems)
- Sustainability (e.g., environmental health and safety management) solutions
- Enterprise asset management

The focus is on ensuring that the systems are smarter, faster and simpler. Smarter via insights provided by SAP HANA on converged operational and enterprise data. Faster by embedding this insight into integrated applications from idea to service. Simpler through 3-D visualization delivered on mobile devices.

The offering extends existing solutions with innovations. It aims to support companies to add value on four dimensions: Sustainable innovation, responsive manufacturing, operational excellence and aftermarket service.

Sustainable innovation means supporting companies to have complete transparency on their portfolio, invest in their most profitable areas, and then speed up time to market for their products. As an example, Givaudan, a global leader in the fragrance and flavor industry, uses SAP EHS Management for its compliance checks. With the big data capabilities of SAP HANA, a fragrance designer can now automatically check the compliance

status during the development process. What used to take hours can now be done in a few minutes. This accelerates time-to-market for new products and safeguards compliance if new regulations come into effect. Responsive manufacturing aims at supporting companies to reduce their order fulfillment cycle times and cost, while at the same time increasing agility. The solutions enable companies to run variant processes for much more variant products. As an example, steel manufacturer Joris Ide profits from 15% faster production lead times and 50% fewer stock corrections.

"The latest implementation has boosted manufacturing efficiency and integrated all of our SAP systems," said Bernard Bossuyt, ICT manager, Joris Ide Group. "With SAP BusinessObjects solutions installed on top of SAP ERP and SAP MII (Manufacturing Integration and Intelligence), top management has immediate insight into manufacturing key performance indicators."

Operational excellence aims to support companies to efficiently manage their assets. The solutions enable the view on the machines and help to keep them up and running, so to speak. This is done by not only combining machine data, but also by combining data from environmental health and safety, quality and energy data (IT-OT integration). As an example, Nova Chemicals improved maintenance scheduling compliance by 22% and time spent on reactive, emergency work by 47% with SAP Enterprise Asset Management.

Aftermarket service solutions enable new business models and service scenarios for customers. They support contract management and billing, complaint, returns and depot repair, field service and service contract management as well as multi-channel customer service.

Big Data, 3-D and Mobility

Looking at those four dimensions, one thing is becoming clear: The only way businesses can succeed is by leveraging big data. Data from enterprise business applications is being coupled with operational data. The amount of data is growing exponentially. Companies also want to connect with their suppliers, partners and customers and to analyze and simulate production processes. This

is only possible with big data capabilities, as offered by SAP HANA; 80% of decision-makers think access to the right information at the right time is critical to their business.

Another area that bears big potential is mobility: When mobile access is provided to employees, this brings about up to 40% higher employee productivity. Imagine a maintenance worker gets a work-

ing instruction on a tablet PC to exchange a valve of a machine. The worker receives step-by-step 3-D visual instructions to follow until the new valve is installed. After that, the worker confirms that the repair is done and this information is instantly available to management. This saves time and cost and increases transparency.

Idea to Performance is a holistic approach; nevertheless, customers might want to implement it step-by-step. They should revise their processes and solutions in use and decide in which of the four scenarios they would profit most from fully integrated processes. As a conclusion, let us keep it with Thomas A. Edison: "Vision without execution is hallucination."

Scott Bolick, Head of Idea to Performance, SAP

Contact:

Scott Bolick
SAP
San Francisco, CA, USA
scott.bolick@sap.com
www.sap.com



Smart and Connected

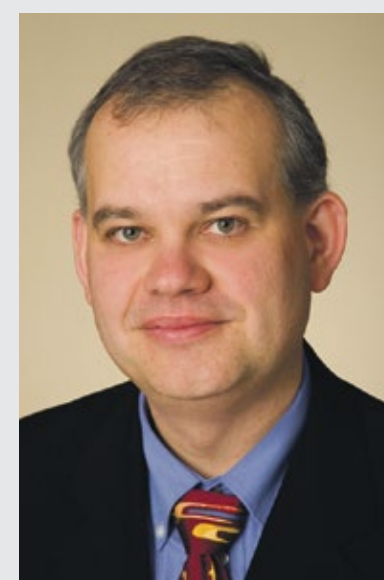
Short Interview with Dr. Marko Lange, SAP, IBU Chemicals

CHEManager Europe: How will the trends and challenges described by the term "Industry 4.0" affect the chemical industry in particular?

Marko Lange: In order to understand what "Industry 4.0" means for the chemical industry, it is helpful to reduce this broad term to its essentials. And these are mainly two things, in my opinion: Firstly, all elements of a chemical company become smarter, and secondly they become connected — be it assets, employees, products, business partners or end customers. Here are some examples: Assets will be equipped with SIM cards so that they can provide information about their condition. Maintenance workers get mobile devices, which inform them about new work orders, including working instructions. Products get tagged with unified identifiers, which allow tracking and tracing them and knowing their history. Business partners can exchange information in social networks to drive open innovation or to exchange material data declarations to ensure product compliance. And last but not least, end customers can check eco-friendliness of products via mobile devices.

SAP's holistic business approach was designed to support companies to tackle these challenges. Could you please describe in what areas chemical companies might profit most?

Marko Lange: The given examples show that we do not talk about manufacturing alone. We have to break down the barriers between the business functions like



Dr. Marko Lange, Solution manager, IBU Chemicals, SAP

analyzed. This is possible with a new database concept called SAP HANA, where the database is running in-memory and where the organization of data is done along rows and columns. This allows significant data compression and gives the opportunity to read millions of data sets out of a database within seconds, or even less than a second.

From your point of view, will sustainability management become even more important in the future? How will companies profit from a holistic approach that covers engineering, production and sustainable operations?

Marko Lange: Challenges like global warming and limited resources of raw materials and energy in spite of a growing population, obviously prove that sustainability will gain importance. These findings are not new for the chemical industry that has been running the Responsible Care initiative for many years now. However, the use cases described can help to turn product into service business and to increase energy and material productivity tremendously. I think that this is the real fourth industrial revolution — the outstanding increase of material and energy efficiency enabled by connecting different elements that become smarter.

Contact:

Dr. Marko Lange
IBU Chemicals, Industry Business Solutions
SAP AG
Walldorf, Germany
marko.lange@sap.com

Saving Time And Money

Increased Automation of Drawings Pays Off Even in Smaller Projects

Speed And Accuracy – As project schedules and budgets continue to get shorter and tighter, automation will continue to be a key driver in an organization's ability to increase productivity, avoid errors and lower costs. As a significant proportion of the execution time of a small project is dedicated to deliverables creation, this is one focus area that design companies are expecting software vendors to improve.

A plant design project usually requires two primary and essential drawing deliverables to be produced — 2D layouts or general arrangements, and piping isometrics. Whereas layouts and general arrangement drawings will ordinarily show all disciplines in the plant, isometrics on the other hand will only document individual pipelines.

Therefore, for smaller projects that are typically fast-track and low-margin in nature, any 3D plant design solution that can automate the production of both types of deliverable from a 3D model will be highly valuable and attractive to companies who are struggling to cost-effectively produce the deliverables their projects need.

Why is drawing automation attractive? Because automatic drawings generated from 3D models can be created in a fraction of the time of any other means, but more importantly, they always accurately and consistently reflect model conditions, almost eliminating the need to check them.

The design, fabrication and construction of capital projects — such as major industrial facilities including process plants, power stations or offshore platforms — would not be possible without engineering drawings. Documenting the design of these facilities will typically result in literally thousands of drawings being produced throughout the course of a project. Crucial for project success therefore is having the ability to create drawings and reports quickly and accurately, and to be able to update them easily when the design is revised.

Regardless of project size and scope, it's universally understood that process plant design is a spatial task that is best addressed by working in three, rather than two, dimensions. Why is this? A typical plant is an intricate, complex web of interconnecting piping, structure, equipment, instrumentation, electrical and HVAC. Hence executing plant design projects in 2D alone is extremely time consuming, error prone and hugely difficult.

Furthermore, because of the manual nature of the 2D design process, which is predominantly drafting biased, even the smallest projects executed entirely using 2D CAD can be challenging. Even when taking the utmost care and paying close attention to detail, the project will often suffer schedule delays and cost increases due to mistakes and omissions caused by human error. Unfortunately, many of these problems don't come to light until late in the project, when they are both difficult and costly to rectify.

3D Modeling For All

To support the needs of large, multi-discipline design groups, working on large-scale or even mega-sized joint venture projects, often based in different geographical locations around the globe, many software companies in the market have invested heavily in developing high levels of drawing and reporting automation as part of their 3D design solutions. Using these solutions, high-quality deliverables can be generated automatically from the 3D design model at the click of a button, without manual intervention or any need for further editing or touch-up.

But what if you need a solution that is suitable for smaller-scale projects, or don't have the budget to invest in any of the high-end solutions that are available, for that matter? Well, the good news is that a wide range of solutions addresses the needs of engineers, designers and the broad spectrum of small, medium, large and mega-sized projects executed in the process, power and marine industries.

The major players in 2D and 3D modeling are looking after the



smaller segment of projects and companies with well-developed AutoCAD-based plant design products. Appropriate for any sized organization, but more so, perfectly suited to smaller design contractors, particularly those who are looking to make the transition from 2D drafting to 3D plant design for the first time, one of those tools in the market is Intergraph's CADWorx Plant Professional. The tool has a user-friendly interface, and in a few days, personnel who are already familiar with AutoCAD can be taught to leverage their existing 2D skills to quickly become proficient and productive in AutoCAD-based 3D plant design.

Some vendors focus on the lower end of the plant design market with their 3D plant design tools that are built on 2D CAD platforms like

AutoCAD or MicroStation. In those systems, the production of deliverables is usually highly manual, with responsibility for general arrangement drawing production delegated entirely to the user. However, some systems do offer basic automation to make the drawing creation task easier — such as the ability to add dimensions and labels, and perform hidden line removal on scaled views in paper space, or extract bills of material reports from the 3D model. It is possible to produce good quality deliverables in this way, and it is certainly much easier and less time consuming than drafting deliverables by traditional means in 2D CAD. But most companies who choose to invest in low-end solutions really want fully automated drawing production from the 3D model.

This would enable them to increase their productivity and reduce errors. However, so far, attaining complete deliverables automation continues to be the accomplishment of just the high-end systems.

For many years, users of high-end design solutions such as Intergraph's PDS have benefitted from the use of OrthoGen — developed by 3DS Net Inc. for the automatic production of 2D layouts and general arrangement drawings. Low-end system vendors on the other hand have not taken advantage of OrthoGen, and therefore provide only half of the drawing automation capability that design contractors expect to be offered in 3D plant design solutions today. Now Intergraph's CADWorx Plant Professional is the first to break that impasse and is cur-

rently the only solution available in the low-end plant design market today to offer OrthoGen.

Millions of drawings for extremely large and complex plant designs across all disciplines — petrochemical, pulp and paper, pharmaceutical, power, offshore, mining and minerals, and shipbuilding projects — are using highly developed automated 3D design tools to accelerate the project process. The same automation levels and productivity boost can now be achieved by smaller companies and projects — and now for AutoCAD-based plant design projects.

Low Cost, User Friendly

Drawings can be created in a fraction of the time they would take to produce manually, even if the process is semi-automated in some way. For example, industry users involved in drawing production activities in major international engineering firms have reported spending 40 to 60 hours per complicated piping drawing using semi-automatic methods. Taking into account the time needed to add other required details — such as hatching, notes and detailed dimensions — these same firms report it taking 2 to 4 hours per drawing supported by OrthoGen automation. A considerable time saving!

The time savings reported have mainly to do with the higher accuracy and consistency of the drawings, which require less double-checking and report fewer errors. Additionally, when changes to the design occur, updates to the drawings are also made automatically when the drawing has been re-run, saving even more time and effort.

Easy configurable options make these tools available to engineers without the burden of expensive training, and drawings meet the most demanding customer requirements. Through the application of standards and use of templates, these design tools enable smaller companies to be completely in control of the deliverables produced for projects. Users can select from a set of predefined drawing types and are able to see a preview of the output, as well as descriptions and tips on the options used for each drawing type.

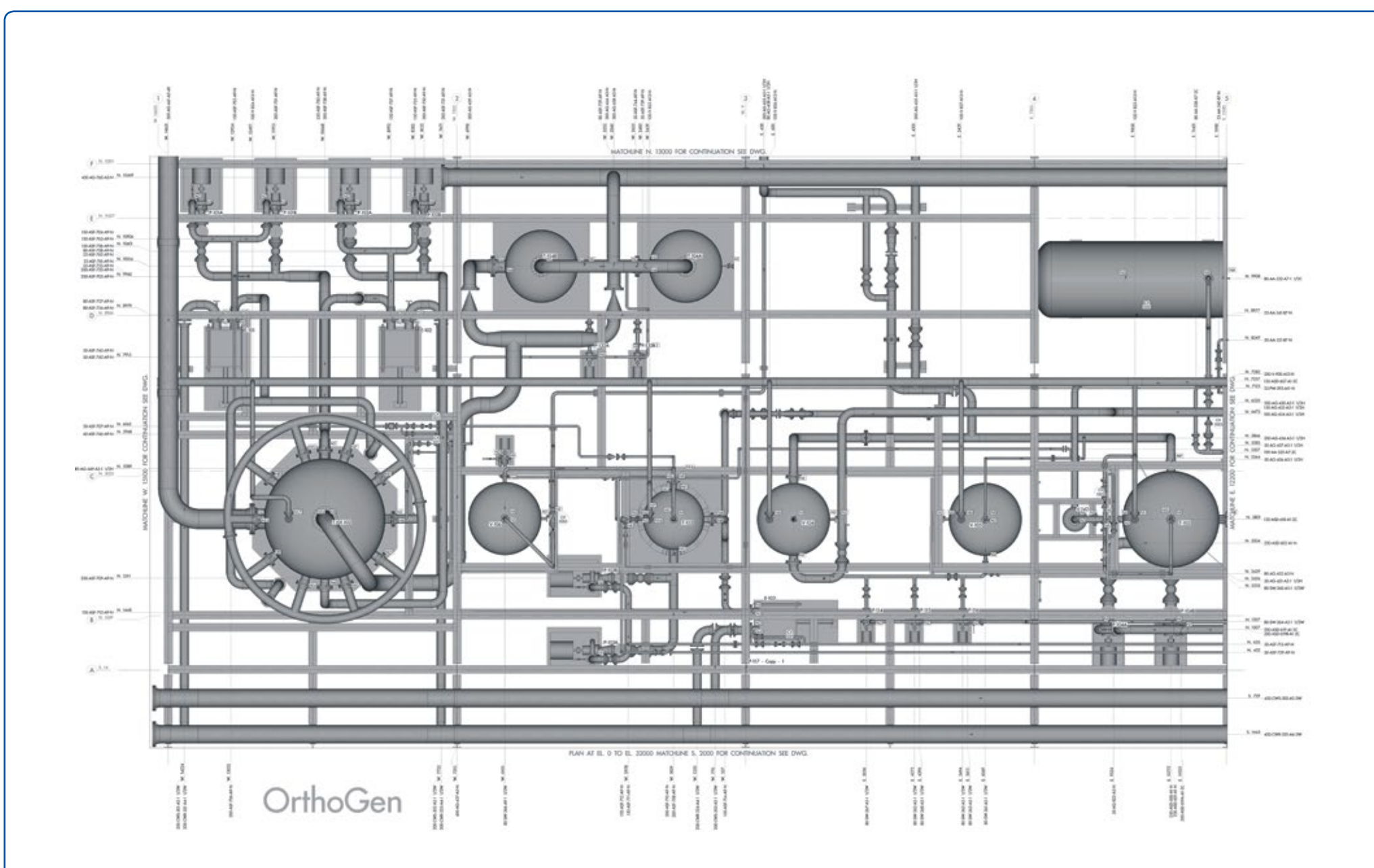
Complete drawing automation is a key differentiator when choosing a plant design system to ensure projects are delivered with high quality, on time and within budget. Smaller companies have been postponing the decision to join the fully automated drawing generation because of constraints in price or technical accessibility of the tools available in the market.

There is no reason to stay out of the game any longer. Whether you're in the market for a 2D/3D plant design solution for the first time, looking for an alternative or a complementary solution for smaller projects, or looking to move from a low-end to a high-end system, drawing automation is now available to all.

Paul Martin, Business Development Manager, Intergraph CADWorx & Analysis Solutions, Europe

Contact:

Cristina Gonzalez
Intergraph
Hoofddorp, Netherlands
Tel.: +31 23 5666 551 F
cristina.gonzalez@intergraph.com
www.intergraph.com





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Merck KGaA to Build New Pharma Plant in China

German chemicals and pharmaceuticals producer Merck KGaA plans to invest €80 million in a new pharmaceutical plant in the Nantong Economic Technological Development Area of Greater Shanghai. The Darmstadt-based company said production will focus on its leading brands referenced in China's essential drug list and serve the country's expanding healthcare needs in the areas of diabetes, cardiovascular diseases and thyroid disorders. The new facility, the second largest site worldwide for biopharmaceuticals arm Merck Serono, will concentrate on bulk production and packaging of the drugs Glucophage, Concor and Euthyrox for treatment of diabetes, cardiovascular diseases and thyroid disorders respectively. Construction is scheduled to begin in 2014, with commercial production to start in 2017. Merck said maximum resource efficiency and minimized waste generation during the manufacturing process will be targeted.

In Shanghai, Merck Millipore recently opened a biopharmaceutical technical and training center in China and will shortly start up a liquid Crystals manufacturing facility there. (dw)

Formosa Plastics Plans \$2 Billion Ethane Cracker in Texas

One of Asia's largest chemicals and plastics producers, Taiwan-based Formosa Plastics, is seeking to cash in on the U.S. shale gas boom with its own \$2 billion ethane cracker in Texas. In 2012, Formosa announced that it would spend \$1.7 billion on an integrated 800,000 t/y gas-fed cracker and a 300,000 t/y LDPE plant at Port Comfort, along with a 600,000 t/y dehydrogenation (PDH) plant to start up in 2016. Formosa Vice Chairman Susan Wang did not elaborate on what the additional \$300,000 expenditure would cover. Separately, press reports from Vietnam and Taiwan say that Formosa is planning to build a 200,000 t/y production facility for polystyrene in Vietnam's Nhon Trach industrial park, where it already produces manmade fibers, polyester and biaxially oriented polypropylene film (BOPP). (dw)

Glaxo SmithKline to Invest In Scottish Plant Expansion

Glaxo SmithKline (GSK) has announced plans to invest £25 million in expanding its active ingredient formulating plant at Montrose, Scotland. The UK drug maker said it would locate production of four unspecified new entities at the site, where it is receiving more than £3 million in financial support from the local government of Angus and the business development agency Scottish Enterprise.

The company's latest investment in Scotland is in addition to the £100 million it previously announced it was spending at Montrose and at Irvine, Scotland, where it produces antibiotics. The two investments together will bring GSK's headcount in Scotland to around 750. (dw)

SABIC To Start Up Yanbu PET Plant in January

After construction delays foiled plans to start up its new 420,000 t/PET plant at Yanbu, Saudi Arabia, in Q 4 2013, SABIC has rescheduled the start for January 2014, news reports say.

The Saudi petrochemical giant is believed to be expanding feedstock capacity at the site, where it also operates a 330,000 t/y PET plant. Capacity for paraxylene (PX) will be doubled to 400,000 t/y and PTA capability widened to 600,000 t/y, according to the reports.

The start-up of the new PET facility comes at a time when worldwide markets for the packaging resin are already glutted, observers say. (dw)

Dickow Delivers Pumps for Sadara Chemical Complex



German pump manufacturer Dickow Pumpen has been awarded several orders covering 164 magnetic coupled pumps for the Sadara Chemical Complex. Sadara is a joint venture of Dow Chemical and Saudi Aramco located in Jubail Industrial City, Saudi Arabia. Once completed it will represent the largest petrochemical facility ever built in a single phase. The fully integrated complex will consist of 26 chemical manufacturing units producing a variety of chemicals, such as amines, propylene glycol, polyurethanes, low density polyethylene, elastomers, glycol ethers and propylene oxide. Due to the sheer size of the complex multiple EPC (engineering, procurement and construction) contractors are involved in the realization of this huge project. Dickow pumps are part of several pump packages for different production units, including orders from Daelim (South Korea), Fluor (USA), Jacobs/Alfa Laval (Denmark) and lately Tecnicas Reunidas (Spain). 100 pumps are already shipped or almost completed.

Beside the pumps, the scope of supply includes electric motors, couplings, instrumentation, polymer concrete base plates, intensive tests and inspections, and special conservation of the pumps. All equipment has to follow strict specification requirements specially generated for this complex and demanding project.

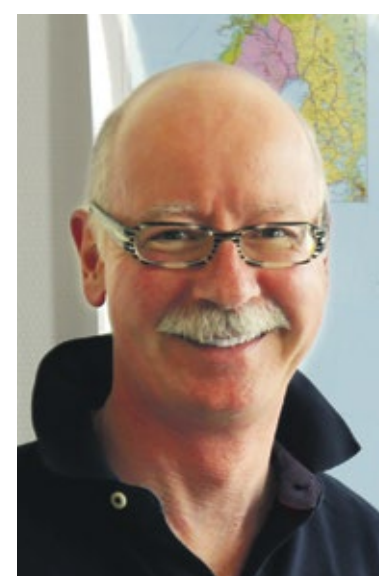
REACH and Chemical Distributors

Brenntag on Implications for the Industry

Every Player Counts – By now, everyone in the chemical industry is aware of REACH and in the best-case scenarios, every player knows what is expected of them under the law. But it's not just manufacturers of chemicals who are obligated to follow the registration guidelines; chemical distributors also have their role to play under the law. Brandi Schuster spoke with Marianne Lyngsaee, Quality System Manager and REACH Adviser, Brenntag Nordic and Matthias Raduner, REACH & European Projects Analyst, Brenntag Europe, about what REACH means for their company.



Marianne Lyngsaee, Quality System Manager and REACH Adviser, Brenntag Nordic



Matthias Raduner, REACH & European Projects Analyst, Brenntag Europe

CHEManager Europe: How many REACH inspections within Brenntag have been carried out to date?

Marianne Lyngsaee: The inspections have often been carried out as combined REACH/CLP inspections, and the weight of these two elements (or other elements) differs. Therefore, it's not easy to come up with an exact overall figure at European level. Some countries already had five REACH inspections, some others only three and some also none.

Do you feel like the inspections were thorough enough to meet the goals set out by REACH?

Marianne Lyngsaee: REACH is a highly complex piece of legislation, and the learning curve is steep. This is the case for inspectors as well as for the inspected Brenntag entities. By experience, the focus of the inspections is changing along with the REACH timeline from pre-registration to registration and from SDS to extended SDS. In areas where inspectors are very familiar — like classification and labeling — REACH compliance of the SDS and registration status of substances inspections have been very thorough. In other areas, inspectors could benefit from learning more about company procedures and business practices that are beneficial for making thorough inspections and helps to facilitate the dialog with the inspected company.

What challenges do chemical distributors face when it comes to regulatory issues such as REACH?

Matthias Raduner: REACH has its impact on every actor in the chemicals supply chain. Not only manufacturers and importers, but also any company or professional person using chemicals as well as the distributors have their legal obligations under this regulation.

The majority of chemical distributors are confronted in dealing with several aspects of the regulation, depending on their role in the supply chain as defined by REACH, be it distributor, importer and/or downstream user.

In the beginning of the REACH era, the most challenging activity in terms of effort for distributors has certainly

been the task to comply with communication obligations related to use identification. On top of that, distributors were challenged in dealing with requests from their customers to provide information on or even a "guarantee" regarding "REACH Compliance" of their products supplied. Now, after the first and second registration deadlines, the main activity when dealing with dangerous substances or preparations consists of forwarding extended SDS to customers and to act as a communication link between customer and supplier when it comes to uses not covered or to conditions of use outside the description in the exposure scenario.

A distributor importing substances or preparations must either make sure it has registered or pre-registered the chemicals by itself or rely on the non-EU supplier's appointment of an Only Representative (OR) to do the (pre-) registration. While the first option often is a question of strategy and cost, the second option is challenging in terms of trust in the non-EU supplier's registration strategy and the professionalism of its OR. As some non-EU suppliers do still lack knowledge with regards to the regulatory provisions concerning imports, it often is a challenge for the importers to prove and document REACH compliance of individual transactions when relying on an OR.

Typically the chemical distributor does not only buy, store and distribute chemicals but operates as re-packer, re-filler and even offers value-added services like mixing and blending. By these activities, the distributor becomes a downstream user and has to take over obligations upon receipt of the extended SDS. A downstream user using dangerous substances or preparations, has to comply with the provisions set out in the exposure scenarios attached to the main body of the extended SDS which describe how to use a substance/preparation safely. Any use outside conditions or a use not covered in the Exposure Scenario entails measures to be taken to correct the situation.

All in all, the communication up and down the supply chain has significantly increased due to REACH as has the need to keep records of this communication. As the common business model of the distributors is the sourcing from a variety of suppliers and servicing a high number of typically small and medium sized enterprises, the communication obligation and record keeping represents a challenging and resource-binding task.

What do your customers expect from you when it comes to regulations like REACH?

Matthias Raduner: First of all customers can expect Brenntag to act in compliance with effective regulations. While in terms of our processes we are in compliance with the obligations stipulated in REACH, a general confirmation on REACH compliance for the products supplied, often requested by customers, has no value since the compliant use is always in the responsibility of the downstream user. For instance a registration alone does not imply the downstream user's compliance when his use is not covered by the registration.

What our customers may expect is the swift and professional response to questions around REACH generally and regarding uncovered uses particularly. In many cases customers are overwhelmed by the complexity and technical terms of an exposure scenario and can be satisfied by advice how to interpret the content of the document. In case a use is not covered a professional, smooth communication up and down the supply chain with the aim of adapting extended SDS is key.

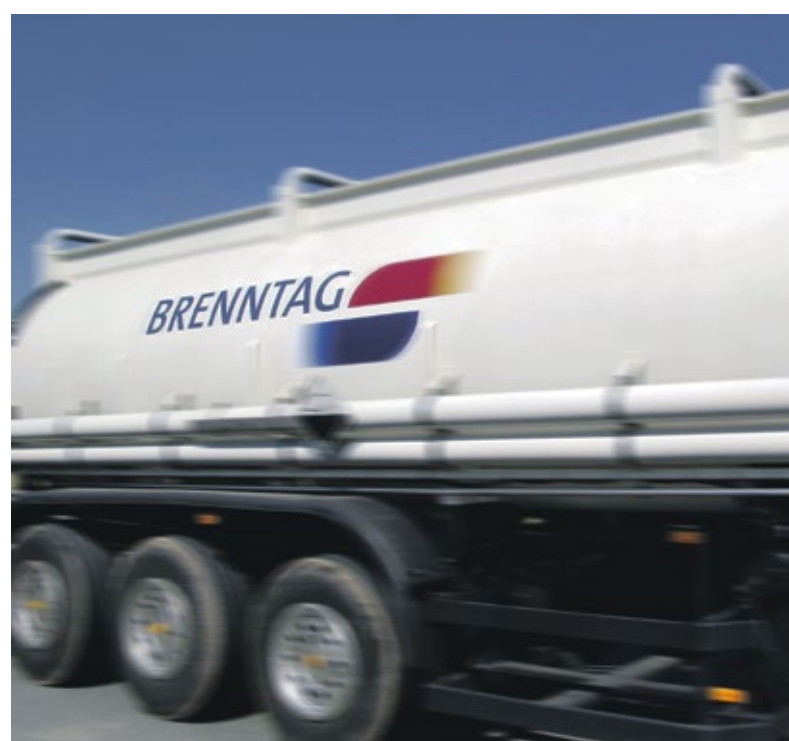
How has REACH affected your business and the businesses of your customers?

Matthias Raduner/Marianne Lyngsaee: The regulation, with its impacts on all dimensions of Brenntag's business processes, forces us to continuously dedicate resources on subsidiary level as well as centrally. One of the most perceptible impacts of REACH has been increase of communication between Brenntag and our business partners and the related documentation. Also, our environmental, health & safety management system had to be adapted to cope with the additional requirements imposed by the regulation.

EACH induced Brenntag's commercial departments to get increasingly involved with inquiries around regulatory provisions requiring internal trainings to provide a solid basic knowledge on REACH which is today key when offering professional service as a chemical distributor.

REACH compliant purchases from outside the EU require the continuous control of import volumes as well as the ongoing monitoring of Only Representatives. To ensure compliance of own operations is another dimension of REACH related tasks that has to be organized in the daily work. The compilation of Brenntag proprietary extended SDS is an additional effort demanding challenge requiring high levels of skill and professional accuracy.

Bottom line: The requirements of REACH have increased the complexity in every dimension of business processes for all participants in the chemicals supply chain, but six years after entering into force, REACH has become integral part of business practice.



Interpreting REACH

Work of the ECHA Board of Appeal and the Appeals Process

Little-Known Step – More than six years after the REACH regulation went into force, perhaps the least-known part of the regulation is the Board of Appeal (BoA) of the European Chemicals Agency (ECHA) and the appeals process.

In one way this is easy to understand, as the number of appeals has been less than anticipated by the European Commission, ECHA and the Board of Appeal itself. However, each BoA decision could have a significant effect on the interpretation and implementation of REACH, the Biocidal Products Regulation (BPR) that took effect Sept. 1, and the working practices of ECHA generally.

The BoA was established by REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) to allow recipients of, and those affected by, certain ECHA decisions made under REACH to have those decisions reviewed by an independent and impartial body.

The BPR has now extended the remit of the BoA to also consider appeals against certain ECHA decisions made under the BPR. One of the keys to the successful operation of the BoA is for it to be — and to be perceived as — independent and impartial.

To this end, a number of measures have been taken. First, all the full-time members of the BoA, and its external alternates and additional members (AAMs), are appointed by the ECHA Management Board rather than by ECHA and its execu-

tive director. Second, the members of the BoA may not perform any other duties in the agency. Third, while there are benefits to the BoA from being co-located with ECHA in terms of understanding the processes followed, both the BoA and ECHA are extremely vigilant in ensuring that the members of the BoA are never exposed to case-specific material or discussions that might be perceived to potentially influence the BoA's decision-making. Members of the BoA also attend stakeholder events to help ensure that they are in touch with the wider stakeholder environment, and they actively encourage invitations to attend events outside ECHA. And fourth, perhaps most importantly, all BoA final decisions and most of its procedural decisions are published.

As mentioned above, only certain ECHA decisions can be appealed to the BoA. In short, under REACH these are ECHA decisions related to two fundamental REACH processes: registration (rejection of registrations; certain conditions for product and process orientated research and development [PPORD] exceptions; and data-sharing decisions) and evaluation (dossier evaluation, testing proposals and compliance checks, and substance evaluation). Under the BPR, appealable decisions are related to data-sharing, technical equivalence, and the rejection of applications because of nonpayment of fees.

The BoA comprises three full-time members, one technically qualified and two legally qualified, appointed for a term of five years per member. One of the legally qualified members serves as chairman for the



duration of the five-year tenure. Three BoA members consider each appeal. These will usually be the three full-time members, but AAMs may be used in certain circumstances. Each full-time member has alternates who may be appointed to work on a case if there is a potential conflict of interest or if a member of the BoA is not available. Additional members may also be called to work on particular cases for resource reasons, i.e., the number of cases is such that they can be processed at a reasonable rate only by calling upon additional resources.

The appeals process itself is in principle quite straightforward. But while lawyers do not need to be involved in an appeal, the appellant should be aware that the appeals process bears certain similarities to judicial proceedings. The appellant makes an appeal by submitting a notice of appeal (NoA) within three months of the date of notification of the decision being contested. Certain mandatory elements of a NoA must be supplied for the appeal to be ad-

missible, and these are specified in the Rules of Procedure of the BoA (for example, proof that the appeal fee has been paid, and the pleas in law and the arguments of fact and law being relied on by the appellant).

An announcement of each appeal received will be published on the BoA section of the ECHA website so that interested parties are aware of the subject matter of appeals and also so that potential interveners in a case have sufficient information on which to base an application to intervene. Again, the BoA Rules of Procedure lay down the requirements for an application to intervene, and the BoA will make a decision on whether such applications shall be accepted.

The decision-making process for the BoA includes a written procedure and, in some cases, an oral hearing. The written procedure involves ECHA providing a defense of its decision, in response to the NoA, and potentially further submissions from the appellant and ECHA and

responding to specific questions from the BoA or requests for information. Once the written procedure is closed, if either the appellant or ECHA requests an oral hearing then one shall be held; an oral hearing can also be held if required by the BoA. Once the written procedure and the oral hearing are completed, the BoA will consider and prepare its decision, which, if necessary, will be adopted by a vote of the BoA. All final decisions and certain procedural decisions (e.g., decisions on applications to intervene and requests for confidentiality) are published, minus any information accepted as being confidential by the BoA.

The BoA can, in broad terms, take any decision that would have been open to ECHA when they made the initial decision. In practice, most BoA decisions are likely to be to: reject the appeal and uphold the contested decision; annul the contested decision and remit the contested decision back to ECHA for further consideration with ECHA being

bound by the reasoning in the BoA decision; or annul the contested decision and substitute the contested decision with another as directed in the BoA decision.

It should be borne in mind that the review performed by the BoA is a legality review, which implies that the appeals process should not be regarded as a second chance for registrants but as a means to correct decisions that are legally incorrect. If a company is considering utilizing the appeals system, it is advised to read carefully the relevant legislation as well as the guidance and supporting material prepared by the BoA.

Over time the BoA's decisions will help to clarify certain grey areas in REACH and the BPR. They also will help to ensure that ECHA's processes are fully in line with the requirements in both of these regulations as well as with EU law more generally. While most stakeholders will not need to use the appeals system, the decisions made by the BoA may nevertheless be relevant to all stakeholders.

While the appeals process and the work of the Board of Appeal may not be the best-known aspect of REACH, it is nonetheless an integral part of the systems established by REACH and the BPR. It plays a vital role in ensuring the smooth and effective operation of these regulations in the interests of all stakeholders.

Andrew Fasey, technically qualified member of the ECHA Board of Appeal Mercedes Ortuño, chairman of the ECHA Board of Appeal

Contact:
Andrew Fasey
European Chemicals Agency
Helsinki, Finland
Tel.: +358 9 686180
andrew.fasey@echa.europa.eu
www.echa.europa.eu

www.bit.ly/REACH

Note:

The views expressed in this article are those of the authors alone and do not necessarily represent the views of the European Chemicals Agency or its Board of Appeal. Furthermore, this article has been written in a relatively informal style to make it accessible to as wide an audience as possible. This article should therefore not be used as the basis for either preparing an appeal or during the appeals procedure itself. The REACH regulation, BoA's Rules of Procedure, BoA's Practice Directions, the Biocidal Products Regulation, and other resources made available on the Board of Appeal's section of the ECHA website should be carefully consulted by anyone who needs to understand the legal provisions concerning the Board of Appeal and the appeals process (<http://echa.europa.eu/regulations/appeals>).

Celanese Aims to Close Two European Acetyls Plants

SHUTDOWN U.S. Group Looks to Implement New Strategy

Celanese is consulting with employees about closing two acetyl intermediates facilities in France and Spain after failing to find a buyer that would continue production and retain the 100 employees.

Spain/France — In May, the U.S. group had said the 210,000 t/y vinyl acetate monomer (VAM) plant at Tarragona/Spain and the 34,000

t/y acetic acid plant at Rousillon/France, both non-integrated, were not a good fit with its new strategy of concentrating output at sites with "critical economies of scale."

In the six months the units were on the sale block, Celanese said it had no offers. Observers attributed the lack of interest in the VAM plant to low-cost competition from U.S. and Middle East producers that were making European production unsustainable.

Citing cheap imports, Swiss-based Ineos in early October said it would close its 300,000 t/y VAM plant at Hull, UK, where 18 people are employed. "Regrettably, our cost per ton remains significantly higher than the international competition and as a consequence we have lost a number of contracts," said Ashley Reed, CEO of the group's UK arm, Ineos Enterprises. (dw)

BASF to Sell PVC Modifiers Business to Kaneka

Germany/Belgium — BASF has said it will sell its acrylate-based PVC modifiers business to Kaneka Belgium, European arm of Japan's Kaneka Corporation for an undisclosed sum. The deal, set to close in Q1 2014 pending antitrust approval,

includes comprises intangible assets and inventory but not production facilities at Ludwigshafen, Germany.

The world's largest chemical producer said the modifiers, used in the construction sector, and sold

under the Vinuran trademark, are not a core business. The divestment will allow it to focus on growing its acrylate-based dispersions portfolio. With the acquisition, Kaneka will be able to expand its services to the PVC processing industry. (dw)

European Commission Probes Belgium's Aid to Innovation

Belgium — The European Commission (EC) has launched an investigation into Belgium's system of support for innovative companies, seeking in particular to determine whether the country awarded tax breaks to young innovative companies for seven years before it transposed the relevant EU directive from 2006 into national law.

Based on the results of a screening exercise it started in 2011, the Com-

mission suggested that some companies may have been exempted from paying payroll taxes on remuneration of scientific R&D staff without the required legal framework. This may have given the companies an unjustified competitive advantage, it said, adding that Belgium has not provided sufficient information to dispel doubts.

The EC said Belgian authorities also "failed to notify the Commis-

sion when they tacitly renewed the scheme after its expiry in July 2011 and increased the level of tax relief."

To qualify as a young innovative company under the EU scheme, a company must be small, have existed for less than 10 years and spend 15% of its total costs on R&D. (dw)

ECHA Review Finds No Need to Tighten TDI Restrictions

Finland — The European Chemicals Agency (ECHA) has concluded that there is no need for further-reaching restrictions on the use of polyurethane chemical TDI in European work places if current occupational exposure limits are respected, and good control is practiced. The agency responsible for administering the REACH program based its recommendations on an evaluation by member state Poland, which did not ask for further information on the chemical suspected of causing isocyanate-related asthma.

ECHA's evaluation of TDI and three other substances, ethylene oxide (EO), TDI starting material toluene and tributyl phosphate, began in 2012. For all four, it said, the evaluating member states did not ask for further information, and there was therefore no draft decision.

In its evaluation of EO, Austria, said a community level agreement is needed to determine an acceptable risk level for workers and the general population with regard to the carcinogenic potential of this and other substances. It noted that

EO may cause allergic skin reactions.

Finland, which evaluated toluene, said it agreed with the EU's Risk Assessment Report from 2002, which recommended 20 ppm as a more appropriate long-term exposure level than the current 50 ppm.

In its review of tributyl phosphate, Hungary said it saw no need for any additional risk management measures, stating that "the current CLP classification for the human health endpoints is appropriate." (dw)

Saudi Chemical Producers Sign MoU on Merger

Saudi Arabia — Saudi International Petrochemical Company (Sipchem) and Sahara Petrochemical have signed a memorandum of understanding on a potential asset merger, bringing the deal, which would take the form of a share swap, one step closer to fruition.

Sipchem said a closing could come in the first half of 2014. According to reports, the merged com-

pany would be worth \$5 million, with Sipchem taking on the role of corporate parent to Sahara.

In early November, the chemical producers which have a common shareholder, Zami Holding Company Group, had said they were still "progressing detailed studies and negotiations in relation to the potential merger," following a five-month economic and technical feasibility study.

A non-binding agreement expires at the end of January.

Sahara focuses on olefins ethylene and propylene as well as polyethylene and polypropylene. Sipchem produces methanol, butanediol, tetrahydrofuran, carbon monoxide and a number of acetyls products such as acetic acid, acetic anhydride and vinyl acetate monomer (VAM). (dw)

Two Contract Workers Killed in Total Refinery Blast

Belgium — Two employees of an independent contractor were killed in an explosion at French petrochemical producer Total's refinery at Antwerp, Belgium, on Nov. 19. The blast, which forced the shutdown of some — unspecified — produc-

tion units, occurred during routine maintenance on a steam generation system in a gasoline production unit.

Total said fire did not break out, no hydrocarbons were released and the situation was quickly brought under control. The French group

added that the steam cracker operated by subsidiary Fina Antwerp Olefins, with nameplate capacity for 1.5 million t of ethylene and 900,000 t/y of propylene, was unaffected. (dw)

Transparency is the Golden Ticket

REACH Offers Lessons for U.S. Chemicals Regulation

Borrowing From EU Approaches

The EU's REACH regulation (EC 1907/2006) enacted a comprehensive approach to chemicals, sweeping away four decades of legislation in 2007. All 31 European Economic Area (EEA) countries enforce this requirement. Beyond those jurisdictions, interconnected global manufacturing supply chains ensure all companies worldwide are affected, at least indirectly. Transparency is a critical principle for future chemicals regulation in the U.S.

Transparency in Regulatory Goals: Hazard vs. Risk

The EU's regulatory climate is informed by the Precautionary Principle, a concept that assumes that if an action carries a suspected risk of harm to the public or to the environment, in the absence of scientific consensus that it is harmful, the burden of proof that it is not harmful falls on the actor. The principle implies a social responsibility to protect the public when scientific investigation suggests a plausible risk. In the EU this principle is instantiated in various statutory requirements, including REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), in which the principle guides enforcement. A perceived historical difference between the U.S. and EU regulatory approaches is that the U.S. has often prioritized regulatory goals by risk rather than by inherent hazards.

Critics have seen the EU's interpretation of the Precautionary Principle as irrationally conservative and stifling marketplace innovation by eliminating useful chemicals from commerce, some of which improve human health and the environment, but which are presumed guilty until proven innocent. These voices are countered by those who see the U.S.'s approach to prioritization by risk as resembling a giant laboratory test tube, dosing 300 million citizens with 100,000 chemicals and waiting on evidence of harm before taking action.

However, thanks to increasing information exchange among regu-

ulators, there are signs of global convergence toward approaches that give due regard to both hazard and risk. For example, REACH's phased approach to compliance uses import volume thresholds as a proxy for exposure. This prioritizes higher-volume (hence higher-risk) chemicals for accelerated timelines and for increased regulation. Critics of previously hazard-centric EU approaches perceive this as a step forward.

In a corresponding movement toward convergence on a global regulatory approach, the state of California's draft Safer Consumer Products (SCP) regulation borrows extensively from REACH concepts. California's SCP requirement, as currently composed, requires alternatives assessments, an approach that can often rely on inherent chemical hazards for alternatives selection criteria. The trend toward U.S. "green chemistry" legislation borrows from EU approaches, such as the REACH authorization requirement, which regulates harmful chemicals by confronting hazards at the design stage, rather than by placing products on the market and managing the risks after Pandora's box has already sprung open.

If a global consensus on regulatory goals can indeed emerge, there will be more predictability for executives who are managing compliance in a marketplace that abhors uncertainty and punishes uncertain decision-makers.

Transparency in Harmonized Enforcement

The EU recognized that its 1960s-era regulatory enforcement patchwork was antiquated in a globalized 21st-century economy. Global commerce now involves far-flung supply chains sprawling across multiple regulatory jurisdictions, and disparate enforcement approaches were constructing a regulatory Tower of Babel for companies seeking a coherent global compliance policy.

The U.S. has developed a notorious patchwork of regulations — any presentation on U.S. chemicals requirements includes the obligatory color-coded map to attempt an explanation of the regulatory landscape. As the EU struggles to herd sovereign member states into a



harmonized enforcement corral, the U.S. would benefit by observing the EU's measures to facilitate information exchange among member state competent authorities — measures that include joint training sessions, coordination of sanctions and information exchange.

With 31 countries involved (including the three EEA states), initial REACH enforcement has been predictably uneven, with some notable disagreements potentially requiring adjudication at the European Court of Justice. But the consistency is remarkable given the vast differences in languages, cultures, economies and histories.

The challenges faced by this union of sovereign member states mirror the balancing act that the U.S. faces in its own precarious equipoise between federalism and a centrally coordinated approach to interstate regulation of commerce. But surely the U.S. faces lower barriers for regulatory cooperation among its states compared with the EU; and harmonized U.S. enforcement has fairly strong industry support because of the burdens of the current patchwork.

Transparency in Industry Collaboration

REACH requires companies to join Substance Information Exchange Fora (SIEFs) to complete substance

registrations. This mandate has placed competitors in an arena in which they discuss sensitive information and build a comprehensive dataset for proper evaluation of chemical hazards and exposure scenarios. There are concerns about running afoul of EU antitrust provisions or compromising trade secrets, so third-party trustees facilitate SIEFs to protect production information, supply chains and proprietary formulations.

REACH was intended to prod industry stakeholders into these resource-sharing arrangements and task them with the data-generation process. Despite the tensions inherent in forced collaboration among competitors, these groups leverage opportunities for resource-sharing and avoid duplication of effort. U.S.

regulators are studying SIEF arrangements to conduct cost-benefit analyses and glean the lessons learned from these collaborative endeavors. SIEF-type arrangements hold the promise of providing a common transparent dataset for industrial stakeholders and can create a more level playing field for attaining compliance for small enterprises.

Importance of Transparency for All Stakeholders

The EU's six-year-old grand experiment in comprehensive chemicals regulation has highlighted the importance of transparency for all stakeholders: consumers, voters, regulators, executives, employees and investors. All these parties have decisions to make and if we are truly

seeking a workable consensus on regulatory approaches, providing all stakeholders with clear regulatory goals, enforcement expectations and access to information is paramount.

All global jurisdictions require some level of transparency in product feature representations, to allow consumers an informed choice in purchasing decisions. Similarly, publicly traded companies are required to furnish financial information in a transparent manner to provide all investors with an opportunity to evaluate company performance and prospects for future earnings growth.

Increasingly it is also becoming a fundamental obligation for companies to disclose the environmental hazards and risks their products present. Why not likewise consider it a corresponding right for companies to be themselves provided with streamlined, consistent, predictable, transparent regulations that allow them to do long-term planning? They can then compete and innovate freely on a globally level playing field where the only price of admission is transparency.

Arnold J. Guikema, Tetra Tech

Contact:

Arnold J. Guikema
Tetra Tech Inc.
Ann Arbor, Michigan, U.S.
Tel.: +1 734 213 4095
Fax: +1 734 213 3003
aj.guikema@tetratech.com
www.tetratech.com



Ineos Unveils Plans for Grangemouth Ethane Terminal

Under Construction UK, Scotland Promise Investment Aid

After winning promises of investment aid from the UK and Scottish governments, Ineos has ripped detailed plans for its proposed £300 million ethane terminal at Grangemouth off the drawing board and presented a blueprint to British authorities.

UK — Unsurprisingly, the plans bear a distinct similarity to the facility the company is building at Rafnes, Norway, due to be fully operational in early 2015. The new Scottish terminal, for which start-up has been pencilled in for 2016, will

have a new 40-meter high storage tank capable of holding 33,000 t of liquefied ethane produced from U.S. shale gas.

Docking facilities will be built on the banks of the nearby river Forth for two ships specially commissioned by the company to transport the gas from the U.S. to Scotland, and the site's ethylene cracker is to be revamped and expanded. When the upgrades are finished, Grangemouth could have capability to process around 400 t of U.S. ethane — that is, if opponents of gas exports in Congress do not thwart the ambitious plan.

Ineos has warned that the new projects will go hand in hand with

the closure of other facilities at Grangemouth, noting that three older plants "have reached the end of their useful life." A benzene unit is due to close at an unspecified time in 2014, the G4 naphtha cracker and butadiene plant in 2015.

The trade union Unite, which only agreed to accept management's survival plan for the loss-making site after Chairman Jim Ratcliffe threatened to liquidate all assets, urged the Swiss-based company to "come clean over job losses, the timescales involved and provide assurances to the workforce this Christmas." (dw)

Consumer Health Division of Merck KGaA in Turnaround

Germany — The Consumer Health division of Merck KGaA has made "substantial progress" in raising profitability levels to those of other global over-the-counter drug competitors, the company said. The improvement in profit margins pre-one-time items as a percentage of sales was 18.4% in Q3 2013, well up on the 14.2% margin of September 2011.

Driver of the turnaround was said to be the strong focus on strategic brands and better allocation

of resources in key markets. For the first nine months of 2013, on the back of organic sales growth of 14.6%, EBITDA pre one-time items rose 22% year-on-year to €58 million, and the Darmstadt, Germany chemicals and pharmaceuticals group said it is lifting its earnings forecast for the full year to €73-77 million.

Given this "impressive performance," Merck can now look at how to further support organic growth,

particularly in emerging markets, where its "strong brands" have significant potential, said Stefan Oschmann, member of the managing board with responsibility for Consumer Health and ethical pharmaceuticals arm Merck Serono.

Oschmann said the company's strategy is to develop at least three strong brands generating a 3% total share per key market in 20 strategic investment markets. (dw)

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Phasing Out Mercury

How WeylChem PPC Made the Switch to Membrane Technology

Phase Out – Mercury contamination continues to be an environmental and public health concern. The World Health Organization considers mercury as one of the top 10 chemicals posing a threat to public health. This is certainly one of the main reasons why in Europe, chlor-alkali producers using mercury technology are committed to phase-out by the year 2020.

European producers have about 7,600 tons of liquid mercury used by 34 electrolysis plants in 15 countries. These units account today for 31 % of European chlorine capacity. The objective set for the end of 2010 was to have less than 35% of mercury based production in total. As a result, the gradual shift away from the mercury cell technology continued, accounting for 30.6% of the total installed capacity in 2011. The Industry achieved the target set, even more than was previously anticipated. The more energy-efficient membrane technology accounted for 51% of 2011 European chlorine capacity



Lejla Skaljic
Marketing Communications Manager,
WeylChem

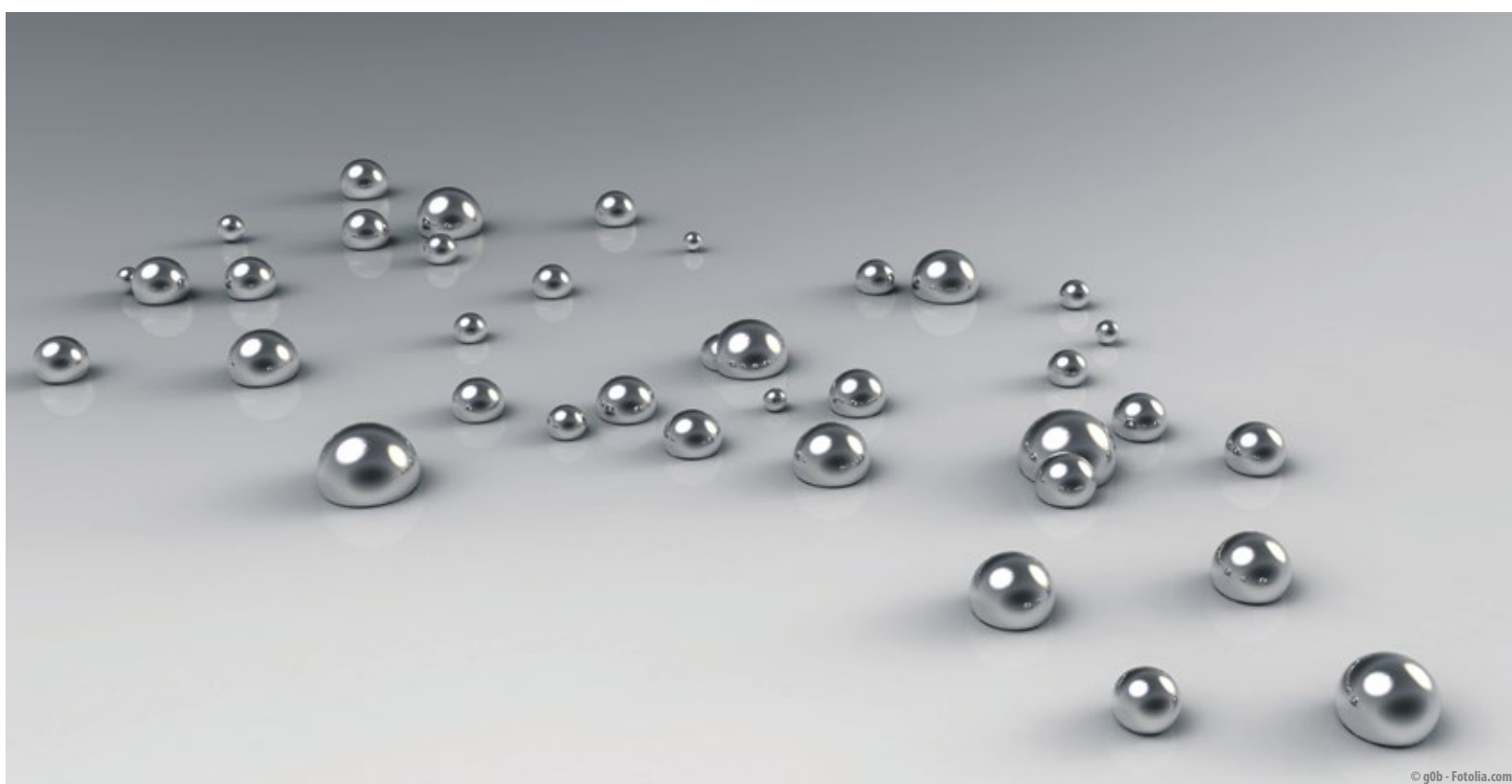
the ground in raindrops, in dust, or simply due to gravity. After the mercury falls, it can end up in streams, lakes, or estuaries, where it can be transformed to methylmercury through microbial activity. Methylmercury accumulates in fish at levels that may harm the fish and the other animals that eat them. For the environment, this means a threat to the entire food chain, thus to the health of humans and wildlife. A significant example of how harmful and hazardous the discharge of mercury occurred in the Japanese village of Minamata. A nearby factory discharged waste contaminated with mercury over several decades. It is estimated that more than 50,000 people were affected in one way or another, resulting in severe cases of brain damage and paralysis, among other possible side effects.

Why Ban Mercury?

Mercury in the air may settle into water bodies and affect water quality. This airborne mercury can fall to

Membrane vs. Mercury

The advantages of membrane technology vs. mercury are that energy consumption is 30% lower, and mercury emission is zero, thus no envi-



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ronmental pollution. Besides lower operating costs and ease of handling and operation, one other significant advantage is that the product purity is higher. What does this mean for the industry? Offering a range of mercury-free raw materials to the market will bring more environmentally friendly products to the end users.

Secured Future

WeylChem PPC, one of the major producers of chlorine, bromine derivatives and potassium derivatives, is one of the first to announce the full production switch to membrane technology. Potasse et Produits Chimiques (PPC), located in Thann, France, has started with the conversion of its production unit of chlorine and potassium derivatives via a mercury-based electrolysis to membrane technology. In parallel, PPC is to carry out an upgrade and extension of the current bromine recovery capabilities on site which should lead to significant cost savings for bromine. The total investment for both projects will be € 53

million. Bank financing has been secured from Commerzbank, while the equity portion of the financing will be provided by International Chemical Investor's Group (ICIG). Chemieanlagenbau Chemnitz (CAC) has been selected to build the new membrane electrolysis plant and the bromine recovery plant, having extensive experience in the segment of erection, re-vamping and expanding electrolysis plants. The works should be completed by September 2015.

"This investment is proof of ICIG's long term commitment to a sustainable presence in the market of potassium and chlorine chemicals and underlines the importance of WeylChem PPC as a key player in this field," says Tomas Hainich, president of the WeylChem Group.

The site in Thann, founded in 1808, is the oldest chemical site in France. For the stakeholders in the region, it means a safer future in terms of environmental protection. It also means that PPC is one of the chlor-alkali production sites that will remain in Europe after the year 2020, securing jobs on site but also

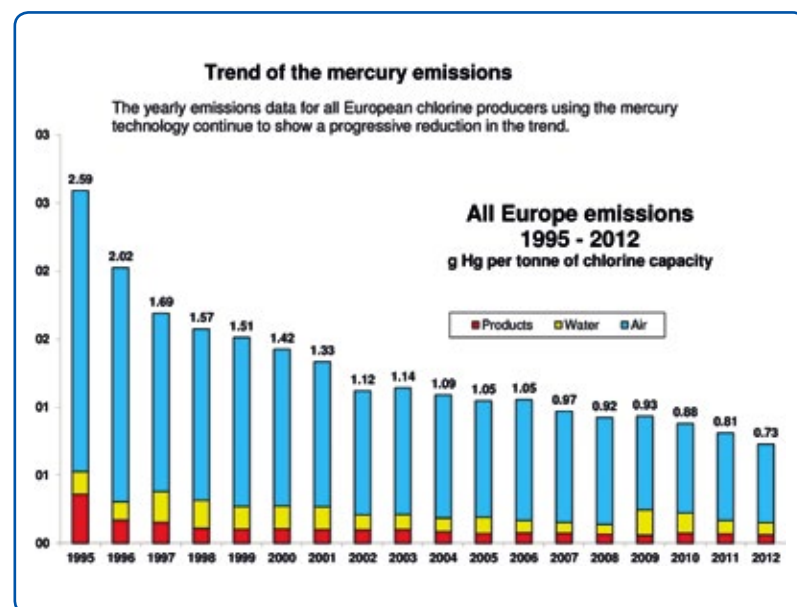
the supply of chlorine to neighboring companies. Although supply exceeds demand, the industry is dependent on the major players, such as PPC.

"This project is a major milestone in PPC's life. We are giving PPC all the means to secure its future and to operate with the best available technology," says Philippe Robin, PPC's CEO. "In addition, our project has received a strong support from local authorities will sustain the whole product portfolio."

Lejla Skaljic, Marketing Communications Manager, WeylChem

Contact:

Lejla Skaljic
WeylChem International GmbH
Frankfurt, Germany
Tel.: +49 69 3800 2448
Fax: +49 69 3800 2445
www.weylchem.com
lejla.skaljic@weylchem.com



BASF Files Legal Challenge in EU's Fipronil Restrictions

LEGAL German Chemical Maker to Challenge Moratorium

BASF has taken the European Commission (EC) to court over plans to include the German group's insecticide fipronil in a two-year moratorium on products suspected of playing a role in the bee disease Colony Collapse Disorder (CCD).

Germany — The moratorium that took effect on Dec. 1 targets mainly the neonicotinoid class of insecticides produced by Germany's

Bayer and Switzerland's Syngenta, including the active ingredients clothianidin, imidacloprid and thiamethoxam. It applies to all crops except winter cereals and plants not attractive to bees, such as sugar beet. Fipronil, used in treatment of maize and sunflower seeds, was included later following a recommendation by the European Food Safety Agency, EFSA.

After a two-year trial, the EC has said it will "consider the newest scientific information" and review the restrictions.

Announcing the challenge filed in the General Court of the European Union, BASF said it remains convinced that the decline of the bee population is caused by multiple and complex factors and that the ban of fipronil uses will not contribute to protecting bees. It labeled the EC move a "disproportionate application of the precautionary principle.

Prior to the decision, we reached out to the Commission, but unfortunately our valid scientific studies and evidence were not properly taken into account," said Jürgen Oldeweme, senior vice president global product safety and regulatory affairs in the group's Crop Protection division. "This is why we have taken this step. Fipronil is an important technology in modern agriculture that growers count on."

BASF said the Commission had not considered all the scientific evidence available and also had breached EU pesticide legislation.

The world's largest chemical group said it supports research projects investigating the causes related to the decline of bee health and also is developing new products to control bee pests, pathogens and diseases. In this respect, it plans to market a product that controls the Varroa destructor mite. Bayer recently announced it would focus research on the mite as a primary culprit in CCD. (dw)



Whitepaper

Medicine for the Pharmaceutical Industry: Cutting Costs in Infrastructure Processes

Cost-cutting pressures affect many sectors. However, in few industries do they impact innovativeness and long-term competitiveness as immediately as in pharmaceutical manufacturing.

To stay competitive, pharmaceutical companies have to explore every cost-cutting opportunity. They have already made some progress by outsourcing research & development, contract manufacturing and administrative non-core business processes to established partners. Infrastructure processes offer additional opportunities for optimization, but they rarely receive the attention they deserve. This will have to change soon. Several pharmaceutical companies have already begun to follow in the footsteps of the chemical and manufacturing sectors and are steering their corporate ships into more cost-efficient waters.

As they embark on this new venture, pharmaceutical companies should minimize their interfaces with service providers. After all, the potential for cost-cutting correlates closely with the extent of transferred responsibility.

However, partnerships in infrastructure processes can be just as successful, as illustrated by Industriepark Höchst. At this deeply integrated industrial estate, Infraserv Höchst, the site operator, has been providing services such as pharmaceutical-grade utilities, pharmaceutical production logistics and clean room services for Sanofi, Sandoz and other partners for a long time.

This is an established model that transfers readily to other pharmaceutical sites and companies. Infraserv Höchst is already sharing their experience and portfolio with UCB in Monheim and Novartis Vaccines in Marburg. A new whitepaper published on CHEManager.com explains how pharmaceutical companies can cut costs by up to 20% if they devote their attention to their core processes and rigorously outsource non-core processes.

We hope you find this whitepaper to be informative.





PEOPLE



Stephan Sielaff

Stephan Sielaff has been named chief operating officer of Archroma, a global leader in color and specialty chemicals, and the former textile, paper and emulsions businesses of Clariant, based in Reinach, Switzerland. Sielaff will oversee the business' global production, manufacturing and integrated supply chain activities. Sielaff has significant materials and process industry expertise. He has spent the past 8 years with Symrise, most recently as the senior vice president Global Operations of the Flavor & Nutrition business. Previously, he held various roles in supply chain, innovation and engineering, as well as marketing at Unilever. He holds a MS, chemical engineering from the Technical University of Dortmund, Germany.

Dr. Rolf Drewes has joined Songwon as vice president of the business sector Specialty Chemicals, effective Oct. 1. Drewes brings 25 years of industry experience and an international track record of leading technically challenging business units and building up new markets. Prior to joining Songwon, he held senior positions at Heraeus Precious Metal and Ciba Specialty Chemicals. At Songwon, Drewes, who holds a PhD in chemistry from Ruhr University Bochum (Germany), will play a pivotal role in developing and implementing a strategy to expand the global Specialty Chemicals business with an emphasis on high value industries.



Greg Hughes

Dr. Greg Hughes has joined Codexis, a developer of engineered enzymes for pharmaceutical, biofuel and chemical production as vice president, Strategic Alliance & Product Development, effective Oct. 28. Prior to joining Codexis, Hughes worked at Merck & Co. beginning in 2002 in a variety of roles, most recently as executive director, Enabling Technologies in the Process Chemistry department with a primary focus in developing and implementing biocatalysis technology. Hughes holds a Ph.D. in organic chemistry from the University of Toronto and a B.S. in chemistry from the University of New Brunswick. He completed his postdoctoral work at the Massachusetts Institute of Technology.

Dr. Catherine Dick has been appointed to the new role of Aesica's site manufacturing manager at Cramlington, UK. Dick brings strong experience and knowledge of operations at Cramlington to the task in hand, having joined the global contract development and manufacturing organization (CDMO) back in 2007 as the site's Quality Manager. In 2010, she was promoted to head of quality for UK API, responsible for the quality and regulatory compliance of all products manufactured across both the Cramlington and the Queenborough sites. Dick holds a PhD in biochemistry from Newcastle University and a degree in biochemistry and genetics from Durham.



Nadege Laborde

Nadege Laborde has been appointed as president of Novasep's Industrial Biotech business unit. This internal promotion strengthens the business unit and is a key addition to the executive committee. Laborde joined Novasep in 2000 after qualifying as an engineer from Ecole Centrale, Paris. She started at Novasep as a project manager and expanded her responsibilities as an engineering manager in the US and Asia. Since 2009 she has headed the system engineering and construction department and driven her multicultural team in France and China towards achieving both operational excellence and customer satisfaction.

Tang Yong "TY" Ang has been appointed vice president of Dow Corning's Compound Semiconductor Solutions, effective Oct. 1. In this newly created role, Ang will lead the company's expanding business and report to the general manager of the Specialty Chemicals business. He joined Dow Corning from Lam Research where he held a number of key positions, including region vice president, Southeast Asia; vice president, Asia Pacific Region Operations. Prior to this, he worked 13 years at Chartered Semiconductor Manufacturing. Earlier, TY held positions of increasing responsibility at Texas Instruments and AT&T Consumer Products. He began his career in 1980 at Hitachi Electronics and holds a master's in business administration from the State University of New York/Singapore Institute of Management.



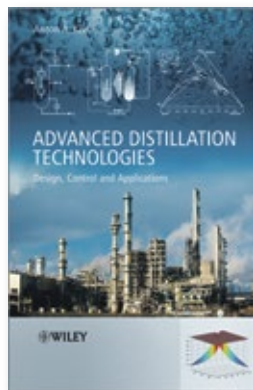
Dirk Frame

Dirk Frame has been appointed managing partner for Europe at T.A. Cook Consultants. A professional engineer by trade with an MBA from Cranfield School of Management, Frame was previously managing partner for T.A. Cook North America. With over 25 years' experience in providing expert strategic and operations advice to asset heavy businesses across the globe, he returns now to further develop and grow the asset performance management consultancy's core business in Europe. Commenting on his new role, Frame said, "Working for clients in the U.S. and Canada has allowed us to significantly widen our experience base and helps us formulate better solutions for all clients. I expect to use our knowledge to help accelerate growth of our European market over the coming years."

Richard Segiel, Jr. has joined Almac as vice president of U.S. business development. He brings with him 23 years of experience in the contract pharmaceutical development sector. Prior to joining Almac, Segiel held a number of Business Development and Operational positions. Most recently, he served as business development director of Intertek Pharmaceutical Services. Prior to that he worked with MDS Tricon, Celsis Analytical Services, and Pharmakon Research International. Segiel holds a bachelor's degree in chemistry and business from the University of Scranton and an MBA in Marketing and Finance.

Advanced Distillation Technologies

Distillation has historically been the main method for separating mixtures in the chemical process industry. However, despite the flexibility and widespread use of distillation processes, they still remain extremely energy inefficient. Increased optimization and novel distillation concepts can deliver substantial benefits, not just in terms of significantly lower energy use, but also in reducing capital investment and improving eco-efficiency. While likely to remain the separation technology of choice for the next few decades, there is no doubt that distillation technologies need to make radical changes in order to meet the demands of the energy-conscious society.



Advanced Distillation Technologies gives a deep and broad insight into integrated separations using non-conventional arrangements, including both current and upcoming process intensification technologies.

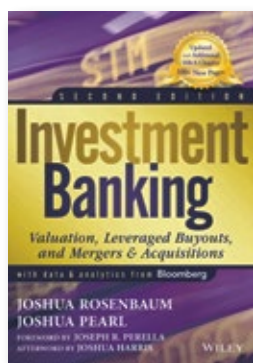
Containing abundant examples and industrial case studies, this is a unique resource that tackles the most advanced distillation technologies – all the way from the conceptual design to practical implementation.

▶ Advanced Distillation Technologies

Anton A. Kiss
John Wiley & Sons
Price: €122.90
ISBN 13: 978-1119993612

Investment Banking

In the constantly evolving world of finance, a solid technical foundation is an essential tool for success. Until the welcomed arrival of authors Josh Rosenbaum and Josh Pearl, no one had taken the time to properly codify the lifeblood of the corporate financier's work—namely, valuation, through all of the essential lenses of an investment banker. With the release of Investment Banking, Second Edition: Valuation, Leveraged Buyouts, and Mergers & Acquisitions, Rosenbaum and Pearl once again have written the definitive book that they wish had existed when they were trying to break into



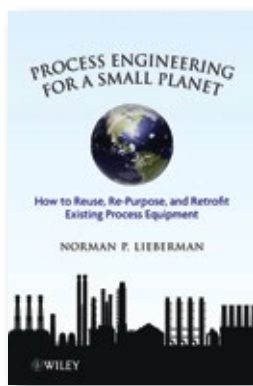
Wall Street. The Second Edition includes both the technical valuation fundamentals as well as practical judgment skills and perspective to help guide the science. This book focuses on the primary valuation methodologies currently used on Wall Street: comparable companies analysis, precedent transactions analysis, discounted cash flow analysis, and leveraged buyout analysis.

▶ Investment Banking

Joshua Rosenbaum, Joshua Pearl
John Wiley & Sons
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Process Engineering for a Small Planet

We live on a small planet with limited air, water, and mineral resources and learn how to get by with what we have. Process engineers and operators do not need to look to exotic technology to make a contribution to combating the environmental issues. This easy-to-follow handbook shows how to operate and retrofit process facilities to re-use existing process equipment to



save energy and reduce greenhouse gas emissions, as well as invoking other sound environmental measures. Process Engineering for a Small Planet offers viable global solutions to green technology.

▶ Process Engineering

for a Small Planet
Norman P. Lieberman
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ISBN 978-0-470-58794-2



EVENTS

Informex, January 21 – 24, 2014, Miami

Informex will celebrate its 30th edition at the Miami Beach Convention Center with 400+ exhibitors and 3,500+ attendees. The convention offers an unparalleled opportunity to make business connections with leaders across the fine & performance chemical markets including agrochemicals, pharmaceuticals, biotechnology, construction, electronics, paints & coatings or plastics. The event brings together an international mix of motivated buyers, manufacturers, distributors and sellers of high value chemistry for 4 days of sourcing, education & networking.

▶ www.informex.com

4th Russia & CIS Executive Summit, February 20 – 21, 2014, Dubai

Russia and the CIS (Commonwealth of Independent States) remains one of the regions with high potential in the oil and gas industry and at the same time one of the most challenging ones. Major companies are investing in new plants or modernizing existing facilities in order to improve operations, meet stringent quality standards requirements and increase efficiency, profitability and competitiveness. The conference will gather representatives of operating Oil & Gas Companies, Consultants, Financial & Legal Advisors, Ministry Officials, Licensors, and Contractors & Service Providers to discuss future strategies.

▶ www.europetro.com/en/summit_2014

4th Ubiquitin Research & Drug Discovery Conference, February 20 – 21, 2014, San Diego

The conference is an intimate forum focused on the Ubiquitin Proteasome System and its potential for drug discovery. Session topics to be discussed include developing novel therapeutics targeting deubiquitinating enzymes, ubiquitin-like modifiers, ubiquitin pathways in neurobiology, and the proteasome structure and function. Speakers include experts from Genentech, Takeda, Celgene, CNRS - INSERM, Mayo Clinic, Harvard Medical School, Charité Berlin, Karolinska Institute or Scripps Research Institute. Presentation slots are still available, abstracts can be submitted by January 20, 2014.

▶ www.gtcbio.com/conference

PaintExpo, April 8 – 11, 2014, Karlsruhe

The international trade fair for industrial coating technology will present products and solutions for wet painting, powder coating and coil coating, from pre-treating through paints, systems engineering and application technology right up to final inspection and packaging. In 2012, 410 exhibitors from 24 countries welcomed over 8,000 visitors. These numbers are expected to grow further in 2014.

▶ www.paintexpo.de

Logichem Europe, May 20 – 22, 2014, Antwerp

LogiChem is Europe's only strategic-level chemical supply chain and logistics event. The 2014 edition will again deliver top-line strategies from leading chemical manufacturers. Key topics include the reduction in process, product and organizational complexity, growth from organizational strength and efficiency, people management - retention, exploring growth potential for supply chain careers, optimizing supply chain processes, collaboration along supply / value chains by applying state-of-the-art technologies, and how to make supply chain a competitive advantage for a company.

▶ www.logichemeurope.com

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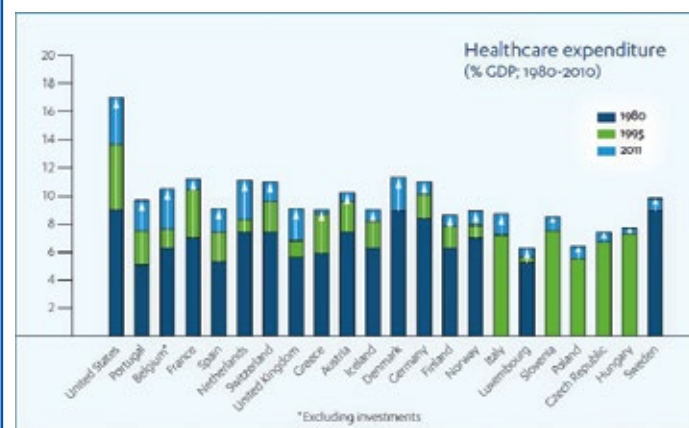
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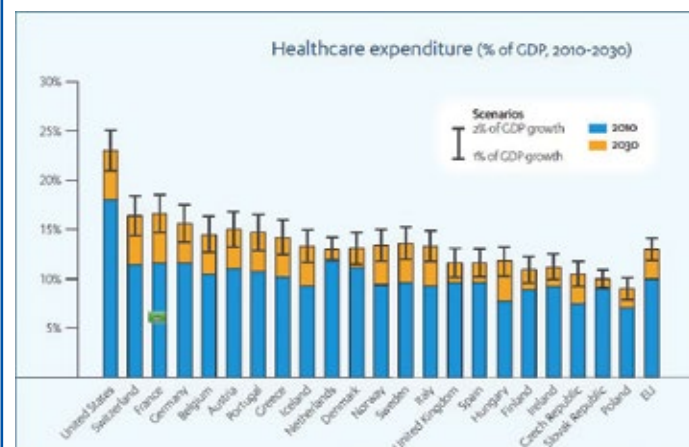
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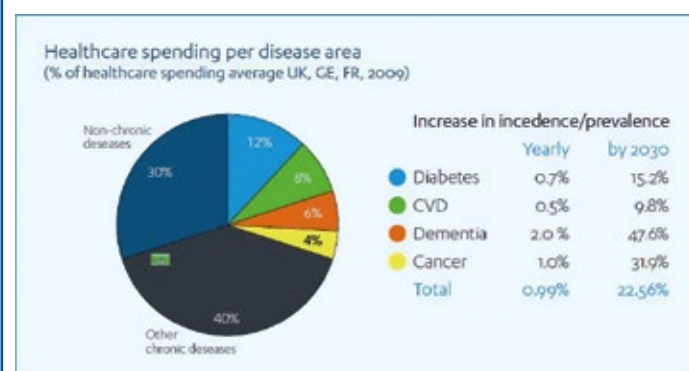
European Health R&D Investments Stagnate for First Time in History



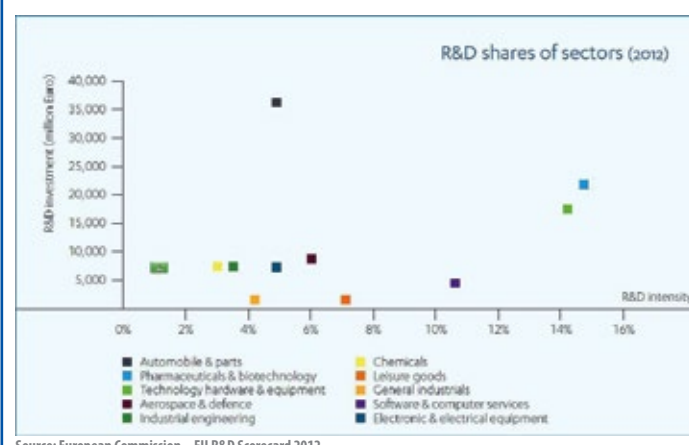
Source: OECD 2012



Source: OECD



Source: Calculations based on sources mentioned in the report



Source: European Commission – EU R&D Scorecard 2012

A new report shows that European research and development (R&D) investments in health have stagnated since 2010, and this is the first time after decades of annual increases. The report was commissioned by Janssen Pharmaceutica and the research was conducted by Deloitte Health Economics Group.

Healthcare Spending

Healthcare spending in Europe has increased substantially over the past three decades. A large part of this increase can be attributed to the ability to pay. The total healthcare expenditure in the region amounts to €1.4 trillion, but the shares of the individual countries are diverse. About 90% of the observed cross-national variation in health spending across the OECD countries in 2011 can be explained simply by differences in GDP per capita. However, healthcare expenditure in European countries has risen faster than economic growth, gradually committing a far higher share of the countries' annual GDP to healthcare (Fig. 1).

Future Healthcare Expenditure

With an increasing demand for healthcare services due to population dynamics; supply of healthcare is growing as a result of technological advancements and technology conversions; and the potential for productivity gains is limited due to the nature of the healthcare sector. Unless societies will deny care to, for example, diabetes, dementia and cancer patients, all these factors point to rising healthcare budgets in the years to come (Fig. 2). With a wide range of new state-of-the-art technologies to anticipate, it appears that an increasing share of most countries' economies will continue to be spent on healthcare services.

Clinical and Economic Burden

Most of the burden of illness and mortality arises from non-communicable, often chronic, diseases (NCDs). Four examples were selected based on WHO prevalence data for Europe and disease-specific healthcare spending in a number of countries. The increasing clinical burden of these diseases, for which the incidence or prevalence is growing on average by 1% per year, will be reflected directly in healthcare expenditure. In order to avoid a deterioration of care to these patients, healthcare budgets have to increase by 1% per year just to cover the growth in patient numbers (Fig. 3) and hence by 23% by 2030.

Healthcare R&D Investments

The European Commission estimates that of all industries, pharmaceuticals is the most R&D intensive (R&D investments as percentage of turnover) and the second largest R&D sector in Europe (Fig. 4). It is therefore one of the key contributors to a knowledge based economy operating in a global growing market. The total amount of health R&D in the European Union was €47 billion in 2011, of which 60% was invested by the pharmaceutical industry and 40% by the member states and the European Commission. This amount represents 3% of total healthcare expenditure in the region. The private investments have stagnated for the first time, staying at €29 billion and public investment decreased with 1% to €18 billion. Within Europe, the major investors in health R&D are Germany with a total of €9.4 billion, followed by France (€8.3 billion), the UK (€7.4 billion), Switzerland (€5.3 billion) and Italy (€2.4 billion).

The full report is available for free on www.Janssen-HealthPolicyCentre.com

Clinical Advance of the Year

At the 9th annual Scrip Awards, the Phase 2a study of Dupilumab in asthma was named "Clinical Advance of the Year" by Scrip Intelligence. Dupilumab, a fully-human monoclonal antibody that is in clinical development for treatment of asthma, atopic dermatitis, and nasal polyps is being developed by Regeneron Pharmaceuticals and Sanofi.

George D. Yancopoulos, M.D., Ph.D., President, Regeneron Laboratories and Chief Scientific Officer, said, "We appreciate the recognition that Dupilumab is one of the most exciting emerging clinical candidates in the industry. We also feel that this award is additional validation of the overall depth and productivity of our R&D team."

Elias Zerhouni, MD, President Global R&D, Sanofi added: "On behalf of all of the men and women within our organizations working diligently to develop this investigation treatment, we are truly honored by this award. The ultimate recognition for their innovative research, at the end of the day, is when we are able to deliver improved solutions to patients."

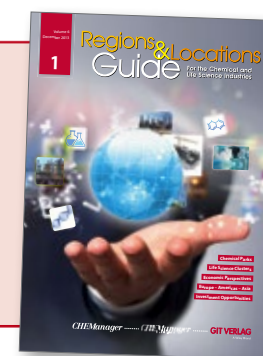


Brazilian Way of Life – The official match ball of the 2014 FIFA World Cup in Brazil was unveiled on December 3rd in Rio de Janeiro. The name "Brazuca" is an informal local term that describes national pride in the Brazilian lifestyle. The ball features a completely new design with only six panels and a new surface. The most noticeable fact about the 2014 World Cup Ball made of high-performance chemicals and polymer materials is the flight speed, which seems to be much higher than with the current ball generation. Also, unlike the last Adidas World Cup balls, the Brazuca seems to flutter less, even if the shot is very fast.

This issue of CHEManager Europe contains the special supplement

Regions & Locations Guide

For the Chemical and Life Science Industries



Coming Up in the January/February issue of CHEManager International

- Interview with Celanese CEO Mark Rohr on the company's strategy and vision
- Green Chemistry Metrics in the Fine Chemical and Related Industries by Will Watson, Scientific Update
- A Booming Business: The World Pharmaceutical Contract Research and Manufacturing Services Industry by Giuseppe Tamburini, CPA (Chemical Pharmaceutical Association)
- API Manufacturing in the U.S. by Joshua Gilpatrick, Thomson Reuters
- Commoditization or the Aging of the Chemical Industry, Kai Pflug, Management Consulting – Chemicals
- Standardization Supports Faster Plant Planning Effective Planning Of Chemical Plants Through Optimized Engineering by Ingo Kaiser, Siemens
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Publisher:
Wiley-VCH Verlag
GmbH & Co. KGaA
GfT VERLAG
A Company of
John Wiley & Sons, Inc.

Geschäftsführer
Dr. Jon Walmsley,
Bijan Ghawami

Director
Roy Opie

Product Management
Dr. Michael Reubold (mr)
Tel.: +49 6201 606 745
michael.reubold@wiley.com

Editor-in-Chief
Brandt Schuster (bhs)
Tel.: +49 6201 606 755
brandt.schuster@wiley.com

Editor
Dr. Roy Fox (rf)
Tel.: +49 6201 606 714
roy.fox@wiley.com

Media Consultants
Corinna Matz-Grund
Tel.: +49 6201 606 735
corinna.matz-grund@wiley.com

Thorsten Kritzer
Tel.: +49 6201 606 730
thorsten.kritzer@wiley.com

Jan Kaeppler
Tel.: +49 6201 606 522
jan.kaeppler@wiley.com

Roland Thomé
Tel.: +49 6201 606 757
roland.thome@wiley.com

Marion Schulz
Tel.: +49 6201 606 565
marion.schulz@wiley.com

Team Assistants
Lisa Rausch
Tel.: +49 6201 606 742
lisa.rausch@wiley.com

Beate Zimmermann
Tel.: +49 6201 606 764
beate.zimmermann@wiley.com

Freelancers
Dr. Sonja Andres
Dede Williams (dw)
Miranda Kennedy
Dr. Volker Oestreich
Sean Milmo (sm)

Production Managers
Christiane Pothast
Claudia Vogel (Advertising)
Ramona Kreimes (Litho)

Reprints
Dr. Katja Habermüller
Tel.: +49 6201 606 719
katja-carola.habermueller@wiley.com

Subscription/Reader Service:
Silvia Amend
Fax: +49 6201 606 100
silvia.amend@wiley.com

Bank Account
Commerzbank AG Darmstadt,
Germany
Account No. 01715501/00,
Routing No. 50880050
The current price list is valid
from 1st October 2012

CHEManager Europe
appears 10 times in 2013.
Print run: 20,000
(IVW Report
Q3 2013: 19295 tvA)
Ninth year 2013
Subscriptions
10 issues €85.70
incl. postage
single copy €13.80
plus postage

Students receive a discount of 50% upon presentation of a valid certificate. Subscription orders can be canceled within 1 week in writing. Dispatch complaints are possible only within 4 weeks after publishing date. Subscription cancellations are accepted 6 weeks before end of year.

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Printed by
Druckzentrum Rhein-Main
GmbH & Co. KG
Alexander-Fleming-Ring 2
65248 Rüsselsheim, Germany

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GfT VERLAG
A Wiley Brand

Printed in Germany
ISSN 1861-0404

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